

# LANDSAT HISTORY AND LEGACY

**Presented at the  
UNCOPUOS Special Panel  
for the 40<sup>th</sup> Anniversary  
of Landsat**

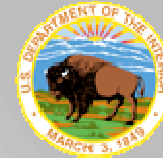
**June 6, 2012**

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Land Remote Sensing Program  
United States Geological Survey  
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ERTS satellite

# Early Vision of Landsat



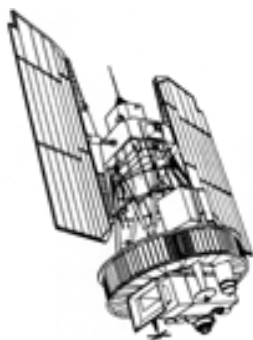
Inspired in part by NASA's early moon-surface observation satellites.

1966 - Initiated Earth Resources Observation Systems Program

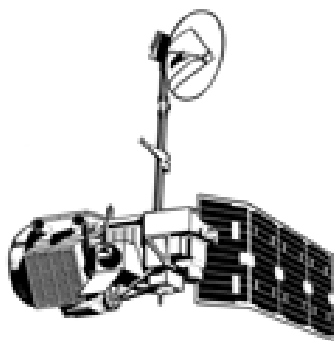
*"...the time is now right and urgent to apply space technology towards the solution of many pressing natural resource problems being compounded by population and industrial growth."*

Secretary of the Interior Stewart L. Udall, 1966

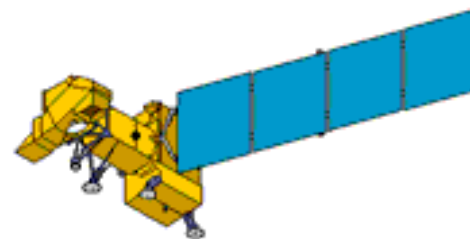
William Pecora – USGS – Proposed idea of a remote sensing satellite program to gather facts about the natural resources of our planet.



Landsat 1-3  
Multi-Spectral Scanner (MSS) 79 meter  
Return Beam Vidicon (RBV) 80/40 meter



Landsat 4-5  
Multi-Spectral Scanner (MSS) 79 meter  
Thematic Mapper (TM) 30 meter



Landsat 7  
Enhanced Thematic Mapper Plus  
(ETM+) 30/15 meter

# Setting the Stage: The Early 1970s

- The dawning environmental awareness
- Pollution at the doorstep
- First Earth Day
- Political Action
  - EPA creation
  - Clean Air Act
  - Clean Water Act
  - Ocean Dumping Act
  - Endangered Species Act
  - Coastal Zone Management Act
  - Marine Mammal Protection Act



Burnt aftermath.  
Cuyahoga River, Cleveland, Ohio  
Credit: NGS



# Landsat 1 Launch and L2 & L3

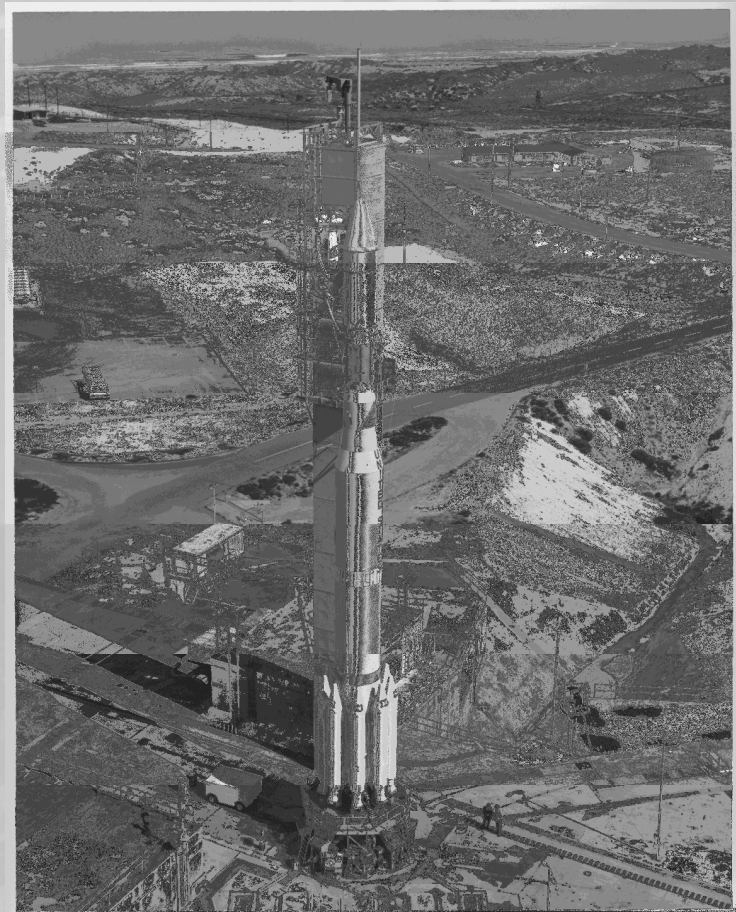
## Landsat 1

- Launched by NASA in cooperation with USGS and USDA – ERTS renamed to Landsat 1
- July 23, 1972 – January 1978
- Two Sensors - RBV and MSS sensors
- First MSS scene – superb quality
- 1<sup>st</sup> civilian sensor to send data in real time
- Acquired over 300,000 images worldwide

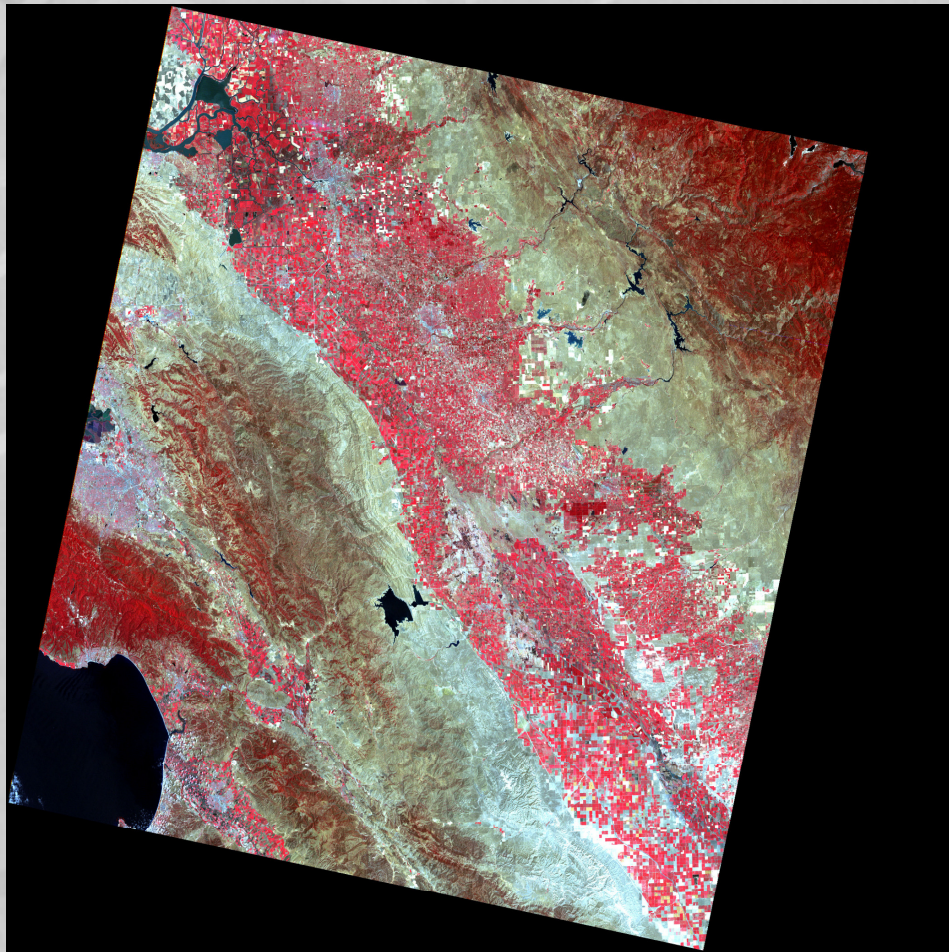
## Clones of Landsat 1

- Landsat 2 (January 22, 1975)
  - Operated for 7 years
- Landsat 3 (March 5, 1978)
  - Operated for 5 years

**L1, L2 & L3** – all funded as NASA research missions



# First MSS Image from Landsat



First Landsat 1 image transmitted to ground station.

Monterey Bay, California

July 23, 1972

Simulates color infrared aerial photo  
Vegetation in shades of red

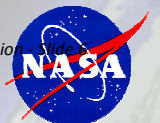


# Landsat Satellite Missions

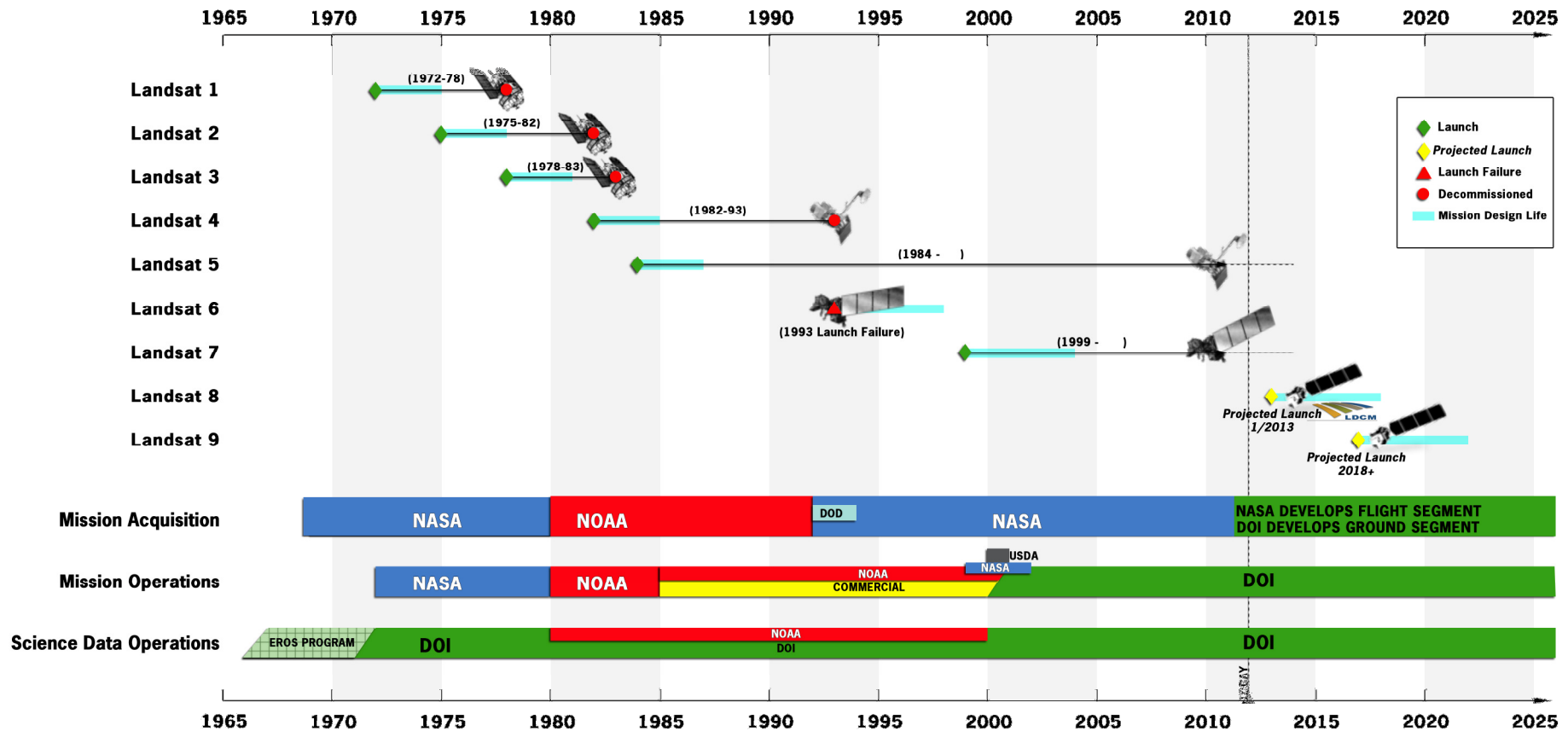
- **Landsats 1-3** were NASA-funded research missions
- **Landsat 4** – launched July 16, 1982
  - decommissioned December 14, 1993
  - MSS and new sensor Thematic Mapper
  - First GPS on civilian satellite
- **Landsats 4 & 5** were funded by NOAA, built by NASA, and initially operated “commercially” by EOSAT
  - High data prices caused a sharp drop in user demand
- **Landsat 6**, funded by NOAA, built by GE for EOSAT, failed at launch in 1993
- **Landsat 7** was a gap filler for data and policy
  - 1992 law directed NASA&DOD to build Landsat 7 but sought eventual commercialization of the program
  - In 2001 Landsat satellites turned over to USGS
- **Landsat Data Continuity Mission (Landsat 8)** now being developed by NASA and USGS for operation by USGS after January 2013 launch



A Brief History of the Landsat Mission – Slide 5



# Shifting Landsat Responsibilities

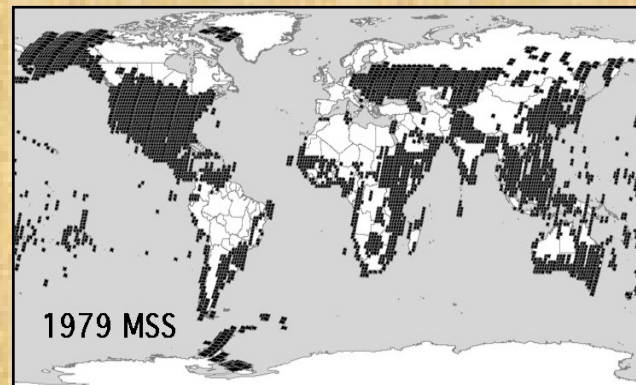
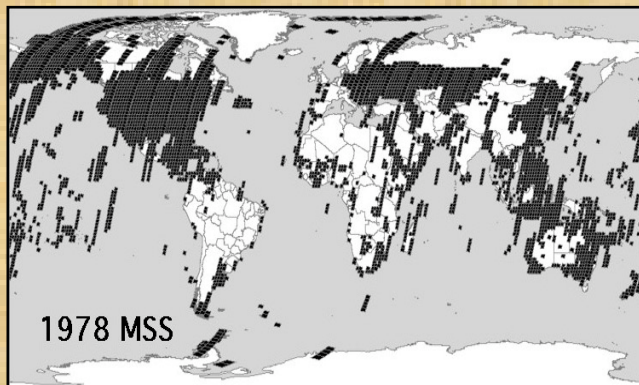
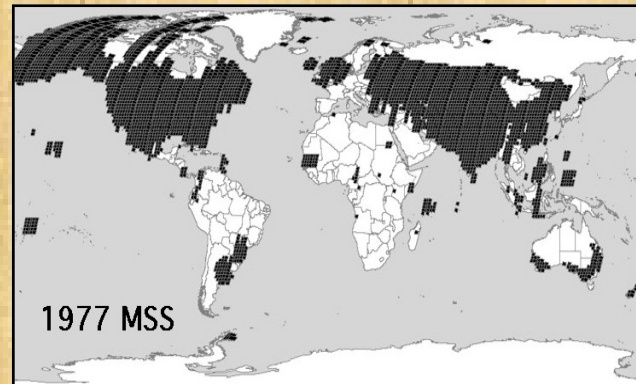
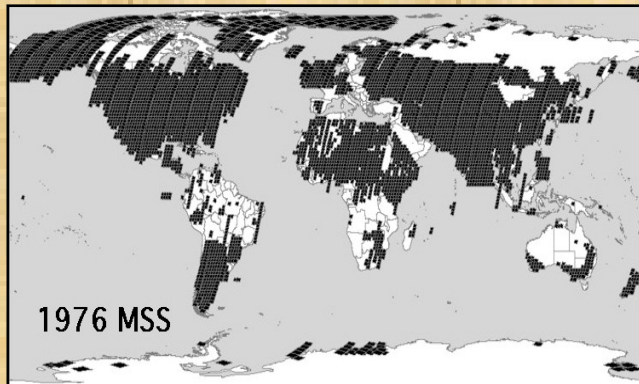


# Current Status of Landsat 5 and 7

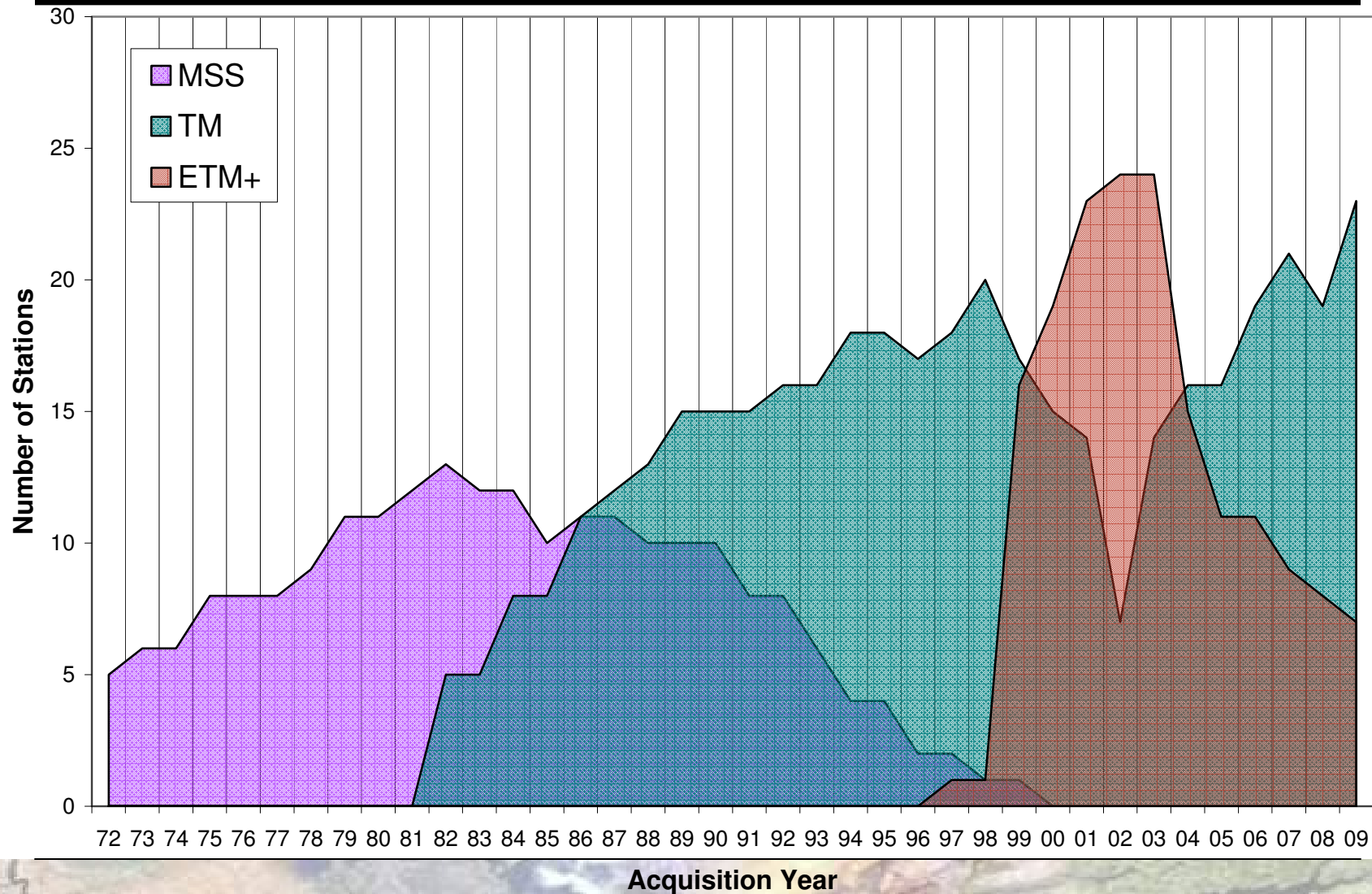
- **Landsat 5**
- Launched by NASA in 1984 (3-year design life), just turned 28!
- Operated by USGS since 2001
- November 2011: USGS suspended TM imaging temporarily to investigate electronic problem and resurrected the MSS using a different transmitter
- Longest-operating Earth observing satellite – orbited the earth 150,000 times and transmitted over 5 million images
- **Landsat 7**
- Launched by NASA in 1999 (5-year design life) and operated by USGS since 2000
- Acquiring over 350 images/day worldwide
- Estimated end of mission, based on fuel supply only: January 2017



# Early Collections from Landsat

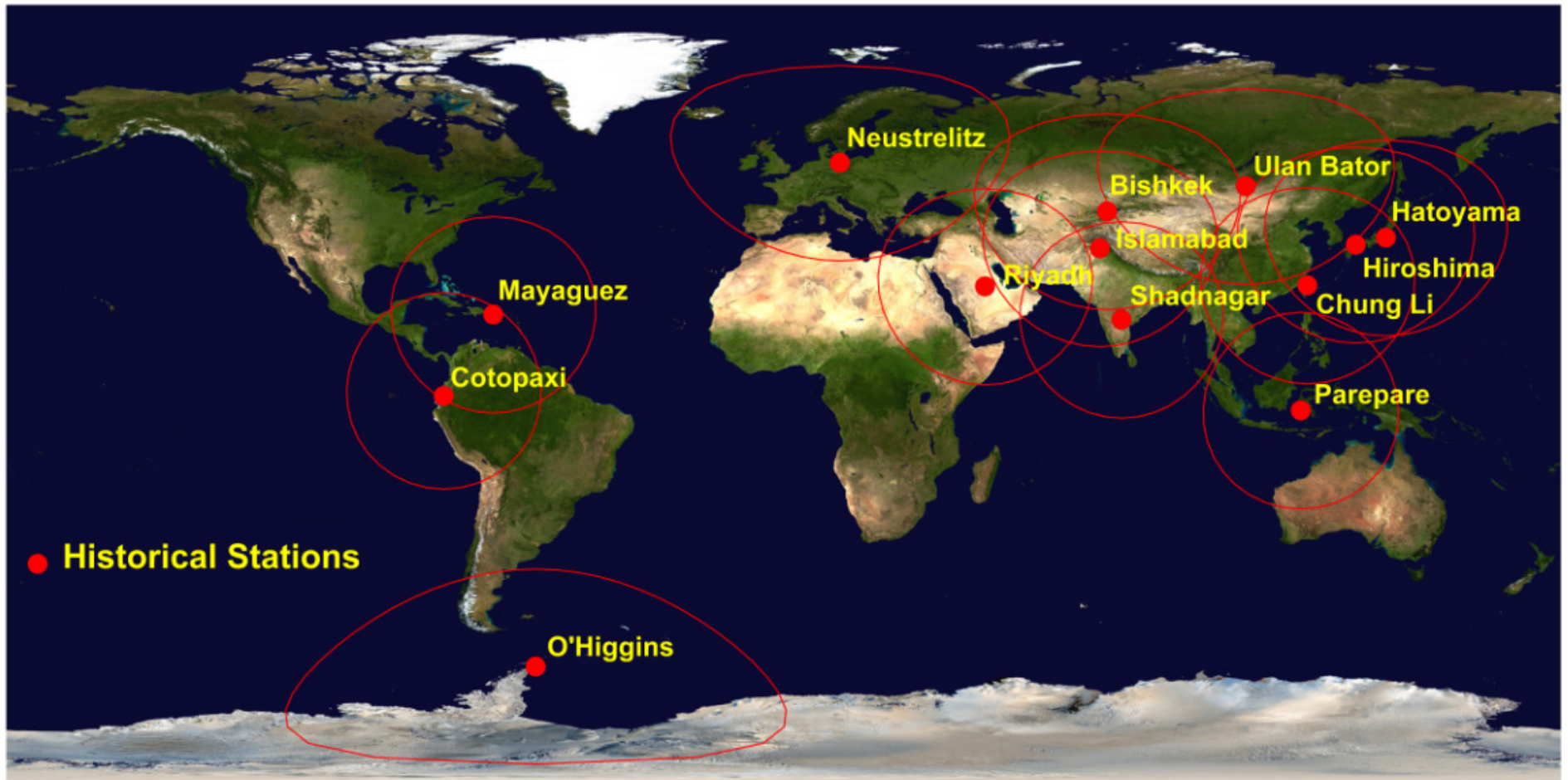


# Historical Landsat Ground Stations



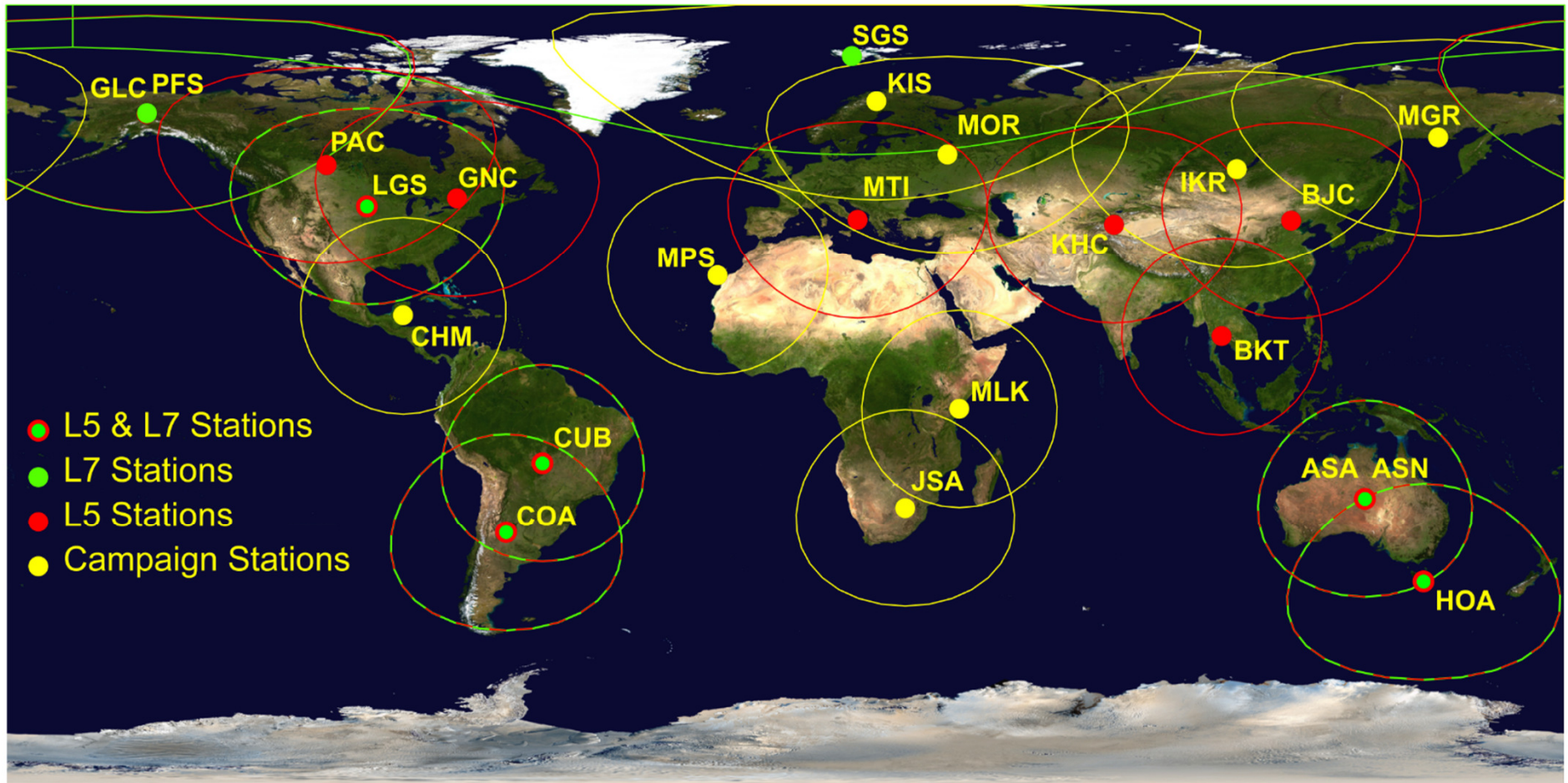
# Historical International Cooperators

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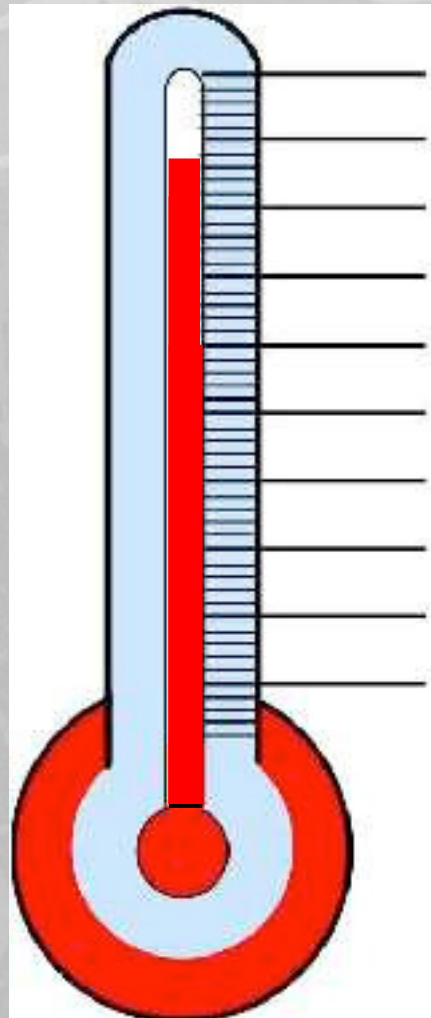




# Active International Cooperators



# Goals Of The Visionaries— Accomplished Yet?



Operational Landsat system

Data to all free of charge

From local to global

From data to information

Earth System Science established

Satellite-based remote sensing

