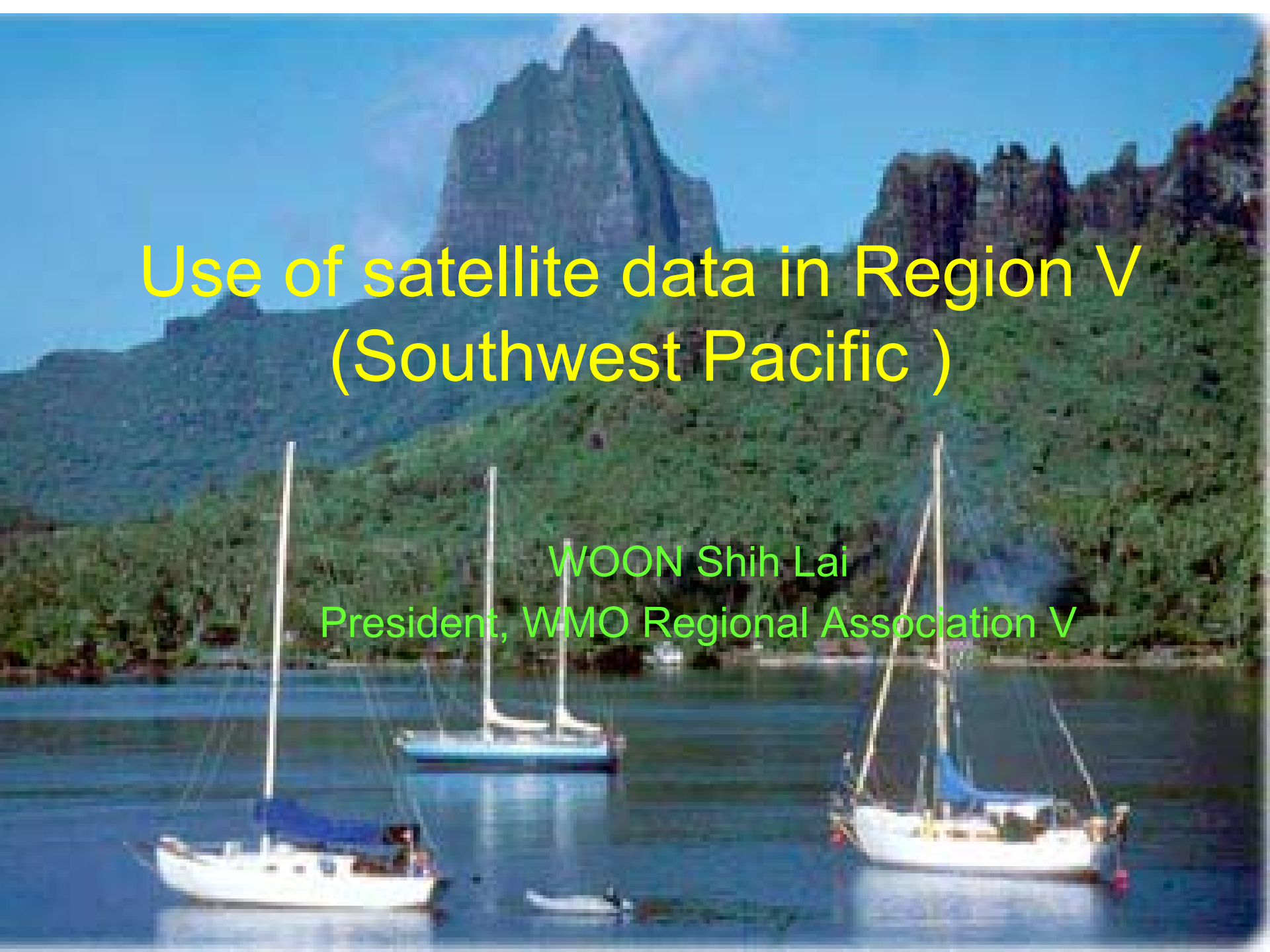
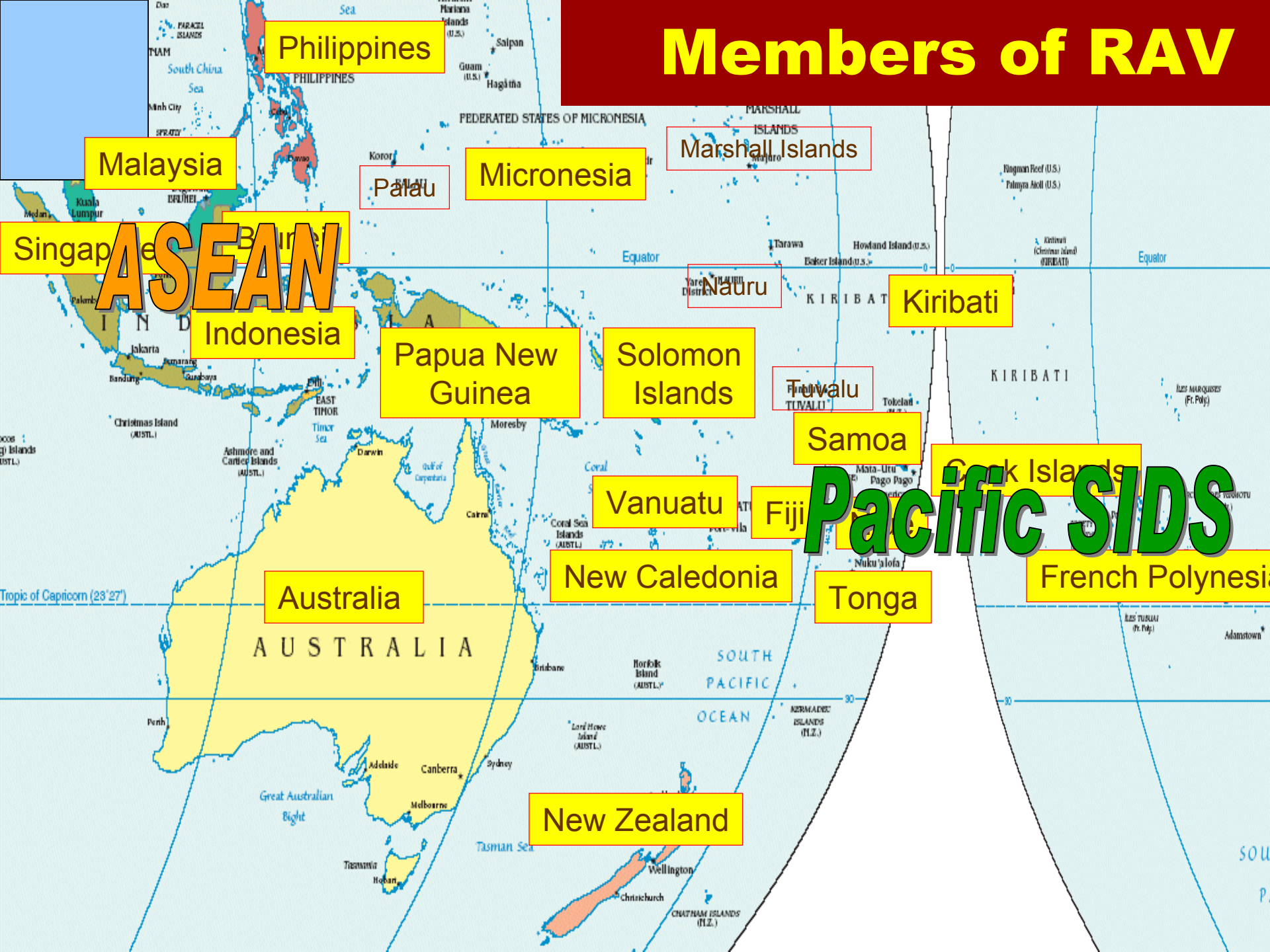
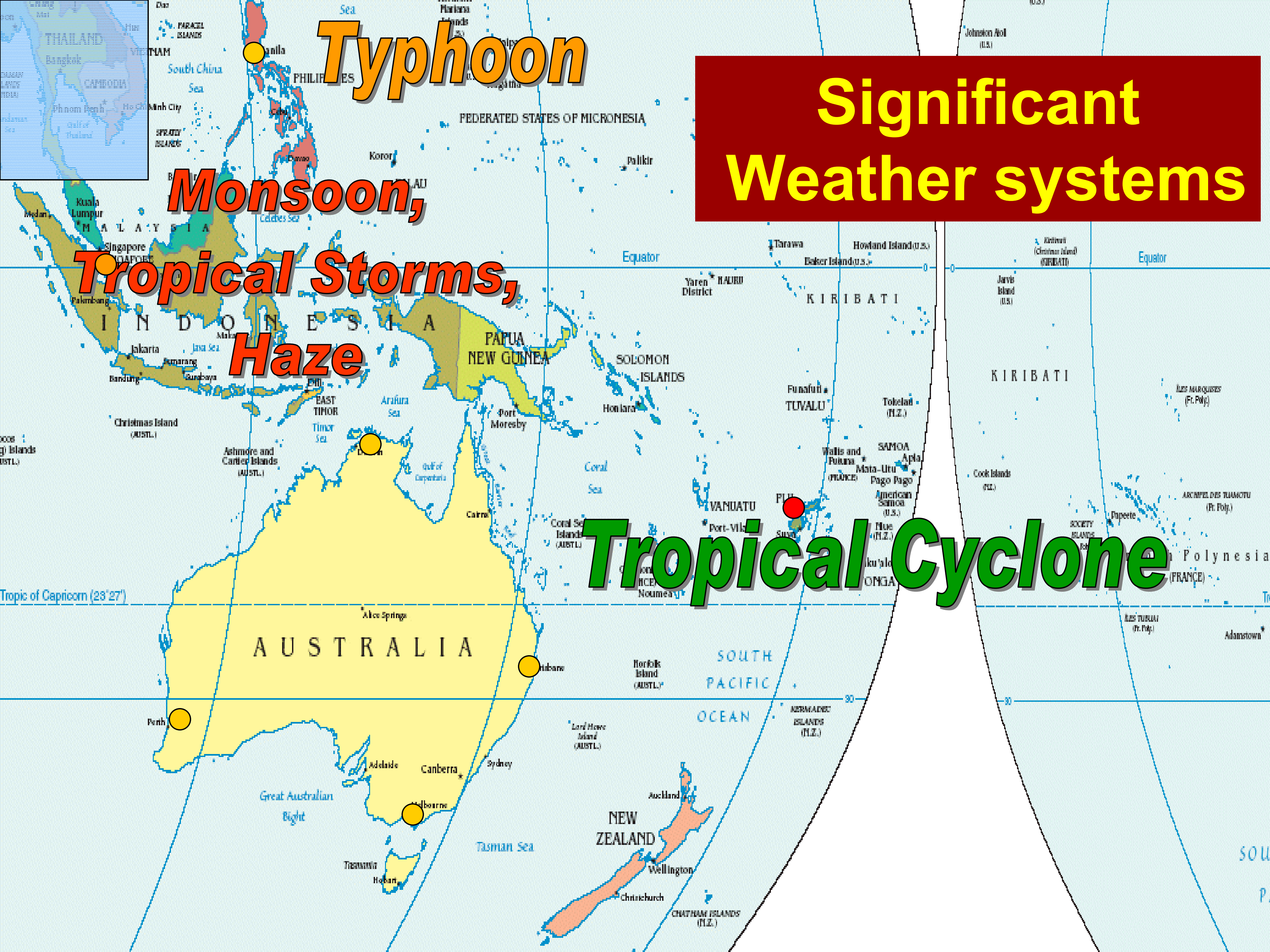


Use of satellite data in Region V (Southwest Pacific)

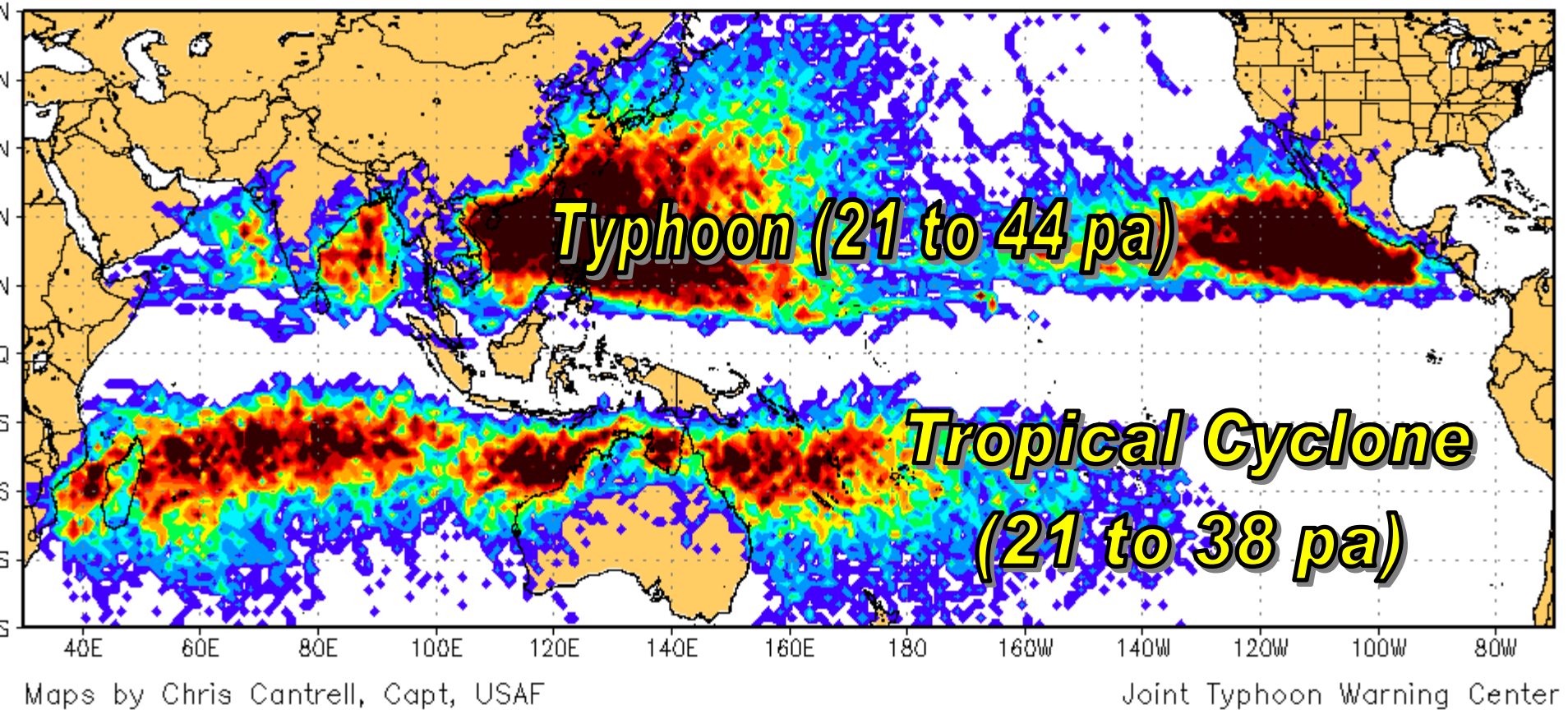
WOON Shih Lai
President, WMO Regional Association V

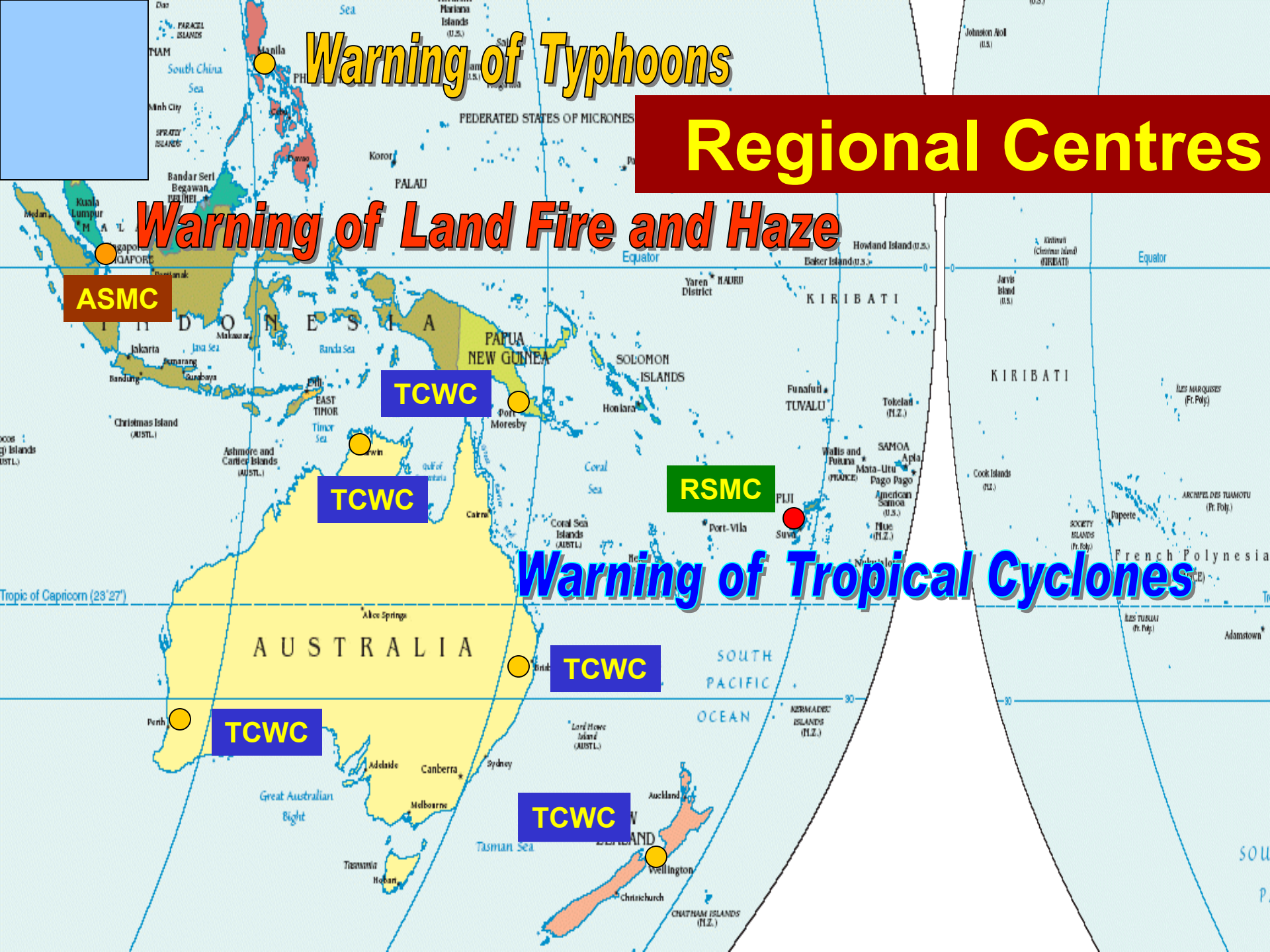

Members of RAV
Philippines
Malaysia
Micronesia
Palau
Marshall Islands
Singapore
ASEAN
Brunei
Indonesia
Nauru
Kiribati
Papua New Guinea
Solomon Islands
Tuvalu
Samoa
Cook Islands
Vanuatu
Fiji
Pacific SIDS
New Caledonia
Tonga
French Polynesia
Australia
New Zealand
PHILIPPINES
FEDERATED STATES OF MICRONESIA
MARSHALL ISLANDS
KIRIBATI
AUSTRALIA
SOUTH PACIFIC OCEAN
Equator
Tropic of Capricorn (23°27')
Jakarta
Darwin
Perth
Adelaide
Canberra
Sydney
Melbourne
Brisbane
Great Australian Bight
Tasman Sea
Wellington
Christchurch
Port Moresby
Nuku'alofa
Pago Pago
Tarawa
Majuro
Saipan
Guam
Hagåtña
Koror
Kuala Lumpur
Manila
Timor Sea
Coral Sea
Gulf of Carpentaria
Cairns
Hobart
Tasmania
Norfolk Island
Lord Howe Island
Christmas Island
Ashmore and Cartier Islands
Howland Island
Baker Island
Kingman Reef
Palmyra Atoll
Funafuti
Port Vila
Suva
Honiara

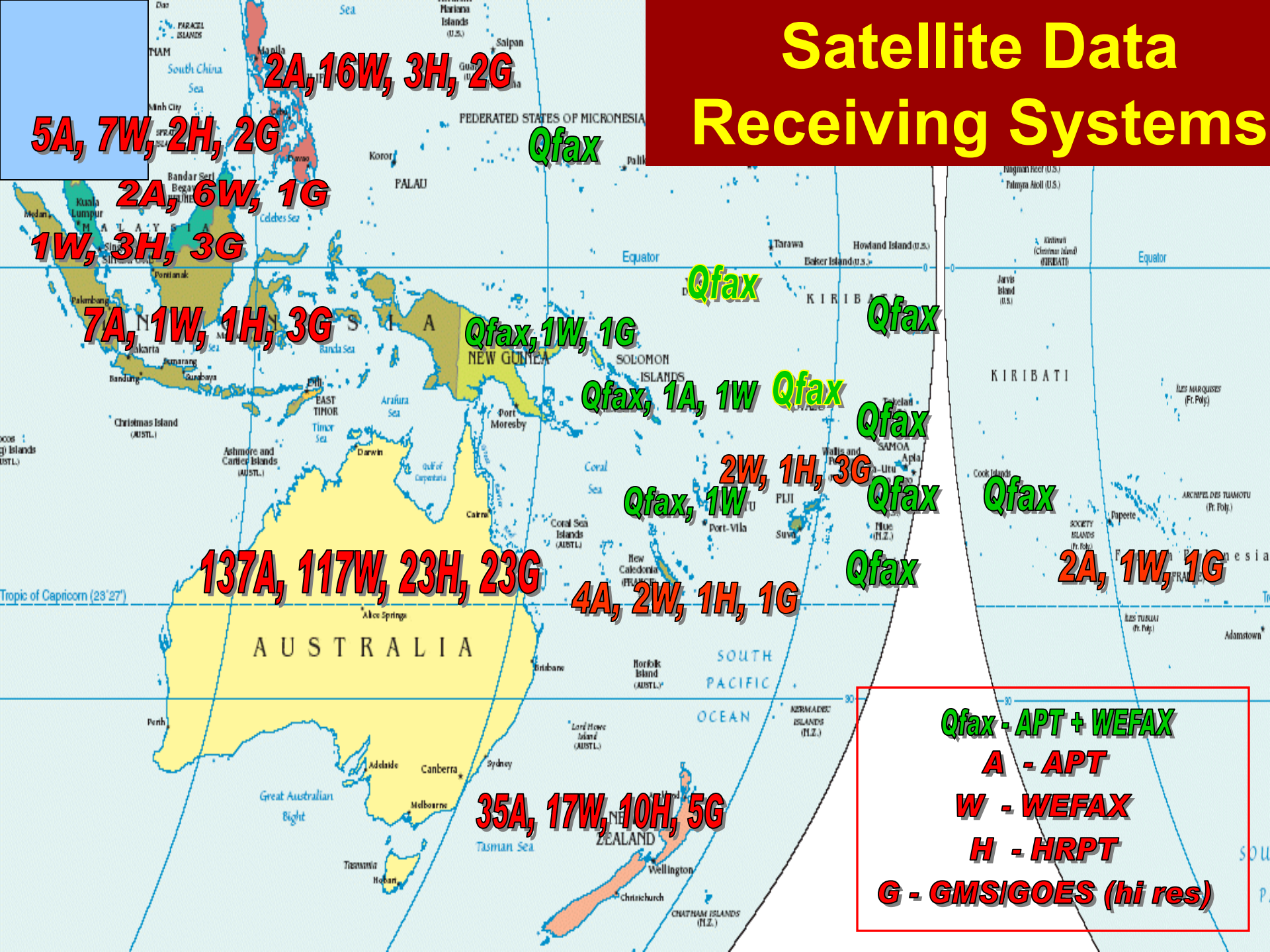
Significant Weather systems



Yearly TC Occurrence




Warning of Typhoons
Regional Centres
Warning of Land Fire and Haze
ASMC
TCWC
TCWC
RSMC
Warning of Tropical Cyclones
TCWC
TCWC
TCWC
Manila
Kuala Lumpur
Jakarta
Port Moresby
Honiara
Suva
Port-Vila
Funafuti
Alice Springs
Perth
Adelaide
Canberra
Sydney
Melbourne
Auckland
Wellington
Christchurch
Darwin
Cairns
Brisbane
Tropic of Capricorn (23°27')
Equator
AUSTRALIA
INDONESIA
PAPUA NEW GUINEA
SOLOMON ISLANDS
TUVALU
KIRIBATI
SAMOA
FIJI
PALAU
FEDERATED STATES OF MICRONESIA
SOUTH PACIFIC OCEAN
Great Australian Bight
Tasman Sea
Coral Sea
Timor Sea
Banda Sea
Java Sea
South China Sea


Satellite Data Receiving Systems
2A,16W, 3H, 2G
5A, 7W, 2H, 2G
Qfax
2A, 6W, 1G
1W, 3H, 3G
Qfax
Qfax
7A, 1W, 1H, 3G
Qfax, 1W, 1G
Qfax, 1A, 1W
Qfax
Qfax
2W, 1H, 3G
Qfax, 1W
Qfax
Qfax
137A, 117W, 23H, 23G
4A, 2W, 1H, 1G
Qfax
2A, 1W, 1G
35A, 17W, 10H, 5G
Qfax - APT + WEFAX
A - APT
W - WEFAX
H - HRPT
G - GMS/GOES (hi res)

Major Applications of Satellite Data in RA V

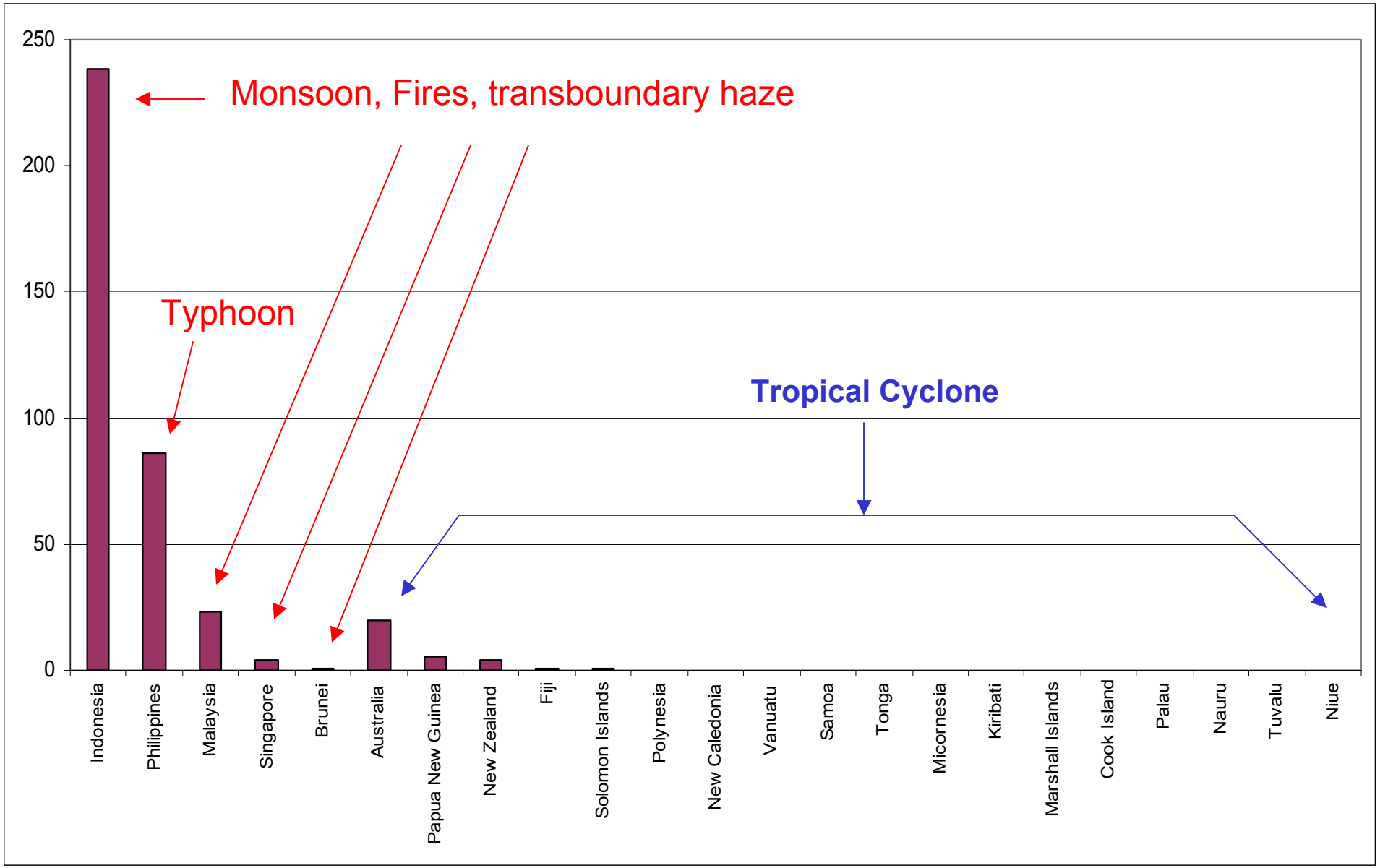
- **Monitoring & Prediction of** (data shared freely on Internet)
  - Tropical cyclone
  - Typhoon
  - Monsoon depression
  - Transboundary smoke haze

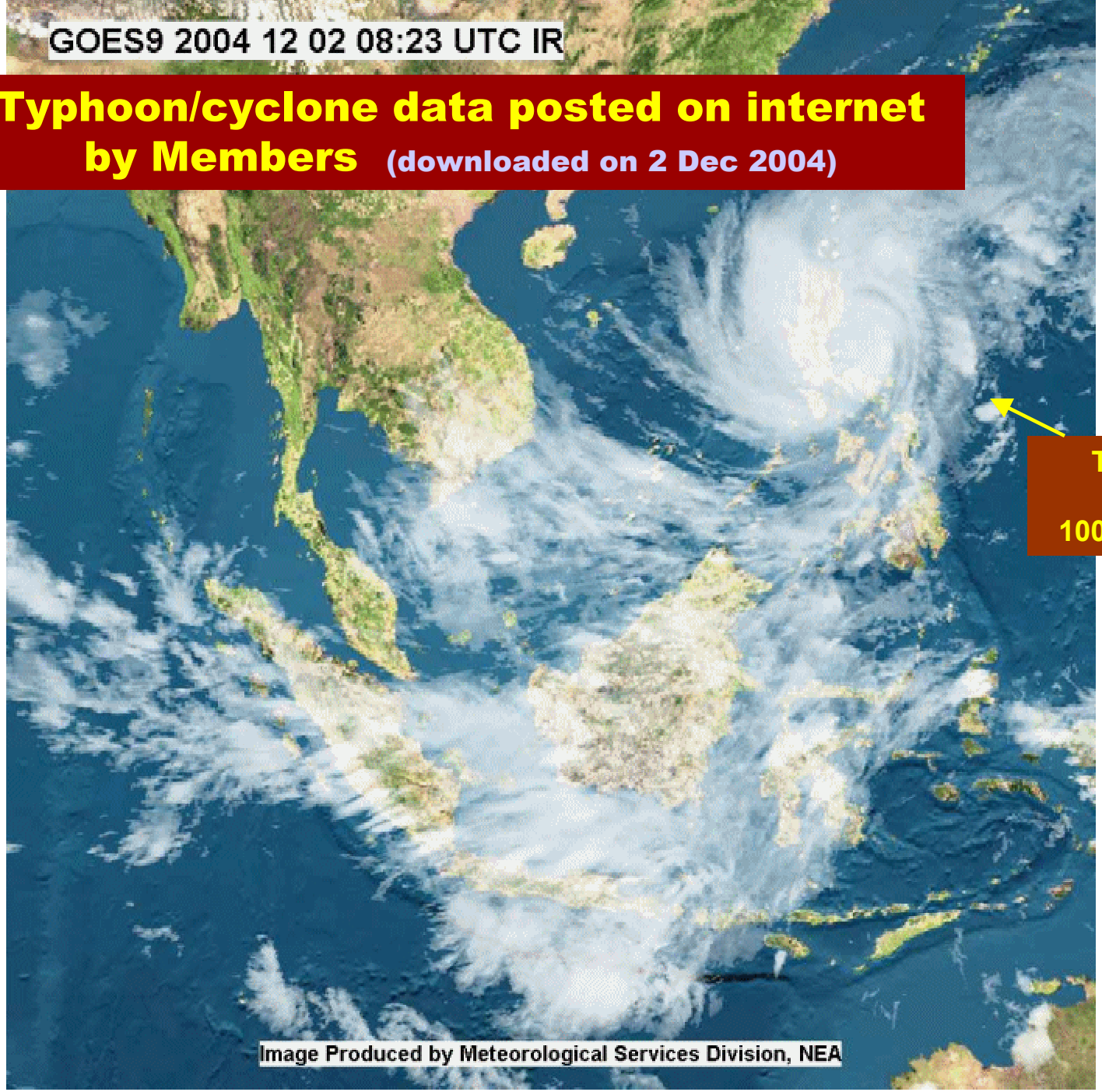
- **Remote sensing applications** (by few Members with needs & means)
  - Rainfall distribution, Wind flow, SST, atmospheric profile, etc
  - Air & sea environmental conditions
  - Data assimilation

Major Applications of satellite data
(other than general weather forecasting)

	Tropical Cyclones	Typhoon	Monsoon weather systems	Land Fires, haze & other remote sensing applications
Southeast Asia		GMS/GOES (Hi Res)	GMS/GOES (Hi Res)	NOAA (Hi Res)
Better equipped island states	GMS/GOES (Hi Res)			NOAA (Hi Res)
South Pacific (SIDS)	WEFAX		WEFAX	
	Geostationary satellites			Polar orbiting satellites

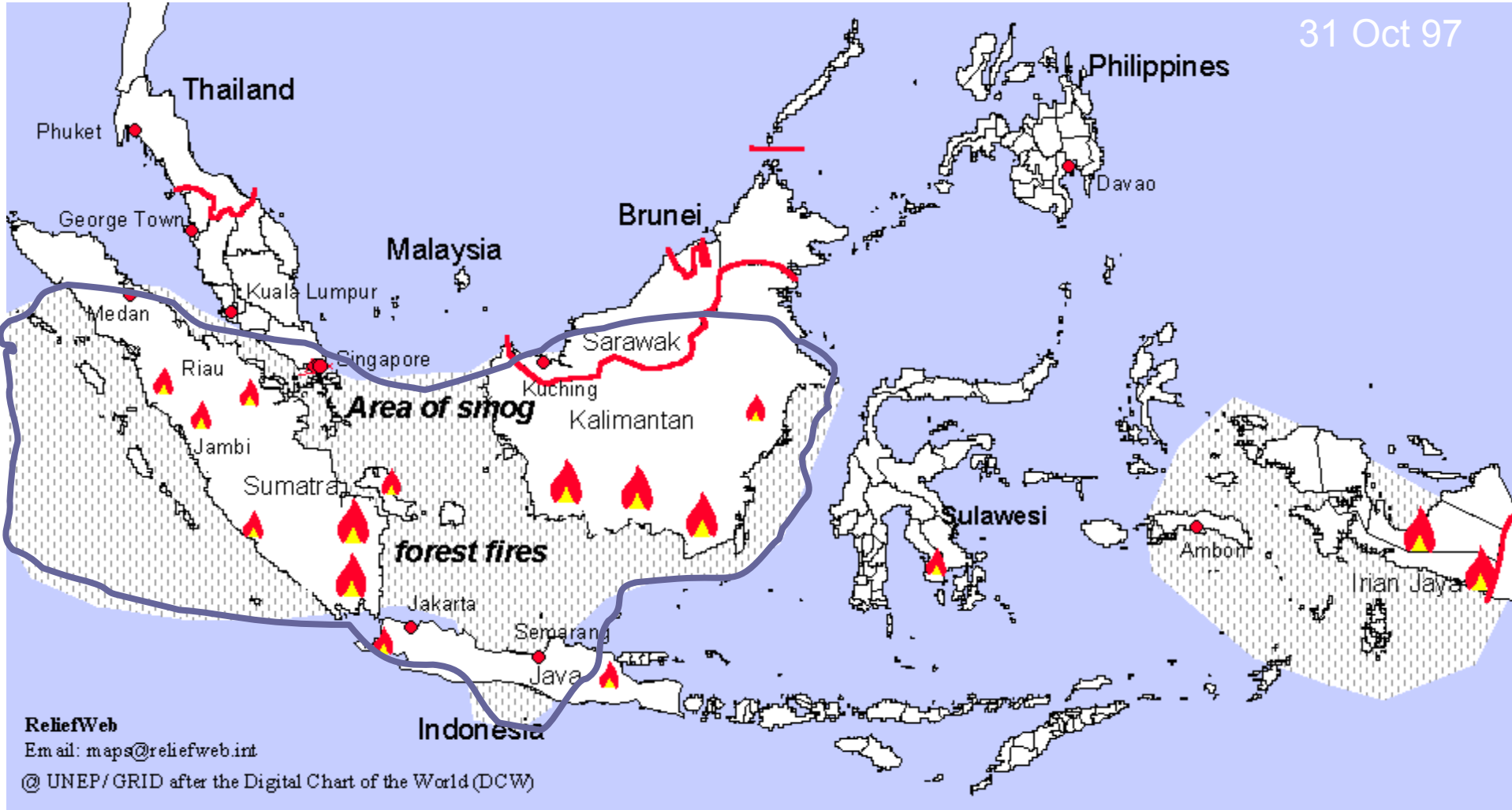
Populations & Significant Weather in RA V

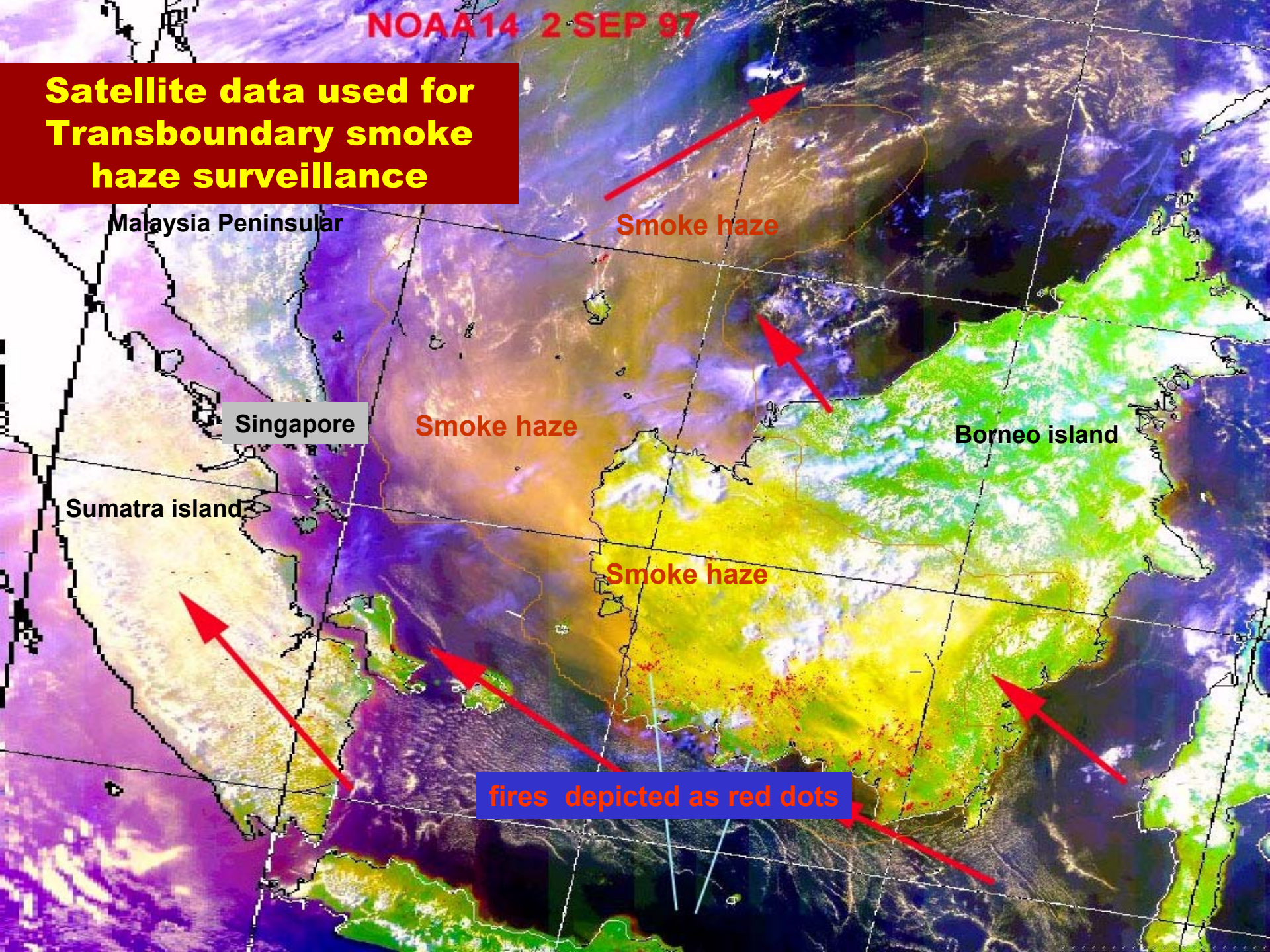


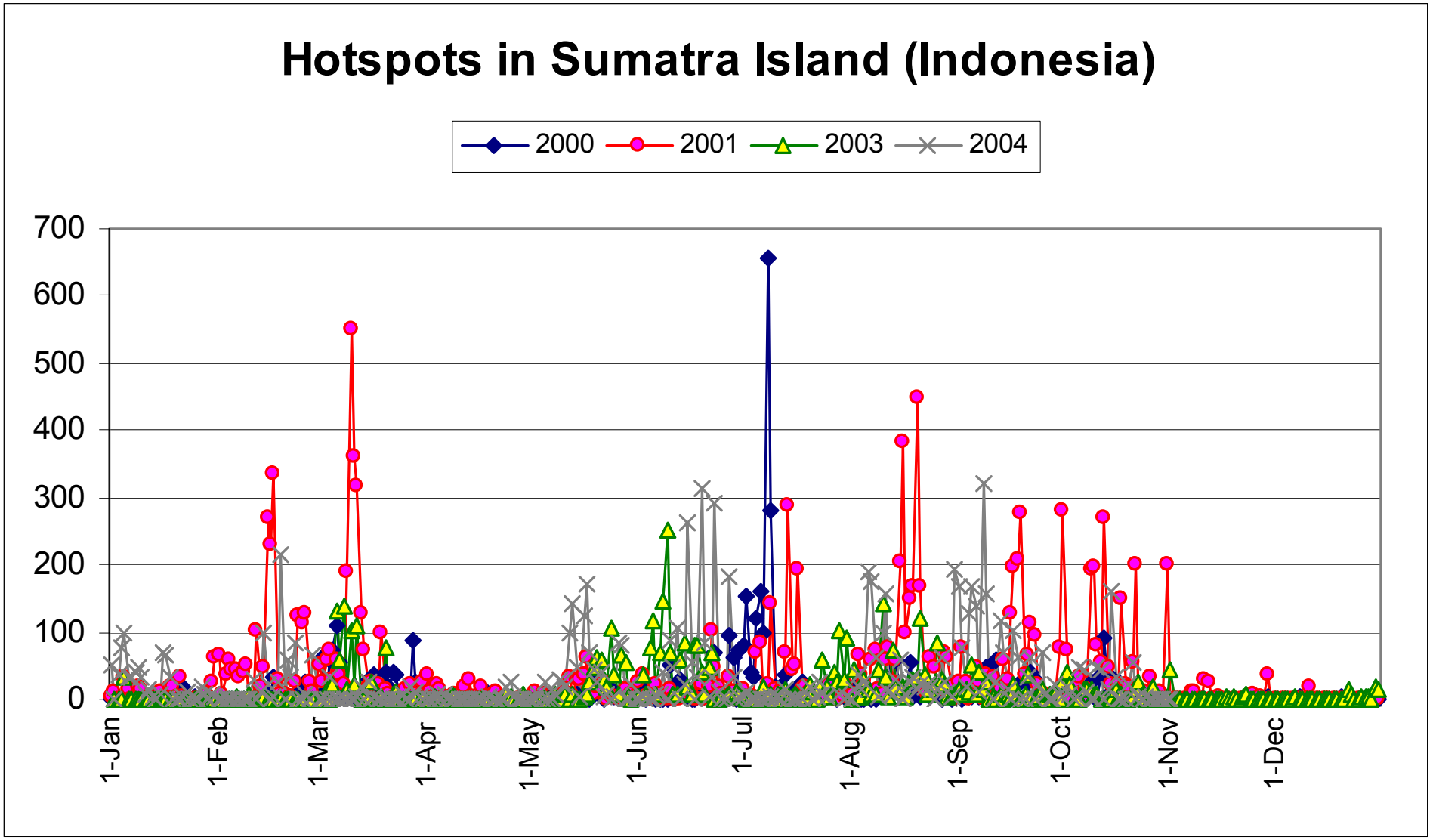

GOES9 2004 12 02 08:23 UTC IR
Typhoon/cyclone data posted on internet by Members (downloaded on 2 Dec 2004)
Typhoon Nanmadol caused 1000 dead in Philippines
Image Produced by Meteorological Services Division, NEA

Severe Smoke Haze Watch

(1997)




NOAA 14 2 SEP 97
Satellite data used for Transboundary smoke haze surveillance
Malaysia Peninsular
Smoke haze
Singapore
Smoke haze
Borneo island
Sumatra island
Smoke haze
fires depicted as red dots


Hotspots in Sumatra Island (Indonesia)
2000
2001
2003
2004
700
600
500
400
300
200
100
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec

Costs ($ M) of 1997 Haze

Damage	Indonesia	Malaysia	Singapore	Total
Short-term Health Damages	924	8	3.7	935.7
Industrial Production Lossess	NA	157.4	0	157.4
Tourism	70.4	127.4	58.4	256.2
Airport & Airline Losses	17.6	0.2	0.4	18.2
Fishing Decline	NA	16.2	0	16.2
Cloud Seeding	NA	0.8	0	0.8
Total	1,012	310	63	1,384.5

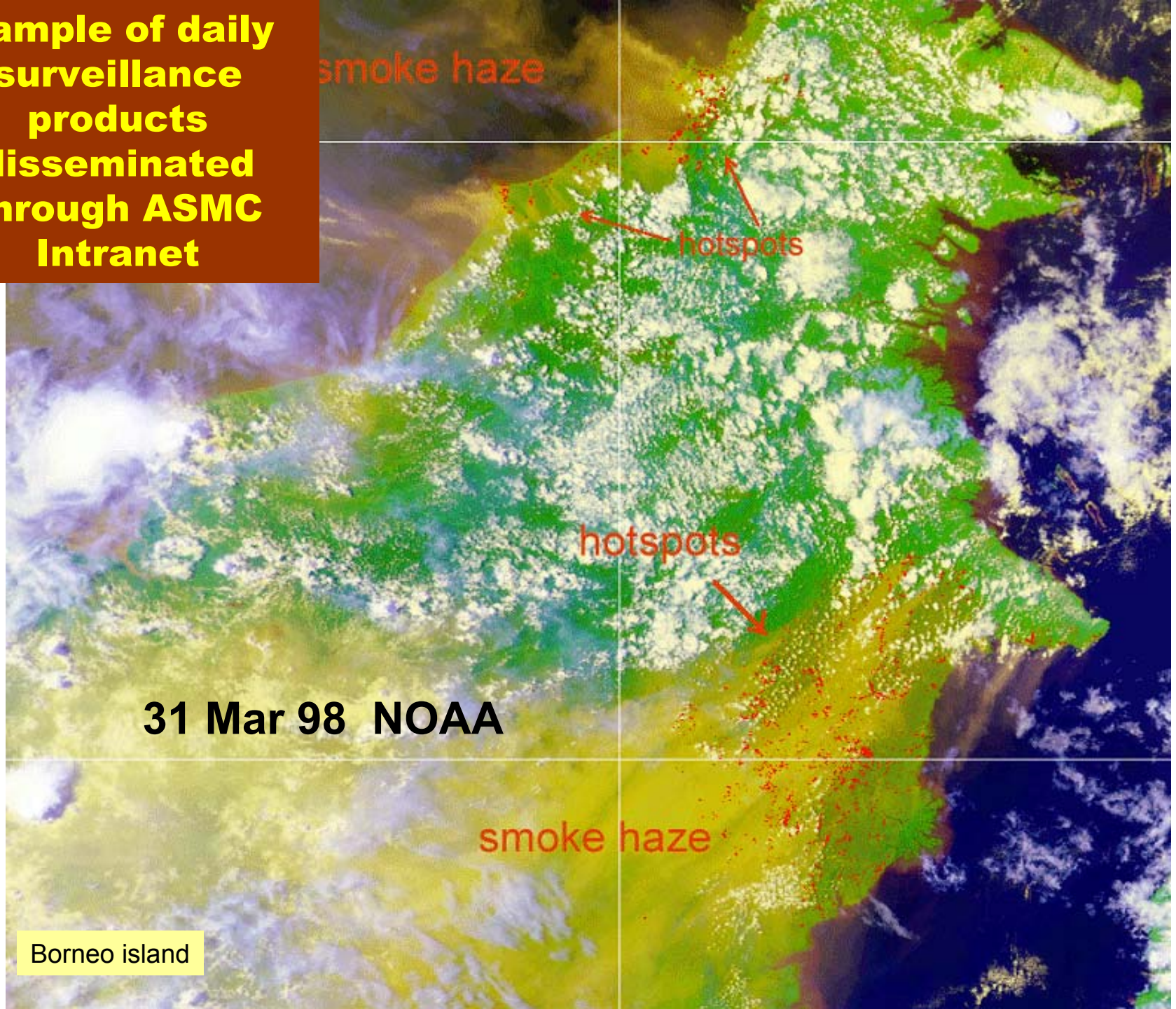
Joint study by WWF -Indonesia and EEPSEA

Regional Haze Action Plan

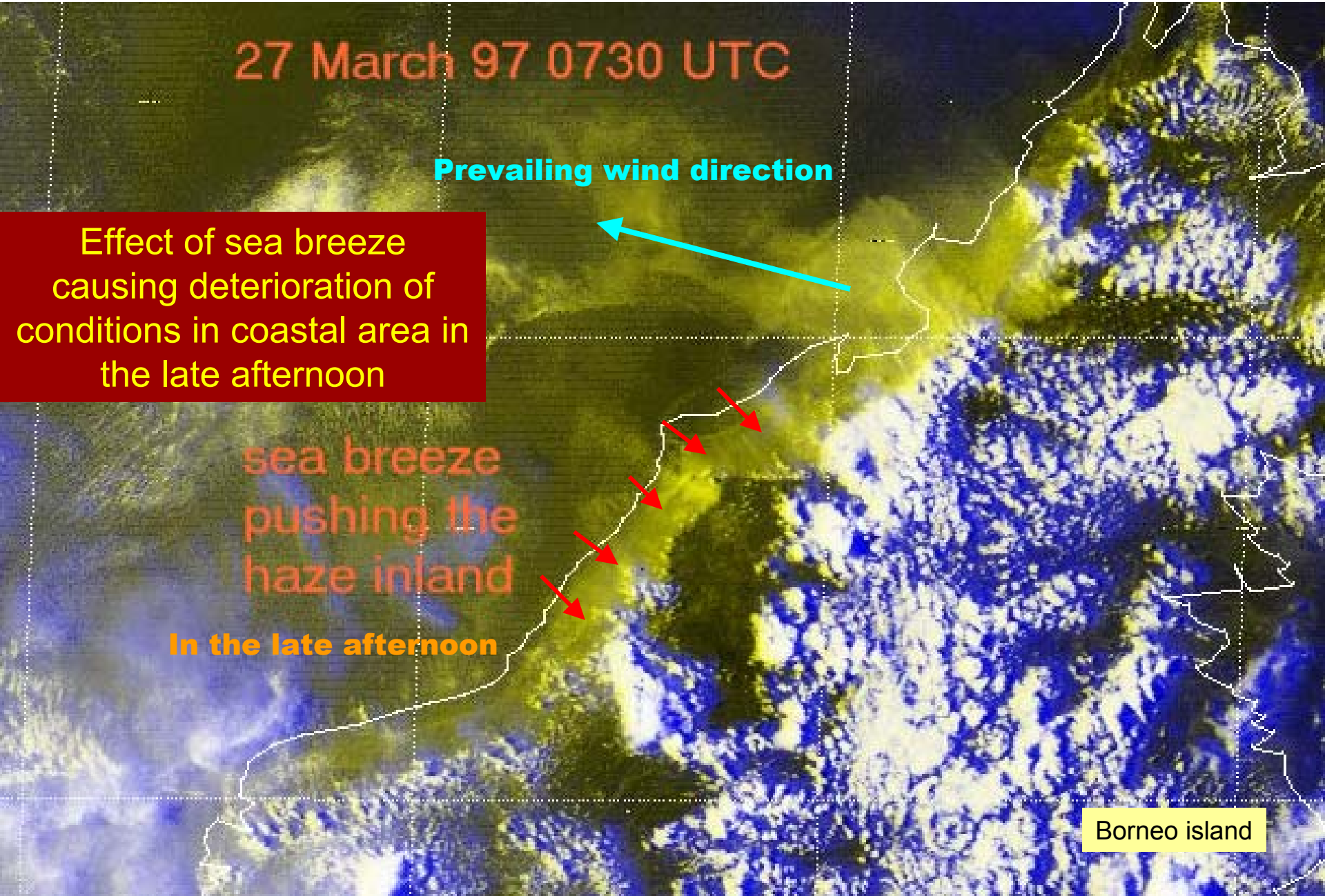
- **Adopted by the Environment Ministers in ASEAN to address transboundary haze problem**

- **ASMC (ASEAN Specialized Meteorological Centre) designated to provide**
  - → **forecasts and daily surveillance of land & forest fires and transboundary haze**
  - → **Relevant products derived from satellite observations**

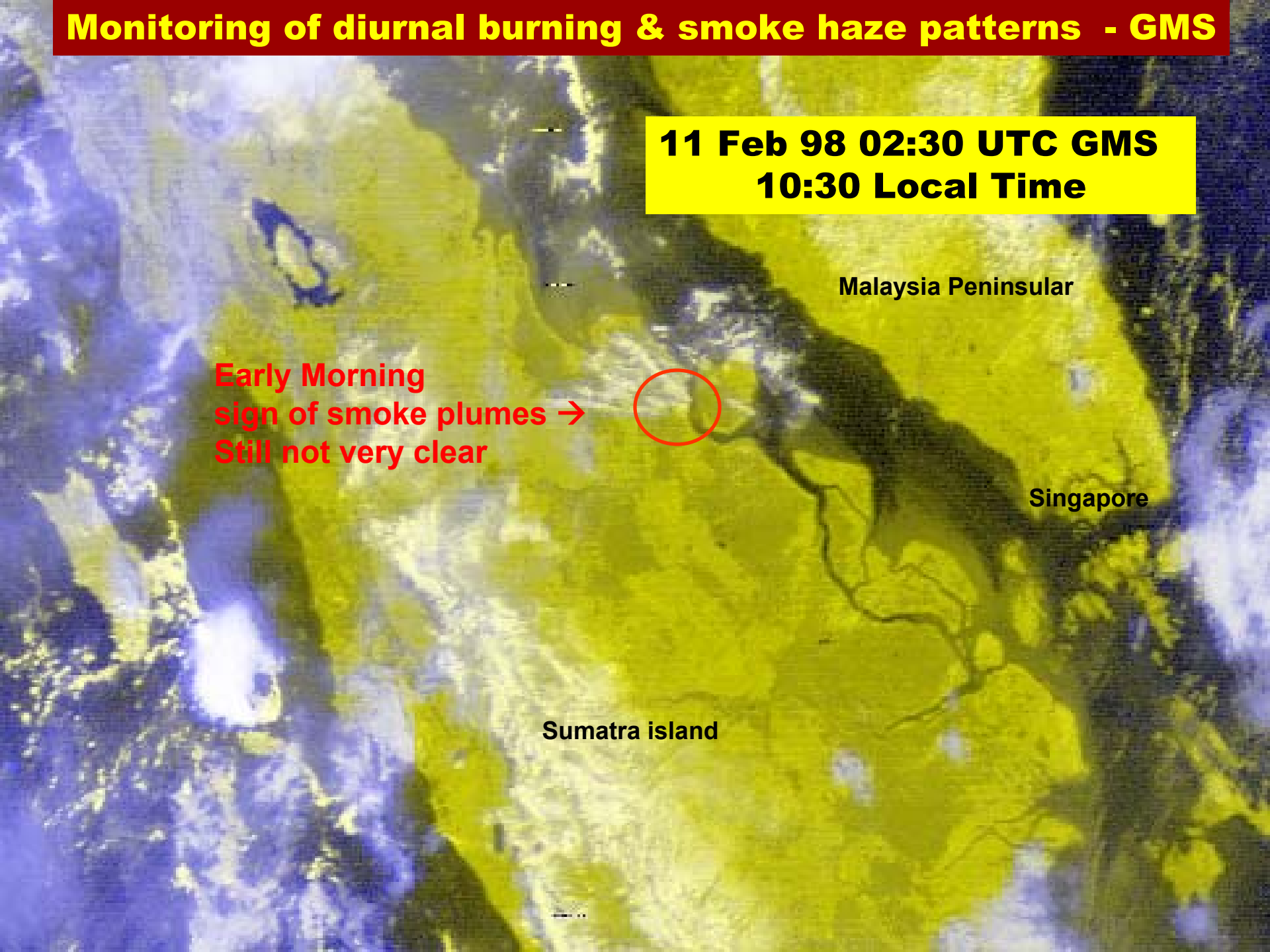
Sample of daily surveillance products disseminated through ASMC Intranet



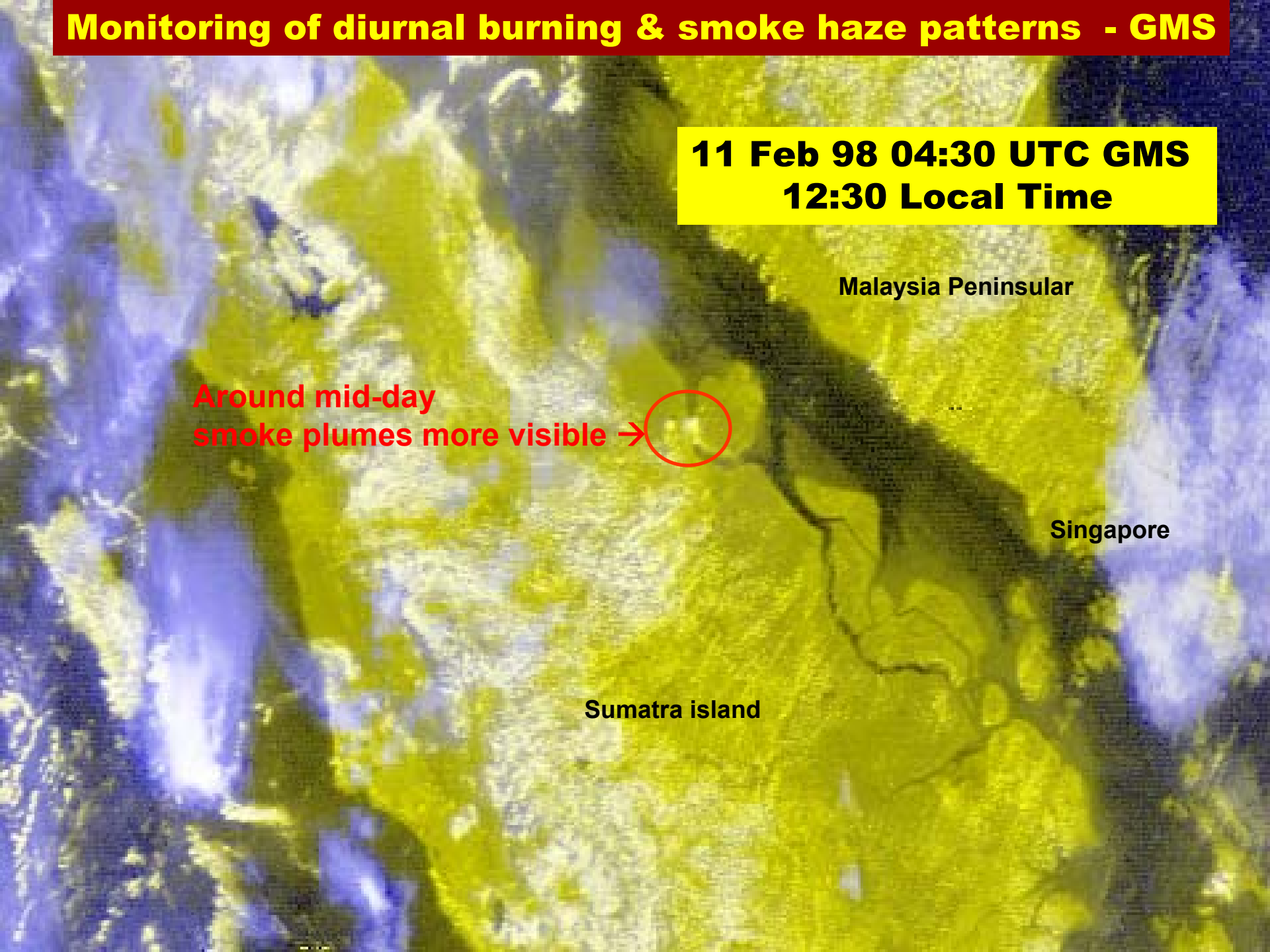
Monitoring of diurnal development of fires & haze - GMS



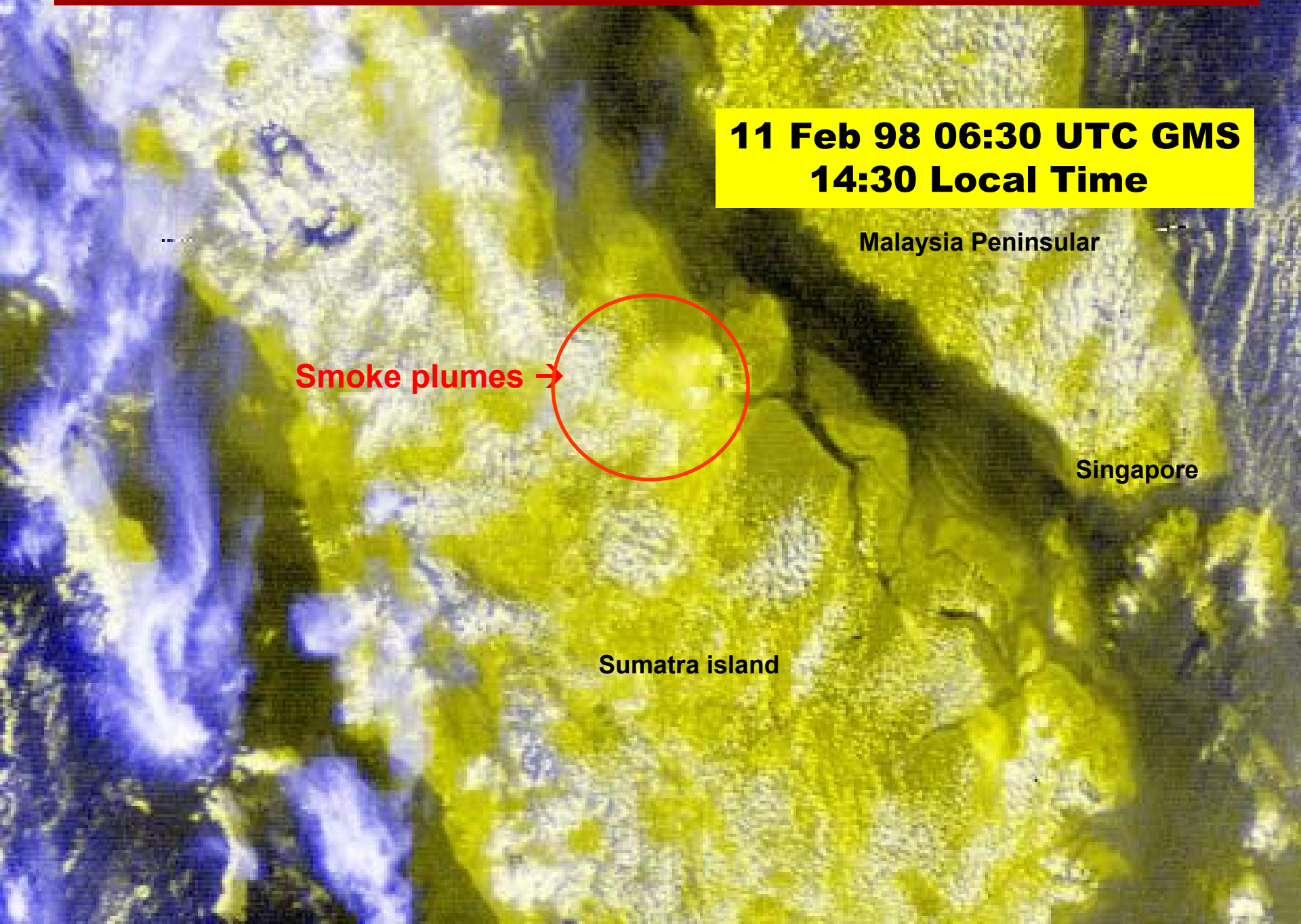
Monitoring of diurnal burning & smoke haze patterns - GMS



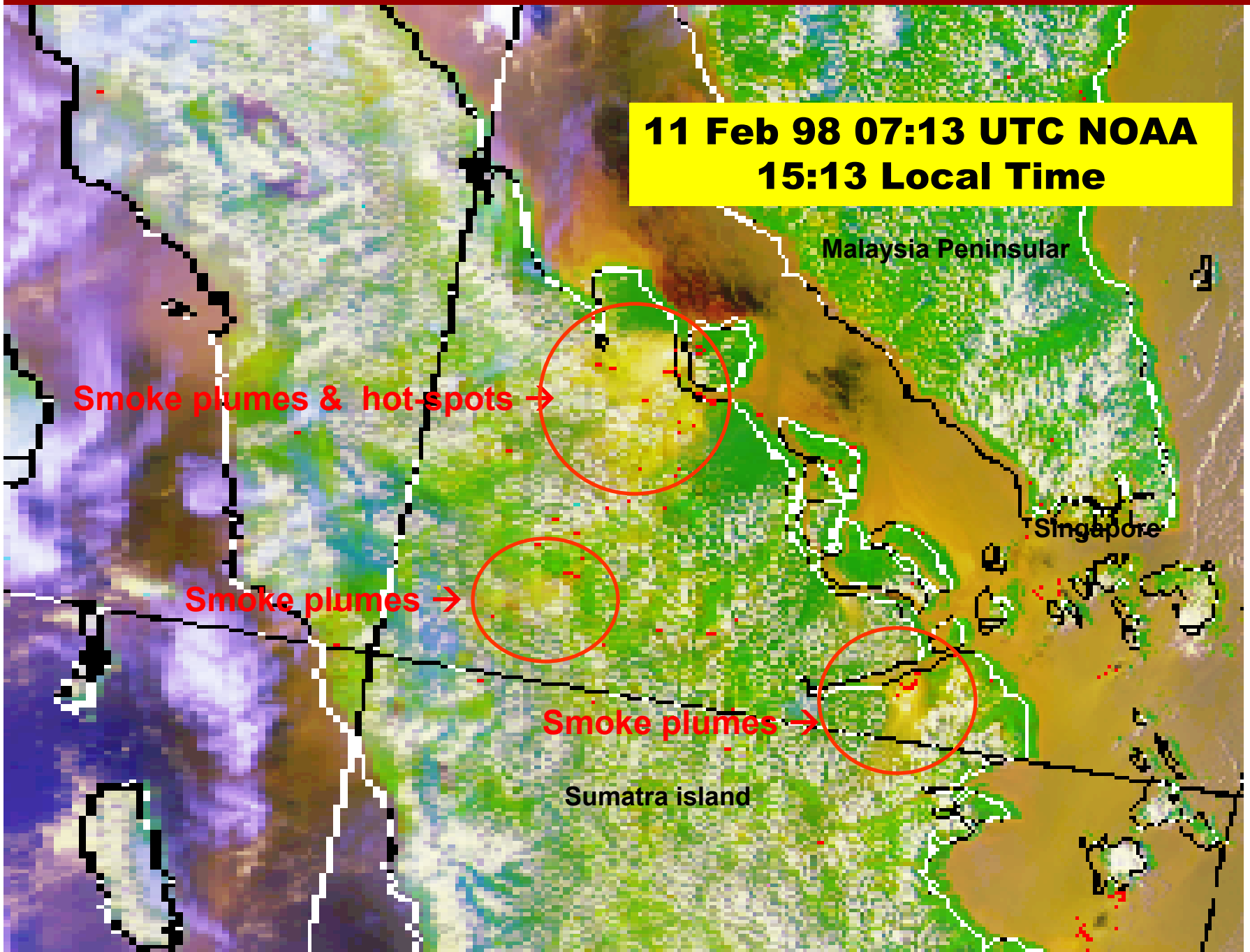
Monitoring of diurnal burning & smoke haze patterns - GMS



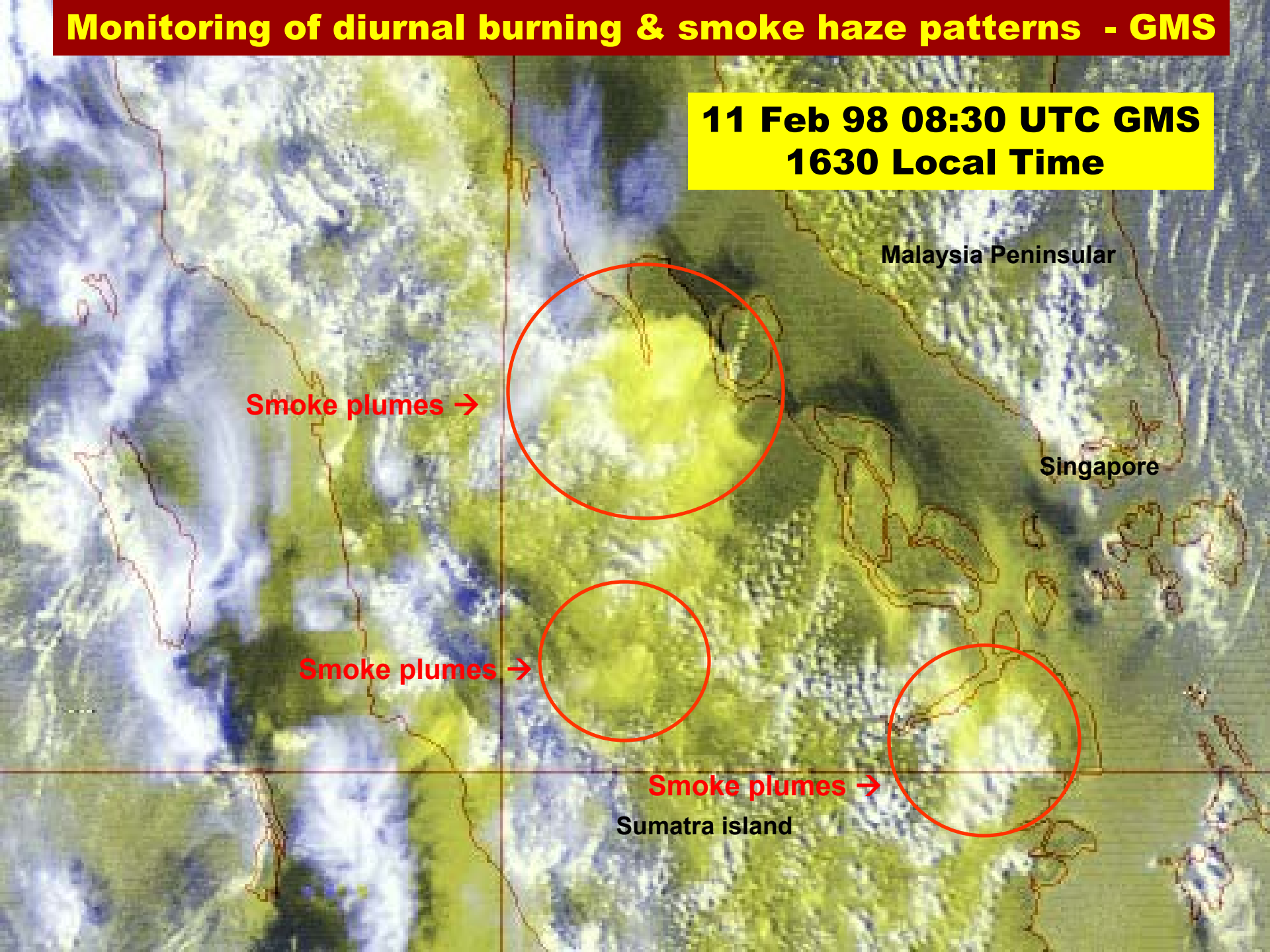
Monitoring of diurnal burning & smoke haze patterns - GMS



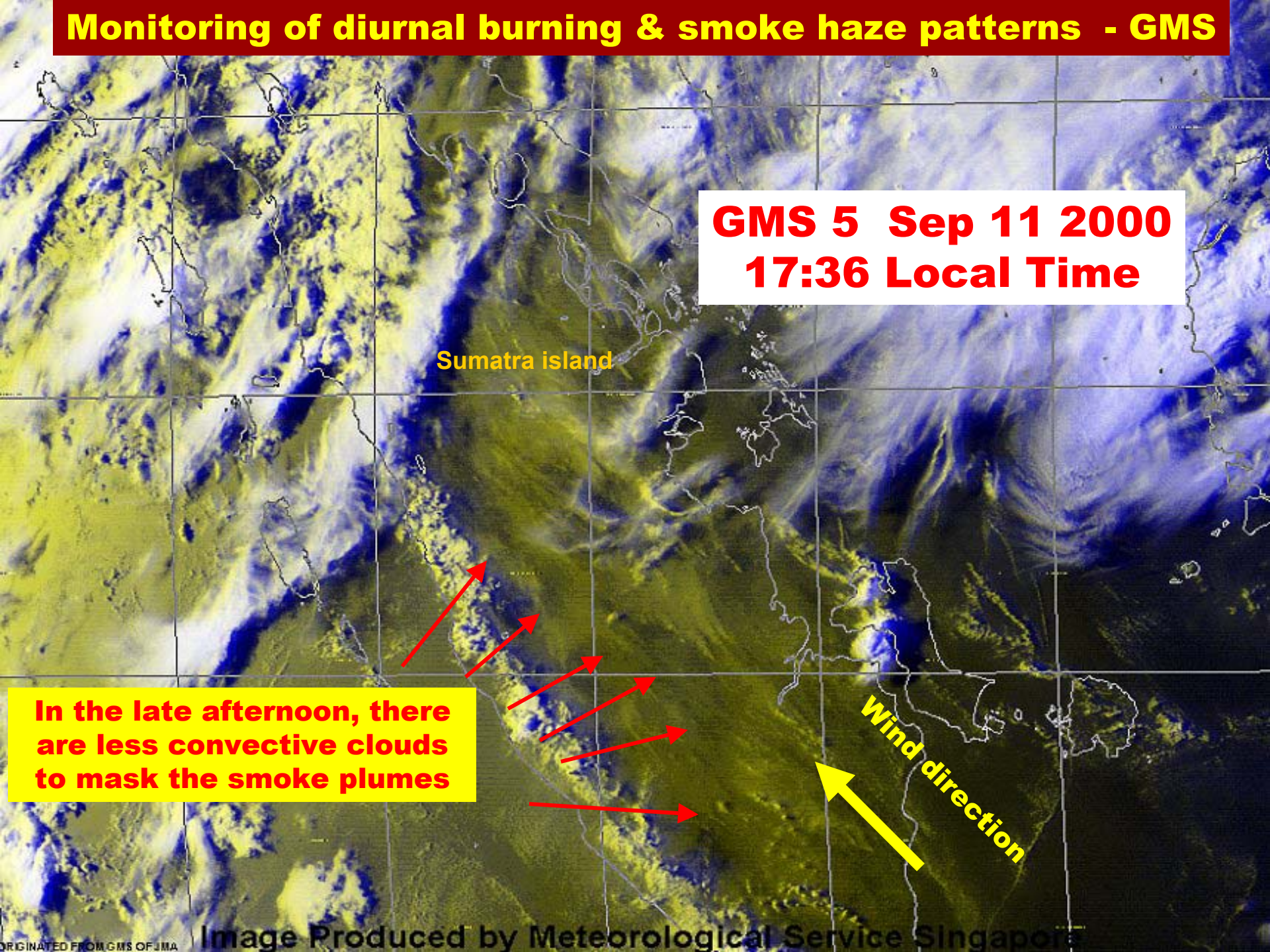
Monitoring of diurnal burning & smoke haze patterns - NOAA

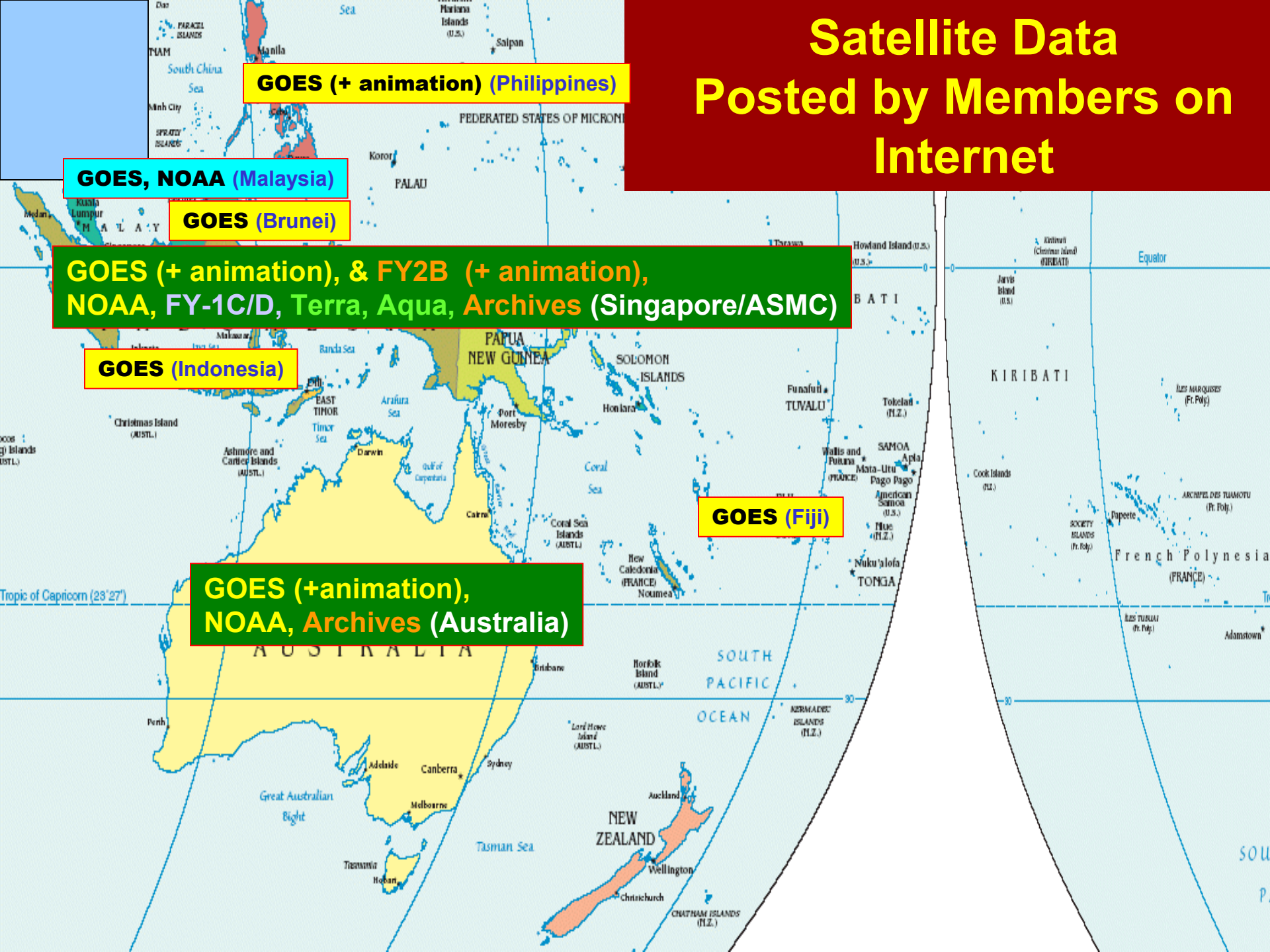


Monitoring of diurnal burning & smoke haze patterns - GMS



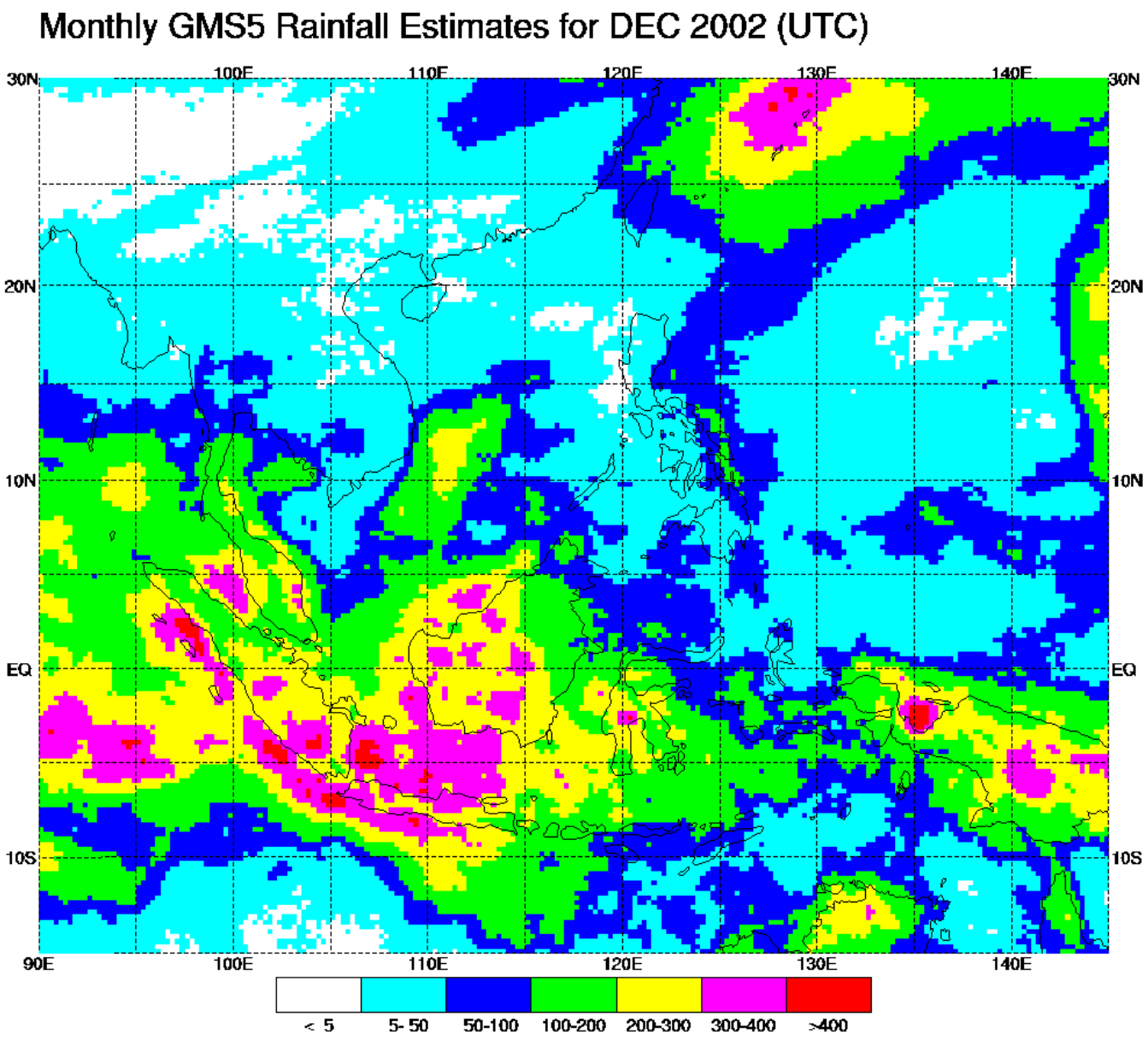
Monitoring of diurnal burning & smoke haze patterns - GMS



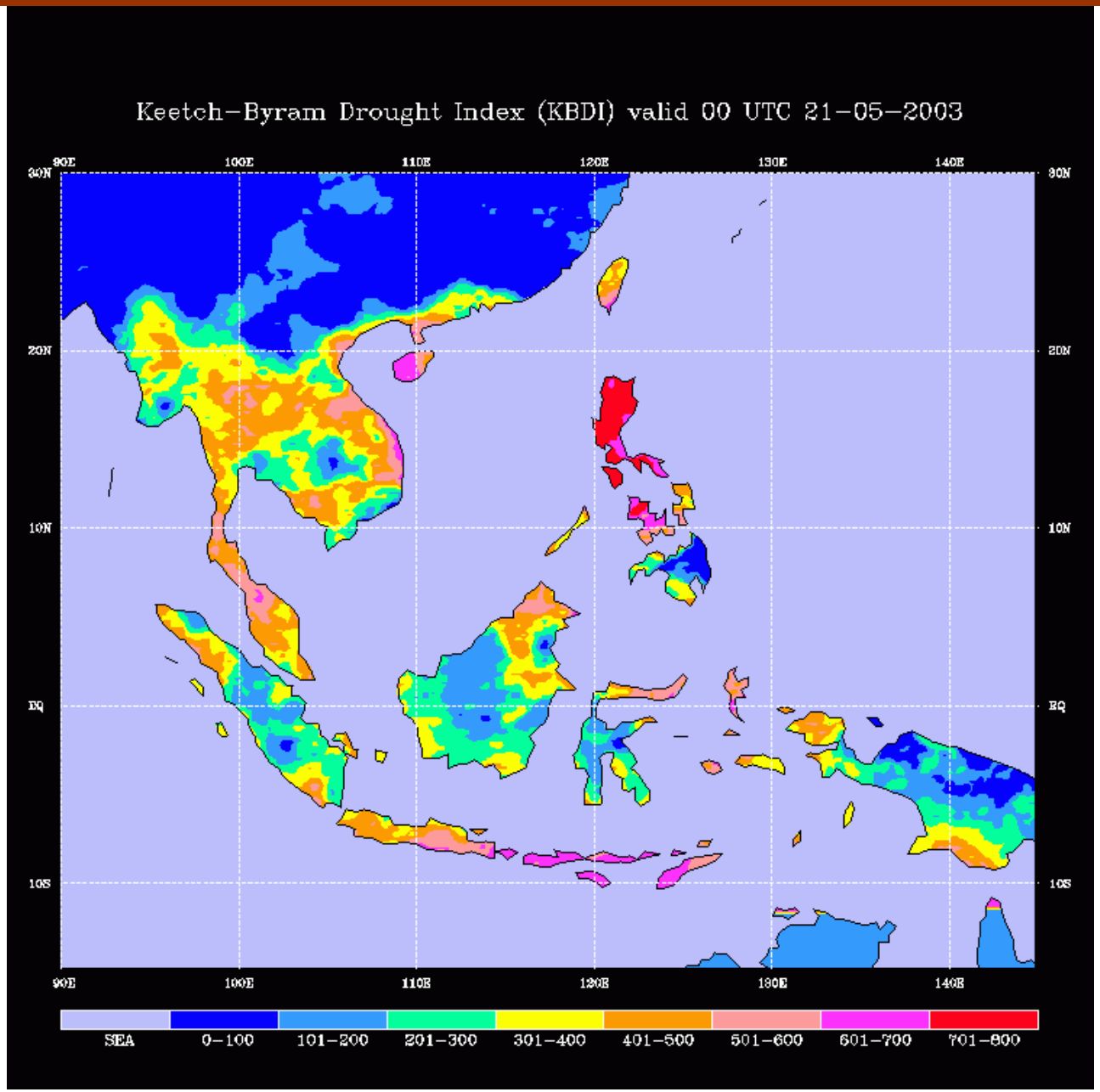

Satellite Data
Posted by Members on
Internet
GOES (+ animation) (Philippines)
GOES, NOAA (Malaysia)
GOES (Brunei)
GOES (+ animation), & FY2B (+ animation),
NOAA, FY-1C/D, Terra, Aqua, Archives (Singapore/ASMC)
GOES (Indonesia)
GOES (Fiji)
GOES (+animation),
NOAA, Archives (Australia)
Manila
Saipan
PALAU
Kuala Lumpur
MALAYSIA
PAPUA NEW GUINEA
SOLOMON ISLANDS
Honiara
TUVALU
Funafuti
KIRIBATI
Tokelau (N.Z.)
SAMOA
Apia
Pago Pago
Wallis and Futuna (FRANCE)
Mata-Utu
American Samoa (U.S.)
Niue (N.Z.)
Cook Islands (N.Z.)
Papeete
French Polynesia (FRANCE)
Nuku'alofa
TONGA
New Caledonia (FRANCE)
Noumea
Coral Sea Islands (AUSTL.)
Howland Island (U.S.)
Jarvis Island (U.S.)
Equator
Tropic of Capricorn (23°27')
AUSTRALIA
Darwin
Cairns
Brisbane
Perth
Adelaide
Canberra
Sydney
Melbourne
Great Australian Bight
Tasman Sea
Norfolk Island (AUSTL.)
Lord Howe Island (AUSTL.)
SOUTH PACIFIC OCEAN
NEW ZEALAND
Auckland
Wellington
Christchurch
Chatham Islands (N.Z.)
Adamstown
Christmas Island (AUSTL.)
Ashmore and Cartier Islands (AUSTL.)
EAST TIMOR
Timor Sea
Arafura Sea
Banda Sea
Coral Sea
South China Sea
Sea
Port Moresby
Tasmania
Hobart

Samples of products derived from satellite data distributed by Members in RA V

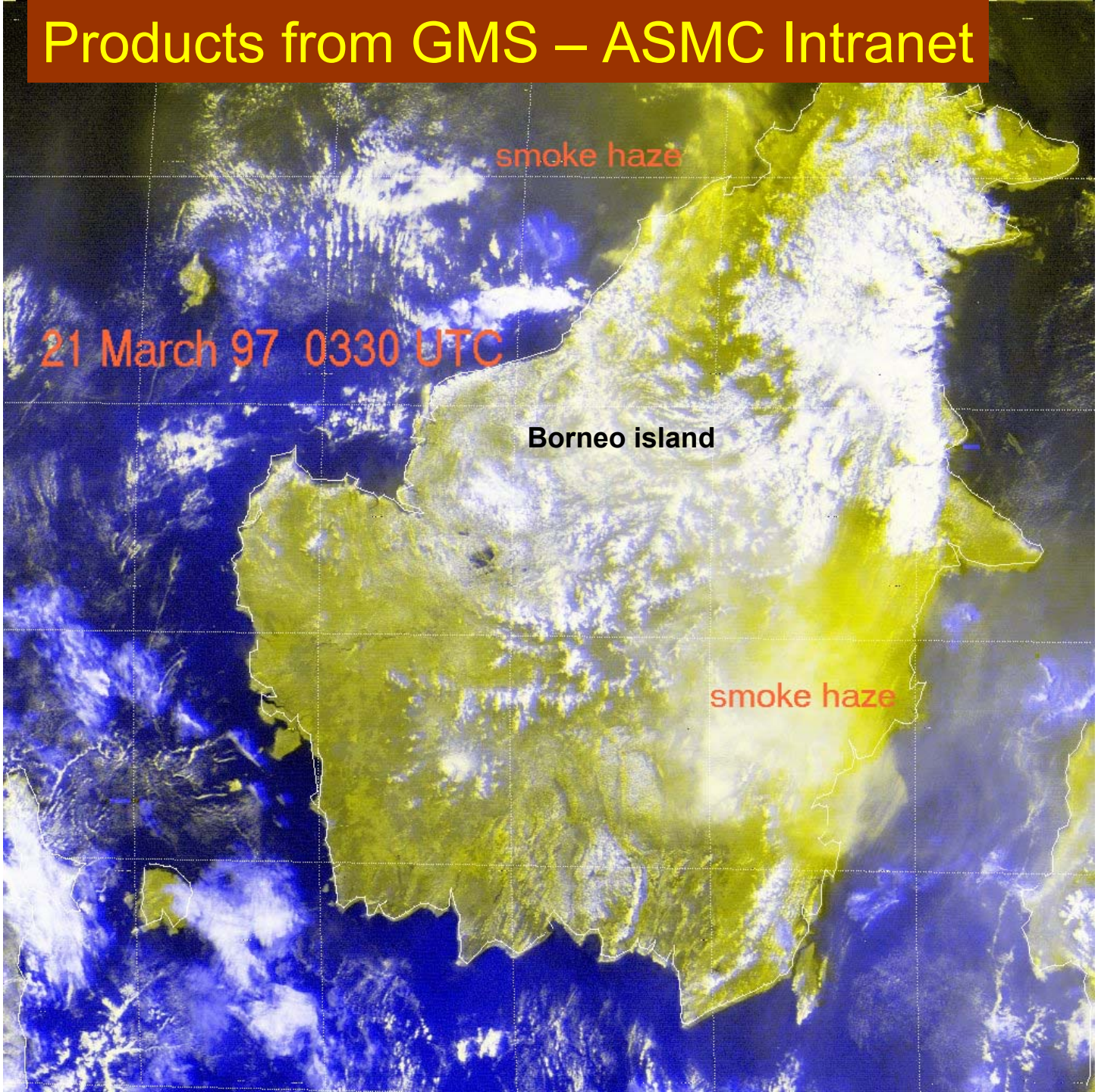
Product from GMS - rainfall distribution



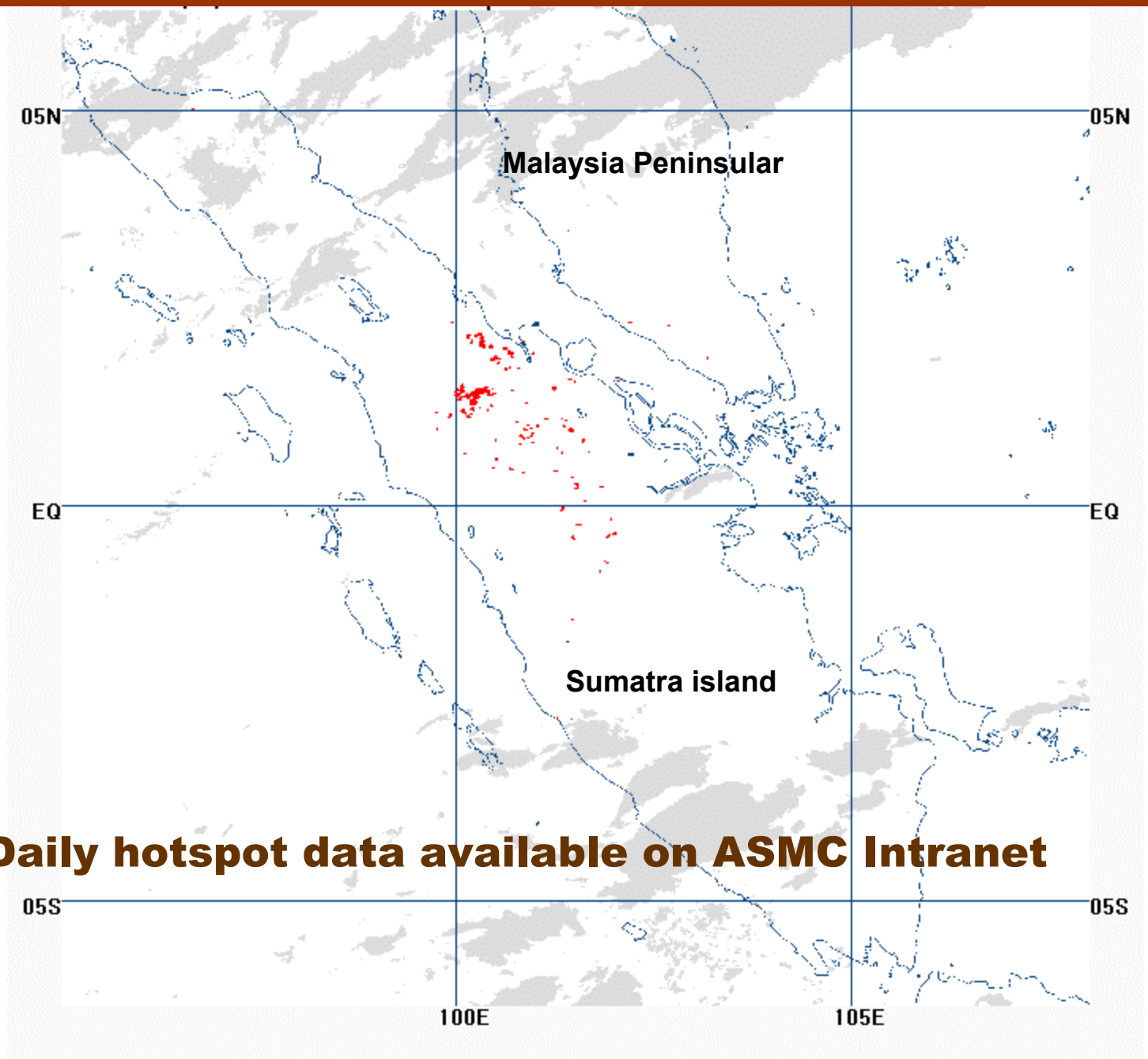
Product from GMS - Drought index derived from estimated rainfall



Products from GMS – ASMC Intranet



Products from NOAA (locations of fires) - ASMC Intranet



Daily hotspot data available on ASMC Intranet

Products from AVHRR & MODIS (detailed info of fires) - ASMC Intranet

METEOROLOGICAL SERVICES DIVISION, NEA

***** Hotspot Count Report *****

Created On: 2004, October 21, 10:05:05

Satellite: NOAA12

Date & Time: 2004/10/21 09:03:57

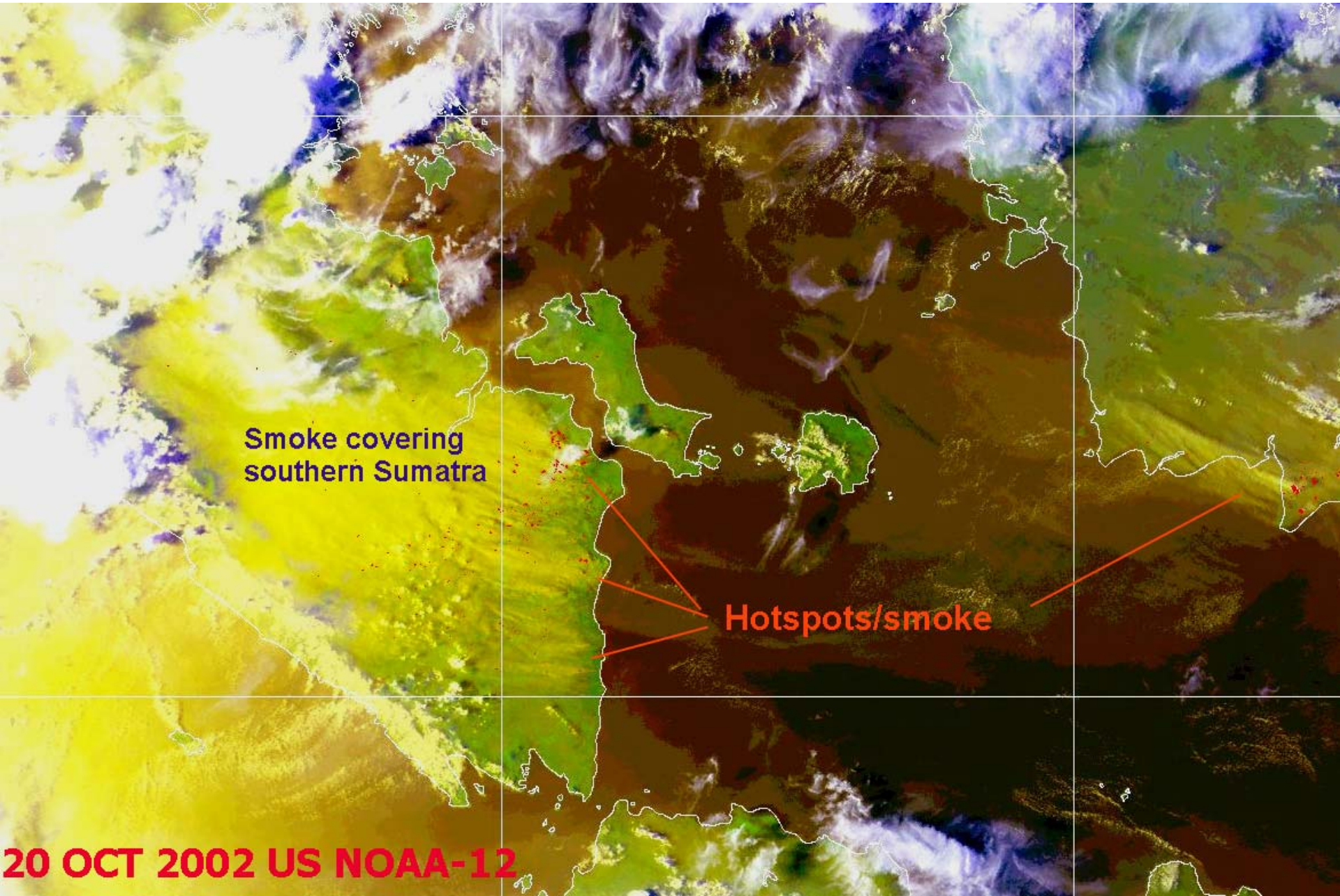
Total Hotspot Count in Pixel: 193

Total Hotspot Count in Group: 79

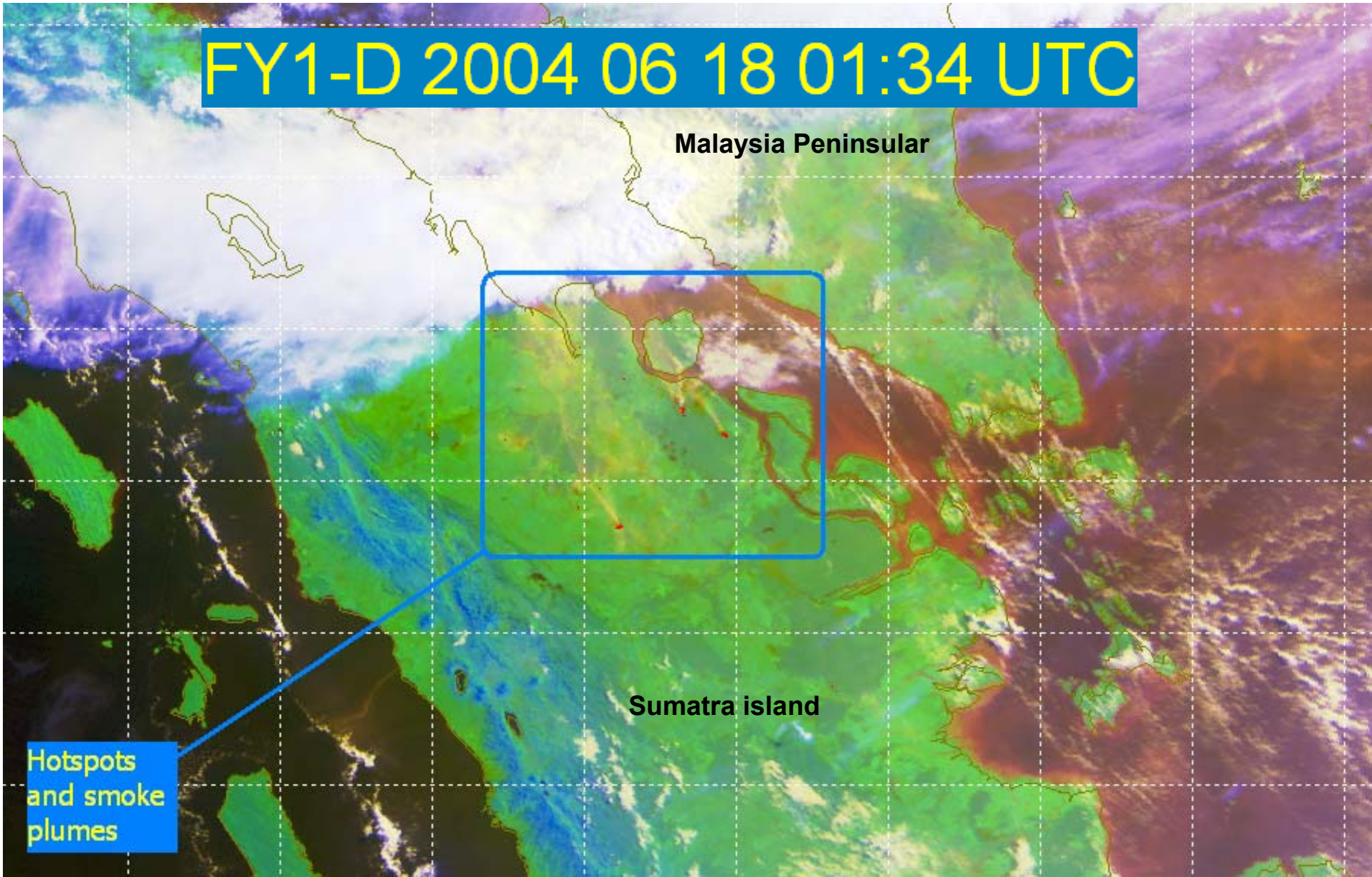
Ch1 Ch2 Ch3b Ch4 Ch5 Discriminating level

Group	Index	Longitude	Latitude	R1	R2	T3	T4	T5	Level
1	2	117.500	4.425						
	1	117.500	4.430	0.13	0.14	44.3	21.0	17.6	5
	2	117.500	4.420	0.14	0.15	47.6	21.0	17.9	5
2	1	112.220	2.840	0.08	0.07	44.0	21.8	17.4	6
3	1	116.750	1.210	0.10	0.08	41.5	21.3	17.8	5
4	1	116.830	0.900	0.06	0.05	37.5	23.6	20.5	5
5	1	116.820	0.860	0.10	0.08	37.3	22.7	19.5	5
6	1	116.910	0.540	0.11	0.09	38.8	24.7	21.5	7
7	6	116.817	0.508						
	1	116.830	0.520	0.12	0.09	37.2	24.1	20.7	5
	2	116.820	0.510	0.13	0.10	39.5	22.7	20.4	7
	3	116.830	0.510	0.13	0.09	42.5	24.8	21.1	10
	4	116.810	0.510	0.16	0.12	42.0	21.8	18.7	6
	5	116.810	0.500	0.19	0.14	44.2	22.2	19.1	7
	6	116.800	0.500	0.13	0.09	37.0	22.7	19.8	5
8	1	116.890	0.510	0.11	0.09	45.5	25.5	21.7	10

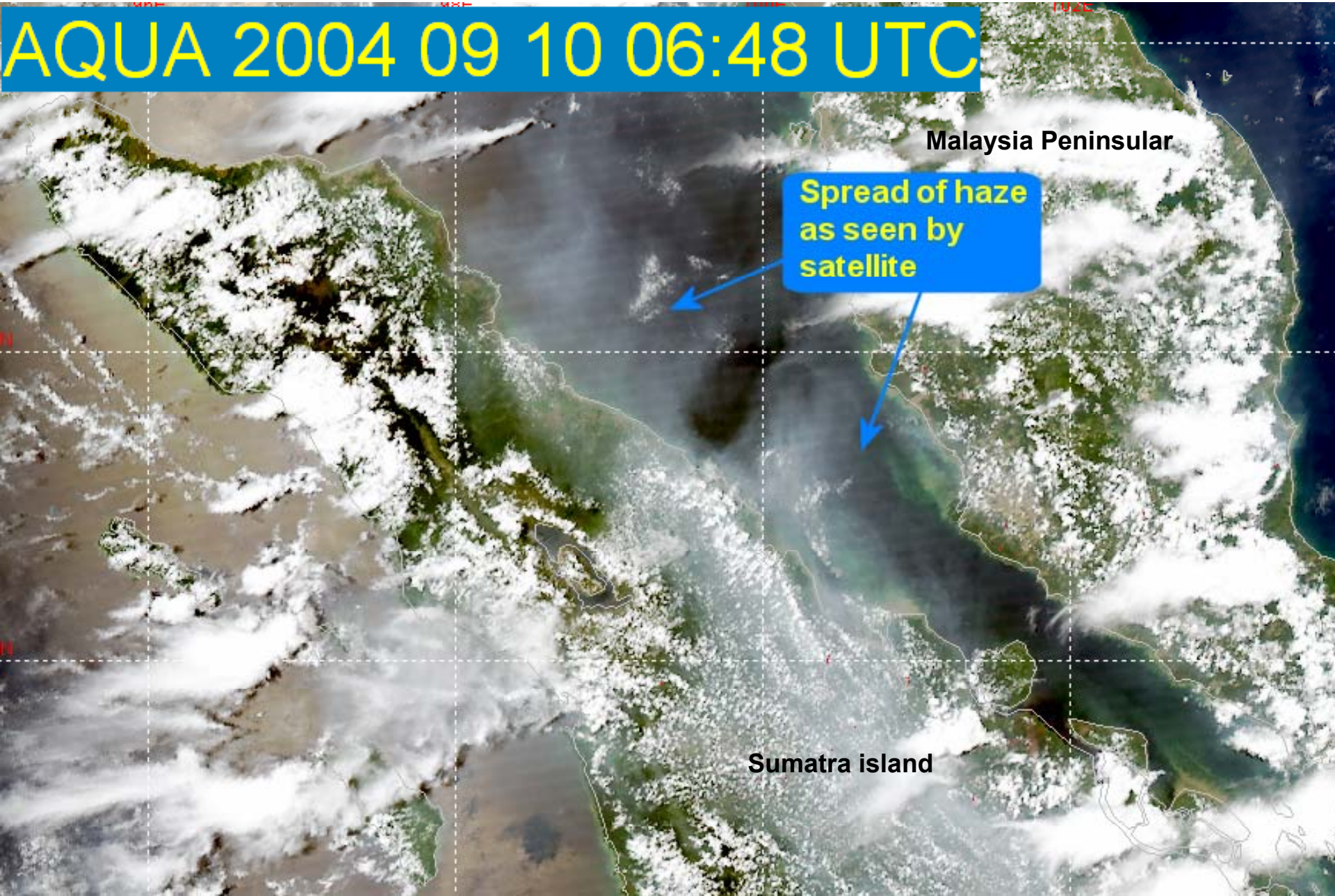
Products from NOAA – ASMC Intranet



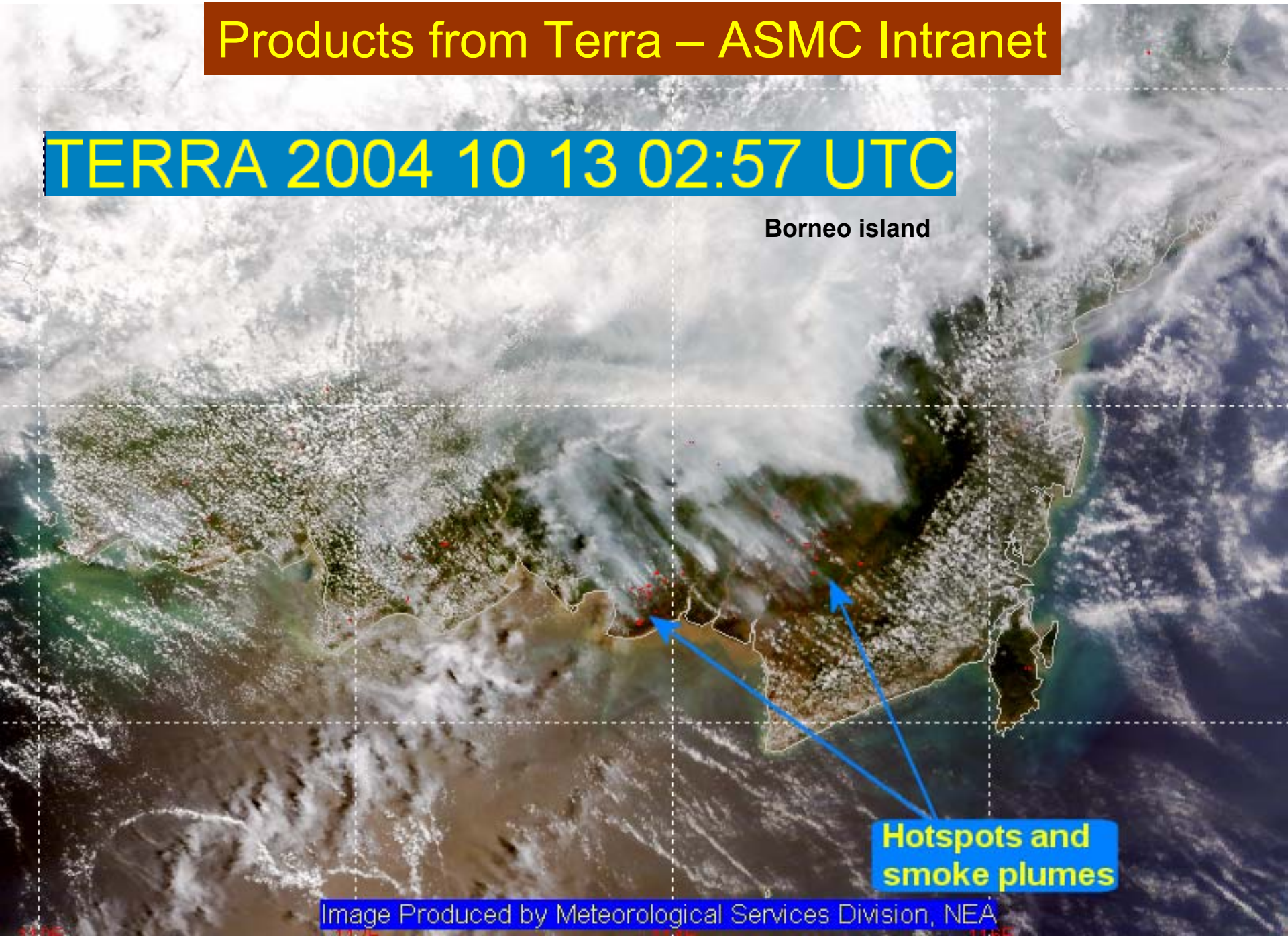
Products from FY 1D – ASMC Intranet



Products from AQUA – ASMC Intranet

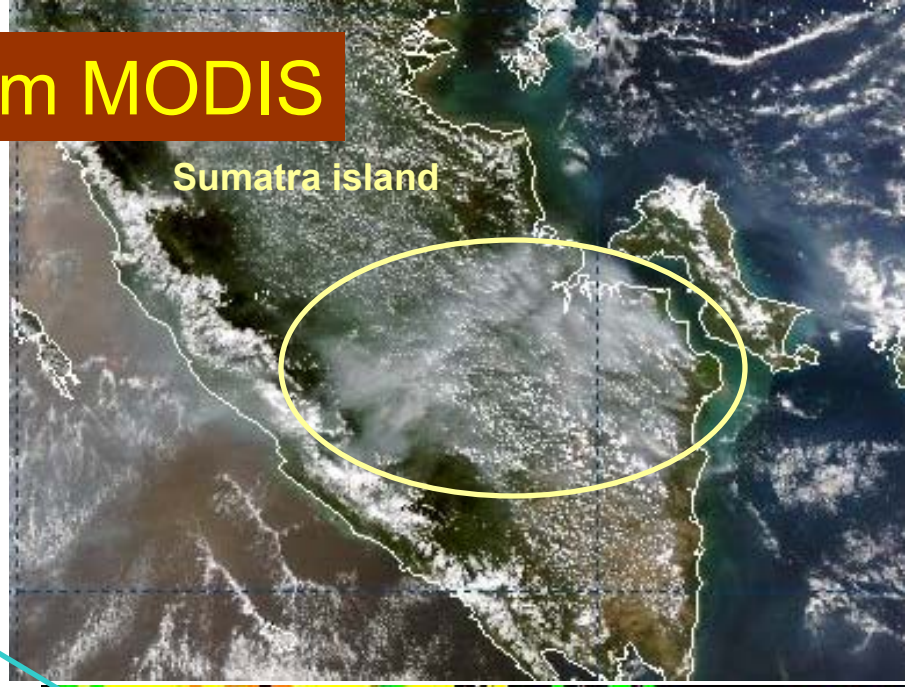


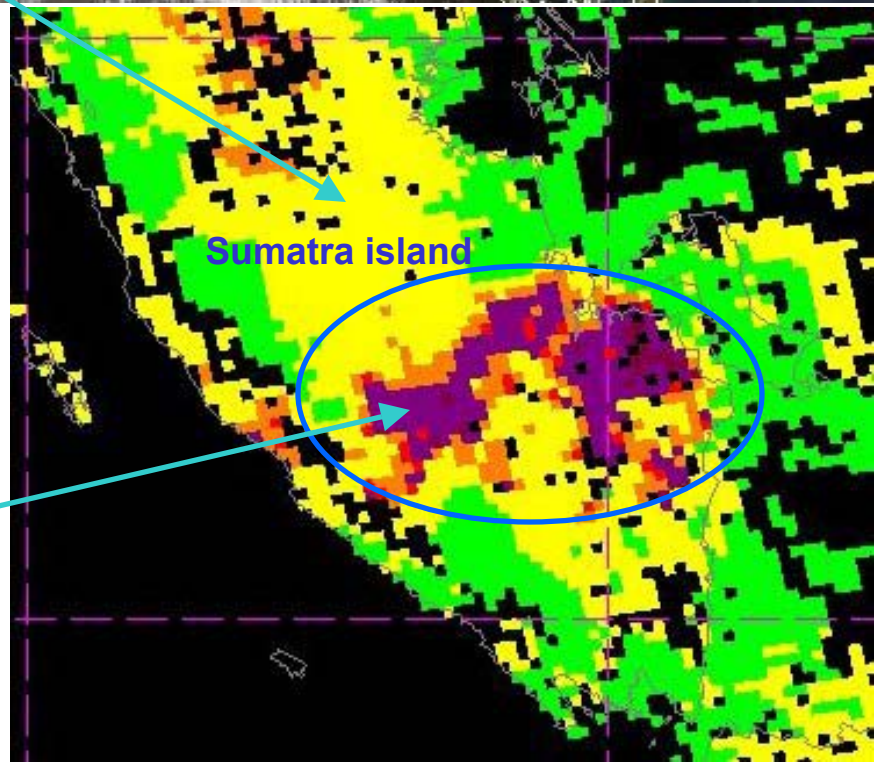
Products from Terra – ASMC Intranet

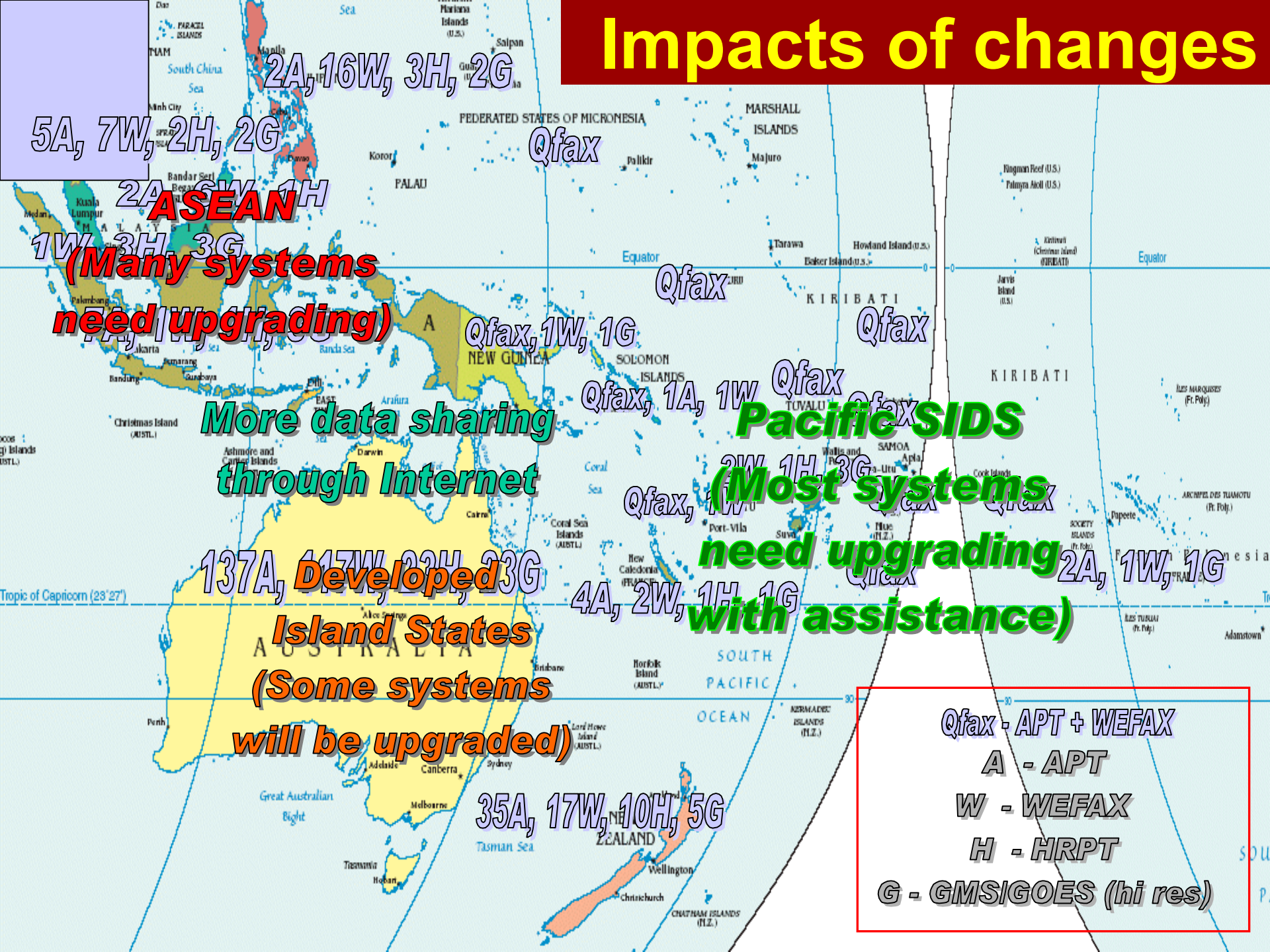


Pollution Index derived from MODIS

Index Values	Levels of Health Concern
0-50	Good
51-100*	Moderate
101-150	Unhealthy for Sensitive Groups
151-200	Unhealthy
201-300	Very Unhealthy
301-500	Hazardous






Impacts of changes
2A, 16W, 3H, 2G
5A, 7W, 2H, 2G
2A, 6W, 1H
ASEAN
1W, 3H, 3G
(Many systems need upgrading)
Qfax
Qfax
Qfax
Qfax, 1W, 1G
Qfax, 1A, 1W
Qfax
Qfax
More data sharing through Internet
Pacific SIDS
(Most systems need upgrading with assistance)
2W, 1H, 3G
Qfax, 1W
Qfax
Qfax
Qfax
2A, 1W, 1G
137A, 47W, 23H, 23G
Developed Island States
(Some systems will be upgraded)
4A, 2W, 1H, 1G
35A, 17W, 10H, 5G
Qfax - APT + WEFAX
A - APT
W - WEFAX
H - HRPT
G - GMS/GOES (hi res)

Thank You