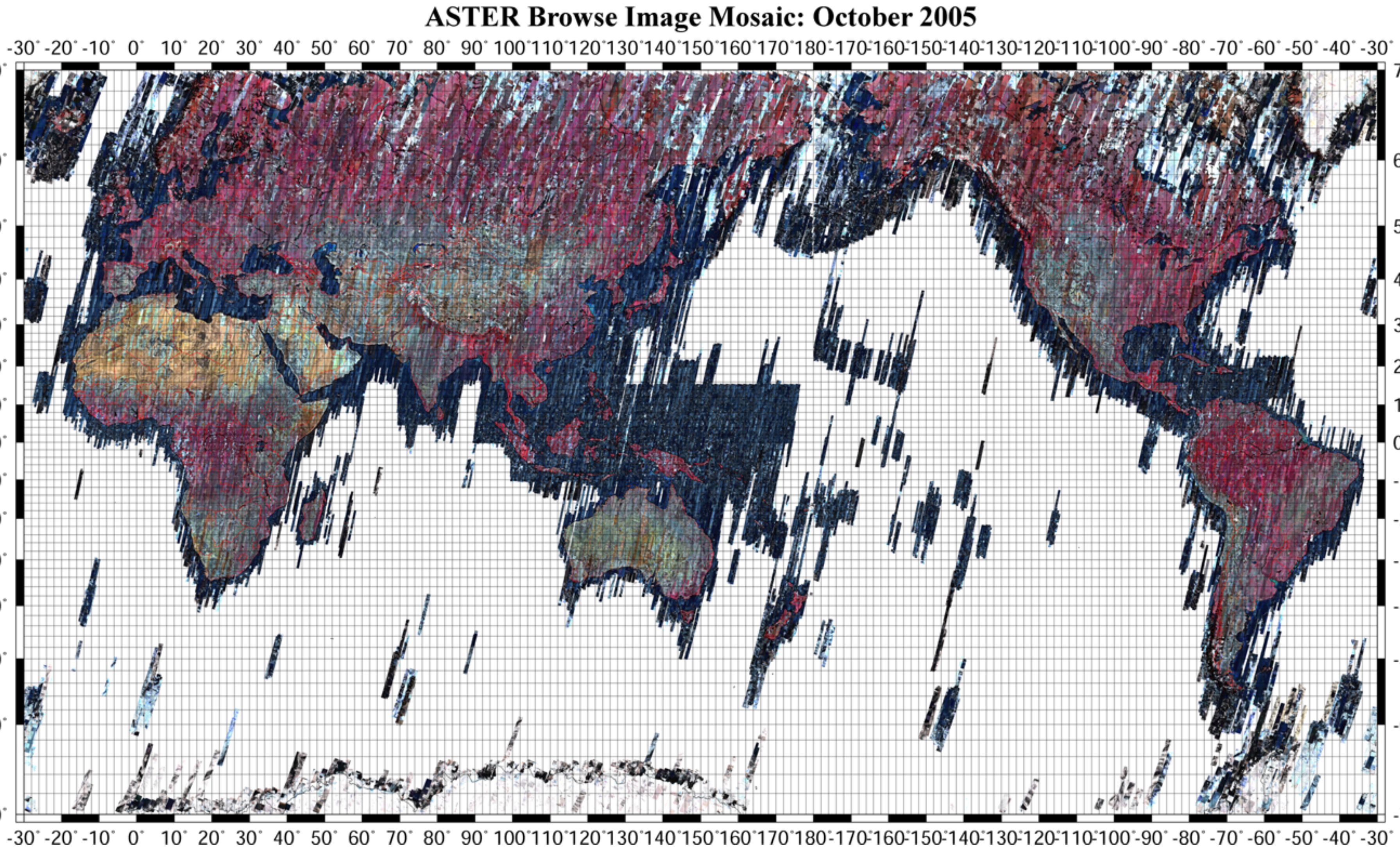
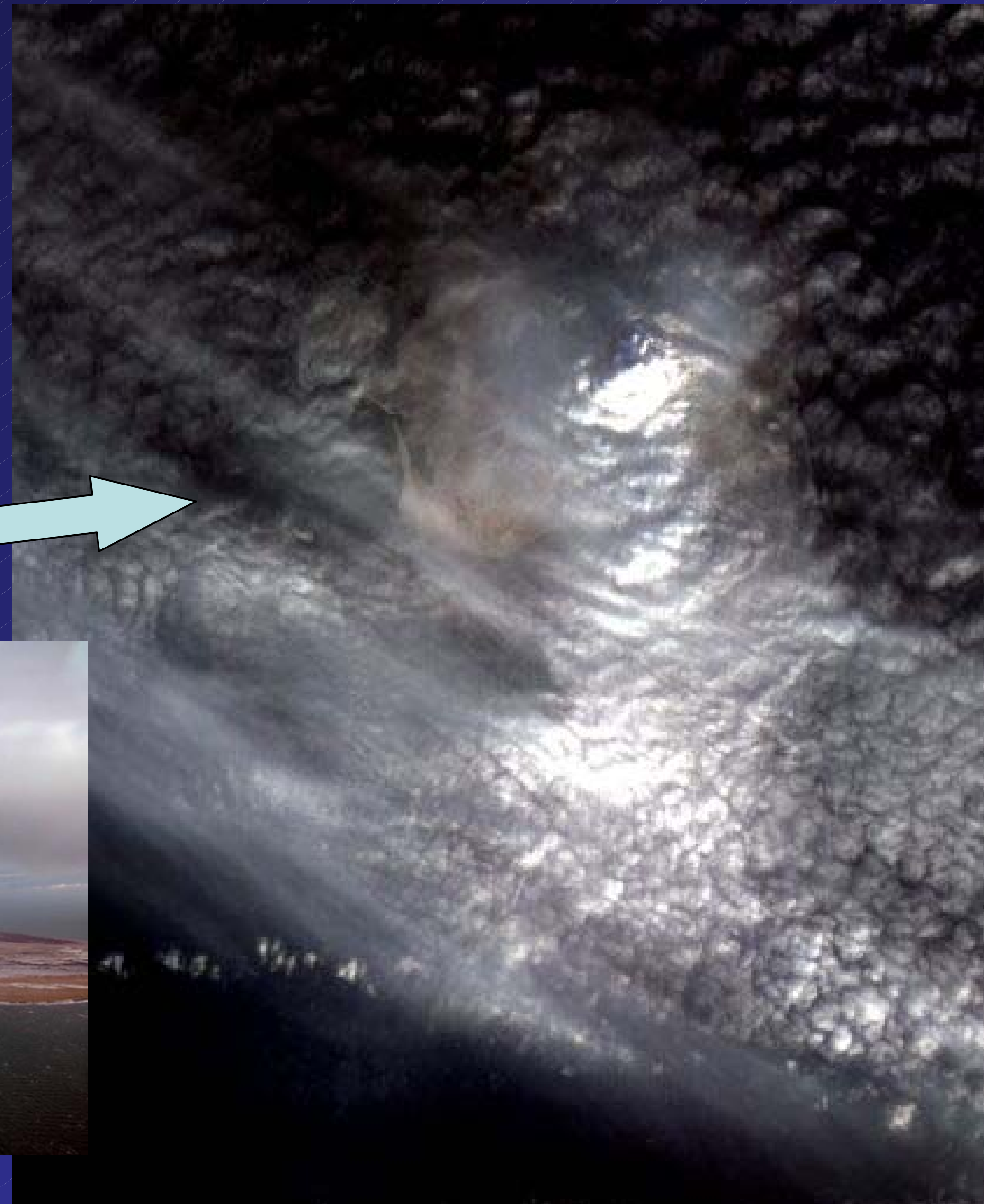
Over 1,000,000 scenes acquired!!!



January '06 Eruption of Augustine Volcano, Alaska

ASTER, 12 Jan 2006

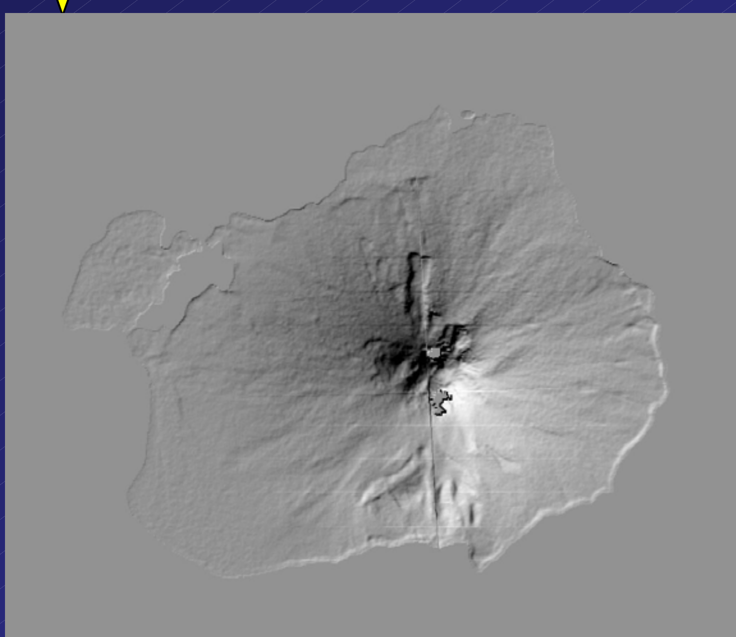


Look Direction

Input Data Sets

Landsat

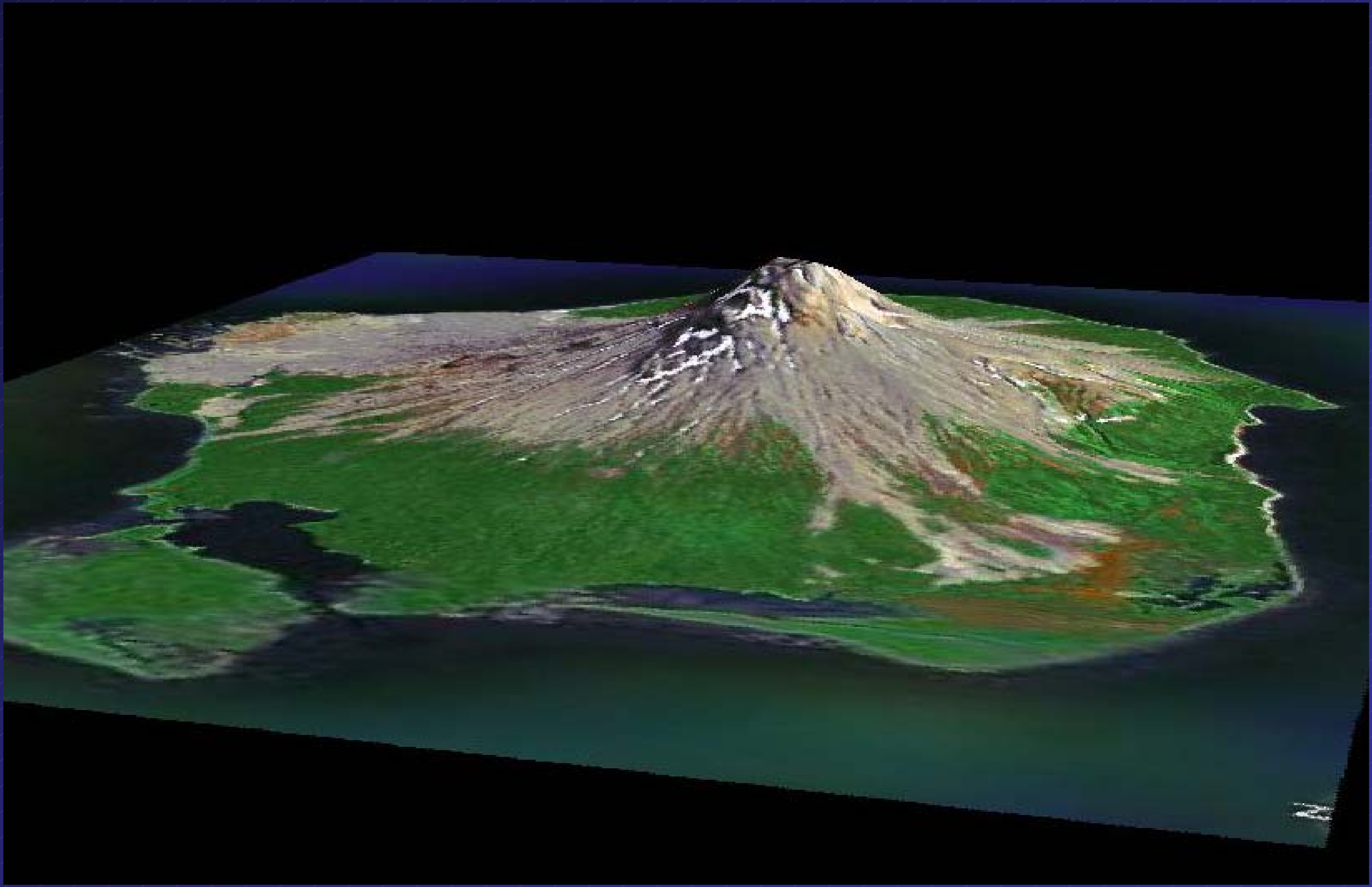
SRTM



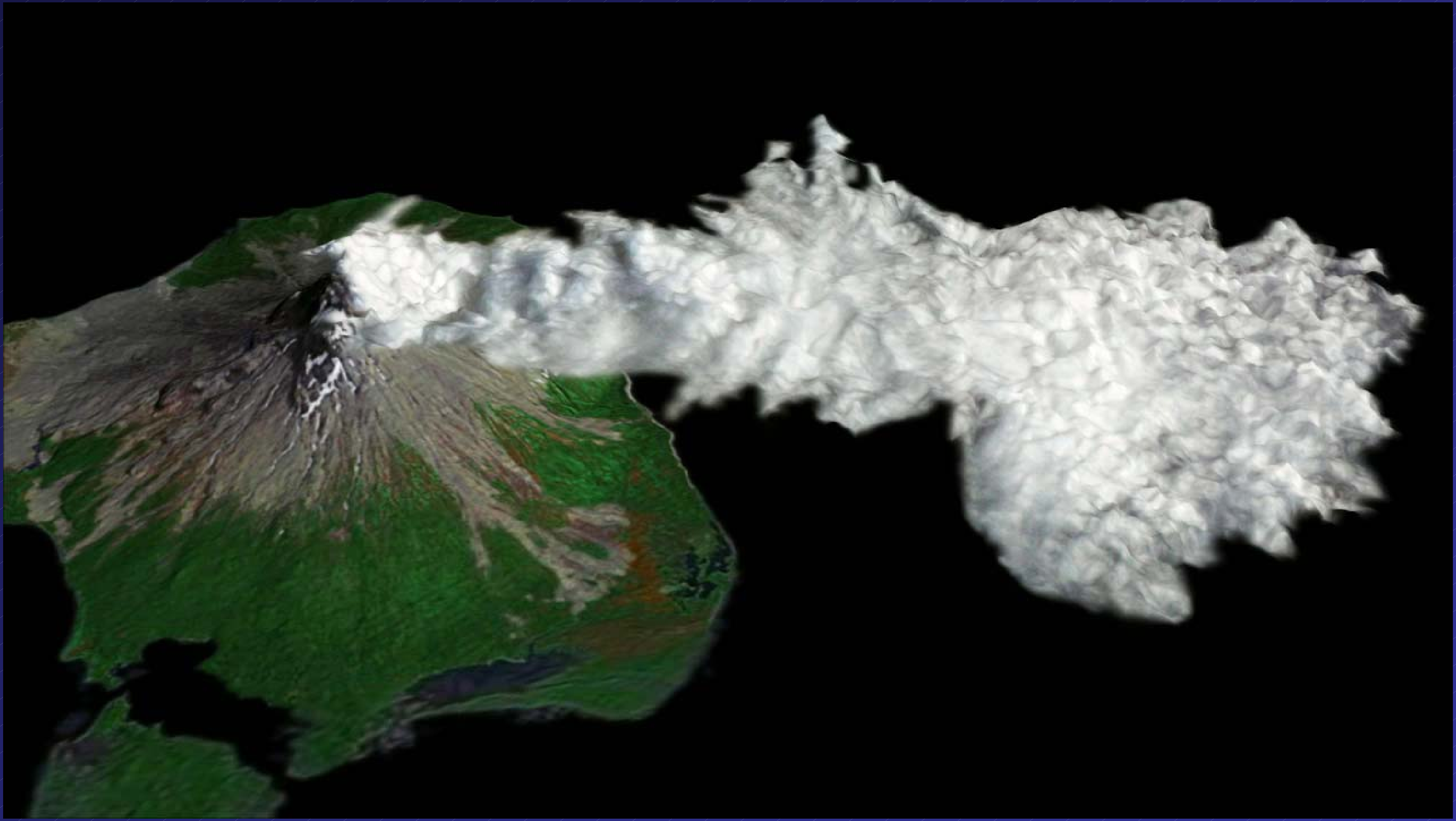
ASTER

ASTER DEM

Historic Landsat + SRTM

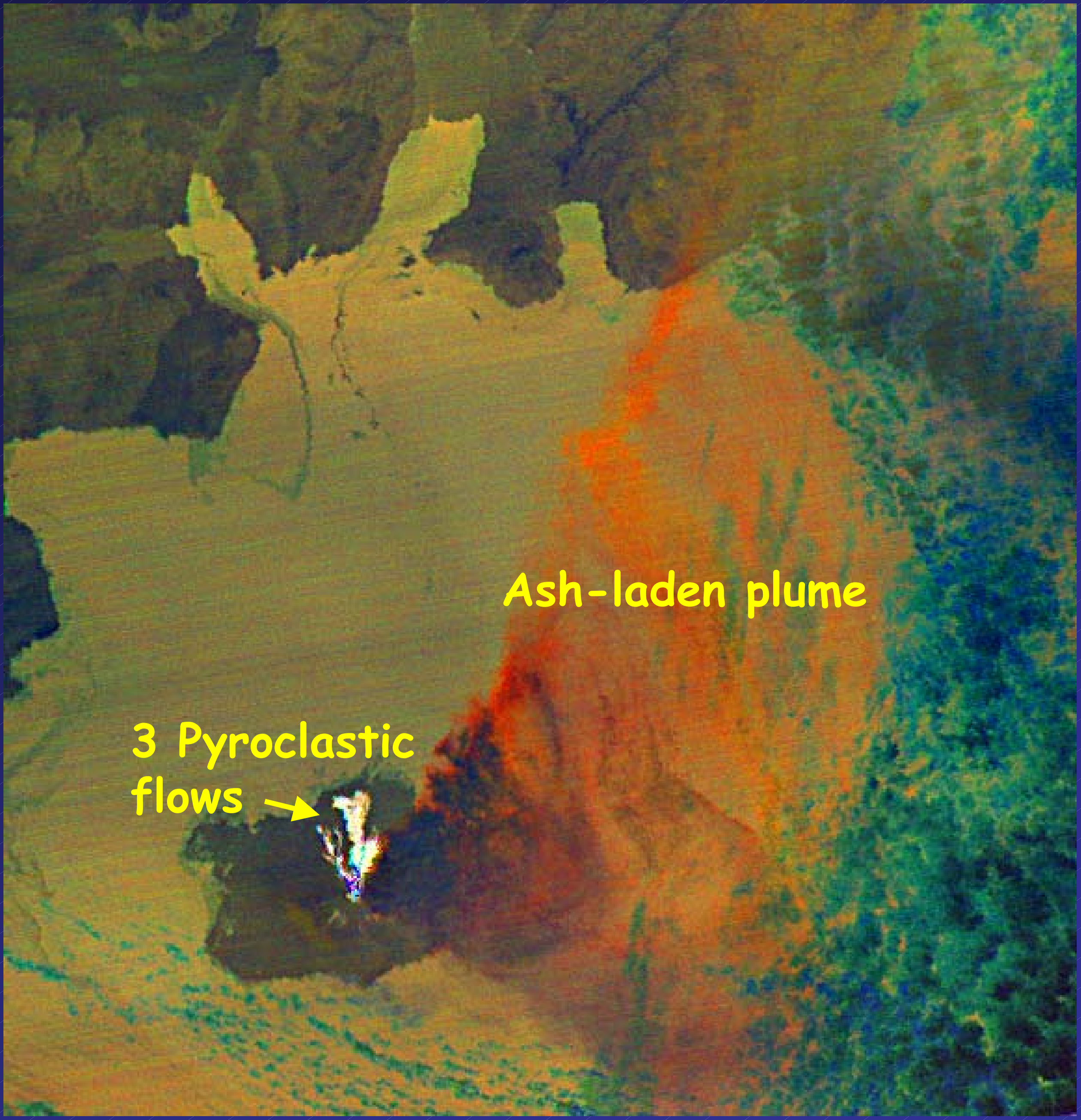


ASTER + ASTER DEM + SRTM + Landsat



Plume extent and cloud top topography derived from ASTER image

ASTER night TIR image, January 31



Applications

- Working with National Weather Service Alaska
- NWS primary responsibility is real-time ash hazard warnings and alerts to in-flight aircraft
- NWS uses RAMS ash dispersal model to forecast plume movement
- ASTER data will be used quantitatively to validate and improve RAMS model:
    - adiabatic cooling and sinking of plume
    - ash loading
    - height of plume
    - velocity of downwind dispersal

Polar Glaciology

Gordon Hamilton
Leigh Stearns

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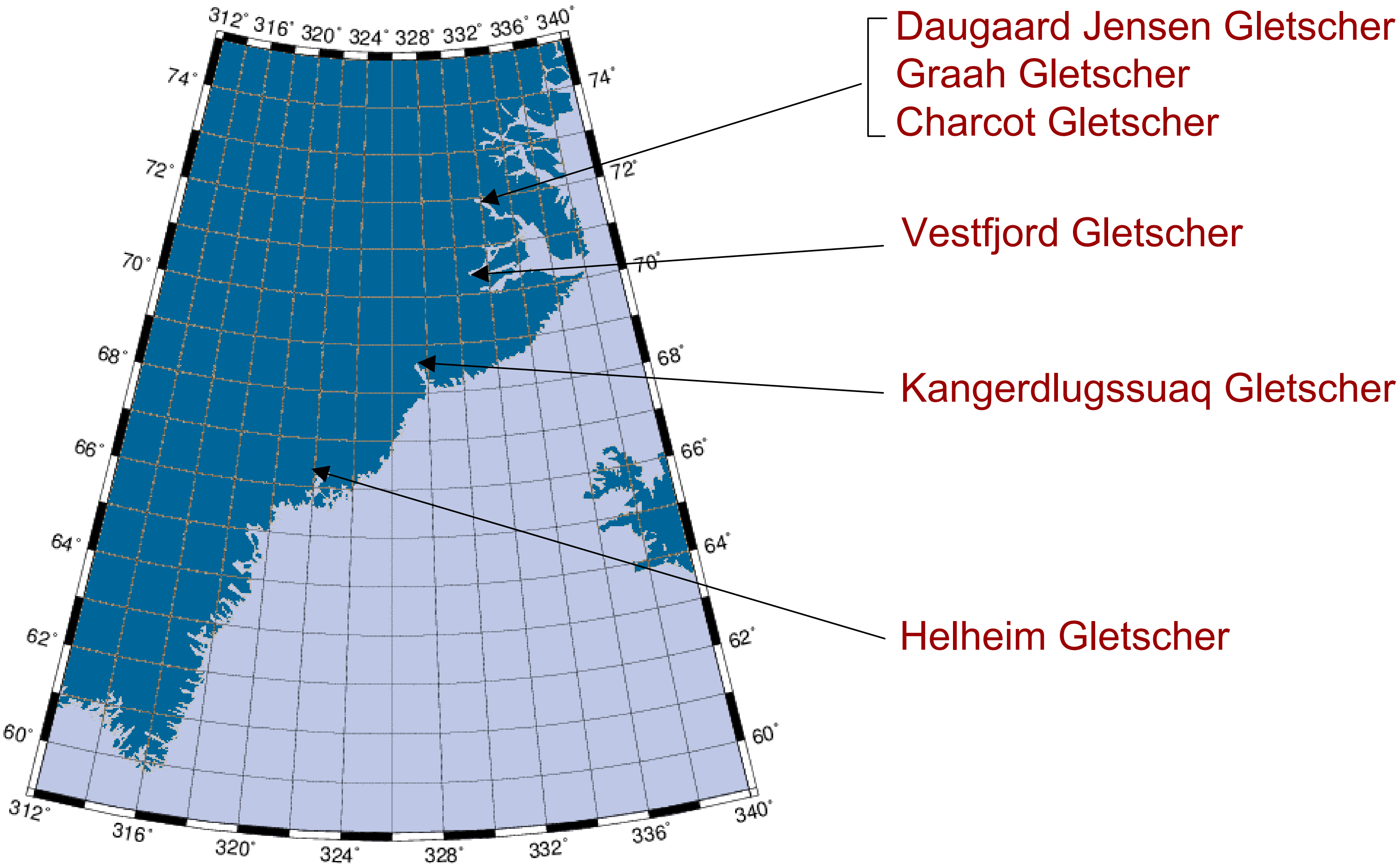
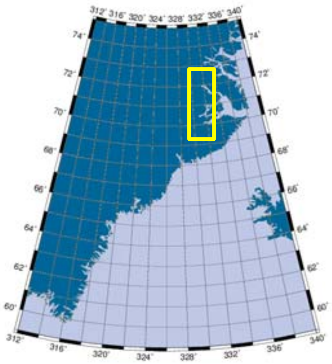
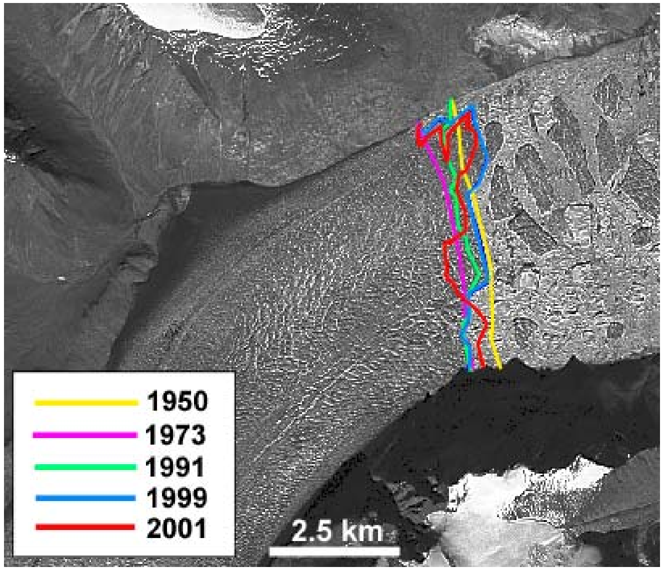
CLIMATE CHANGE INSTITUTE

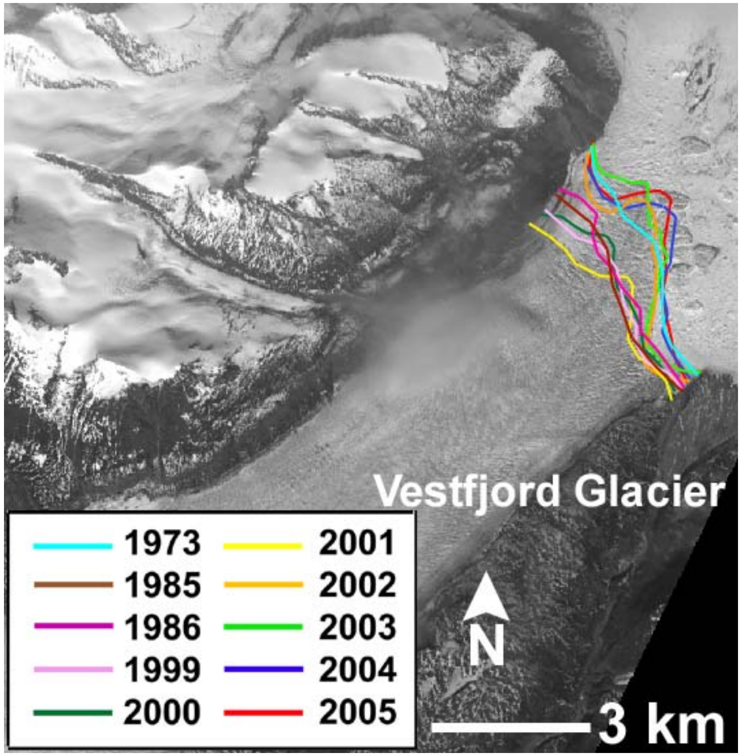
East Greenland outlet glaciers

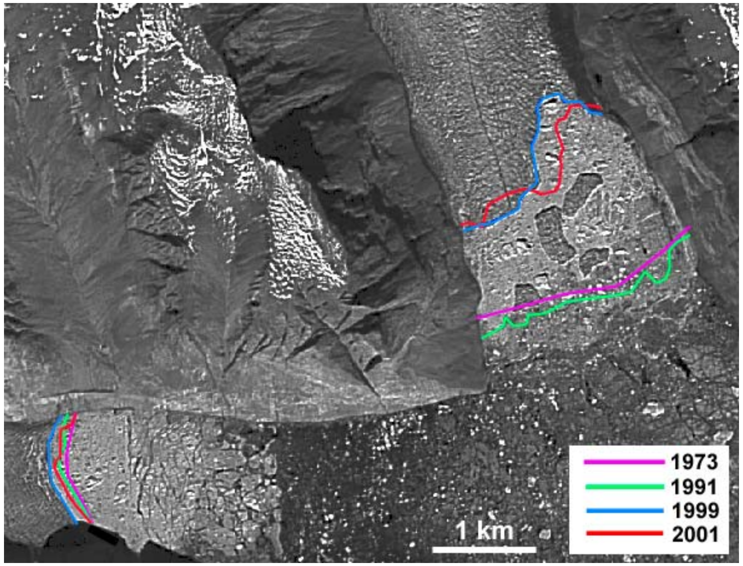


Scoresby Sund glaciers

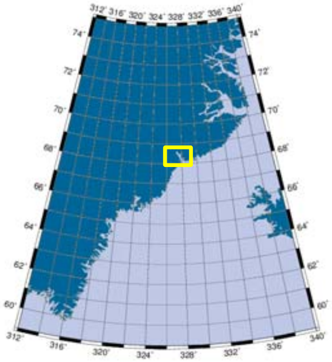


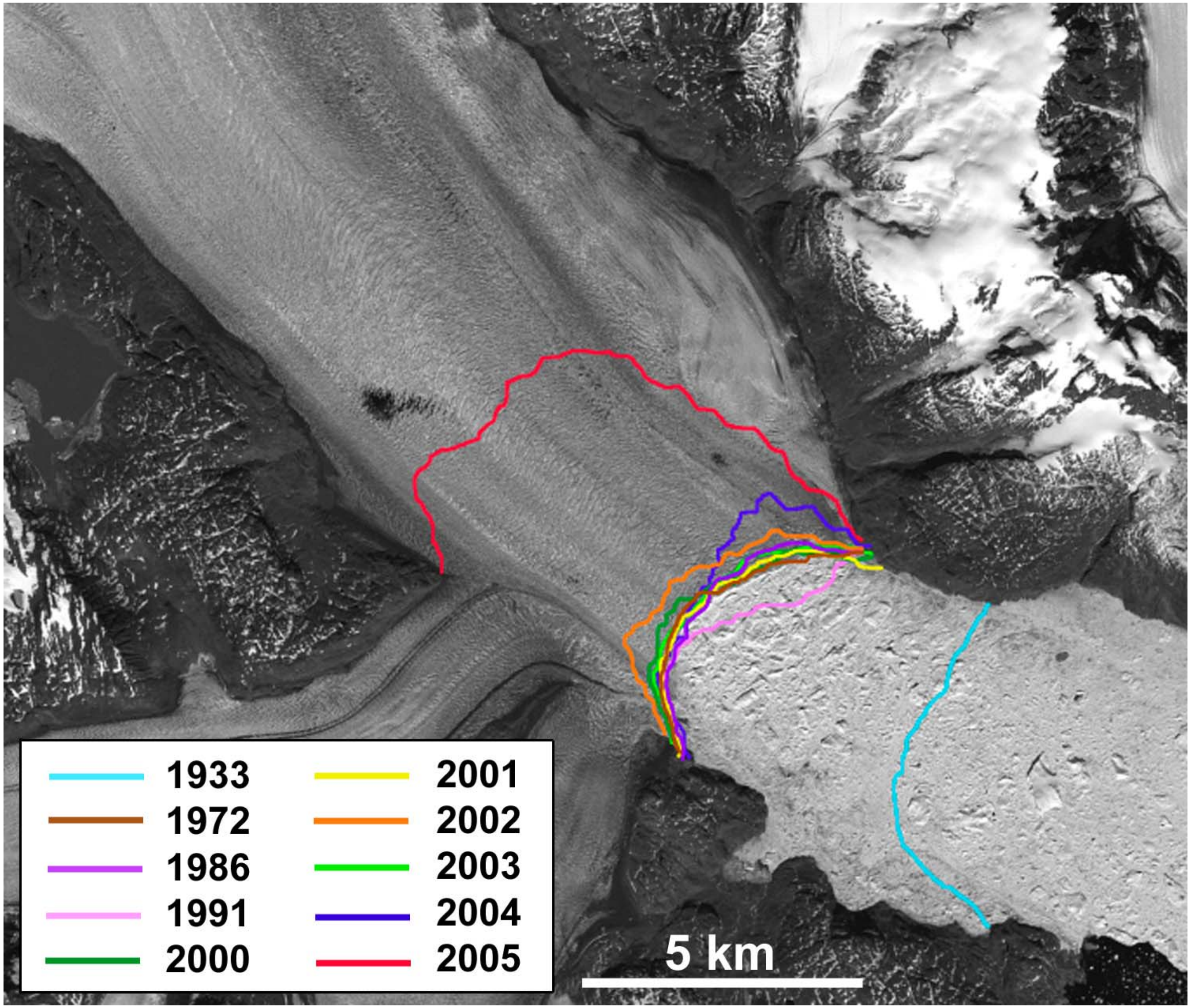




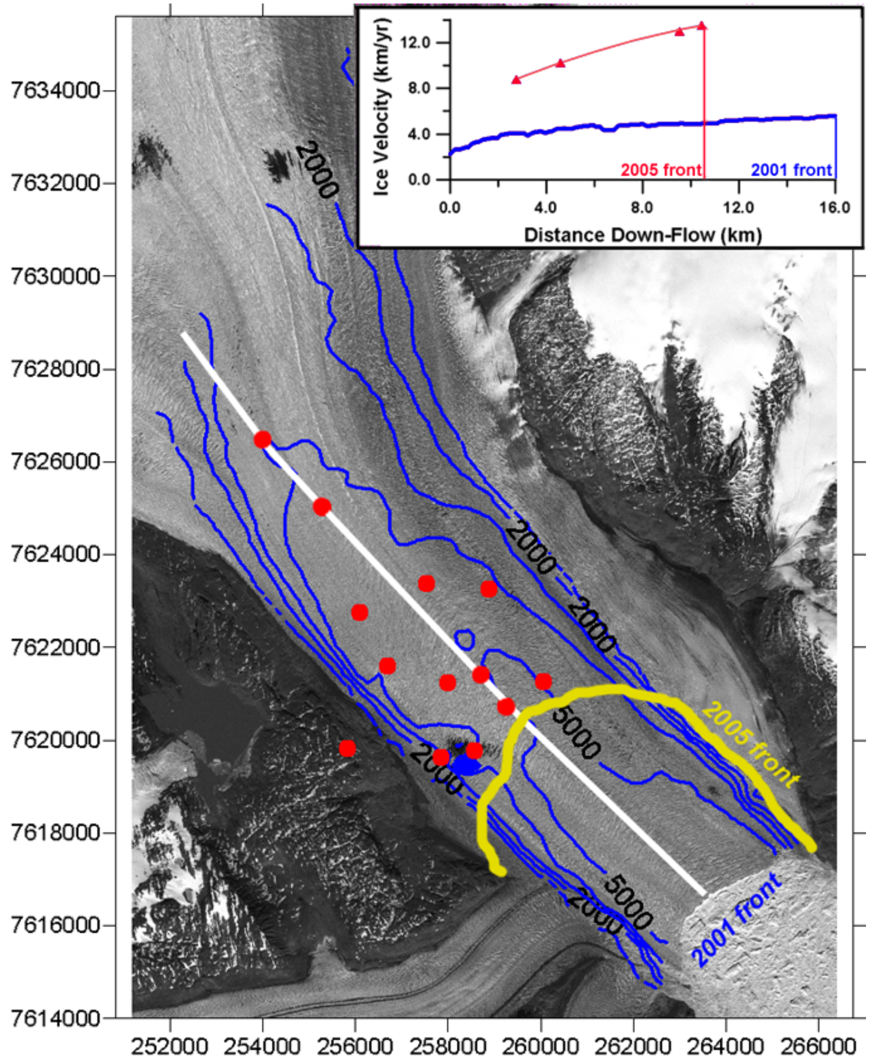


Kangerdlugssuaq Glacier





Kangerdlugssuaq Glacier



2001 velocities from feature tracking

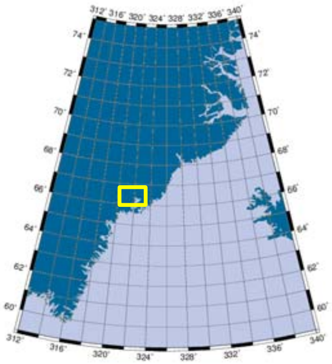
2005 velocities from GPS surveys

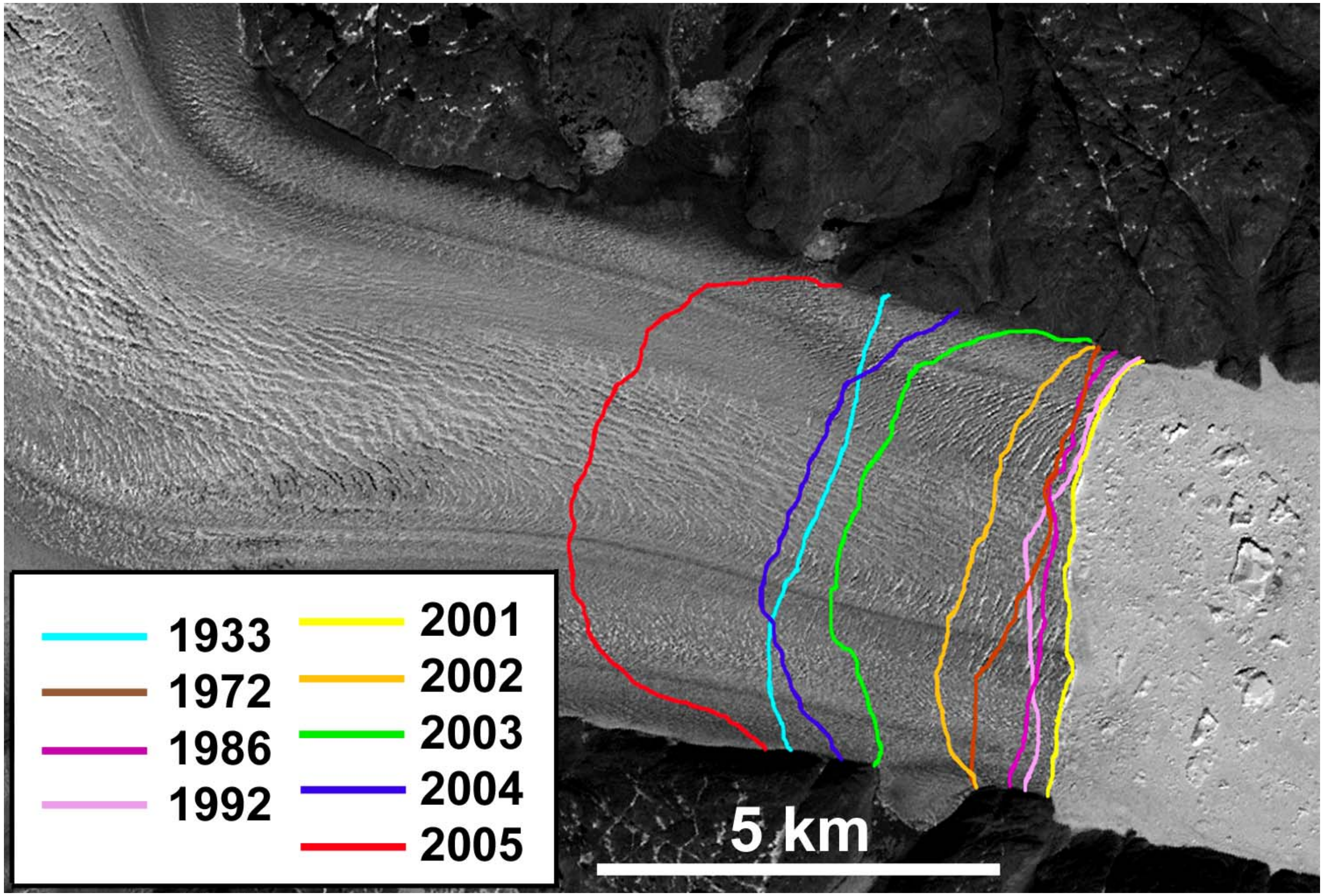
- 12 markers
- Surveyed on >4 occasions
- July 22-26

~200% flow speed acceleration

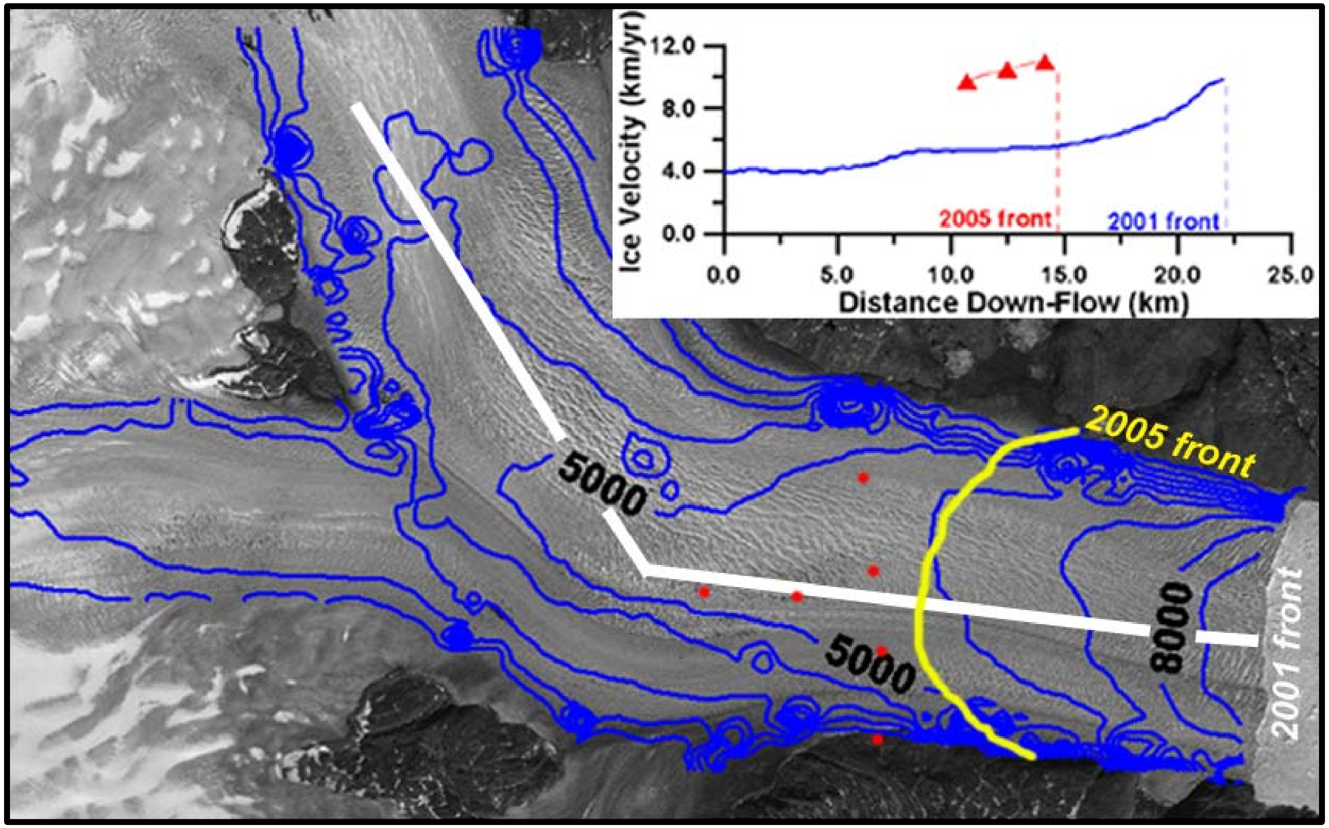
- ~5 km/yr in 2001
- ~14 km/yr in 2005

Helheim Glacier





Helheim Glacier



60% flow speed acceleration
- ~6 km/yr in 2001
- ~10 km/yr in 2005

Interpretation & Implications

- Kangerdlugssuaq and Helheim glaciers exhibit similar responses at nearly coincident times
  - Implies a common trigger mechanism
  - Climate change is a possible trigger
  - Increased summer melting?
  - Inflow of warmer ocean water?

- Demonstrates short time scale for significant changes in outlet glacier dynamics
  - Other outlet glaciers in Greenland might exhibit similar responses as climate change effects migrate northwards
  - Rapid changes in outlet glacier dynamics are not included in current predictions for sea level rise

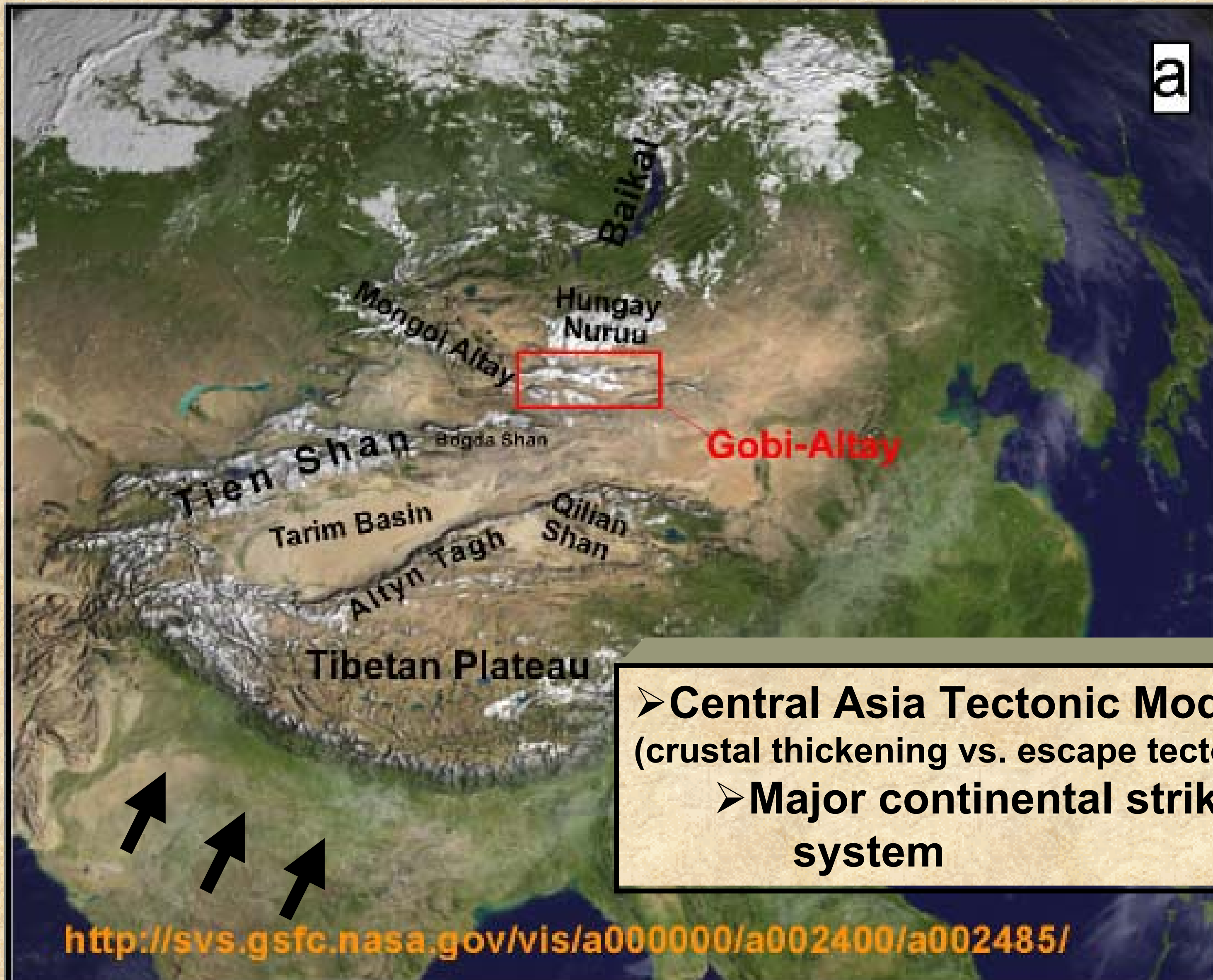
Using ASTER to Study Quaternary Deformation Along the Gobi-Altay Fault System, Southwestern Mongolia

Amit Mushkin & Alan Gillespie

W.M. Keck Remote Sensing Lab,
University of Washington, Seattle WA.

mushkin@u.washington.edu

Why study the Gobi-Altay Fault system ?



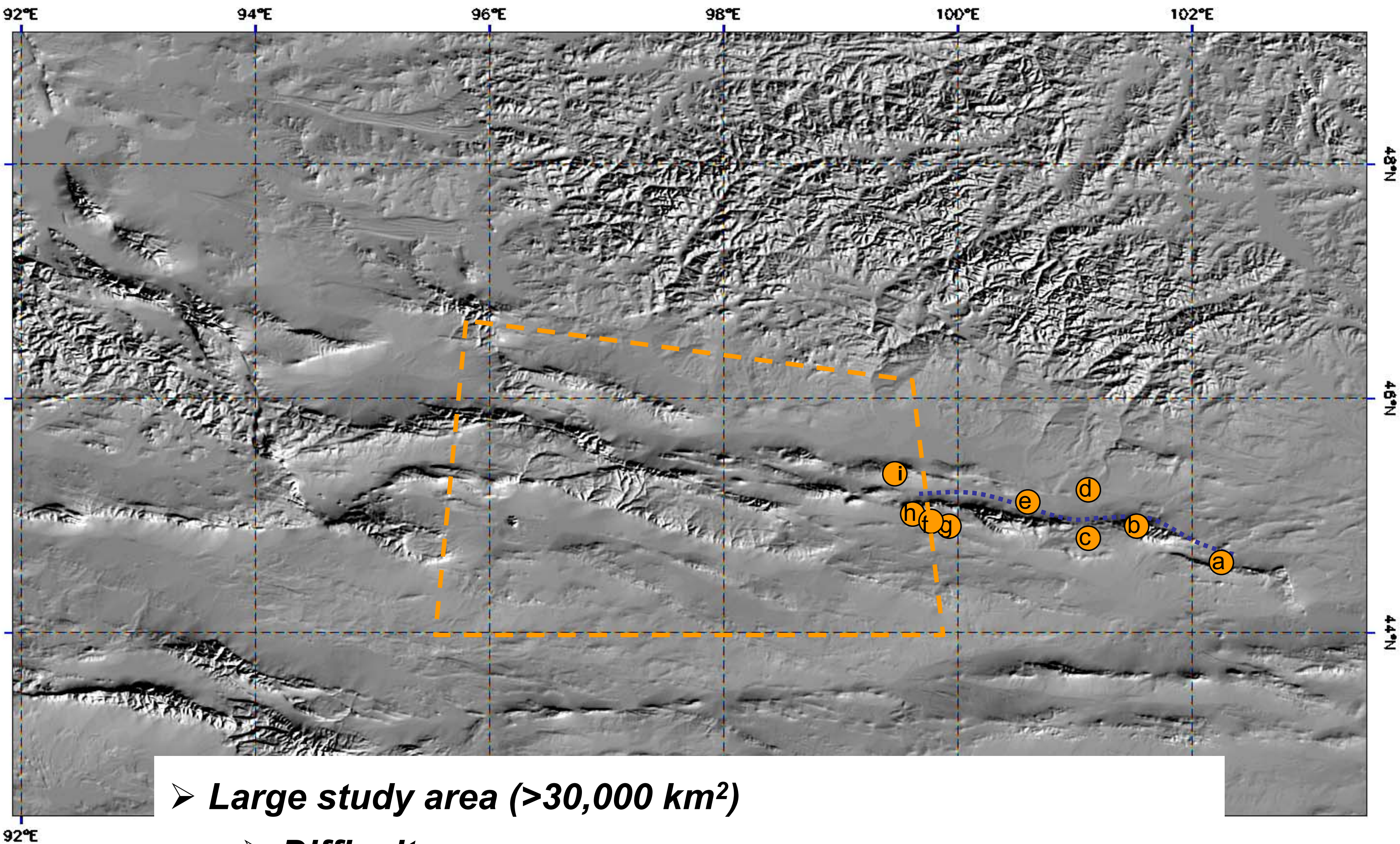
- **Central Asia Tectonic Models**

(crustal thickening vs. escape tectonics)

- **Major continental strike-slip system**

Study Area & Objectives

- Measure Quaternary offsets across multiple strands



- Large study area (>30,000 km²)
  - Difficult access
    - Good exposures in the arid Gobi environment

Methodology

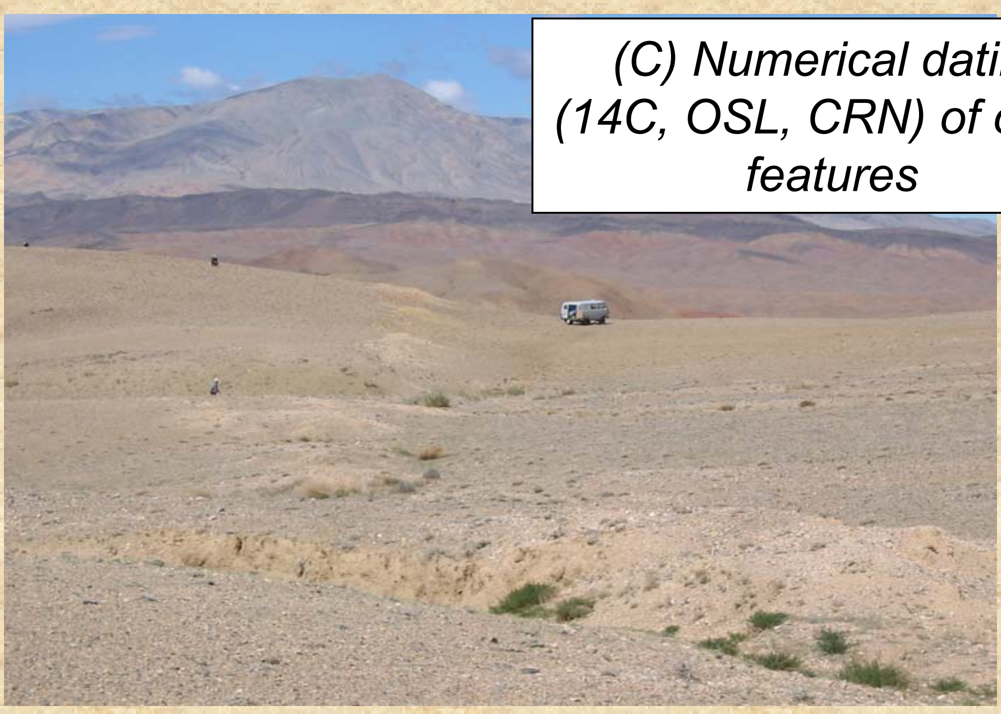
(A) Remote mapping, using spectral image data to identify apparent tectonic offsets

(B) Field study

(C) Numerical dating (14C, OSL, CRN) of offset features

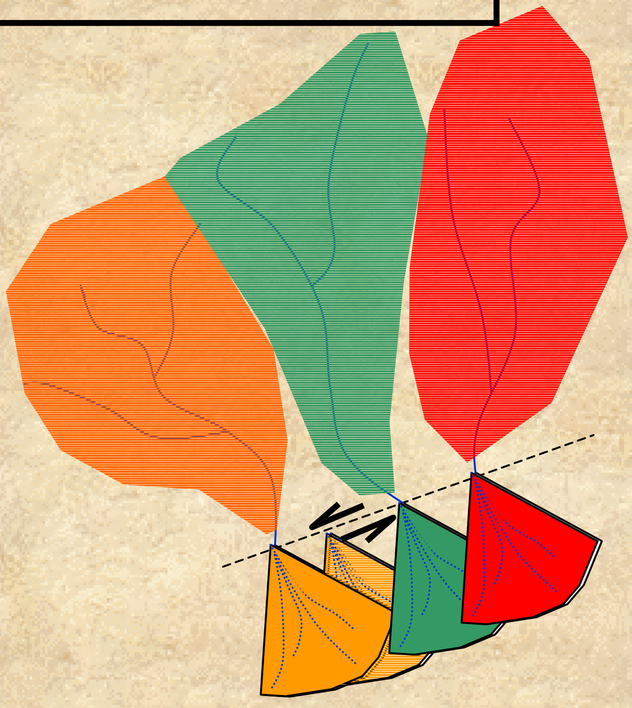
(D) Utilize field data and the numerical dates to calibrate remote estimates and better-constrain sites that were not studied on the ground

Constrain the distribution, rate and timing of Quaternary deformation across the study area



ASTER data

VNIR	Photo interpretation
Stereo	DEM Sub-pixel Roughness → relative dating
SWIR + TIR	Compositional mapping



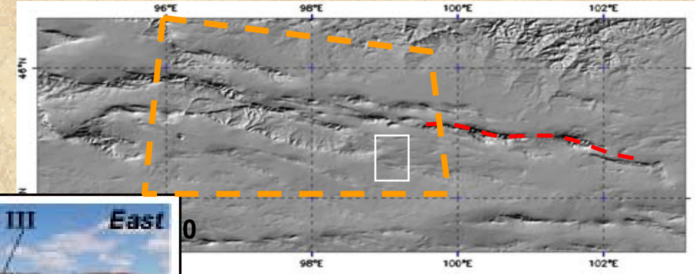
Apparent tectonic offset:

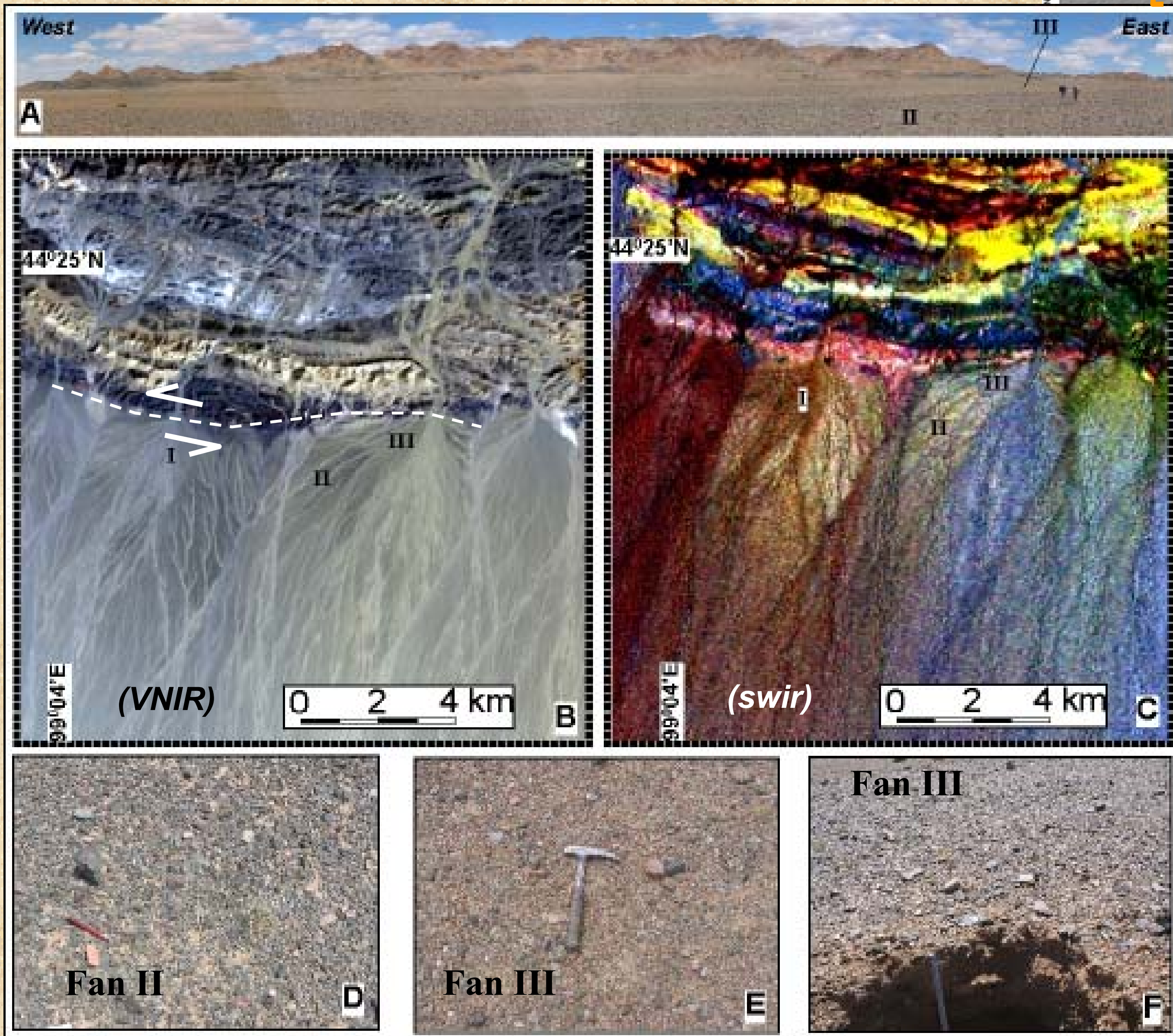
→ **Composition of alluvial surface is incompatible with its present-day drainage basin**

→ **Discontinuities in surface properties across fault traces**

Site GB-28

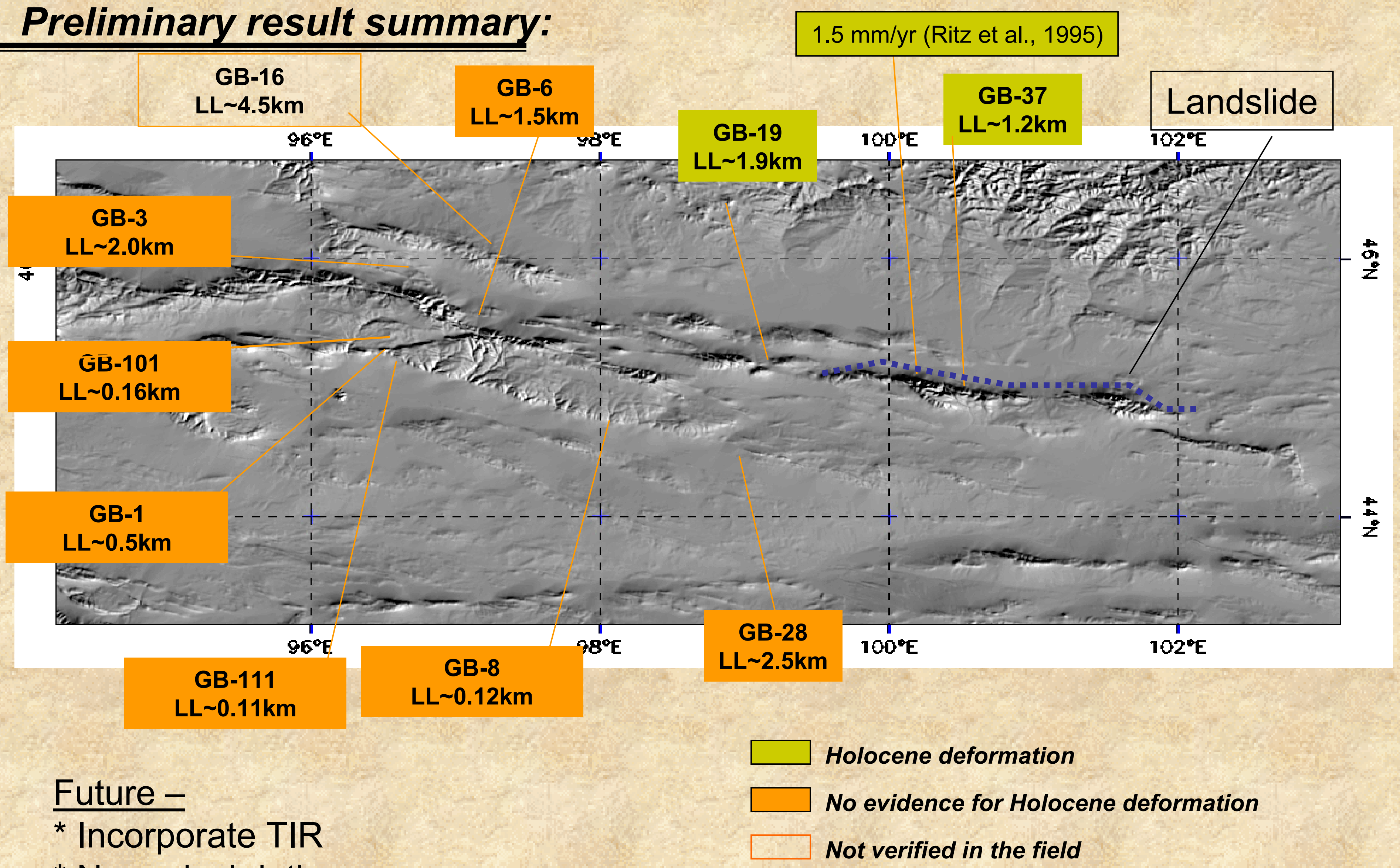
- Offset: ~ 2.5 km, left-lateral
- Age: (?)





ASTER 12/21/2001

Preliminary result summary:



Future –

* Incorporate TIR
* Numerical dating


NASA
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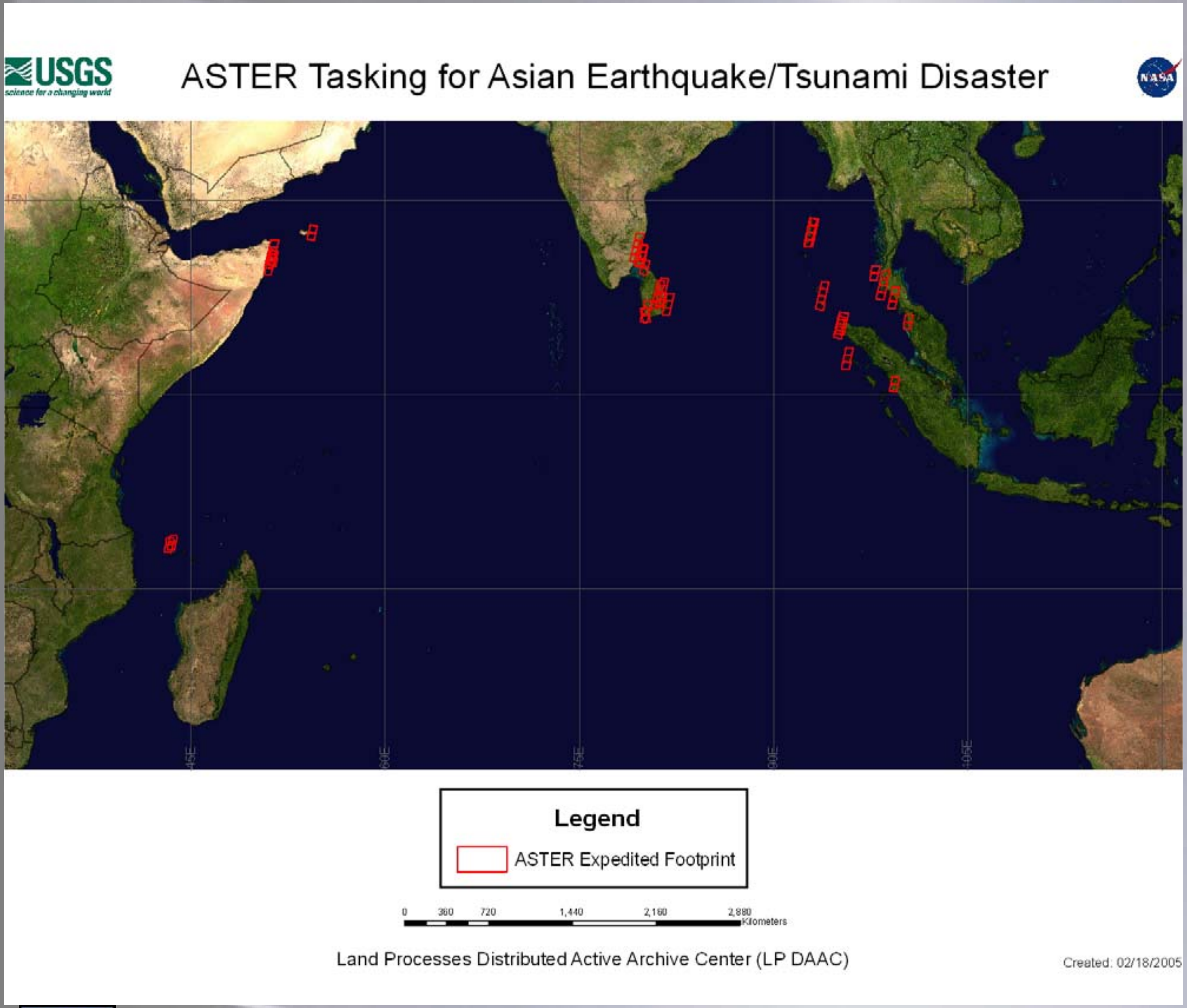
Ministry of Economy, Trade and Industry
METI
2004 Tsunami
ASTER
JAPAN/USA

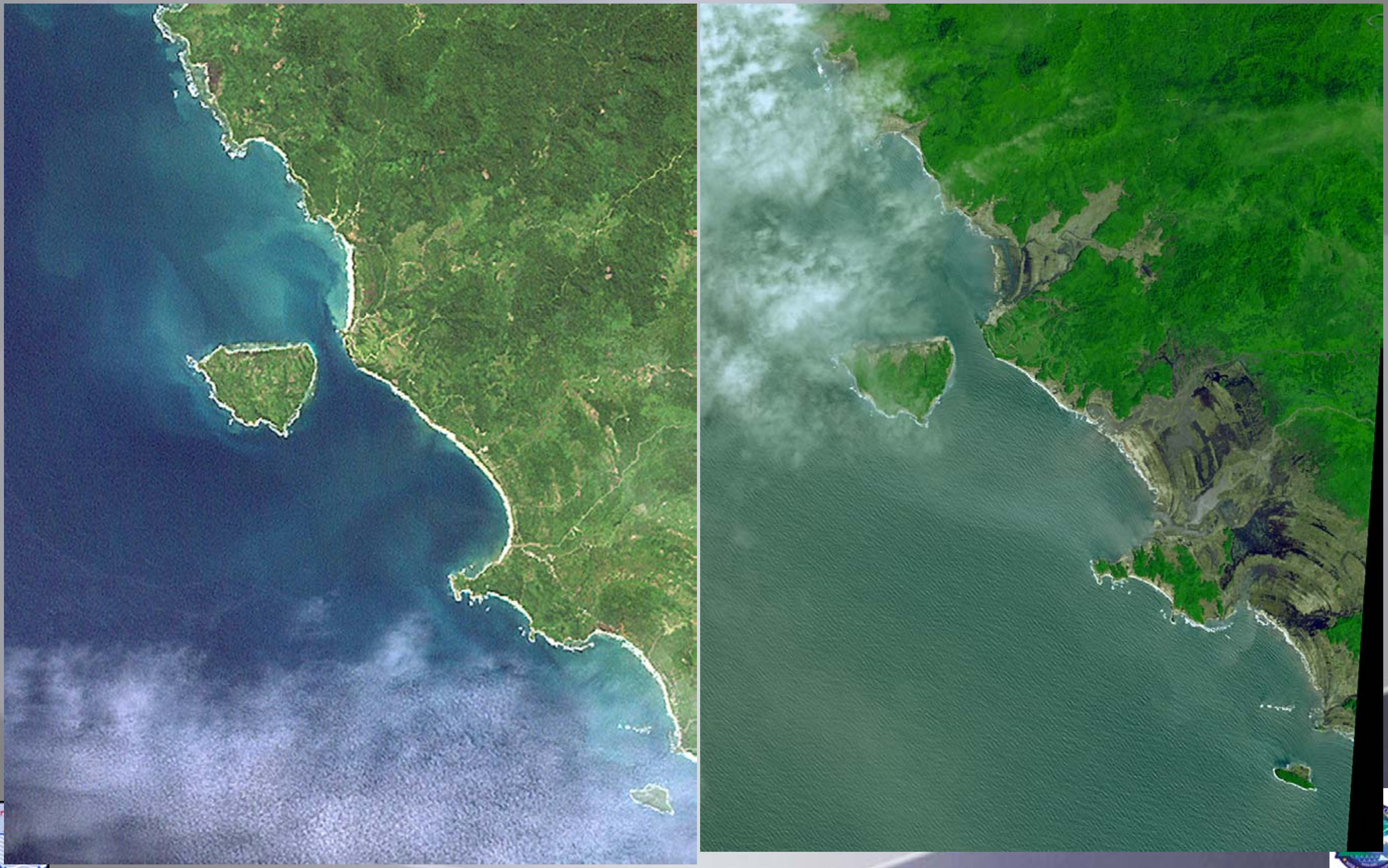
ASTER Response to Indian Ocean Tsunami



- Data acquired for USAID, International Charter, US foreign embassies, IUCN
- Data used by Pacific Disaster Center, and for congressional briefings
- As of February 18, 2005

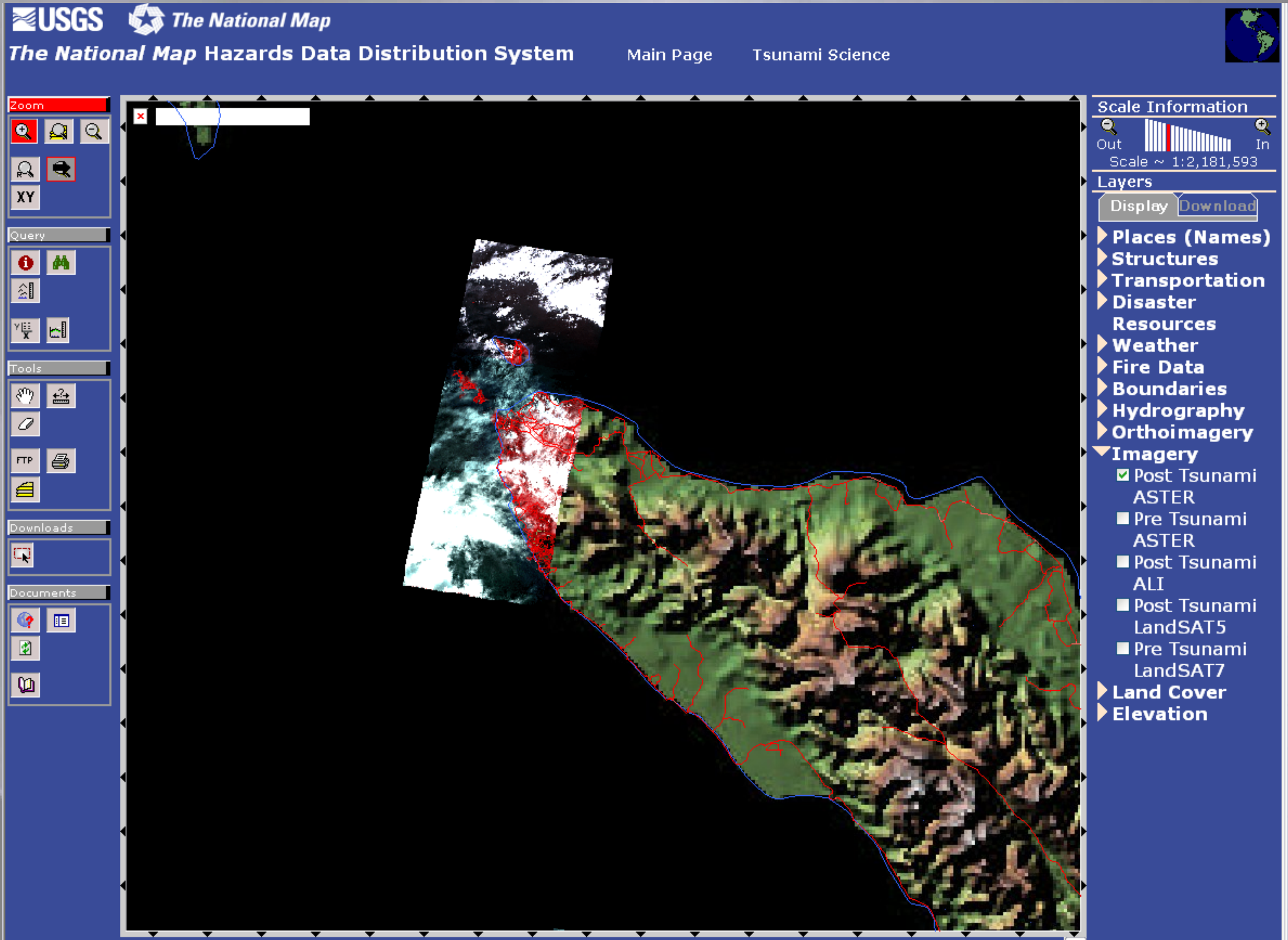
ASTER Response to Indian Ocean Tsunami

Banda Aceh before tsunami (left) and 5 days after tsunami (right)

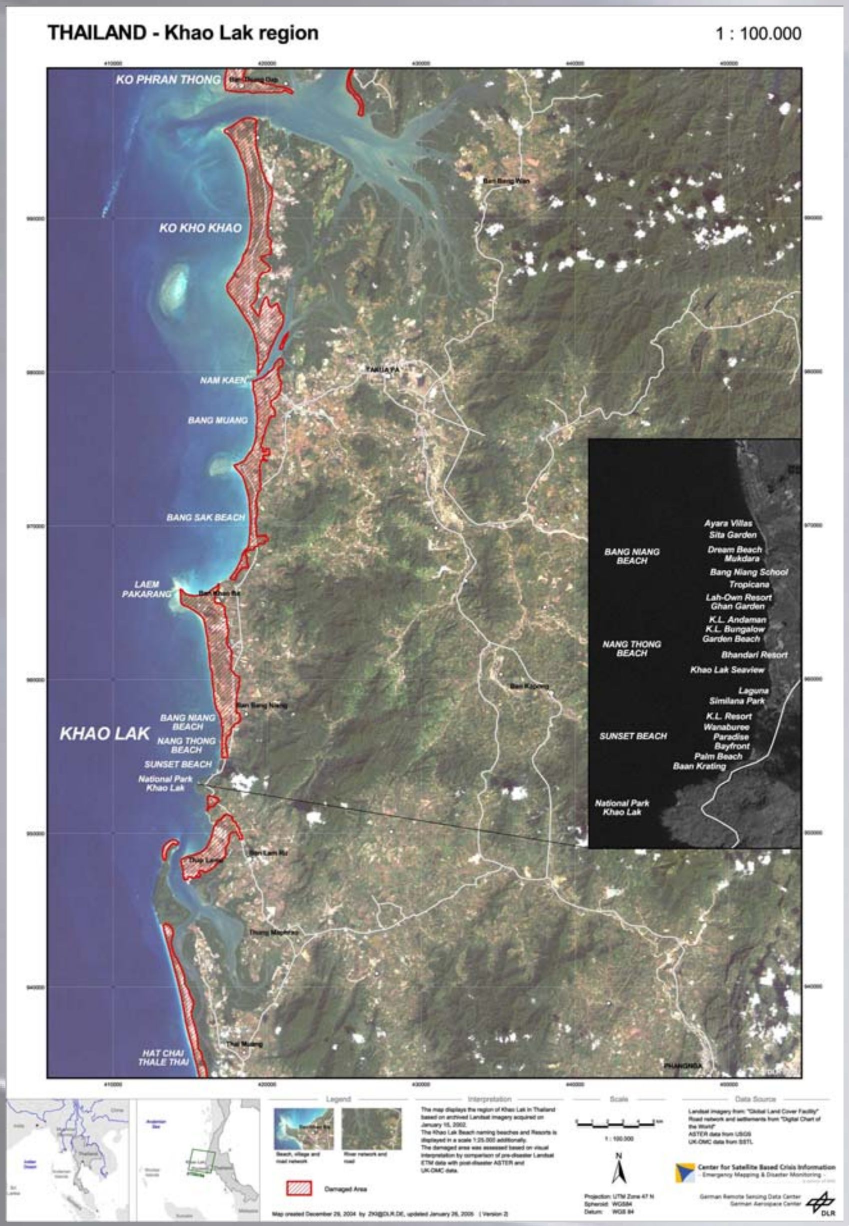


ASTER Response to Indian Ocean Tsunami

US Geological Survey Hazards Data Distribution



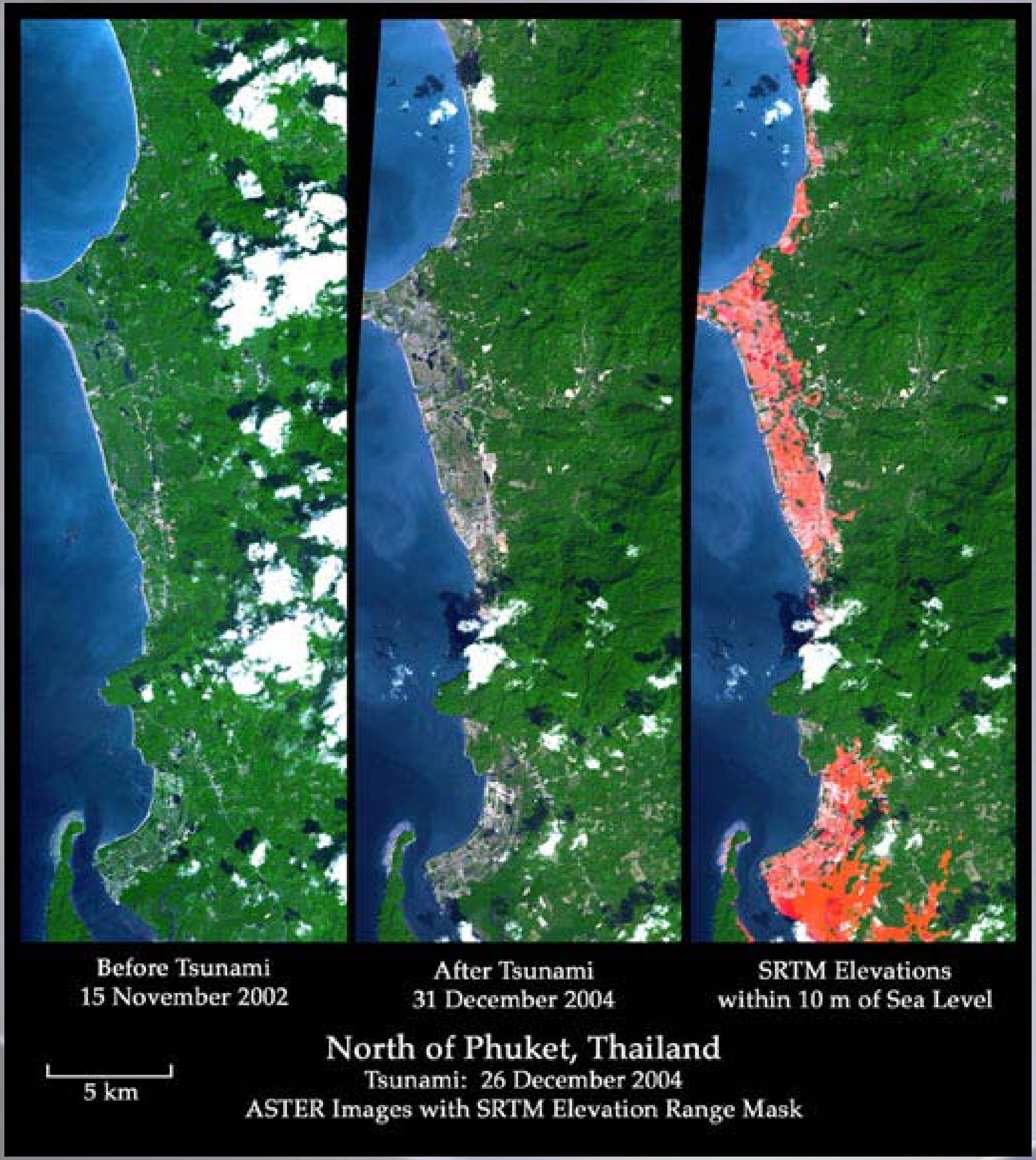
ASTER Response to Indian Ocean Tsunami



DLR
Center for Satellite Based Crisis Information
- Emergency Mapping & Disaster Monitoring -

DLR disaster map. Produced for EU and UNOSAT. Base is historic Landsat image. Damage assessment derived entirely from ASTER images.

ASTER Response to Indian Ocean Tsunami



Phuket, Thailand before tsunami (left), 5 days after tsunami (center), and merged with SRTM data of 10m elevation

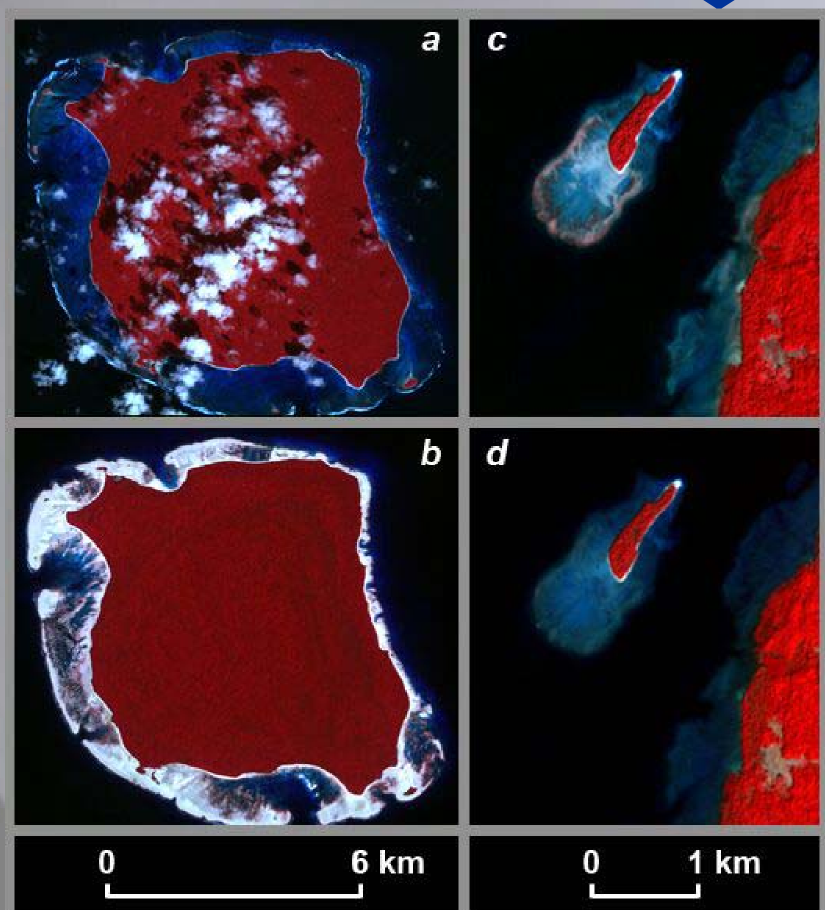
Uplift and Subsidence Associated with the Great 2004 Sumatra Earthquake

A. Meltzner, K. Sieh, K. Hudnut, R. Sanchez, M. Abrams, D. Agnew

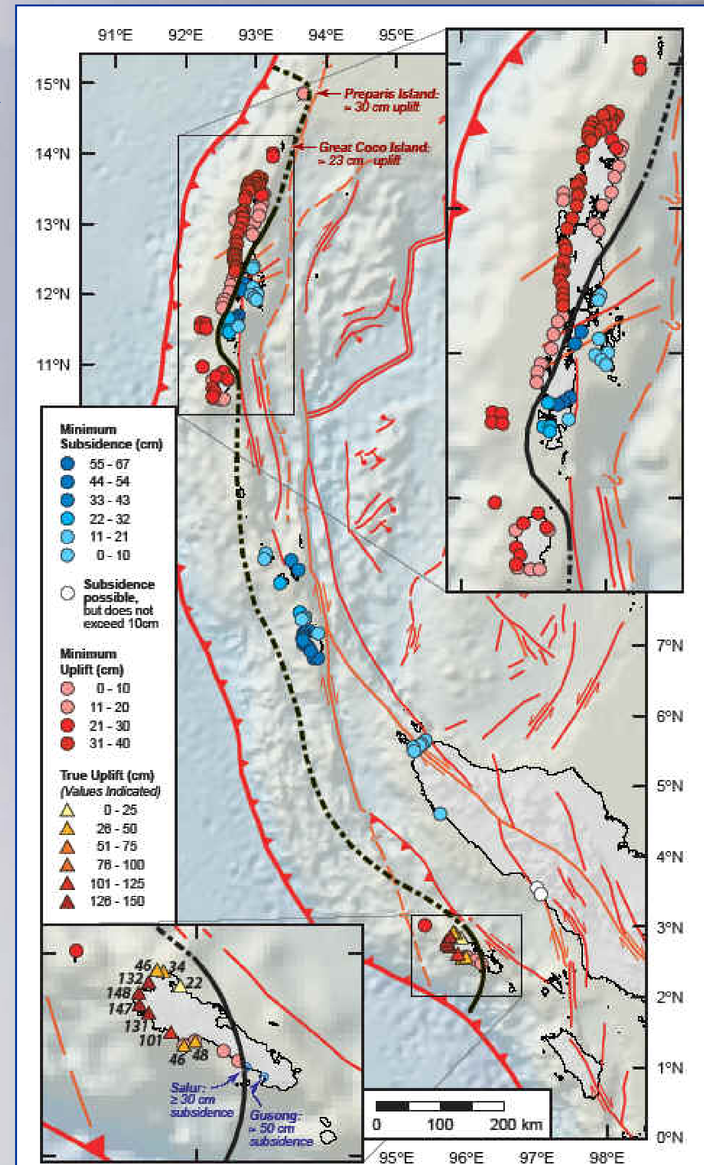
(*JGR, in press*)

Uplift (red) and subsidence (blue) derived from ASTER images

Examples of tectonic displacements



Uplift **Subsidence**



Assessment of Water and Temperature Influence on Vegetation in Urban Areas by the VWTI Index

Yasushi Yamaguchi and Akiyoshi Kato
Nagoya University

28th ASTER Science Team Meeting
Palm Springs, California
December 15, 2005

Background

Heat Island Effect : a serious problem in urban areas

Evapotranspiration of vegetation can lower temperature in urban areas.

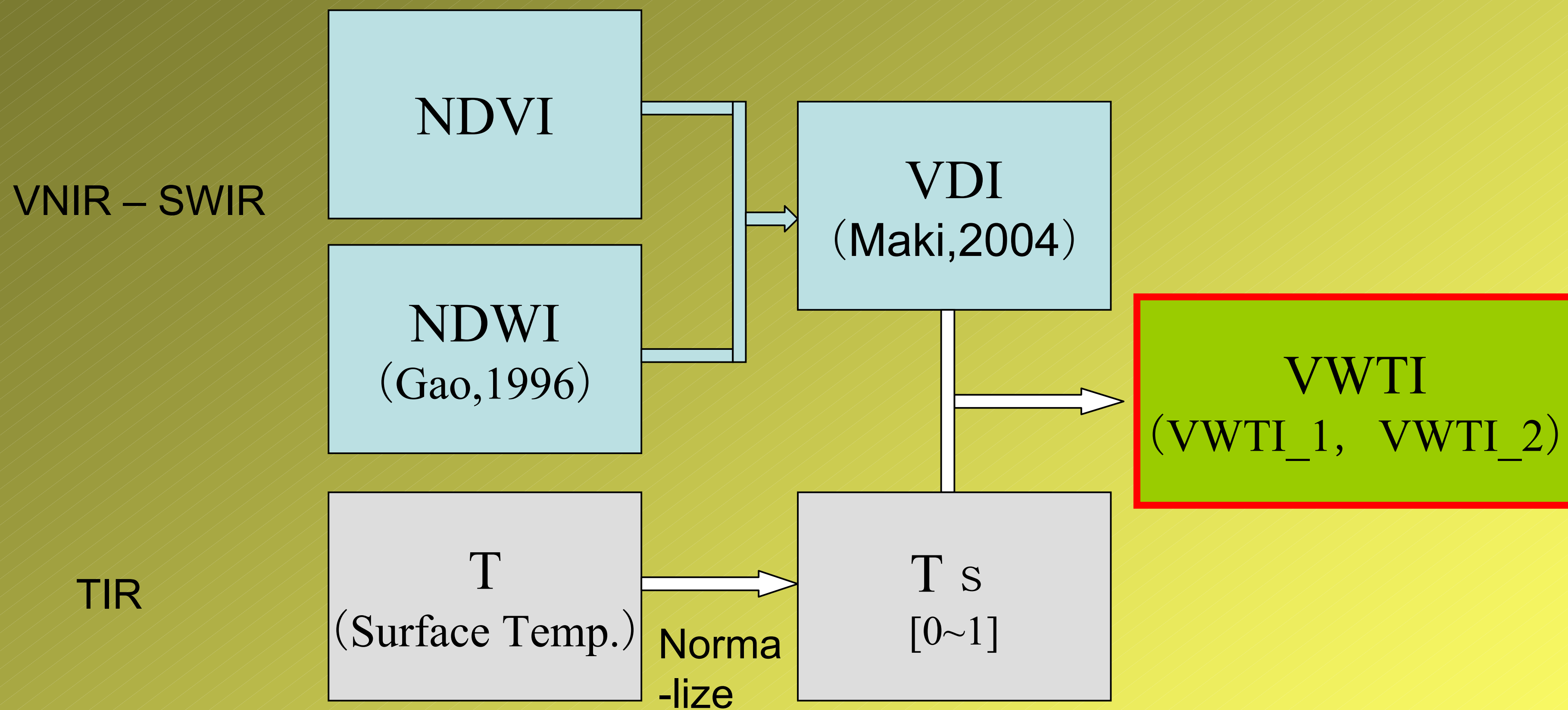
It is important to assess vegetation status, particularly water and temperature stresses.

Target Area and Data

City of Nagoya : approximately 5,000 km^2

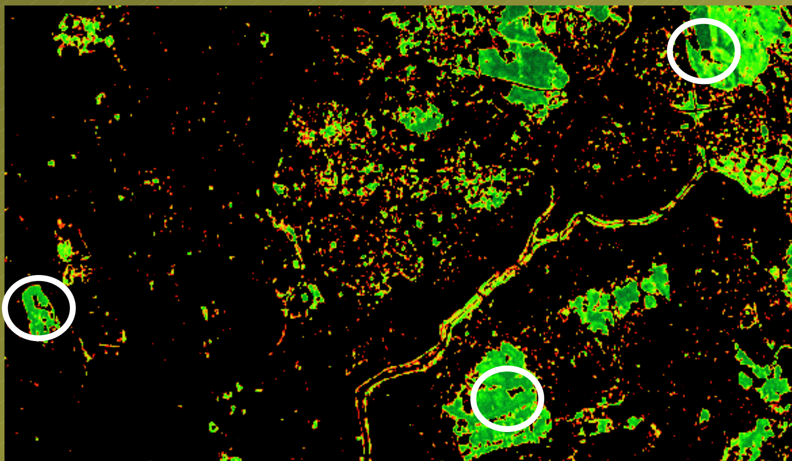
ASTER Data : Full mode data, July 10, 2000

Flow Chart



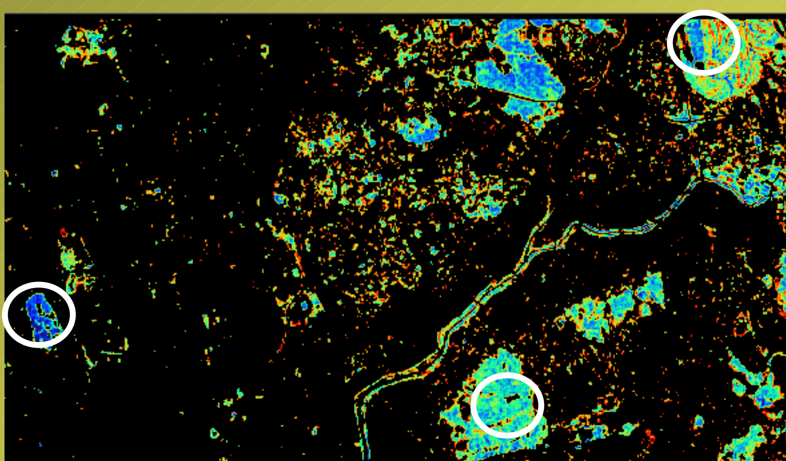
NDVI [Normalized Difference Vegetation Index]
NDWI [Normalized Difference Water Index]
VDI [Vegetation Deficit Index]
VWTI [Vegetation Water Temperature Index]
(VWTI_1: Stress Intensity, VWTI_ 2 : Stress Type)

NDVI and NDWI images of Nagoya



NDVI

0.5 1



NDWI

- 1 1

(1) Atsuta : Tall evergreen trees
(2) Aioi : Mixed forests of deciduous trees and bamboo
(3) Makinoga-ike : Mixed forests of deciduous trees and bamboo, lawn, golf links,

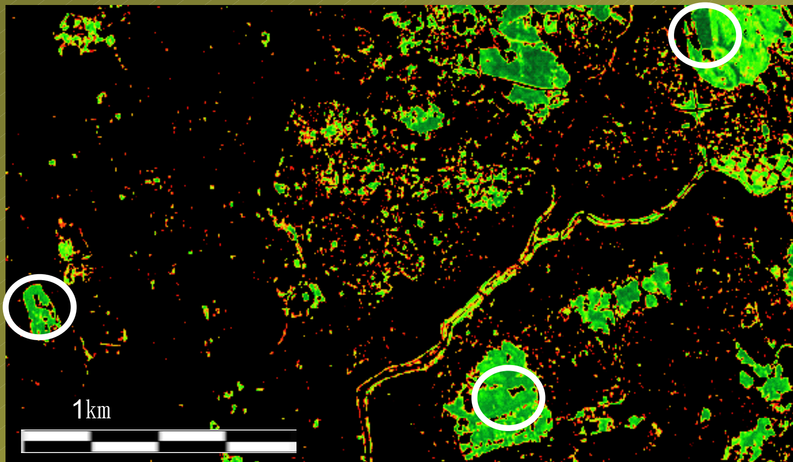
⇒Areas with the similar NDVI show different NDWI values.

Makinoga-ike

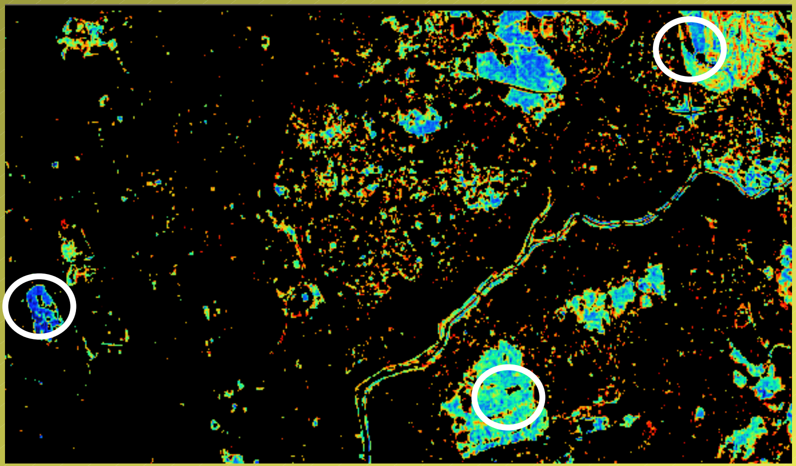
Mixed deciduous forests with bamboo. Not well managed.

There are golf links and lawn in this area.

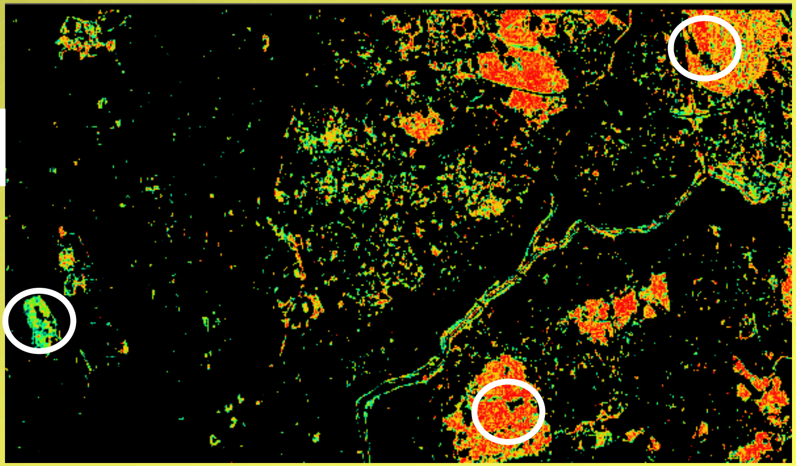
Comparison of NDVI, NDWI, and VDI



NDVI 0.5 1



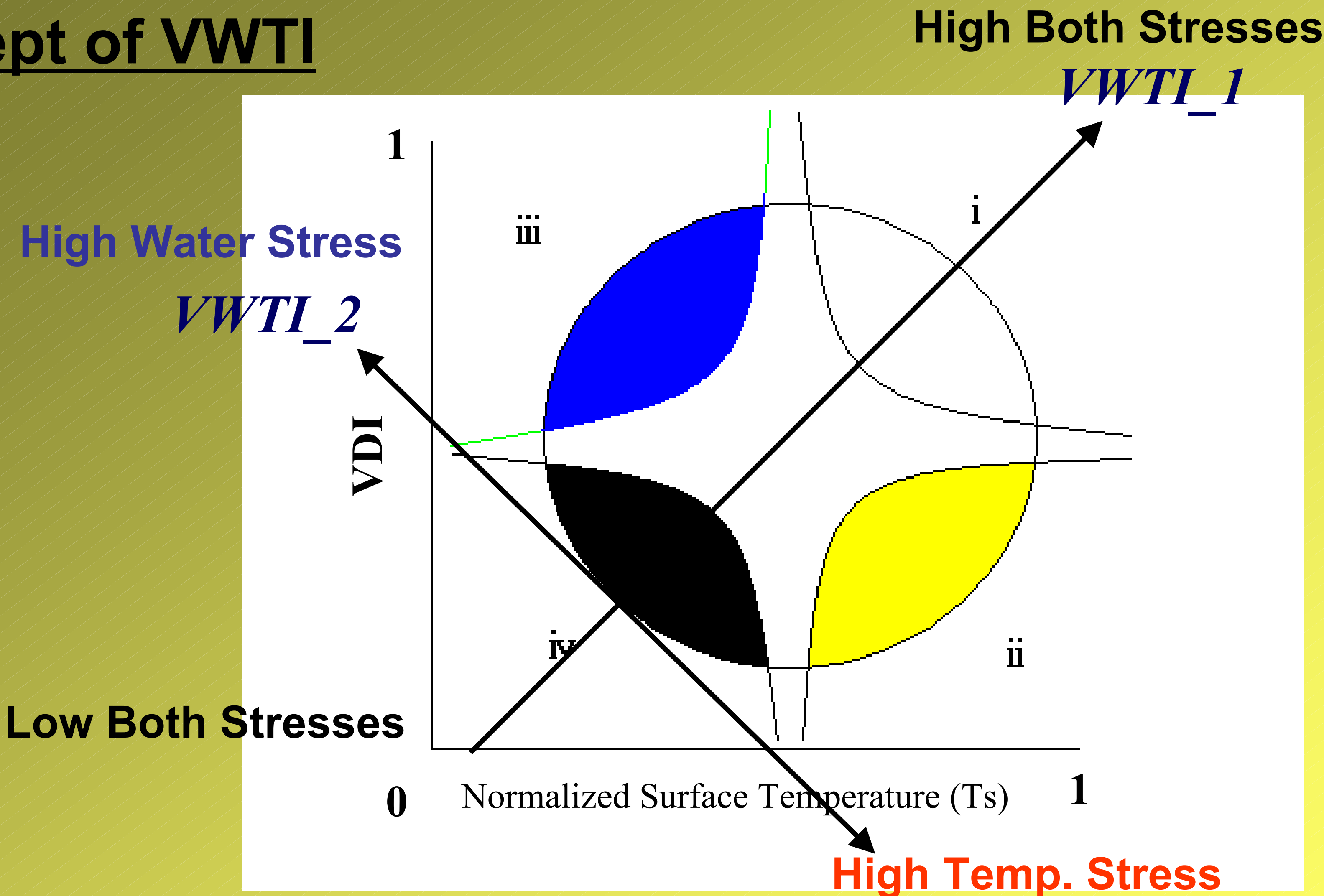
NDWI - 1 1



VDI 0 1

VDI indicates water deficit status of vegetation in urban areas.

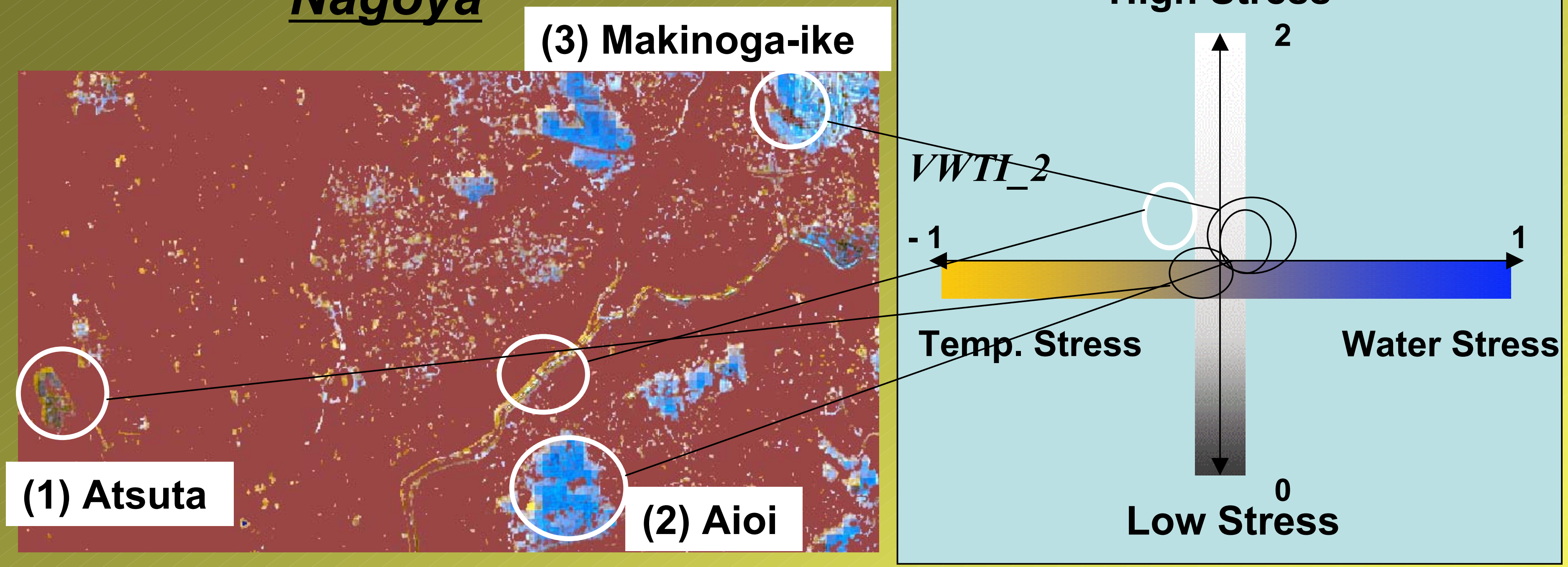
Concept of VWTI



Stress Intensity Index = *VWTI_1* = VDI + Ts

Stress Type Index = *VWTI_2* = VDI − Ts

VWTI image of Nagoya



(1) Vegetation in Atsuta is under the least stress.

(2) Water stress is higher than temp. stress for vegetations in Aioi and Makinoga-ike areas.

(3) Temp. stress is higher than water stress for vegetation on river banks.

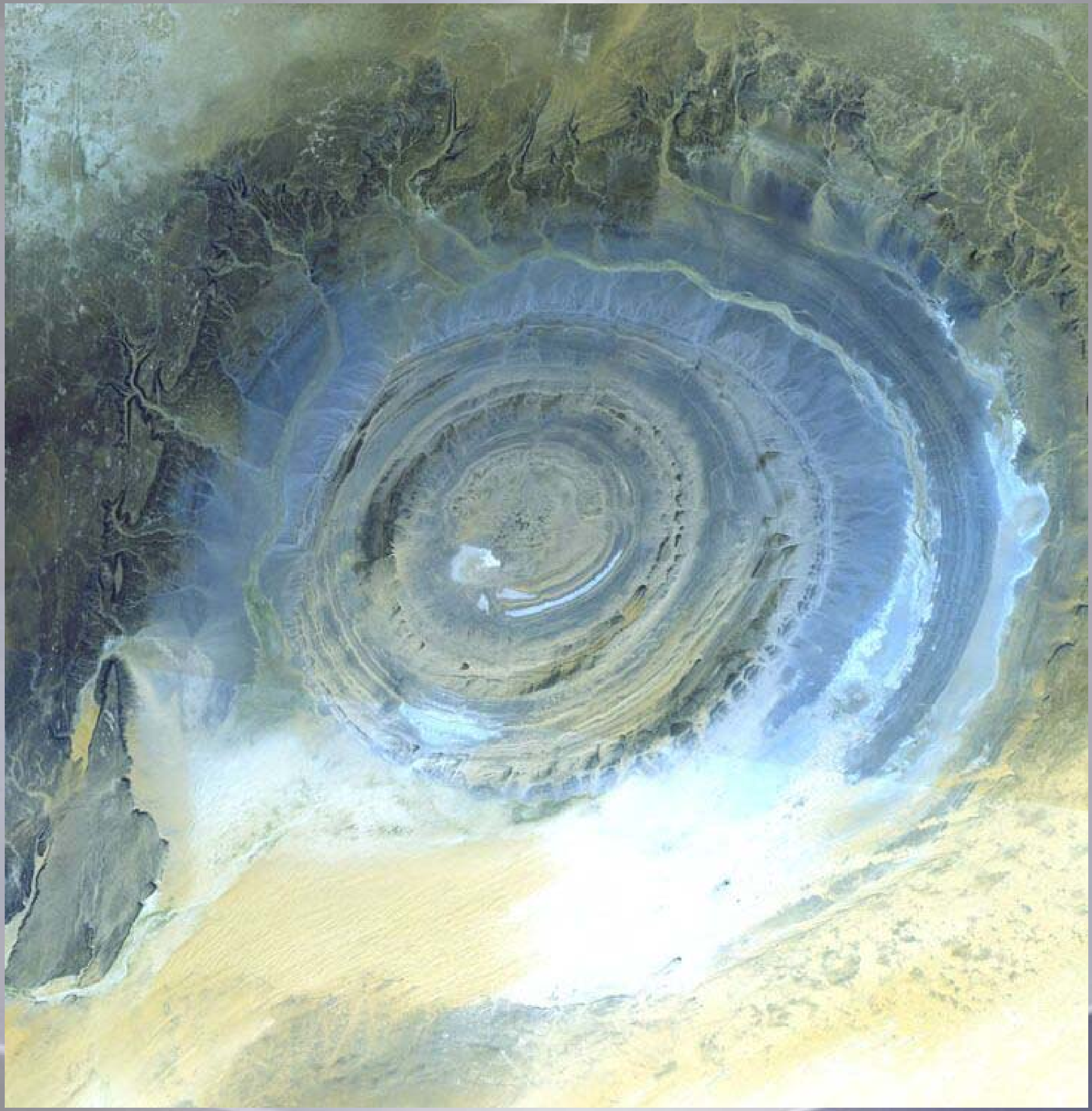
⇒VWTI is useful to assess water and temp. stresses of vegetation in urban areas.

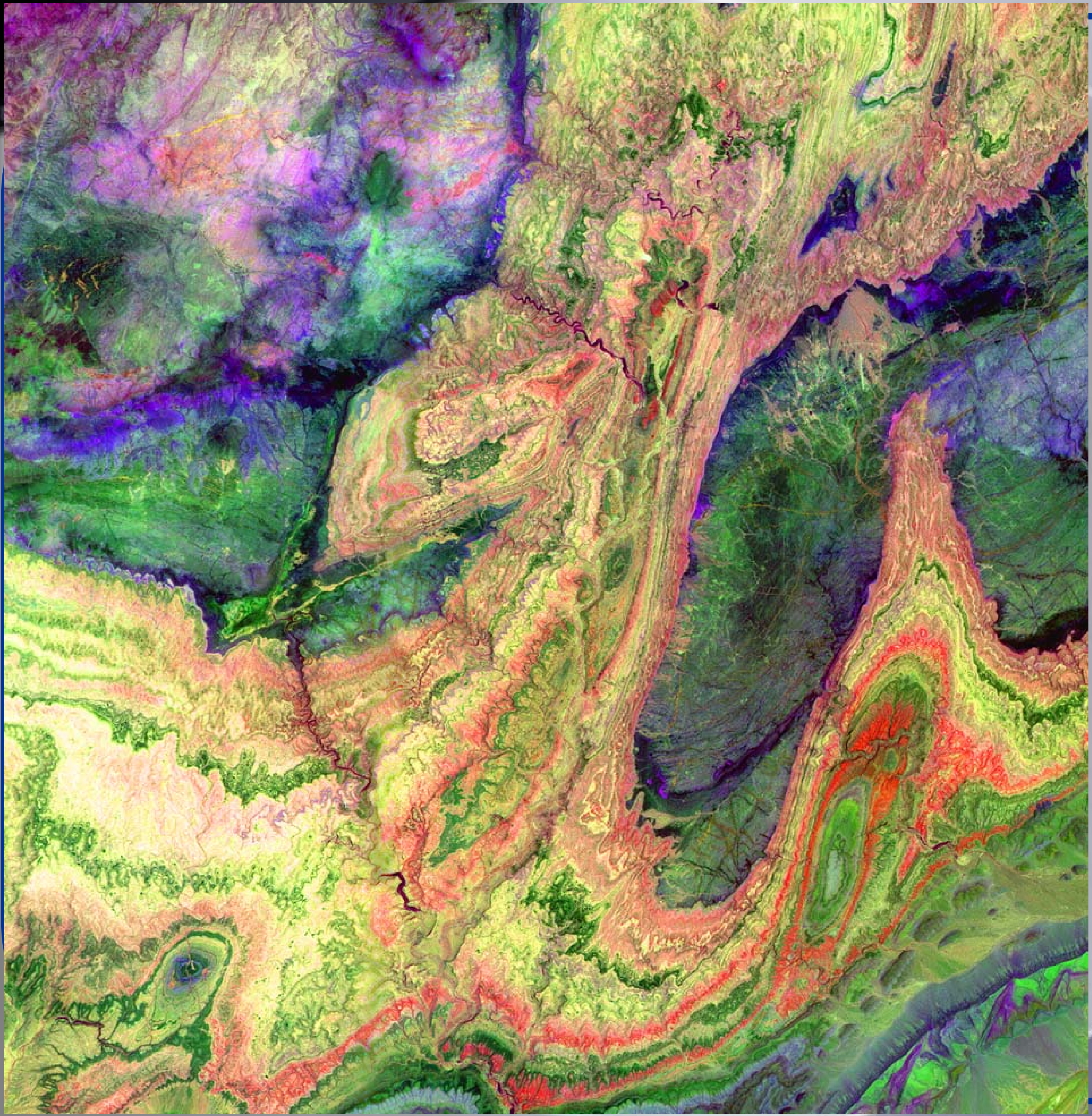
Concluding Remarks

- VDI is useful to assess water stress of vegetation.
- VWTI is useful to assess both water and temperature stresses of vegetation in urban areas.
- VWTI utilizes the characteristics of the ASTER; wide spectral coverage in the VNIR-SWIR-TIR.


The World
NASA
経済産業省
METI
Ministry of Economy, Trade and Industry
ASTER
JAPAN/USA

Richat Structure, Mauritania, Africa

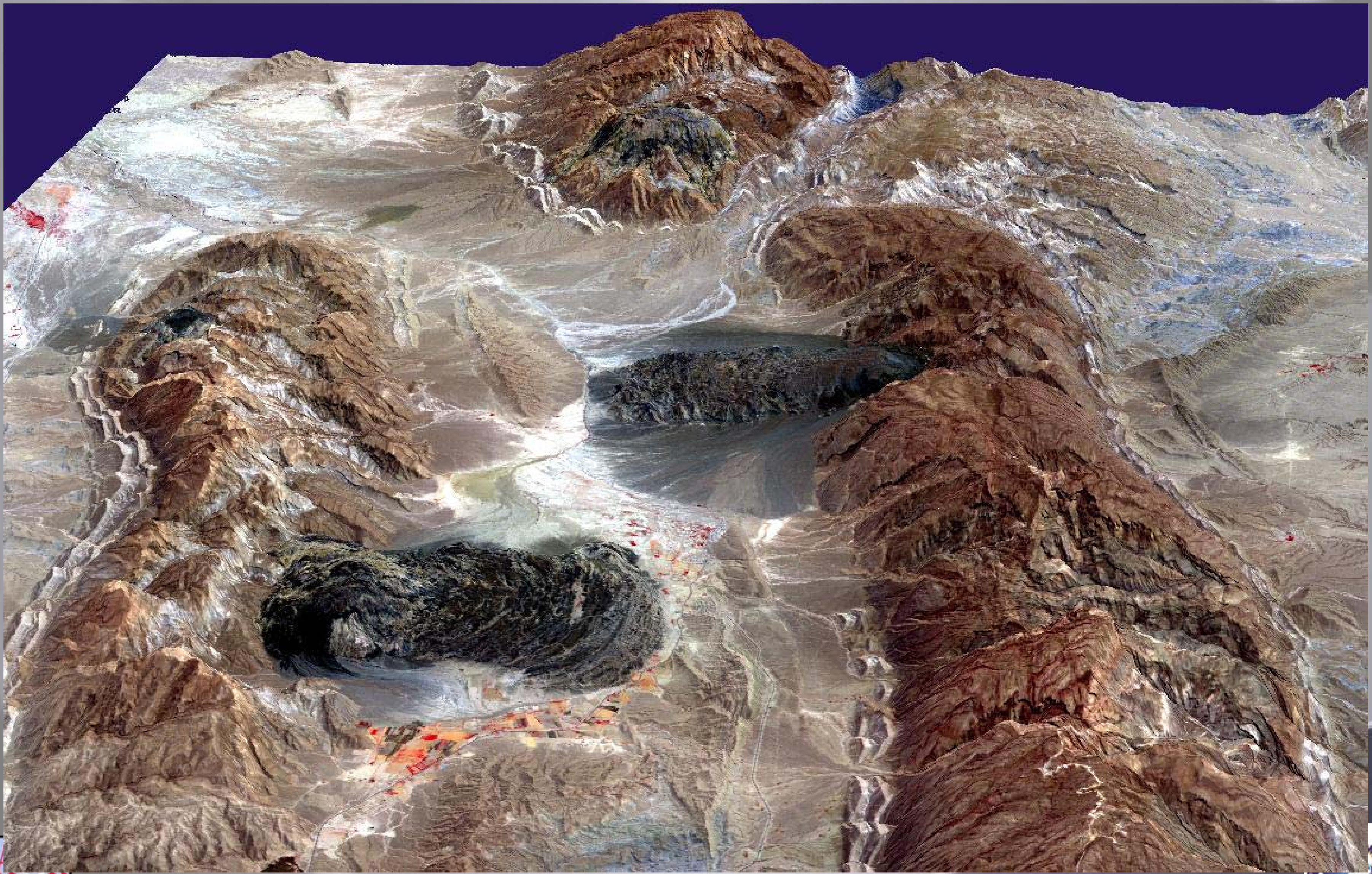




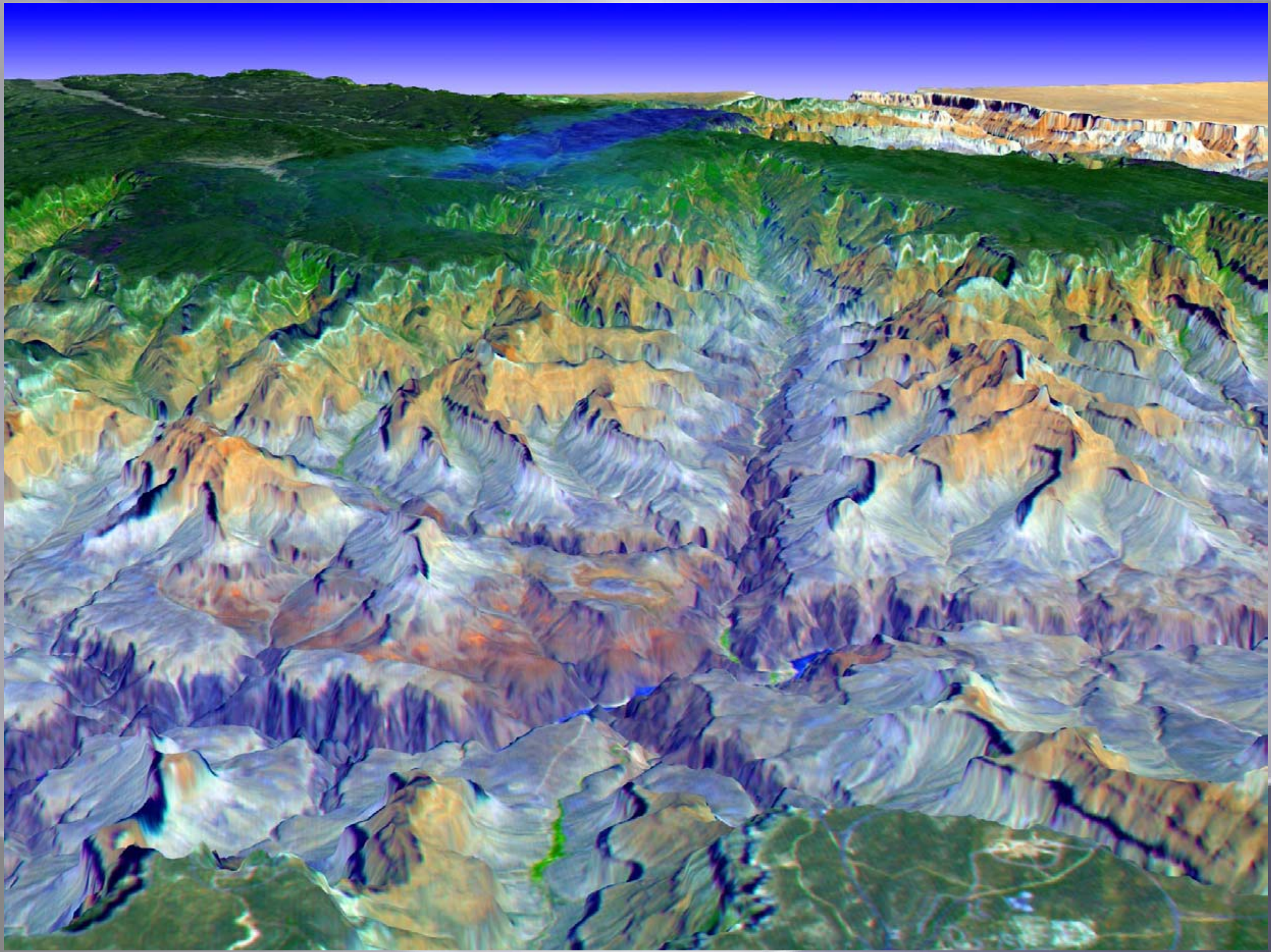
Atlas Mtns, Morocco

ASTER SWIR composite

Salt Glaciers, Iran

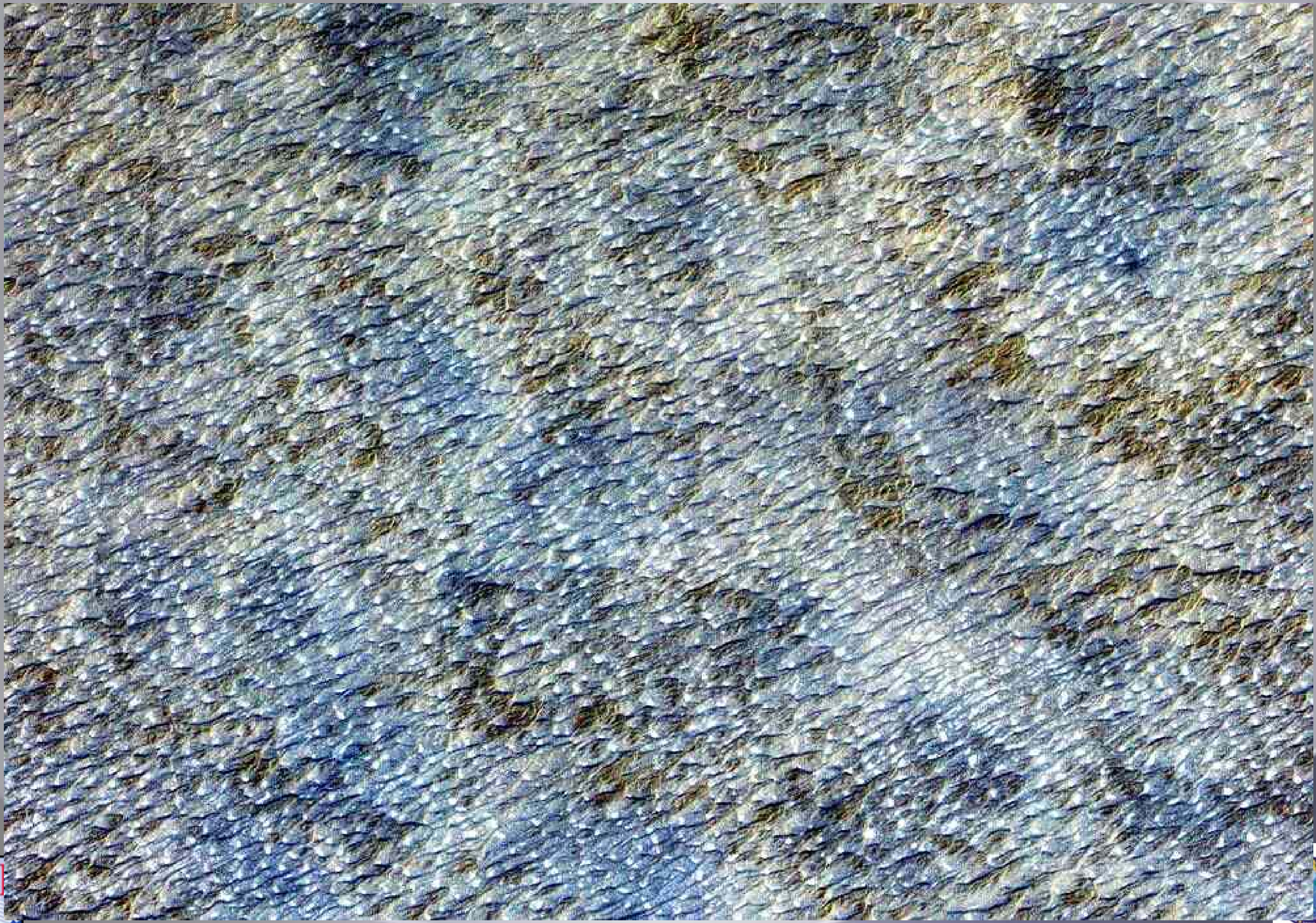


Grand Canyon, looking north



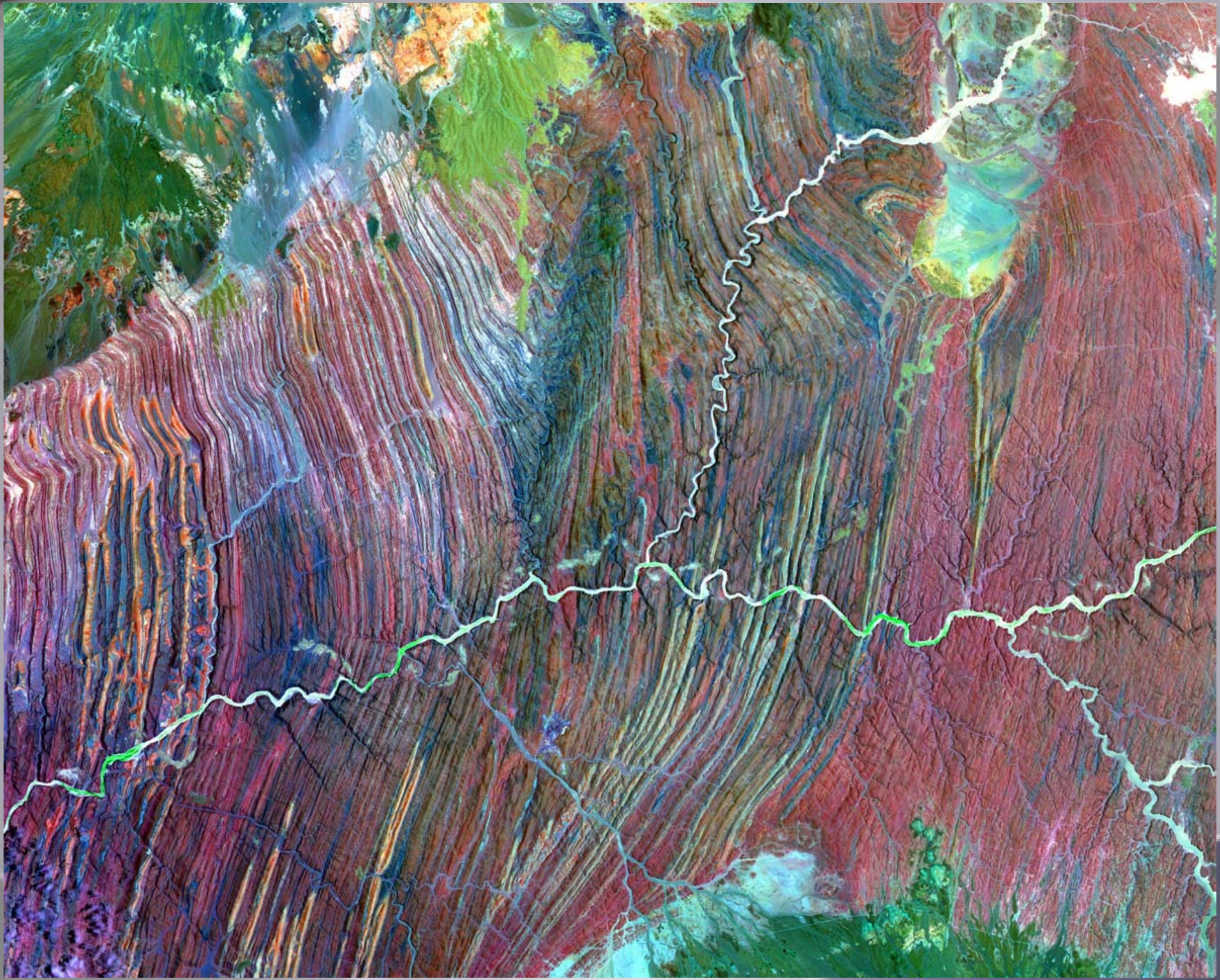
The Great Dyke, Zimbabwe

Sand Dunes, Afghanistan



Alluvial Fan, China

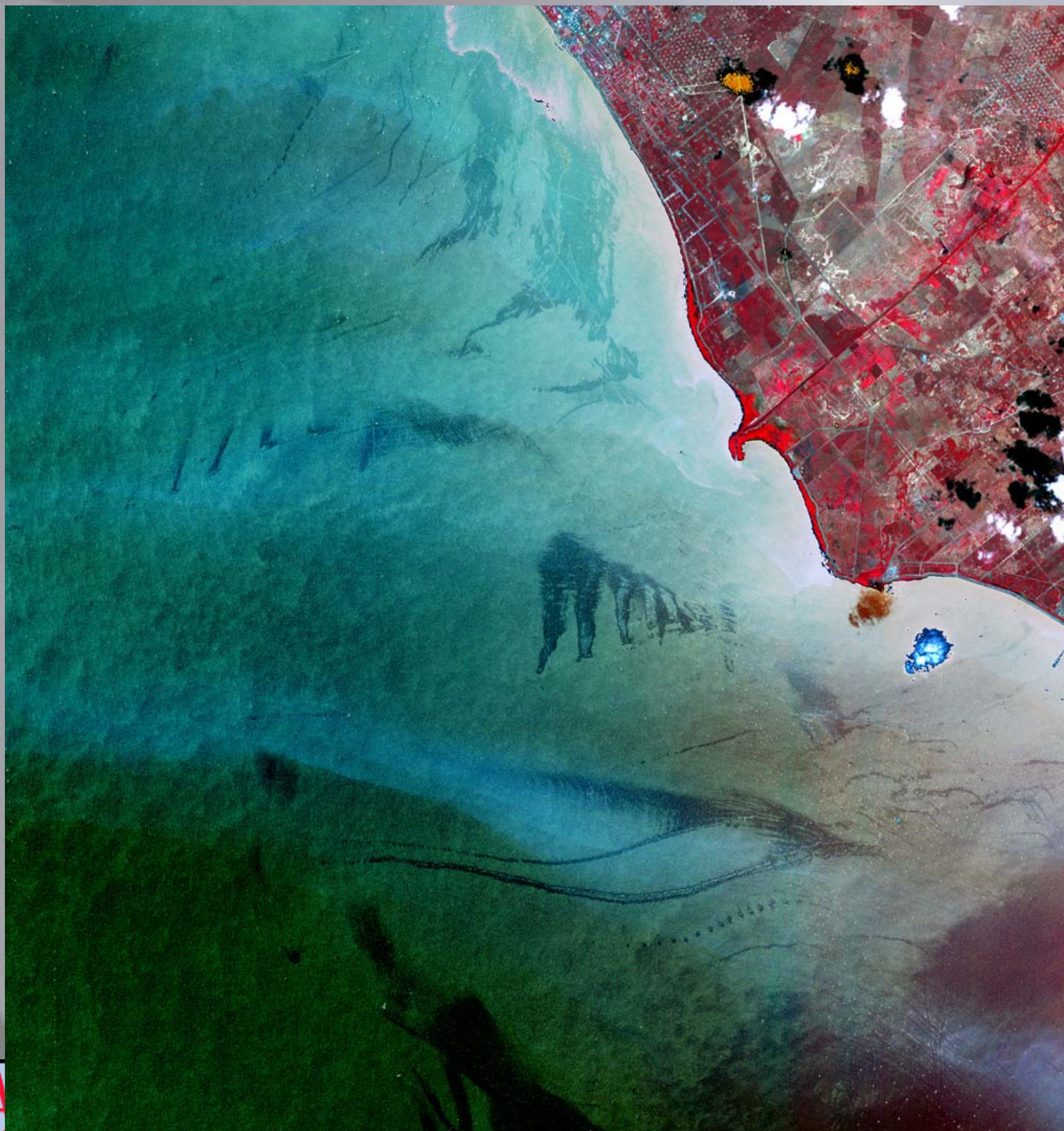
Ugab River, Namibia



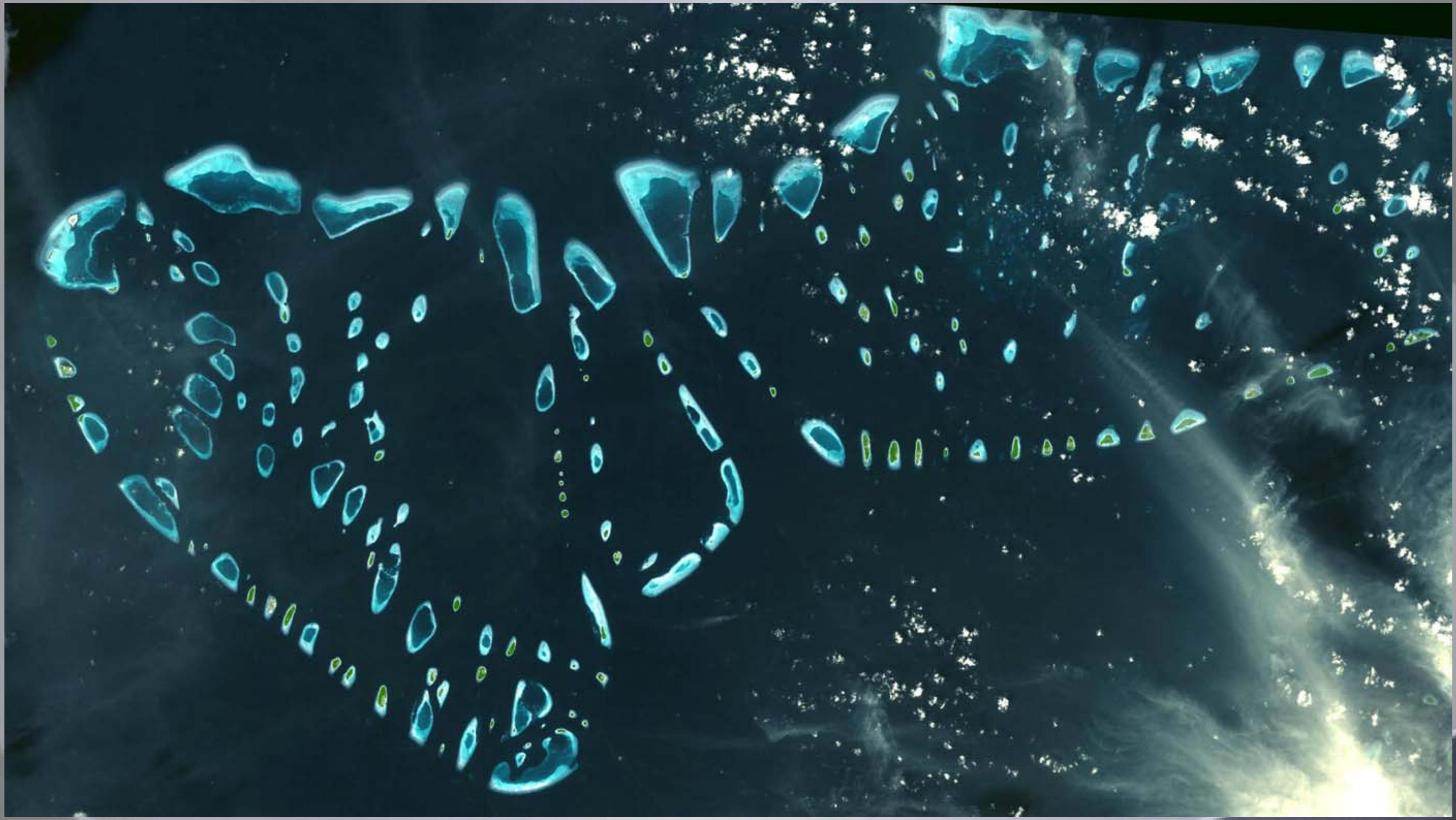
Namib-Naukluft National Park, Namibia

Mississippi River Delta

Oil Seeps, Lake Maracaibo, Venezuela (Jan 2003)



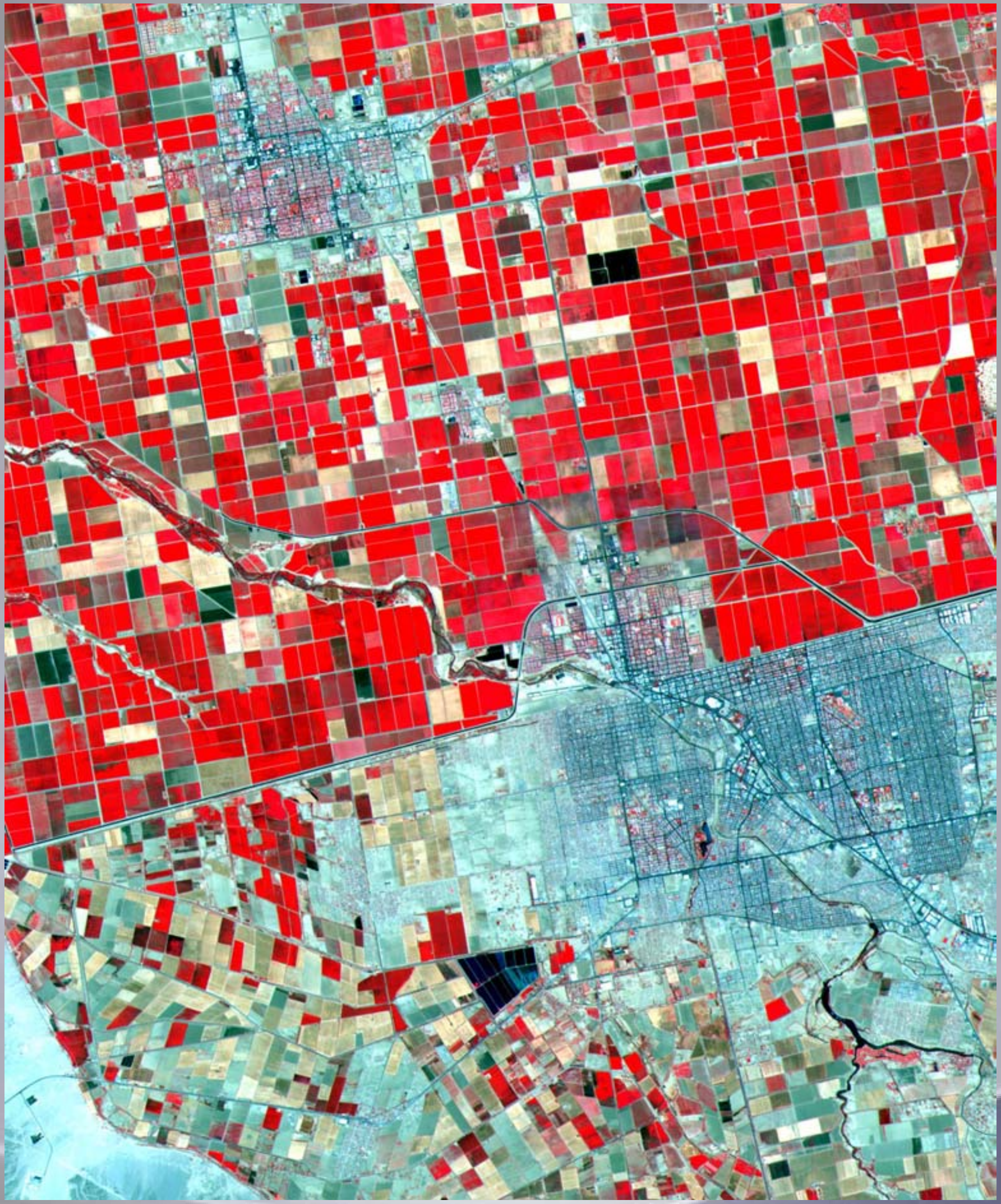
Maldives



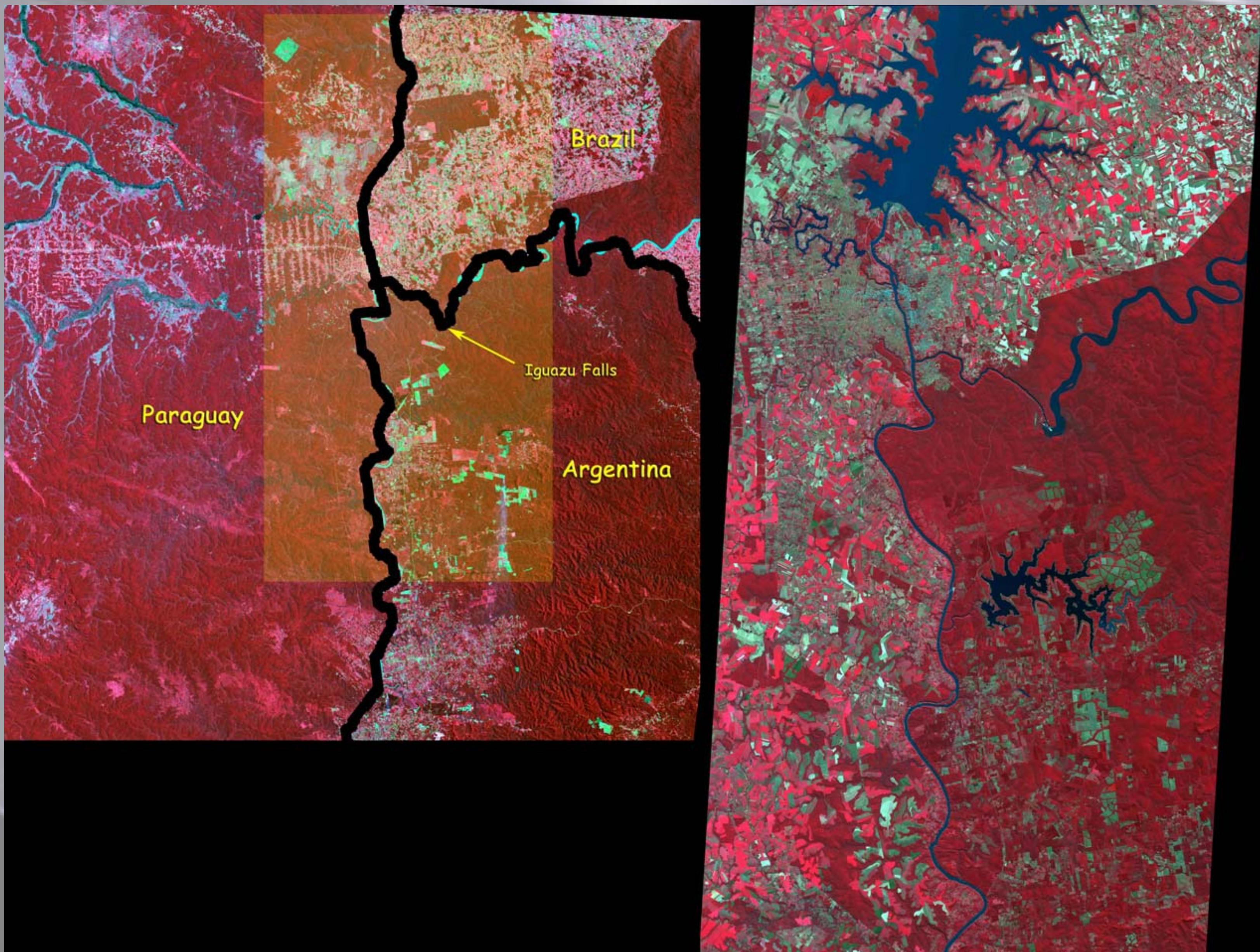
Lake Natron, East African Rift

Bombetoka Delta, Madagascar

US-Mexico Border, Mexicali



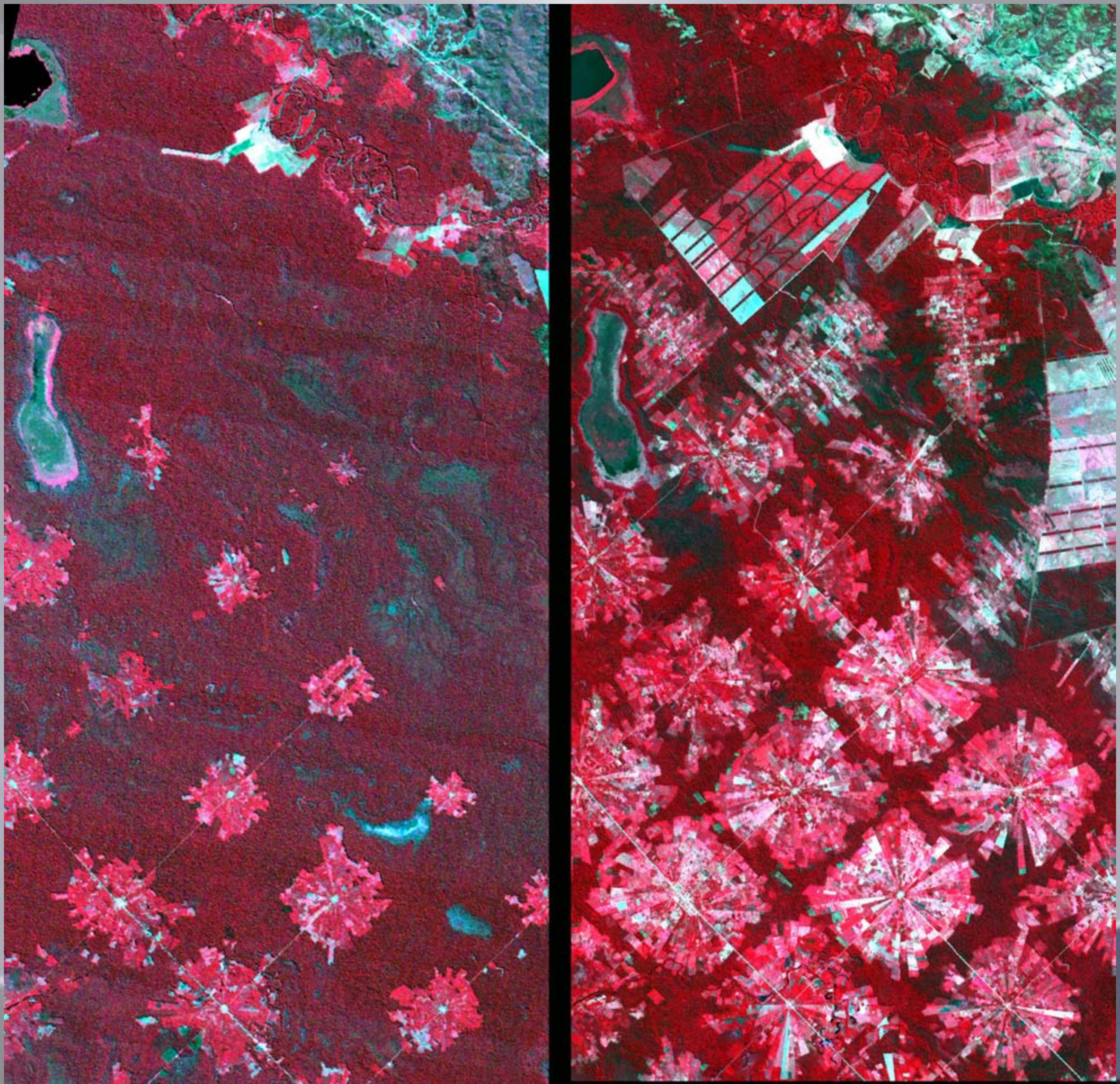
Area around Iguazu Falls



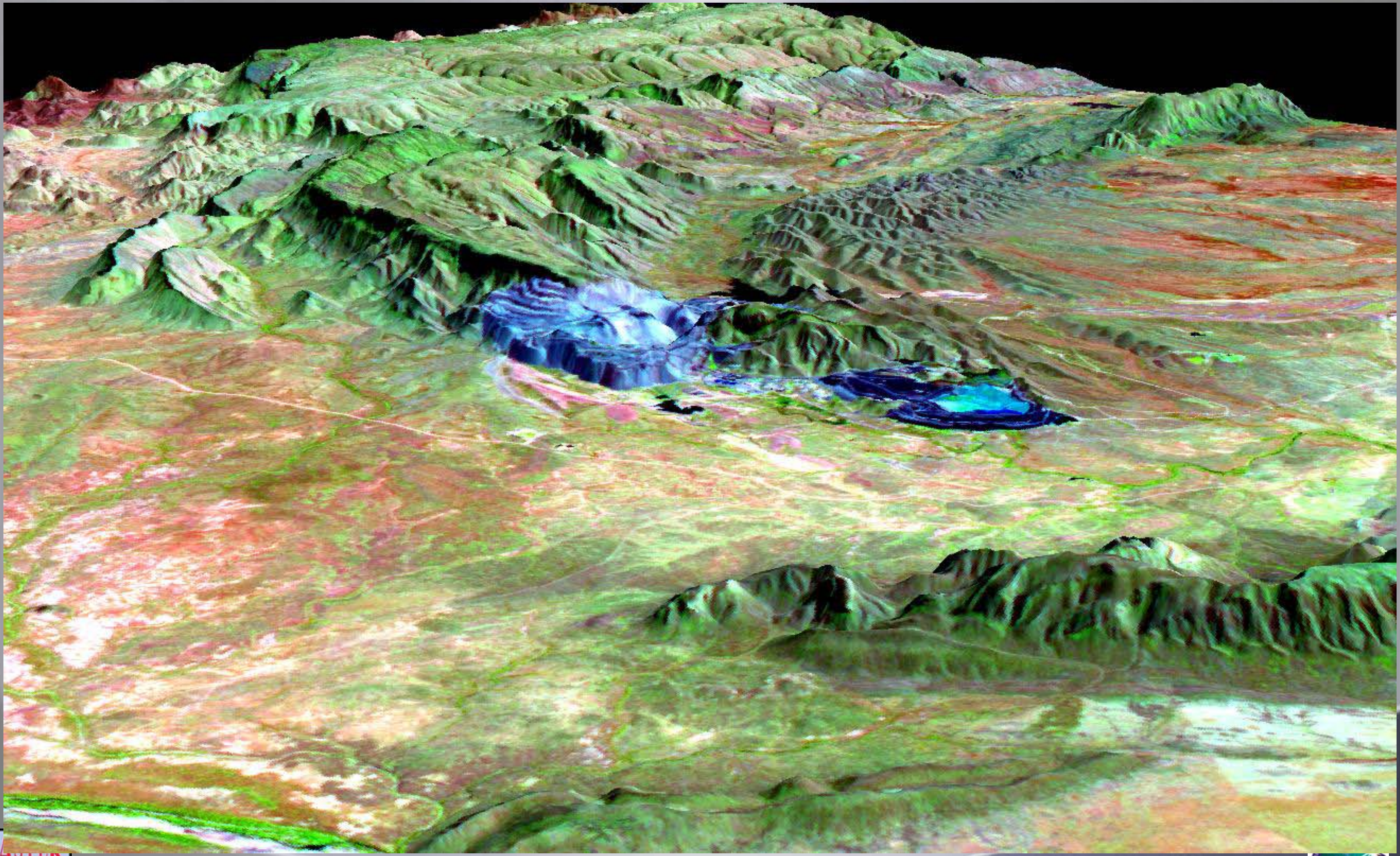
Mt. Egmont, New Zealand

Palm Island, Dubai

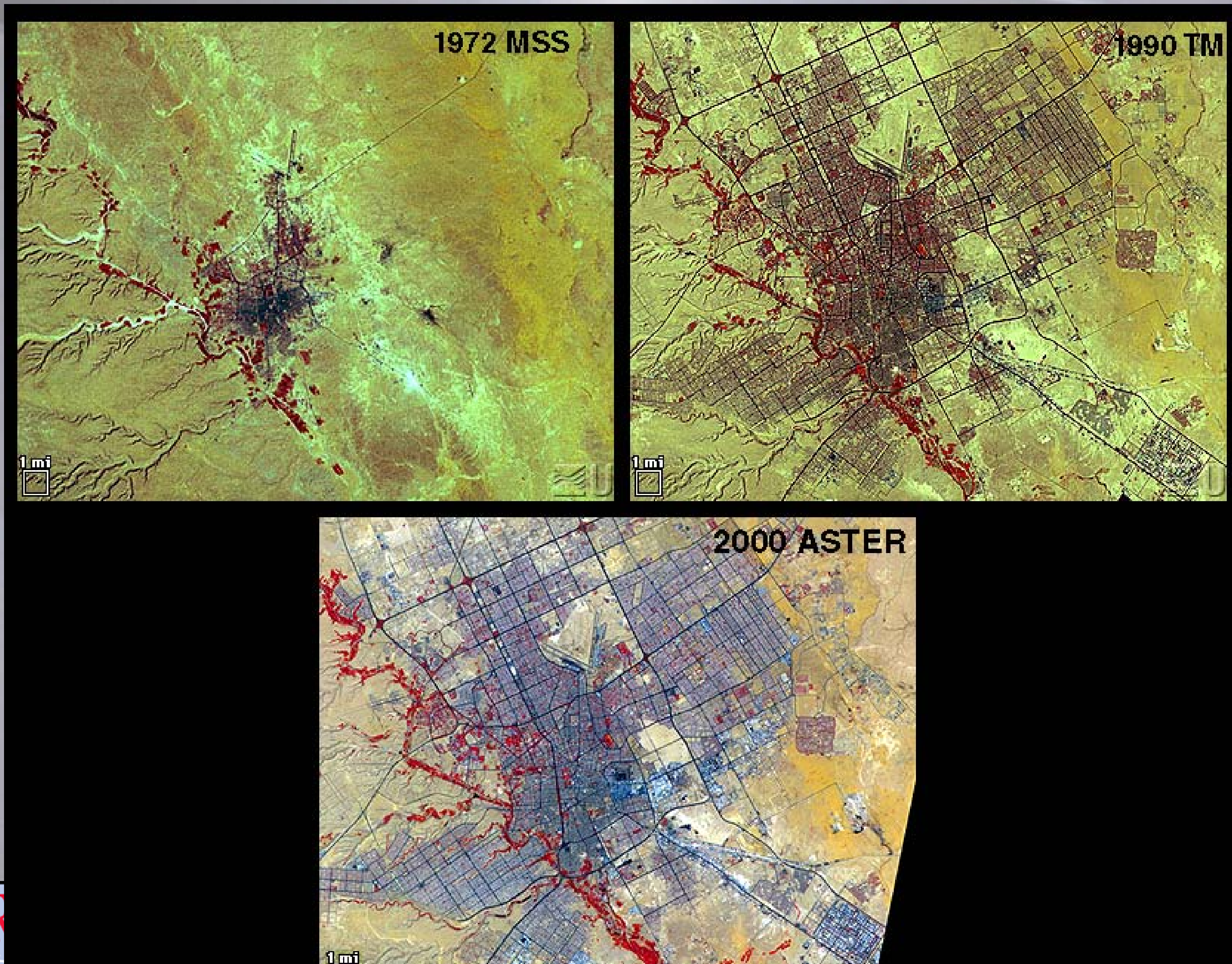
Santa Cruz de la Sierra, Bolivia: 1986 & 2001



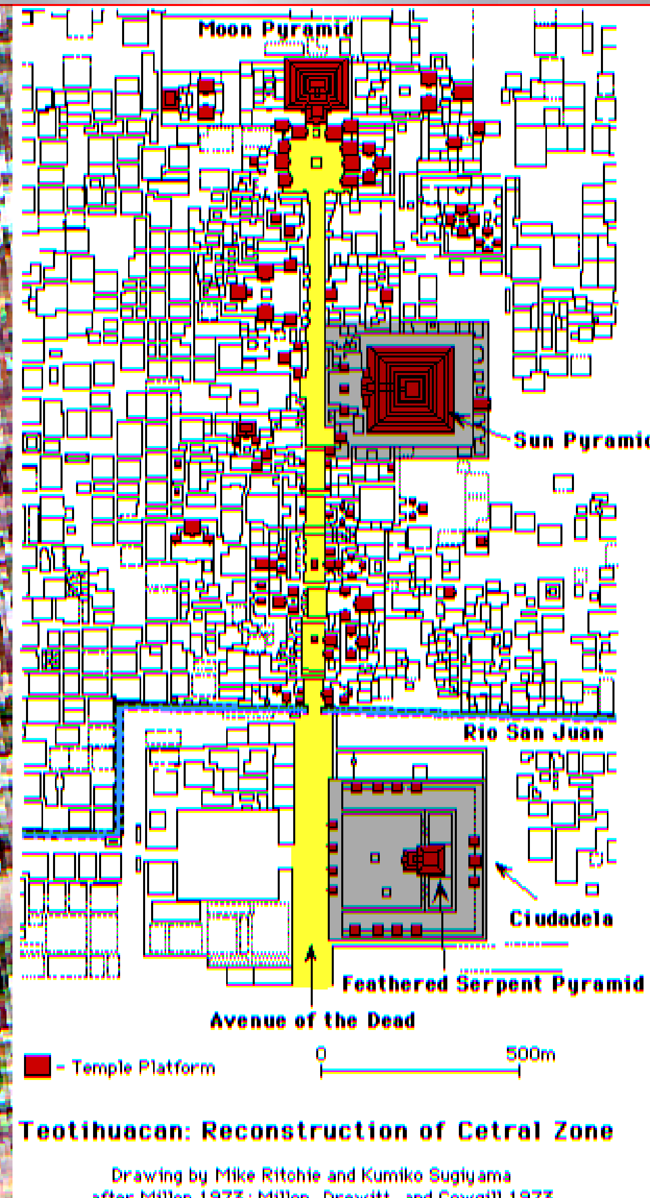
Argyle Diamond Mine, Australia



Growth of Riyadh Saudi Arabia

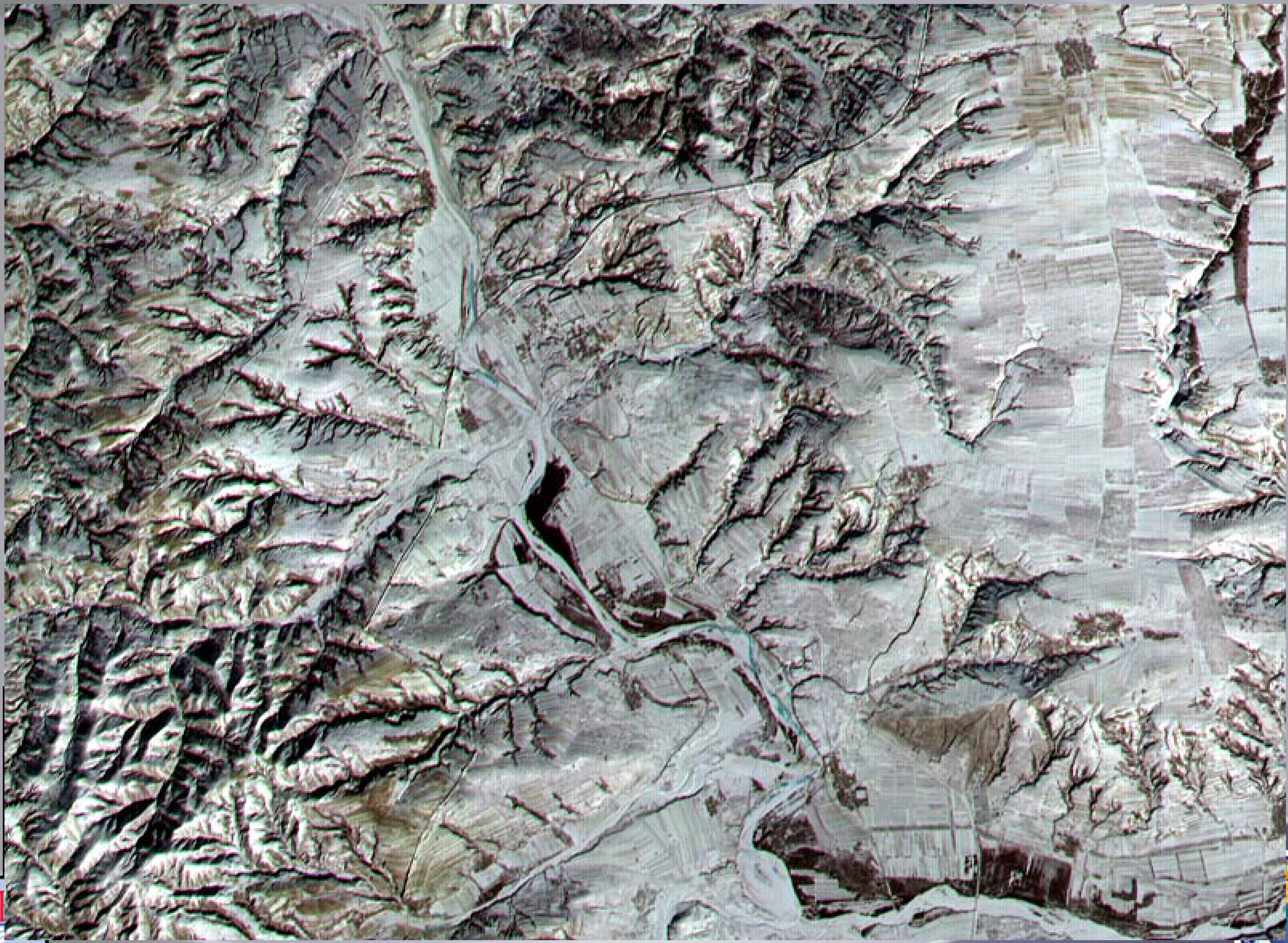


Teotihuacan, Mexico



Growing to 100,000+ inhabitants in the 4th century, Teotihuacan was abandoned in the 8th century. Massive pyramids were used for religious ceremonies.

Great Wall of China



Sand Dunes, Bahamas