

An aerial satellite image of a landscape, likely a river valley. The image shows a winding river in the center, surrounded by green fields and some urban areas. The colors are somewhat muted and grainy, typical of satellite imagery. The text is overlaid in a bold, purple font.

Earth Observation

Open Science 2.0

ESRIN, Frascati, Italy

12-14 October 2015

The background of the slide is a false-color aerial remote sensing image of Albania. It shows a complex network of rivers and streams, with urban areas appearing as dark, irregular shapes. The terrain is rendered in various shades of green, yellow, and brown, indicating different land cover types. The text is overlaid on this image in a bold, blue, sans-serif font.

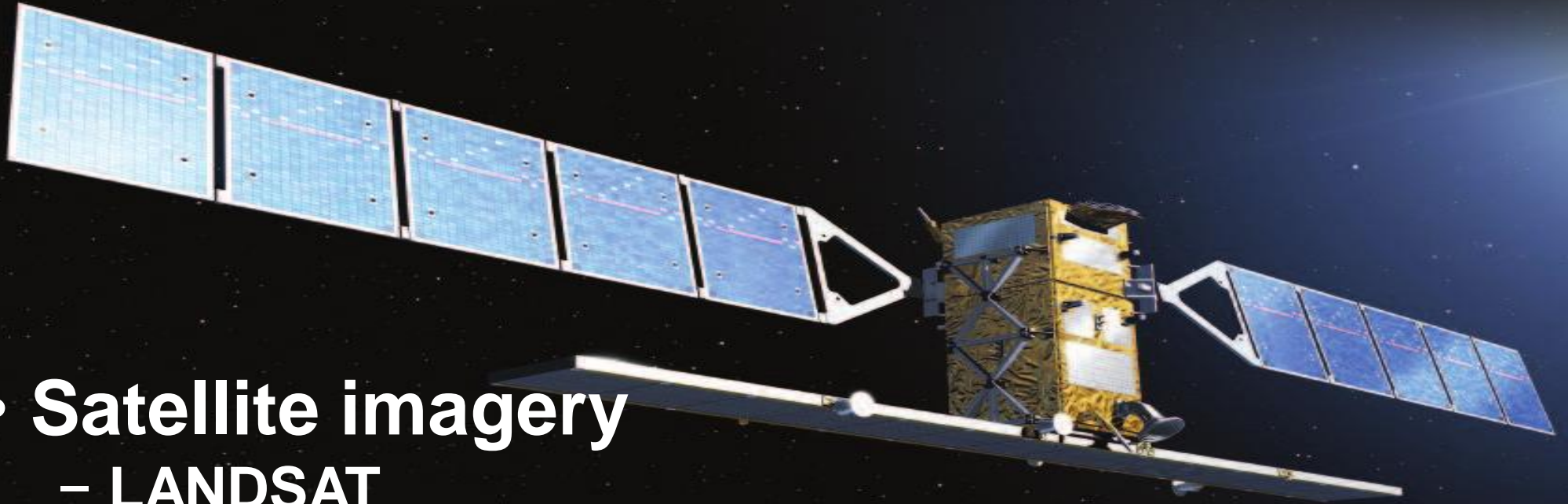
RECENT ENVIRONMENTAL CHANGES IN ALBANIA THROUGH REMOTE SENSING

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Polytechnic University of Tirana**

Earth observation ...

- **Satellite imagery**

- LANDSAT
- ENVISAT
- SENTINEL
- MODIS
- ...





Open science ...

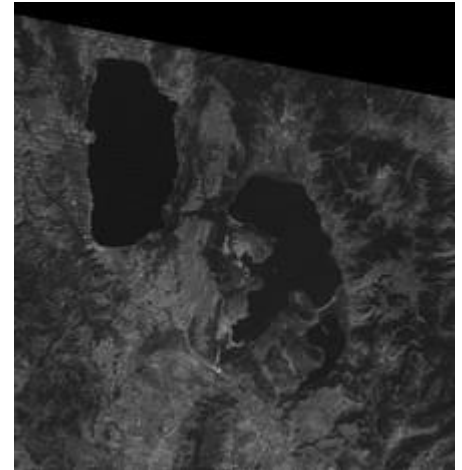
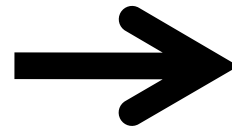
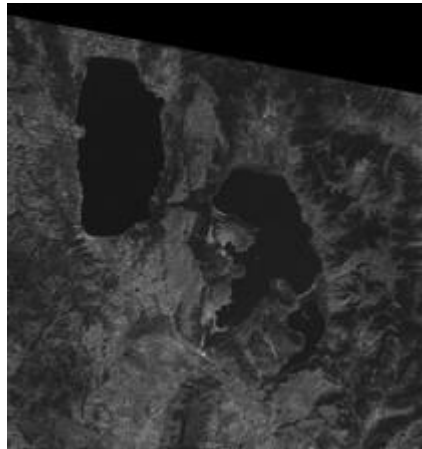
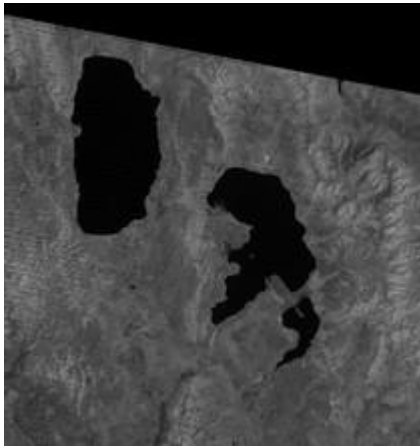
- **Open data**
 - **ESA online archive**
 - **USGS online archive**
 - **Tools**
 - **EOLI-SA**
 - **NEST**
 - **POLARPRO**
 - **GIMP**
 - **...**

Our objective

- **Analysis of vegetation variation in time**
 - Using vegetation index combining Landsat bands RED and Near Infra Red
 - Using general purpose open source software
 - Using data from ESA and USGS online archives
 - ESA project 30467

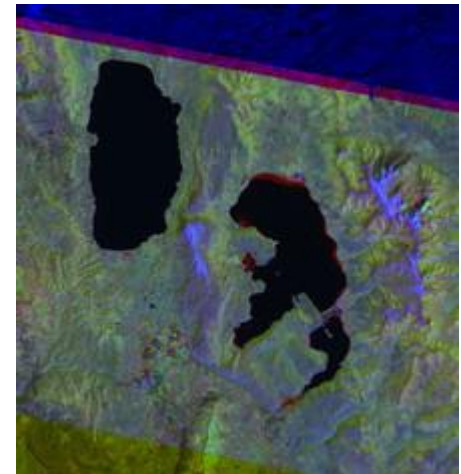
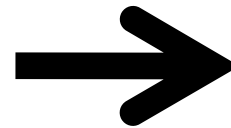
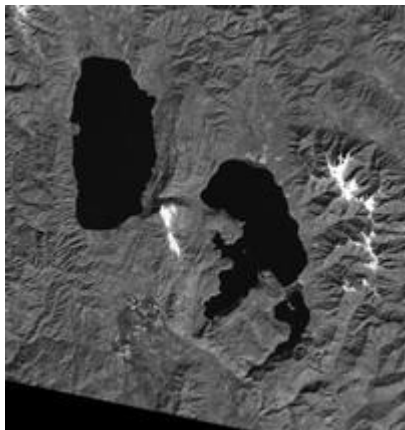
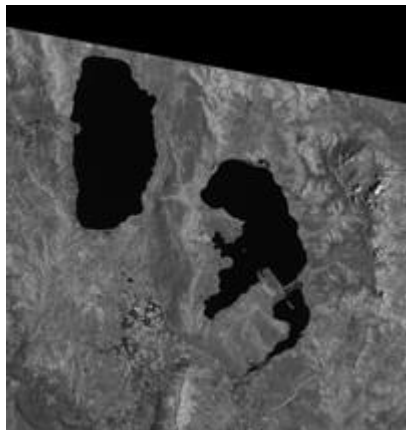
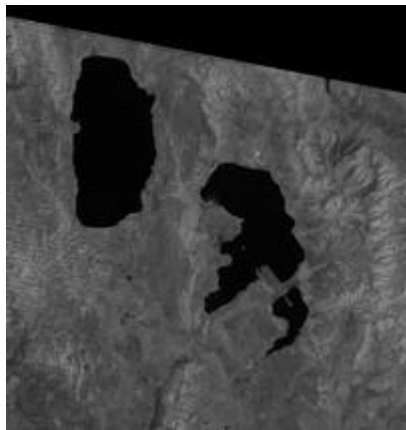
Methodology – vegetation index

- Coregistration of bands Red and NiR as separate grayscale layers using terrain features
- Subtractions of Red layer from NiR layer



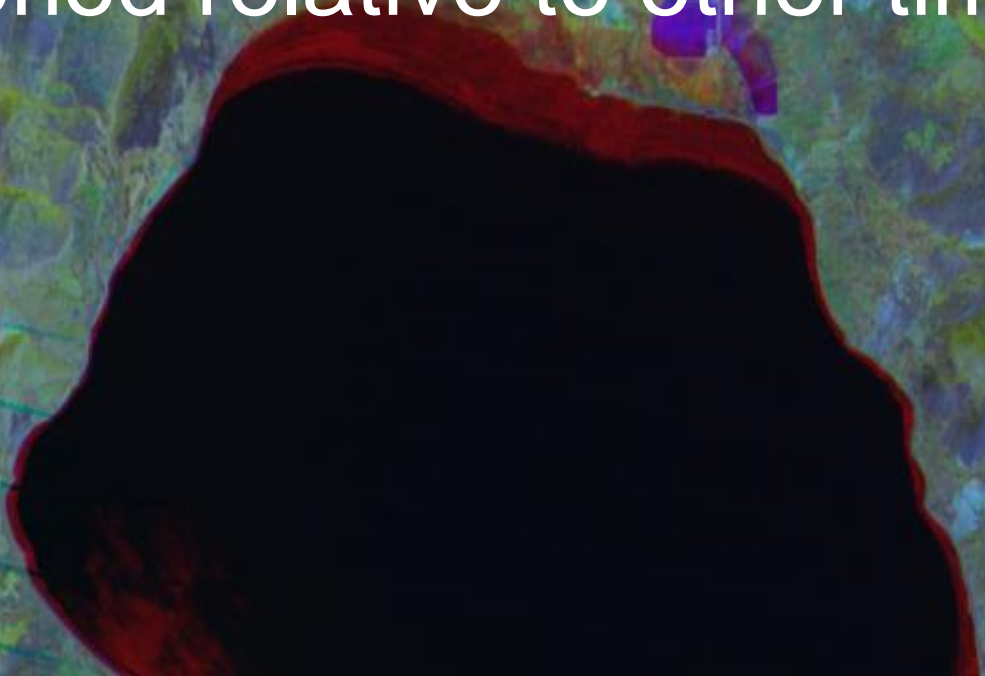
Methodology – combination in time

Three vegetation index images from three different times combined as single RGB image



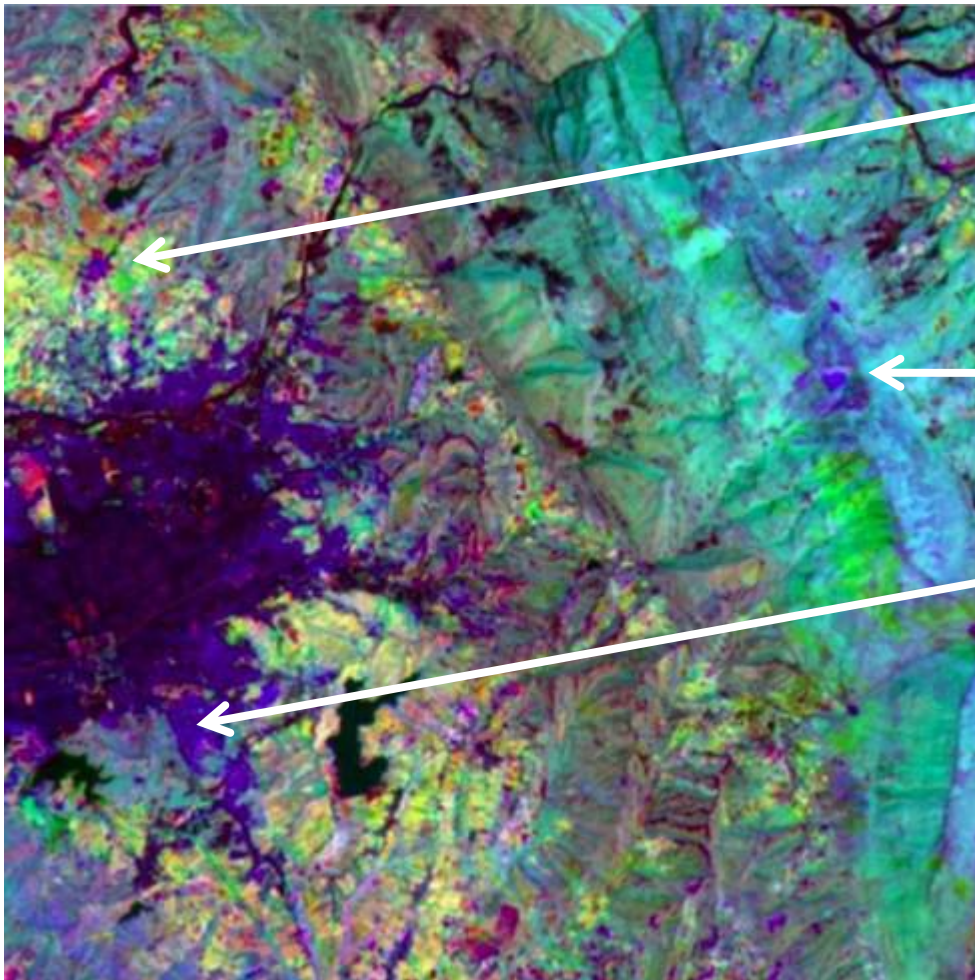
Methodology – interpretation

- Base colors Red / Green / Blue represent vegetation index in respective time periods
- Dominance of specific color shows dominance of vegetation in respective time period relative to other time periods



Yearly vegetation variations – Dajti

- Spring 1985~Blue, 2000~Green, 2014~Red



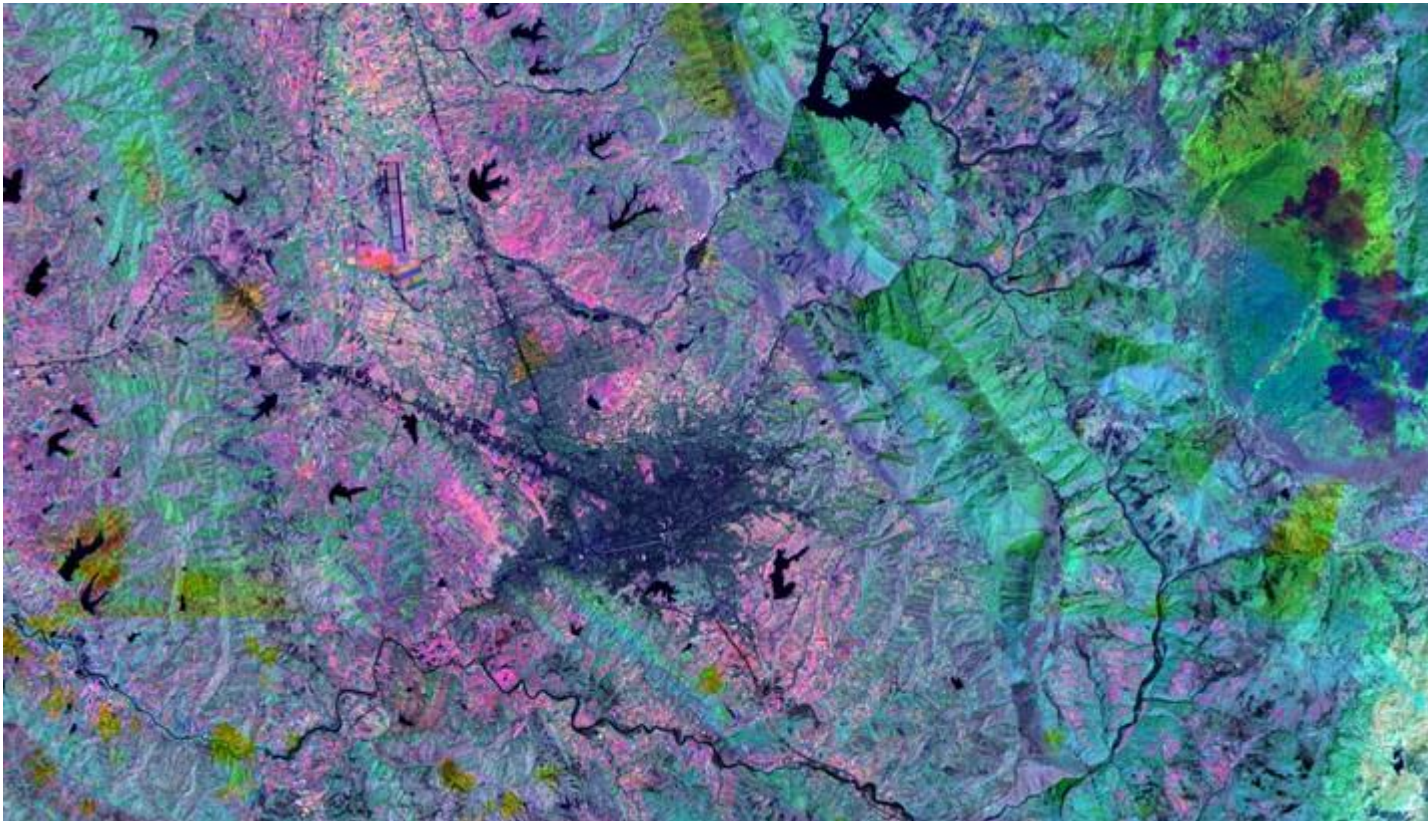
Expansion of suburban / garden areas

Deforestation (fires) in slopes of mountain

Expansion of urban areas with lack of vegetation

Dajti seasonal variations

- Landsat8 2014 vegetation dominance
 - Spring~Red, Summer~Green, Autumn~Blue

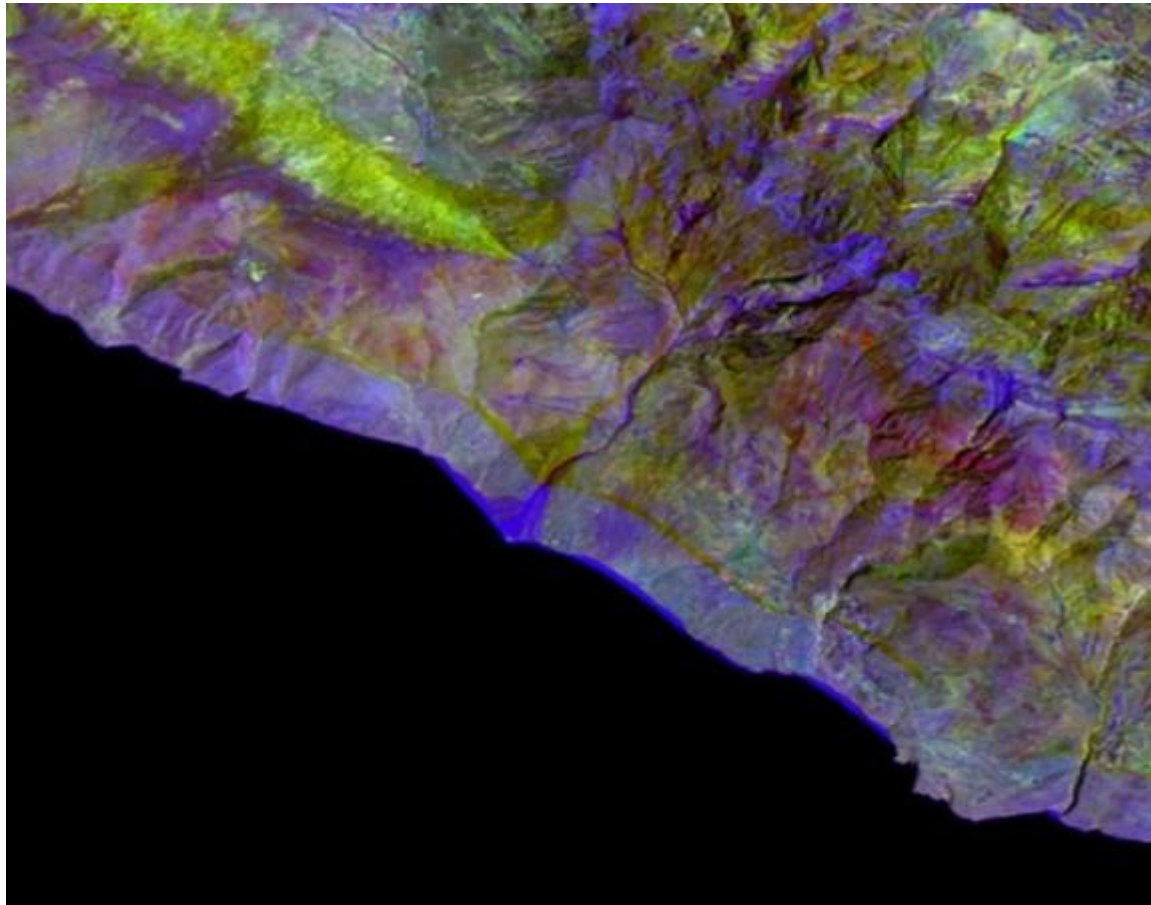


Spring in
[sub] urban
areas

Summer &
Autumn in
wild areas

Yearly vegetation variations - Llogara

- Summer 1985~Blue, 2000~Green, 2014~Red



Pink – areas with little vegetation in 2000 (fires)

Green – unusual vegetation bloom in 2000

Blue – areas remained without vegetation

Llogara – seasonal variations

- Landsat8 2014 vegetation dominance
 - Spring~Red, Summer~Green, Autumn~Blue

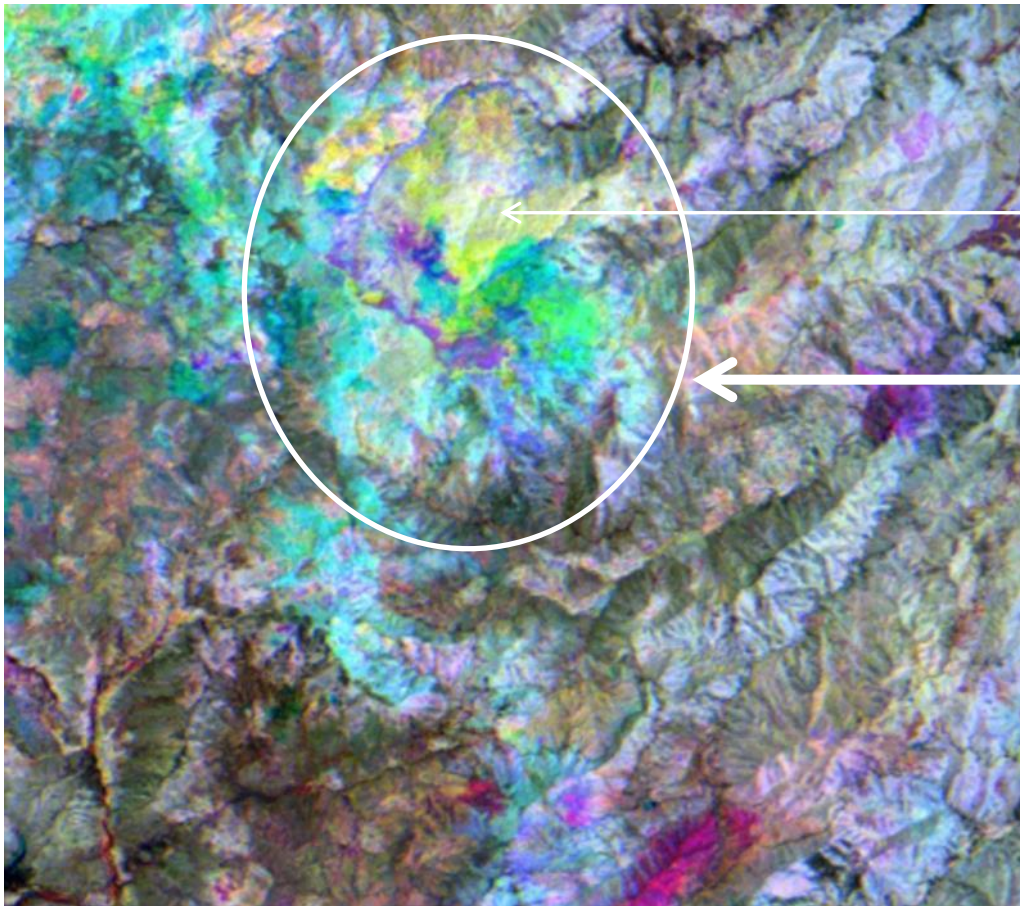


Lowlands in
Spring & Autumn

Highlands in
Summer

Yearly vegetation variations - Qafmali

Summer 1985~Blue, 2000~Green, 2014~Red

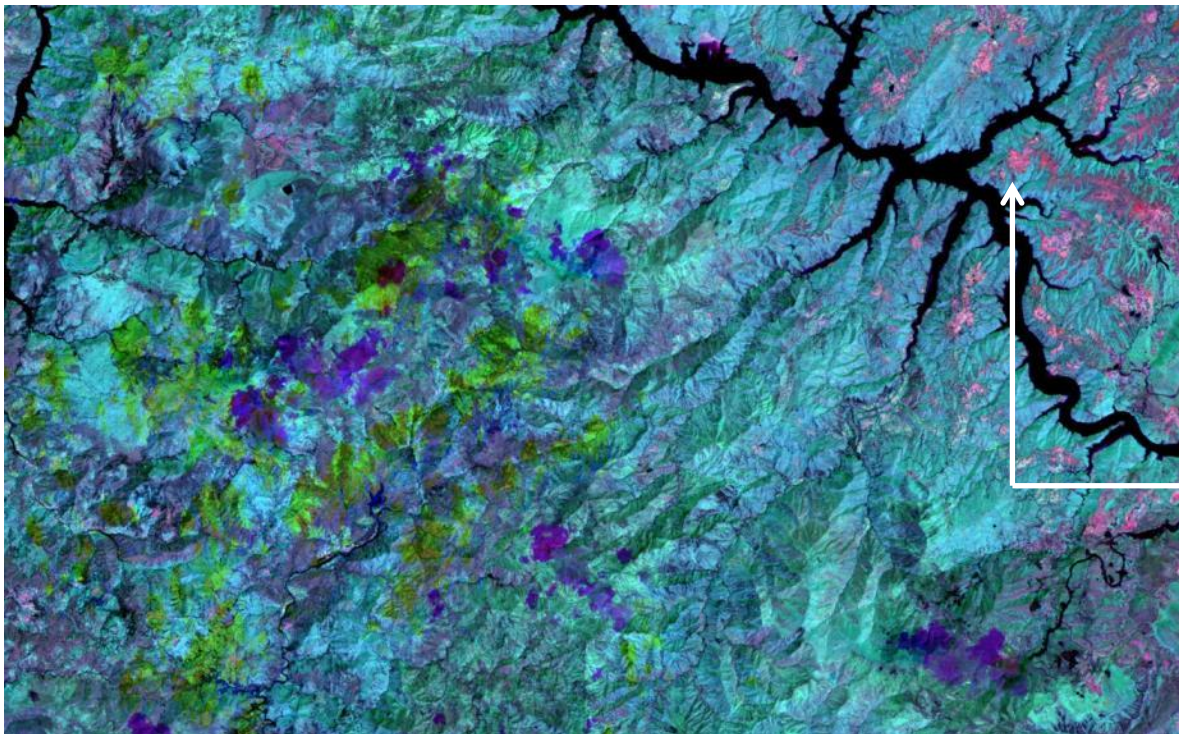


Untouched mountain slope

Deforestation areas

Qafmali – seasonal variations

- Landsat8 2014 vegetation dominance
Spring~Red, Summer~Green, Autumn~Blue

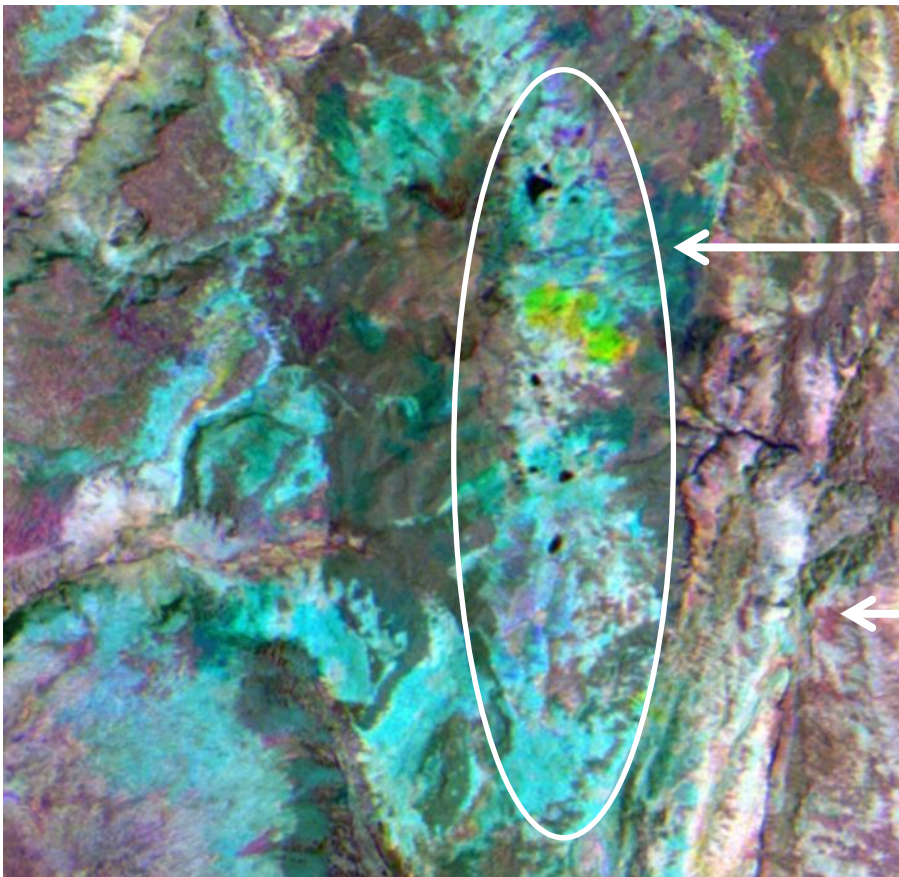


Dominance of blue-green: summer and autumn vegetation

Spring grass in some mountain highlands

Yearly vegetation variations – Lura Lakes

Summer 1985~Blue, 2000~Green, 2014~Red

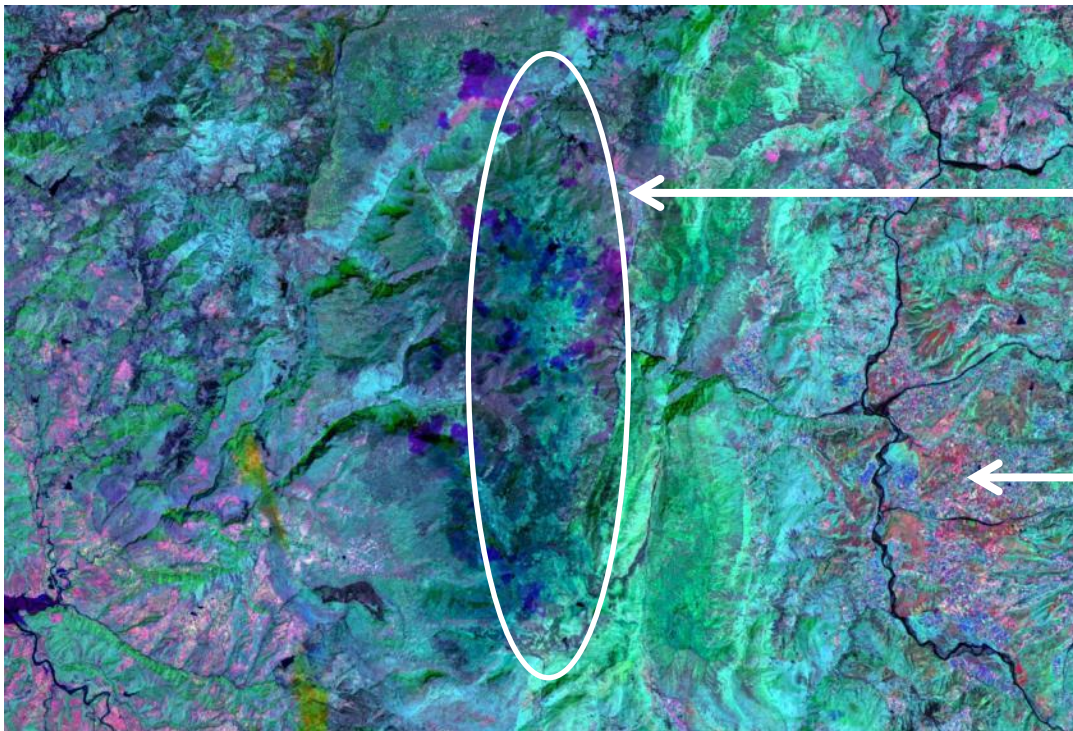


Dominance of blue-green:
deforestation areas

Red areas: vegetation
developed in recent years

Lura Lakes – seasonal variations

- Landsat8 2014 vegetation dominance
Spring~Red, Summer~Green, Autumn~Blue



Dominance of blue-green: summer and autumn vegetation

Red: spring vegetation farming areas and grasslands

Complexity of environment changes

The background of the slide consists of three vertical panels of a topographic map of North America. The map uses a color gradient to represent elevation, with darker colors (blues and purples) indicating higher elevations and lighter colors (greens and yellows) indicating lower elevations. The map shows the rugged terrain of the western United States and Canada, with prominent mountain ranges and valleys. The panels are slightly offset from each other, creating a layered effect.

- Complexity of terrain
- Complexity of urbanization and farming
- Long term changes
- Seasonal changes
- Human impact
 - Movement of populations
 - Economic activities



□ **The story continues ...**