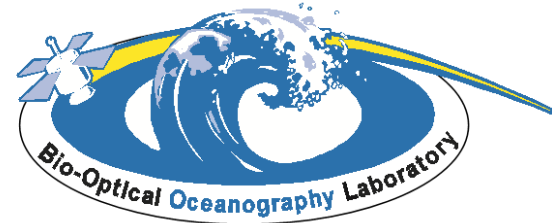


DISPONIBILIDAD DE DATOS DE LANDSAT-8 Y SU PROCESAMIENTO EN ARCGIS

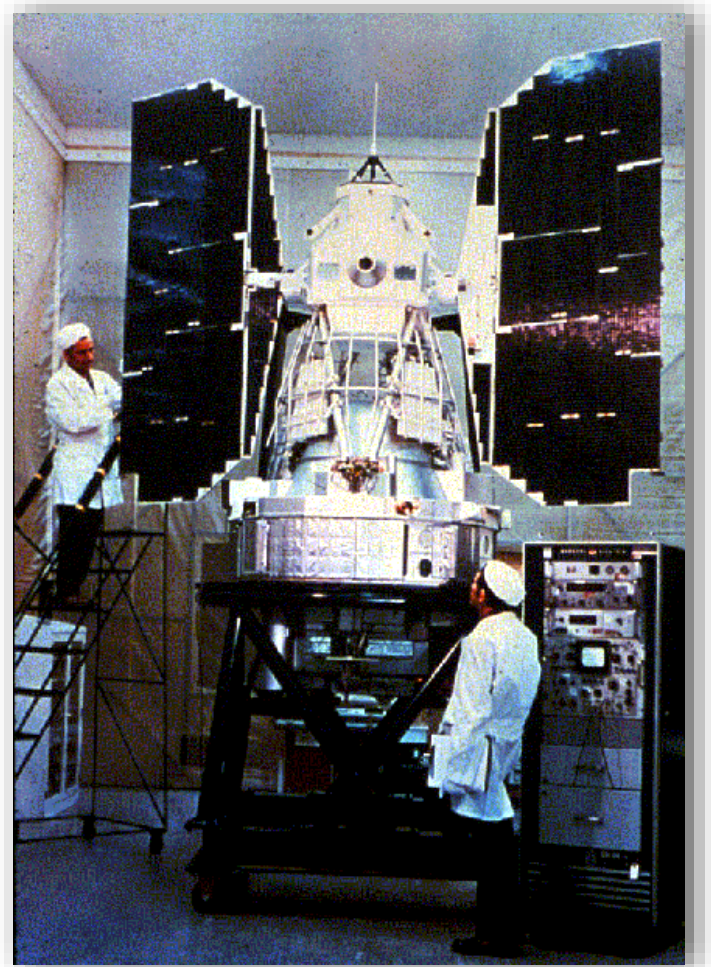


William J. Hernández (UPRM-Dep. de Ciencias Marinas)
Fernando Gilbes (UPRM-Dep. de Geología, GERS Lab)

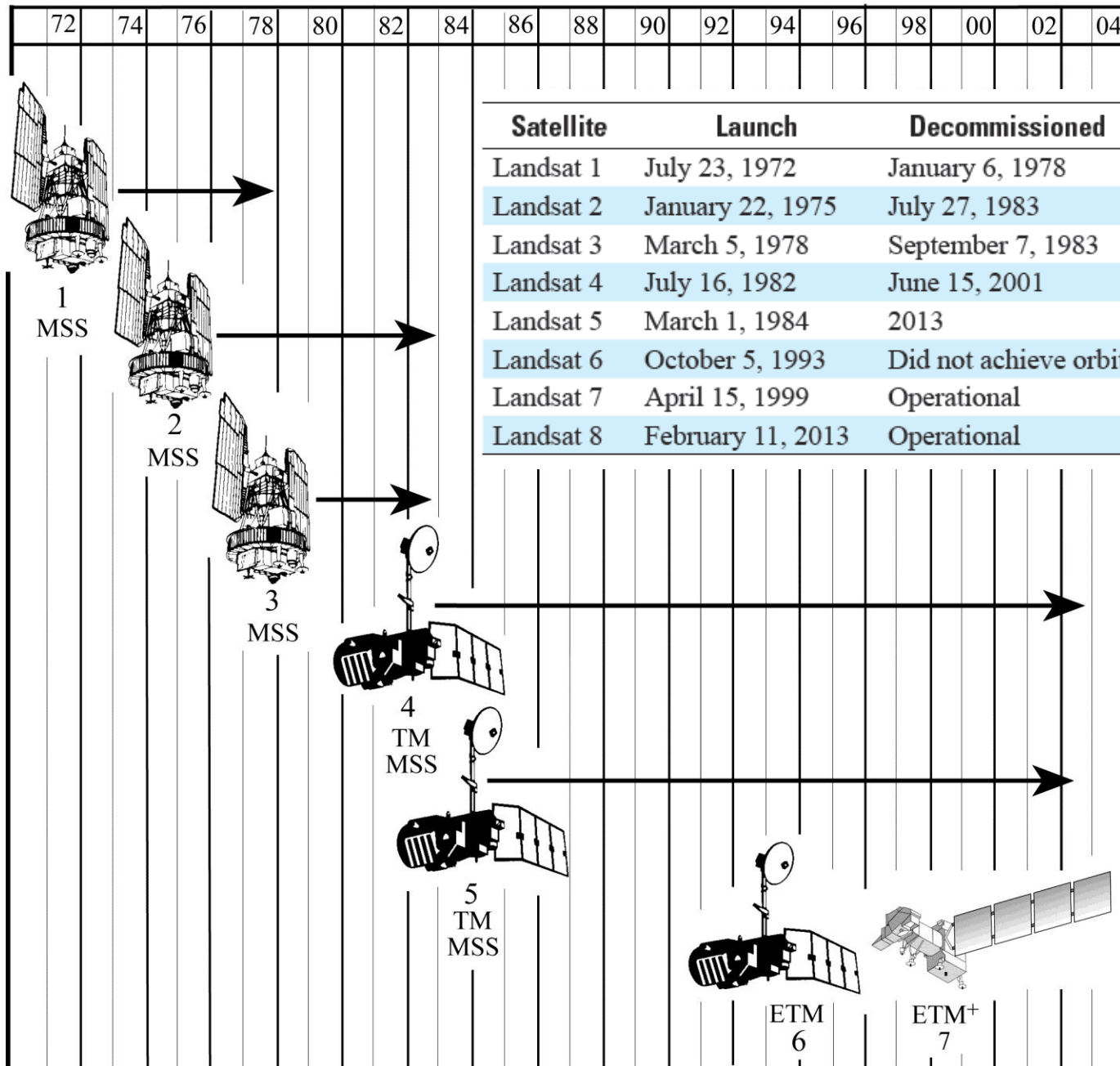


From ERTS-1 to LANDSAT

- A finales de la década de los 60 se comenzó la planificación del primer satélite dedicado específicamente a percepción remota multiespectral.
- Diseñado y construido por NASA. El ERTS-1 (Earth Resources Technology Satellite) fue lanzado el 23 de julio de 1972.
- Más tarde su nombre cambió a LANDSAT



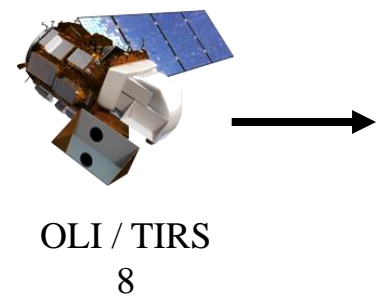
Chronological Launch and Retirement History of the Landsat Satellites



2013

2014

| Satellite | Launch | Decommissioned | Sensors |
|-----------|-------------------|-----------------------|----------|
| Landsat 1 | July 23, 1972 | January 6, 1978 | MSS/RBV |
| Landsat 2 | January 22, 1975 | July 27, 1983 | MSS/RBV |
| Landsat 3 | March 5, 1978 | September 7, 1983 | MSS/RBV |
| Landsat 4 | July 16, 1982 | June 15, 2001 | MSS/TM |
| Landsat 5 | March 1, 1984 | 2013 | MSS/TM |
| Landsat 6 | October 5, 1993 | Did not achieve orbit | ETM |
| Landsat 7 | April 15, 1999 | Operational | ETM+ |
| Landsat 8 | February 11, 2013 | Operational | OLI/TIRS |

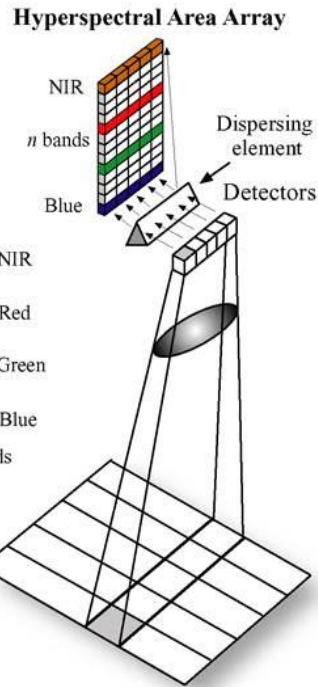
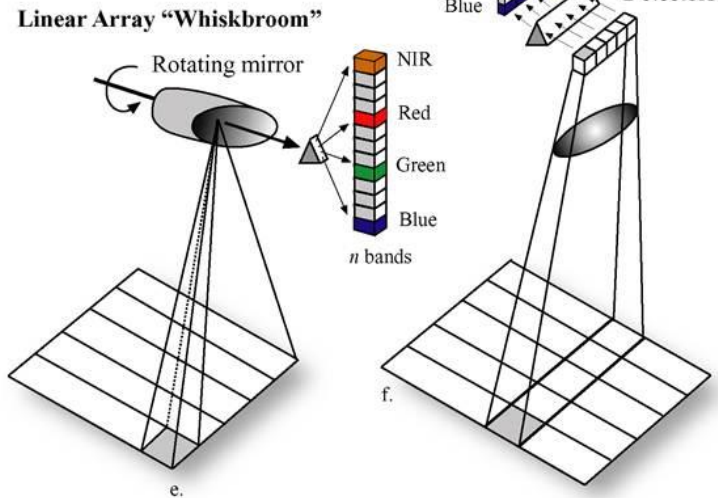
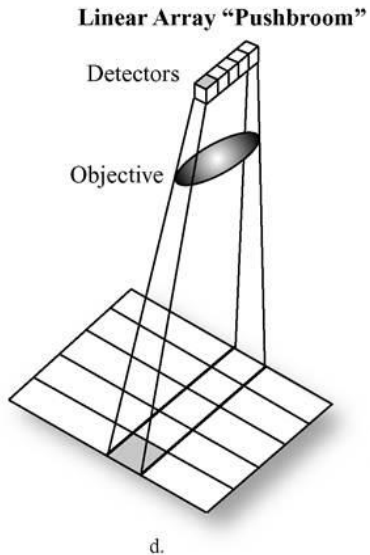
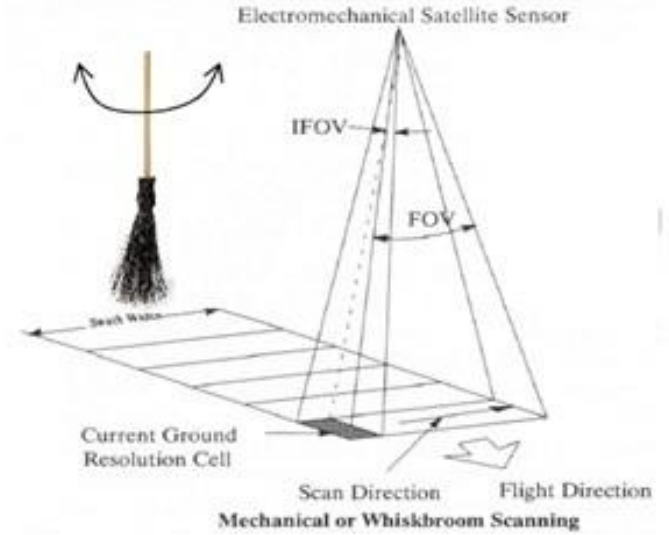
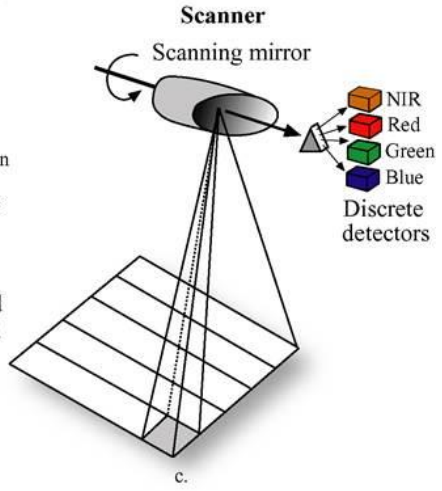
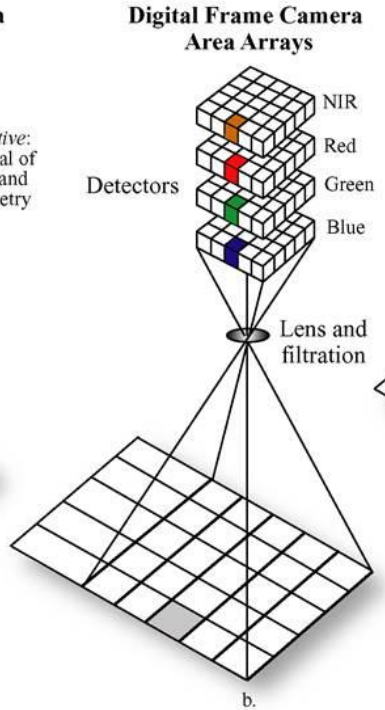
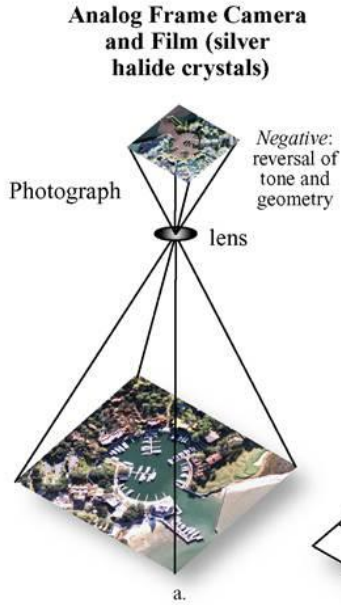


COMPARIZON BETWEEN SENSORS

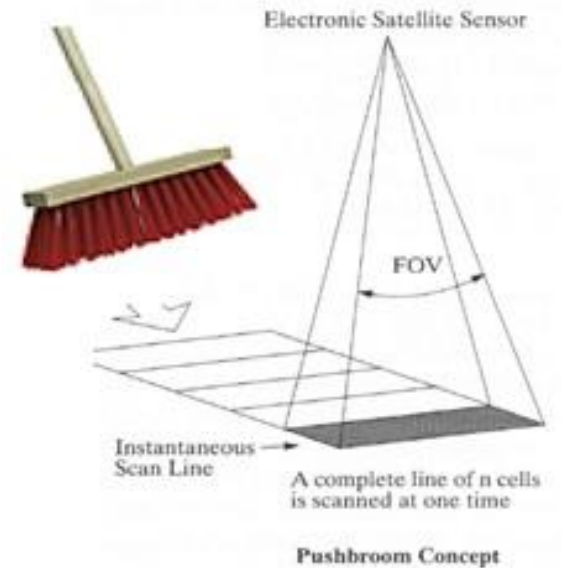
| | MSS | TM | ETM+ | OLI/TIRS |
|-------------------------------|--------------------------------------|---------------------------|--|-----------------------------------|
| Sensor type | opto-mechanical | whiskbroom | whiskbroom | pushbroom |
| Spatial Resolution | 80 m | 30 m (120 m - thermal) | 30 m (120 m - thermal, 15 m pan) | 30 m (15 m pan, 100 m thermal) |
| Spectral Range | 0.5 - 1.1 μm | 0.45 - 12.5 μm | 0.45 - 12.5 μm | 0.43 – 12.51 μm |
| Number of Bands | 4 (5 in Landsat 3) | 7 | 8 | 11 (9 and 2) |
| Temporal Resolution | 18 days (L1-L3) 16 days (L4 & L5) | 16 days | 16 days | 16 days |
| Image Size | 185 km X 185 km | 185 km X 172 km | 184 km X 185.2 km | 185 km X 185 km |
| Radiometric Resolution | 6 bits (64 DN) | 8 bits (256 DN) | 8 bits (256 DN) | 12 bits (4096 DN) |
| Programmable | No | Yes | Yes | Yes |

Remote Sensing Systems Used to Collect Aerial Photography, Multispectral and Hyperspectral Imagery

TM and ETM+

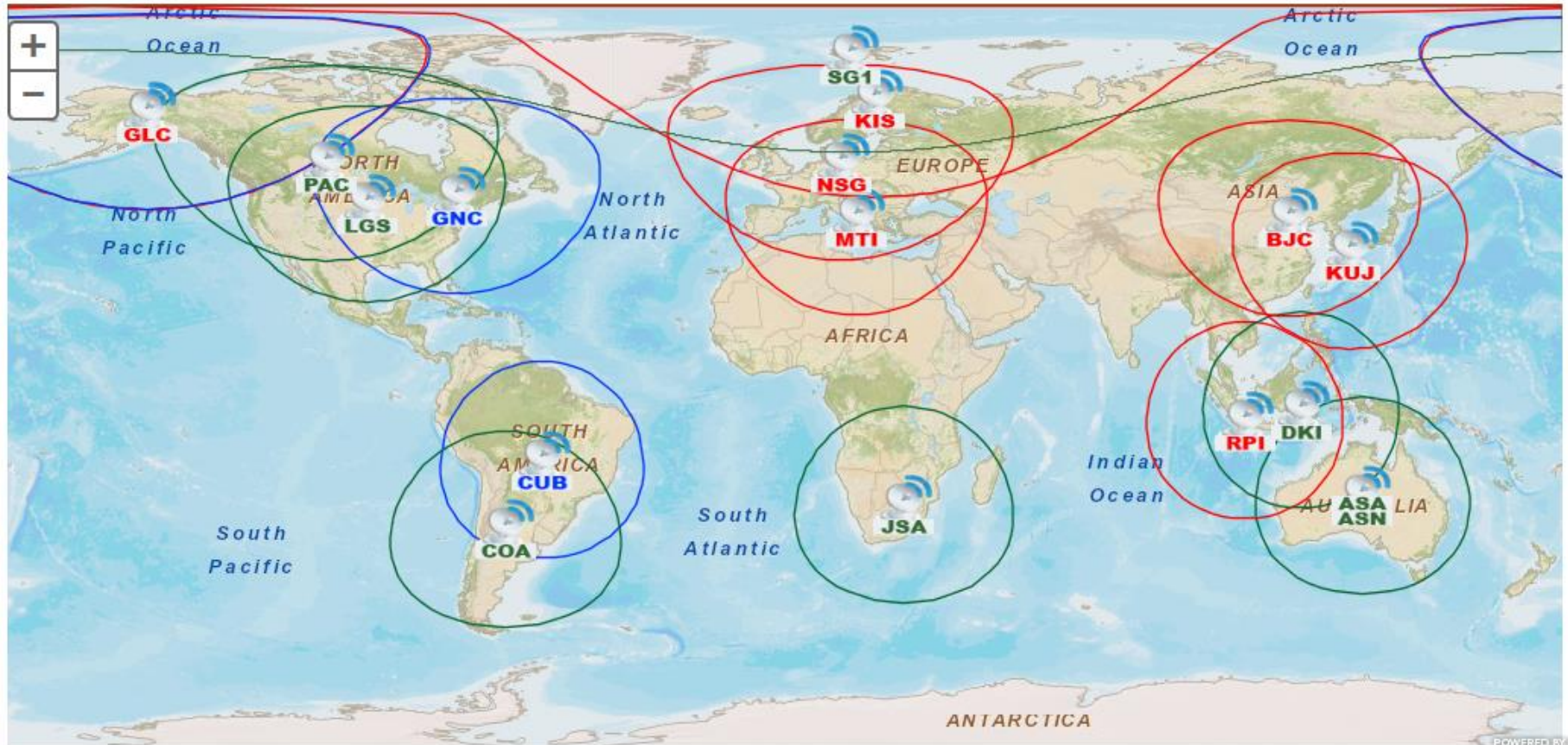


OLI and TIRS

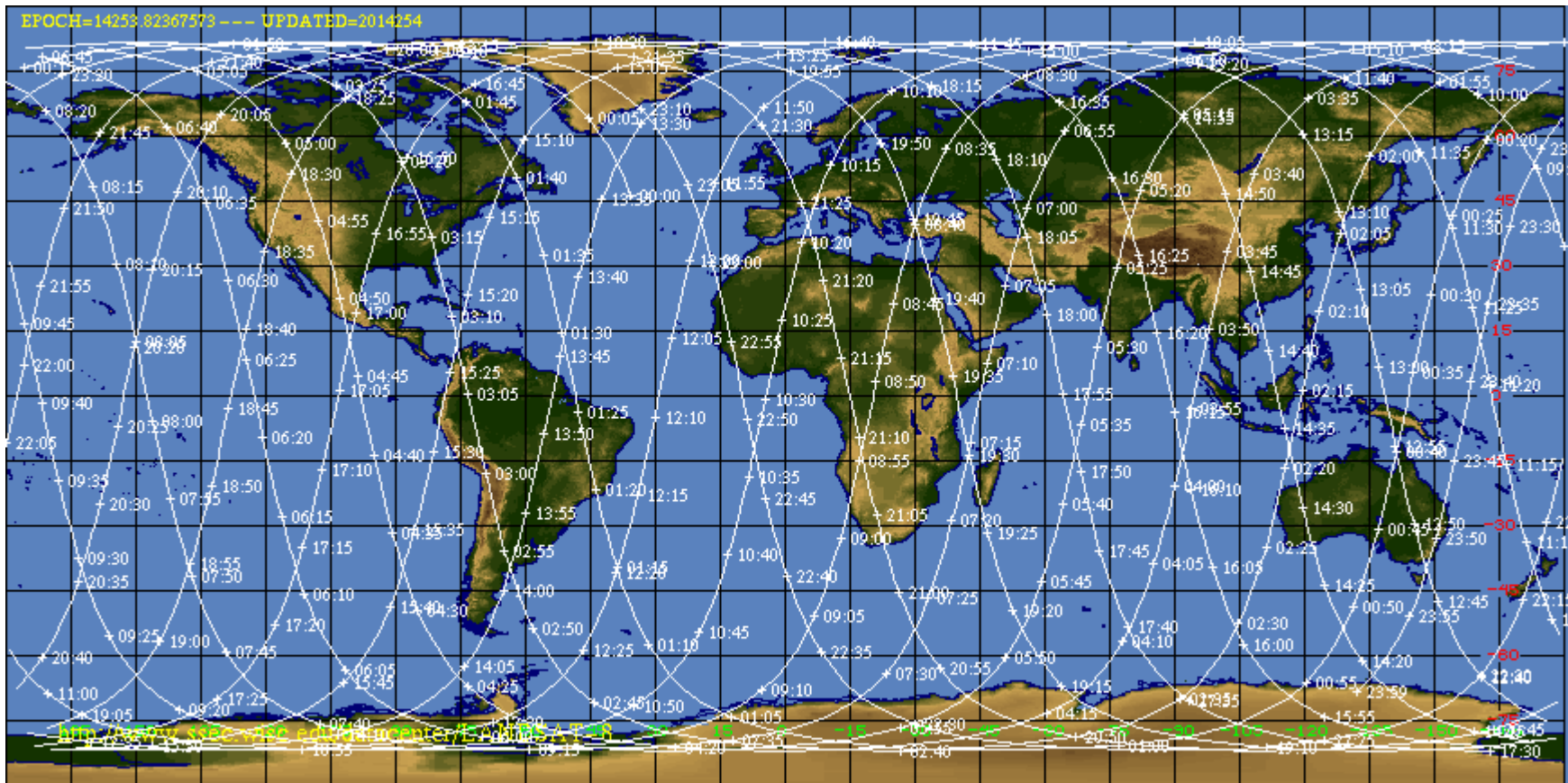


International Ground Station (IGS) Network

Key: L7 Stations L8 Stations L7 & L8 Stations (5 degree station masks)



EPOCH=14253.82367573 --- UPDATED=2014254





LANDSAT-8

Launch: February 11, 2013

Operational Land Imager (OLI)

Thermal Infrared Sensor (TIRS)

OLI and TIRS band designations.

| Spectral bands | Wavelength (micrometers) | Resolution (meters) | Use |
|------------------------|--------------------------|---------------------|---|
| Band 1—coastal/aerosol | 0.43–0.45 | 30 | Increased coastal zone observations. |
| Band 2—blue | 0.45–0.51 | 30 | Bathymetric mapping; distinguishes soil from vegetation; deciduous from coniferous vegetation. |
| Band 3—green | 0.53–0.59 | 30 | Emphasizes peak vegetation, which is useful for assessing plant vigor. |
| Band 4—red | 0.64–0.67 | 30 | Emphasizes vegetation slopes. |
| Band 5—near IR | 0.85–0.88 | 30 | Emphasizes vegetation boundary between land and water, and landforms. |
| Band 6—SWIR 1 | 1.57–1.65 | 30 | Used in detecting plant drought stress and delineating burnt areas and fire-affected vegetation, and is also sensitive to the thermal radiation emitted by intense fires; can be used to detect active fires, especially during nighttime when the background interference from SWIR in reflected sunlight is absent. |
| Band 7—SWIR-1 | 2.11–2.29 | 30 | Used in detecting drought stress, burnt and fire-affected areas, and can be used to detect active fires, especially at nighttime. |
| Band 8—panchromatic | 0.50–0.68 | 15 | Useful in ‘sharpening’ multispectral images. |
| Band 9—cirrus | 1.36–1.38 | 30 | Useful in detecting cirrus clouds. |
| Band 10—TIRS 1 | 10.60–11.19 | 100 | Useful for mapping thermal differences in water currents, monitoring fires and other night studies, and estimating soil moisture. |
| Band 11—TIRS 2 | 11.50–12.51 | 100 | Same as band 10. |

Instrument-specific relative spectral response functions may be viewed and compared using the Spectral Viewer tool: http://landsat.usgs.gov/tools_spectralViewer.php.

**OLI Image of
Mayaguez Bay
May 1, 2013**

**Resolutions
of OLI:**

**Spatial=
30 m, 15 pan**

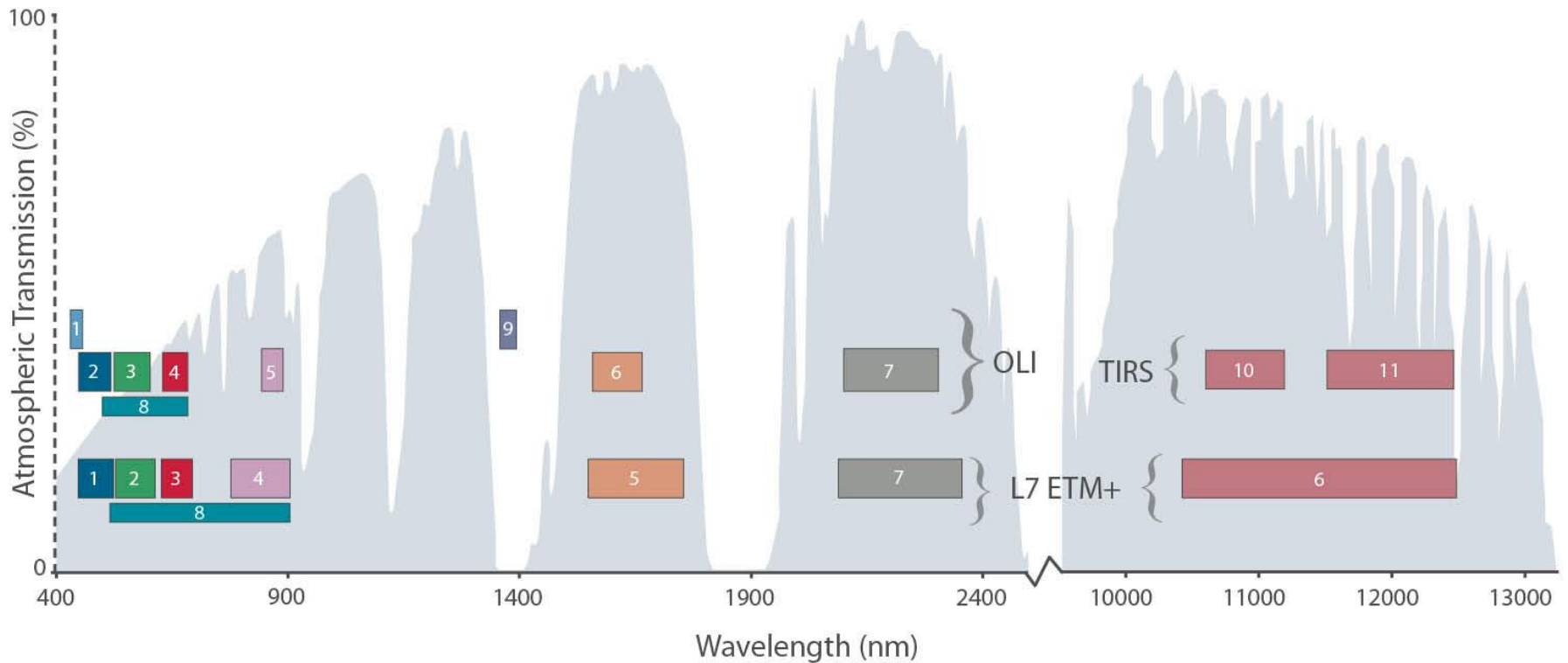
**Spectral=
9 bands**

**Radiometric=
12 bits**

**Temporal=
16 days**



Bands of Landsat 7 and 8



Bands of Landsat 7 and 8

| Landsat-7 ETM+ Bands (μm) | | | Landsat-8 OLI and <i>TIRS</i> Bands (μm) | | |
|--|-------------|---------------|---|----------------------|---------|
| | | | 30 m Coastal/Aerosol | 0.435 - 0.451 | Band 1 |
| Band 1 | 30 m Blue | 0.441 - 0.514 | 30 m Blue | 0.452 - 0.512 | Band 2 |
| Band 2 | 30 m Green | 0.519 - 0.601 | 30 m Green | 0.533 - 0.590 | Band 3 |
| Band 3 | 30 m Red | 0.631 - 0.692 | 30 m Red | 0.636 - 0.673 | Band 4 |
| Band 4 | 30 m NIR | 0.772 - 0.898 | 30 m NIR | 0.851 - 0.879 | Band 5 |
| Band 5 | 30 m SWIR-1 | 1.547 - 1.749 | 30 m SWIR-1 | 1.566 - 1.651 | Band 6 |
| Band 6 | 60 m TIR | 10.31 - 12.36 | <i>100 m TIR-1</i> | <i>10.60 - 11.19</i> | Band 10 |
| | | | <i>100 m TIR-2</i> | <i>11.50 - 12.51</i> | Band 11 |
| Band 7 | 30 m SWIR-2 | 2.064 - 2.345 | 30 m SWIR-2 | 2.107 - 2.294 | Band 7 |
| Band 8 | 15 m Pan | 0.515 - 0.896 | 15 m Pan | 0.503 - 0.676 | Band 8 |
| | | | 30 m Cirrus | 1.363 - 1.384 | Band 9 |

Processing parameters for Landsat 8 standard data products

[UTM, Universal Transverse Mecator; WGS, World Geodetic System; OLI, Operational Land Imager; TIRS, Thermal Infrared Sensor]

| | |
|-----------------------|---|
| Product Type | Level 1T (terrain corrected) |
| Data type | 16-bit unsigned integer |
| Output format | GeoTIFF |
| Pixel size | 15 meters/30 meters/100 meters (panchromatic/multispectral/thermal) |
| Map projection | UTM (Polar Stereographic for Antarctica) |
| Datum | WGS 84 |
| Orientation | North-up (map) |
| Resampling | Cubic convolution |
| Accuracy | OLI: 12 meters circular error, 90 percent confidence TIRS: 41 meters circular error, 90 percent confidence |

<http://landsatlook.usgs.gov/>

The image shows the USGS LandsatLook Viewer interface. The main map displays a satellite view of the Americas, including the United States, Mexico, Central America, and South America. The map is overlaid with a grid and labels for various geographical features and cities. The interface includes a search bar at the top right, a navigation panel on the left, and a control panel on the right. The control panel has sections for Time, Enhancements, Transparency, and Tools. The status bar at the bottom left shows the scale, latitude, longitude, and format.

USGS LandsatLook Viewer

Welcome! | About | Quick Guide | Contact Us | Help

search for a location

Labels Basemaps Bookmarks

Display

Zoom-in to 1:1M to select scenes

Time

Slider Date

Only One Current & Older

Enhancements

None Percent Clip Stretch 3SD

Transparency

off visible

Tools

Metadata Table **Measure** Export Display

Advanced Query

Scale: 1 : 18 M | Lat: 34.69°N Lon: -50.81°W | Format: png

POWERED BY esri

0 200 400k

http://glovis.usgs.gov



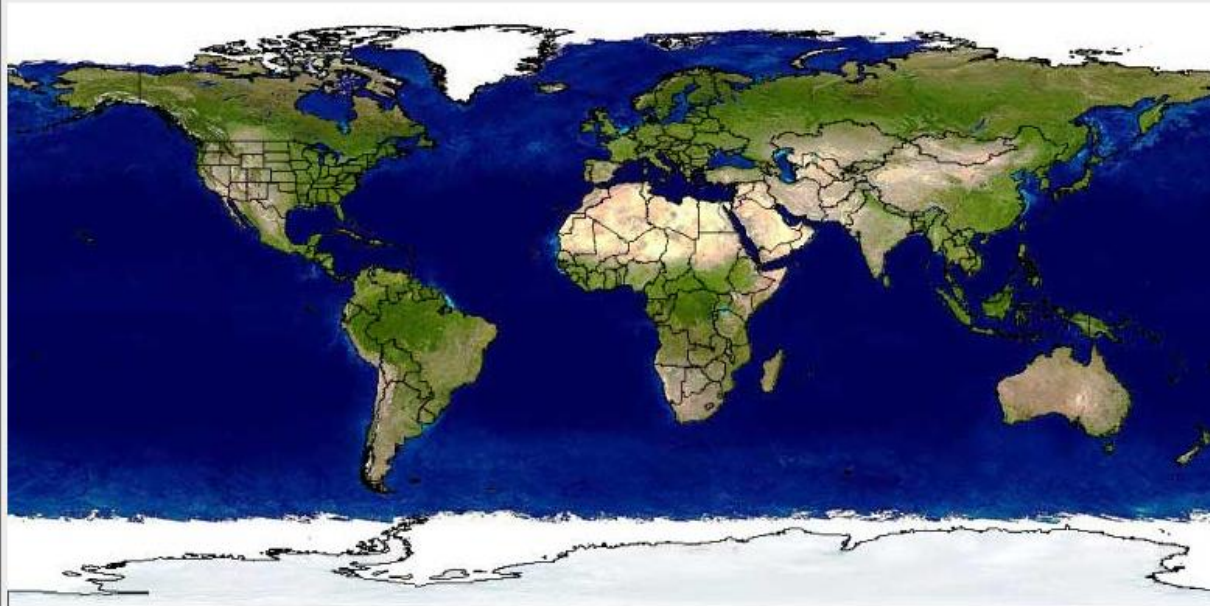
Earth Resources Observation and Science Center (EROS)

USGS Global Visualization Viewer

Select a collection, then click on the Global Locator Map to view satellite browse images in that area.

Select Collection

Latitude Longitude



| | | | |
|-----------------------------------|--------------------------------------|----------------------|--------------------------------------|
| What's New! | Browser Requirements | Help | Download Source Code |
| Quick Start Guide | About Browse Images | | |

| | | | | | |
|---------------------|---------------------------|-------------------------|---------------------------|-------------------------|-----------------------|
| DOI | USGS HOME | Biology | Geography | Geology | Water |
|---------------------|---------------------------|-------------------------|---------------------------|-------------------------|-----------------------|

| | | | | |
|-------------------------------|----------------------|-------------------------|--------------------------------------|----------------------------|
| Accessibility | FOIA | Privacy | Policies and Notices | Disclaimer |
|-------------------------------|----------------------|-------------------------|--------------------------------------|----------------------------|

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

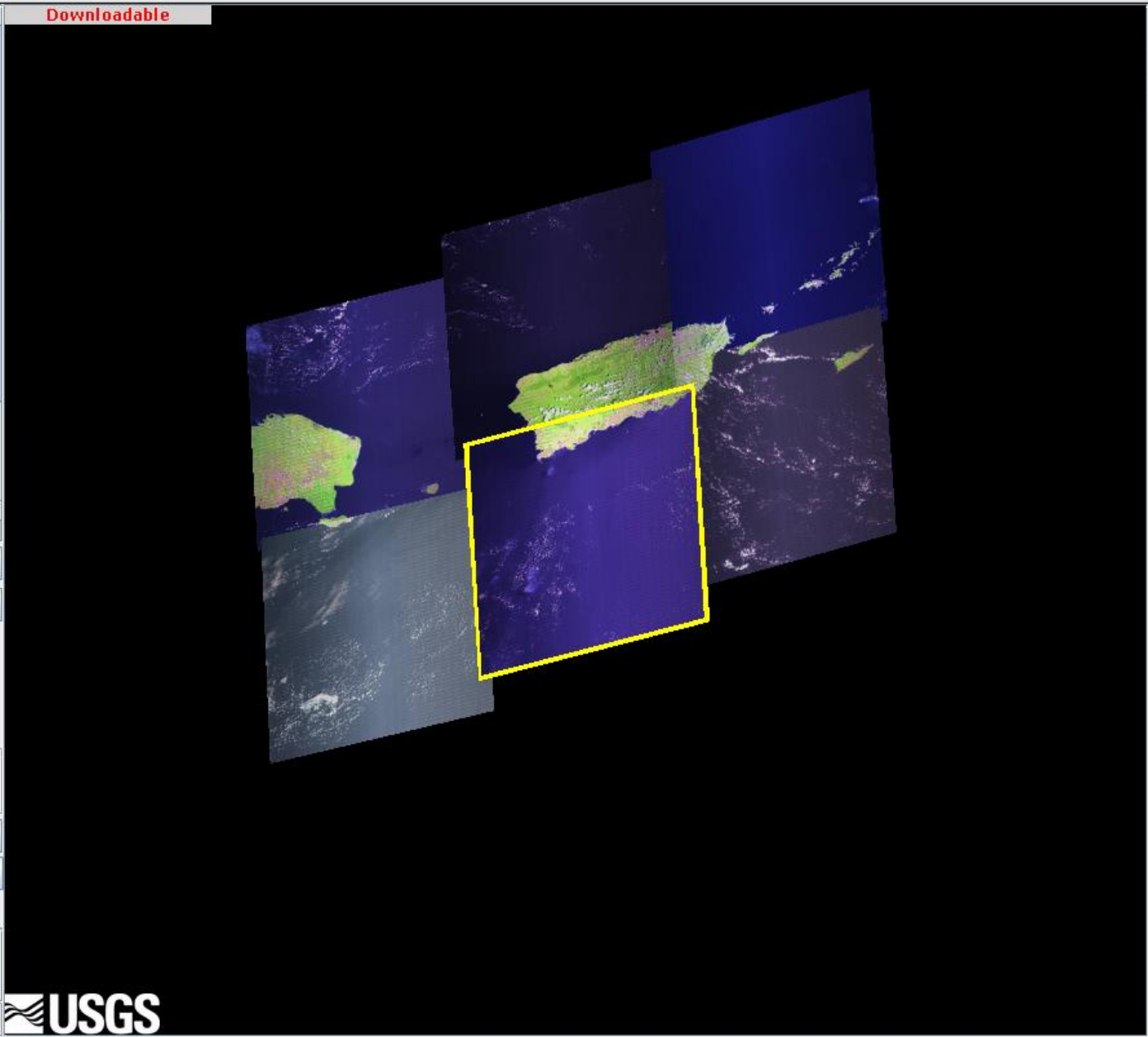
URL: <http://glovis.usgs.gov/BrowseBrowser.shtml>

Contact Information: custserv@usgs.gov | ASTER and MODIS questions: lpdaac@eos.nasa.gov

Page Last Modified: 08/06/09



Downloadable



WRS-2 Path /Row:

Lat/ Long:

Max Cloud:

Scene Information:
 ID: LE70050482004217ASN01
 Cloud Cover: 0% Qlty: 9
 Date: 2004/8/4

Aug 2004

L7 SLC-off (2003->) List



1000m No Limits Set

http://earthexplorer.usgs.gov/

USGS
science for a changing world

EarthExplorer

USGS Home
Contact USGS
Search USGS

Home Login Register Feedback Help

Search Criteria Data Sets Additional Criteria Results

1. Enter Search Criteria

To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range.

Address/Place Path/Row Feature Circle

Show Clear

Coordinates Predefined Area Shapefile KML

Degree/Minute/Second Decimal

No coordinates selected.

Use Map Add Coordinate Clear Coordinates

Date Range Result Options

Search from: 01/01/1920 to: 02/09/2014

Search months: (all)

Data Sets » Additional Criteria » Results »

Search Criteria Summary (Show)

Clear Criteria

(13° 55' 24" S, 106° 10' 18" W) Options Overlays Map Satellite

Google

Map data ©2014 INEGI Imagery ©2014 NASA, TerraMetrics 1000 km Terms of Use