The GEO Quarterly

Group for Earth Observation

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The Independent Amateur Quarterly Publication for Earth Observation and Weather Satellite Enthusiasts

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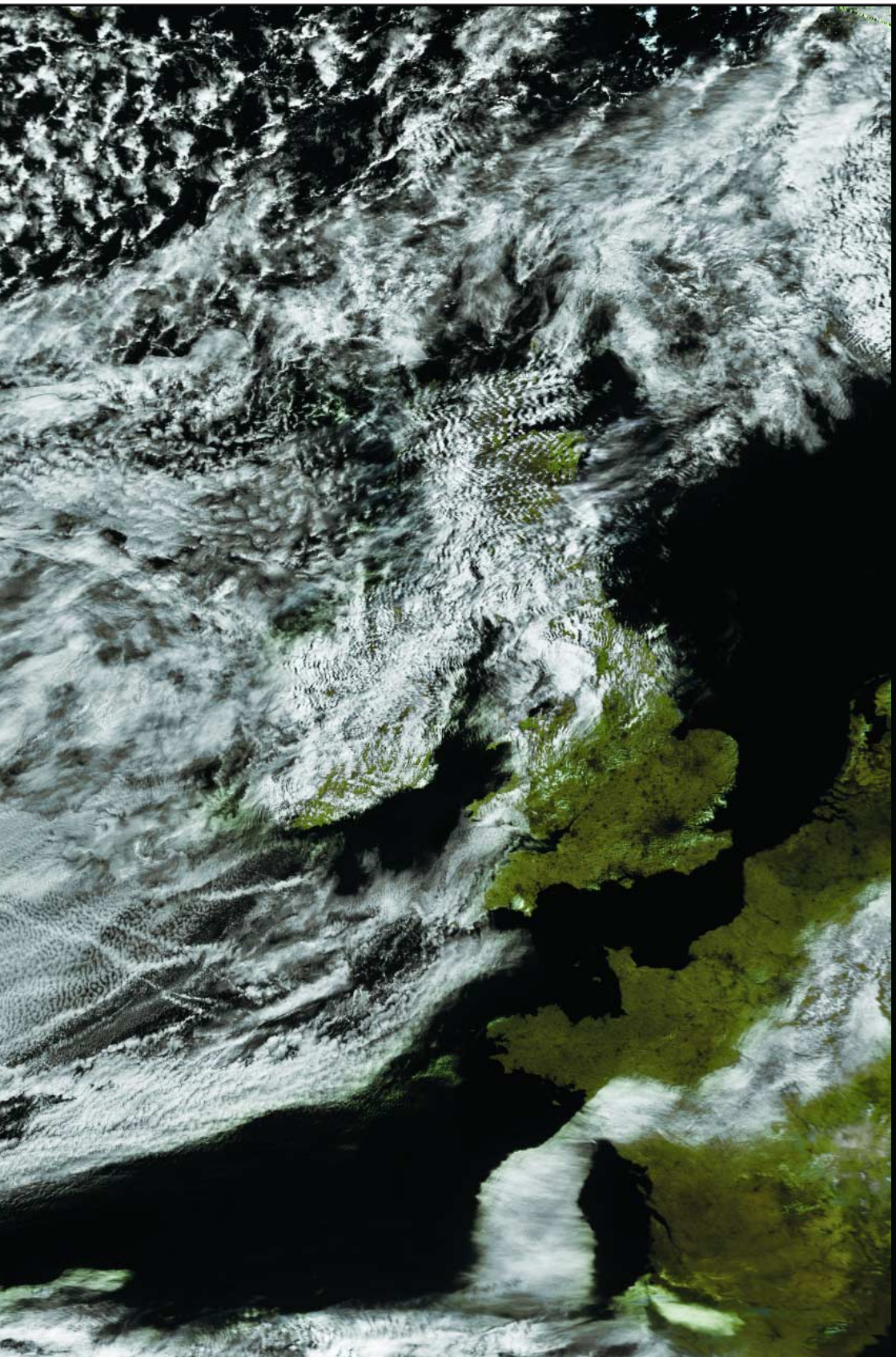


Inside this issue . . .

GEONETCast: Read about the development of this world-wide system for sharing geostationary weather satellite data

Rob Hollander theorises over how Reflections of Electromagnetic Waves can affect reception with even the best antennas

Peripatetic APT: Francis Bell describes the delights he has experienced when taking a minimal APT system to unusual locations around the globe

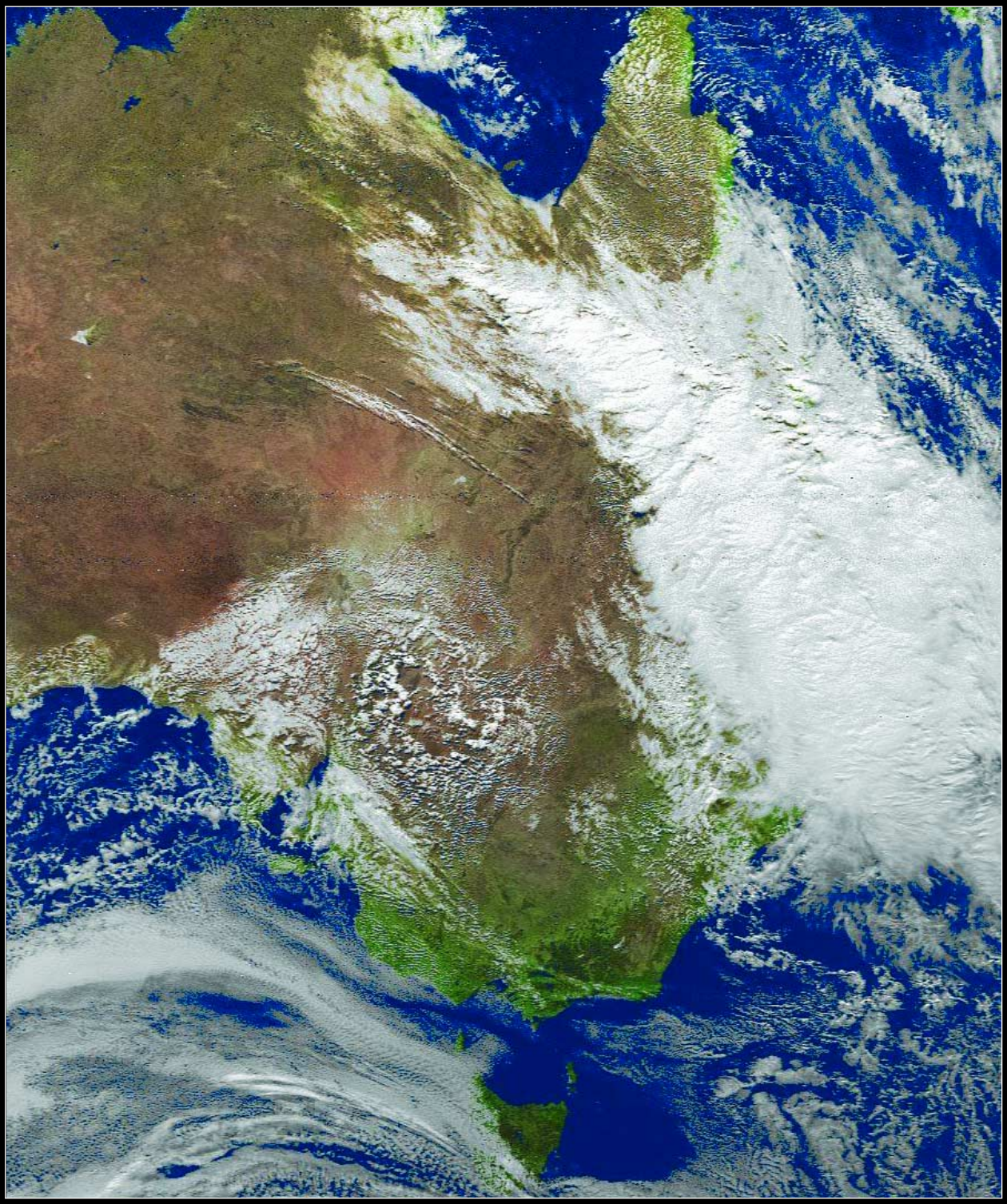
Meteosat-8 has started an experimental rapid scanning service—David Taylor explains

If you have struggled to set up your own PC network, Mark Edwards' article provides a certain guide to success

The Strait of Dover. In the second part of his article, John Tellick describes what can be seen from orbit on the French side of the Channel

Plus many more features ...

GEO Visits EUMETSAT
Special Issue



Keep up to date with the latest WXsat News every Month

Radio and Communications Monitoring Monthly (ISSN 1749-7809) aims to be the magazine of choice for all serious radio enthusiasts and to serve all the specialist areas of the hobby. 'I am pleased to say that all our regular columns provide more information than any current or former alternative', commented Editor Kevin Nice.

The magazine provides a regular 4-page Weather Satellite column, "Satellites' View", by Lawrence Harris. In addition, the May 2007 wxsat 'special' issue included a feature on the WS2300 Weather Monitoring System, a review of some of David Taylor's less well-known MSG software, '"Round the World in 100 minutes with MetOp", plus a review of the new R2ZX APT wxsat receiver from Holger Eckardt.

Radio and Communications Monitoring Monthly is available from most good newsagents as well as direct from the publishers.

Subscriptions are available world-wide. For more information contact Nice One Publishing Ltd, Tel: +44 (0)1202 862690 or visit the website:
www.monitoringmonthly.co.uk

The first thing you will have noticed about this issue of *GEO Quarterly* is it's size: we have included an additional eight pages this quarter, many of them in colour, to provide you with a flavour of GEO's visit to EUMETSAT HQ in Darmstadt last July. An event over twelve months in the planning, this visit drew enthusiasts from across the length and breadth of Europe together for what proved to be the ultimate in educational and social experiences. Our report, compiled by John Tellick and David Taylor, starts on page 19.

John Tellick has also been busy with a follow-up to his *Strait of Dover* article, this time providing a guide to what can be seen on the French side of the Strait. He also looks ahead to GEONETCast, a system that promises, before very long, to bring continuous world-wide DVB access to images and products from all the world's geostationary weather satellites.

Have you ever tried to network two or more home PCs but failed. Your Editor certainly has! But armed with Mark Edwards' step-by-step guide, it was simply a piece of cake. If you really would like to share information between your PCs, just turn to page 34 to discover how easily it can be accomplished..

Recently, the weather satellite community bade farewell to a stalwart of many years, NOAA-14. Our front cover bears testimony to well over a decade of service by reproducing the satellite's final image over western Europe, captured by Lawrence Harris on his direct reception HRPT system in Southampton. Although more modern NOAA satellites now grace the skies, NOAA-14 was one of the last of its generation of WXsats. You can read its story on page 9.

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Publisher
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The GEO Report

Francis Bell

Visit to EUMETSAT

I am writing this brief report having just returned from GEO's visit to EUMETSAT HQ in Damstadt. 42 GEO members attended,representing seven countries. This was a comfortable number making the administrative effort by both GEO and EUMETSAT worthwhile.

If the comments from our members were anything to go by, the whole visit was a great success. We toured three sites involved in the technical aspects of instrumentation, satellite control, data acquisition, processing, dissemination and archiving, and also enjoyed a number of demonstrations. Less technical, but perhaps more important, were the personal interactions between GEO members and the EUMETSAT staff. This included the Director General, who took the time to speak to us at the beginning of our visit and at the end of the day and all the User Services staff, our escorts to Usingen and everybody else we met on the tours. All were pleased to talk to us and explain the facilities we visited.

When you interleave the above with the social side of technical and personal conversations, meal-times in our hotel, filling local restaurants with GEO delegates in the evenings and EUMETSAT's canteen by day, it generated an outstanding experience for all those who attended. You will find numerous photographs of the occasion included in the six-page report prepared by John Tellick and David Taylor on page 19.

Image

I recently received my latest copy of *Image* from EUMETSAT. As usual I read this 8-page publication from cover to cover. I find it very interesting and the back page particularly informative because it lists all current weather satellites and those planned for launch in the near future. This publication is available on-line but if you want a printed copy then write to:

EUMETSAT User Services
Am Kavallerisand 31
D-64295 Darmstadt
Germany

or email ***ops@eumetsat.int***

and ask to be put on the mailing list.

My thanks to those who responded to my mystery photograph, taken from an aircraft while flying over Canada. The most likely explanation came from Mike Jupp suggesting that the feature was a linear clearing through the trees to accommodate power-lines from a major hydroelectric scheme at Churchill Falls carrying electricity to Quebec in the south. The dimensions of the 700 foot wide clearing accommodates huge V-type 170 foot high guyed towers carrying three 730,000 volt overhead lines. This scheme does seem to fit my observation and my thanks to Mike for his explanation.

As always my thanks to our talented membership for sharing their skills and knowledge with us both via *GEO Quarterly* and on-line. A reminder that the editor is always happy to receive copy about any aspect of Earth observation.

Future Events

GEO will attend the AMSAT colloquium in Guildford on July 20-22 and on September 7-8 will have a stand at the Leicester Amateur Radio Show. Please tell your friends that GEO will be at this rally—it is our first time at this event and we would like it to be worthwhile, with many visitors to our stand.

GEO hopes to be represented at the EUMETSAT conference in Amsterdam between September. 24-28.

Finally, in early November, GEO will have an enlarged stand at the London radio rally at Kempton. The exact date will be intimated when known.

I will not take up too much space with these notes because of the report relating to our AGM last May which gives an overview of our group's financial and membership position. Please read this report. However, I will as usual urge our existing members not to forget to renew their membership when it becomes due. We need the membership income to remain financially viable. Please encourage others to join, a few hundred additional members would generate financial security.

GEO Quarterly tries to cater for a wide spectrum of interests but if there is anything additional you would like included please let the editor or myself know and I'm sure we can respond in a positive way.

QUARTERLY QUESTION

From Last Time

The previous quarterly question was straightforward mathematics. It related to the theoretical fall from orbit of a weather satellite if it abruptly ceased its forward motion round the Earth from its altitude of 800 km.

Neglecting the Earth's atmospheric drag and assuming a constant gravitational acceleration of 10 ms^{-2}, the equation relating the variables is

$$s = \tfrac{1}{2} a t^2$$

where s = 800 000, a = 10 and t = time.

You should be able to do this in your head! Divide 800 000 by 5 and take the square root.

The answer is 400 seconds, making the answer, to the nearest minute, 7 minutes.

I received a number of correct answers but chose the winner as Andreas Lubnow, a student in Germany. He receives a copy of Storm Dunlop's book '*A dictionary of Weather*' kindly donated by the publisher, Oxford University Press.

This Quarter's Question

The background to this question relates to my recent visit to Ecuador. A guide was showing us around the capital city of Quito. During the tour we stopped at a viewpoint overlooking the city in the valley below, with the Andes mountains in the background. Among those mountain peaks was the beautiful conical snow-covered volcanic peak of Cotopaxi, the summit of which is 5896 m.

The guide said that the summit of Cotopaxi was the closest point on the earth's surface to the sun [1] Of course, Cotopaxi is high, and less than one degree off the equator so the statement was beguiling. I nodded politely but decided within about two seconds that this was only intermittently true. The Earth's highest mountains are outside the tropics, for example Mount Everest. However, does the curvature of the earth away from the sun cancel out the increased height of a mountain outside the tropics.

The question is this:

On an annual cycle, which single point on Earth comes closest to the sun? Email your answer to me. Do not submit your calculations in full just the answer for your chosen spot on the earth's surface. The prize: recognition of your geographical and mathematical skills.

I will not be visiting this point—wherever it is. My compromised breathing when crossing the western Andes by road at a height of 4130 m was affected enough to suggest that I was high enough for one day: perhaps for a lifetime.

Contacting the Editor

Please note the
new email address
for contacting the editor

geoeditor@geo-web.org.uk

Jet Stream shift

brings disastrous climate extremes across Europe

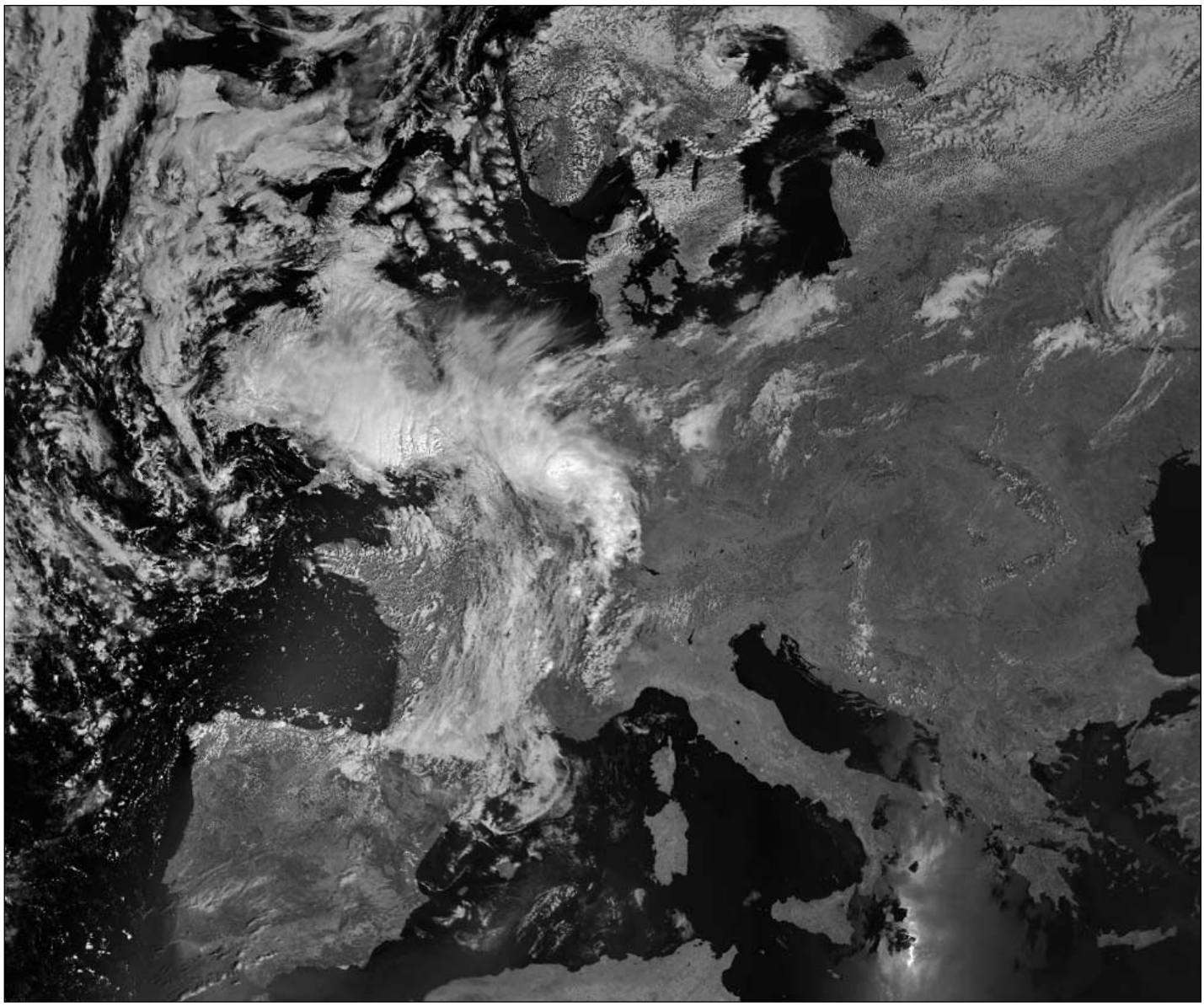
It's been a summer of extremes so far across Europe this year! In the UK, a record-breaking, warm sunny month of April was predicted to herald a long, hot summer: but it was not to be. June and July have both been the wettest ever. Many regions have suffered unprecedented flooding as the rain simply refused to stop falling as Britain experienced its worst 'climate change event' in living memory. On one single day, July 20, Brize Norton experienced 126 mm of rain, equivalent to 3 months summer precipitation.

During a 'normal' northern hemisphere summer, the jet stream lies over the north Atlantic and acts as a barrier which directs Atlantic depressions towards Iceland and northern Scandinavia. But this year a persistent kink in the Jet Stream has resulted in it flowing several hundred kilometres farther south than is usual, ushering a continuous flow of depressions across the British Isles.

At the same time, eastern Europe was experiencing near-drought conditions as a heatwave sparked countless wildfires throughout Hungary, Romania, Italy and the Balkans. Temperatures soared to record levels, frequently into the mid-forties Celsius, and in Hungary over 500 people, many of them elderly and infirm, died from the effects of the heat during July. Farther west, on the French Riviera, 300 residents were evacuated from the district when fire destroyed 25 hectares of forest close to the seaside village of Escalet, near St Tropez.

It was a similar story in the Puglia region of southern Italy where brush fires forced holidaymakers to flee from campsites and hotels to the safety of the seashore to await rescue by sea and air.

Over 20 000 hectares of forest and farmland were destroyed by fire in Bulgaria where temperatures were the highest since records began. Forests were also ravaged by fires throughout Bosnia, Serbia, Macedonia, Bulgaria, Italy, Greece and Turkey.



This is a composite image created by combining data from two successive passes of Metop-A on July 22, 2007. The image highlights the contrasting weather conditions across Europe. While the Balkans were suffering drought conditions, England was drowning.
Image: NOAA CLASS Archive (www.class.noaa.gov/)

The Strait of Dover

A Personal View - part 2

John Tellick

Bienvenue à France! I hope you had a good journey either over or under The Channel. It's time now to describe the French side of the Strait of Dover as depicted so vividly in a high-resolution ASTER image, originally acquired on March 14, 2001 by NASA's Terra Earth observation satellite. The image is far too large to reproduce in its entirety, but interested readers can locate it at:

http://asterweb.jpl.nasa.gov/gallery-detail.asp?name=tunnel

Credit: NASA/GSFC/METI/ERSDAC/JAROS and U.S./Japan ASTER Science Team

On the French side of the Channel, the town and major port of Calais can clearly be seen and the inset image shows the Calais region at full resolution. Wide sandy beaches, many backed by tall sand dunes, extend all the way through Belgium and Holland and on into northern Germany and Denmark. The sandy islands off the Dutch and German coast, the Waddenielanden and the Ostfriesische Inseln, show up well in our high resolution Meteosat-9 HRV and NOAA/Metop AVHRR images (figure 1).The coast and countryside to the east of Calais right up through Holland is 'famously' flat: kilometre after kilometre after kilometre of it!

To the west of Calais there is an area of tall cliffs facing their counterpart in Kent. These cliffs give way again to sandy beaches backed by lower cliffs, part of the rolling hills with forests, farms and villages that extend inland as the coastline turns south to Boulogne and the famous wide sandy beaches of Hardelot-Plage, Le Touquet and Berck-Plage.

The cliffs rising at Sangatte offer great views of the Channel and Kent with viewing points at Cap Blanc-Nez and Cap Gris-Nez—the pointed bit where the coast turns abruptly south. It was from these sites that one of history's more recent and most infamous characters, along with his second in command, surveyed the jewel in his would be crown. But it was not to be!

Just southwest of Calais, the French Channel Tunnel terminal at Coquelles can be clearly seen along with the massive (white) *Cite Europe* shopping complex. The Channel Tunnel—*Le Tunnel sous la Manche* in French—is, at 30 miles long, the second longest rail tunnel in the world but claims the worlds longest undersea tunnel section at 24 miles. The rail link is a vast continuous loop disappearing into two tunnels beneath the Channel: the end of the loop can be seen circling the French terminal together with the several platform access bridges and the engineering area. The layout is similar at the Folkestone terminal with another loop, except that it loops from right to left in France but from left to right at Folkestone. This has nothing to do with the different sides of the road on which we drive. It's just to maintain equal wear on the shuttle's wheels!

The total journey time is 35 minutes, platform to platform. *Eurostar* and rail freight services only join the loop to pass through the tunnels. Noticeable on both sides of the Channel is the patchwork of fields showing the similar agricultural use of the countryside.

The Strait of Dover itself is the narrowest part of the English Channel, or *La Manche* as the French call it, which connects the North Sea with the Atlantic Ocean (figure 2). The Channel is one of the busiest shipping arteries in the world; over 400 commercial

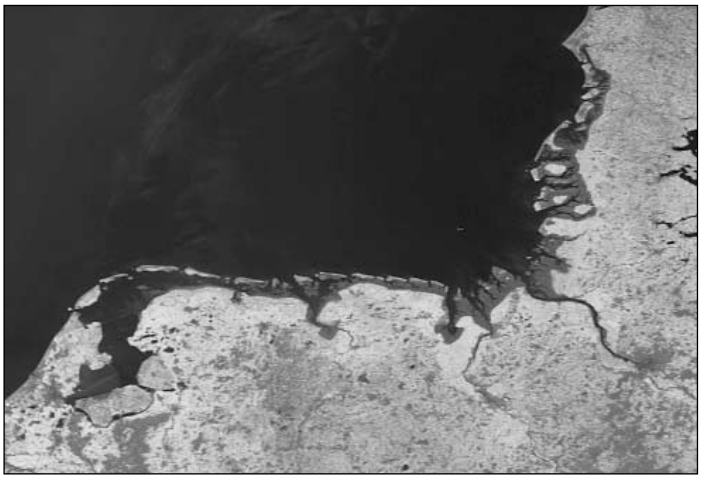


Figure 1 - Sandy offshore islands at low tide

NOAA AVHRR - Image © EUMETSAT 2007

vessels travel through it daily, not to mention the many ferries travelling across the shipping lanes—and the odd swimmer or two. Thank goodness for radar! Given this narrowing, the tides bring great currents of water flowing though this bottle-neck. Near to the coast the water looks milky due to the chalk sediment coming from the cliffs on either side.

But, it wasn't always like this!

For several hundred thousand years, parts of Britain have been joined to the continent. The land area changed with the varying ice ages but, at its fullest extent, the edge of the land area stretched from Yorkshire to Denmark and from Brittany to Ireland. What is now the southern North Sea was then a vast fertile plain with rivers while the English Channel was a great basin where the rivers Rhine, Thames and Seine (all several miles wide) joined together to flow out to sea between present-day Cornwall and Brittany.

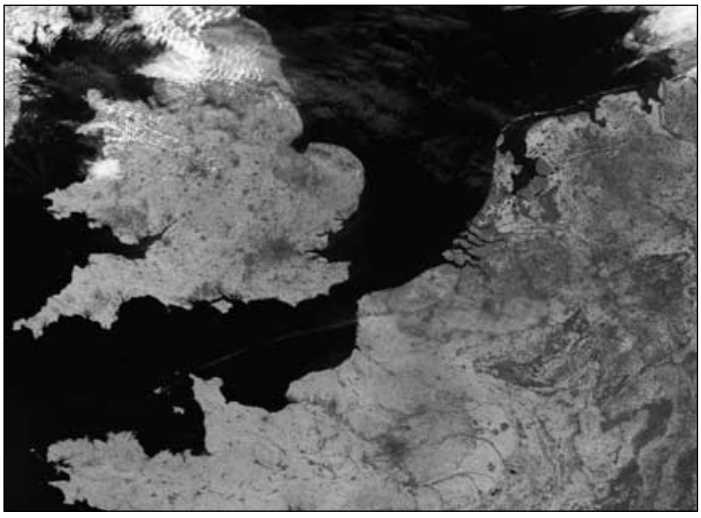


Figure 2
The Strait of Dover, English Channel and southern North Sea

NOAA AVHRR - © EUMETSAT 2007

Dutch fishermen have for many years trawled up animal bones which show that, at varying times, woolly mammoths, hyenas, lions, sabre-toothed tigers, elephants, hippopotamus, red deer and wild boar all lived on what is now the southern North Sea.

More exciting is the fact that flint implements from the *Neanderthal* period have also been found, indicating that early man lived and hunted there.

Later more sophisticated tools have also been discovered, showing that 'modern man'—our own ancestors—lived and hunted here around 12,000 years ago on the North Sea plains which archaeologists now call Doggerland.

But the last great climate change saw temperatures rise about seven degrees in as little as 15 years and sea levels began to rise as the ice caps started to melt: and kept on rising. It is estimated that up to 200 metres of coastline began disappearing per year. Yes! Per year! Around 11,000 to 9,000 years ago, Doggerland began to shrink as it became flooded by the North Sea until it finally joined up with the flooding English Channel as Britain and Ireland became islands off Europe.

The two areas we've visited are often quite ignored as holiday-makers 'rush to the sun.' But there is much to recommend them. In Kent, sleepy Downland villages and scenery, 'the garden on England,' dozens of stately homes, some castles and many traditional pubs serving *real ale*, plus the walled city of Canterbury with its vast cathedral: and great walks and vistas along the Downs and cliffs.

On the French side it is mostly an unspoilt area that time and the developers (till recently) forgot. More sleepy villages, interesting old towns, wonderful sandy beaches, uncrowded roads, good food and a real feeling of 'being abroad'—yet so close to home. It even smells different!

Within an easy day-trip there are several typical Flemish towns well worth visiting: Veurne, Diksmuide and Ieper (better known to us as Ypres). All possess wonderful gabled buildings surrounding their town squares.

If passing near Ypres, you must visit one of the many beautifully tended and poignant WW-I cemeteries that abound in this area. The *Last Post* is played by the local fire brigade, every day of the year, at 'sunset' under the Menin Gate in Ypres in memory of the fallen. Impressive Bruges and Gent are around an hour and a half's drive from Calais.

In France it is well worth visiting St Omer, the fortified town of Bergues and Boulogne with its 'ancient quarter':there, a visit to *Nausica* is a must. And fashionable Le Touquet and Berck-plage shouldn't be missed with their excellent wide beaches.

For the British on their way home there is a big bonus here, the hypermarkets, wine and beer warehouses around Calais, including *Tesco* and *Sainsburys* (where you can use your UK 'points cards'), and where where you'll see more English people than French. This is hardly surprising since beer and wine are half the price here compared with the UK, as are many grocery and DIY items. The choice is just out of this world. Fill up the car too—fuel is also cheaper.

So, what was a nice image from space has I hope turned into a journey of discovery? By using the various spectral channels of Meteosat HRIT and NOAA/Metop AVHRR you can continue this journey of discovery. Albeit at lesser resolution, you can explore features throughout Europe—towns, rivers, mountains and forests; as well as 'weather,' snow and sea-ice.

The Straits of Dover—*vive la difference*: but long live the entante cordiale.

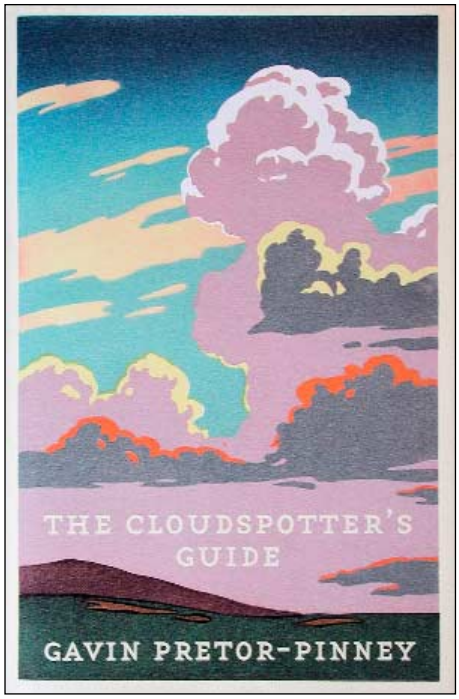
Book Review

Clive Finnis

The Cloud Spotter's Guide

Author: Gavin Pretor-Pinney

Whilst browsing through the local bookshop desperately looking for inspiration for my wife's birthday present I was drawn to the multi coloured jacket of a book 'The Cloudspotter's Guide' by Gavin Pretor-Pinney. Although unsuitable for my wife I realised that it would make an excellent present for me instead – and so I purchased it on the spot!



The book is divided into four sections, 'The Low Clouds', 'The Middle Clouds', 'The High Clouds' and a fourth section which the author describes as 'Not Forgetting' but is basically 'other clouds'. Each section devotes an entire chapter to one particular cloud type, for example cumulus, stratus, cirrus etc. In all there are thirteen chapters and a total of 320 pages.

The book is written in that rare way that puts across what could so easily be a dry, technical subject in a light hearted and witty way. But the subject matter is there, and is clearly described with illustrations and photographs. The author's regular excursions into tales and anecdotes related to the particular cloud in question, makes for an easy read that I found difficult to put down.

The centre section of the book is in colour and is a set of questions leading to your 'Cloudspotting Diploma'! All other illustrations are monochrome, and lead to my only slight criticism in that they tend to be grey and white rather than black and white, although they are generally quite legible.

Mr. Pretor-Pinney is clearly an ultra dedicated cloudspotter, and the story of his 12000 mile trip to, literally, the middle of nowhere in Australia to observe a particular cloud type is one of my favourite sections of the book. I almost felt like ringing the travel agents to book my own flight to Australia to follow in his footsteps!

All in all a thoroughly readable book which I can recommend whole-heartedly.

The version I bought was hardback, published by Hodder & Stoughton, ISBN 0 340 89589 6 priced £12.99, although I believe it has now been released in paperback.

First Radioactive Show a Great Success

A warm, sunny day welcomed almost 1,000 visitors to the first *RadioActive Show* held on the last Sunday in April, where over 90 stands of both traders and exhibitors provided a large cross-section of amateur radio products to satisfy even the most eclectic tastes and requirements. Visitors travelled from as far afield as Aberdeen, Swansea, Londonderry and Truro to enjoy the bright and airy Cheshire venue of Nantwich Civic Hall where, in addition to the profusion of items on offer and excellent catering facilities, they were also entertained by talks and demonstrations given by specialist groups and clubs.

Upon arrival, every visitor received a copy of the Show programme that also served as the spring edition of *Broadcast,* the quarterly journal of the Mid-Cheshire Amateur Radio Society (MIDCARS), the event organisers. *Broadcast* contains many interesting articles to suit all levels of differing aspects of amateur radio, written by a variety of experts. Many visitors confirmed that it was a worthy addition to their reference library and an excellent primer for those new to the hobby.

Roger Reeves M0ROJ of MIDCARS said that they were overjoyed with the visitor numbers and with the many positive comments received during and after the Show by both visitors and traders alike. 'It's certainly a great reward for all the time donated and effort made by Club members in arranging the Show and far in excess of our expectations. Many of the traders have already made reservations for the 2008 RadioActive Show, which we plan to be even larger and more appealing. We hope the Show will become one of the premier annual events in the amateur radio calendar.'

RSGB President Angus Annan MM1CCR took advantage of the RadioActive Show to publicly present Arnold Matthews G3FZW with the RSGB Founder's Trophy for his outstanding work in promoting amateur radio.

RSGB President, Angus Annan MM1CCR, presenting the Founder's Trophy to Arnold Matthews G3FZW, along with MIDCARS Chairman, Simon Chettle G8ATB

The Mid-Cheshire Amateur Radio Society (MIDCARS) was established over 40 years ago and is an extremely active club for amateur radio enthusiasts. They meet every Wednesday evening at the Cotebrook village hall, located on the A49 near to Tarporley in Cheshire, where they have a variety of permanent amateur radio facilities for all members to enjoy. A programme of talks and demonstrations is held throughout the year.

The ***2008 RadioActive Show*** will be held on Sunday, February 3, 2008. More information about MIDCARS and the *RadioActive* Show can be obtained by contacting Roger Reeves M0ROJ by email to:

info@RadioActiveShow.co.uk

Freak Storms Batter Australia

The most severe storms to hit the southeast Australian state of New South Wales for two years struck during a four day spell between June 9-12 this year. The splendid false-colour NOAA-18 APT image sent to us from Australia by Ken Morgan and reproduced inside the front cover of this issue, graphically illustrates the situation.

Savage 90 kph winds of near-cyclonic proportions swept through the region, removing roofs, downing trees and power lines, while the accompanying rainfall caused the worst flooding for 36 years. In the Newcastle suburb of Wallsend, 200 millimetres of rain fell in just a few hours.

The gale-force winds which lashed the NSW coastline caused ocean swells as high as 18 meters and grounded a coal freighter, the *Pasha Bulker*, on a sandbank off Newcastle. The ship's 21 Philippino crewmen had to be winched to safety.

The storm, created by low pressure systems converging off the state's mid-north coast, cut power to more 130,000 homes while fifteen thousand residents had to be evacuated after large sections of Newcastle were flooded with roads cut and trees toppled over roofs

On Sunday, June 11, some 5,000 residents in the Hunter Valley, 200 kilometres north of Sydney, were ordered to leave their homes because of fears that the Hunter River would burst its banks. The Hunter River rose some 10.7 meters overnight, only 70 centimetres below its peak overflow level.

In the aftermath of the storms, power crews from New South Wales and Victoria state had their work cut out as they battled to restore power to the network following its worst damage in 30 years.

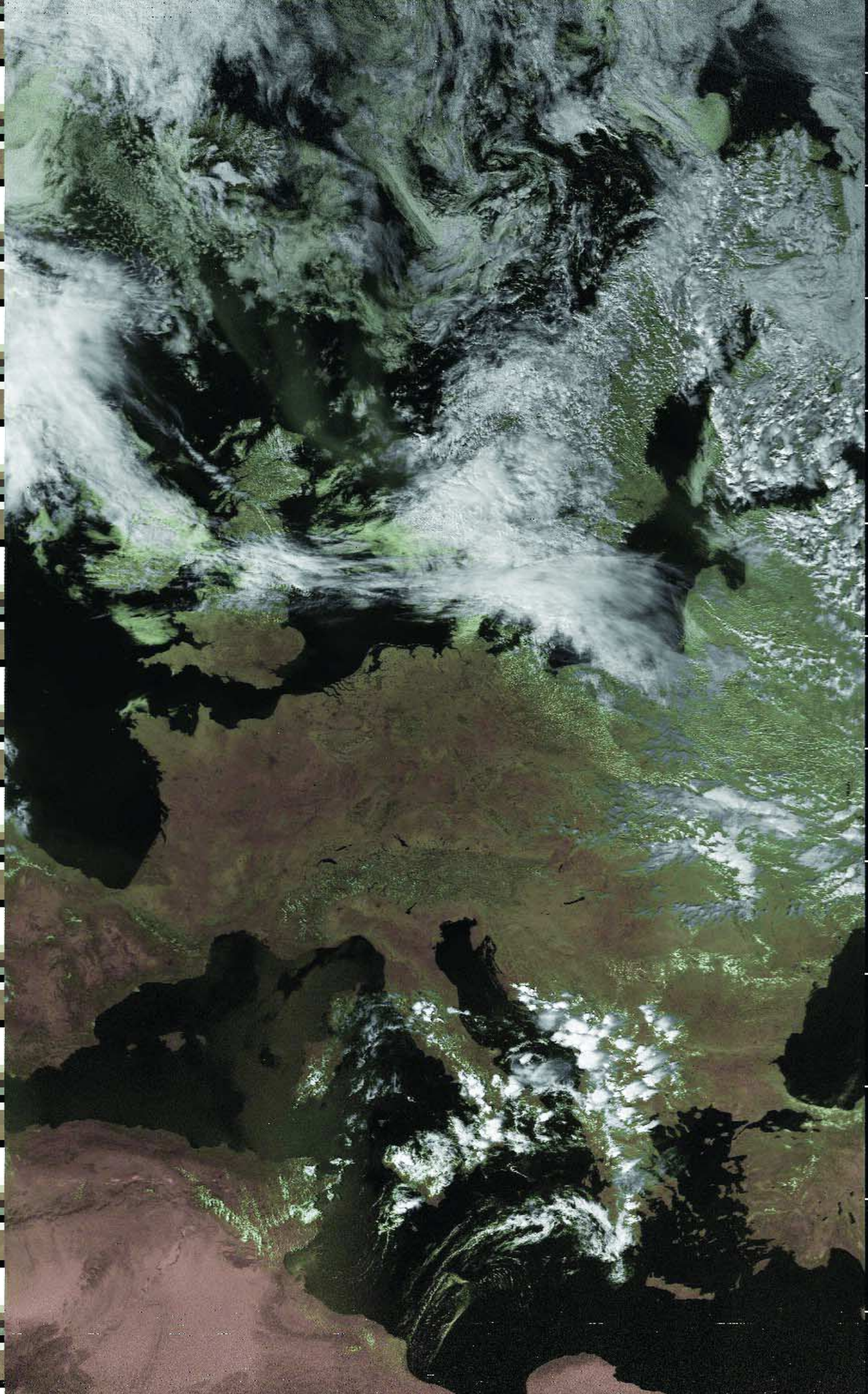
Useful Links

Fred van den Bosch has compiled a Web Page listing many useful Internet links. Topics covered include

- Weather Satellites
- User Groups
- Imaging and Processing software
- Hardware suppliers
- Organisations
- Weather satellite home stations
- Weather Groups and Forums
- University links

You can consult this list at:

http://www.fredvandenbosch.nl/links.html



1994-12-30

End of an Era

2007-05-25

NOAA-14 Decommissioned

Les Hamilton

An old friend departed from the wxsat airwaves on May 23 this year when the ageing NOAA-14 satellite was finally taken out of service. This was a sad blow for the dedicated band of amateurs who still monitored its transmissions, particularly as, even on this final day in service, it was producing some absolutely splendid images. Our front cover image shows the historic final HRPT image sent down by NOAA-14. This was monitored by Lawrence Harris from his station in Southampton, and the colour composite image was produced from raw data he supplied using David Taylor's HRPT Reader software.

NOAA-14 had taken to the skies at a particularly troubled time for amateur weather satellite enthusiasts. Readers with long memories will recall the troubled saga of the NOAA afternoon (ascending) APT satellites during the 1990s. When NOAA-11 (launched in 1988) became due for replacement, NOAA-13 took to the skies in August 1993 and excellent imagery was received from the new satellite by enthusiasts around the world. Then suddenly, just two weeks following its launch, NOAA-13 completely lost all power and it soon became apparent that this satellite was irrecoverably 'lost'.

NOAA swung into action to make ready its successor, NOAA-J, as expediently as possible and this became NOAA-14 following its successful launch on December 30, 1994. The NOAA-13 disaster was responsible for breaking the numbering sequence for the afternoon satellites: traditionally these had all borne odd numbers; NOAA-14 was the first of the even numbered ascending orbiters which has continued to the present.

NOAA-14 has been around for a long time and endured as the sole reliable American afternoon APT satellite until July 2004..

After functioning well for almost double its design lifetime (nominally 3 years), NOAA-16 was deployed to take over from NOAA-14 as the primary ascending satellite; but after just a few months, its APT transmitter failed and although NOAA-16 did become the primary afternoon satellite, it disseminated only HRPT.

NOAA-14 was left to carry the flag for the APT service and was effectively the sole APT afternoon satellite between May 1995 (when NOAA-11 was placed in standby mode—essentially switched off for all but emergency requirements) and April 2004, a spell of almost nine full years. Figure1 (opposite page) is a colour composite APT image from NOAA-14, dating from August 8, 1998. Notice how dark the land features are compared with the more modern NOAA satellites! This is due to a modified algorithm called *Dual-Slope Gain Transfer* which has been employed in the subsequent NOAA KLMN satellites [1] in order to discriminate land features more effectively.

In mid-October 2001, degraded imagery from NOAA-14 suggested a problem with the satellite's AVHRR scan motor. The following month, the scan motor started to exhibit anomalies: drawing an unusually high working current and displaying synchronisation problems. This was alleviated somewhat by introducing a daily resynchronisation procedure, but intermittent sync. problems persisted throughout the year that followed although HRPT continued to be disseminated, albeit with varying degrees of distortion in its images.

Matters came to a head on April 14, 2004 when, in an effort to resolve the continuing high scan motor currents and associated loss of synchronisation, NOAA decided, contrary to the manufacturer's recommendations, to try and switch off the motor (which was still working but with high torque etc) and then reactivate it.

But when they attempted to switch it back on again (the first time such a procedure had ever been attempted) the result was the worst possible scenario—because the motor simply would not re-start. With the scan motor now seized up completely it was assumed that this represented the final end to imaging from NOAA-14, and the APT data stream was switched off, ostensibly for good.

Nevertheless, HRPT telemetry continued to be relayed to the NOAA Class Archive [2], where it remains on file to this day. Interested readers can still download HRPT telemetry files from this period though processing (with *HRPT*

Figure 2
HRPT telemetry dating from June 29, 2005 showing the complete absence of AVHRR imagery
Telemetry file:NOAA CLASS Archive

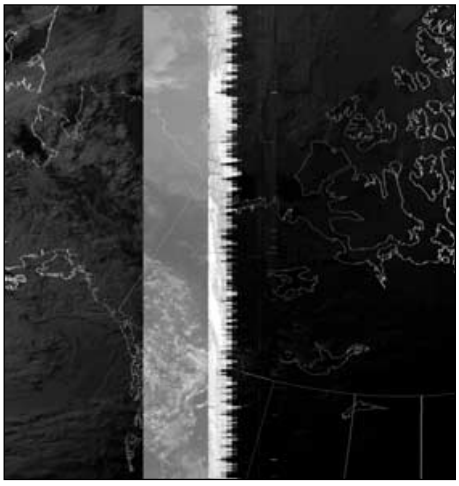


Figure 3
Imagery starts to return to the NOAA-14 HRPT telemetry stream (04:02 UT on July 17, 2005)
Telemetry file:NOAA CLASS Archive

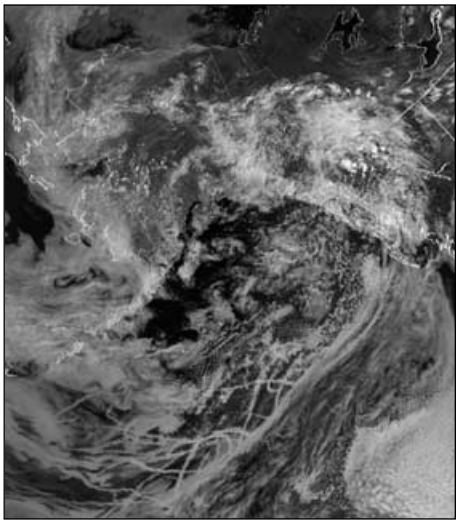


Figure 4
Image synchronisation returns to NOAA-14 HRPT telemetry (19:31 UT on July 17, 2005)
Telemetry file:NOAA CLASS Archive

Reader) reveals no actual imagery to be present. Figure 2 shows a section from such a telemetry file dating from June 29, 2005.

Then, completely out of the blue and without human intervention, NOAA-14 unexpectedly started to show signs of imagery once more on July 16, 2005. Perhaps cycles of heating and cooling as the spacecraft continued orbiting the Earth had released whatever was jamming the scan motor. Soon, the motor current and synchronisation were clearly recovering and partial imagery was restored. Figure 3 comes from an ascending NOAA-14 pass over Alaska early on July 17 and clearly displays detail from both a visible and an infrared channel although the synchronisation is askew. On a descending pass much later the same day, imagery is perfect and synchronisation is spot-on (figure 4).

In the wake of this turn of events, NOAA actually reactivated the APT stream for test transmissions between July 28 and August 2, though, unusually, these consisted of a pairing of two infrared images from channel-3 and channel-4. APT was then switched off, presumably because NOAA-18 was by this time providing afternoon APT.

Since that time, NOAA-14 has continued to provide some superb HRPT images, though continuing to alternate between spells of synchronisation loss. But with NOAAs-12, -15, -17 and -18 plus Metop-A all currently providing high-quality HRPT, it was apparently decided that the time had come to remove NOAA-14 from service. Accordingly, the satellite was successfully decommissioned on May 23, 2007. This involved turning off transmitters, de-programming the CPU, disconnecting the battery charge paths and moving the solar array away from the sun, which, collectively, should ensure that there is no sporadic interference with the other APT satellites (as has been recorded from TIROS-N, NOAA-6 and NOAA-9).

Acknowledgement

Thanks to Douglas Deans for helpful discussion in the preparation of this article.

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1 NOAA-12 Reborn, Les Hamilton, GEO Q4, December 2004, p 20.

2 http://www.class.noaa.gov/

A Word of Caution Concerning The use of an External USB Hard Drive for EUMETCast Reception

Arne van Belle and David Taylor

Last issue we published an account from Mike Stevens relating to problems he experienced when attempting to set up a RAM Drive for his EUMETCast system and how he had devised a working solution using an external USB hard drive. Mike's efforts produced considerable interest, but two of the leading exponents in the field expressed concerns that, in the long term, this approach could face future pitfalls. There are doubts that a USB drive, which is inherently slower than an internal hard drive, will be able to keep pace as the EUMETCast data stream continues to burgeon in the months and years ahead. There is also a known problem that USB drives which run continuously are notoriously short-lived. Arne van Belle and David Taylor, both of whom have tested the *AR Soft* RAMdisk extensively, comment below.

Arne van Belle

The article from Mike Stevens surprises me. I feel very sorry that Mike lost his complete Windows configuration after setting up a RAMdisk. But based on his report I am sure that this was not caused by the *AR Soft* RAMdisk. I feel that this was most likely due to manually editing the registry in such a way that Windows judged it to be corrupt and reverted to the status after its first install! It's really a pity that Mike did not mention any of this problem on the lists as I could have given him advice on restoring his lost registry and improving his system.

The *AR Soft* RAMdisk does suffer from one or two well-documented issues on XP and Vista. You have to disable *System Restore* for the RAMdisk and if you set the slider too high, it will not load or produce a RAMdisk that is smaller than set. I have done many, many tests involving the AR Soft RAMdisk, from Windows 2000 up to and including Vista, and only once have I found Windows failing to load properly. And even that case was easily resolved by booting into *Safe Mode* and selecting a smaller size for the RAMdisk.

I am almost 99% certain that Mike's problem is caused by the fact that *AR Soft* will behave strangely when you have less memory (Mike has 1 GB) and try to set a large RAMdisk (over 73 MB). The RAMdisk will simply fail to load at all (and *Tellicast* will immediately abort after a reboot as Mike describes—but Windows is unharmed) or create a **Z:** drive that has less capacity then that set with the slider.

If you don't check the created RAMdisk size you will get lost segments as *Tellicast* restarts, when it can no longer write to its expected size. Of course, with a backup of his Registry, as described in GEO, Mike would have been able to restore everything. You should always create a Registry backup before editing your Registry.

And **do not** install the RAMdisk on Windows XP or higher without applying the *System Restore* fix first.

If you are not confident about editing the Registry you could consider buying a RAMdisk like *Superspeed* or *Qsoft,* neither of which requires Registry editing. But no matter which RAMdisk software you use, always verify the free space on the RAMdisk after creating it. Only then can you set the correct file database size in your ***recv.ini*** file

The inventive way Mike chose to receive without using a RAMdisk is unfortunately a far poorer solution. He uses an external USB disk which will lead to more problems than the default *EUMETCcast* installation which doesn't use a RAMdisk. I am amazed that, despite of this, he is able to get good results. Even the fastest USB 2.0 portable disks can only reach about half the speed of a built in IDE disk. For MetOp we need the best performance a disk can give.

Whilst Mike's solution works for him, my advice (and that from EUMETSAT) continues to be to use a RAMdisk where possible as a performance enhancement technique for coping with he very high data volume now seen on EUMETCast.

Based on multiple cases at my work, I have to warn against this use of USB disks. We have had multiple crashes of these disks (manufactured by *Seagate* and *Maxtor*) with total loss of all data.

Many external drives do not provide enough cooling to the disk. In particular, when you run these external disks for many hours continuously, you can 'cook' the hard drive. And we find that glitches on the USB bus are happening far more frequently than with internal drives.

David Taylor

I completely support Arne's comments. We have developed the RAMdisk solution over the years and I have complete confidence in it: I'm using it on three PCs here. There are one or two well-documented issues, although they aren't apparent here.

The last thing most people should be doing is tampering with a working system. Rule number one is: 'If it works, leave it!'

Radar Satellites

Part 4 - Radar Altimetry

Peter Wakelin

This final part in the series looks at how radar altimetry works: the improvements made since the *Skylab* mission, *Envisat's* radar altimetry system, and finally a look at some of the results derived from radar altimeters.

Basic Principles

A radar altimeter on a satellite, typically orbiting at an altitude of 800 km, transmits pulses vertically downward and measures the me taken for an echo from the Earth's surface to return to the satellite. This interval can be measured to a high precision and, as the pulse travels at the speed of light, the distance between the satellite and the surface can be determined with great accuracy.

Although the speed of light in a vacuum is precisely known, radar pulses passing through the atmosphere are retarded very slightly and not always to the same degree. Dry air effectively increases the satellite/surface distance by about 2.3 metres but atmospheric moisture can increase this further by up to 30 cm. Ionisation in the upper atmosphere also slows the pulse by a variable amount depending on the time of day and solar activity, and also on the radar frequency used. However, by using two radars operating at different frequencies, the error from this cause can be accurately compensated for.

The ultimate aim of radar altimetry is to measure altitudes of sea, ice or land surfaces relative to a terrestrial reference frame. It is not sufficient to know only the surface-to-satellite *distance*; a precise knowledge of the satellite's *position* is also essential. This reference frame may be the ellipsoid (figure 1), which would equate to mean sea level if there were no gravitational variations around the globe. These irregularities in Earth's gravitational field cause the actual mean sea level, the geoid, to depart from the ellipsoid by around ± 100 m. The geoid itself is distorted by topography, dynamic forces such as tides, winds and ocean circulations caused by the Earth's rotation to form the actual surface.

Modern altimeter-carrying satellites also carry equipment to accurately determine the spacecraft's orbit to a high precision. For example, *DORIS* (Doppler Orbitography and Radiopositioning Integrated by Satellite) and *PRARE* (Precise Range And Range-rate Equipment) instruments enable the position of the altimeter to be determined to within a few centimetres. Many satellites also carry a small corner reflector enabling laser-ranging techniques to determine distances to better than one centimetre but with few laser ranging stations, which can operate only in clear sky conditions, these measurements are mostly used to calibrate the other instruments.

Thirty Years of Evolution

The first radar altimeter was flown on the massive 70-tonne *Skylab 1* orbiting laboratory launched on May 14, 1973. It demonstrated that radar altimetry from orbit was not only possible but that the precision achieved exceeded expectations (even though the accuracy in those days was no better than one metre). The first scientific altimeter mission was flown on the Geodynamic Experimental Ocean Satellite (*GEOS-3*) launched on April 10, 1975. This demonstrated that flat land and ocean could be profiled but, at 50 cm, the accuracy was too low for serious scientific work. Accuracy improved to 30 cm when *SeaSat* was launched on April 10, 1978 but this spacecraft failed after operating for little more than three months. A similar accuracy was achieved by the US Navy's Geophysical and Geodetic Satellite, *GEOSAT*, which was launched on March 13, 1985 and remained operational for about four years. The real breakthrough in accuracy came in the 1990s with the launch of Europe's *ERS* satellites and the US/French *Topex/Poseidon* mission followed later by *Jason-1*.

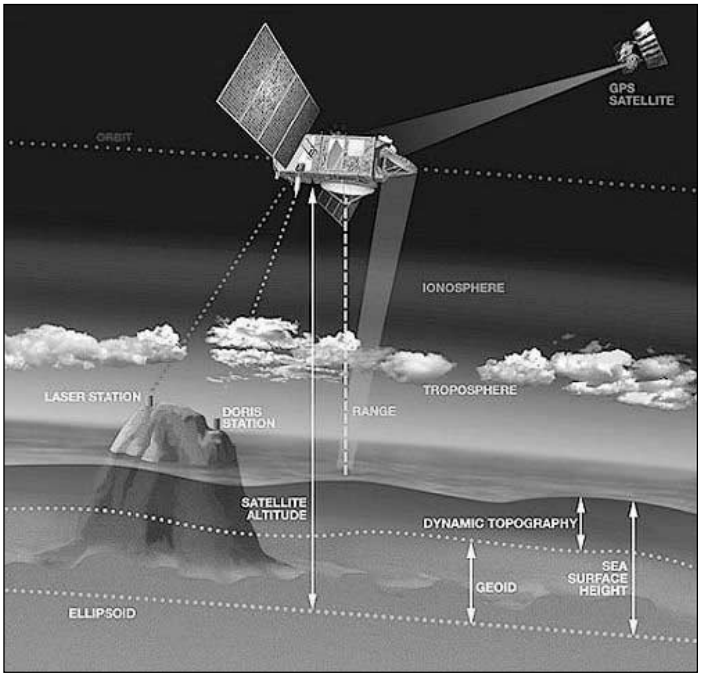


Figure 1 - The 'Ellipsoid' Reference frame

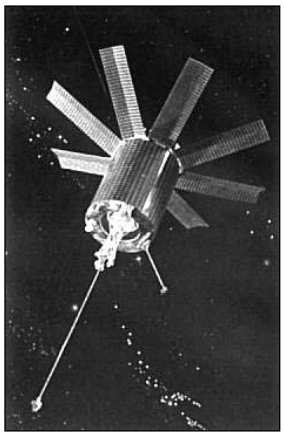


Figure 2
Russia's GEO-IK spacecraft

The Russians took an interest in geodesy very early in the space age, probably due to the need to know precisely the location of their missile launch sites. Initially they used simple triangulation by simultaneously photographing satellites from two or more locations, and it was not until *Cosmos 1589* was launched in 1984 that an operational radar altimetry programme began. Most Russian launches were given a cover-all *Cosmos* number in an attempt to hide their role and it was many years later that *Cosmos 1589* was identified as *GEO-IK 1*. This satellite operated for 15 months and was followed by eight more in the following 10 years. Surface measurements were accurate to about 60 cm. All the *GEO-IK* craft orbited at about 1,500 km altitude, far higher than other radar altimeters.

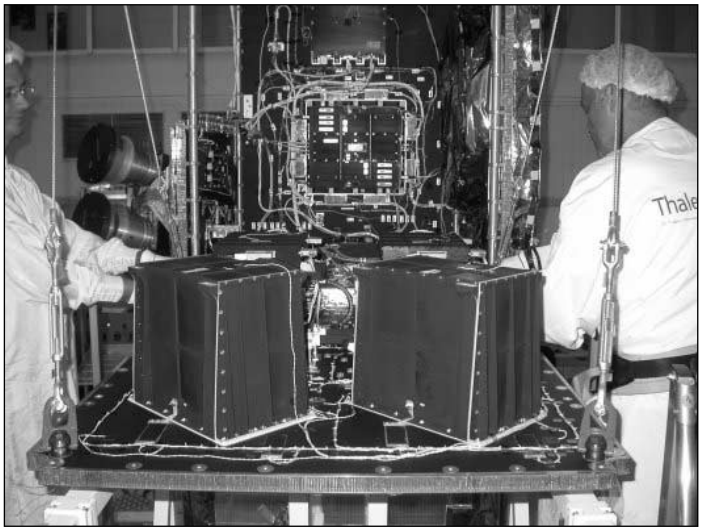


Figure 3
The radar altimeter being installed on Jason-2.
Launch is scheduled for June 2008.

Not only has the hardware improved over thirty years but so has the ability to analyse and interpret the returned echoes. For example, it was soon realised that, when measuring sea surface heights, more of the return echo came from the troughs of the waves than the crests. Revised algorithms now enable heights in quite rough seas to be measured almost as accurately as in calmer conditions. More recent developments now permit the heights of quite small lakes and even rivers to be measured accurately with obvious benefits.

Envisat's Altimetry System

ESA's polar satellite for environment monitoring, *Envisat*, was launched on March 1, 2002 and follows the very successful *ERS-1* and *ERS-2* satellites. *ERS-1* was launched in 1991 and operated until a year after *ERS-2* was launched. *ERS-2* is still working and has now passed 10 years of flawless operations. Data comparisons during these operational overlaps enable any small calibration discrepancies to be quantified and compensated for.

Figure 4
DORIS omnidirectional antenna
Credit: CNES

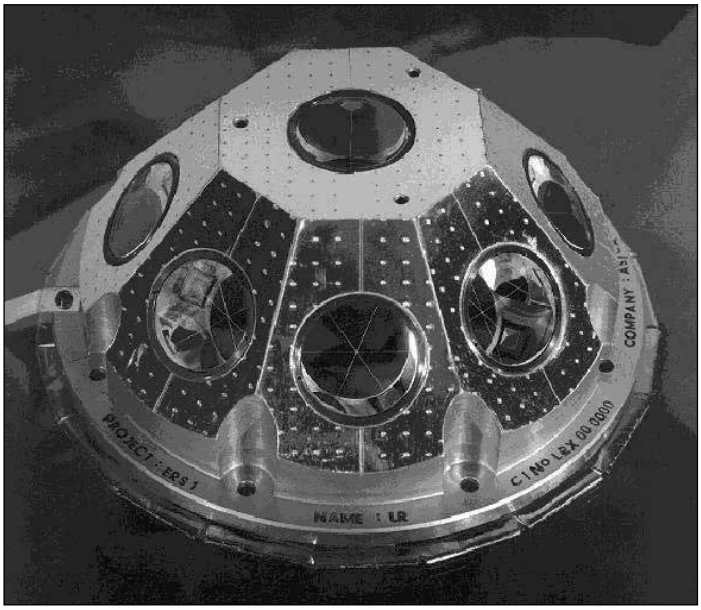


Figure 5
Envisat's Laser Retro-Reflector
Credit: Aerospatiale

The *RA-2* is a dual-frequency altimeter operating at 3.2 GHz and 13.575 GHz. The pulse repetition frequencies are 448.83 Hz (for S-band) and precisely four times that for Ku-band, allowing interleaved operation. Over oceans the high-precision measurements are used to determine the surface topography, thus supporting studies of ocean circulation, bathymetry, gravity anomalies and marine geoid characteristics. Processing of the radar echo power and shape enables the determination of wind speed and significant wave height. *RA-2* is also able to map and monitor sea ice and polar ice sheets. New features of *RA-2* enable it to extend its measurements of altitude and reflectivity over land. It also includes an auto-adaptive tracker capable of switching to any one of three bandwidths to achieve improved accuracy at the highest resolution. To further improve the accuracy, *Envisat* carries a microwave radiometer to enable corrections to be applied to compensate for the effects of atmospheric water in the path of the altimeter signal.

Envisat carries *DORIS*, a microwave doppler tracking system for precise orbit determination (figure 4). *DORIS* accurately measures the doppler shift of radiofrequency signals transmitted from beacons on the ground. Two frequencies are used so that propagation delays in the ionosphere can be

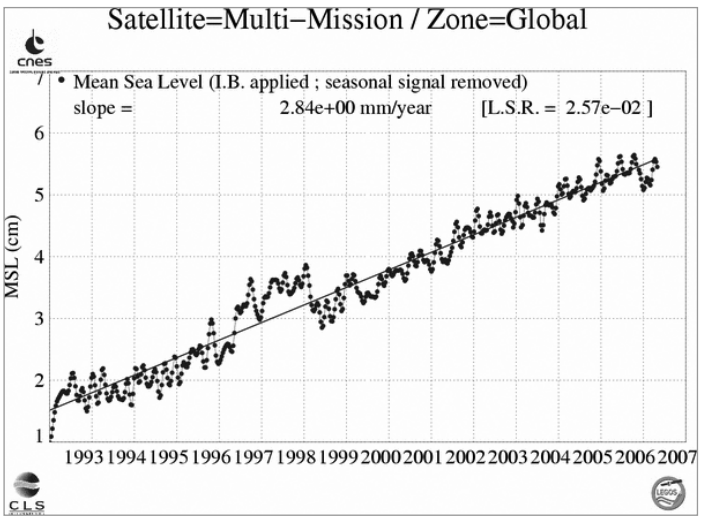


Figure 6
Global sea-level rise since 1992
Credit: CLS/LEGOS

determined and corrected for. Doppler shift measurements are made every few seconds enabling orbit determination to an accuracy better than 5 cm in altitude.

Envisat also carries a laser retro-reflector (LRR) to support laser-ranging altimeter calibration (figure 5). Situated near the altimeter antenna, its array of precision-made corner-cubes reflect a pulsed laser beam back to the originating laser-ranging station where the round-trip time is measured.

Some Results from Radar Altimeters

It will come as no surprise to learn that ice and sea surface level measurements make up the bulk of data derived from radar altimeters. Accuracies have improved to such an extent that changes to ice and sea levels are easily detected over short periods of time. The *Topex/Poseidon* mission was the first to have sufficient accuracy to detect the variation in sea level due to seasonal temperature changes—which amount to several centimetres between spring and autumn in temperate latitudes. The diagram shows changes in global mean sea level since October 1992 after the removal of seasonal effects and corrections applied for atmospheric pressure variations. An average annual rise of almost 3mm has occurred over the last 15 years.

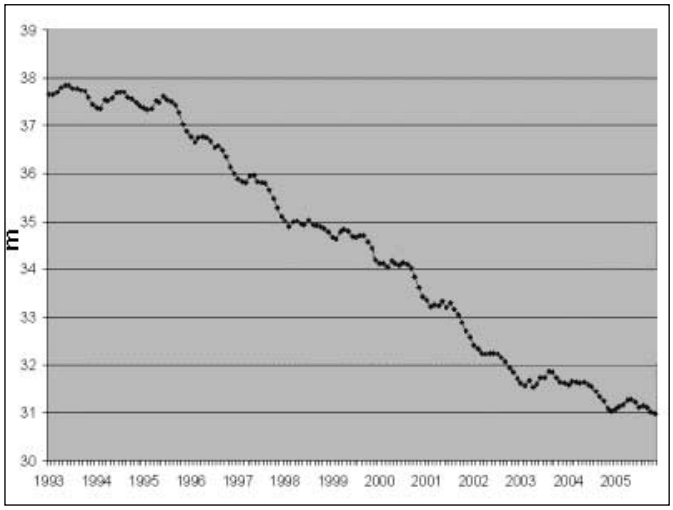


Figure 7
The Aral Sea is drying up
Credit: CNES/LEGOS

The Aral Sea, bordering Kazakhstan and Uzbekistan, has been drying up for the past 50 years since large-scale extraction of water from the two main rivers feeding it has been used to irrigate cotton-growing areas set up in the region. Being mostly shallow, the drop in water level has reduced the surface area dramatically and divided the sea into the Big Aral and Little Aral. The town of Aralsk, once on the shore, is now nearly 30 km from the water. *Topex/Poseidon* measurements show that Big Aral's surface has dropped by almost 7 metres since 1992.

Cover and Full-Page Images

Front Cover

This is the historic NOAA-14 AVHRR image acquired by Lawrence Harris on May 23, 2007 during the satellite's final pass over Britain prior to being decommissioned. Read more on page 9.

Image: Lawrence Harris

Inside Front Cover

Ken Morgan from Victoria, Australia sent us this breathtaking NOAA-18 APT image of eastern Australia, acquired on June 6 this year, which shows the storm which caused the severe flooding of the Hunter River, its valley and the city of Newcastle.

Back Cover

Anthony Lowe from St Helens, Merseyside acquired this superb APT image from the 12:34 UT NOAA-18 pass on May 2, 2007. Equipment used was an AOR 5000 scanner with a crossed dipole antenna mounted at approximately 5 metres. WXtoImg was used to capture and process the signal. The image dates from the long spell of high pressure that brought summer early to much of Great Britain but shows the persistent haar (sea-fog) that bedevilled the east coast for days on end.

Page 30

Keith Fraser of Buffalo, New York sent us this NOAA-12 APT image dating from 22:44 UT on June 19. A low pressure area centred on James Bay had generated a cold front which was just passing overhead at his location at the time of acquisition. New York city and the East coast were in the firing line of a line of violent thunderstorms which left trees and power lines down.

Page 33

The lower course of Russia's Ob River is captured in this MODIS (Moderate Resolution Imaging Spectroradiometer) image from NASA's *Terra* Earth observation satellite. You can read more about this scene on page 47.

NASA image courtesy Jeff Schmalz (MODIS Rapid Response Team)

Fires on the Balkan peninsula on July 25, 2007, as captured by the MODIS instrument flying on NASA's Aqua satellite (see page 3).
Image: MODIS Rapid Response Team at NASA/GSFC

GEONETCast

John Tellick

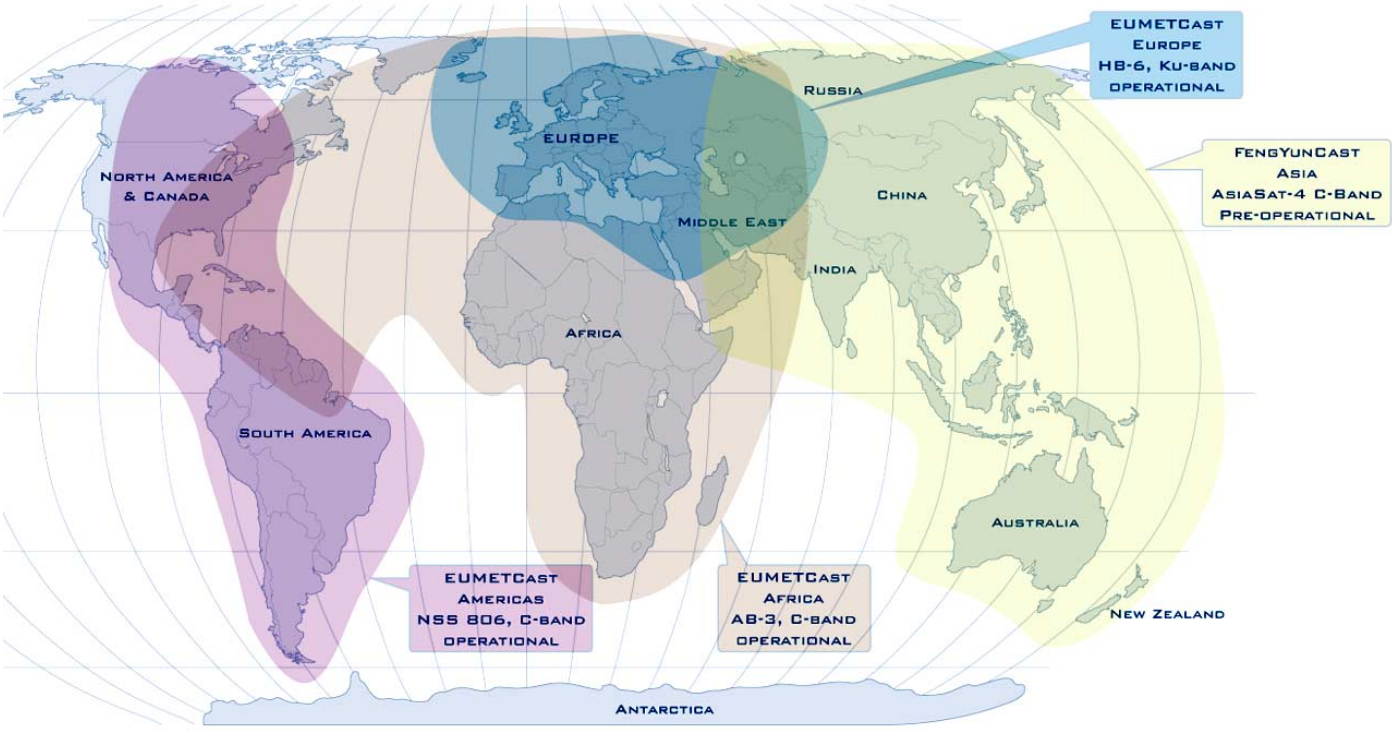


Figure 1 - The current GEONETCast Service Areas

Readers may recall the failure during early commissioning of one of MSG-1's solid state power amplifiers (SSPA) in October 2002. An enquiry board investigating the failure decided in early January 2003 not to risk failure of the other SSPA's (the imaging downlink was operating correctly) by disseminating processed data via the satellite as direct read-out services. *EUMETSAT* were therefore obliged to seek an alternative method to disseminate the 12-channel SEVIRI data from this new generation satellite.

The Origins of EUMETCast

EUMETSAT had already been evaluating data dissemination via a commercial TV satellite during 2003, transmitting NOAA ATOVS (Advanced TIROS Operational Vertical Sounder) data, and it was proposed to experiment using this same downlink for MSG data. Tests, adding MSG-1's HRIT data to the ATOVS stream on this K_u-band downlink from the *Hot Bird-6* satellite began in April 2003, using the DVB (Digital Video Broadcast) industry satellite TV format.

These data transmissions could be received with cheap off-the-shelf satellite TV equipment on a computer (PCI card or USB box) fed from an 85 cm offset satellite TV dish with Universal LNB, across most of the European footprint. A 1.8 metre dish was required for the easternmost European areas, the Middle East and western Russia (figure 1).

Tests, which ran throughout 2003, and in which many GEO members took part by feeding useful logistical and operational information regarding reception experiences on differing set-ups back to *EUMETSAT*, were a tremendous success. During the test period more and more data were added to the stream which proved its expandability, ruggedness and reliability, and *EUMETCast* went operational in January 2004.

The rest—as they say, is history and the K_u-band European service now disseminates some 55 gigabytes of data daily.

Extending EUMETCast Coverage

The first generation Meteosat satellites operated a 2 channel L-band direct read-out service providing PDUS and WEFAX. The footprint was of course hemispheric as seen from 0°, as would have been the footprint for MSG's 2-channel HRIT and LRIT direct read-out services. Africa and much of South America would therefore be without the new 12-channel SEVIRI data following MSG-1's SSPA failure and the curtailment of direct read-out dissemination. These regions did of course at that time still have direct read-out PDUS and WEFAX services from Meteosat-7.

EUMETSAT are obliged to provide meteorological data services to Africa. Indeed, the EU had already equipped African nations with HRIT/LRIT reception equipment under the PUMA agreement (Preparation for the Use of MSG in Africa), so had to consider yet another means to provide them with MSG's new high resolution digital data. The K_u-band service footprint from *Hot Bird-6* covers only Europe, the Middle East and parts of western Russia (figure 1).

Owing to the frequent heavy rain storms over many parts of Africa, K_u-band transmissions would suffer badly from rain-

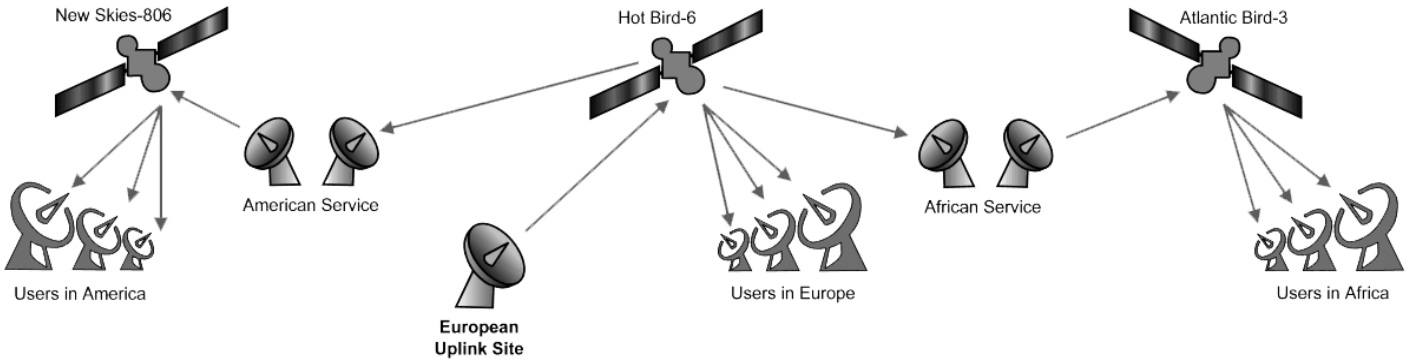


Figure 2 - The GEONETCast/EUMETCast System Overview

fade; so C-band transmissions had to be used—and a satellite with a large C-band footprint over Africa identified..

The C-band Services

EUTELSAT's Atlantic Bird-3 stationed at 5°W was chosen and tests which began in late 2003 proved successful. The Africa service became operational during 2004.

The C-band footprint for this service covers a very large area, resulting in lower signal levels which require much bigger dishes than for the K_u-band service. *EUMETSAT* recommend a minimum 2.4 metre dish although a GEO member is South Africa has achieved good quality and consistent results using a 1.8 m dish with this service.

With the termination of Meteosat-7's PDUS/WEFAX services following the successful launch and commissioning of MSG-2, South America would have lost its access to direct 'Meteosat Atlantic data'—as would parts of the eastern seaboard of the North America. So, another link in the *EUMETCast* service was set up, a C-band service covering the whole of South America and much of North America, from the *New Skies* satellite *NSS-806* situated at 40.5°W. This C-band service also requires a dish between 1.8 m and 2.4 m depending on the receiving location within the *NSS-806* footprint.

The EUMETCast Data Chain

The data chain for *EUMETCast* services (figure 2) is as follows:

- *EUMETCast*-Europe is uplinked from Usingen, Germany (Deutsche Telekom) to *Hot Bird-6*.
- This service is received by *EUMETSAT's* Fucino ground station in Italy and an Africa-specific subset of the data is uplinked (Telespazio) to *Atlantic Bird-3* for transmission of the C-band *EUMETCast*-Africa service.
- The Hot Bird-6 K_u-band European service is also received by a ground station in Madrid and relayed to a ground station in Paris where an Americas specific subset of the data is uplinked (Globecast) to *NSS-806* for the *EUMETCast*-America C-band service.

GEONETCast

The extensions to *EUMETCast* are Europe's contribution to the *GEONETCast* system, instigated in 2005 by the **Group on Earth Observations** (GEO) and to be completed in 10 years. This will be a global meteorological data dissemination service, disseminated via commercial satellites; it will provide round-the-clock continuous, reliable global data to end-users just minutes following acquisition, and '*requiring only off-the-shelf satellite receiving equipment and standard personal computers*.'

The Chinese Meteorological Administration (CMA) has begun a pre-operational service called *FengYunCast*, their contribution to *GEONETCast* via the *AsiaSat-4* satellite at 122°E, also on C-band in DVB format. Its footprint covers a wide area: the whole of Asia, part of the Western Pacific and into the Middle East and most of Russia (figure1). It relays data from FY-1D, FY-2C, NOAA, MODIS on *Terra* and *Aqua,* and MTSAT. America are currently developing a *GEONETCast-Americas* DVB service which will cover both North and South America

Regarding *EUMETCast-America* and *GEONETCast-Americas,* I received the following details from *EUMETSAT* in early May:

> *'GEONETCast-America* and *EUMETCast-Americas* are at the moment complementary to each other, since they cover different kinds of data. NOAA is currently not intending to include/cover the data on *EUMETCast-America* in their planned *GEONETCast-Americas* system but focuses instead on products only in particular, the non-meteorological society benefit area ones. The continuation of the operation of *EUMETSAT's EUMETCast-America* service beyond the initial period depends on *EUMETSAT* delegate body decision.'

As to the ongoing data content of the expanding *GEONETCast* services:

> 'Data exchange between the three *GEONETCast* Network Centres (GNC) (NOAA, *EUMETSAT*, CMA) is currently being discussed with a view to cover all nine societal benefit areas as defined by GEO.'

It seems that *GEONETCast* was destined to happen anyway? This form of distribution of meteorological data via commercial satellites had been suggested by CGMS (the World Meteorological Organisation's Coordination Group for Meteorological Satellites) for many years. But it was *EUMETSAT* who, through adversity, pioneered the way to a new multi-cast data distribution system and proved it to be reliable, rugged and expandable; and the big bonus for the user community is being able to utilise inexpensive, off-the-shelf domestic satellite-TV reception equipment.

Acknowledgements

I should mention *T-Systems*, *Deutsche Telekom* and *Telespazio* who also played a part in this development and the provision of the service links plus, of course, David Taylor for his brilliant suite of processing and display software and Rob Alblas for his free *XRIT2PIC* processing/display software.

The *EUMETSAT* website at ***www.eumetsat.int*** has a full page of *GEONETCast* information regarding the various providers and services as well as links to further relevant documents. Just enter 'geonetcast' in the 'Search' field and click 'GO'.

Thanks also to *EUMETSAT* for help in preparing this article.

References

1 Group on Earth Observations
http://www.earthobservations.org/

The Meteosat-8 Rapid Scanning Service

David Taylor

During May and June 2007 we bade goodbye to an old friend, only to welcome it back again shortly after. Meteosat-8, which was launched in 2002, has been providing operational data for the 0° European and African sector since 2004 (and before that, commissioning data since April 2003 as 'MSG-1'). For many of us, this was our first introduction to *EUMETCast*—the highly successful, low-cost dissemination system adopted after one of the MSG-1 power amplifiers failed. What good fortune that turned out to be!

Well, all good things come to an end, and with the successful launch and commissioning of MSG-2 (Meteosat-9 in production), it became time (in May 2007) for MSG-1 to become a hot standby 0° satellite, in case of faults with MSG-2. Figure 1 opposite shows the final image disseminated by MSG-1 on that date.

However, it turned out that EUMETSAT had other plans for MSG-1. The Convective and Orographically-induced Precipitation Study (COPS) has procured a three month period of 5-minute rapid scans from Meteosat-8. These rapid scans are made possible by reducing the scan vertically so that a region smaller than the whole globe is covered. Figure 2 shows the very first Rapid Scan image from Meteosat-8 (processed to false-colour with the *GeoSatSignal* software).

You can see the cessation of full-scan MSG-1 data at the middle of week 19 in figure 3. The same EUMETCast throughput-monitoring graph also shows the start of the rapid-scan MSG-1 data in week 22, immediately following the red line which marks the start of June. This particular PC receives both MSG-1 and MSG-2 data, as well as EARS AVHRR data, hence the approximate halving of the data throughput while MSG-1 data was not being disseminated.

What Software is needed for the new Rapid Scan Data?

You need no new software, although you may need the most recent updates. You will need to ask EUMETSAT to be added to the service (if it is still running at the time of publication).

TelliCast software

The only change required for the *TelliCast* software is the addition of a line to the *recv-channels.ini* file to allow reception of EUMETSAT Data Channel-5. Here are before and after examples:

Before:

```
[EUMETSAT Data Channel 3]
target_directory=D:\ECast\received
```

After:

```
[EUMETSAT Data Channel 3]
target_directory=D:\ECast\received

[EUMETSAT Data Channel 5]
target_directory=D:\ECast\received56
```

Of course, your directories will differ from the examples I give above, but I hope you see the idea. You must point the new data to a different directory than that used for existing data.

Processing software

Although the *MSG Data Manager* software had been around since the very early rapid-scan tests during the commissioning phase of MSG-1, my other software had not; so an early task was to update the *MSG Animator* software to handle the more frequent scans. This was done as soon as the new data was available, which means that many enthusiasts have been enjoying the super-smooth animations which the 5-minute scans make possible. A beta version of the new *MSG Animator* software may be downloaded here.

http://www.satsignal.eu/ => Software, Beta Versions

Look for version V2.5.8.187 or later. This may even be a released version by the time you read this.

To handle both the production Meteosat-9 and the Rapid Scan Meteosat-8 data on the same PC requires that you run two instances of the *MSG Data Manager* (so that the files and settings don't get mixed up).

Copy all the files from a working *MSG Data Manager* directory to a new directory (I suggest you name it MsgDataManagerRS). Rename the *MSG Data Manager* files in that directory to, for example:

MsgDataManager-RS.chm
MsgDataManager-RS.ESN.lng
MsgDataManager-RS.exe
MsgDataManager-RS.FRA.lng
MsgDataManager-RS.ITA.lng
MsgDataManager-RS.ntv.lng
MsgDataManager-RS.RUS.lng

Now you can run the renamed *MSG Data Manager* and set it up to point to the new source directory for the channel-5 data, and select the HRIT channels you want to process.

Processing all twelve HRIT channels requires about 250 MB of memory for the second MSG Data Manager instance, but you can reduce that footprint by processing fewer channels.

For further information on COPS see

http://www.uni-hohenheim.de/cops/

Reader's Letters

Remember, we are always pleased to receive readers' thoughts, comments and queries for our '*In Tray*' letters page.

Forward these to the editor or any member of the Management Team. Contact details appear on page 1.

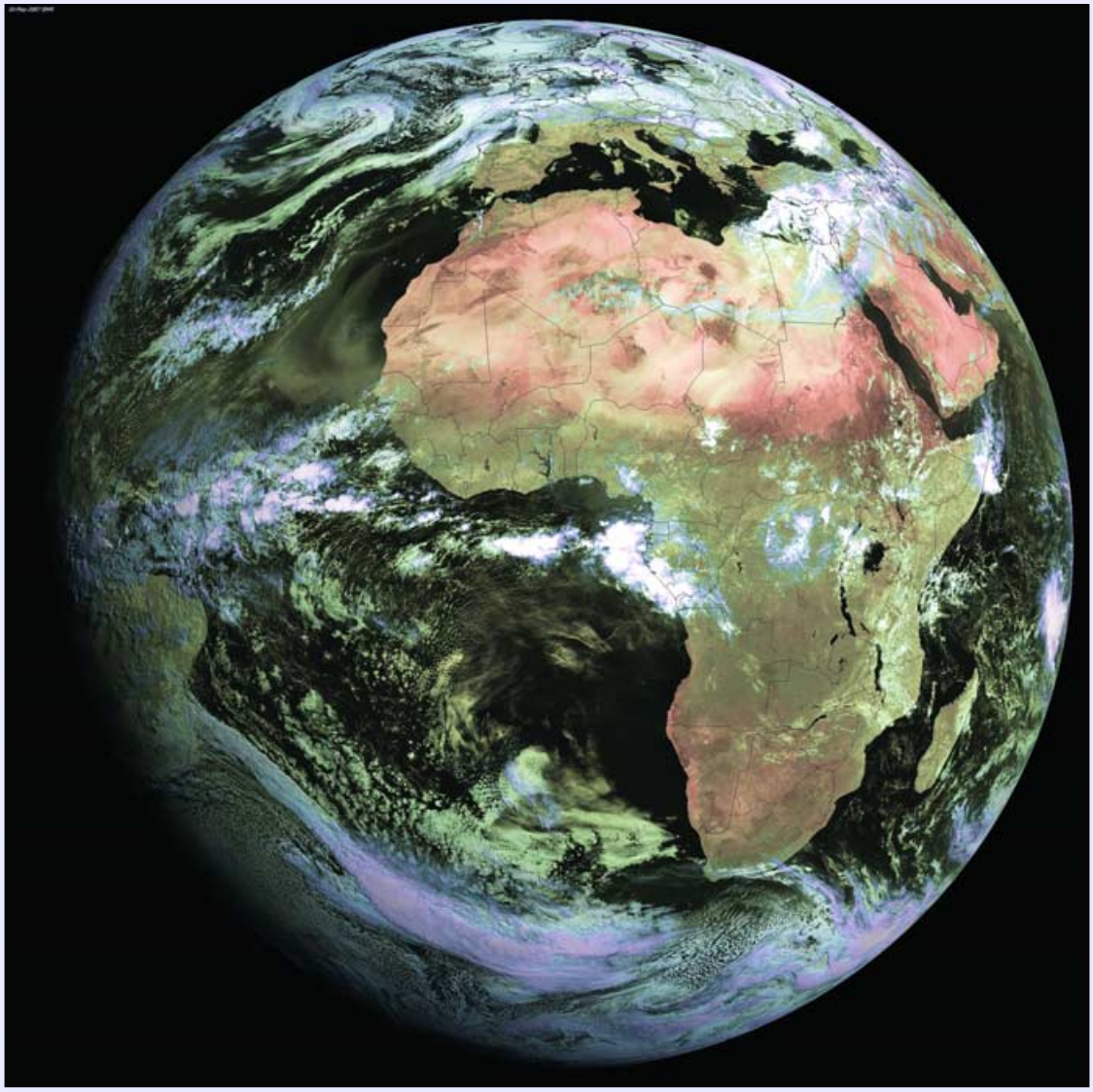
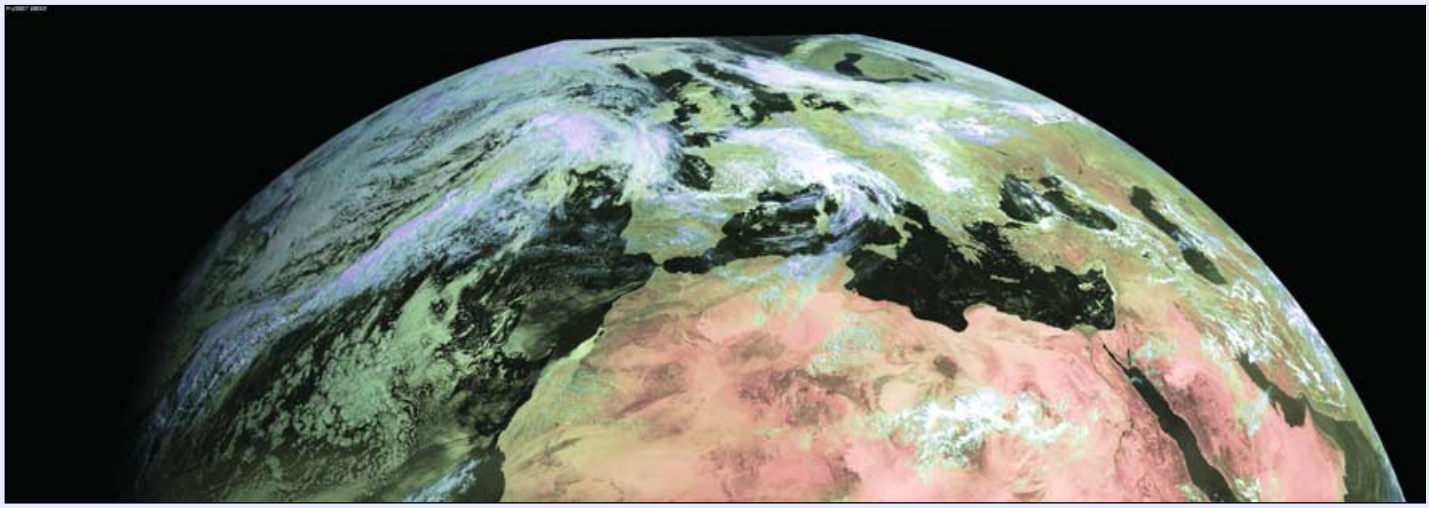


Figure 1 (Top)

This was the final primary transmission from Meteosat-8, received at 09:48 UT on May 10, 2007, immediately prior to the satellite being designated the standby 0° satellite.

Figure 2 (centre)

This is the first rapid scan frame received from MSG-1 at 09:55 UT on June 1, 2007.



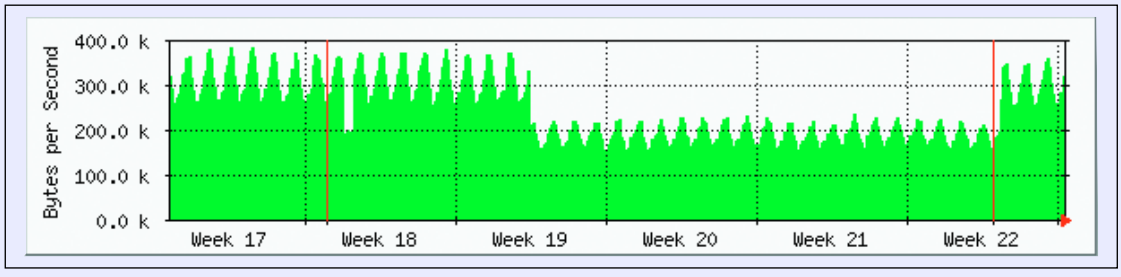


Figure 3

This is a 'monthly' graph of throughput (two-hour averaged) showing the period when MSG-1 was 'silent'.

Streamline your EUMETCast Reception

Minimise Missing Segments by modifying your recv-channels.ini File

Fred van den Bosch

Since the end of May this year, the numbers of missing MSG-segments and Metop chunks I was receiving had decreased greatly:

- MSG: from 2 to 15 per quarter-hour to 0 (zero!)
- Metop: from 5 to 20 per day to almost none (a maximum of just 1-2 per day)

I explain below what I have done, which has also appeared in a number of messages on the MSG-1 forum [1]. Some observations by David Taylor [2] and Arne van Belle have been included in what follows.

Reasoning and Adaptation

While testing the reception of Metop HIRS, MHS etc. I was experiencing some problems and Arne van Belle provided me with a copy of his own *recv-channels.ini* file for comparison. I found a number of small differences and adapted my own file to match Arne's. The differences were:

My old file:

- I used 2 folders for all reception: '*received*' and '*received-AVHRR*'
- I saved the files in 'C:\Program Files\ T Systems\BusinessTV-IP\received'. This file contained only 'target_directory=received' so did not contain the complete path.
- 'allow_execute=1' was active

The new file

- Each type of Metop file has its own folder. I did likewise for MSG-1 data channels 1-3. *MSG Data Manager* has accepted this since v 1.3.4 (March 2004) and it has been documented in its Version History.
- The Target folder is now '*C:\Ecast\xxxx*', where 'xxxx' is, for example. DWDSAT, EPS10 etc. I have used the full path.
- A '#' symbol has been placed before 'allow_execute=1' (commenting out the command). Both David Taylor and I doubt whether this command has any influence.

Example

To indicate how the new file looks, figure 1 shows part of my *recv-channels.ini* file. The complete version can be obtained under 'General Files' from the download page of my website [3].

Some Observations

Files which are sent with a lower frequency all go into one folder, like the SAF data, for instance. Files with a higher frequency, like MSG data channels 1, 2 etc, get their own folder.

Personally, I have chosen to use the full path. The advantage of this is that you see rapidly where the file has been written. It is also possible to use only the name of the folder in 'target_directory'; e.g. 'target_directory=EPS-3'. To do so, a line with 'tmp_directory= C:\Ecast' must be incorporated into the *recv.ini* file under [Parameters].

Saving files in '*\Program Files*' is, for several reasons, a bad idea:

- it can cause problems when you upgrade to Windows Vista
- if Windows crashes, all your data will be lost.

The best solution is to put all data on a separate hard disk and not on separate partitions. For example,

```
[EUMETSAT Data Channel 1]
target_directory= F:\Ecast\MSG\Data Channel 1
```

The advantage of this solution is that the read/write head will always stay in the neighbourhood of the data and therefore does not have to move so much. The more movement, the greater the delay in reading the data.

The second best solution is to place all data on separate partitions, the only solution if just one hard drive is present in your PC. Personally, I have not done this for the *Tellicast* data, which is saved on my C\: drive. My main idea here was that should Windows crash, I would lose a lot of data for a longer time—so those few segments would be of little importance. **All** other data is of course saved on D:\.

Arne for instance, receives 40+ GB per day on a 3 GHz Pentium-4 using only a single 250 GB SATA hard drive divided in a C:\ partition of 20 GB and a D:\ partition of 230 GB.

```
[EUMETSAT Data Channel 1]
target_directory= C:\Ecast\MSG\Data Channel 1

[EUMETSAT Data Channel 2]
target_directory= C:\Ecast\MSG\Data Channel 2

... ditto 3 & 4

[SAF-Europe]
target_directory= C:\Ecast\MSG

[SAF-Americas]
target_directory= C:\Ecast\MSG

... ditto Africa

[DWDSAT]
target_directory= C:\Ecast\MSG

# [EPS-1]
# target_directory= C:\Ecast\EPS - 1

[EPS-2]
target_directory= C:\Ecast\EPS - 2

[EPS-3]
target_directory= C:\Ecast\EPS - 3

... ditto 4 to 18
```

Figure 1 - Part of the recv-channels.ini file

I have a 2.67 GHz Pentium-4 with a 250 GB hard disk divided into a C:\ partition of 15 GB and a D:\ partition of 235 GB.

Finally

I had never expected that these small modifications would have such a large impact. Should you modify your own '*recv-channels.ini*' file, please do so in small steps and let us know the result. I, and undoubtedly many others, are very interested as to which of the above points really 'do the trick'. And finally a note which has appeared most often on the different forums:

'If your system is working well,
please leave it well alone!'

References

1 MSG-1 forum, messages 9799– 9803
http://tech.groups.yahoo.com/group/MSG-1/

2 David Taylor, http://www.satsignal.net/

3 Fred van den Bosch, http://www.fredvandenbosch.nl

GEO visits EUMETSAT HQ in Darmstadt July 5/6, 2007

John Tellick and David Taylor

Earlier this summer, over twelve months of preparation finally came to fruition when forty-two delegates from throughout Europe and the UK assembled for a meeting at EUMETSAT's operations headquarters in Darmstadt, Germany. The party was warmly welcomed by Dr Lars Prahm, Director General of EUMETSAT, who praised GEO's contribution to furthering the amateur use of EUMETCast. Throughout the hectic two-day programme of activities, staff and officials at both EUMETSat and Usingen showed genuine appreciation of GEO's role in the weather satellite sector and could not have been more friendly and helpful. John Tellick and David Taylor have prepared the following illustrated report covering the GEO party's adventures in Germany.

It's not often that you enjoy the opportunity to meet so many fellow enthusiasts from across Europe, people you have come to know well over many years—but only through the medium of e-mail. Equally, it's rare to be afforded the chance to visit the heart of Europe's weather satellite operations and space missions. Imagine the thrill of being able to do both: *that's just what GEO members did in July 2007!*

We met up in the *Ibis Hotel* (photo 3) in Darmstadt on the Wednesday afternoon, where Carol Finnis handed everyone their GEO name badges so that we could put faces to names hitherto known only from e-mails. This was followed by a convivial meal at a nearby Greek restaurant (photo 4)—'A table for 25, please' in our best schoolboy German: or was it in holiday Greek?

EUMETSAT Headquarters

Thursday morning dawned damp and dismal but the spirit of the group was high as we set off on the 20-minute walk to EUMETSAT Headquarters, the impressive building we were familiar with from many photos (see masthead illustration). As we were congregating outside the building, our cameras clicking around the life-size models of MSG and Metop satellites, the rain finally ceased. On entering the impressive atrium, complete with a stream containing carp running through it (photo 5) and a large screen display welcoming GEO (photo 6), we were greeted by Sally Wannop, who impressed us so much with her presentation during last year's GEO Symposium in Leicester.

On our seats in the hallowed ground of the EUMETSAT Council Chamber we each found a goody-bag packed with technical publications and brochures for the day ahead. This included a splendid Metop image of Europe and the UK, specially printed with the heading '*To commemorate the visit of the Group for Earth Observation to EUMETSAT on 5th July, 2007*'.What a start! As we settled in, we were welcomed by Francis Bell (photo 7) before Sally Wannop officially opened our visit by introducing EUMETSAT Director General, Dr Lars Prahm.

Dr Prahm welcomed us most warmly (photo 8) with some highly complimentary remarks about GEO: the quality and content of *GEO Quarterly,* which he reads, plus the important contribution GEO and its members have made—and continue to make—in furthering amateur use of EUMETCast. EUMETSAT has found the technical involvement and feedback from GEO members and our colleagues from Werkgroep Kunstmanen in the Netherlands most useful, and it is very much appreciated.

The opening session began with a new video dealing with all aspects of EUMETSAT operations. Once it concluded, Sally Wannop brought us up to date with current operational status: this included investigations into a recent incident where Meteosat-8 appeared to have suffered a collision from a fragment of space debris and news of some exciting new products and services to come in the not too distant future.

Photo 1 - Jochen Kerkmann
Photo: David Taylor

A coffee break in the atrium (photo 14) was followed by a fascinating illustrated talk from the enthusiastic Jochen Kerkmann (photo 1), entitled *Getting the most out of MSG.* In his talk, Jochum dealt with the use of RGB formats for detailing and highlighting various meteorological and environmental phenomena. There exist both well-known, operationally used RGB combinations, and some other esoteric ones that are more experimental in nature. For any RGB combination, there will be occasions when the precise colour does not turn out as expected; this means that human skill is still required for interpretation. However, RGB does offer much greater analytical potential than simple single-channel greyscale images.

EUMETSAT Operational Facilities Tour

For many, the highlight of the day was the much-anticipated tour of EUMETSAT's operational facilities. The party was split into three groups because of the large numbers, and we visited three areas in turn.

We were allowed into the most impressive MSG control room (photos 2, 9) which contains banks of monitors detailing all aspects of the MSG satellites' parameters,operations and

Photo 2 - The EUMETSAT MSG Control Room
Photo: Arne van Belle

Photo 3 - The Ibis Hotel
Photo: David Taylor

Photo 4 - Wednesday dinner at the Greek Restaurant 'Poseidon'.
Photo: Arne van Belle

Photo 5 - The Stream
Photo: Cecilia Taylor

Photo 6 - 'Welcome to GEO'
Photo: Cecilia Taylor

Photo 7 - Francis Bell welcomes delegates within the EUMETSAT Council Chamber
Photo: David Taylor

Photo 8 - Director General, Dr Lars Prahm welcoming GEO
Photo: David Taylor

Photo 9 - The MSG Control Room
Photo: David Taylor

Back Row	Ben Schellekens	Harm de Wit	Harry Arends	Hendrik Jalving	Peter Smits	Ton van den Bosch	Peter Bradley	David Strickland	David Anderson	Robert Moore	Holger Eckardt	Fred van den Bosch	Eric Dean	Gerald Ihninger	John Button	Roger Jones	Roland Ertl	Marc Peigneux	John Tellick	Rob Alblas
Middle Row	Sally Wannop	Giuseppe Cico	Carsten Arnheiter	David Painter	Brian Davis	Donald Martin	Carol Finnis	Clive Finnis	Peter Green	Irene Storrar	Tim Holdsworth	Cecilia Taylor	Valerie Dean	Karen Ernst	Pamela Schöbel-Pattiselanno					
Front Row	Francis Bell	Lars Prahm	David Taylor	Ruud Jansen	Arne van Belle	Ferdinand Valk	Rob Denton													

Photo 10

photo: EUMETSAT

imagery. There, Justin Larkins described how EUMETSAT were currently checking the charging on Meteosat-8 and Meteosat-9's batteries in preparation for the upcoming eclipse season. A familiar display (David Taylor's *MSG Data Manager*) was visible on the large monitor above operations.

Photo 11 - The EPS Control Room *(Photo: Arne van Belle)*

In the EPS control room, which deals with the Metop polar satellite (photo 11), Gareth Williams guided us round another area replete with monitors carrying information about the Svalbard ground station and various Metop services. We were privileged to have unprecedented access and time for questions at both control rooms.

Finally, in the Archive Facility, Marc Jenner showed us where the terabytes (even petabytes) of downloaded data are now dealt with, and where orders for electronic, digital and photographic copies of EUMETSAT products are processed (photo 15).

The EUMETSAT building includes a most excellent dining facility where we broke off for lunch. Not only was the food excellent, with a superb choice of quality hot and cold items and drinks, but the conservatory-like seating area had a really light and airy atmosphere—with tables reserved for GEO! What a great opportunity this provided to sit down with fellow delegates to discuss the morning with EUMETSAT staff and ask those questions we forgot during the presentations.

We regrouped for the afternoon session when the opening presentation came from Julia Figa (photo 12), and was entitled *Jason-2: Measuring Sea Surface Height from Space*. Although the considerable satellite observation data of the atmosphere and land surfaces now available are invaluable to the meteorologist and for climate studies, since 70% of the Earth is covered by oceans, more precise data about these would add enormously to our knowledge of their role in climatic developments.

Photo 12 - Julia Figa
Photo: David Taylor

Julia explained that some oceanographic data had been available for several years through the *TOPEX/Poseidon* mission and outlined their data services. *Jason-2* however, a co-operation between CNES and NASA, will provide unparalleled high-precision oceanographic data which will help with understanding the ocean's role on weather, climate change, ocean currents and, of course, sea level changes. Julia outlined the various services to be disseminated by *Jason-2* and detailed her area of involvement, sea surface height measurement, and how the satellite measures this. Following the launch of *Jason-2*, scheduled for 2008, some of this satellite's data will be disseminated via EUMETCast.

Julia's talk was followed by François Montagner's presentation, *Metop: Products and Applications* (photo 16). Many GEO members are already familiar with the high-resolution images provided by the AVHRR/3 instrument, but Metop offers much more, through, for example its *GRAS* and *IASI* instruments.

GRAS is a radio occultation sounding instrument which monitors the signals from GPS satellites as they rise and set over the Earth's horizon to measure vertical atmospheric profiles for humidity and temperature. *IASI*, the most advanced instrument aboard Metop, is an 8000-channel infrared sounding interferometer, which establishes temperature and water vapour profiles throughout the troposphere and lower stratosphere, as well as determining concentrations of trace gases such as ozone, methane and carbon monoxide.

François concluded by touching on areas of interest to the AVHRR user: the challenge of handling so much data (Metop dumps a full orbit's worth of data each time it flies over Svalbard) and the resultant delay in supplying data to end user stations. Metop direct read-out services are currently not available and it is unlikely that the VHF-band LRPT service can ever be restored. It is possible that the L-band AHRPT service may be restored (although an attempt to do so during our visit proved unsuccessful). Nevertheless, there is every intention to provide these direct readout services on future Metop satellites.

Photograph

Following a short break for refreshments, all the delegates made their way to the atrium for a group photograph (photo 10, page 21), in which we were privileged to be joined by Director General Dr Lars Prahm. A full-size version may be downloaded from

http://www.satsignal.eu/group-photo.html

After the end of the formal sessions, a small meeting (Photo 18) was convened between Klaus-Peter Renner and team members of the EUMETCast system, and some GEO members who had been participating in system hardware/software testing and problem solving. This was most useful and productive for all concerned, with EUMETSAT taking onboard our comments and suggestions with the possibility of incorporating some of them in future system upgrades and modifications.

There are some great characters at EUMETSAT, including Phil Harvey, who suggested the Darmstädter Ratskeller Hausbrauerei restaurant in the Altes Rathaus (old Town Hall) for dinner on Thursday (photo 19). This is a typical vibrant German establishment where they also brew their own beer! We were delighted to be joined by several EUMETSAT staff, and both technical and non-technical discussions continued long into the evening. Nevertheless, we all made the 07:30 start the next day to board the coach to the Usingen ground station a few kilometres north of Frankfurt.

Usingen

The weather en-route was at times atrocious and it didn't look very encouraging for our visit. However, as we left the autobahn and headed into the pleasant fir-tree clad rolling hills leading towards the picturesque town of Usingen, with its church atop a small hill, the rain stopped and the sky started to brighten. Then, through the trees, we got our first sight of lots of dishes: a change from all those computers at EUMETSAT HQ!

As we alighted from the coach, sunny periods began to develop and skylarks were singing high above the grassy clearings in the forest where the dishes were located. But ominous slate-grey clouds were never far away, providing a dramatic back-drop to the bright white dishes (photo 17).

The visit to the ground station was again brilliant, with complete access to the dishes and control room facilities at a leisurely pace. We started off at the two large Meteosat-8 and -9

command and control dishes (photo 20) and were surprised when, every now and again, the dish actuators switched on with a clunk. Although a fixed dish is normally used for reception from geostationary satellites, there is actually enough short-term movement in these satellites' orbits to necessitate tracking of these high-gain, narrow beamwidth dishes. The sounds that we heard were that tracking taking place in real time. Note how the photo shows the two dishes to be pointed in slightly different directions. This is not an illusion because Meteosat-9, the primary operational satellite, is located exactly at 0°, whereas Meteosat-8 is currently located at about 3.5° west.

We were guided by Phil Harvey and Mohamed Kamel from EUMETSAT who described the operations at the *T-Systems* ground station, where the MSG dishes and facilities are totally under the control of EUMETSAT via links from the adjacent transmission tower. The two control rooms house the data receivers and dish control systems, being split into the Primary Ground Station (PGS, photo 21) and the Backup Satellite Control Centre (BSCC). The BSCC is a smaller version of the Control room at EUMETSAT and can, in an emergency, be used to take control of the satellites when the Main Control Room is down.

We moved on to another clearing where the *T-Systems* EUMETCast uplink dish is located (photo 22). As this uplink frequency is 13.827 GHz, the antennas are not especially large; but as we know, the uplink from this dish to Hot Bird-6 occasionally suffers rain-fade when Usingen experiences exceptionally heavy downpours, resulting in temporary loss of the Ku-band EUMETCast service.

The visit completed, we headed back to Darmstadt for lunch, after which Phil, with the help of some GEO members (finding the right socket for the plug) actuated the life sized model of MSG (photo 23) to set it in rotation—though not at the full operational speed of 100 rpm!

Tour of ESOC

In the afternoon we were treated to an interesting tour of ESOC the European Space Operations Centre, where we were split into two tour groups. The very friendly Dutch lady who guided us round (photo 24) was impressed by our space-related knowledge and pleased to meet the large number of Dutch

Photo 13 - The ESA Control Room
Photo: Arne van Belle

members in our party! She began with the history of European space operations and the eventual forming of the European Space Agency (ESA). A video detailing ESA operations was followed by a visit to the ESA control room (photo 13), from where European satellites are controlled following their launches from Kourou or Baikonur. As there were no launches in progress the control room was not manned. We were, however, able to view the busy control rooms for several active European satellite projects in operation.

Welcome Address to the Group for Earth Observation GEO

by Dr Lars Prahm

On behalf of EUMETSAT, I am very pleased to have the opportunity to welcome GEO members to the EUMETSAT Headquarters and Operational Centre.

EUMETSAT, through its provision of meteorological satellites represents a key component of the Global Observing System. EUMETSAT as a European satellite operator and data provider plays a crucial role in the delivery of environmental data which is used for all forms of meteorology and climate monitoring. In a time where we more frequently see the impact of climate change in our every day lives, the GEO members' contribution, in bringing Earth observation data to the man-in-the-street is most welcome. GEO has made a significant contribution to the success of the low cost EUMETCast reception station - I know that many members of GEO swell our ever increasing numbers of private users of Meteosat and Metop data and products. Your interest, enthusiasm and passion for satellite imagery and all forms of Earth observation data is clear to see.

I regularly receive and read your Quarterly journal and I find many articles both interesting and informative. The quality of the input from a non-funded, voluntary organisation, such as GEO is to be highly commended. My colleagues and I also appreciate the many positive comments you attribute to EUMETSAT and our satellite missions in the many articles you prepare.

I trust the Agenda prepared for you today will allow you to gain further insight into our planned activities and additionally, I hope that you will go away today with a greater understanding of the use and application of some of the data and products EUMETSAT provides to the user community at large. The tour of our Control Centre facilities will allow you to experience at first-hand the nerve-centre of EUMETSATs operational activities.

I see that you are using your time in Germany wisely—I am very pleased to learn that you have organised a visit tomorrow morning to the Usingen Ground Station and that you intend to round off your trip to Darmstadt with a visit to ESA-ESOC.

Once again, thank you for your interest in visiting EUMETSAT and your continued commitment to the promotion of Earth observation data for the amateur user. It only remains for me to wish you a very successful and enjoyable visit.

At the end of the ESOC visit it was time to say goodbye to some delegates who were travelling home that same day. Those of us remaining enjoyed a splendid dinner in the vast Khan's Mongolian restaurant—Chinese and Thai style food. Set meals were available from the menu or, for €15 (about £10), you could have the 'eat as much as you like' option with a choice of more than twenty pre-prepared dishes. Alternatively, you could select your own choice of ingredients and have them cooked in front of you on a large griddle (photo 25).

Homeward Bound

Saturday dawned sunny and warm, and we all said our goodbyes after breakfast. Some of us took the opportunity for a further look around Darmstadt while others made an excursion to Heidelberg before heading off to nearby Frankfurt airport. Everyone agreed that it was a most successful, enjoyable and informative trip.

Report concludes on page 39 .... more photos on page 24 ...

Photo 14 - Refreshment Break
Photo: Cecilia Taylor

Photo 18 - Meeting of Hardware/Software Testers
Photo: David Taylor

Figure 21 - Primary Ground Station
Photo: David Taylor

Photo 15 - David Taylor in the Archive Facility
Photo: EUMETSAT Staff

Photo 19 - Darmstädter Ratskeller Hausbrauerei
Photo: Cecilia Taylor

Photo 22 - EUMETCast Uplink Dish
Photo: Arne van Belle

Photo 16 - François Montagner with Sally Wannop
Photo: David Taylor

Photo 20 - MSG Command and Control Dishes
Photo: David Taylor

Photo 23 - Rotating MSG Model
Photo: Arne van Belle

Photo 24 - Our Dutch Guide
Photo: David Taylor

Photo 17 - Dark Clouds at Usingen
Photo: Ruud Jansen

Photo 25 - Khan's Mongolian Restaurant
Photo: David Taylor

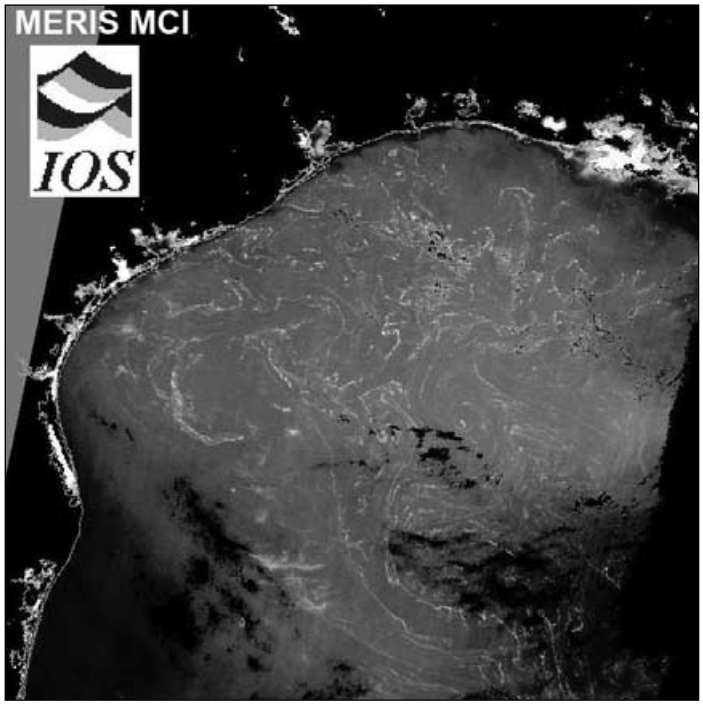
Earth Imaging News

Peter Wakelin

Envisat Images Sargassum Seaweed

The Medium Resolution Imaging Spectrometer (MERIS) on Europe's polar satellite for environment monitoring, Envisat, has, for the first time, detected sargassum, the often dense vegetation famous in nautical lore for entangling ships. MERIS uniquely incorporates a 709 nanometre band and it is this wavelength that has enabled researchers at the Canadian Institute for Ocean Sciences and at the University of South Florida to differentiate between Sargassum and other floating vegetation. A more detailed account of this discovery can be found at:

http://www.esa.int/esaCP/SEMHO6ARR1F_index1.html



Lines of sargassum in the western Gulf of Mexico

Credit: ESA

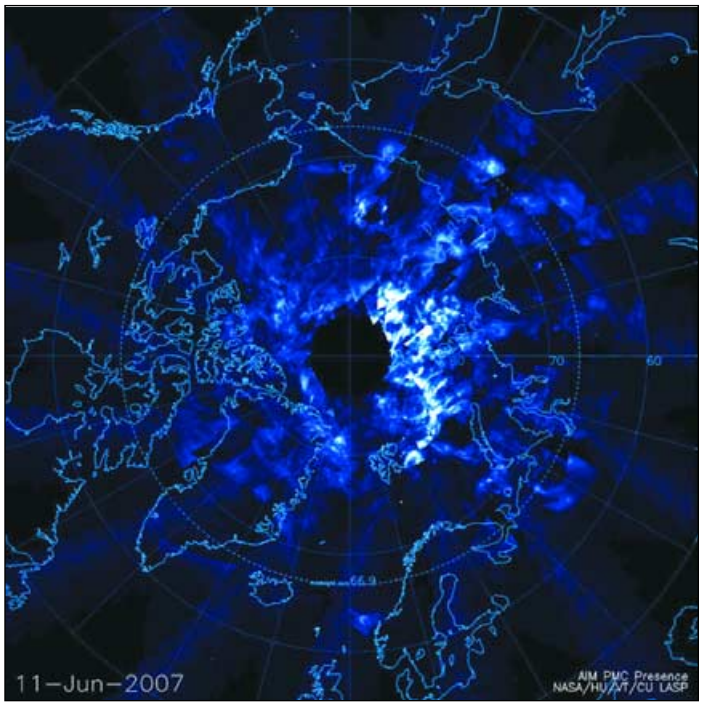
AIM Successfully Images High-Level Clouds

The successful launch of NASA's *AIM* spacecraft (Aeronomy of Ice in the Mesosphere) was reported in the previous issue (page 23) and within a month the first images of this season's Polar Mesospheric Clouds (PMCs) were observed to the north of Europe. These clouds form at an altitude of approximately 84 km, only in the summer, and only at high latitudes where mesospheric temperatures are as low as -170°C.

All three instruments on *AIM* are working perfectly and it is anticipated that early results from the *AIM* mission will be reported at a major international conference on PMCs and other high altitude layered phenomena to be held in Fairbanks, Alaska in August.

Further information on NASA's *AIM* mission can be found at:

http://www.nasa.gov/aim



PMCs over the Arctic imaged by **AIM**

Credit: Cloud Imaging and Particle Size Experiment data processing team at the University of Colorado Laboratory for Atmospheric and Space Physics

China Launches Radar Imaging Satellite

China's recent launch surge continued with the orbiting of its second SAR (synthetic aperture radar) remote sensing satellite, *Yaogan-2*, on May 25. From the northern launch site at Jiuquan, the CZ-2D rocket lifted off towards a sun-synchronous 642 km orbit and achieved China's 100th successful satellite launch since their first orbital mission on April 24, 1970. Some sources claim that the *Yaogan* series also has a military role under the codename *Jianbing-5*. A tiny satellite weighing less than 1 kg, developed by Zhejiang University, was also launched on this mission.

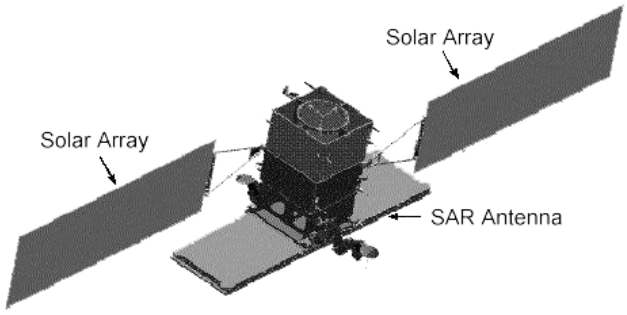
Just six days later, another Chinese launch placed *Sinosat 3*, a C-band domestic communications satellite into geostationary transfer orbit. It was geostationary over 125°E by June 15.

Much of this information has come from Jonathan McDowell's launch reports which are renowned for their accuracy and can be found at:

http:// www.planet4589.org/jsr.html

Imaging Radar Launched for Italy

United Launch Alliance used a Boeing Delta II to launch the first of four *COSMO-SkyMed* radar imaging satellites for Italy on June 8. *COSMO- SkyMed* (Constellation of Small Satellites for Mediterranean basin Observation), funded by *ASI* (Agenzia Spaziale Italiana) and the Italian Ministry of Defence, carries X-band SAR (Synthetic Aperture Radar) equipment for environmental as well as defence and security applications. The



COSMO-1
credit ESA

1,700 kg spacecraft will operate in a sun-synchronous orbit at an altitude of 620 km.

TerraSAR-X Launched

The fifth imaging radar satellite to be launched in the past year took off from Baikonur, Kazakhstan on a Dnepr rocket on June 15. The 1,346 kg German *TerraSAR-X* spacecraft is carrying an X-band synthetic aperture radar imager and was developed jointly by EADS Astrium GmbH and the German Aerospace Centre (DLR Cologne).

In addition to the usual 'stripmap' mode *TerraSAR-X* can operate in 'spotlight' mode when a 10 x 10 km scene can be imaged at a resolution of 1-2 metres. This high resolution will enable scientists to study soil characteristics and even identify different arable crops, and will also improve the mapping of urban areas.

TerraSAR-X
Credit: EADS Astrium

TerraSAR-X incorporates the Tracking, Occultation and Ranging Experiment (TOR) which consists of a dual-frequency GPS as well as a laser reflector unit to assist in maintaining a precise orbit. It was developed jointly by *GeoForschungsZentrum*, Potsdam and the Center for Space Research at the University of Texas.

Just four days after launch, and even before the final operating orbit was achieved, the first test image was received. The image appeared, to loud applause, on the monitors of the DLR Space Operations Centre in Oberpfaffenhofen, near Munich, just 30 minutes after receipt of the data by the Neustrelitz ground station.

DMSP Successfully Operated Without Gyros

The 15th Defense Meteorological Satellite Program spacecraft has operated successfully for 24 hours in a gyroless navigation mode, demonstrating a new, promising capability that can extend portions of a DMSP mission even when critical gyro data are not available.

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The first image from *TerraSAR-X* radar showing the River Don near Volgograd
Credit: DLR/EADS

A DMSP satellite
Credit: Lockheed Martin

GEO Shop

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The 'Pager-Hardened' R2ZX

APT Weather Satellite Receiver

This upgraded version of the German-built R2FX receiver has been developed specially for the UK market and is available solely from the GEO Shop. If you are in an area suffering from pager interference on the NOAA-18 frequency of 137.91 MHz, this receiver should be the answer to your problems - see the R2ZX review in GEO Quarterly No 14.

UK member's price - 159.00 UK non-member's price - £173.00

We still stock the original R2FX receiver which has proved itself to be a top-quality receiver throughout Europe and the world at large. Members in the UK find that the R2FX gives perfect reception of NOAAs 12-17, and in favourable locations (pager-free) of NOAA-18 also.

UK member's price - £140.00 UK non-member's price - £154.00

R2FX Accessory Pack

This contains everything required to implement a complete APT receiving system when used with either the R2FX or R2ZX receiver. It comprises:

- 137 MHz Turnstile Antenna
- UK plug-in power supply
- PC audio lead + PC Serial 'computer control' lead
- Aerial lead (20 m with fitted connector)
- CD of PC shareware starter software
- Instructions

We do not normally ship outside the UK as this receiver should be available elsewhere more cheaply from the manufacturer. But contact the GEO Shop if you wish a quote.

UK member's price - £59.00 UK non-member's price - £69.00

The Bias-Tee allows a mast head preamplifier to be used with the 'Antenna 2' input of an R2FX or R2ZX. Only the 'Antenna 1' input normally feeds power to a preamp. The Bias-Tee now allows you to power twin preamps and maintain the receiver's Antenna Diversity feature.

UK members price - £15.00
UK non-members price - £19.00

TechniSat SkyStar 2 PCI Card

This 'free-to-air' DVB satellite TV and data receiver card recommended by EUMETSAT must be installed inside your computer. It comes with comprehensive installation instructions and a CD-ROM of driver software.

UK members price - £55.00
UK non-members price - £61.00

John Silver's APT preamplifier was featured as a constructors' kit in GEO Quarterly No 12 (December 2006). Now we are able to offer this high-linearity LNA to GEO readers, ready built.

UK members price - £29.50
UK non-members price - £33.50

Telestar Universal Ku-band 0.6 dB Universal LNB

(or similar model)

Digital satellite TV Universal LNB for use with the SkyStar receivers above or any DVB satellite TV receiver.

UK members price - £11.00
UK non-members price - £17.50

GEO PIC 1.0 for the RX2

Programmed with the new channel frequencies required for NOAA-18.

UK - £7.00
UK non-members price - £7.00

Current Price List

	Members Prices UK	EU	RoW	Non Members UK	EU	RoW
APT Equipment						
R2ZX APT Receiver (no PSU)	159.00	163.00	171.00	173.00	177.00	185.00
R2FX APT Receiver (no PSU)	140.00	144.00	152.00	154.00	158.00	166.00
R2FX Accessory Pack	59.00	-	-	69.00	-	-
BNC Lead (0.25 metre)	4.50	5.25	5.75	6.50	7.25	7.75
UK Power Supply Unit (12 volt)	7.50	-	-	10.00	-	-
Dartcom High Quality QFH Antenna	259.00	279.00	-	279.00	299.00	-
Turnstile APT antenna	42.50	-	-	47.50	-	-
John Silver Preamplifier (built)	29.50	30.00	31.00	33.50	34.00	35.00
Bias Tee	15.00	15.50	16.00	19.00	19.50	20.00
GEO-PIC 1.0	7.00	7.80	8.40	7.00	7.80	8.40
GEO/Dartcom EPROM v 1.3	10.00	10.75	11.25	10.00	10.75	11.25
Martelec MSR40 EPROM	10.00	10.75	11.25	10.00	10.75	11.25
EUMETCast Equipment						
TechniSat SkyStar 2 PCI Card	55.00	56.50	-	61.00	62.50	-
Telestar 80 cm dish with LNB	54.00	-	-	61.00	-	-
Telestar Ku band universal LNB	11.00	12.50	-	17.50	19.00	-
Technisat Satfinder Alignment Meter	21.50	24.50	-	24.50	27.50	-
Miscellaneous						
GEO Quarterly Back Issues (subject to availability)	3.50	4.20	5.10	n/a	n/a	n/a
GEO 2004 CD (PDF back issues)	8.00	8.80	9.30	n/a	n/a	n/a
GEO 2005 CD (PDF back issues)	8.00	8.80	9.30	n/a	n/a	n/a
GEO 2006 CD (PDF back issues)	8.00	8.80	9.30	n/a	n/a	n/a
GEO Membership (4 x *GEO Quarterly*)	20.00	24.00	28.00	20.00	24.00	28.00

All prices are in £ sterling and include postage and packaging

Ordering and Shipping

We will ship by post, so please allow a few days for items to arrive in Europe and perhaps a few weeks for the Rest of the World.

Orders should be sent to:

GEO Shop,
44 Disraeli Road
Christchurch BH23 3NB
Dorset, England

If you are paying by credit card, you can FAX us your order to:

+44 (0) 1202 893 323

And remember, you can now order through the GEO Website using ***PayPal***.

TechniSat SatFinder Antenna Alignment Meter

This sensitive meter is a great help in setting up and aligning the dish for maximum signal. The meter comes with full instructions.

UK members price - £21.50
UK non-member's price - £24.50

Not a GEO Member?

GEO can provide most of the items advertised—with the exception of GEO Quarterly back-issues and CDs—to both members and non members. However, non-members cannot benefit from the discounted prices available to members.

Why not join GEO and take advantage of the discounted prices we can offer you as a member?

Subscription Rates (12 months/4 issues of GEO Quarterly) are just £20 (UK), £24 (EU) and £28 (rest of world).

Telestar 80 cm dish and Universal 0.6 dB LNB

(or similar model)

A quality German made aluminium dish and LNB with an AZ/EL mount to fit onto a vertical pole. (Wall or patio mounts are available from local satellite TV dealers)

UK members price - £54.00
UK non-members price - £61.00

NOAA Satellite Predictions

(Based on Latitude 52°N, Longitude 2°W, UT/GMT)

	NOAA 12 137.50 MHz	NOAA 15 137.50 MHz	NOAA 17 137.62 MHz	NOAA 18 137.91 MHz
Sep 01	04:44 06:23 16:11 17:51	06:04 07:44 15:52 17:32	10:19 11:59 20:08 21:47	01:45 03:26 11:39 13:19
Sep 02	05:59 07:39 15:46 17:26	05:40 07:20 15:28 17:08	09:56 11:36 19:45 21:24	01:35 03:16 11:29 13:09
Sep 03	05:34 07:14 15:22 17:01	05:16 06:57 15:05 16:44	09:33 11:13 21:01 22:42	01:24 03:05 11:19 12:58
Sep 04	05:09 06:49 14:58 16:36	04:53 06:33 16:20 18:01	10:50 12:30 20:38 22:18	01:14 02:55 11:09 12:48
Sep 05	04:45 06:24 16:12 17:52	06:09 07:49 15:56 17:37	10:27 12:07 20:15 21:55	01:04 02:45 12:38 14:20
Sep 06	06:00 07:40 15:47 17:27	05:45 07:25 15:33 17:13	10:04 11:44 19:53 21:31	02:34 04:15 12:27 14:09
Sep 07	05:35 07:15 15:23 17:02	05:21 07:01 15:10 16:48	09:41 11:21 21:08 22:50	02:24 04:05 12:17 13:59
Sep 08	05:10 06:50 14:59 16:37	04:57 06:37 16:25 18:06	10:58 12:38 20:46 22:26	02:13 03:54 12:07 13:48
Sep 09	04:46 06:25 16:13 17:53	04:34 06:13 16:01 17:42	10:34 12:15 20:23 22:02	02:03 03:44 11:57 13:37
Sep 10	06:01 07:41 15:48 17:28	05:49 07:30 15:37 17:17	10:11 11:51 20:00 21:39	01:53 03:34 11:46 13:27
Sep 11	05:36 07:16 15:24 17:03	05:26 07:06 15:14 16:53	09:48 11:28 19:38 21:16	01:42 03:23 11:36 13:16
Sep 12	05:11 06:51 15:00 16:38	05:02 06:42 14:51 16:29	09:25 11:05 20:53 22:34	01:32 03:13 11:26 13:06
Sep 13	04:47 06:27 16:14 17:54	04:38 06:18 16:05 17:46	10:42 12:22 20:30 22:10	01:21 03:02 11:16 12:55
Sep 14	06:02 07:42 15:49 17:29	05:54 07:34 15:42 17:22	10:19 11:59 20:08 21:47	01:11 02:52 11:06 12:45
Sep 15	05:37 07:17 15:25 17:04	05:30 07:10 15:18 16:58	09:56 11:36 19:45 21:24	01:01 02:42 12:35 14:17
Sep 16	05:12 06:52 15:01 16:39	05:06 06:46 14:55 16:34	09:33 11:13 21:01 22:42	02:31 04:12 12:24 14:06
Sep 17	04:48 06:28 16:15 17:55	04:43 06:22 16:10 17:51	10:50 12:30 20:38 22:18	02:21 04:02 12:14 13:55
Sep 18	06:03 07:43 15:50 17:30	05:58 07:39 15:46 17:26	10:27 12:07 20:15 21:55	02:10 03:51 12:04 13:45
Sep 19	05:38 07:18 15:26 17:05	05:35 07:15 15:23 17:02	10:04 11:44 19:53 21:31	02:00 03:41 11:54 13:34
Sep 20	05:13 06:53 15:02 16:40	05:11 06:51 15:00 16:38	09:41 11:20 21:08 22:50	01:50 03:31 11:43 13:24
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Sep 22	06:04 07:44 15:51 17:31	06:03 07:43 15:51 17:31	10:34 12:14 20:23 22:02	01:29 03:10 11:23 13:03
Sep 23	05:39 07:19 15:27 17:06	05:39 07:19 15:27 17:07	10:11 11:51 20:00 21:39	01:18 02:59 11:13 12:52
Sep 24	05:15 06:54 15:03 16:41	05:15 06:55 15:04 16:43	09:48 11:28 19:38 21:16	01:08 02:49 12:42 14:24
Sep 25	04:50 06:30 16:17 17:58	04:52 06:31 16:19 18:00	09:25 11:05 20:53 22:34	00:58 02:38 12:32 14:14
Sep 26	06:05 07:45 15:52 17:32	06:08 07:48 15:55 17:36	10:42 12:22 20:30 22:10	02:28 04:09 12:21 14:03
Sep 27	05:40 07:20 15:28 17:07	05:44 07:24 15:32 17:11	10:19 11:59 20:07 21:47	02:18 03:59 12:11 13:52
Sep 28	05:16 06:55 15:04 16:42	05:20 07:00 15:08 16:47	09:56 11:36 19:45 21:23	02:07 03:48 12:01 13:42
Sep 29	04:51 06:31 16:18 17:59	04:56 06:36 14:45 16:23	09:33 11:13 21:00 22:41	01:57 03:38 11:51 13:31
Sep 30	06:06 07:46 15:53 17:33	04:32 06:12 16:00 17:40	10:49 12:30 20:38 22:18	01:47 03:28 11:40 13:21
Oct 01	05:41 07:21 15:29 17:08	05:48 07:28 15:36 17:16	10:26 12:07 20:15 21:54	01:36 03:17 11:30 13:10
Oct 02	05:17 06:56 15:05 16:43	05:24 07:04 15:13 16:52	10:03 11:43 19:52 21:31	01:26 03:07 11:20 13:00
Oct 03	04:52 06:32 16:19 18:00	05:01 06:40 14:50 16:28	09:40 11:20 21:08 22:49	01:15 02:56 11:10 12:49
Oct 04	06:07 07:47 15:54 17:34	04:37 06:17 16:04 17:45	10:57 12:37 20:45 22:26	01:05 02:46 12:39 14:21
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Oct 06	05:18 06:57 15:06 16:44	05:29 07:09 15:17 16:56	10:11 11:51 20:00 21:39	02:25 04:06 12:18 14:00
Oct 07	04:53 06:33 16:20 18:01	05:05 06:45 14:54 16:32	09:48 11:28 19:37 21:16	02:15 03:56 12:08 13:49
Oct 08	06:08 07:48 15:55 17:35	04:41 06:21 16:09 17:50	09:25 11:05 20:53 22:33	02:04 03:45 11:58 13:39
Oct 09	05:43 07:23 15:31 17:10	05:57 07:37 15:45 17:25	10:42 12:22 20:30 22:10	01:54 03:35 11:48 13:28
Oct 10	05:19 06:58 15:07 16:45	05:33 07:13 15:22 17:01	10:19 11:59 20:07 21:46	01:44 03:25 11:38 13:18
Oct 11	04:54 06:34 16:21 18:02	05:10 06:50 14:58 16:37	09:55 11:36 19:45 21:23	01:33 03:14 11:27 13:07
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Oct 18	05:21 07:00 15:09 16:48	05:42 07:22 15:30 17:10	10:34 12:14 20:22 22:02	02:01 03:42 11:55 13:36
Oct 19	04:56 06:36 16:23 18:04	05:18 06:59 15:07 16:46	10:11 11:51 20:00 21:39	01:51 03:32 11:45 13:25
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Oct 21	05:46 07:26 15:34 17:13	04:31 06:11 15:58 17:39	09:25 11:04 20:52 22:33	01:30 03:11 11:24 13:04
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	NOAA 12 137.50 MHz	NOAA 15 137.50 MHz	NOAA 17 137.62 MHz	NOAA 18 137.91 MHz
Nov 01	06:14 07:54 16:01 17:42	05:08 06:48 14:57 16:36	10:10 11:50 19:59 21:38	01:17 02:58 11:11 12:51
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Nov 05	06:15 07:55 16:02 17:43	05:13 06:53 15:01 16:40	10:18 11:58 20:07 21:46	02:16 03:57 12:09 13:51
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Nov 30	05:56 07:36 15:44 17:23	05:15 06:55 15:04 16:43	10:40 12:21 20:29 22:09	01:18 02:59 11:13 12:52
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Dec 09	05:33 07:13 15:22 17:00	05:00 06:40 14:49 16:28	10:32 12:13 20:21 22:01	01:26 03:07 11:20 13:00
Dec 10	05:09 06:49 16:36 18:17	04:37 06:16 16:04 17:45	10:09 11:49 19:58 21:37	01:15 02:56 11:10 12:49
Dec 11	06:24 08:04 16:11 17:52	05:53 07:33 15:40 17:20	09:46 11:26 19:36 21:14	01:05 02:46 12:39 14:21
Dec 12	05:59 07:39 15:47 17:26	05:29 07:09 15:17 16:56	09:23 11:03 20:51 22:32	00:55 02:35 12:28 14:10
Dec 13	05:34 07:14 15:23 17:01	05:05 06:45 14:54 16:32	10:40 12:20 20:28 22:08	02:25 04:06 12:18 14:00
Dec 14	05:10 06:50 16:37 18:18	04:41 06:21 16:08 17:49	10:17 11:57 20:06 21:45	02:14 03:56 12:08 13:49
Dec 15	06:25 08:05 16:12 17:53	05:57 07:37 15:45 17:25	09:54 11:34 19:43 21:22	02:04 03:45 11:58 13:38
Dec 16	06:00 07:40 15:48 17:27	05:33 07:13 15:21 17:01	09:31 11:11 20:59 22:40	01:54 03:35 11:47 13:28
Dec 17	05:35 07:15 15:24 17:02	05:09 06:49 14:58 16:37	10:48 12:28 20:36 22:16	01:43 03:24 11:37 13:17
Dec 18	05:11 06:51 16:38 18:19	04:45 06:25 16:13 17:54	10:24 12:05 20:13 21:52	01:33 03:14 11:27 13:07
Dec 19	06:26 08:06 16:13 17:54	06:01 07:42 15:49 17:29	10:01 11:41 19:50 21:29	01:23 03:03 11:17 12:57
Dec 20	06:01 07:41 15:49 17:28	05:37 07:18 15:26 17:05	09:38 11:18 21:06 22:47	01:12 02:53 11:07 12:46
Dec 21	05:36 07:16 15:25 17:03	05:14 06:54 15:02 16:41	10:55 12:35 20:43 22:24	01:02 02:43 12:36 14:18
Dec 22	05:12 06:52 16:39 18:20	04:50 06:30 16:17 17:59	10:32 12:12 20:20 22:00	02:32 04:13 12:25 14:07
Dec 23	06:27 08:07 16:14 17:55	04:26 06:06 15:53 17:34	10:09 11:49 19:58 21:37	02:22 04:03 12:15 13:57
Dec 24	06:02 07:42 15:50 17:29	05:42 07:22 15:30 17:10	09:46 11:26 19:35 21:14	02:11 03:53 12:05 13:46
Dec 25	05:37 07:17 15:26 17:04	05:18 06:58 15:07 16:45	09:23 11:03 20:51 22:31	02:01 03:42 11:55 13:35
Dec 26	05:13 06:53 16:40 18:21	04:54 06:34 14:43 16:22	10:40 12:20 20:28 22:08	01:51 03:32 11:45 13:25
Dec 27	06:28 08:08 16:15 17:56	04:31 06:10 15:58 17:39	10:17 11:57 20:05 21:44	01:40 03:21 11:34 13:14
Dec 28	06:03 07:43 15:51 17:30	05:46 07:27 15:34 17:14	09:54 11:34 19:43 21:21	01:30 03:11 11:24 13:04
Dec 29	05:38 07:18 15:27 17:05	05:22 07:03 15:11 16:50	09:31 11:10 20:58 22:39	01:20 03:00 11:14 12:53
Dec 30	05:14 06:54 15:03 16:41	04:59 06:39 14:48 16:26	10:47 12:28 20:35 22:16	01:09 02:50 11:04 12:43
Dec 31	04:49 06:29 16:16 17:57	04:35 06:15 16:02 17:43	10:24 12:04 20:13 21:52	00:59 02:40 12:33 14:15

You can download a PDF version of these predictions from: ***http://www.geo-web.org.uk/predictions.pdf***

GEO Helplines

Douglas Deans
Dunblane, Perthshire, SCOTLAND
All aspects of weather satellites from APT, HRPT to Meteosat-8 DVB/EUMETCast systems.

- telephone:(01786) 82 28 28
- e-mail: dsdeans@tiscali.co.uk

John Tellick
Surbiton, Surrey, ENGLAND
Meteosat-8 advice - registering for the various MSG services, hardware and software installation and troubleshooting. John will also field general queries about any aspect of receiving weather satellite transmissions.

- telephone: (0208) 390 3315
- e-mail: info@geo-web.org.uk

Keith Holland
London, ENGLAND
Specifically, help for APT users (137 MHz band).

- e-mail: geo@koholland.plus.com

David Strickland
Truro, Cornwall, ENGLAND
David has set up his own wireless network system of three computers. He has interests in electronic design and prototyping, general computing, microchip processors with various facilities and of course MSG satellite imaging. He will be happy to discuss any of the above topics, and to help anyone local, including viewing his setup.

- e-mail: David@Strickland.uk.com

Geoff Morris GW3ATZ
Shotton, Flintshire, NE WALES
Geoff has lots of experience with aerial, co-ax,connectors, mounting hardware etc. and has also done a lot of work with the orbiting satellites. Geoff has been a EUMETCast Meteosat-8 user for some time and is familiar with David Taylor's MSG software; he should be able to share his experiences with newcomers to this branch of the hobby.

- Tel: (01244) 818252
- e-mail: gw3atz@btopenworld.com

Guy Martin G8NFU
Biggin Hill NW Kent, ENGLAND
Guy is prepared to advise anyone who wishes to receive MSG under Windows 2000.

- agm@tonbridge-school.org

Hector Cintron
San Juan, Puerto Rico, USA
Hector is prepared to field enquiries on HRPT, APT, EMWIN and NOAAPORT

- Phone: 787-774-8657
- e-mail: n1tkk@hwic.net

Email contact can of course be made at any time, but we would ask you to respect privacy by restritricting telephone contact to the period 7.00-9.00 pm in the evenings.

Internet News/Discussion Groups

There are a numerous Internet-based discussion groups available to weather satellite enthusiasts. You can join any of these by sending an e-mail to the appropriate address, with a request to subscribe. Indeed, a blank e-mail containing the word 'subscribe' in its Subject line is all that is required. Some of the more useful groups and their contact addresses are listed below.

GEO-Subscribers

This is a group where GEO members can exchange information relating to either GEO itself or Earth observation satellites and related matters.

http://tech.groups.yahoo.com/group/GEO-Subscribers/

Satsignal

An end-user self help group for users of David Taylor's Satellite Software Tools including the orbit predictor WXtrack; the file decoders GeoSatSignal and SatSignal; the HRPT Reader and image creator program; the image remapper GroundMap; and software for the EUMETCast service—the MSG Data Manager, the AVHRR Manager and the ATOVS Reader.

http://tech.groups.yahoo.com/group/SatSignal/

MSG-1

A forum dedicated to Meteosat Second Generation (MSG), where members can share information about the EUMETCast reception hardware and software for the Meteosat geostationary satellites.

http://tech.groups.yahoo.com/group/MSG-1/

METOP

A forum for users of high-resolution AHRPT data from the MetOp satellite, available via EUMETCast.

http://tech.groups.yahoo.com/group/METOP/

AVHRR

A forum for users who download high-resolution EARS-AVHRR data from the NOAA polar orbiting weather satellites via EUMETCast.

http://tech.groups.yahoo.com/group/AVHRR/

ATOVS

A Group for discussions about using ATVOS data. With 40 sounder channels (20 microwave, 19 thermal and 1 visible), there is a vast amount of data available. Data from the whole world is available from CLASS (www.class.noaa.gov) and for an extended Europe, via EUMETCast.

http://tech.groups.yahoo.com/group/ATOVS/

Weather Satellite Reports

A group providing reports, updates and news on operational aspects of weather satellites.

http://tech.groups.yahoo.com/group/weather-satellite-reports/

WXtoImg

Users of the WXtoImg software package for capturing and imaging NOAA APT can air their problems, discuss its features and ask questions about it.

http://groups.yahoo.com/group/wxtoimg-l/

Websites

There are numerous websites devoted to Earth observation and weather satellite images. Here are just a few of the best ones. Note that some of these are *Case Sensitive*.

NASA Earth Observation Newsroom

A high-resolution satellite image of an interesting area or weather event is posted each day. An archive of such images stretching back several years is available.

http://earthobservatory/nasa.gov/Newsroom/NewImages/images.php3

Earth Observatory Natural Hazards

Images of recent major hazards (severe storms, fires, volcanic eruptions, floods) are posted. A great site for images of tropical cyclones and hurricanes.

http://earthobservatory/nasa.gov/NaturalHazards/

MODIS Rapid Response System

Recent high-resolution imagery from NASA's Terra and Aqua satellites is posted here. There is also a gallery of near real-time current images.

http://rapidfire.sci.gsfc.nasa.gov/gallery/

The Copy Deadline for GEO Quarterly No 16 is Saturday, October 27

The Editor is always on the lookout for articles and images for inclusion in GEO Quarterly. These can relate to any aspect of Earth Imaging, especially:

- Technical articles concerning relevant hardware / software
- Construction projects
- Weather satellite images
- Reports on weather phenomena
- Descriptions of readers' satellite imaging stations
- Activities from overseas readers
- Letters to the Editor
- Problems and Queries for our experts to answer

Contributions should of course be original and, where possible, should be submitted to the editor in electronic format (floppy disc, e-mail attachment, CD). But of course we will also accept handwritten or typed copy should the need arise.

Please note, however, that **major articles** which contain large numbers of satellite images, photographs or other illustrations should be submitted **as early as possible** so that they can be prepared and made up into pages in time for publication.

Images and Diagrams

Images can be accepted in any of the major bitmap formats, e.g. JPG, BMP, GIF, TIFF etc. Images in both monochrome and colour are welcomed for inclusion. Line drawings and diagrams are preferred in Windows metafile and postscript formats. We can also scan original photographs, negatives and slides.

Gridding, Overlays and Captions

Please note that readers' satellite images should be provided ***without*** added grid lines, country outlines or captions ***unless*** these are considered essential to illustrate an article.

If your article submission contains embedded images and diagrams, please note that it is essential that you **also submit the individual images** in one of the formats described above: these are essential for page make-up purposes.

Submission of Copy

All materials for publication should be sent to the Editor, Les Hamilton, 8 Deeside Place, Aberdeen, AB15 7PW, Scotland.

Materials may also be sent as attachments to the following e-mail address:

geoeditor@geo-web.org.uk

Larger attachments (1 Mb to 10 Mb) are best sent to:

editor.geo@googlemail.com

And finally . . . if you do have material ready for the next GEO Quarterly, please submit it as soon as it is ready—do not wait till the deadline before sending it in. This simply creates an editorial log-jam.

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Reviewing some Historical Weather Satellite Images

Marciano Righini, I4MY** and **Giampaolo Rossini, IW4CSG

Lake Nasser

When we receive an image of Egypt from a satellite, we are accustomed to seeing a widening in the course of the river Nile south of Aswan. The construction of the huge Aswan dam converted a long stretch of the river upstream into a reservoir.

Figure 1 is a first generation Meteosat HRI VIS image which shows a long lake which is named after President Nasser. The lake is relatively recent, more recent than the earliest weather satellites. Have a look at Figure 2: this is a frame from ITOS-1 taken in 1970. Yes, there is a small lake created by an old dam built in 1902, but the big Aswan dam was still under construction. It was finished in 1971 just in time to avoid the damage of the great drought of 1972.

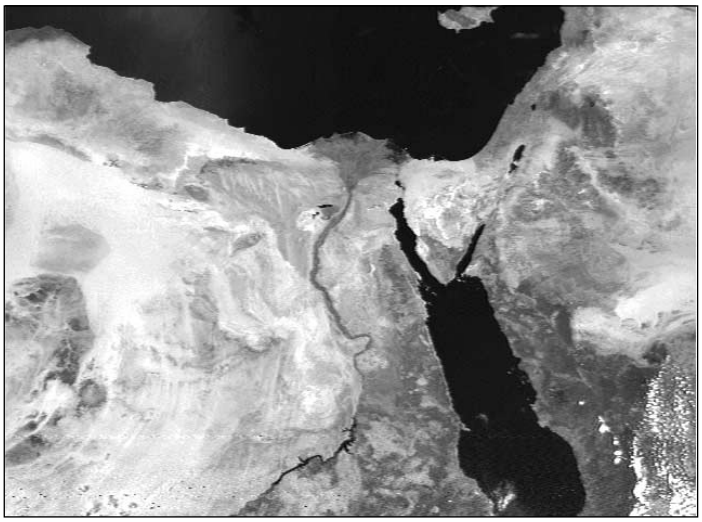


Figure 1
Egypt showing Lake Nasser in the course of the Nile (Meteosat HRI visible)

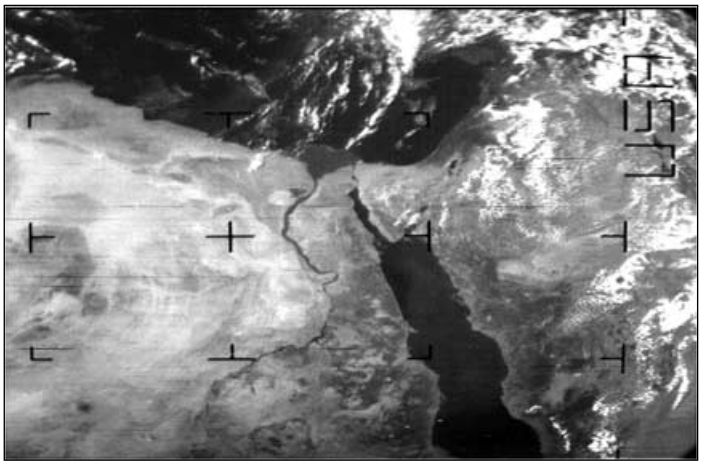


Figure 2 - A frame from ITOS-1, taken in 1970, before the construction of the big Aswan dam.

The Basin of the River Po

Most of northern Italy is occupied by the basin of the river Po, a broad plain whose boundaries are the Alps, the great chain of the Apennines stretching from the gulf of Genoa to the Adriatic and the Adriatic Sea.

Perhaps the best image of the area we have ever acquired is that shown in figure 3 because, on that May day in 1996, the atmosphere was very dry; all the details a NOAA can see are clear and sharp. The course of the river Po is visible from the western Alps to the Adriatic Sea where it drains into a wide delta to the south of the Venice lagoon.

The picture shows not only the structures of Nature, but also the work of man. A NOAA satellite flying over a flat area always shows cities and towns as gray spots, and in this image there are a lot because the broad plain is densely populated. But we want to call your attention to an interesting feature: a long straight road running northwest at the foot of the Apennines, from Rimini on the Adriatic to Piacenza, for 283 kilometres. This is the Via Emilia (or Aemilian Way), a highroad constructed in 187 BC by the consul M Aemilius Lepidus, whence its name. The road also gives its name to the region it crosses. Today, parallel with it, are both a railway and a motorway. The sensor in the satellite can see it because there are a lot of built-up areas along the road : factories, stores, houses, etc.

Figure 4 is a winter IR image where the warm Via Emilia stands out against the cold countryside. The largest spot is Bologna, the capital of the region where we live, but Ravenna, our home town, is not on the Via Emilia; It is located in splendid isolation, 'Far from the Madding Crowd'.

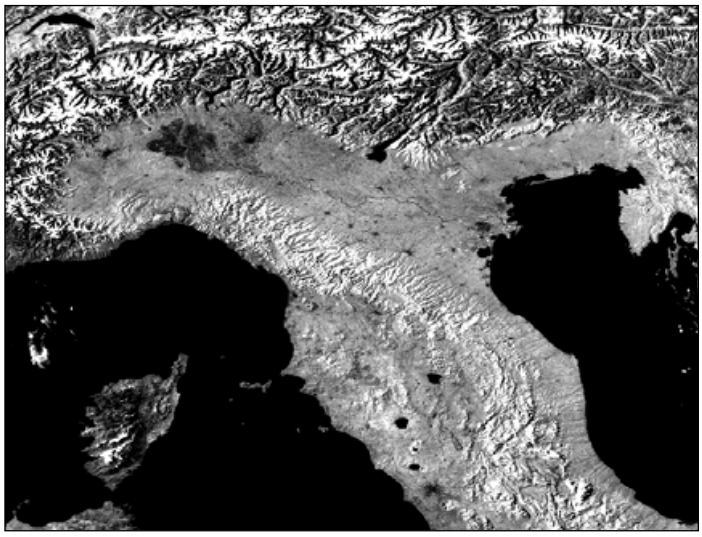


Figure 3
NOAA-10, HRPT, CH.2, 29 May 1996, 16:07 UT.

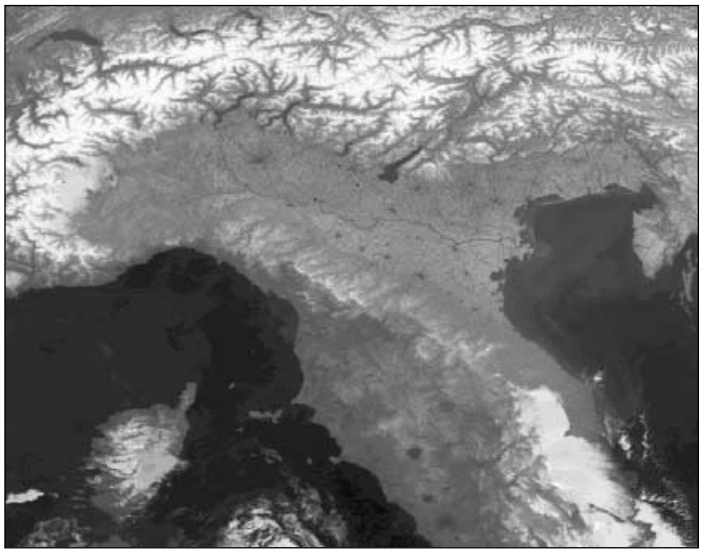


Figure 4
NOAA-15, HRPT, CH.3b, 23 February 2003, 17:38 UT.

Reflections of Electromagnetic Waves

R W Hollander

Reflections of EM-waves play an important role in the reception of satellite signals. It is possible to have very poor reception with an antenna that performs very well at another location. One part of the game is to construct an antenna that is tolerant of reflections; the other part is to find a location where reflections are minimal.

In calculations regarding reflections of EM-waves on a surface **S**, e.g. ground, from a transmitting antenna **T**, it is often convenient to introduce a mirror antenna **M** (figure 1).

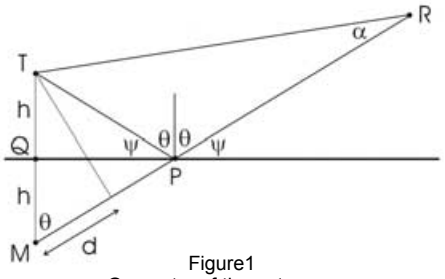


Figure1
Geometry of the antennas
and the reflecting EM-wave.

A receiving antenna **R** 'sees' the direct wave **TR** from **T** and a reflected wave **TPR**, also emitted from **T**, which seems to come from **M**. The result is that **R** 'sees' the vector sum of both waves. This summed wave seems to come from a direction somewhere within the angle **α**.

At the reflection point **P**, both the amplitude and the phase of the wave will change. When we calculate the vector sum of the direct and reflected wave we have to take into account this change in amplitude and phase. The phase of the direct and the reflected wave is not only different because of the reflection; the difference in path length also introduces a phase difference.

When the receiving antenna **R** is very far away compared to the height **h** of the transmitting antenna above the reflecting surface **S**, then the angle **α** becomes very small and the path difference becomes

$$\mathbf{d} = 2\mathbf{h}\cos\boldsymbol{\theta}$$

The phase difference due to this path length difference is

$$\Delta\boldsymbol{\varphi} = 2\boldsymbol{\pi}\,\mathbf{d} / \boldsymbol{\lambda}$$

where **λ** is the wavelength.

The change in amplitude and phase at the reflection point P is expressed by one complex reflection coefficient **Γ** [1],

$$\Gamma = \frac{\sin\psi - z}{\sin\psi + z}$$

with, for horizontally polarised waves (where, if T is a dipole antenna then T is parallel with S,

$$z = z_H = \sqrt{\varepsilon_c - \cos^2\psi}$$

and for vertically polarised waves (where, if T is a dipole antenna then T is perpendicular to S,

$$z = z_V = \frac{1}{\varepsilon_c}\sqrt{\varepsilon_c - \cos^2\psi}$$

where ε_c is the complex relative electric permittivity:

$$\varepsilon_c = \varepsilon_r - j\frac{\sigma}{\varepsilon_0\omega}$$

and ε_r the normal relative electric permittivity of **S**, ε_0 the absolute electric permittivity of **S**, **σ** the conductivity of **S** and

$$\boldsymbol{\omega} = 2\boldsymbol{\pi}\mathbf{f}$$

the radial frequency.

Until now, the mirror antenna **M** is only used to simplify the calculation of the phase difference **Δφ** and to find the direction of the reflected wave. The physics of the reflection at **P** is completely contained in **Γ**.

The reflection of EM-waves is also described in ARRL [2]. The problem there is that part of the physics of the reflection in **P** is incorporated in the properties of the mirror antenna **M**. In particular, a phase change of **π** radians (180°) is introduced in **M**, but only in the case of a horizontally polarised field. There are good theoretical reasons to do so, but the formulae for **Γ** have to be changed as well to account for this **π** radians phase change of **M** relative to **T**. The phase change is incorporated correctly in the reflection coefficient by ARRL.

However, the explanation of what happens at the reflection point (the physics of the reflection) is rather difficult to understand in ARRL.

There are contradictions between text and figures, and between the description of the reflections of EM-waves in chapter 3 (pp 14-17) and chapter 27 (p 47). These problems arise from the fact that the model in which a mirror antenna **M** is used with properties, which include the effect of the reflection, is meant for calculations. If you use this model to explain what the phase changes are at reflection, especially for horizontally polarised waves, you end up with a mess when you try to explain the physics of the reflection using formulae intended for use with a mirror antenna in which already a **π** radians phase change is introduced.

What happens with horizontally polarised waves; e.g. from a horizontal dipole above ground? In this case, the E-vector is always parallel with the reflecting surface **S**, independent of the reflection angle **ψ**. In the case of a perfect ground (a good conductor, no losses) the E-vector in the plane of the conducting ground plane at point **P** has to vanish. The amplitudes of the incoming wave and the reflected wave are the same (no losses).

The E-vector can only be zero at **P** when the phases of the incoming and the reflected waves are opposite (have a phase difference of **π** radians). By convention, the phase of the reflected wave is **-π** radians relative to the incoming wave. If the ground conditions are not perfect, then losses occur on reflection. The amplitude of the reflected wave is smaller than the amplitude of the incoming wave and the phase change is not exactly 180°.

H-polarised waves have their E-vector at **P** completely in the reflecting plane **S**. V-polarised waves only have one component of their E-vector at **P** in the reflecting plane **S**; the other component is perpendicular to **S**. The ratio of these components depends on the reflection angle.

For the horizontal component, the same story applies as described for H-polarised waves. The vertical component of the E-vector has to be 'continuous', which means that the electric field component perpendicular to a surface is the same before and after the reflection. The surface will reflect (part of) the vertical component of the EM-wave if the reflecting surface is conducting. If the conduction is poor, then most of the wave will penetrate the ground and only a small fraction will be reflected. The vertical component of the E-vector of the incoming wave has to be the same as the

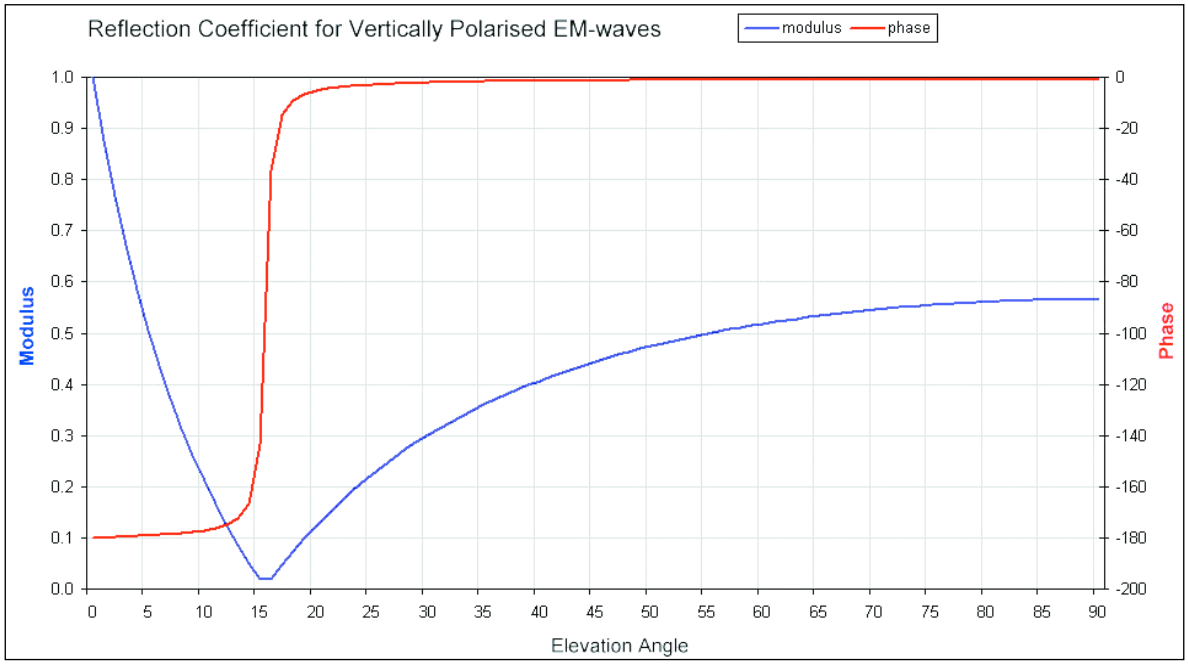
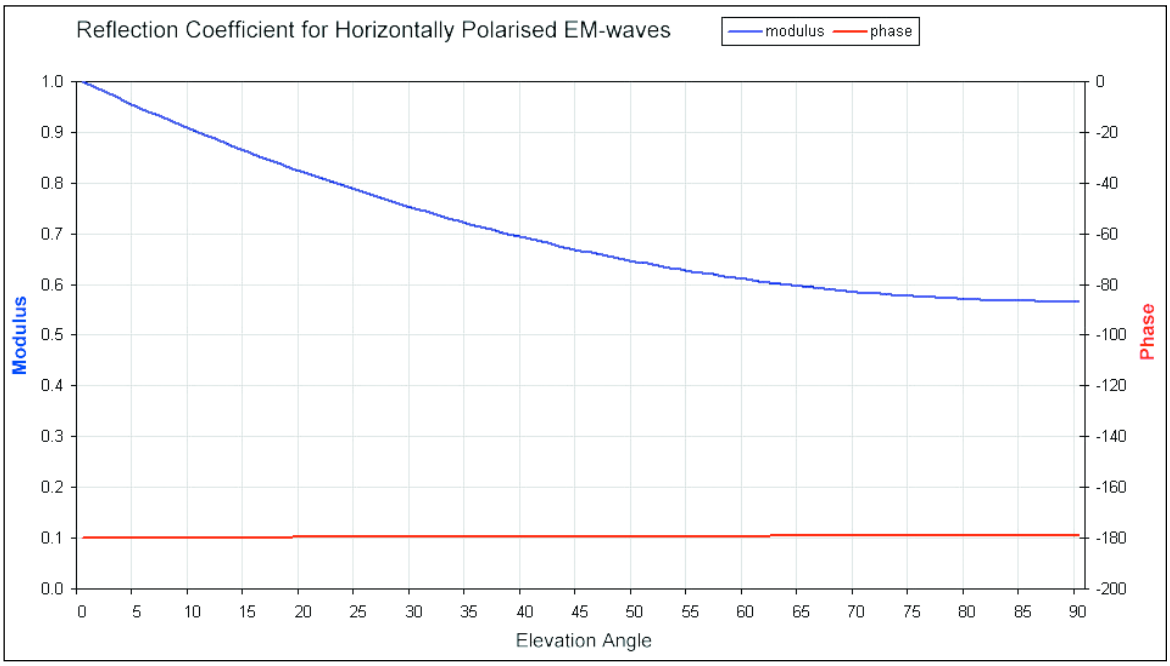


Figure 2

Figure 3



sum of the vertical components of the E-vectors of the reflected wave and the ground penetrating wave at **P**. If the conduction is good (perfect ground) then the vertical component of the incoming wave's E-vector has to be the same as the vertical component of the reflected wave's E-vector at **P**.

Since V-polarised waves have components of the E-vector in the S-plane and perpendicular to the S-plane (with different properties for reflection, which moreover, depend on the conduction and permittivity of the reflecting plane **S**), this results in the reflection coefficient Γ_V for vertically polarised waves showing complex behaviour as a function of the reflection angle.

Figure 2 shows Γ_V as amplitude (modulus) and the phase of the reflected wave relative to the incoming wave as a function of reflecting angle ψ for 'realistic' ground conditions at a frequency of 137.5 MHz.

$$\sigma = 5 \text{ mS} \qquad \varepsilon_r = 13$$

Figure 3 shows Γ_H for horizontally polarised waves under the same conditions.

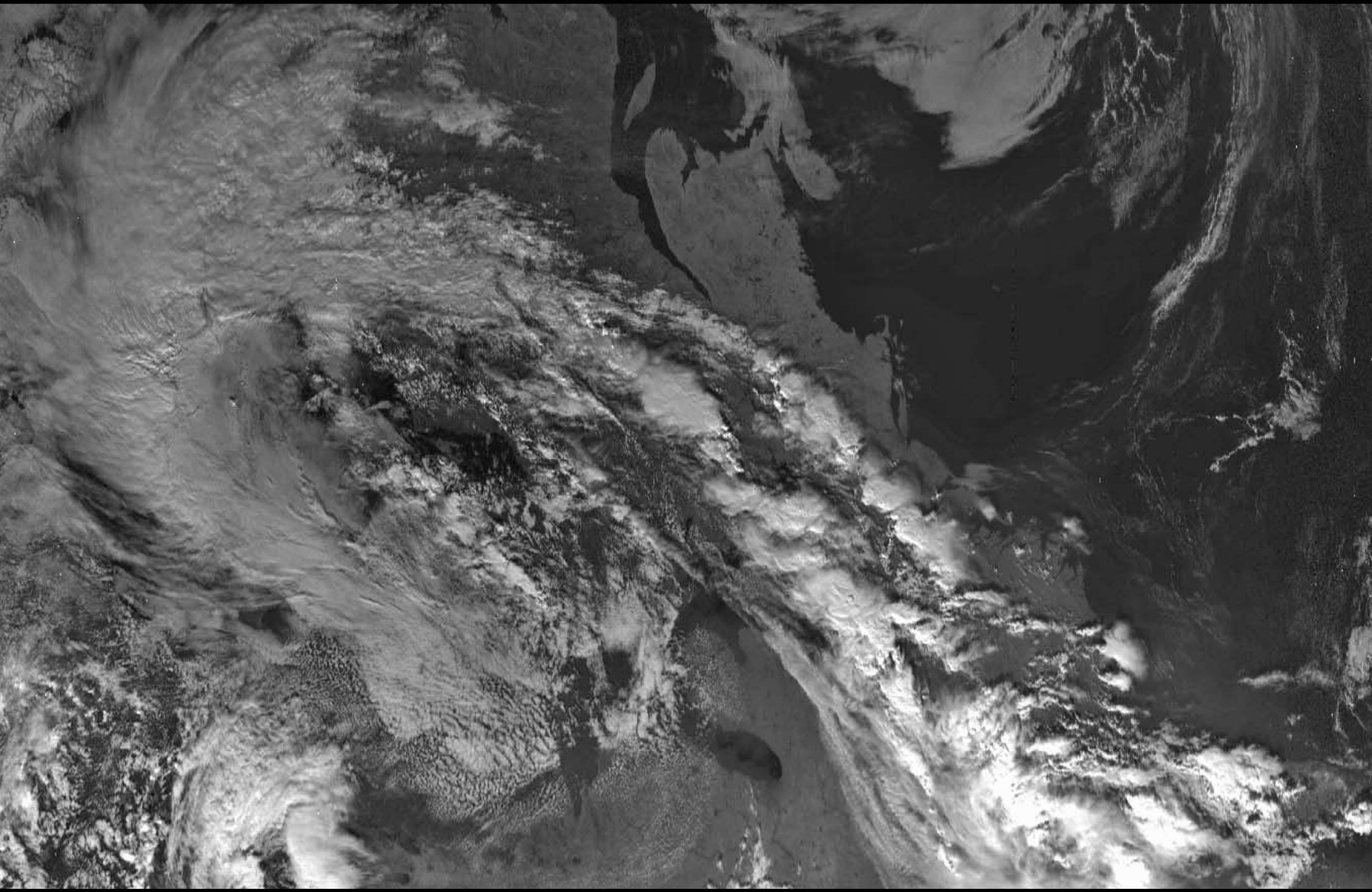
For vertically polarised waves there is a reflection angle, the Brewster angle, for which the amplitude of the reflected wave is minimal and the phase change is 90°. This Brewster angle is about 16° under the conditions used (137.5 MHz and realistic ground) and is very small for a 'perfect' ground like sea water. For reflection angles larger than this Brewster angle, H-polarised waves are reflected with a 180° phase shift and V-polarised waves are reflected without any phase shift. This difference in phase shift means that, in the case of circularly polarised waves, the sense of the circular polarisation is reversed. Antennas which are only sensitive for the sense of polarisation emitted by the satellite are blind for the reflected waves. With these antennas, noise bands caused by the destructive interference of the direct and the reflected wave will be absent from the satellite images.

For the effect of reflections on signal reception, read about the comparison of antennas for 137 MHz in the December issue.

References

1 Electronic Engineering Handbook, Dorf, p.844

2 The ARRL Antenna Book, 20th impression, chapter 3



Symposium 2007

Francis Bell

This was GEO's fourth annual symposium, again held at the National Space Centre in Leicester. There was a slight change in format this year with less time being devoted to presentations, hence leaving more time for workshops, demonstrations and personal interactions. It still proved to be a busy day.

First thing in the morning there was a hive of activity as stands were set up and live EUMETCast signals were routed to two computer systems. This year, because Storm Dunlop was our keynote speaker, and he is the author of numerous books on the subject of clouds and weather, some of his publications were on display and available for purchase. One of his publishers ,Oxford University Press, had publicity material on display and the book shop in the NSC also had promotional displays relating the Storm's books. During the day, Storm signed a number of copies for delegates. The *GEO Shop* was well supported with sales during the day. BNSC literature mentioned in GEO Q14 was on display and available to anyone who preferred to pick up copies on the spot rather than write to the publisher.

The Symposium commenced with a welcome to the delegates and speakers together; there was a special welcome to David Anderson, GEO's new Membership Secretary.

Storm Dunlop made the opening presentation, speaking about cloud observations both from Earth and space. The examples and explanations that Storm gave to the images he showed left me feeling quite inadequate. I'm supposed to be interested in these observations but I felt just like beginner when faced with Storm's commentary. He suggested that, if you could recognise ten different makes of car or ten different species of trees, there is no reason why you should not be able to recognise ten different cloud types together with the likely weather which they foretell.

David Taylor was next to take the floor with an update on the newly launched Metop-A satellite, its sensors, and data dissemination methods. The data are freely and easily available to amateurs such as GEO members. David concluded with some hints on how to fine tune your PC to handle these new data. I was amazed to learn of the wealth of satellite data which is now readily available to GEO members. During the lunch break, David complemented his talk by giving demonstrations, offering advice and running workshops to some of the members.

The break during the middle of the day was very productive and was filled with workshops, discussions and practical activities. These included dish alignment for EUMETCast, visiting Internet sites and tutorials on handling EUMETCast software.

As usual, the GEO Shop was at Leicester and proved a very popular attraction for delegates who were able collect items and save on the normal post and package charges.

Photo: David Taylor

Ferdinand Valk, visiting from the Netherlands, was our afternoon speaker. He illustrated the effects of global warming on our planet's polar regions. Covering the history of polar exploration and the establishment of polar scientific stations, he continued by showing dramatic satellite images to illustrate the steady decline of ice coverage at the poles in recent years. He pointed out that as part of the International Polar Year 2007-2008, hundreds of scientific surveys will be made relating to our polar regions. With the current recognition of the polar regions as important indicators of climate change, it is not surprising just how many projects and studies are planned take place in this IPY.

AGM

It was very encouraging that almost all the 40 delegates remained for the AGM. The business was quite straightforward but did offer an opportunity for any member to introduce a topic for general discussion.

The financial report indicated that the Group is just financially viable provided that membership levels do not decline. It was stressed that GEO should try not to lose members by the default just forgetting to renew. The company has constantly underwritten the financial security of the group but membership income is the life-blood which supports the main expenses of Quarterly publication and its distribution.

Members of the management team gave their own reports to the meeting. The shop made a worthwhile profit for the Group over the past year. There is an encouraging amount of business, with the new pager resistant R2FX being a popular item.

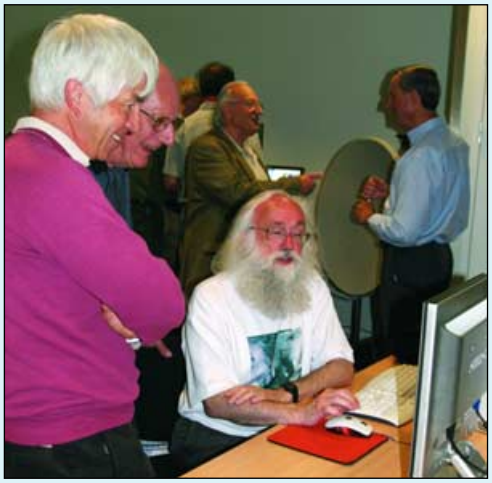
The membership secretary indicated that membership was about 500. He is going to introduce a membership card to remind forgetful readers that they are members of GEO and anticipates that it will generate a sense of belonging to the Group beyond the Quarterly publication.

John Tellick reported on correspondence and other communications with national authorities, particularly Ofcom. He also reported about experimentation with a new faster USB interface box for EUMETCast reception, which should be available in a few months time.

The open discussion related mainly to the suggestion that it may be appropriate for GEO to register as a charity. With the Group's commitment to self training, education and non commercial objectives, a charitable status may be appropriate. It was noted that if this happened there would be financial benefits relating to tax refunds. No decision was taken except to research the idea.

There was also some discussion as to the location for the next GEO Symposium, and any suggestions will be welcome although we have a provisional booking for Leicester once more, on May 10, 2008.

The meeting ended with the drawing of the popular well supported raffle. And thanks for the SatSignal meter I won!



David Taylor holds a Software Workshop

Photo: John Wiggins

Keynote Speaker Storm Dunlop

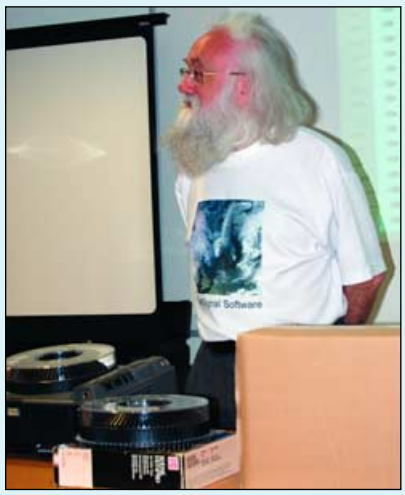
Photo: Clive Finnis

John Tellick demonstrates Antenna Alignment

Pjhoto: John Wiggins

GEO Company Secretary Nadine Bell

Photo: Clive Finnis



David Taylor Discussing his Software

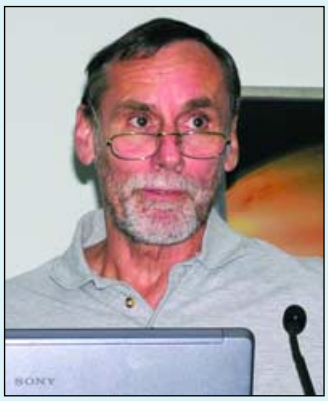
Photo: Ferdinand Valk

John Tellick demonstrates Antenna Alignment

Photo: John Wiggins

The GEO Shop Table

Photo: Clive Finnis



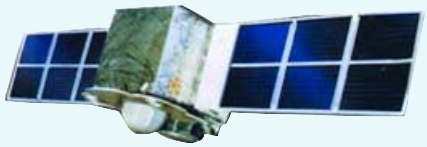
Ferdinand Valk speaking on the International Polar Year

Photo: David Taylor

Symposium 2007 Group Photograph

Francis Bell

China's ASAT Attack Destroys Feng Yun-1C



This article has been compiled, with permission, from material on the Celestrak website

As reported by Peter Wakelin [1] in our March issue, China implemented an anti-satellite weapon test on their ailing Feng Yun-1C polar orbiting weather satellite on January 11, 2007 in what turned out to be by far the largest debris-generating event ever recorded. During the following three months well over a thousand orbiting fragments, in addition to the remains of the original payload, had been assigned NORAD [2] catalogue numbers. It has been estimated that the breakup created more than 35,000 fragments larger than a centimetre across.

Clearly this armada of space shrapnel poses an ongoing threat to existing communications and Earth observation satellites and recently a report on Dr T S Kelso's *CelesTrak* website [3] delved further into this matter. By propagating the 2-line elements of the fragments back in time he created *AGI Viewer* images and animations showing the distribution of debris along the orbital path of Feng Yun-1C. Figure 1 illustrates the fated satellite's final orbit above the Xichang Space Centre (in red) with the positions of the debris fragments (in green) added as they would have appeared a mere five minutes following the attack. Readers who possess the free *AGI Viewer* software [4] may also download animations of the event which show the spread of the resulting debris cloud.

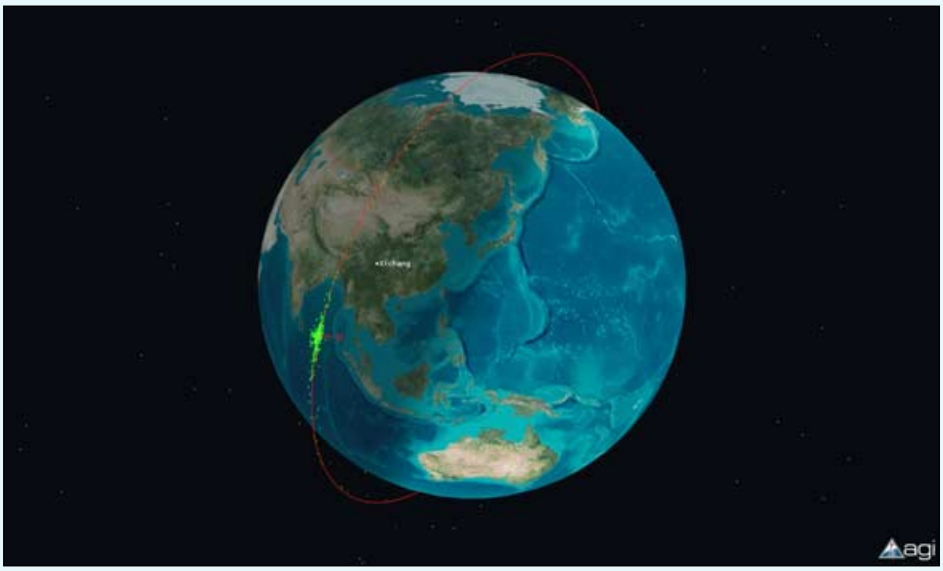


Figure 1 - The Feng Yun-1C orbit and debris cloud 5 minutes following impact (january 11, 2007)

STK-generated image courtesy of CSSI (www.centerforspace.com)

Further analysis indicated that the debris cloud lay in a polar orbit that stretched between an altitude as low as 200 km all the way to 4000 km, posing a threat to many operational satellites. In an average 7-day period it could be determined that there were over 2500 'near-miss' events when a piece of Feng Yun-1C approached within 5 kilometres of an operational satellite payload in low-Earth orbit (LEO).

Figure 2 illustrates the risk to other LEO satellites, including the International Space Station (ISS). The population of LEO satellites (including payloads, rocket bodies, and debris) which could be affected is plotted in green. The debris cloud is shown in red and the single green track shows the path of the ISS.

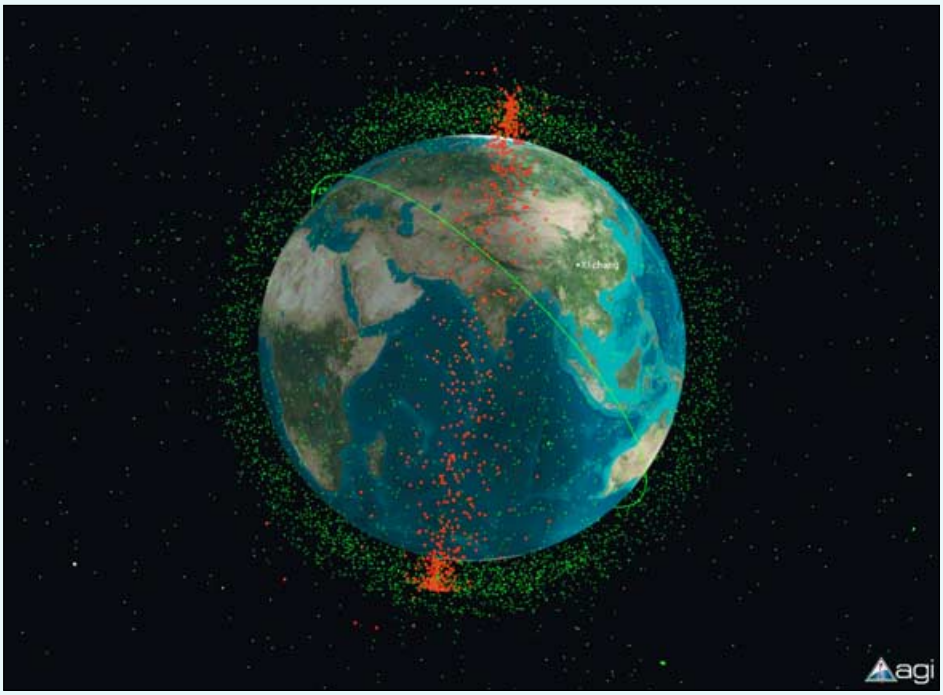


Figure 2 - The Feng Yun-1C debris cloud in context with existing LEO satellites (early April, 2007)

STK-generated image courtesy of CSSI (www.centerforspace.com)

A detailed analysis of the lifetime of the debris catalogued so far shows that only about 5% of it (62 pieces) will have decayed within ten years.

Almost 85% of this debris will still remain in orbit 100 years from now.

The majority of the debris from this single event will therefore remain a hazard for centuries to come.

References

1 Earth Imaging News, GEO Q13, page 23 (March 2007).

2 NORAD - North American Aerospace Defense Command, the body responsible for monitoring man-made Earth orbiting objects.

3 http://www.celestrak.com/

4 http://www.agi.com/products/viewer/

Setting up a Local Area Network

Mark Edwards

So you've bought a new computer with the hope it can process data from *EUMETCast* better than your old one. After reviewing the specification you find it has a 10/100 mbps network card built in—but what does this mean?

Well essentially, a network card will allow you to do many things with your new computer: sharing files, sharing printers and sharing a single Internet connection are just some of the many things you can do with a networked computer.

This guide hopes to give you an idea of how to set up a local area network in your house.

Figure 1 - A router, or a broadband modem with router built-in.

Figure 2 - Network 'Patch' Cable

Figure 3 - Network Interface Card

The Equipment You Require

Before you can begin to set up your network, you will need a router (or a broadband modem with a router built in), a network cable (typically CAT5e) and computers, each with a network interface card present (figures 1, 2, 3).

These items will give you the essentials for setting up the most basic of networks. With a network, it is always best to start with a basic setup. You can expand it later as you need to add more computers.

This guide also assumes that you have broadband internet access, either cable or (A)DSL, and are using Microsoft Windows XP.

Now let's look at the above components in more detail

Broadband Routers

In my network I use a *Netgear DG834* ADSL Firewall router. I know that is a mouthful but, when you break it down, it is quite simple. Essentially it is one device that can do the job of three.

- It is a modem, so it can replace that old USB ADSL modem that you have plugged into your computer. It also has the advantage that it can stay connected to the Internet when you turn your computer off—a big help when you have more than one computer sharing the same Internet connection.
- It can further enhance your computer's security as it has its own built in firewall, similar to what Linux and Windows systems have incorporated into them.
- Finally it is a router. Routers are responsible for letting two or more computers talk to each other and the Internet at the same time.

All-in-one devices like this used to be expensive but as they are now becoming more commonplace the price has fallen. Devices such as the Netgear *DG834* can be picked up for around £30-£60.

Other advantages in using a device like this to construct your network are its built-in web interface and setup wizards. These take all the hassle and most of the work out of setting up a network.

Network Cabling

There are two types of wiring arrangement in network cables, crossover and straight.

- Cross over cable is used to connect one computer directly to another computer
- Straight wired cable is used to connect a computer to a router, switch, access point or any other similar network device.

Network cable also comes in various types. CAT-5, CAT-5e and CAT-6 are among the most common types.

For home networks, any of these is fine but the most favoured is CAT-5e. Network cable comes in various lengths and can be supplied up to a maximum of 100 metres before it becomes too lossy. This means that computers can be connected to the Internet or to each other wherever you can lay 100 metres of network cable. If you need to connect a computer to another one, or to the Internet, over a greater distance, you will need to use fibre optic cable, which supports a range of up to two kilometres without amplifiers or repeaters.

Network Cards

Network cards are responsible for transferring the data on your computer into packets and then sending these packets over the network cable to the desired destination. Most computers today come with network cards already installed. If your computer does not already have a network card it is not too hard to buy one and install it yourself.

Most network cards are reasonably priced and install easily into a spare PCI slot. This is a similar installation to that for the *Technisat Skystar-2* card. Let's now look at the various steps involved in setting up a network:

Setting up a Broadband Router

Most broadband routers will come with documentation that explains the process of setting them up—or at least shows you how to access the web interface, which contains a setup wizard (or provide further documentation to guide you through the setup procedure).

Most routers also provide a short length of **CAT-5e** cable (also known as a patch cable) to allow you to connect your computer's network card to it.

An ADSL router has a telephone connector on the back to allow you to connect it to a micro-filter and then into your ADSL-enabled phone line. If you have a cable modem, most cable companies provide these with a network port on the rear, allowing you to connect a router to it with a network cable. If you already have a cable modem you will need *only* a router, *not* an ADSL modem router.

The documentation with a router for a cable modem will give setup instructions and wiring diagrams. In figure 4, you can clearly see the ports on a typical ADSL modem router: from left to right the power connector, four network ports and the telephone socket—connected to a micro-filter which then plugs into your ADSL-enabled phone line.

Figure 4 - Rear connections to the Router

Once you have connected your computer to a network port on the back of the router (and have powered on both computer and router) it will issue your computer with a network address known as an *IP address*. As long as the drivers for the network card on the computer are correctly installed, and if your computer is running Microsoft Windows XP or later, this all happens automatically.

The *IP address* is used to identify your computer to other computers on the network. Each networked computer has to have its own unique *IP address*. Even the router will have its own *IP address*.

Accessing the web interface of an ADSL router is simple. Open your Internet browser and type in the *IP address* of the ADSL router; which is commonly either

192.168.0.1 or ***192.168.1.1***

If neither of these works, consult the documentation provided with your router. This will provide the correct *IP address*.

Once connected, you will be prompted with a username and password box. The username and password details will also be found in your router's documentation.

Note

Most of the newer routers now come with a CD which, in addition to documentation, also contain a setup wizard which can be run on your computer to configure the router for you. This means that you can avoid the web interface if you don't feel comfortable with it.

Once you run the web interface, you are presented with a wide range of options, many of which you may not need to touched (as they are often either already configured or for advanced users only). At this point I do recommend following your router's documentation as setups vary quite significantly from one router to another. But basically, what you are aiming to do is to configure the router to connect to the Internet. This is easy to do as you will probably only have to enter your username and password details as provided to you by your Internet service provider (ISP). A setup wizard is also included in most web interfaces, which can aid you in configuring your router.

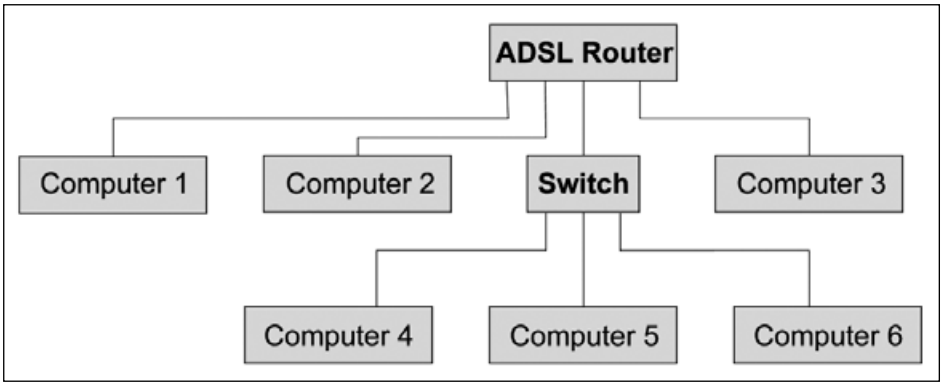


Figure 6 - Connecting multiple Computers to a Router

Once you have entered your Internet settings so that the router can connect to the Internet, you have almost completed the router setup. Most routers will come with a default setup for networking; if not, you can consult the documentation that comes with them to configure the router as required for networking.

To test that your broadband router is working, enter a website address into your Internet browser. Hopefully, your chosen site will be displayed.

If so, congratulations! You have now successfully networked your computer to your broadband router.

Connecting Additional Computers

Now that you have successfully connected one computer to your router it's time to add a second one. This is where the advantage of using a router starts to show. All you now need do is connect the 2nd computer's network card to the router with a network cable and the router will assign it an *IP address* (provided the network card drivers are correctly installed on the 2nd PC). This computer can now access the Internet at the same time as the original one; and the two computers connected to the router can now also 'talk' to each other.

Since most routers have 4 or 5 ports on the back you can have up to 4 or 5 computers connected at any one time without additional equipment. If you need to connect yet more computers, you will need to buy a switch unit. This unit is a device which 'switches' the connections between 4 or 5 networked devices. By doing this, more computers can be added into the network. It is a lot more basic in comparison with a router and there is no setup required. With a switch you simply plug it into your router then plug the computers into the switch and/or the router and they can then communicate with the Internet and each other. Figure 6 is a block diagram showing how six computers could be operated from a 4-port router.

Configuring the Computers

Nowadays, Microsoft Windows™ will do a lot of the setup without your input, which makes the task much easier. But there are still one or two things you need to know about in order to make your network easier to operate.

If you want to share printers and files on your network, you first need to set up a *workgroup*. Fortunately, with Windows, there is a *Setup Wizard* to make this easier for you. Here's what to do.

Note

If you are running your Windows XP computer under the *Classic* interface, you will not be able to access the menus that follow. Make sure that you are running the *Windows XP* theme (or a variant).

Open Windows **Control Panel** to reveal the **Pick a Category** screen and click the second option down on the left, named **Network and Internet Connections**.

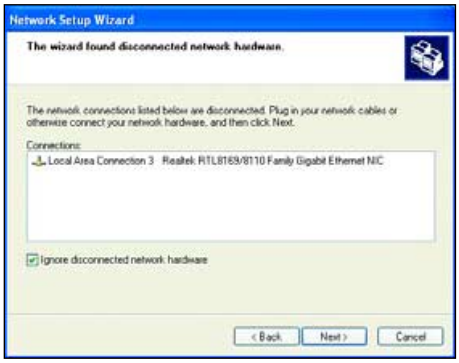
This opens the **Pick a Task** screen. Select the option **Network Setup Wizard** which appears near the foot of this screen.

You will now be presented with the sequence of screens illustrated on page 36 (overleaf). Work through these screens, row by row, following the instructions below each to complete configuring your network.

You will have to run this wizard from every computer that you intend to run on the network. Remember: you must use the same Workgroup name but a different computer name to enable the network to identify the respective computers.

This is the opening screen of the **Network Setup Wizard**. It simply indicates what you will have accomplished once you have completed it. Just click 'Next' to start your setup.

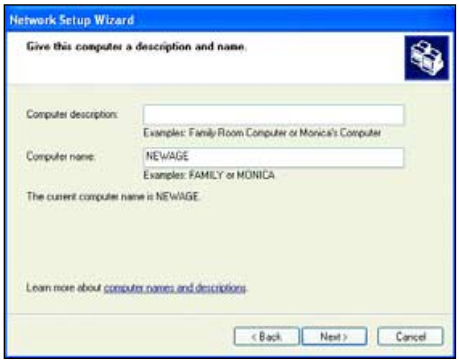
You don't have to review the checklist (as it is geared more towards advanced network setups). Make sure all steps are completed, and when the wizard states '*connect to the internet*' this really means '*make sure your router is powered on and connected to the telephone line*'.



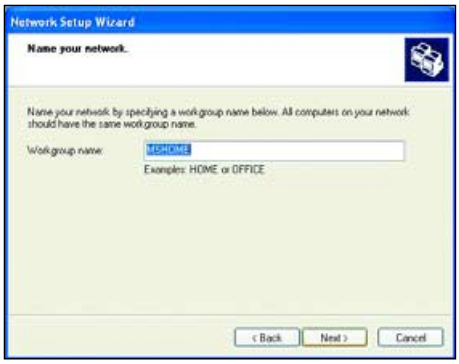
If you haven't connected your network card to the router the wizard will prompt you to do so. Many newer computers have more than one network card: if both are not connected this message can appear. If you are sure your network card is connected to the router and is powered on, check the 'ignore disconnected hardware' box and proceed.

This screen may or may not appear depending on your previous setup. If it does, it is best to ignore the recommendation it gives and choose '*No*'.

On this screen select the middle option. This will configure your computer to always connect through the router rather than try to dial up a connection of its own.

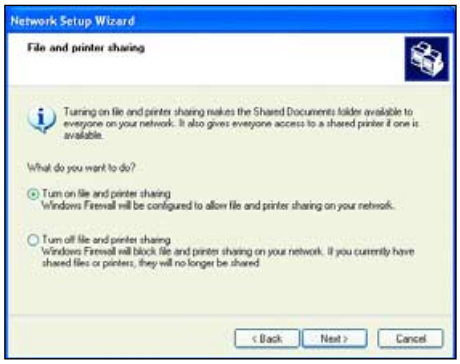


This screen allows you to choose a name for your computer. This is the name that will be shown to other computers on the network to help you identify it. Each networked PC must have a unique name.

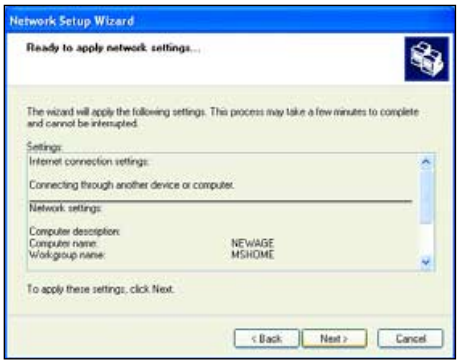


This is one of **the most important steps** in the wizard. The Workgroup name defines which computers can work together to share resources.

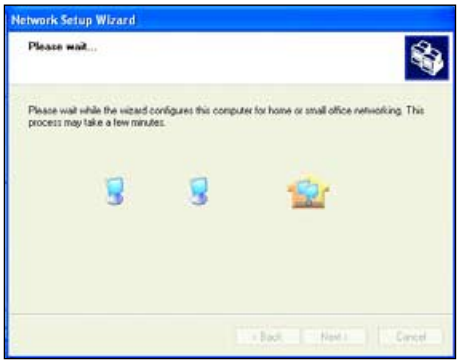
The name you select here must be the same for every computer on your network—otherwise the computers will not be able to 'see' each other.



This step in the wizard is equally important. Make sure that you select the top option. This will enable file and print sharing services in Windows and open the ports on the firewall in Windows to allow this to happen.

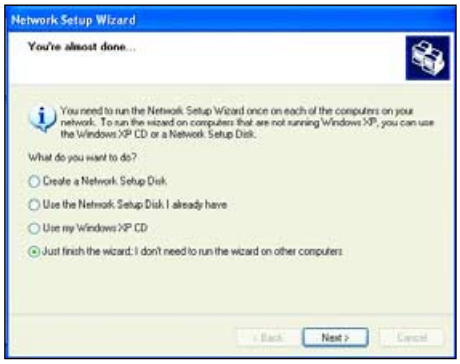


This screen is a summary of all the settings you have just made. It enables you to double-check the settings you made to ensure they are correct before applying them. If the settings appear to be correct you can move onto the next step.



The wizard is now configuring Windows for you.

As it says 'This process may take a few minutes'.



You can create a network setup disc for use on any of your PCs that lacks this wizard. If all your PCs possess this wizard, select 'Just finish the wizard'.

You have finished the wizard on this computer. Next, you will have to run it on all the other computers that you intend to run on this network.

Resident Firewalls

There is one important consideration before moving on. If you have a resident firewall installed on your PC (e.g. *Norton Internet Security*), make sure that you set it up so that it 'knows' that you are using a network. Most firewalls block the ports Windows uses for file transfers. As a result, you cannot 'find' the other computers on the network, even though they are connected and set up. You may require to consult the documentation that came with your firewall software should problems arise.

Using Networks

In Windows you can browse through the computers on your network as easily as you can browse through folders and files on a single computer. To do this you just need to know where to look. If you open the **My Computer** window and look at ***Other Places*** you will find a link to **My Network Places** (figure 7). Alternatively if you select the drop down box at the top where **My Computer** is displayed you can select **My Network Places**.

When you follow this link, you will be presented with a window that should show a collection of folders headed **Local Network** (figure 8). This folder holds links to the *Shared Document* folders on all the computers you have networked.

Whenever you choose to share a folder on a computer it will appear here.

To see which computers are currently on the network, or to get a better view of which computers have which files on them, select **View Workgroup Computers** under **Network Tasks** from the left-hand panel. Now you can see each computer on the network listed (figure 9). By selecting one of these, you can see all the files and folders available on that specific computer.

How to Share Folders and Files

If you can't find a particular file or folder on the computer you are browsing the chances are you haven't shared it. Windows will not display files or folders on a network unless they have been designated for sharing as a security precaution.

A single file can be shared in two ways. Firstly you can copy the file into the local computer's *Shared Documents* folder. This will allow every other computer on the network to see it underneath the *Shared Documents* folder for that remote computer's name. The second way in which you can share the file is to share the folder the file is in. Note: if there are other files in that folder they will also be shared. The folder you have shared will be displayed alongside the *Shared Document* folders in the **My Network Places** window.

To share a folder, browse to it, right click over it and choose *Properties* from the menu. On the window that pops up, select the '*Sharing*' tab at the top and you should see something similar to figure 10 on page 38.

If you are setting up a network for the very first time on that computer, you may be presented with a slightly different window that explains the risks of sharing folders and files. You can acknowledge the risk message by clicking the link and then figure 10 will appear.

Selecting the **Share this folder on the network** option will unblank the '*Share name*' box and allow you to type the share-name for that folder on the network. Choosing a different share-name to the folder name will still leave the folder with its original name on the computer where it is located.

The **Allow network users to change my files** option will allow you, from another computer on the network, to edit, rename and delete the files remotely. Be careful, as all other computers connected to the network can also do this.

You should now see this folder in the **My network Places** window on all other computers on the network and be able to access the

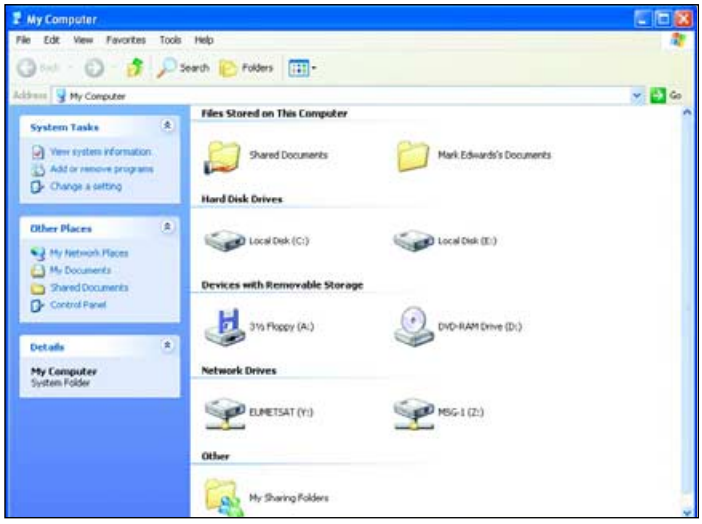


Figure 7 - The *My Computer* Window

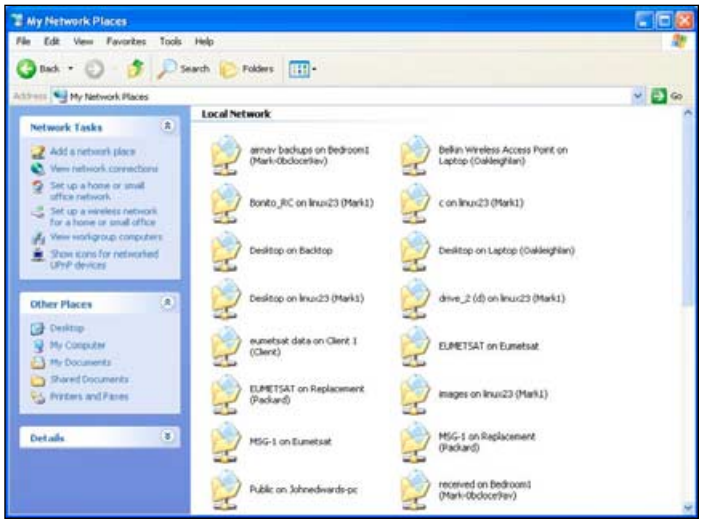


Figure 8 - The '*My Network Places*' Screen

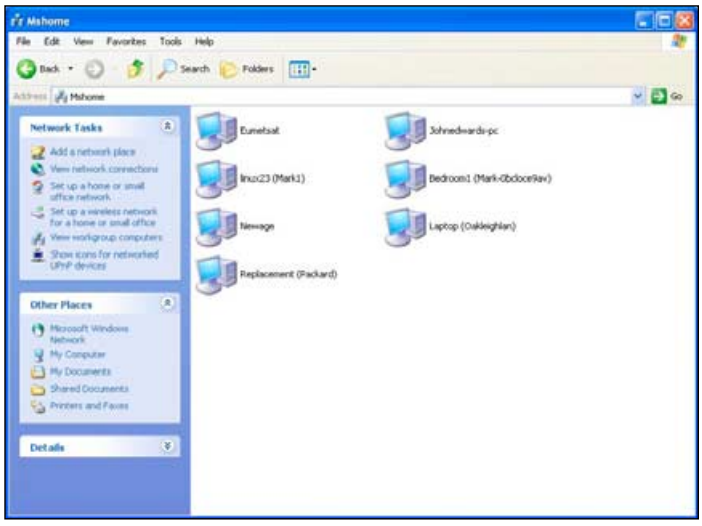


Figure 9 - The '*View Workgroup Computers*' Screen

sub-folders and files. It is also shown under the relevant computer under your chosen workgroup name.

Creating a Network Drive and Configuring Software

A network drive allows you to create a virtual hard drive on your computer from a folder on another computer. It is, essentially, like a shortcut—to save you having to visit **My Network Places** or workgroup window every time you wish to access a folder on a remote computer.

The following describes how to create a network drive and configure David Taylor's satellite software to process data across the network.

Network drives are displayed in the **My Computer** window under '*Devices with removable storage*'

If you want to use the twin-PC setup that *EUMETSAT* describe, creating a Network drive is the best way to go if you are using processing software on another computer.

In this example we will assume that a reception computer has been set up to receive the data from *EUMETCast* using *MSG Data Manager,* while a second computer has been set up to run *MSG Animator*, *GeoSatSignal* and *Metop Manager*.

To begin with, we will create a network drive from the folder where all the data that *MSG Data Manager* processes is stored. If you haven't changed the default setup, this is found in the following location:

C:\MSG-1

You will need to enable sharing of the MSG-1 folder on the reception computer.

If you want to be able to edit or delete the files in this folder remotely be sure to enable '*Allow network users to change my files*.' Once you have done this on the reception computer, head over to the processing computer and open **My Computer** and select **<Tools → Map Network Drive>**.

You will now be presented with a window similar to figure 11. If you don't already have a drive **Z:** on your computer, this is what will most likely be displayed. Any drive letter is fine but, with network drives, it is best to start from the end of the alphabet and work back.

Next to the '*Folder'* drop-down box, select '*Browse*'. You will be presented with another window allowing you to search for the folder you just shared, on the reception computer. This computer will have its name displayed under the workgroup name; the default is 'MSHOME'. The folder will then be found under the computer's name.

Select the *MSG-1* folder and two further folders will be displayed, typically *Raw Data* and *Images*. This is fine, so make sure the *MSG-1* folder is highlighted and select *OK*. Make sure that **Reconnect at logon** on the **Map Network Drive** window is checked as this will reconnect the drive after a computer restart.

If you return to your **My Computer** window you should now see, under a new heading of *Network Drives*, '*msg-1 on [your computers name] (Z:)*' This name is a bit long and, if you are like me and think it looks a bit messy, you can rename it to something simpler such as '*MSG-1*.' To do this, right-click on the network drive and in the menu select '*Rename*'. You will now end up with '[your chosen name] (Z:)'—a lot shorter and easier to read. Network drive shortcuts can also be created on your desktop.

Finding the MSG Data

Now you need to tell *MSG Animator* and *GeoSatSignal* where to find the data. Let us start with *MSG Animator*. When you have launched *MSG Animator* in the system tray, right-click and select **<Options → Set Image Data Path>**. As you will find, it is really easy to do this now that you have a network drive. You don't have to browse through **My Network Places** any more. Simply select '*MSG-1*' and then, as the program says, select the '*Images*' folder above the '*HRIT*' folder. Now *MSG Animator* is configured and you can use it just as before (figure 12).

For *GeoSatSignal* it is a very similar process. When the program is open, select **<File → Browse EUMETCAST>** then, in the window that opens, select **<File → Open Folder>**. A **Browse for folder** window will open, very similar to the one for *MSG Animator* and you are looking to repeat the process you did for that program. Select the '*Images*' folder above the '*HRIT*' folder. Once this has been selected the program will remember this location. To perform a test selection, click 'Browse Latest'. You should see the images start to appear as the program pulls the data across the network.

Finding the Metop Data

The process for the Metop data is fairly similar to what we have just accomplished for MSG. Firstly we need to create another network drive, but this time for the location where the Metop data is stored.

This next step will depend on the folder structure you are using with the *Tellica*st software. I have my folders set so that in the 'Received' sub-folder of

'C:\Program Files\T-Systems\BusinessTV-IP'

I have the following folders:

Data Channel 1
Data Channel 2
Data Channel 3
Data Channel 4
METOP

In the METOP folder, I have the '*AVHRR*' and '*Messages*' folders which allows me to easily find where the relevant data is stored. I suggest sharing the 'Received' folder in the default location of:

Figure 10 - Sharing a Folder

Figure 11 - Mapping a Network Drive

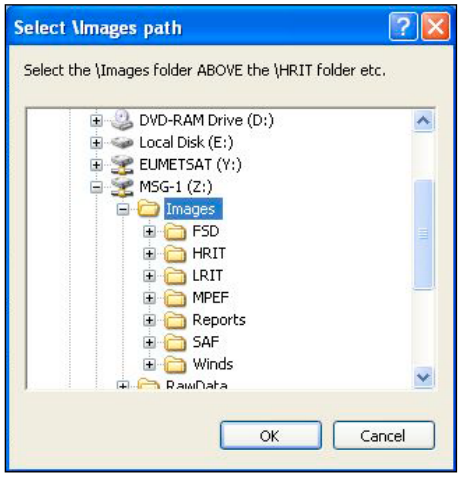


Figure 12 - Finding the MSG Data

'C:\Program Files\T-Systems\BusinessTV-IP.'

This way you can access whatever folders and files you need regardless of your folder structure.

Once you have shared the '*Received*' folder you will need to create a Network Drive for it. On my system I use the Drive **Y:**.

Now you have set up the Network Drive, open *MetOp Manager*. You will need to open the '*Setup*' tab and then the '*AVHRR*' tab.

In the **Tellicast EPS AVHRR global received files path** box you will need to enter the location where the AVHRR files are stored. To do this, browse for the network drive you have just created and then select the folder where your AVHRR files are stored. All that is left now is to repeat the process for all the data you receive and wish to process with *Metop Manager:* ASCAT, GOME, etc.

Congratulations! You now have a networked two-computer *EUMETCast* system.

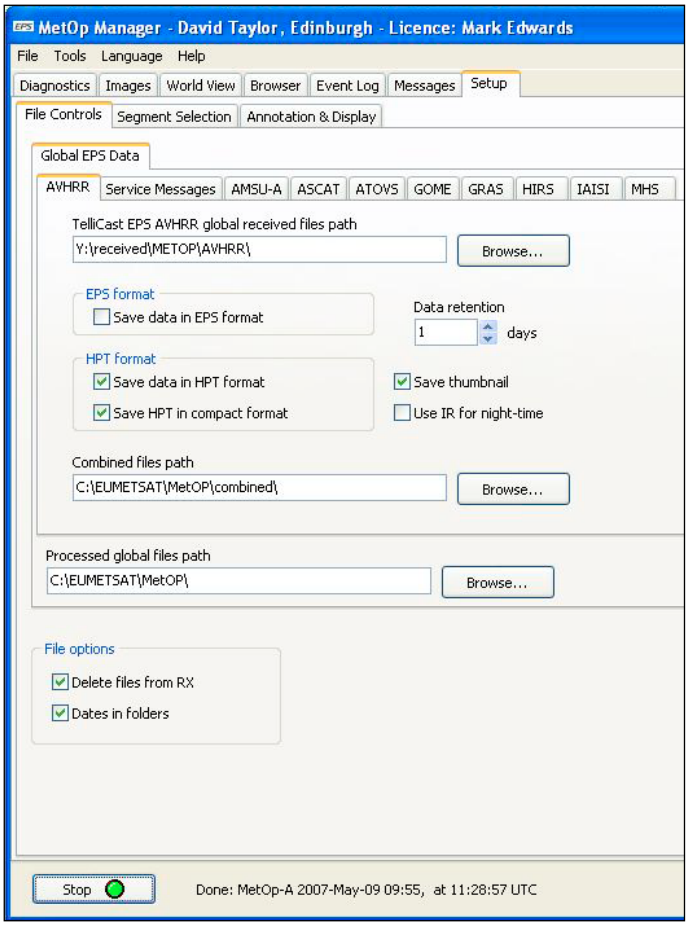


Figure 13 - Selecting the AVHRR Folder in Metop Manager

Some Final Points to Bear in Mind

- If you turn the processing computer off and leave the reception computer on, the data for Metop will gradually build up as there will be no local space management. MSG data is usually managed by *MSG Data Manager*, so that shouldn't have a build-up of data if correctly configured.
- Networks via cable run at a speed of 100 mbps. This means it will take approximately 3 seconds to transfer each 28,123 kB AVHRR Metop file.
- Wireless networks are not recommended for transferring MSG or Metop data as they are currently too slow and don't provide adequate stability
- When running a router with a built-in firewall, you have to bear in mind that you may have to open ports to allow connections to certain programs from the Internet. This is no different from the firewalls that Windows already has incorporated into it. To open a port I suggest reading the documentation that came with your router as it will vary between different routers.

By following this guide you should have a trouble-free, networked system providing a fluid flow of data processed from the raw data received from *EUMETCast*. Enjoy!

GEO visits EUMETSAT HQ

Continued from page 23 ...

Our reception from EUMETSAT was outstanding and further cemented the already excellent working relationship between GEO and EUMETSAT. It was good to renew old acquaintances, put faces to names we regularly deal with and to make new friends. Hopefully, EUMETSAT enjoyed the visit as much as we did.

Acknowledgements

On behalf of the delegates, we express an enormous vote of thanks to Dr Lars Prahm, Director General of EUMETSAT, Sally, Debbie, Pamela and the many others who made us so welcome and organised such a packed, informative and friendly event.

References

Jason 2: http://www.jason.oceanobs.com
http://topex-www.jpl.nasa.gov/mission/ostm.html

What our Members Thought - Letters

May I, through GEO Quarterly, thank everyone who made the trip to Darmstadt a success. Not just those who went on the trip, but also those who worked silently behind the scenes to make it perfect: the organisers within GEO, the staff at Eumetsat, ESOC and all the places which were linked with our visit. I had the time of my life.

I had to make a decision:whether to upgrade my PC or to fly out to Darmstadt. Without a doubt I made the right choice. I met many old friends and made many new ones. The atmosphere was very positive, and as for EUMETSAT—let's just say the hospitality and friendliness, as well as the kindness and understanding, far exceeded my expectations. I really didn't expect to see so much as we did. The girls from OPS are really nice people and Phil, who showed us around Usingen ground station, not forgetting Conchita, my new Spanish friend, all really did everything to make our visit a success. I felt an emptiness when it was time to leave. As the words from Lou Read's song read '*Such a perfect day, You made me forget myself, I thought I was someone else, Someone good*'.

It was an International visit with people from many different nationalities and cultures; but yet we were all one. There were so many languages in my head I couldn't choose the right words to speak. It was a laugh! I'll look at everything and everyone differently now. The visit certainly made a difference in my life so I'm sure others had a similar experience. An Unforgettable few days.

Thank you my friends, ***Rob Denton***

What a welcome they gave us all at EUMETSAT Headquarters. The first day we were taken to every part of this immense HQ building, from the main control centre, right down to where all the data has been stored since records began, by many back up systems and which can be retrieved at any time for the use of media etc. We had talks on all aspects of satellite research, and the purposes and the use of satellites in air sea rescue. When we went to lunch they certainly knew how to look after us. The meals were very very good.

On the second day we had a coach trip through some very pleasant small German towns until we reached Usingen, from where headquarters monitor and control their many satellite systems. This has certainly come a long way since Arthur C Clark foretold the geostationary satellite 'way back in 1945. The final afternoon was spent at the European Space Centre, where Mars Explorer and much other space-related research is done.

There was a great deal of time and effort, done by many people, to make this trip the success it was. From Valerie and myself, a very big thank-you for being such good company on this momentous occasion.

Kindest Regards, ***Valerie and Eric Dean***

Script Snippets

Introducing the Microsoft Command Language

David Taylor

This is the first of what may become an occasional series of articles describing the use of a rather neglected feature of Microsoft Windows - the Command Language. If you find this article relevant and interesting, and would like to read more on this technique, do please get in touch and let us know.

The Problem

Users who regularly collect data from the Internet or from the *EUMETCast* data stream often find find that their hard disks rapidly fill up with data—unless they take steps to prevent this happening! Of course, many applications that regularly handle large quantities of data, like my *MSG Data Manager* and *Metop Manager*, already possess built-in facilities for controlling the datafiles: but what if you want a more refined degree of control or you need to manage data that you obtained or created yourself?

The Solution

To solve this program, I wrote a small program called *TrimTree* whose sole function is to delete files beyond a specified age, and of a specified filetype, from a given folder.

By making use of the Command Language, it is possible to implement two or more runs of TrimTree, each of which uses different parameters (these are arguments that follow the program name and determine how it will behave). These multiple runs of *TrimTree* are achieved by running a single command file.

Running TrimTree Once

To run TrimTree, the program takes three arguments, each followed by a space character, as illustrated below:

TrimTree [n] [p] [w]

[n] - Files older than 'n' days will be deleted

[p] - The full pathname to the folder containing the files to be managed/deleted

[w] - The filetype wildcard

Consider this typical command line,

*TrimTree 2 C:\MSG\images\ *-msg-ch06.* *-msg-ch07.**

This means that, for any files which are

- more than 2 days old and
- in the folder 'C:\MSG\Images\' and below,

TrimTree will check all filenames containing '-msg-ch06.' and '-msg-ch07.' Those that are more than two days old will be deleted while any more recent files will be retained.

Note that the final argument to *TrimTree* can consist of more than one wildcard, each delimited by twin '*' characters and separated from each other by a space character.

Of course, you may wish to have different retention periods for different file types, and you certainly don't want to have to type these long command sequences every time you run *TrimTree*!

So what you need to do is to place the commands into a command file, which you can run simply by double-clicking on it whenever you need to implement that particular set of commands.

Making a Command File

Using *Notepad*, create a file named *TrimFiles.cmd*. Just as *.DOC* is the extension for a document file, so *.CMD* is the file extension for a command file (sometimes called a 'batch' file).

In the file *TrimFiles.cmd*, enter these lines.

```
TrimTree 2 C:\MSG\images\ *-msg-ch06.* *-msg-ch07.*
TrimTree 10 C:\MSG\images\ *-msg-ch02.* *-msg-ch09.*
```

The first line removes files for MSG channels 6 and 7 once they are more than **2 days** old while the second line does likewise for the channel 2 and 9 files, but only when they are older than **10 days**. I find the channels 2 and 9 to be particularly interesting, and consider it worthwhile retaining them for a longer period.

You can run this command file either by placing a shortcut to it in your *Startup* folder, or by scheduling it to run overnight. Future *Script Snippets* will cover these options (and may be written by others).

Indeed, any reader who regularly makes use of command files and who has scripts that might interest other GEO members is welcome to contact us (Ed).

How to Obtain the Program

TrimTree can be downloaded from

http://www.david-taylor.myby.co.uk/software/disk.html#TrimTree

Unzip the TrimTree.zip archive into your \Windows\System32\ folder so that it can be called without having to specify its full path name.

Windows Operating Systems

Windows NT and its successors (Windows 2000, Windows XP and Windows Vista) all feature greatly expanded command-line functions compared with Windows 95/98, and all *Script Snippets* assume you are running one of the the newer Windows operating systems.

If you plan to use command language methods under Windows 9X, you must create a command file with extension *.BAT* (i.e. a batch file' rather than *.CMD*;

i.e. in this case you would save your file as

TrimTree.bat

and **not** as

TrimTree.cmd.

Try a 3-PC System to Extend your EUMETCast options

Alan Banks - *alanjamesbanks@yahoo.co.uk*

I recently described my Home *EUMETCast* Receiving Station on my web pages and asked David Taylor to give it a critical eye as I discuss his software in some detail. It was he who suggested I write for *GEO Quarterly* and describe my thinking and conclusions while assembling this home system. I will not describe the software side of things in detail as that has been covered extensively in earlier Quarterlies, although I will however address some software issues.

I have been involved in Amateur Astronomy for about seven years and have been an active member of Macclesfield Astronomical Society for the same time. As we used to hold all our meetings at Jodrell Bank, radio astronomy is therefore always prominent in our meetings. We only meet there for our monthly 'workshops' since the Planetarium was demolished.

I missed a talk on 'Radio Meteor Detection' but was fascinated by the principles and had a go myself. One needs a scanner, a dipole aerial and a computer running free software available on the web. The data is fascinating, especially when one can correlate visual sightings with radio detection. However, the system becomes automatic and I wanted to go further.

Two years ago I discovered the RX2 weather satellite receiver and various sites describing home-brew quadrifilar helical antennas. By January 2006 I was operating a reliable APT system with a homemade QFH in the roof space and the RX2. I then discovered the GEO website (and joined) and all the talk of *EUMETCast*. By August 2006 I had my licence, EKU and software and started to receive images.

Figure 1 - The workstation, showing the three PCs.

The PC System

Having read the FAQs on David Taylor's website and articles by Arne van Belle and others, I determined on a 2-PC system. However, I eventually ended up with a 3-PC system. I had upgraded my original PC in January 2006 but decided to improve it further: this has evolved as data rates have continued to increase. For my second PC I bought an off-the-shelf 'student' model, for reception only, and then brought into use my son's PC (my 3rd), an essentially home-built PC in a new case. This allowed me to reconfigure my system as described below. I honestly think a 3-PC system is highly desirable, *especially if you do a lot of computing other than EUMETCast reception*. At present the total data received by my system is of the order of 31 gigabytes (GB) per day.

Available Data

Data from EUMETSAT is received via a TV broadcasting satellite, *Hot Bird-6* at 13°E. The service is called *EUMETCast* and is provided by a *tq®-TELLICAST* server. *EUMETCast* services provided by EUMETSAT now include Meteosat-9 (MSG-2), FSD, AVHRR and Metop-A data.

- Meteosat-9 (MSG-2) is a second-generation geostationary weather satellite for Europe, providing twelve spectral channels.
- Meteosat-8 (MSG-1) is, as I write this, sending experimental rapid scan data of Europe every 5 minutes.
- FSD - foreign satellite data - includes hourly images from geostationary satellites around the world, such as the GOES-West and GOES-East stationed over the Americas, Meteosat-7 provides the Indian Ocean Data Coverage (IODC), and MTSAT-1R covers Asia and Australia.
- EARS-AVHRR provides high-resolution 5-channel HRPT image data from the AVHRR scanner on NOAA-17 and NOAA-18. Data from several ground stations (Canary Islands, Northern France, and Svalbard, north of the Arctic Circle) is combined to give Europe-wide coverage. The data has a 1km per pixel ground resolution.
- EUMETCast is the main dissemination mode for data from the Metop-A satellite, launched in October 2006. This satellite provides high-resolution continuous round-the-world coverage, with data at 1km per pixel resolution.

My System

My system starts with the 80 cm dish and LNB purchased from GEO shop and is mounted on a fence in the front garden. The fence posts not being absolutely rigid, an additional pole has been driven into the ground. I initially thought that movement in the fence adversely effected my reception: however the problem turned out to be the neighbour's trees overhanging the line of sight, especially worse when raining. I have completely cleared the trees to give much better reception although it is still degraded when I mow the lawn and by the occasional very high-sided vehicle. I am looking at ways of mounting the dish on the end wall of the house. Unfortunately the ideal mounting wall has a telephone pole right in the line of sight.

My workstation (figure 1) looks a bit crowded but works well. I use a KVM (keyboard, video, mouse) switch to move between two of the PCs and *VNC Viewer* to access the third. This means that I only need one keyboard and one mouse to control everything. All PCs are attached via Ethernet cables to a wireless router/modem. The wireless is only used by my laptop.

All the PCs have names associated with Astronomy. Naming the PCs makes networking much simpler. The default names can be pretty horrendous. If you load Windows yourself, you get the option to name the PC during installation. In Win XP it can be changed in Control Panel, though best done before networking.

'Kepler' is the Receive Only PC

A *TechniSat* DVB *PC-TV-Star* PCI card installed in this PC receives the signal. I initially used a *TechniSat Skystar* USB box but it wasn't able to keep up with the vast amount of data provided after the Metop-A launch. Also installed is the EKU (Electronic Key Unit), supplied by EUMETSAT at €40, and the necessary *Tellique* software package costing a further €60. These are both obtained direct from EUMETSAT and allow access to the data.

Kepler is an *HP Pavilion computer*, intended mainly for students, fitted with an with AMD *Sempron* 1800 MHz processor. 80 GB hard drive, 1 GB RAM and Windows XP Home. I added another 1GB RAM and a second 200 GB SATA hard drive. I was planning to add two additional SATA drives and run them in RAID 0, but unfortunately XP Home doesn't support RAID, so I stuck with one drive.

This hard drive has the *TelliCast* software and received data folders only. It doesn't get anywhere near capacity as the raw data is removed by data management software almost immediately. I switch off the processing PC at night, so only around 7-8 hours of data tends to accumulate.

Finally, I added a *Q Soft* 320 MB Ram Drive and changed the case cooling fans to something quieter. This PC runs continuously 24 hours a day.

'Galileo' is the Processing PC

I built this PC myself using parts purchased in early 2006 and upgraded it to cope with *EUMETCast*. It contains an *AMD Sempron* 1833 MHz processor, 2GB RAM, 40 GB and 120 GB hard drives plus twin 200 GB SATA hard drives in RAID 0. There are lots of cooling fans, mainly by Zalman, a Zalman copper CPU heat sink and fan and Zalman fanless cooling for the graphics card. This PC runs very quietly and critical temperatures are never more than 10°C above ambient. The operating system on this computer is Windows XP Pro.

Figure 2 - 'Galileo'

This PC runs all David Taylor's software for about 16-18 hours per day.

'Newton' is my Do Everything Else PC

Newton is not associated with *EUMETCast* and is used for. Internet browsing, email, word processing, PowerPoint, Photoshop etc. It also runs FTP software, regularly downloading data from *Kepler* and uploading it to my web pages. This was originally my son's PC and contains an *AMD Sempron* 1.7GHz processor, 1.25 GB RAM and a 72 GB hard drive with Windows XP Home. I have re-cased this PC, added better cooling and soundproofed it. *Newton* runs 16-18 hours a day.

Figure 3 - 'Kepler' and 'Newton'

I operate the System as follows.

Kepler receives *EUMETCast* continuously. Apart from system processes, the only software running is *Setup4PC*, *TelliCast*, *Filezilla Server*, *VNC Server* and *MRTG* monitoring (covered below). There is no anti-virus or anti-spyware running, though I do complete the monthly Windows update.

An essential part of the setup, to minimise data loss, is a RAM Drive. This is a virtual hard drive that speeds up the writing to disk process that the data rates demand. In the *Tellicast* configuration one sets up a folder in this drive where data can be held temporarily before it is written to the hard drive. A file called *0.fsy* is created.

Virtual Network

I can only access this PC by virtual networking from either of the other two PCs: for this I use *RealVNC*, available at:

http://www.realvnc.com/products/free/4.1/download.html

The download is less than 1 MB and is quick and easy to install. Some conflicts between TelliCast and RealVNC have been reported but I have experienced no such problem. I initially installed *Real VNC* so that I could connect remotely from my laptop when setting up the dish and LNB. I could then monitor signal quality wirelessly. Occasionally, I have to connect *Kepler* to the keyboard and mouse for setting up. However, most tasks can be completed via the virtual network.

MRTG

I need to be able to monitor various factors on this PC. I use *MRTG* 2.15.0 (Multi Router Traffic Grapher), a clever piece of software that allows many processes to be checked every few minutes. David Taylor has been posting his results for some time and, towards the end of 2006, was encouraging others to do the same so that *EUMETCast* reception could be monitored Europe-wide.

Consulting

http://www.david-taylor.myby.co.uk/mrtg/EumetcastEurope.html

allows one to check whether poor reception is local or general.

Setup4PC allows Signal Quality (%), Signal to Noise Ratio (dB) and Bit Error Rate (ppm) of the *SkyStar* card to be recorded. I measure total *SkyStar* traffic activity in Bytes per second.

I measure network activity between the receive and processing PCs. The *TelliCast* software records missed and recovered data packets; this data is monitored.

Finally the temporary file '*0.fsy*' is monitored. If the file overfills, usually because of corrupt data in bad weather, one can take appropriate action (delete it).

All this information is held as html files and .png images in a folder called *C:\myweb\documents*.

Setting up MRTG

To set up *MRTG* on a Windows XP computer, first enable SNMP by going into **Control Panel → Add/Remove Programs → Add/Remove Windows Component**, and make sure *Management and Monitoring tools* is checked.

One also needs, if not already installed, *Active Perl*, which can be downloaded from:

http://www.activestate.com/Products/ActivePerl/

and MRTG_2.15.0 available from:

http://oss.oetiker.ch/mrtg/

Go to **Downloads** → **Stable Release** and select *mrtg-2.15.0.zip*. Download this file then unzip and install it. Go back to the website and click on 'Documentation', select '*mrtg-nt-guide*' and follow the instructions for building a configuration file. You will have to add extra lines to your configuration file, plus some perl scripts, to monitor the various parameters you require. These all need to be placed in the '*mrtg-2.15.0/bin*' folder. The program *b2status.exe* needs to be added to the 'bin' folder.

Once *mrtg.cfg* has been correctly configured, you should be able to run it by typing the command

perl mrtg mrtg.cfg

to start MRTG from the Windows Command Shell. If it is working correctly, results files should start building up in the directory you have specified.

For extra information and examples of files needed see:

- my website:

http://www.alanbanks.org.uk/EumetsatReceivingStation.html

- David Taylor's website:

www.satsignal.eu

From there select EUMETCast under Network Statistics

- Fred van den Bosch has a full set of files on his download page at

http://www.fredvandenbosch.nl/downloads.html

- and I have put a zip file to download them at

http://www.alanbanks.org.uk/MRTGSetup.html

Galileo, the processing PC, is switched on first thing in the morning and all the relevant software runs automatically. It takes an hour or so to catch up with the overnight downloads, the MSG data taking the longest.

At the moment I am running the following software from David Taylor.

- To manage and decode Meteosat-9 (MSG-2) data, I use *MSG Data Manager*.
- To manage and decode Meteosat-8 (MSG-1) rapid scan data, I use a second copy of *MSGDM*. I start this manually after the first copy has processed MSG-2.
- To manage and decode Metop-A data I use *Metop Manager* and to do likewise for the NOAA 17/18 data I use *AVHRR Manager*.
- To make real-time animations from Meteosat-9 or Foreign Satellite Data, I use *MSG Animator*. I am currently running two copies; the second for the rapid scan MSG-1 data.

I use the following as needed

- To make false-colour images, remap to standard map projections, or animate the images from MSG data I use *GeoSatSignal*.
- To make false colour corrected images from Metop-A and NOAA AVHRR data I use *HRPT Reader*.
- Kepler Manager (satellite orbital information)
- For satellite tracking - *WxTrack*
- To geometrically map images - *GroundMap*

Defragmenting

I run anti-virus and anti-spyware software and also use *mst Defrag*, which continuously monitors and defragments all the drives on the PC. The huge volume of write/rewrite operations that occur with all the data would need daily (or at the most, weekly) manual defrags . I found *Windows Defrag* used a lot of resources and took quite a long time. *Mst Defrag* runs in the background and uses little in the way of resources.

The Tellicast System

Data is transmitted from the various spacecraft to Earth stations in Germany (Meteosat 8 and 9), Svalbard (Metop-A) and the Canary Islands, Northern France, and Svalbard (NOAA 17/18 AVHRR). Meteosat 9 data is refined, compressed and encoded as HRIT and LRIT files which are added to the EUMETCast data stream and sent up to the *Hot bird-6* satellite as small 'packets' of data tagged with a packet identifier called the PID. Other packets of data for AVHRR, Metop-A and Foreign Satellite Data (FSD) are also sent up to *Hot bird-6*, but with different packet identifiers (PIDs).

At the receiver one uses the setup for the DVB card to choose which PIDs the card should handle. The data is sent from the DVB card to the *TelliCast* receiving program as an *IP multicast stream* and is now further divided into different channels. A single PID may contain a number of different streams, but each stream will have a different multicast address.

The multicast address of the 'Announcement channel' stream is fixed, and that channel 'talks' to the *TelliCast* program stating what data is available. The *TelliCast* program is configured to accept particular data channels (by editing the *recv-channels.ini* file in the TelliCast software).

When a data stream becomes available the DVB software and the TelliCast software interact with one another, the former verifying that *Tellicast* can handle the data; only if it can (and this may involve an authorisation check through your eToken), will the DVB software actually process the stream and make it available. The data is then written to the configured target drive using, as a temporary folder, the file '*0.fsy*' on the RAM Drive.

Finally, I make use of MSG Data Manager software to convert these files into a usable format for producing images.

Newton - the Utility PC

This is the third PC, which I use for all my other computer needs, including email, browsing, writing this etc.

Those tasks relevant to the EUMETSAT images are as follows:

1 Image enhancement

using *Adobe Photoshop*. Most of the images received warrant further manipulation. I know our editor prefers the raw image when publishing, providing him with no lost data. Generally the images I use are either for presenting at Astronomy workshops or publishing on my web site.

2 File Transfer using AutoFTP Pro

My setup here is as a result of wanting to have my own home web server using the third PC. I have a full copy of my website on this PC, which allows me to check the functionality of the site. *AutoFTP* downloads the *MRTG* data from 'Kepler' (C:\myweb\documents) every 5 minutes. Also in that folder are the saved results (downloaded with the MRTG data) of scheduled jobs from *GeoSatSignal* working on the processing PC. *AutoFTP* then uploads *MRTG* data every 10 minutes to my website and each of the results of the *GeoSatSignal* jobs once per day. Other uploads, such as page updates and new images are sent manually.

3 Web Publishing

This is not so difficult as it may seem. I first tried to set up a web server at home but my ISP wouldn't allow this. It is probably much more secure not to have a web server at home anyway. I bought some web space from *Streamline.net*, which cost me about £29 for two years with a '.org.uk' domain name.

All the software you need is free and I eventually found stuff easy to load and use although I did have a few false starts.

Although I haven't built a web server at home you need some means of checking what you're doing and building a complete copy web site at home before uploading to the web is in my view essential.

Setting up your Web Server

Open Windows **Control Panel → Add/Remove Programs → Add/Remove Windows Components**. If you have a line that says '*Internet Information Services (IIS)*', uncheck it.

You now need to install an application called *AppServ*, which is available at ***http://sourceforge.net/project/***.

To obtain the latest win-32 version, type *AppServ* in the 'Find' field then click 'Downloads'. On the following page, download the file marked 'Appserv Open Project'. Install AppServ. On the opening screen, select 'Apache HTTP Server'. When it asks for 'Server Name' insert your server's Internet URL; when it asks for 'Administrator's email address', insert your email address. You will find that the folder 'c:\Appserv' has now been created, containing a subfolder called 'www'. This is where all the web documents you create must go.

Next, you require the web authoring package *NVU*, which can be downloaded from ***http://www.nvu.com***. Once you have installed *NVU* you can start using it to build web pages, which you must save, along with any images you have included, into your *c:\appserv\www* folder. I learned the bare bones of *NVU* by borrowing *Build Your Own Website* by Kyle MacRae from the library [1].

Once you've got all that sorted you will need web space and some means of uploading the files to it. For file uploading, you will need something like *AutoFTP*, which can be downloaded from ***http://www.primasoft.com/ftp.htm***.

Finally, you require *Active Perl*. This can be downloaded from ***http://www.activestate.com/Products/ActivePerl/***. Just install it and forget about it. There is lots on the web about building your own website. Give it a go.

So there you have it, three PC's under one desk in almost constant use. I've stuck with Windows for all three. I have tried Linux on Newton, but networking is not so easy and I wasn't using the full capacity of the PC.

I post my MRTG monitoring on the web every 10 minutes. I post Met-9 images of 0600, 1200 and 1800 UTC. I regularly add interesting images to the site front page. The whole exercise has been a steep learning curve. The MRTG in particular drove me to distraction over Christmas 2006. As was said recently on a yahoo group "Nothing is obvious until it is obvious to you".

Final Thoughts

A three-PC system may seem extravagant. However, I believe it is a cost effective solution to an upgrade path. One PC I already owned, and I upgraded it by local and *Ebay* purchases. The second was a cheap all inclusive deal—there always seem to be good deals on last year's model. The third was effectively free. I'm sure many GEO members have family gamers who are always upgrading to the latest model, so grab their cast-off' gear when you can. Apart from *EUMETCast*, David Taylor's software and *Photoshop*, all other software I have used is free. The KVM switch was less than £20. There are KVM switches for 4 or more PC's; the cheap ones don't work and reliable ones are expensive.

If your single-PC *EUMETCast* system is struggling, adding a basic specification second or even third PC is effective. The only downside I have is that the 'office' can get a bit warm in summer!

1 *Build Your Own Website* - The complete step-by-step guide to creating a website, by Kyle MacRae is published by the Haynes Group (ISBN: 9781844251162).

Earth Imaging News

... continued from page 26

The DMSP team has developed new control modes requiring fewer than the two gyros normally needed for attitude control. Using its Earth and sun sensors along with an innovative software estimate of yaw error, *DMSP 15* was able to maintain proper, stable attitude without any gyro inertial information.

Formerly under military control, the DMSP spacecraft are now operated by NOAA. Their imaging system is quite different to the familiar AVHRR and includes a low-light capability.

Israel Launches Imaging Satellite

A Shavit rocket lifted off from Israel's Palmachim launch site south of Tel Aviv on June 10 carrying the imaging spy satellite *Ofeq-7* to an eccentric 340 x 575 km orbit. To avoid dropping spent rocket stages on its neighbours, launches are made in a westerly direction thereby losing the benefit of the Earth's rotation.

Japan and Korea imaged at night by a DMSP satellite. Note the absence of lights over North Korea

Figure 1
My mobile APT station on location in Morocco

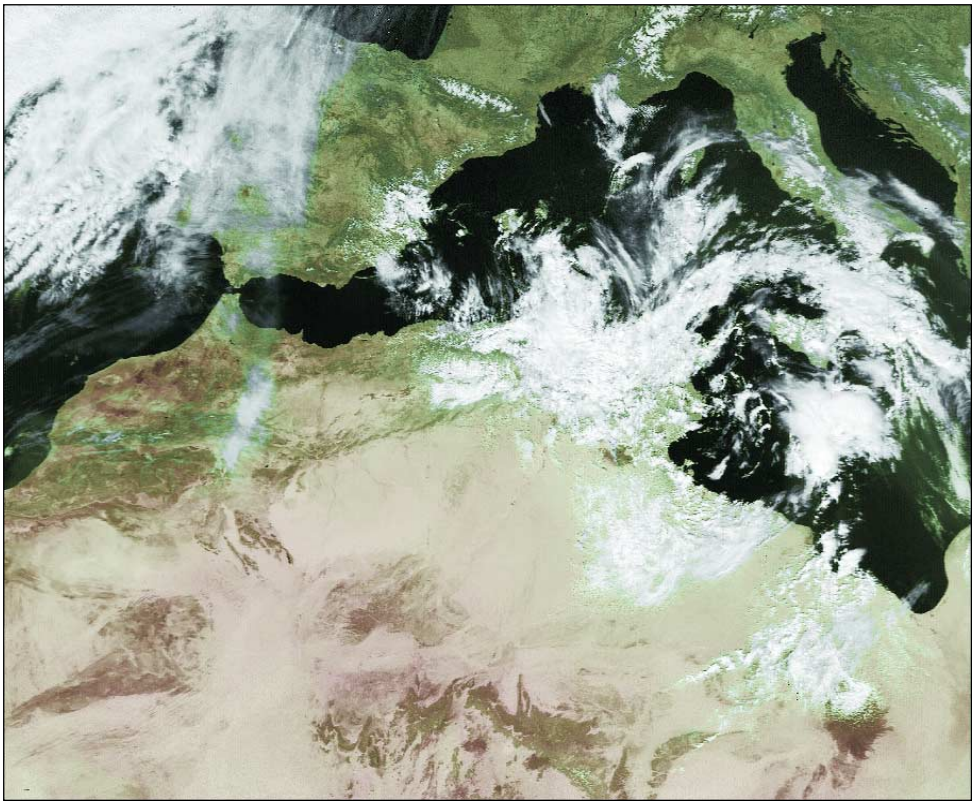


Figure 2 - A NOAA-18 image obtained from Morocco

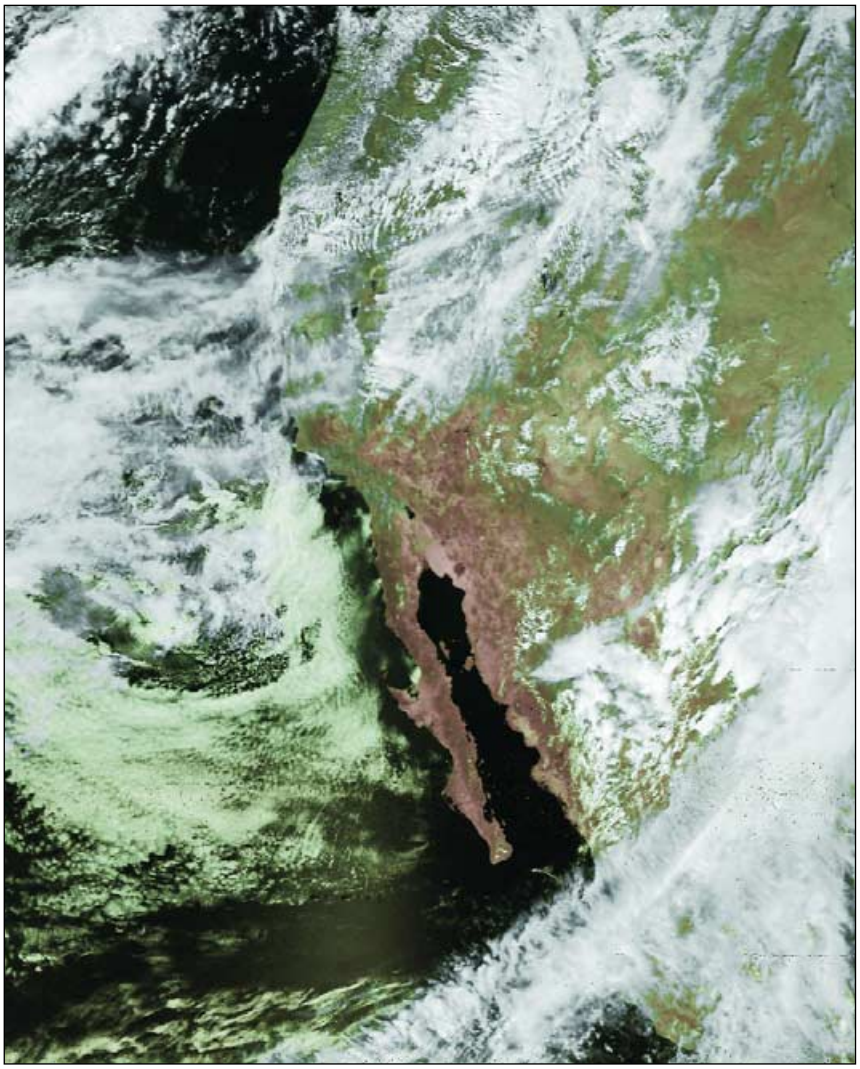


Figure 4 - A NOAA-18 image obtained from Los Angeles

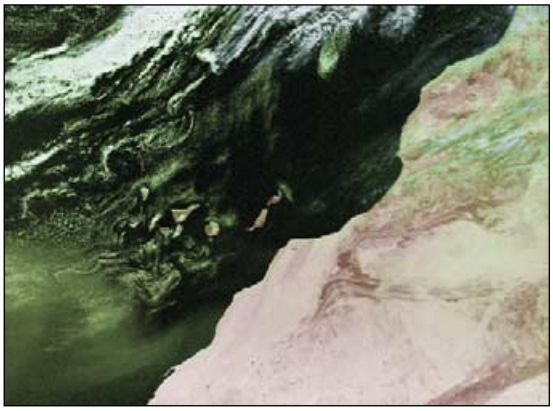


Figure 3 - The subsequent NOAA-18 image obtained from Morocco showing cloud eddies around the Canary Islands

Figure 5
Turnstile Antenna located on a Hotel Stairway in Lagfuna Beach, USA.

Peripatetic APT

Francis Bell

I have been travelling abroad recently, perhaps a little more frequently than in the past. The reasons are various: family to be visited, holidays and sometimes with a semiprofessional purpose. If I judge the practicalities to be worthwhile I often take one of my APT satellite systems with me on such expeditions.

At home of course, I have a *EUMETCast* system as well as APT equipment but to attempt to take a *EUMETCast* mobile system with me on travels would be a pointless exercise. In any case, the location of three out of the five places I have recently visited lie outside the Ku and C band coverage of *EUMETCast.*

It still gives me a thrill to receive live APT signals, particularly when I am receiving them with equipment I have built myself. Second-hand reception via either *EUMETCast* or the Internet, however technically challenging—and recognising the stunning quality of the retransmitted images from around the whole world—is not quite a substitute for receiving live signals from a satellite, in real time, with simple equipment. This may be true for other GEO members too because I note the steady demand from our shop for the latest APT receivers. I also note that members are upgrading their APT systems to cope with the pager problem which is unique to the UK. So APT is alive and well!

Endlessly experimenting, I wanted to know how portable I could make one of my APT systems. Also in the back of my mind was to try for reception while at sea. Could I take a portable system to sea, something I had not done before? I'm not familiar with onboard reception, either on a small or large vessel, so this was an extra incentive for me to try these locations. Perhaps small boat owners are not familiar with APT reception so my experiences may be a useful trial.

The equipment I used on my latest travels consisted of a home-brew turnstile antenna, a *Dartcom* preamp, a ten year old RX2 receiver which I had constructed myself, a *Dell Inspiron 1100* laptop computer running *Windows XP* and a 12-volt rechargeable battery. I used *WXtoImg* capture and processing software.

The laptop runs for about two hours before needing recharging. I'm not sure about the need for the preamp in the system because, when on location, my cable runs tend to be quite short. In future I plan experiment without the preamp.

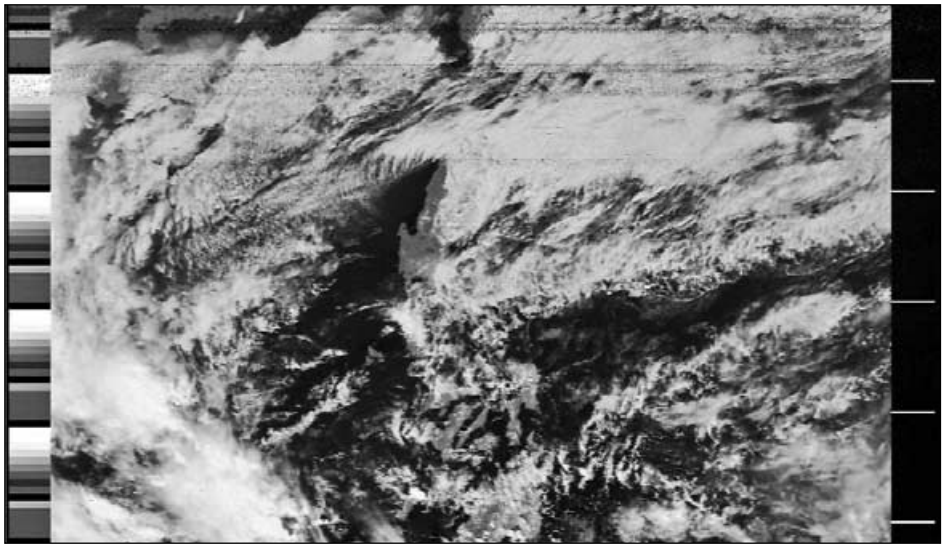


Figure 6 - This NOAA-18 image shows the Philippines. Luzon island and the capital city, Manila are at the very centre of the image. At upper left you can see the southern part of Guangdong province, China.

The antenna I used was the lightest I could reasonably take bearing in mind that it had to fit into a suitcase for air transport. I carefully used the dimensions taken from the turnstile antenna sold by the GEO Shop, copying the lengths of the elements, their spacing and the length of the phasing co-ax between the elements, all to the nearest millimetre. The antenna consisted of a support mast made from plastic water tank overflow pipe which I drilled to accept wire elements cut from 2.5 mm galvanised fence wire which I had in the shed. The wire was strong enough to be self-supporting yet flexible enough to be bent and fitted into a suitcase. The total weight of this antenna was 0.4 kg.

Since January this year I have operated this equipment from the following five locations away from home.

The South China Sea

I was a passenger on a cruise ship which sailed between Hong Kong and Singapore. The itinerary for the cruise was port intensive but there were occasional days at sea which gave me the opportunity of establishing my APT station on a little-used corner of an upper deck where I taped the antenna to the ship's railings. The view of the sky was mainly favourable but to one side there was a obstruction because of the ship's air-conditioning system which was also very noisy. I received several good images of the South China Sea showing the Philippine Islands and the coast of China. The two small problems I experienced related to the physical environment in which I was located. The noise from the air conditioning system was so loud it was difficult to hear the audio output from the receiver. I find it helpful to listen to the audio signal in addition to watching the 'S' meter during a pass. Also the bright ambient light level, especially in sunshine, made it very difficult to see the laptop's screen display. I finished up using towels to shroud the screen and then placing my head beneath this to view the screen. Undignified but practical.

California

Academic issues dispatched me to LA in March and during my stay it was great to meet Ed Murashie and Lynn Grant again. Ed is a GEO member and came to the UK in 2005, stayed with me, then gave a presentation at our Symposium.

The hotel where I was staying was at Laguna Beach, about 40 km south of LA, and conveniently overlooked the beach. It was a complex of small buildings connected by walkways and stairs. Being resourceful, I discovered a quiet stairway where I taped the antenna to railings. This location gave a good view of the sky but was close enough to allow a direct cable run to my room; this enabled me to operate

discretely with the bonus of having access to mains power rather than relying on batteries. I was very pleased with the images I received, which showed the coastline of the western United States and Mexico to the south (figure 4). Why is Baja California part of Mexico and New Mexico part of the United States? History, I guess!

Morocco

An expedition to Morocco was also accompanied by my APT station. A hotel in Fès where I stayed had an under-used roof terrace. There were only a few guests in the hotel so I had the roof to myself. There was an excellent view of the sky and rearrangement of the plastic furniture and tape provided an excellent location for the antenna, receiver and computer. I was very pleased with the NOAA 18 images I managed to log (figures 1, 2, 3).

The Solent

Colin Cox, a good friend and GEO member, invited me for a day out on the Solent. Planned timescales were such that we would be at sea during NOAA 17 and NOAA 18 passes. I thought it would be worth taking my APT station and trying for an image from a small boat.

Figure 7 - The APT antenna mounted on Colin Cox's boat while sailing the Solent.

Again the antenna was taped to railings with the receiver and computer in the cabin. I received two images showing the UK and Europe. The images were not very different to those I receive at home but the circumstances were different, that is, reception using portable equipment while at sea. in a small boat.

Ecuador

This was what I really wanted to do! Having reduced the weight and bulk of my station, could I *really* take it to any part of the world? I have always had the ambition to visit the tropical rain forests of the Amazon basin. I booked a holiday which included a four day cruise on a small river boat which was based on the river Napo, about 20 km from the town of Coca in Ecuador. This river joins the Amazon further downstream but because of the river's smaller scale it provided easy access to smaller side waterways, lakes and forest areas which would have been more difficult to reach from the main Amazon river. The captain of the boat readily agreed to me setting up my APT station and took a genuine interest in what I was doing. Again, I taped the antenna to the ship's railings and operated

Figure 8
The author's mobile APT station in the Amazon basin, showing tropical rain forest in the background, the Napo river and part of the small boat exploring the area.

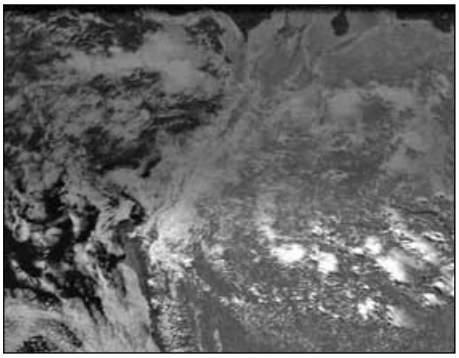


Figure 9
An APT channel-2 image showing Ecuador, Colombia and Venezuela

by battery. Because of our busy itinerary I only had the opportunity to receive two satellite passes. Disappointingly both contained slight interference patterns when the satellite was at a low elevation. I just didn't have the time to sort out this small problem. However, I was still very pleased with the images I did receive, which showed the pacific coast of South America to the west and the Amazon basin with its rivers to the east (figure 9).

The captain was interested in what I had been doing so I left him a copy of *GEO Q14*. For my part I was profoundly impressed with the knowledge and dedication of the people operating this four day cruise, together with their commitment to maintaining and documenting their rain forest and river environments.

Security

Having just returned from Ecuador, one experience did just highlight a possible security issue. On international departure from the airport in Ecuador, my luggage was opened by the police in my presence. There was no problem but the inspecting officer picked up my APT receiver, looked at the front for about five seconds then at the back for five seconds, shook it gently and then put it back in my case without comment. The process did just register with me that carrying unusual electronic items on an aircraft could be judged suspicious. I always carry a *GEO Quarterly* with me while travelling, so if I am ever challenged I

concluded on page 50 ...

Ice Jam on Russia's Ob River

NASA Earth Observatory

The outstanding image reproduced overleaf (page 48) dates from June 29, 2007 and was acquired by the Moderate Resolution Imaging Spectroradiometer (MODIS) flying aboard NASA's *Terra* Earth observation satellite.

The image depicts the lower reaches and estuary of the Ob River—at 3650 km in length, the fourth longest in Russia—which follows a twisting northwesterly course from its source in the Altai Mountains to the Gulf of Ob, before emptying into the Kara Sea..

Frozen over for several months during the winter, the onset of summer brings a thaw that creates a heavy runoff from melted snow, which transports vast quantities of ice floes towards the Arctic. The result is an ice jam downstream from the thawed portions of the river. At the time this image was obtained, the thaw of the Ob was nearing completion.

The scene is typical for early summer. South of the ice jam, the Gulf of Ob is swollen with pent-up run-off; farther upstream from the jam, the river is widened as well. Unable to carve through the still-frozen terrain, the Ob has little choice but to overflow its banks.

This image also depicts sea ice retreating from the Kara Sea into the Arctic Ocean and a lingering line of snow cover snaking its way along the Ob River, to the west. And while the land to the south appears lush and green, farther north it is barren and brown. Near the mouth of the river and bordering the Kara Sea, the land consists of cold-adapted tundra where a short growing season permits the growth of only diminutive plants. The tundra itself had yet to thaw at the time of this image, hence the region's lifeless beige appearance.

NASA image courtesy Jeff Schmalz (MODIS Rapid Response Team)

SOFTWARE SHOWCASE

Douglas Deans *- dsdeans@tiscali.co.uk*

As is usual over the summer months, software updates are in short supply and indeed I am now finding that many of our better known programs are not regularly updated. I suspect that the digital era has something to do with that. Of course, as ever, the exception to the rule is the suite of programs written by David Taylor. Those are updated on a regular basis, mainly to accommodate user suggestions. The latest versions of those programs are shown in the GS1 table list below. In addition Patrik Tast's excellent APT Decoder software has had quite a major update and a short summary of that is also included. So again, whilst things are a little quieter, I take the opportunity to remind readers, particularly those new to GEO, about the CDs being offered in the showcase.

CD GS4

This CD contains a selection of high resolution images taken from Landsat 7, the Space Shuttle, MODIS, weather satellites and a collection from NASA's Earth Observatory.

The original thought behind this CD was primarily to be able to offer those with a slow Internet connection, or perhaps none at all, the ability to enjoy large, high resolution images. With the huge increase in the use of broadband, and indeed very fast broadband, there is probably less need for this. Nevertheless the CD is full of fascinating imagery and comes as a handy composite package with image descriptions. There are endless Internet sites now offering new high resolution imagery on a day-to-day basis but the subject of the images supplied on GS4 have been chosen not only for their interest but also their timelessness. The CD is available from the GEO Software collection as detailed below.

Satscape

Readers may recall that I made mention of a new version of Scott Hather's Satscape software (GEOQ 13). Scott has been planning a JAVA option since, as he puts it, 'Quite simply because it can be just as good as the Windows version, hopefully run better, but will run on any operating system, Windows, Linux, Mac OS X etc.'

The Java version is now in early development but is not yet a replacement for the Windows software. Nevertheless, Scott has released an early alpha version for people to try and to specifically report bugs and problems. This will not overwrite your existing Windows version but will be kept side by side with it. Indeed those trying it are encouraged to use both editions. If anyone is interested in trialling the Java software it is available for download from the Satscape site. Go to http://www.satscape.co.uk/ and follow the links on that page. Once the software is at a more advanced stage I will report further and make it available on CD2 where the current Windows version is still included..

APTDecoder v 2.0.4.76

APTDecoder, already an excellent composite program, has just got better with the addition of mapping features. I have reviewed this program briefly before and Les Hamilton provided an in-depth analysis of the program in GEO Q8 (December 2005). For those new to the program I strongly recommend reading this article as it is an excellent guide to setting up the software and getting to grips with the basic functions as well as the more advanced options.

The latest update now offers new mapping features and includes :-

- The ability to project an image in various projections.
- Create a daily composite image.

GS1

All David Taylor's weather satellite programs and libraries, including the current releases of WXtrack, Satsignal, HRPT Reader, GeoSatsignal, GroundMap, RX2 PassControl and many other program extras. This disc also contains a large quantity of sample files, many of high-resolution data, for use with these programs.		
AVHRR Manager	Processes and manages the files for HRPT via EUMETCast	v 1.3.6
GeoSatSignal	Manipulates Geostationary weather satellite images	v 6.1.0
GRIB Viewer	Viewer for GRIB format files	v 2.1.4
GroundMap	Rescales satellite images	v 2.0.6
HRPT Reader	Converts raw HRPT data files into images	v 2.7.0
Kepler Manager	Organises files of 2-line element data	v 1.2.8
Metop Manager	Processes and manages AVHRR files from Metop satellites	v 1.1.4
MSG Animator	Automatic animation of MSG images following reception	v 2.5.8
MSG Data Manager	Processes and manages MSG data files	v 2.5.8
RX2 PassControl	Computer control program for the RX2 receiver	v 3.1.0
SatSignal	Creates images from wave files	v 5.0.6
WXtrack	Satellite Tracking Program	v 3.6.4

GS2

A wide range of software for all aspects of weather satellite reception, including tracking, receiving, monitoring and image manipulation. Content is detailed below but many other extras are provided. Titles correspond with folder names. * implies a DOS program.		
Collection D02	Recall (wave file recorder), Palette (modifies Wxsat colour palettes).	
Collection D03	Scanner recorder v 1.8 (wave file recorder), *NOAA95/*FENG99 (software for the NOAA 95 HRPT project)	
Collection D04	Wxsat (wave file recorder/decoder), Satmon (wave file recorder).	v 2.59
AGSatTrack	Satellite tracking program	v 1.33
APTDecoder	Program for capturing APT audio and processing images	v 2.0.4.76
Cirkit	Documents for the Cirkit Wxsat receiver and the UOSat receiver (PDF)	
Element Manager	2-line element manager	v 1.59
Footprint	Satellite tracking program	v 2.24
Irfan View	Image/slideshow viewer	v 3.80
JVcomm32	Evaluation version (APT/FAX/SSTV decoder)	v 1.40 pre
Macintosh kepler editor	Edits verbose AMSAT format elements. Mac OS X and OS9 only.	
NeoPaint	Image processing program (30 day evaluation)	v 4.60
Orbitron	Satellite Tracking Program	v 3.70
Paintshop Pro	Image processing program (30-day evaluation)	
PhotoFiltre	Image retouching program with many extras	v 6.1.5
Satscape	Satellite tracker and wave file recorder	v 2.02
Space-Track TLE Retriever	Generates TLE files in 'Celestrak' style from'Space Track' data sets	
Xrit2Pic	Processes MSG and Metop data	v 2007.03
Splitter	Utility program for splitting and reuniting large files	
WXtoImg	WAV file recorder/decoder program with many options.	v 2.7.3

GS3

3DEM Package for 3D Terrain Visualisation
This CD includes the full set of GLOBE Tiles to allow you to produce excellent images and flybys from HRPT inages. Also included is a selection of Mars MOLA files, sample images and helpful guides by Ed Murashie.

GS4

Image CD
A wide selection of high-resolution remote images from a range of satellites, including stunning imagery from the Space Shuttle missions. A full description and source if provided for each image.

GS5

Mars Rover Panoramics
A chronological account, in panoramic images, of the NASA Mars Rovers' progress across the Martian Terrain

- General settings now includes an option to show image after processing.
- Improvements for those using the ICOM PCR 1500.
- Improved sharpen and contrast options in Settings.
- A number of bug fixes.

APTDecoder v 2.0.4.76 is available on GEO software CD, GS2 For further information or to download the program go to :-

http://wap.ptast.com/apt/decoder/index.html

How to Purchase CDs

Write to the address below requesting GS1, GS2, GS3, GS4 or GS5. Prices are £5 for any single CD, 2 for £8, 3 for £11, 4 for £14 or all 5 for £17. Please enclose cash or cheque (made payable to Douglas Deans - not GEO please) for the appropriate amount. Nothing else is required.

The cost includes CDs, packaging, posting and a small donation towards the cost of overheads. No fee is asked from overseas members although an exchange of software or interesting satellite images is always welcome.

Orders are normally dispatched on the day of receipt.

Order your CDs from:
Douglas Deans, 17 Montrose Way,
Dunblane, Perthshire FK15 9JL, Scotland.

Peripatetic APT

... concluded from page 47

can illustrate that my activities are a scientific, educational hobby with no sinister dimension.

The Future

I am going to try to make my portable antenna system a little more visually appealing and quicker to assemble. I will use the much lighter R2FX receiver instead of my home-constructed one and experiment without the use of the preamp. In due course I will report my findings.

Further details

If anyone is interested in following my journey on the River Napo through the adjacent rain forests just email me and I will forward the travel contact points to you.

francis@geo-web.org.uk

IN TRAY

The Column for Readers' Letters and Queries

email: geoeditor@geo-web.org.uk

Symposium 2007

As a new member of GEO, can I say how much I enjoyed the Symposium at the National Space Centre.

All my questions were answered with enthusiasm by other members and I now have an APT system up and running. The next step is to install the dish and PC card RX for MSG reception.

Best Regards
John Wiggins, Newcastle Under Lyme

Mysterious Feature *(GEO Q14, page 30)*

This could be the right of way for the Churchill Falls 735 kV Power lines to Quebec. The right of way is 710 feet wide. Here is a link that shows some of it—scroll down the page a bit to see the photograph.

http://www.ewh.ieee.org/reg/7/millennium/churchill/cf_history.html

Cheers....Mike G1HWY

Super Delivery

Just to let you know my GEO Quarterly arrived in record time here in Bulgaria. It had the Southampton postmark of May 31 and on June 2 my neighbour came to visit me on his bicycle. He told me that the post-lady here had called him and that there was interesting post for the Englishman! Only 2 days. How's that for service!

By the way, they came to install my wireless Internet yesterday, via a remote microwave link. The installation was successful but they forgot the paperwork! This means I have to wait for information on setting up my mailbox for sending emails. But I still receive OK on my domain address (rob@wxsat.org)

I'm hope to meet you all in Germany on the Eumetsat trip. Sorry I couldn't make it to this years Symposium. We have had severe floods in Plovdiv with up to 2 feet of rain on the motorways this week! Average temperature here is about 30°C.

Best Wishes from Bulgaria,
Rob Denton

Etna

Very many thank's for the latest issue of GEO Quarterly and as always an excellent publication.

As a follow-up from the latest issue, I am enclosing an image of Mount Etna in Sicily, with steam and smoke coming from it (opposite page). This lasted about an hour. This image was received on the May 24, 2007 at 13:15 UT. I hope your readers find it of interest. As a further point of interest, you can see the islands of Malta and Gozo to the south of Sicily.

Eric Dean, Maidstone, Kent, England

GEO Visit to EUMETSAT

Exactly a week before July 4, I came to the GEO Homepage and there read of the big event in my neighbourhood. I have been an enthusiastic weather satellite amateur (APT) for 15 years, and therefore I thought this unique chance shouldn't go away without me.

I wrote Peter Green an email and was surprised and happy to receive his welcome the very next day. My chief gave me two days holidays without problems.

I met with many people from different neighbouring countries and we chatted about our hobbies and other interests (good to refresh my English knowledge) .

Thanks to EUMETSAT's superior programme for GEO, I am now up to date over environmental satellite's and have made many new friends.

Thank you very much. Best wishes and regards,

Best wishes and regards,
Carsten Arnheiter

My thanks to GEO for all the hard work which made our visit to EUMETSAT such a huge success. It was wonderful to have such interesting lectures from such dedicated and senior people. Visiting the control rooms was also something that I found quite stunning, and I had looked forward to it ever since the visit was first mooted.

Speaking to others on the visit I am sure that they enjoyed it as much as I did. We all had a great time and got on so well together. It was a good evening too in the Ratskeller all doing our bit for international relations.

So once again, thank you very much.

Kind regards,
Tim Holdsworth

Having looked through some photos I took when I last visited EUMETSAT, and having an interest in things Scandinavian, Cecilia recognised staff member Anders Sorensen from Denmark while she was having lunch. Quite what Anders thought when this 'unknown' lady called him across, I don't know, but she quickly explained that her husband was here, and directed him to my table. Anders and I had a good chat about how the ideas we had discussed a couple of year back had developed—the result had been the EARS-AVHRR service, by the way.

Cheers,
David Taylor

Eric Dean spotted Mount Etna erupting in this clip from Meteosat-9

Image © EUMETSAT 2007

Funnel Cloud

About 15.00 UT on Saturday June 23, while watching an approaching thunderstorm, my attention was drawn to a strange cloud circulation. I grabbed my camera and watched for about five minutes as funnel cloud formed. I then watched this for about 8 minutes and took the photograph below.

The image is through glass, so limited. As the houses cut off the view I cannot tell whether it was just a funnel cloud (which doesn't reach the ground) or a tornado (which does). Whatever, this was a rather unique meteorological event in this part of the world (Dunblane, Scotland). As I said, I don't know if it touched down or not but it was still a great sight: certainly the first time I have seen such an event live.

Best regards,
Douglas Deans

A funnel cloud photographed by Douglas Deans last June

After Darmstadt ...

Shortly following the GEO visit to Darmstadt, one of GEO's continental members, Guiseppe Cico from Italy arrived in Edinburgh for a week's holiday.

During his stay, he enjoyed a lunch with three of GEO's Scottish contingent.

The photograph at right, kindly snapped by a waitress (using David's camera), shows the group enjoying their meal (left to right: Les Hamilton, Guiseppe Cici, Cecilia Taylor, David Taylor)

My Experiences Trialling the R2ZX APT Wxsat Receiver

Lawrence Harris

I thought that I would write this short piece about my experiences with the new pager-resistant APT receiver designed by Holger Eckardt. I originally borrowed an R2ZX from GEO in order to prepare a short review for publication in *Monitoring Monthly*.

APT receivers are few and far between, and this is understandable; with new transmission formats being implemented by the newer generation of weather satellites there is little incentive or concern shown by more established manufacturers to upgrade their products for the special problems generated a few years back by the UK frequency allocations. Holger has become the exception in modifying his previously issued receiver specially for the UK market.

Clive Finnis kindly delivered the original pager-resistant unit to me and I installed it in my computer room. The a.p.t. antenna feed from the garden-mounted QFH had been a little short, so an extension co-ax was fitted. This has never worked very well anyway, even when feeding my long-used Proscan receiver. I connected the new receiver to it and waited optimistically. Unfortunately, virtually every satellite pass was a disaster—filled with powerful interference. There had to be a basic problem here.

Relocation

I decided to move the reception equipment into the garden observatory to see whether there was any improvement. One hour later I was operational. The cable was now more than adequate in length, so the feed now connected straight to the receiver. My original receiver was not too bad on all satellites, with the exception of NOAA-18; in this new location it was a total disaster.

After running this system for a couple of days to establish a 'norm', I switched to the R2ZX receiver. '*Wow*!' is all that I can say. Hearing NOAA-18 rise above my southern horizon and provide excellent signals immediately was a delight. Previously, all NOAA-18 passes (on the 137.9125 MHz frequency) had been punctuated by powerful pager interference every few seconds.

I left the system recording automatically for several hours until I had to lock up the observatory overnight. That experience allowed me to write my review notes for *Monitoring Monthly*.

Having to return the receiver to GEO was something approaching near-trauma! For a few weeks I struggled with my original system, until finally giving in! I ordered my own R2ZX and then not only installed it permanently into the observatory, but also drilled a small hole in the back wall to take the cable feed. I have since recorded all passes continuously, which has of course let me see the overnight and early morning passes from every satellite.

Box of Magic

I have been delighted with the results from this box of magic! My first task each morning has been to connect via the network to the remote computer to examine the pictures collected overnight. Figure 1 is a section from an enhanced early-morning NOAA-18 infrared image.

One unexpected problem here has been the software. I was using Craig Anderson's WXtoimg but on every occasion that I connected to the remote computer via the network, the actual display from the program was missing! I could not activate any commands or see the picture because the screen was blank.

I notified Craig of this problem and he has told me that he is working on a solution. Meanwhile others have confirmed my own experience. As a result of this I have recently been using Patrik Tast's *APTDecoder* which works perfectly at both decoding the a.p.t. signal and producing a selected enhancement.

The coloured image at the upper left on the opposite page was obtained from a daytime NOAA-18 pass, a complete sweep from about two degrees south elevation until cut off by trees to the north of me.

You can just forget about pagers!

And finally, to its right, is an early morning colour composite from NOAA-12 to illustrate that all the satellites are producing excellent results.

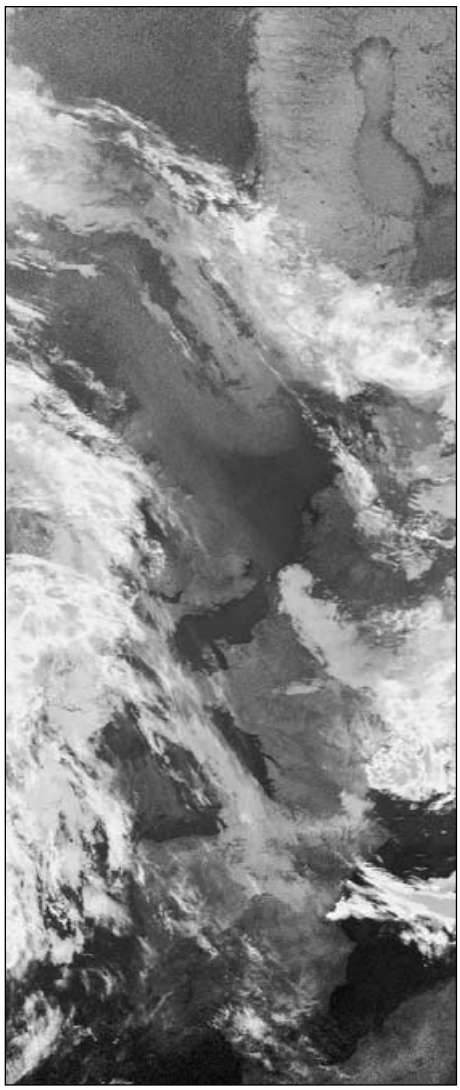
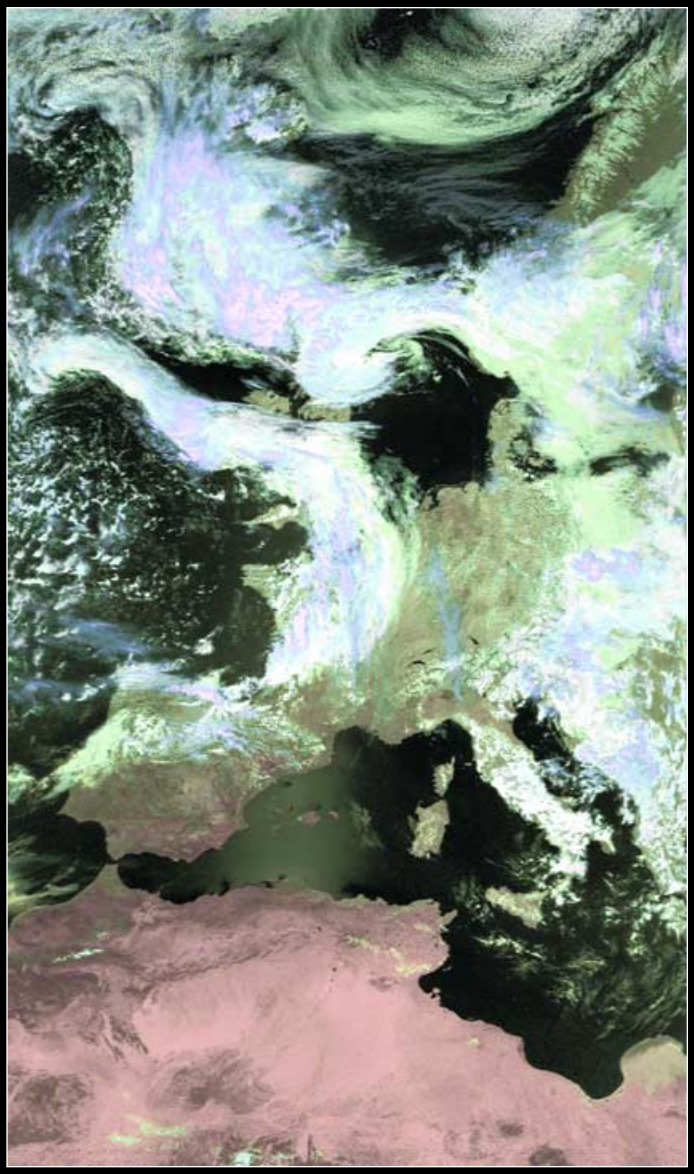


Figure 1
An enhanced NOAA-18 IR image
02:22 UT on June 2, 2007

My local horizon is now quite reasonable in the south; the east has sprouting trees that were not there when we moved in but have shot up to make my observing difficult! The northern horizon has some tall neighbour's trees and the west is broken by the house roofs. This combination of trees causes severe signal drops during certain passes - not to be confused with pager interference.

As in my *Monitoring Monthly* review, I can only say that this is a most excellent receiver. Long may the a.p.t. transmissions continue!

NOAA-12 at 05:35 UT on June 2, 2007



NOAA-18 at 12:45 UT on May 30, 2007

The photograph below shows GEO reader **Anthony Lowe** in his qth, Anthony sent in a collection of his NOAA APT images acquired during April and May, making particular reference to the NOAA-17 pass illustrated opposite.

Acquired at 10:52 UT on May 23, 2007, this image shows a well developed set of *Ship Trails* off the southwest coast of Britain, as well as a regiment of lee wave clouds over the far northwest of Scotland.