



REMOTE SENSING

Course Introduction

Course Description/Overview

This course introduces the main principles and methods of remote sensing monitoring of global phenomena.

Applications to environmental monitoring and management are introduced. Description and explanation of state-of-the-art monitoring technologies will be included.

Fundamentals of using of aerial photographs, satellite imagery, airborne/terrestrial laser scanning data, and GIS.

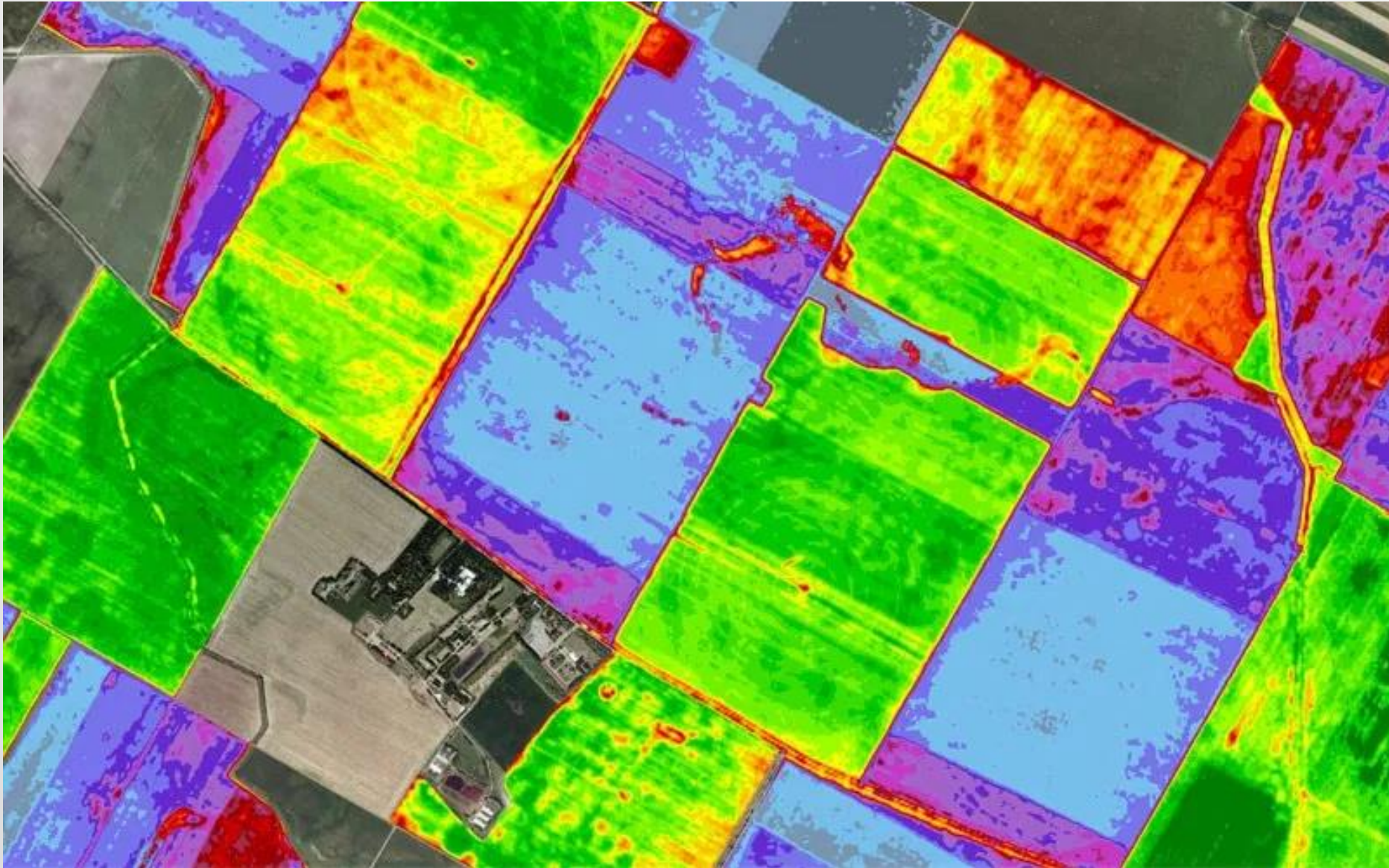
Characteristics of remotely sensed data and information from which is possibly extracted.

Remote sensing monitoring.

Term-project will be focused on how to combine and fuse to a specific application.

A review on data fusion, and a presentation on remote sensing sensors will be carried out.

REMOTE SENSING
land use, agriculture



Course Learning Objectives

- An understanding of the basic principles in remote sensing and GIS
- Gain the knowledge on remote sensing sensors and their raw data
- An understanding of fundamental data/image processing
- Foster the ability to picture of the framework of data fusion in a specific application
- Foster the ability to review related research papers/topics and presentation skill
- Analyze results of environmental monitoring and make predictions using forecasting models.
- Apply modern methods and technologies for monitoring.
- Describe general planning criteria, field, and office execution procedures, and data reduction.

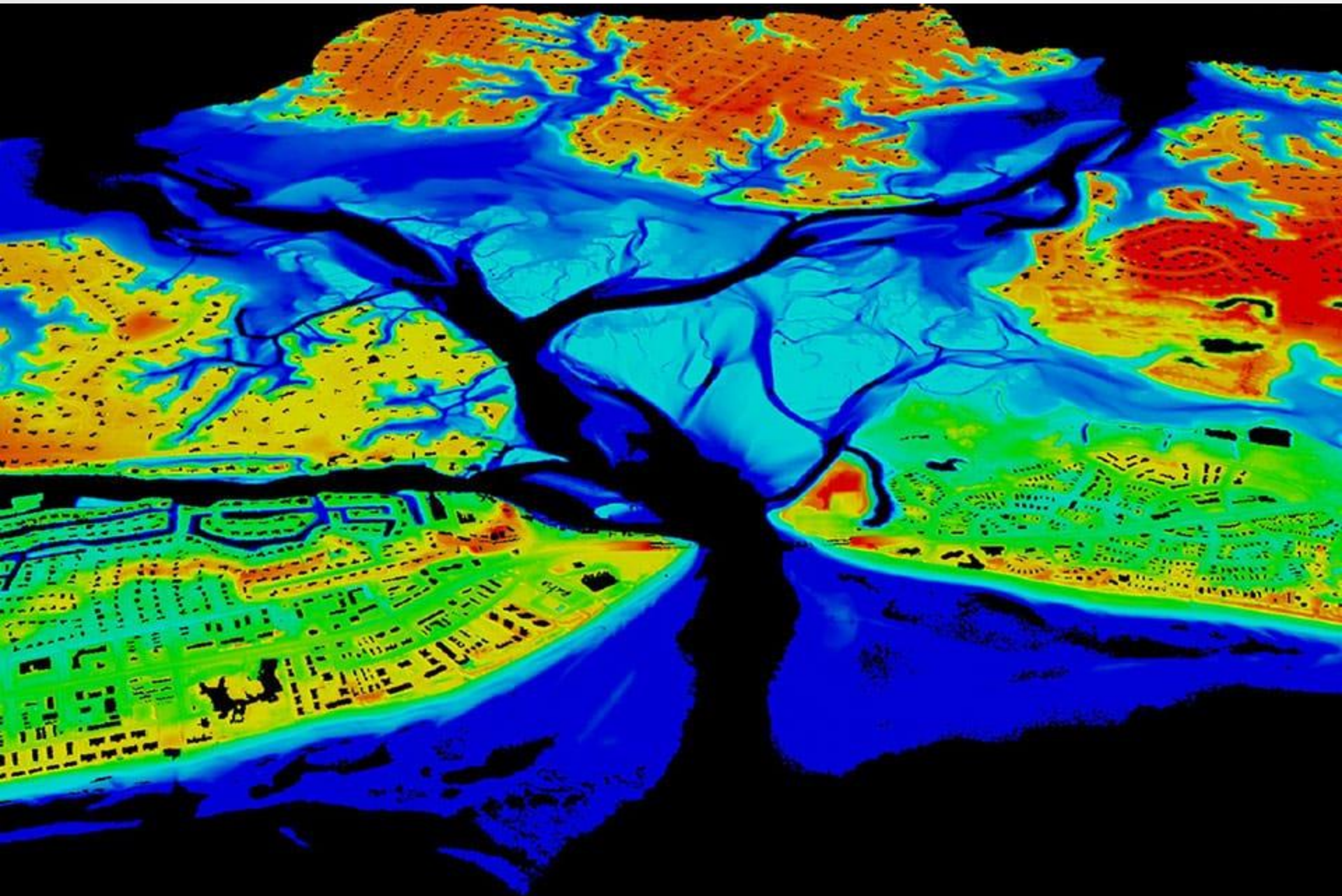
*REMOTE SENSING
SAR/ InSAR technology,
deformation detection*



QUESTIONS THAT I NEED TO KNOW

- Have you ever heard about LiDAR (Y/N)
- Have you ever heard about Remote Sensing
- Have you ever heard about Photogrammetry (Y/N)
- Have you ever used ArcGIS, ERDAS Imagine, ENVI (Y/N)
- Normalized Difference Vegetation Index (NDVI) ? (Y/N)
- I know Image processing (Y/N)
- Classification ? (Y/N)

REMOTE SENSING – lidar data



RAW DATA

REMOTE SENSING

Raster images

Sources

Platforms

Remote Sensing

Artificial Satellites

Aerial Photography

Airplanes

Close-Range Photogrammetry

UAV

Point clouds

LiDAR

Airplanes

Terrestrial Laser Scanning

UAV

Radar images

Remote Sensing

Artificial Satellites

Aerial

Airplanes

Ground Based

Bathymetric data

LiDAR

Airplanes

Echo-sounder

Boats

Coordinates

GNSS

Terrestrial Surveying



PROCESSED DATA

Types

DEM/DSM

Raster

Vector

TIN

GRID

Maps

Maps

Raster

Digital

Orthophoto

Orthophotomap

Orthophotoimage



<https://www.dnv.com/services/satellite-based-remote-sensing-for-energy-infrastructure-141223>

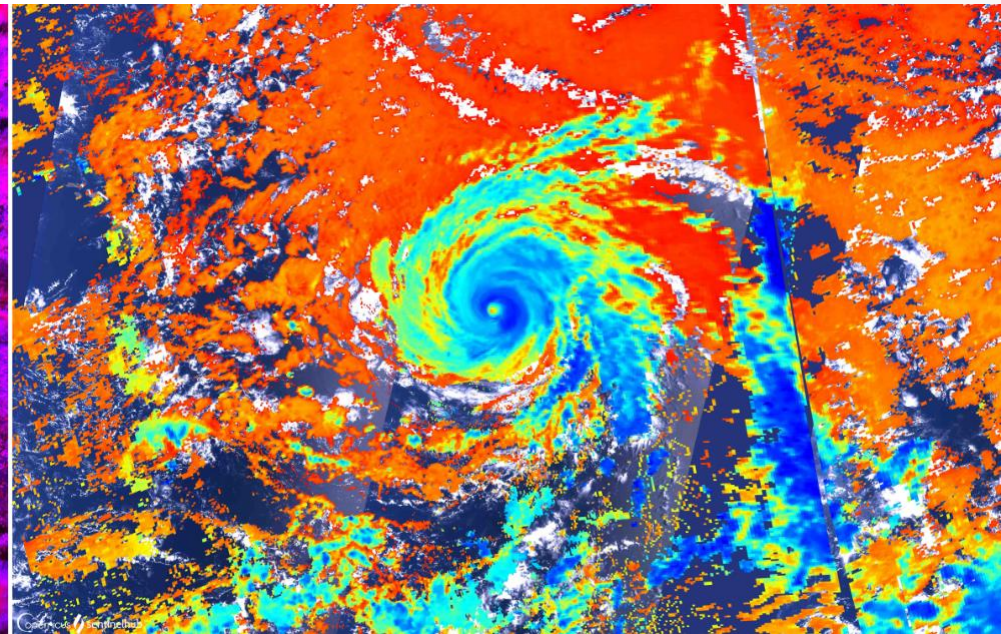
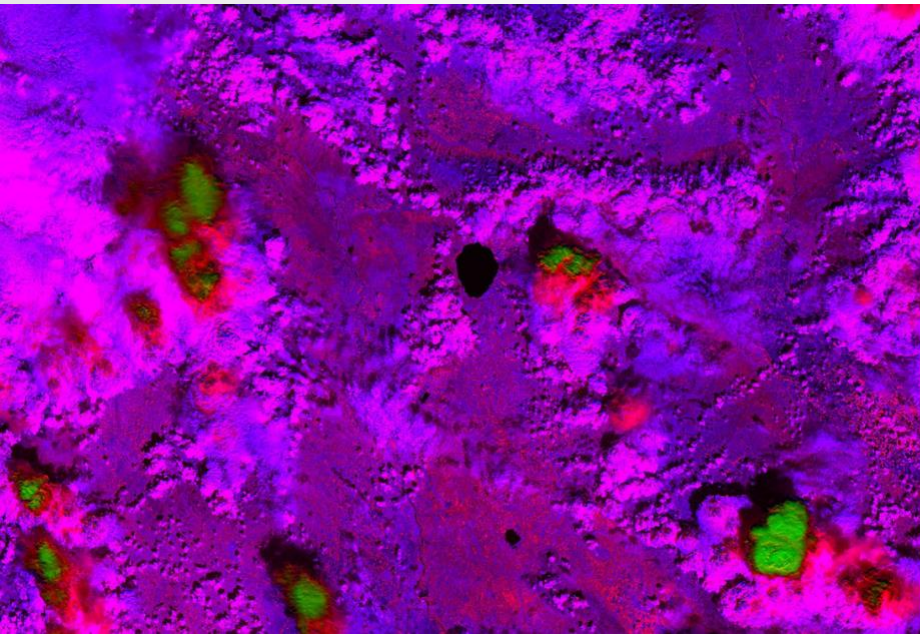
SOME COMMENTS ABOUT DATA ANALYSIS

- Classification
- Buffer zones
- Overlay analysis
- Data aggregation
- Net analysis
- Zoning

Special types

- Fractal analysis
- Chaos theory
- Catastrophe theory

*REMOTE SENSING
warning system,
meteorology*



<https://www.sentinel-hub.com/explore/industries-and-showcases/disaster-management/>

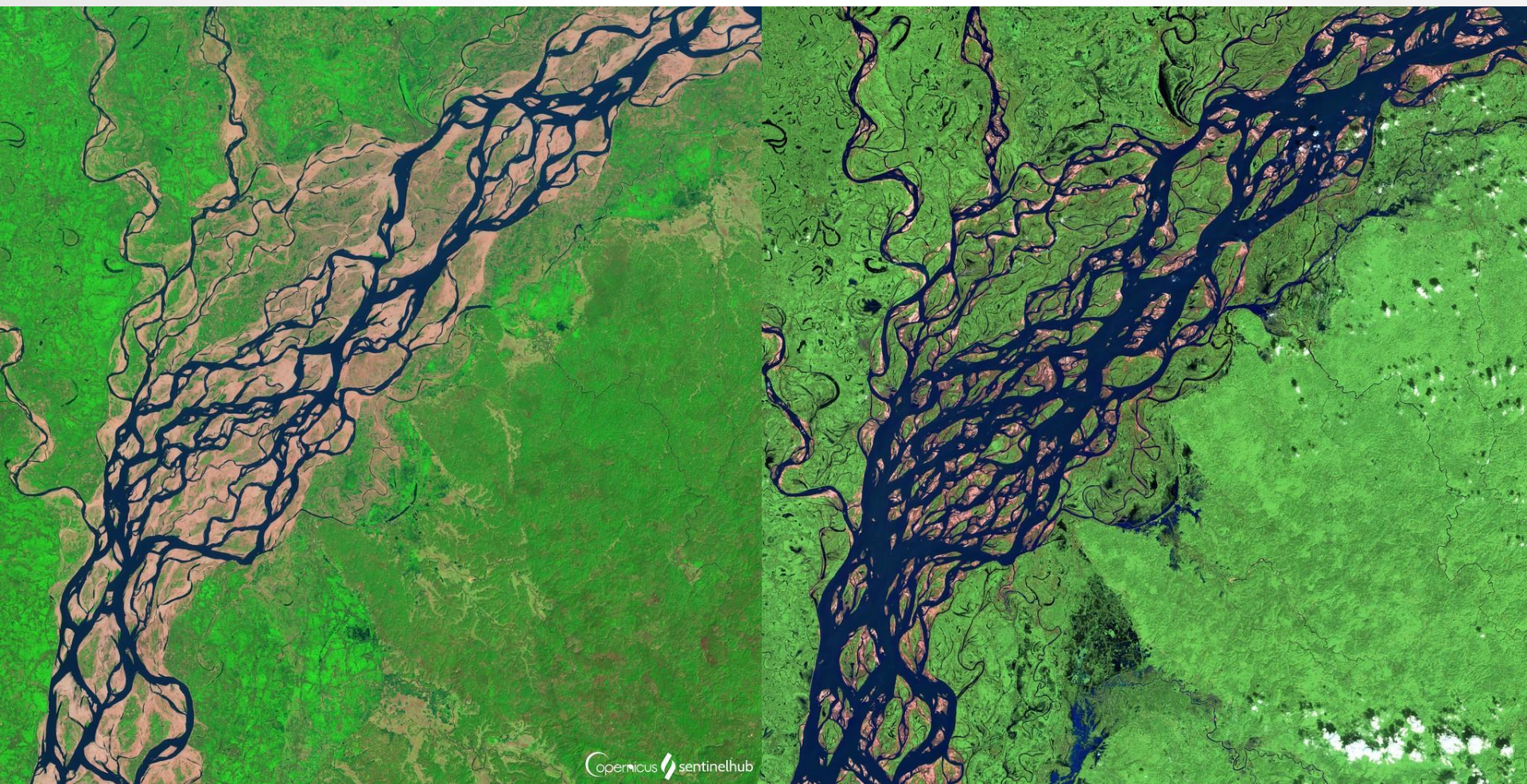
REFERENCES

The next question is about books.

- Environmental Geoinformatics. Monitoring and Management, *Joseph L. Awange, John B. Kyalo Kiema*
- Geoinformation. Remote Sensing, Photogrammetry, and Geographic Information Systems, *Gottfried Konecny*
- **REMOTE SENSING HANDBOOK** Volume I Remotely Sensed Data Characterization, Classification, and Accuracies; Volume II Land Resources Monitoring, Modeling, and Mapping with Remote Sensing; Volume III Remote Sensing of Water Resources, Disasters, and Urban Studies Edited By *Prasad S. Thenkabail*
- MDPI, mdpi.com
- Journal of Applied Geomatics
- Canadian Journal of Remote Sensing

<https://www.routledge.com/Signal-and-Image-Processing-of-Earth-Observations/book-series/CRCSIGIMAPRO>

REMOTE SENSING - floods



<https://www.sentinel-hub.com/explore/industries-and-showcases/disaster-management/>

SOFTWARE

- [Geomatica](#), PCI Geomatics
- [SAGA GIS](#) (Open Source)
- [TNTmips](#), MicroImages
- [ERDAS IMAGINE](#)
- [ENVI](#)
- [Google Earth](#)
- [GRASS GIS](#)
- [QGIS](#) (Open Source)
- [Orfeo toolbox](#) (Open Source)
- [SOCET SET](#)
- [eCognition](#)
- [ArcGIS](#)
- [SNAP](#)