



BDA for agricultural monitoring using Copernicus Sentinels and EU open data

EAP progress review - 8 April 2020

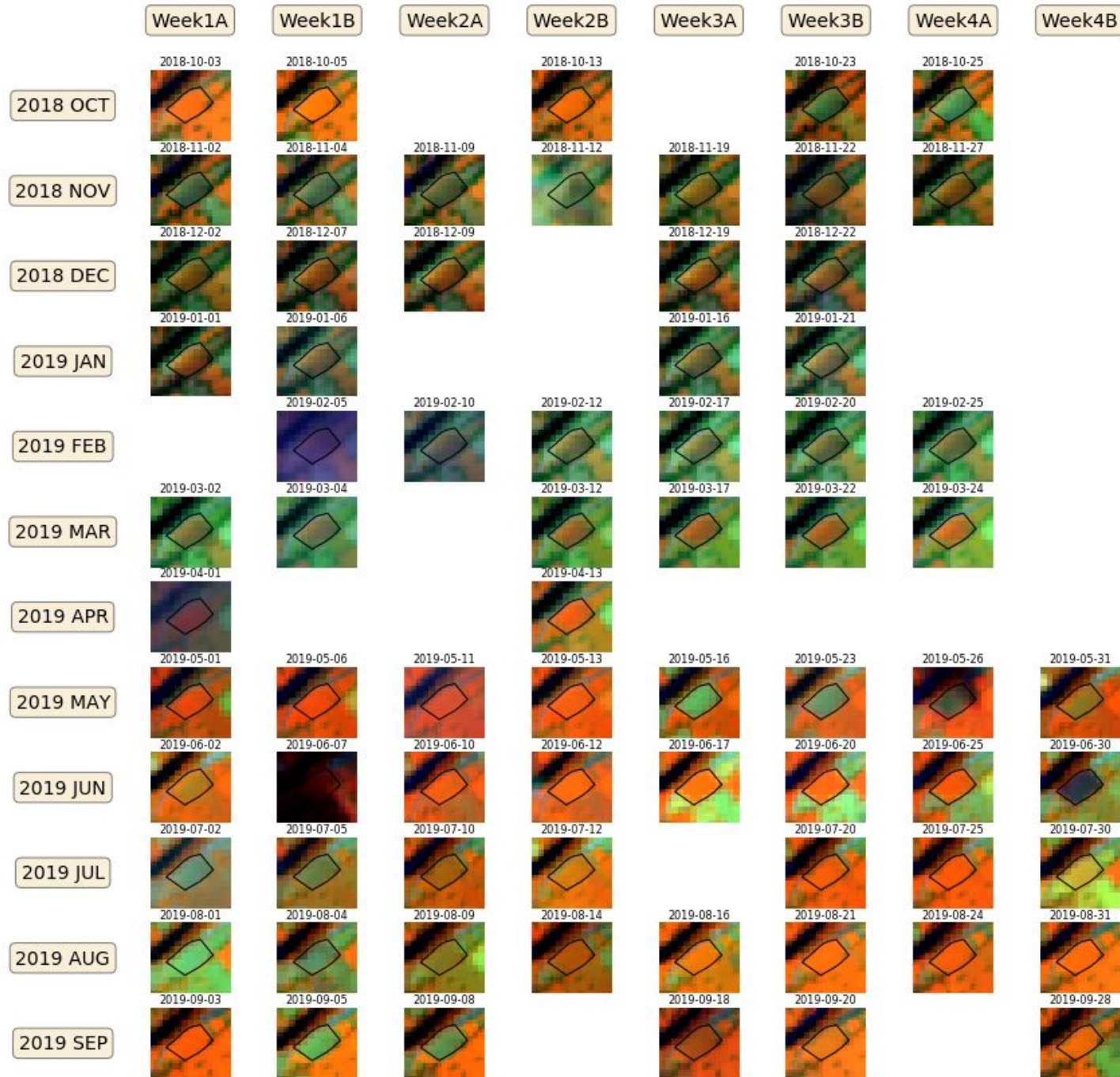
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Joint Research Centre*

Overall objectives

- show how federated EOSC resources can facilitate a range of Sentinel data applications across **agricultural** user domains (science, public, private)
- demonstrate the use of advanced Big Data Analytics approaches applied to multi-annual high resolution Copernicus Sentinel time series and EU open access reference data sets
- project the EOSC as the reference platform that will host the **permanent Sentinel data archive**, so that access by European science users will be guaranteed on a European e-infrastructure

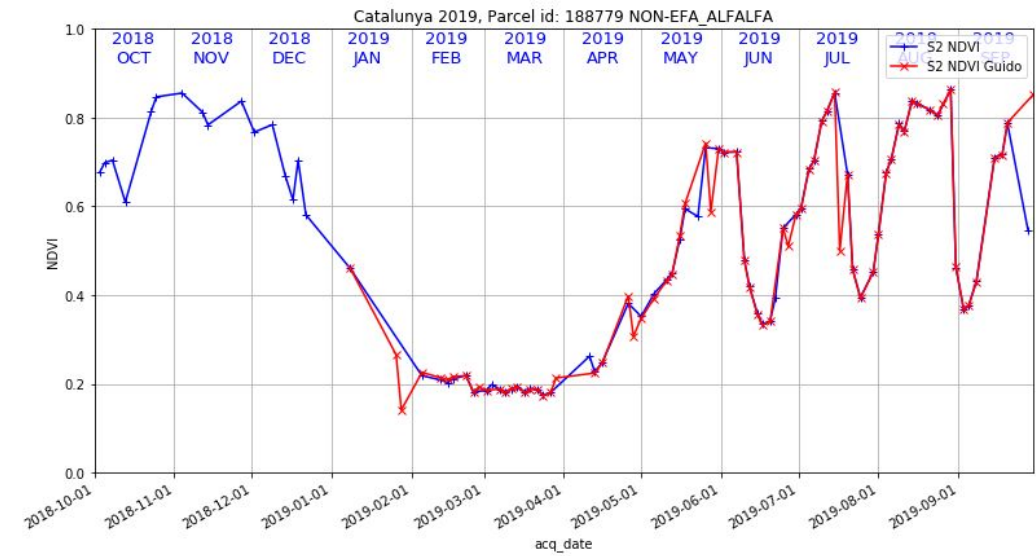
Use cases

- Using Sentinel-1 and Sentinel-2 time series for outlier analysis in CAP farmer declarations. Full resolution, full territorial coverage. Application of machine learning techniques. Prototyped on DIAS (**public**).
- Extension of the Groen Monitor (groenmonitor.nl) with Sentinel-1 time series for crop phenology monitoring and specific crop management practices. Special emphasis on grassland (**science**)
- Correlation of phenometrics derived from Sentinel-2 with other sources, such as temperature-driven phenological models, and ground and/or volunteered phenological observations (**science**)
- Monitoring inter-regional variability in derived indicators for cash crops establishing robust statistical estimators (**private**)

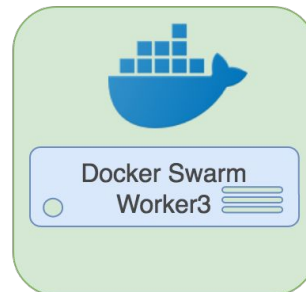
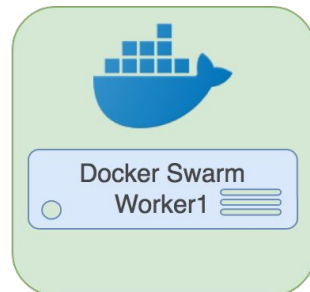
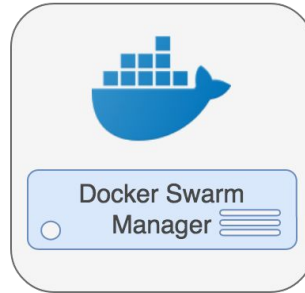
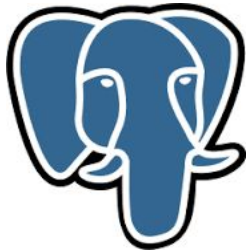


RESTful services

- Serves specific use patterns
- Selection of localized time series
- Selection of (small) image subsets, for visualization and client-side analysis
- Benefit from parallel execution on cloud instances



Open Source software components used



Status update

- Resources set up and in full use, no current issues
- NRW2019 sets processed to CARD and extracted for all parcels (completes data sets for 2018 and 2019)
- Ad-hoc JRC request for small Spanish area for 2019 processed.
- Uptake by science partners somewhat lackluster
- Internal JRC team and public and private use partners NLD very active.

- RESTful server (flask) has become an essential element for access and processing!
- Integrates easily with client-side scripts, Jupyter notebooks
- EGI JupyterHub tested, some software components install issues

Issues

- WIKI access works, more materials to be added
- RESTful service requires some management (cache, scaling)
- We had to install ip_blocker in flask, because continuous hacking efforts

- Multi-user access to EGI Jupyter notebooks to be worked out
- Covid-19 related delays in user uptake, but acceleration of development efforts.
- Presentation at “EO and Agriculture under pressure” workshop, ESA-ESRIN, postponed to autumn

Next steps

- Online training on RESTful services (after Easter)
- Multi-user Jupyter Hub of EGI (with Enol)

- Preparation for 2020 data processing
- Extend client-side image processing of RESTful data extracts
- Migrate some of that to server side (using k8s)

- Further integration of machine learning and data analytics (with partners)
- Extending machine learning to image data (e.g. instance segmentation)
- Testing of new data organisation and access on CESNET block store

Thank you

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