

Earth Observation user workshop

hybrid

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Eetu Jutila (SYKE) and Samantha Wittke (CSC), 16.05.22

CSC - Finnish expertise in ICT for research, education and public administration

Practicalities



- Let's discuss a lot
- Many presentations, but please ask questions
- Mentimeter: www.menti.com; 2773 8461
- Accessibility in hybrid event
- Slides: https://a3s.fi/gis-workshops/22_EO_workshop/EO_intro_slides.pdf , https://a3s.fi/gis-workshops/22_EO_workshop/EO_at_CSC_slides.pdf





- Introduction round
- EO data and processing (general)
- CSC resources for EO
- Use cases of EO research using CSC resources
- Discussion time / Ask us anything

Introduction



- Who are you?
- What is your research about?
- voluntary networking: add your email-address for others to contact you. -> www.menti.com; 2773 8461

Geoportti and CSC





Getting started using EO



- 1. What data are we talking about?
- 2. Which data to use?
- 3. Where to get the data?
- 4. How to get the data?
- 5. Processing EO data



What is your level of experience with...

- optical EO
- RADAR/SAR
- -> www.menti.com; 2773 8461

EO tutorial draft



[https://hackmd.io/@GeospatialCSC/EO_tutorial] (https://hackmd.io/@GeospatialCSC/EO_tutorial)

EO data





Credit: ESA Phi lab

How to decide which data to use?

What information is needed?

- structural vs spectral characteristics
- details
- time series

Budget?

Handling

- experience
- pre-processing needs

What kind of EO data are you interested in?

- optical multispectral
- hyperspectral
- RADAR/SAR
- Lidar
- other
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Where and how to get data?



- Mosaics, Markus Törmä (SYKE)
- Geocubes, Lassi Lehto (FGI/NLS)
- FinHub, Mwaba Hiltunen (FMI)
- Paituli
- Other data sources
- Considerations

Mosaics

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Markus Törmä (SYKE)

Geocubes

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Lassi Lehto (FGI/NLS)

FinHub

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Mwaba Hiltunen (FMI)

Paituli

www.paituli.csc.fi

- ~13 TB data with webbased data preview
- spatial data download service
- some EO data products, possible reference data
- open to anyone, unrestricted access
- includes historical versions of datasets
- not limited to Finland

Other data sources



- Copernicus Open Acces Hub
- Earth Data NASA
- USGS Earth Explorer
- Alaska Satellite Facility
- List at Geoportti
- our EO tutorial

Download vs data and processing platforms



- Puhti, Google Earth Engine (GEE), Amazon Web Services (AWS), Sentinel Hub, DIAS-services, ...
- setup
- costs
- efficiency
- availability

What to consider when choosing a place to get data from?

- download methods
- costs
- license

What to consider when choosing a method to download data?

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- Web interface or other Graphical User Interfaces (GUI)
- visual checking
- search parameters
- Application Programming Interfaces (API)
- scripts
- file lists



Our suggestion

- Search in web interface
- Download via script
- sentinelsat (Python)

How to process the data?



- Graphical User Interfaces (GUI)
- Command Line Interfaces (CLI)
- own code: Python/R/Julia/Matlab/...

Graphical User Interface - GUI



- Good for testing and prototyping workflows and visualization of the results
- Problems with reproducability
- Possibility to create models/graphs and export them as scripts
- Free and open source options: SNAP, QGIS, OrfeoToolbox (OTB), ...

Command Line Interface - CLI



- No need to code (but it helps)
- Manuals/documentation
- Acces to super- and cloud- computing
- Eg. GDAL, FORCE, SNAP GPT, OrfeoToolbox (OTB), ...

Python/R/Julia/Matlab,...



- Flexibilty
- Reproductibility
- Parallellization
- Learning curve
- Good community support and tutorials
- Many different options and packages for EO
- Access to super- and cloud- computing

A few common EO processing steps

Optical multispectral

- atmospheric correction -> Sen2cor, FORCE, OTB, ...
- cloud identification and masking -> FORCE, SNAP, Python (s2cloudless), R (sen2r), ...
- calculation of (vegetation) indices -> raster calculator / band math / map algebra: QGIS, SNAP, Python (rasterio, numpy), R (sen2r), ...
- zonal statistics -> QGIS, Python (rasterstats), ...

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A few common EO processing steps

RADAR

- Radiometric Calibration
- Terrain Correction
- Inferometry
- Polarimetry
- -> SNAP, sarpy, OTB etc.

A few common EO processing steps

Any

- download -> Python (sentinelsat), R (sen2r), ...
- mosaicing -> Python (sen2mosaic, sen1mosaic), ...



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What software do you use and for what?

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