



BDA for agricultural monitoring using Copernicus Sentinels and EU open data

EAP progress review - 16 July 2020

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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

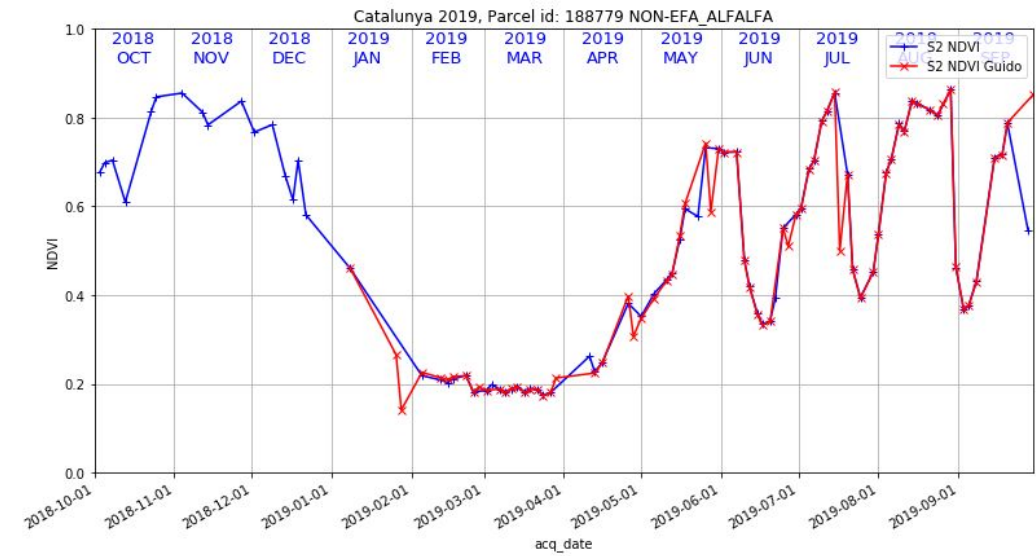
Use cases

- 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**)

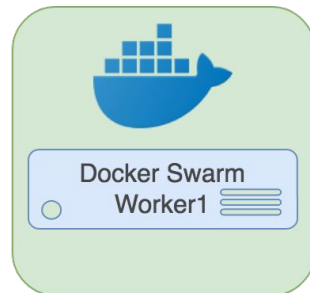
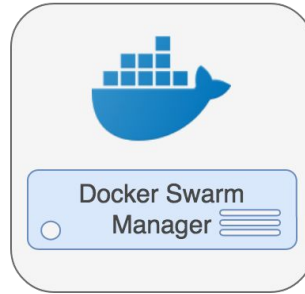
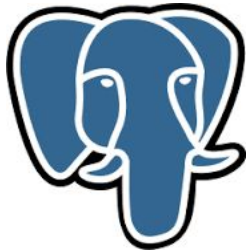


RESTful services

- 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.
- EODC use for dedicated Sentinel-1 processing for “row crop” detection
- EAP is parallel to functionalities used in EU Member States
- 9 MS are now using DIAS instances, benefiting from EAP dev

- RESTful extended to support client-side post-processing
- Experimental use of Octave (image processing)
- EGI JupyterHub software components installed, reviewing *nbgitpuller* as potential tutorial tool (but we are already *github* centric)

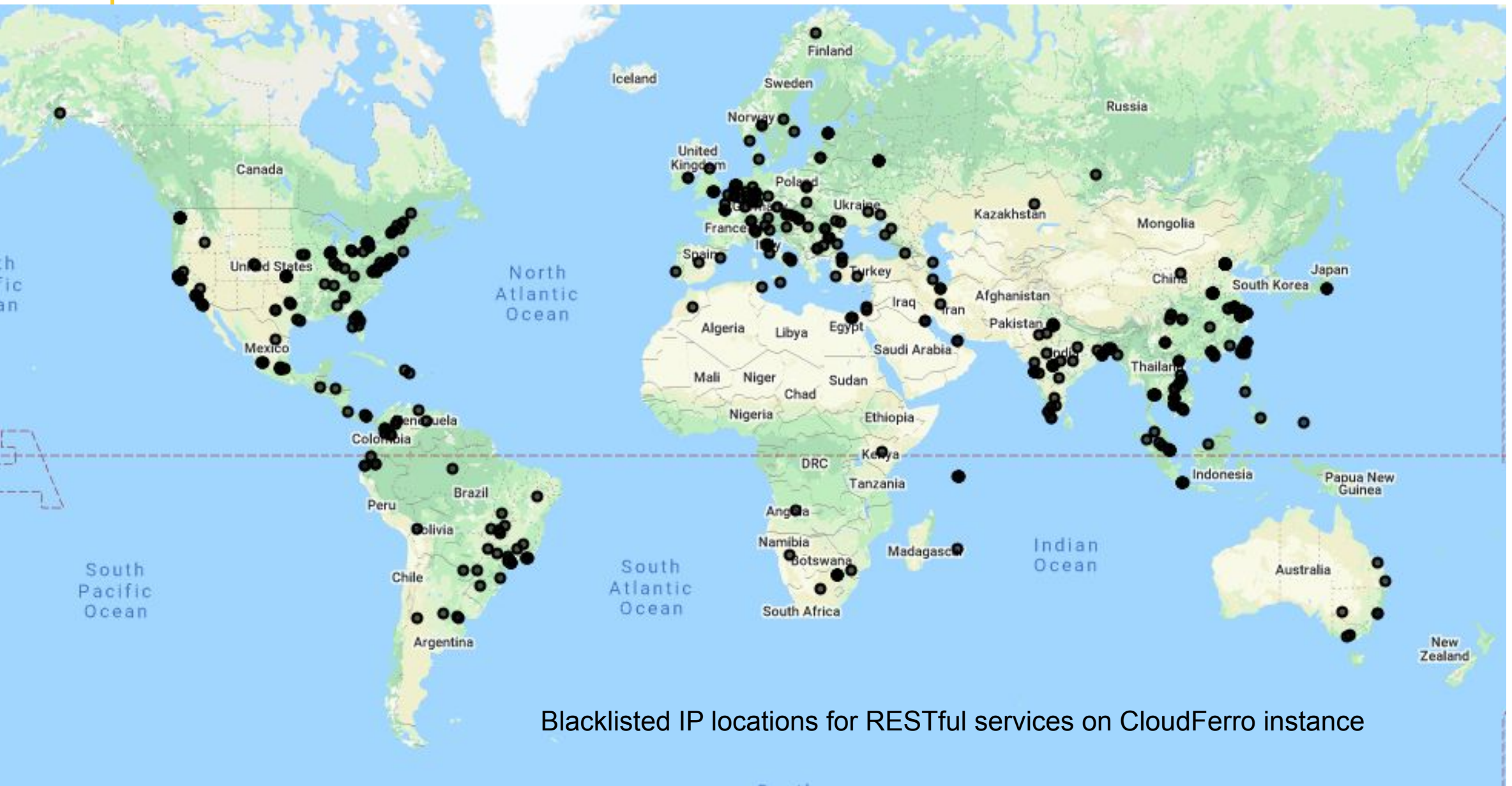


Row crops in Sentinel-1

- Processing S-1 with different offsets
- Highlights coherent scattering
- Occurs in row crops
- Dedicated processing workflow on EODC
- Used to prepare dedicated survey (July 13)
- Peer review article expected

Issues

- WIKI access works, more materials to be added
- Some technical issues with CESNET (connectivity, VMWare SW/HW), certificate mgmt set up on CESNET
- LTS idea on chip generation presented to CloudFerro, no answer yet.
- We have quite an extensive ip_blacklist (see map next slide)
- Presentation at “EO and Agriculture under pressure” workshop, ESA-ESRIN, Q4, *status unknown*
- Abstract to EGI conference (now virtual), deadline now 21/8



Blacklisted IP locations for RESTful services on CloudFerro instance

Next steps

- Online training on RESTful services (video tutorials in preparation)
- EGI JupyterHub review for training purposes (with Enol)
- JRC interest to extend EOSC use beyond EAP (Destination Earth)

- 2020 data processing ongoing, reference data will arrive soon
- 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
- 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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