New data and big data analysis for forest and land monitoring: A practical demonstration

SDG-conference 'Towards Zero Hunger: Partnerships for Impact"

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100years
1918 — 2018

Background

- **My work**
  - PhD candidate – Laboratory of Geo-information Science and Remote Sensing
  - Project: "Large scale forest change monitoring using satellite data"
  - Collaborating with FAO to develop tools for monitoring forest change

- **What data is needed to obtain information on forest and forest change?**
  - Direct observations in the field
  - Remote sensing data

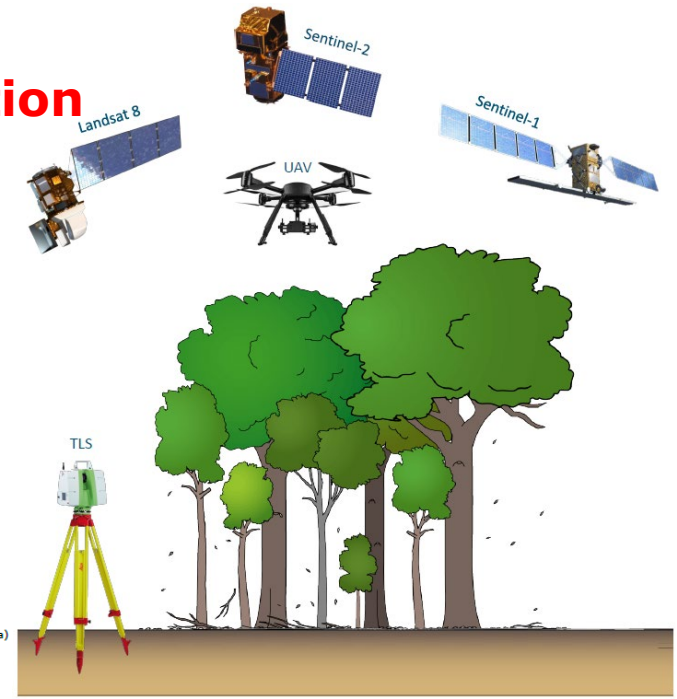


Image Credits
Landsat 8: NASA
Sentinel 1: ESA/P. Carril
Sentinel 2: CC BY-SA 2.0 fr (Rama @ Wikipedia)
TLS: ELTE Department of Cartography and Geographic Information Science, 2012
UAV: Aerialtronics Nederland

Large scale = Big data

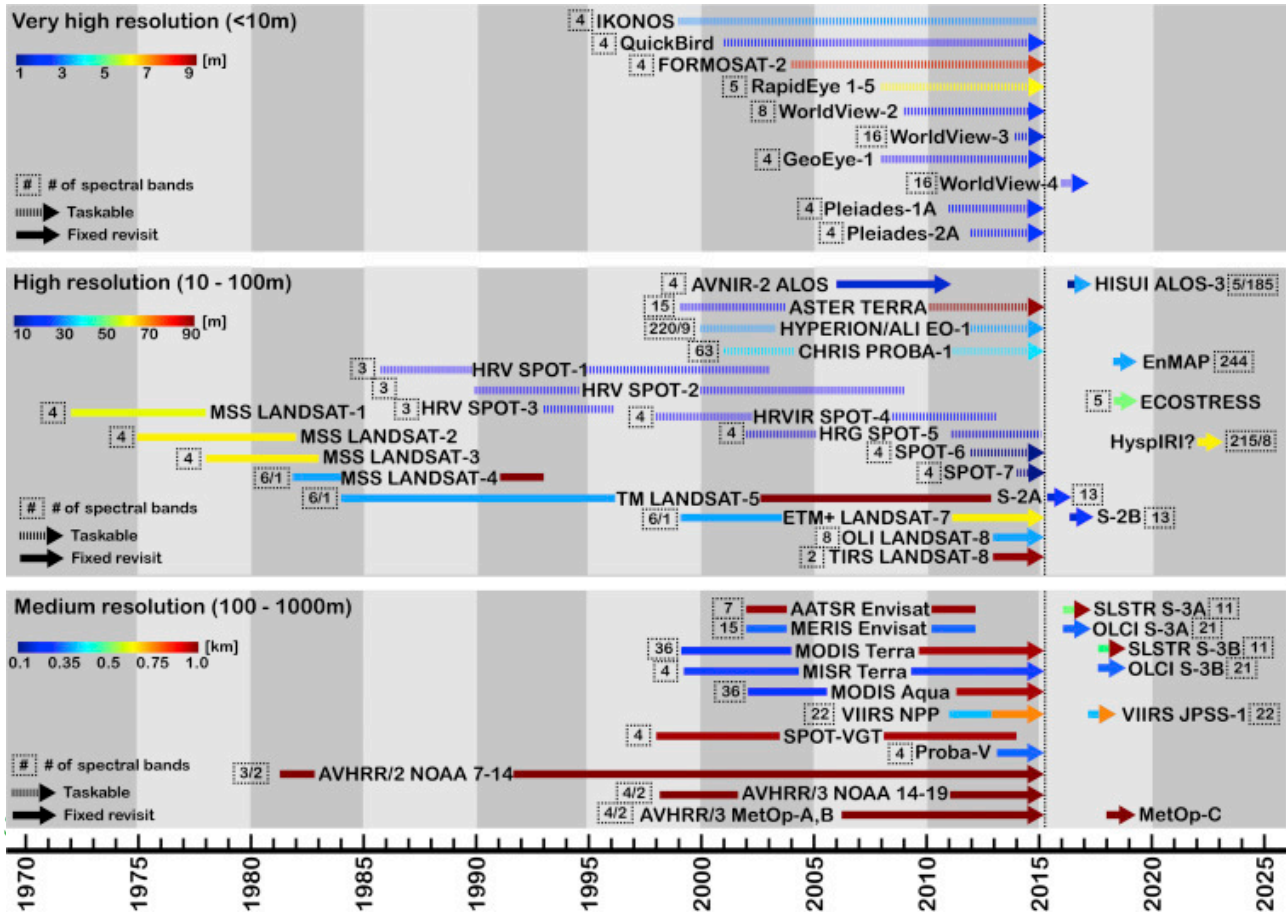
➢ Why is big data so BIG in our case?

- Multiple satellites acquire images globally every day

  In August 2017: 620 EO satellites[1]

  - Optical imaging: 327
  - Radar imaging: 45
  - Infrared imaging: 7
  - ...

[1] https://www.pixalytics.com/eo-sats-in-space-2017/



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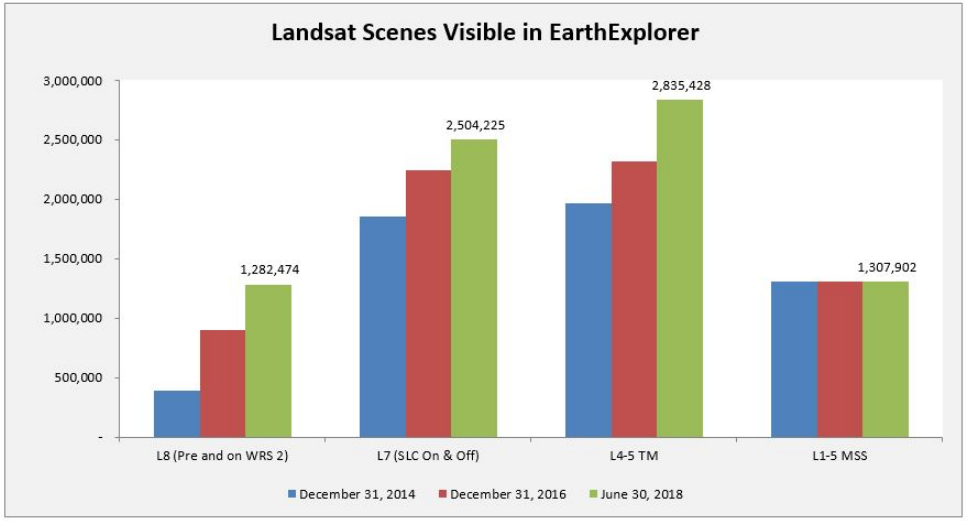
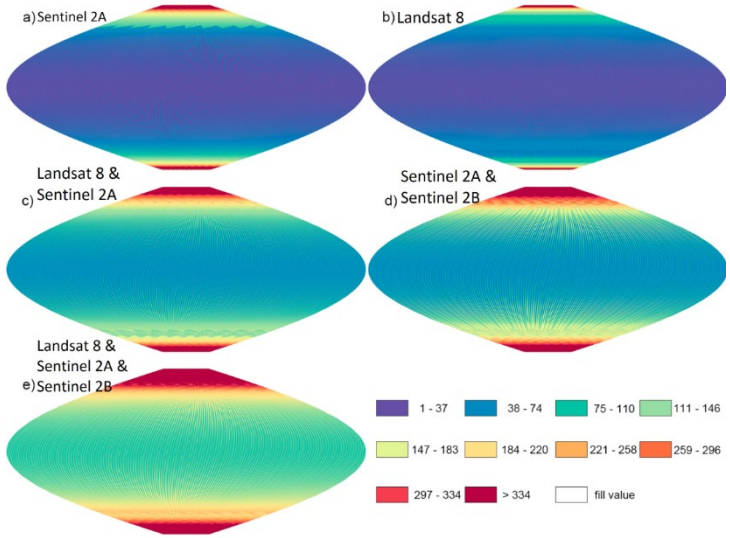
➢ **Why is big data so BIG in our case?**

https://landsat.usgs.gov/landsat-project-statistics



- Landsat 8 captures more than 700 scenes a day
- For the continent of Africa from 01/01.2014 to 31/12/2016 there are 77 528 scenes = 3.14 trillion pixels

- When counting Landsat and both Sentinel A and Sentinel B -> mean of 162 images per year at any point



Li, Jian, and David P. Roy. "A global analysis of sentinel-2A, sentinel-2B and Landsat-8 data revisit intervals and implications for terrestrial monitoring." *Remote Sensing* 9, no. 9 (2017): 902.

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Big data = cloud computing

- **Why is cloud computing the solution for EO?**
  - No need to acquire expensive hardware
  - It already has the data you need, or it makes data acquisition very easy
  - It provides some already built in tools for processing

- **Most popular platforms for geospatial analysis:**
  - Google Earth Engine
  - SEPAL

SEPAL-FAO

System for Earth Observation Data Access Processing and Analysis for Land Monitoring

➢ What is SEPAL?

- Tool that helps producing information from remote sensing data
- Autonomous
- Uses supercomputing power
- Open source
- Software maintenance

➢ FAO Objectives

"Improve data access and delivery of satellite data and forest information products to enable the autonomous national capacity to monitor land surface"

SEPAL-FAO

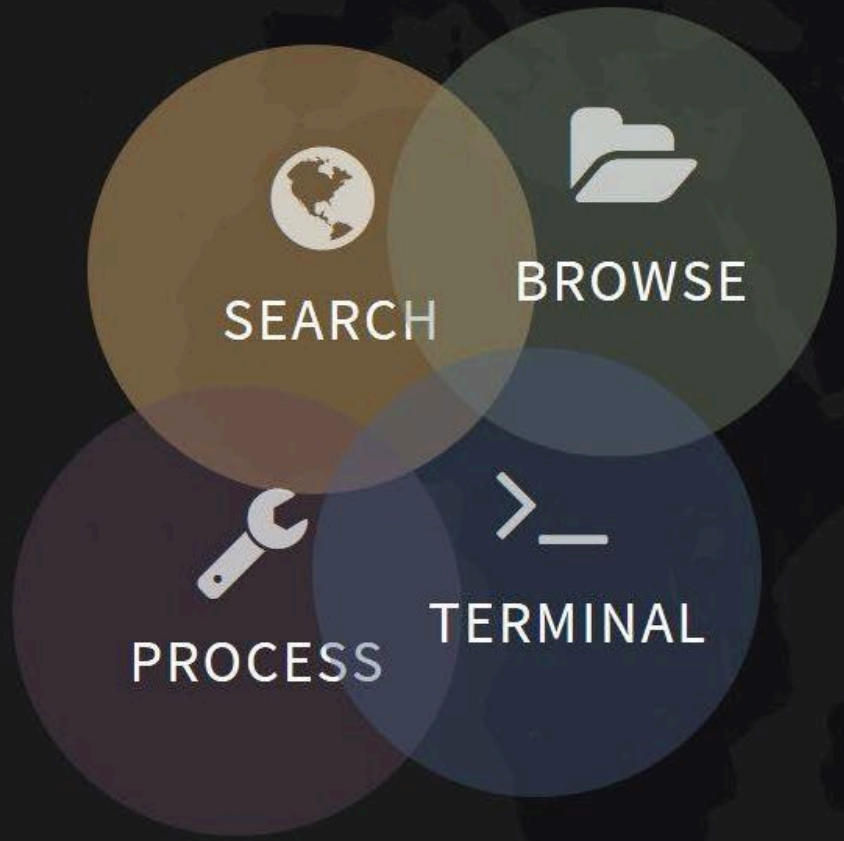
➢ What can you do on it?

- Search visualize and arrange data as you need:
  - Mosaics
  - Time-series
  - Change detection

- Process data as you need using RStudio

- Explore data using the custom tools
  - BFAST explorer
  - Time-series analysis
  - SAR toolkit
  - MSPA (Morphological Spatial Pattern Analysis)
  - Stratified Area Estimator

Practical demonstration



Take home message

We have the data...

More and more research focuses on developing or improving geospatial analysis tools to obtain *information* from satellite imagery

...We have produce the information

Questions?

Thank you!

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