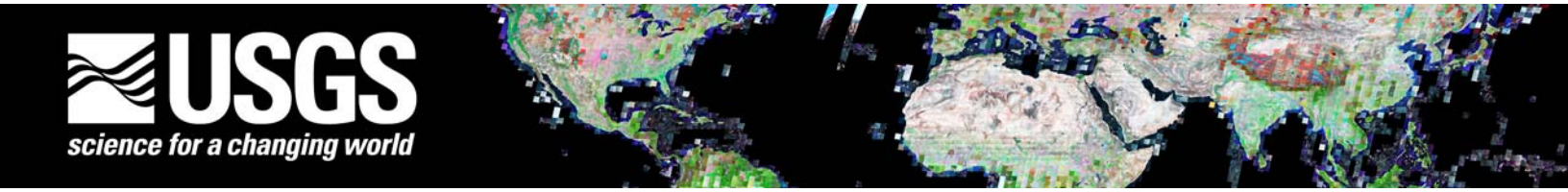

LANDSAT Update – Volume 2, Issue 2, 2008

Imagery for Everyone

By February 2009, any Landsat archive scene selected by a user will be processed, at no charge, automatically to a standard product recipe and staged for electronic retrieval. In addition, newly acquired scenes meeting a cloud cover threshold of 20% or below will be processed to the standard recipe and placed online for at least 3 months, after which they will remain available for selection from the archive. Details can be found in the USGS Technical Announcement below or the file can be downloaded from the Landsat Web page.
http://landsat.usgs.gov/products_data_at_no_charge.php

Technical Announcement

U.S. Department of the Interior
U.S. Geological Survey

Timeline Set to Release Entire USGS Landsat Archive at No Charge.

RESTON, VA – The USGS Landsat archive is an unequaled 35-year record of the Earth's surface that is valuable for a broad range of uses, ranging from climate change science to forest management to emergency response, plus countless other user applications. Under a transition toward a National Land Imaging Program sponsored by the Secretary of the Interior, the USGS is pursuing an aggressive schedule to provide users with electronic access to any Landsat scene held in the USGS-managed national archive of global scenes dating back to Landsat 1, launched in 1972. By February 2009, any archive scene selected by a user – with no restriction on cloud cover – will be processed automatically to a standard product recipe, using such parameters as the Universe Transverse Mercator projection, and staged for electronic retrieval. In addition, newly acquired scenes meeting a cloud cover threshold of 20% or below will be processed to the standard recipe and placed online for at least three months, after which they will remain available for selection from the archive.

Newly acquired, minimally cloudy Landsat 7 Enhanced Thematic Mapper Plus (ETM+) data covering North America and Africa are already being distributed by the USGS over the Internet at no charge, with expansion to full global coverage of incoming Landsat 7 data to be completed by July 2008 (see timeline below). The full archive of historical Landsat 7 ETM+ data acquired by the USGS since launch in 1999 will become available for selection and downloading by the end of September 2008. At that time, all Landsat 7 data purchasing options from the USGS, wherein users pay for on-demand processing to various parameters, will be discontinued.

By the end of December of 2008, both incoming Landsat 5 Thematic Mapper (TM) data and all Landsat 5 TM data acquired by the USGS since launch (1984) will become available, with all Landsat 4 TM (1982-1985) and Landsat 1-5 Multispectral Scanner (MSS) (1972-1994) data becoming available by the end of January 2009. All Landsat

data purchasing options from the USGS will be discontinued by February 2009, once the entire Landsat archive can be accessed at no charge.

Landsat scenes can be previewed and downloaded using the USGS Global Visualization Viewer at http://glovis.usgs.gov [under “Select Collection” choose Landsat archive: L7 SLC-off (2003-present)]. Scenes can also be selected using the USGS EarthExplorer tool at http://earthexplorer.usgs.gov [under “Select Your Dataset” choose Landsat Archive: L7 SLC-off (2003-present)]. For further information on Landsat satellites and products, see http://landsat.usgs.gov.

Landsat Imagery Archive Release Schedule	
Data	**Available over the Internet**
Landsat 7 – all new global acquisitions	July 2008
Landsat 7 – all data	September 2008
Landsat 5 – all TM data	December 2008
Landsat 4 – all TM data	January 2009
Landsat 1-5 – all MSS data	January 2009

Shallow-Water Features Identified with Landsat 7 Imagery

Landsat 7 acquired unique open-water scenes for a project that identified the location of shallow-water hazards in the Indian Ocean in 2006. A year prior, concerns were raised regarding the accuracy of aging maps used for navigation that documented sub-surface features and hazards.

Seventy-five Enhanced Thematic Mapper Plus (ETM+) scenes were identified which showed shallow-water features, such as seamounts, reefs, submerged atolls, or shallow banks. Some of these features had been incorrectly mapped, and others were previously unknown.

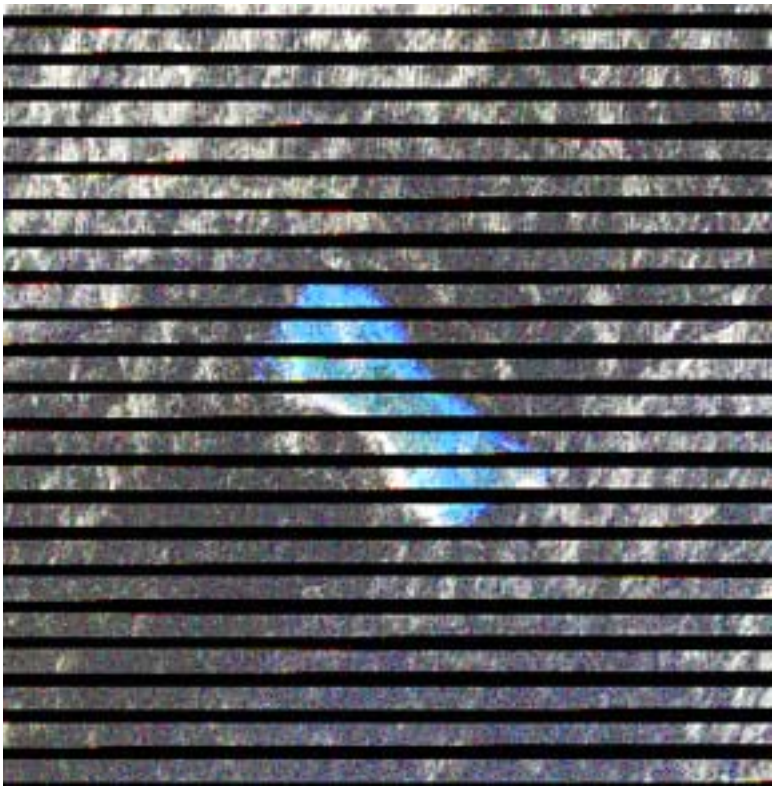

Figure 1. Shallow-water feature near the Seychelles

Fig. 1 shows a shallow-water feature near the Seychelles, northeast of Madagascar in the Indian Ocean (path 152, row 66). The visible bands (3, 2, and 1) demonstrate the ability to identify sub-surface features with the Landsat 7 ETM+ instrument.

Landsat Science Team Spotlight

Dr. Robert Bindschadler – Chief Scientist
Hydrospheric and Biospheric Sciences Laboratory
NASA's Goddard Space Flight Center, Greenbelt, Maryland

Figure 2. Dr. Robert Bindschadler

Dr. Robert Bindschadler has been an active Antarctic field researcher for the past 25 years and has led numerous field expeditions to Antarctica and has participated in expeditions to glaciers and ice caps around the world. He maintains an active interest in the dynamics of glaciers and ice sheets, investigating how remote sensing can be used to improve our understanding of the role of ice in the Earth's climate.

Applications developed by Dr. Bindschadler include measuring ice velocity and elevation using both visible and radar imagery, monitoring melt of, and snowfall on, ice sheets using microwave emissions, and detecting changes in ice sheet volume by repeat spaceborne radar altimetry.

He has advised the U.S. Congress and Vice President on the stability of ice sheets and ice shelves and served on many scientific commissions and study groups as an expert in glaciology and remote sensing of ice.

Dr. Bindschadler was awarded the Antarctic Service Medal in 1984 and the National Aeronautics and Space Administration (NASA) Exceptional Scientific Achievement Medal in 1994.

He has published over 130 scientific papers and numerous review articles and has provided expert opinion regarding glaciological impacts of the climate on the world's ice sheets and glaciers.

NASA's Earth Observatory has featured Dr. Bindschadler's work on numerous occasions, including David Herring's 2005 "Time on the Shelf" (http://earthobservatory.nasa.gov/Study/TimeShelf/), the 2008 article titled "Christmas Among Crevasses: How a Goddard Scientist Spent His Holiday Season" (http://eospso.gsfc.nasa.gov/eos_observ/pdf/mar_apr.pdf - pages 10-21), and more recently, his instrumental involvement with the **Landsat Image Mosaic of Antarctica (LIMA)**, (http://lima.nasa.gov) the first ever true-color high-resolution satellite view of Antarctica.
http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=17599

For more details on Dr. Bindshadler, including a listing of his published works, go to the following NASA Web site: http://neptune.gsfc.nasa.gov/personnel/profile.php?id=4.

Did You Know…?

The Entity Identifiers have recently changed for all Landsat scenes. The new format allows the year to be completely displayed, as well as the code of the Ground Station that downlinked the data from the satellite. These changes were made to comply with the new Landsat Mission Data Dictionary (LMDD) effort, which made all fields of U.S. Geological Survey (USGS) search engines and databases consistent.

Example of new format:
LT40170361982320XXX08
L = Landsat
T = TM
4 = Satellite #
017 = Path (WRS-2)
036 = Row (WRS-2)
1982 = Year
320 = Julian day of year
XXX * = The Ground Station that received the data downlink from the satellite.
08 = version 00-99 (related to ingest processing)

*Ground Station codes can be found within this Landsat FAQ:
http://landsat.usgs.gov/tools_faq.php?id=1

Web Page Updated

The USGS Landsat and USGS Landsat Data Continuity Mission (LDCM) Web sites have been combined into one unified structure. Changes include an updated look, improved functionality, and a more intuitive menu system. The updated Web site is located at http://landsat.usgs.gov.

Landsat Data Continuity Mission USGS Acquisition Strategy for Ground System Segments

The National Aeronautics and Space Administration (NASA) and the Department of the Interior's U.S. Geological Survey (USGS) share responsibility for the Landsat Data Continuity Mission (LDCM). NASA will develop the flight systems including the spacecraft, instrument, mission operations element and mission launch, and perform on-orbit checkout. The USGS will develop, implement, and operate the ground data acquisition network and image processing and archive facilities and will disseminate products to the user community. In addition, the USGS will be responsible for satellite flight operations.

The USGS LDCM acquisition strategy is based upon competitive procurements for the engineering, development, integration and test, and operation of the ground system elements. The two largest USGS LDCM related contracts were awarded in March 2008—the LDCM Data Continuity Contract (LDCC) was awarded to Science Applications International Corporation (SAIC), and the USGS Earth Resources Observation and Science (EROS) Technical Support Services Contract (TSSC) was awarded to Stinger Ghaffarian Technologies, Inc. (SGT). The following list outlines the acquisition strategy for the LDCM ground system segments and their associated elements:

Flight Operations Segment:

The Ground Network Element (GNE) will be procured through a competitive solicitation for ground network equipment and services to ensure repetitive and timely global data acquisition. The exact GNE procurement approach is under study and will be finalized by mid-2008. Definition and integration of the GNE will be supported by the LDCC contractor.

The Collection Activity Planning Element will be modeled after the successful Long-Term Acquisition Plan employed for Landsat 7 to collect global data and will be developed by the LDCC contractor.

The Mission Operations Element (systems required for control and management of the spacecraft and instrument) will be competitively procured through NASA's acquisition process. The Mission Operations Center - a facility to house these operational systems and associated staff - will be configured within the USGS EROS Center through competitive procurement of design and facility modification contracts.

The Flight Operations Team will be procured competitively through a USGS solicitation.

Data Processing and Archive Segment:

The Storage and Archive Element and the User Portal Element will be developed by the USGS EROS Center TSSC contractor.

The Image Processing Element and the Ground System Infrastructure Element will be developed by the LDCC contractor.

Ground System Architecture Analysis and Integration:

The USGS will lead ground system integration activities and will acquire architecture analysis and integration support through a Federally Funded Research and Development Center (FFRDC) contract. The EROS Center TSSC contractor will also provide ground system and segment level engineering and integration support.

Global Land Survey 2005

In the past, the U.S. Geological Survey (USGS) and NASA collaborated on the creation of three global land datasets from Landsat data: one from the 1970s, and one each from circa 1990 and 2000. Each of these global datasets was created from the primary Landsat sensor in use at the time: the Multispectral Scanner in the 1970s, the Thematic Mapper (TM) in 1990, and Enhanced Thematic Mapper Plus (ETM+) in 2000.

To extend this multi-decadal Landsat data collection, NASA and the USGS have again partnered to develop the Global Land Survey 2005 (GLS 2005), a new global land dataset with core acquisition dates of 2005-2006. The data will consist of both Landsat TM and ETM+ imagery, making GLS 2005 the first-ever global dataset built with data from two sensors.

Direct downlink to a ground station is the only way to acquire Landsat 5 TM data. To obtain Landsat 5 TM imagery for areas outside the United States, the USGS negotiated agreements with ground stations around the globe to downlink and send data to the USGS Landsat Ground Station. These agreements make thousands of additional Landsat 5 TM scenes available for GLS 2005 consideration.

The USGS Landsat Ground Station archives nearly 100,000 new Landsat 7 ETM+ images every year. These images are a record of nearly all the land area on Earth. ETM+ scenes have a 22% data loss due to the Scan Line Corrector failure in 2003. Correction of these sensors requires combining two ETM+ scenes for each path/row to have complete, or near-complete, coverage.

The Landsat 7 ETM+ and Landsat 5 TM data incorporated into the GLS 2005 dataset must meet quality and cloud cover standards. Data recorded in 2004 and 2007 will be used as needed to fill areas of low image quality or excessive cloud cover.

The GLS 2005 dataset will be only scene-based (other decadal datasets also included mosaics), and individual scenes will be made available as they are processed. Landsat 7 ETM+ scenes in GLS 2005 became available beginning in February 2008. Landsat 5 TM scenes will not be available until late 2008.

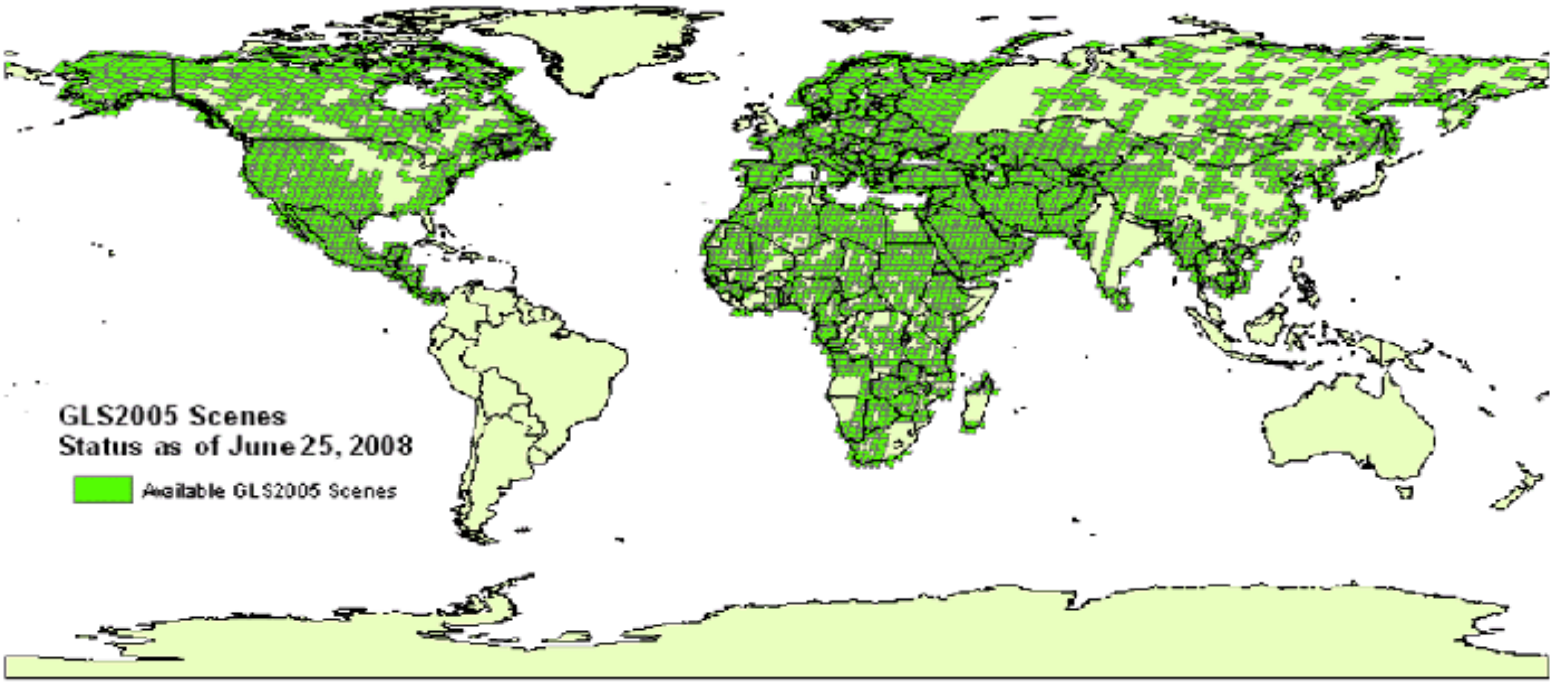

Figure 3. GLS 2005 scenes collected as of June 25, 2008

Largest Continent Released for Newly Acquired Landsat Data

The USGS Landsat Project has expanded its free data acquisitions to Eurasia. As nearly cloud-free scenes are acquired by Landsat 7, they are automatically processed and posted online for users to download at no charge. Because only a portion of the globe is collected daily, and some of the images are cloud-covered, not all areas of Eurasia are equally available at all times. To view and download this data, please visit the Standard L1T dataset in the Landsat Science Collection in GloVis or EarthExplorer.

Ob River Flooding

Beginning its thaw in early May, the Ob River and its tributary the Irtysh flow from the Altay Mountains of northern China to the Arctic Ocean. The northern reaches of the Ob flow over a flat permafrost plain past the cities of Ozernyy and Nefteyvgansk in northern Russia.

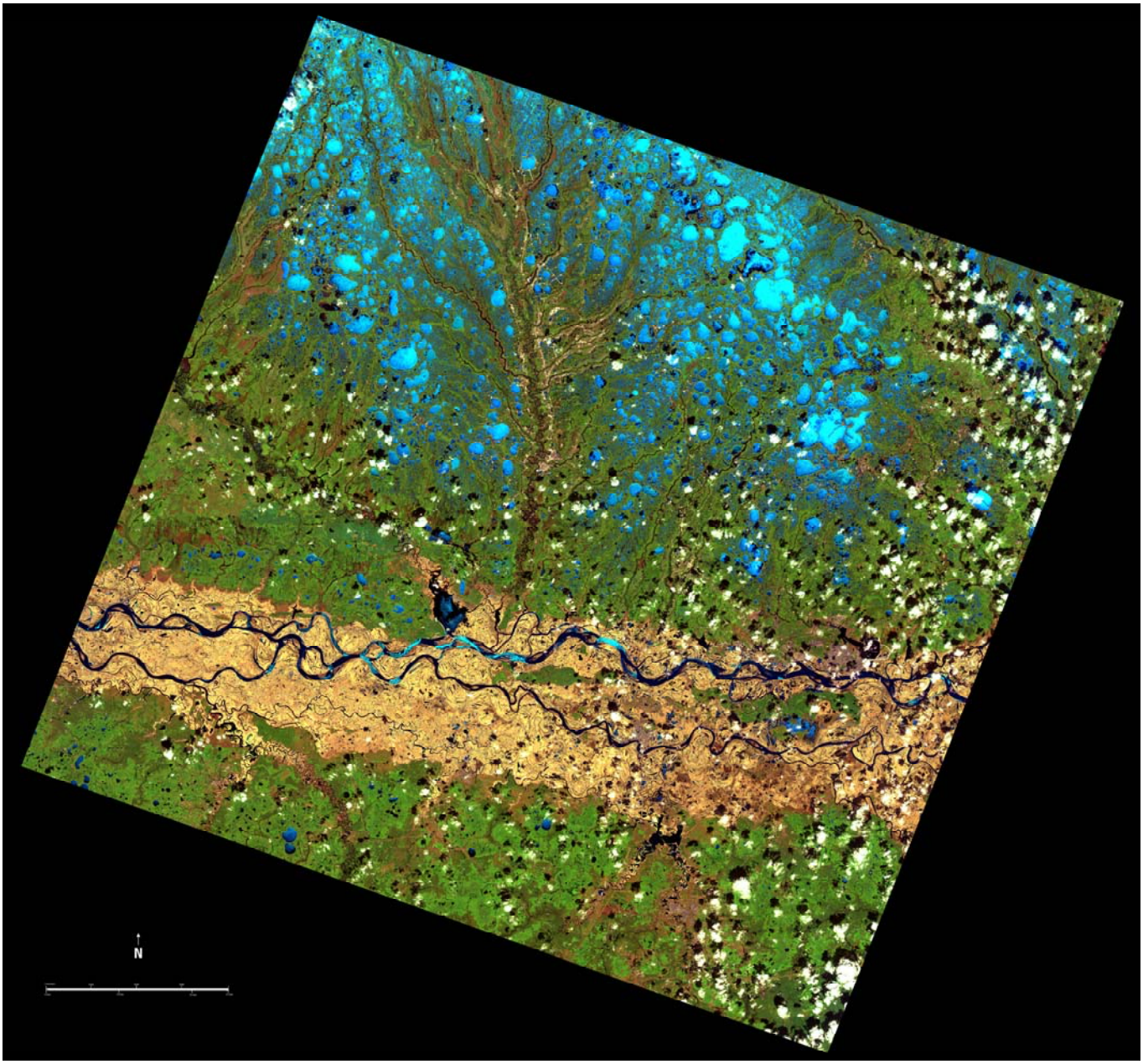

Figure 4. Ob River - May 1, 2007

Since the river cannot cut deep channels into the frozen land, it flows out over the surrounding plain during the spring melt, as shown in the mid-May image.

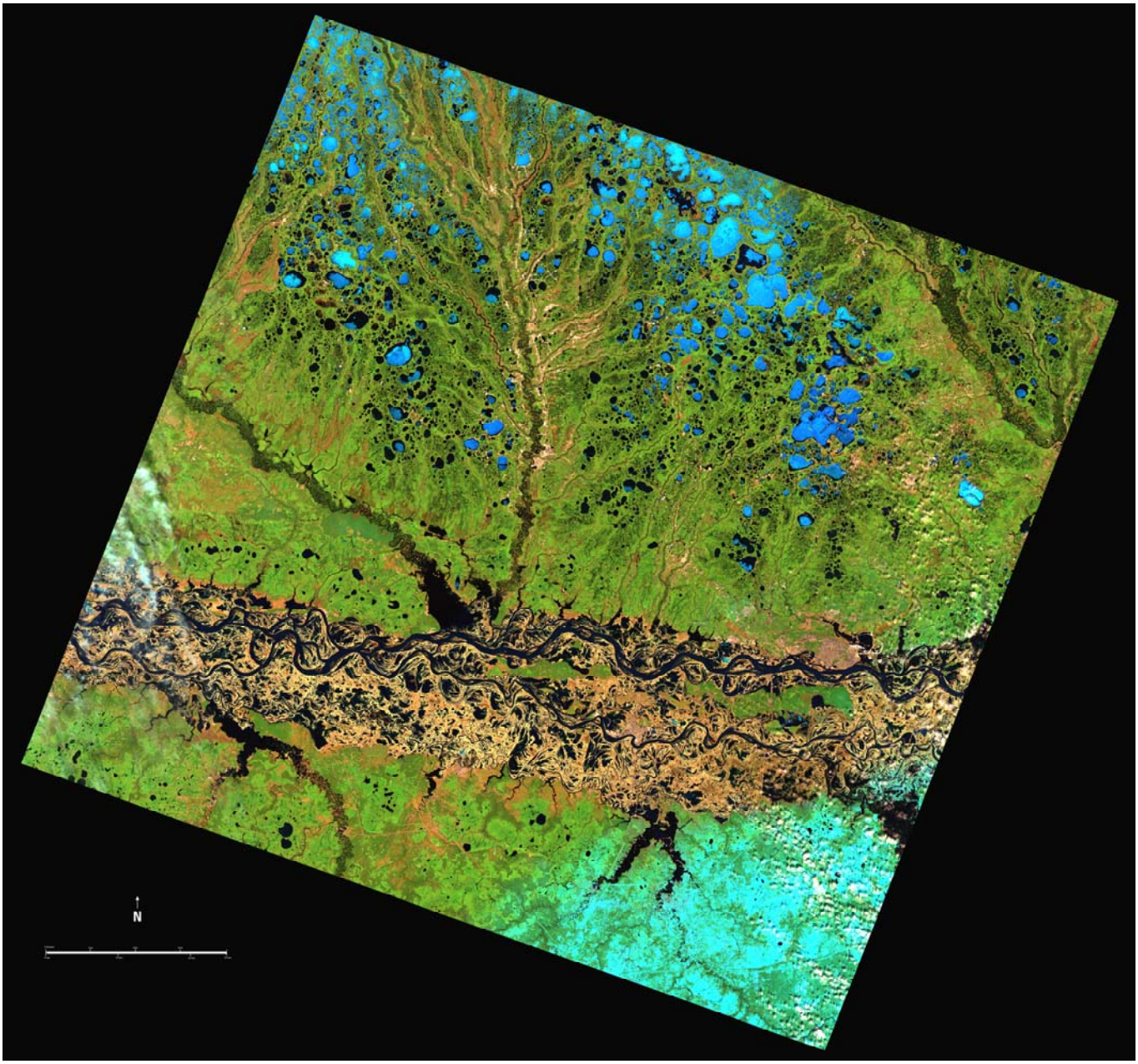

Figure 5. Ob River - May 17, 2007