European Commission

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EO FOR AGRICULTURE UNDER PRESSURE

5–9 October 2020

Summary & Recommendations

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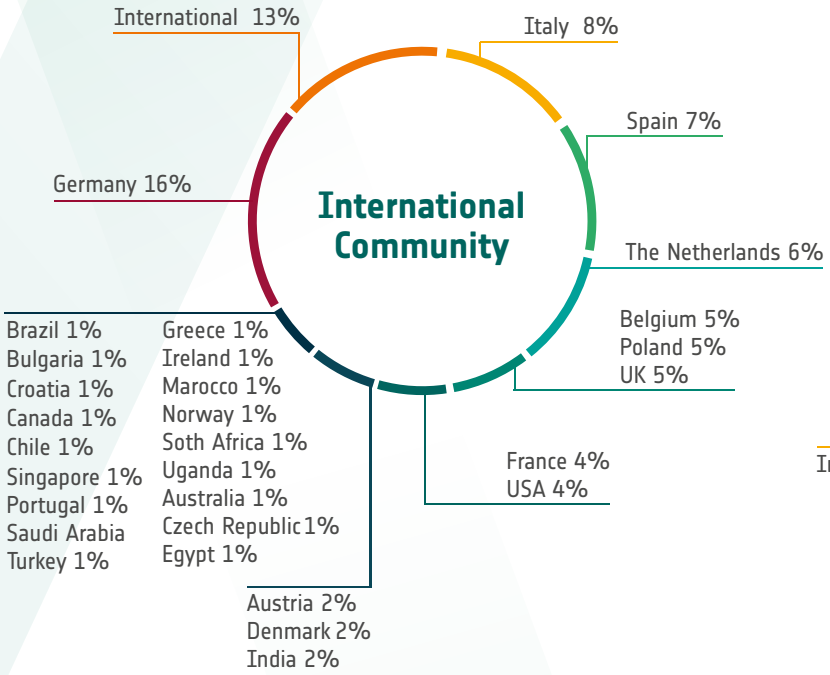
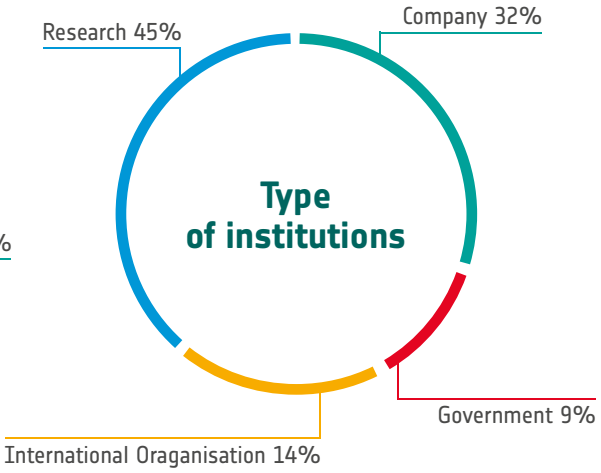
INTRODUCTION

The EO for Agriculture under Pressure workshop was co-organised by ESA and EC as an online event 5-9 October 2020. The workshop aimed at identifying main EO research challenges in monitoring agriculture. This document contains session highlights and recommendations as presented and discussed at the last day of the workshop following the discussions in the sessions and in the virtual discussion rooms

ESA and EC wish to thank all the members of the scientific committee, session chairs and speakers, contributors to the virtual requirements booths and all other participants for their contributions.

PARTICIPANTS

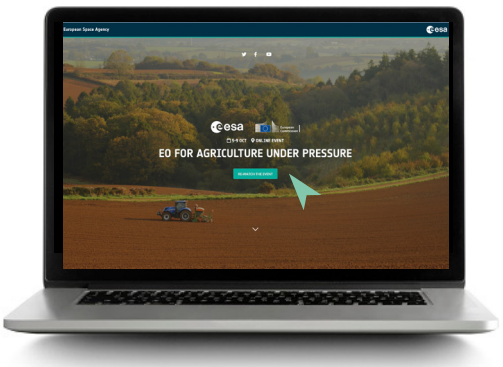




Total participants

Full Workshop online (YouTube videos)

http://eo4agri.esa.int/



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ENVIRONMENTAL IMPACT IN THE CONTEXT OF THE EUROPEAN GREEN DEAL & ITS FARM TO FORK STRATEGY

Chairs

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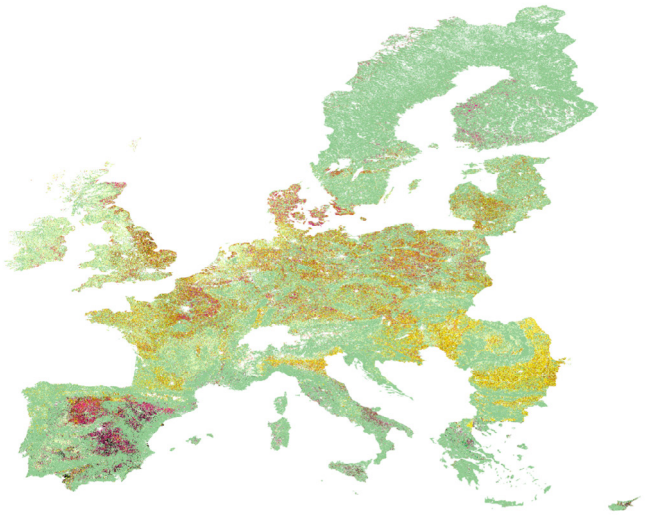


Session Highlights

- Checks by monitoring approach - 22 Paying Agencies are testing Sen4CAP tools
- Some agro-environmental indicators to assess the policy impact have an EO potential for baseline construction and monitoring
- European crop type map based on S1 time series (2018) enabled by EU wide in-situ data (LUCAS)
- Agricultural practices, like a specific water regime for rice, which reduces agricultural GHG emissions, can be efficiently monitored by S1 / Radar data

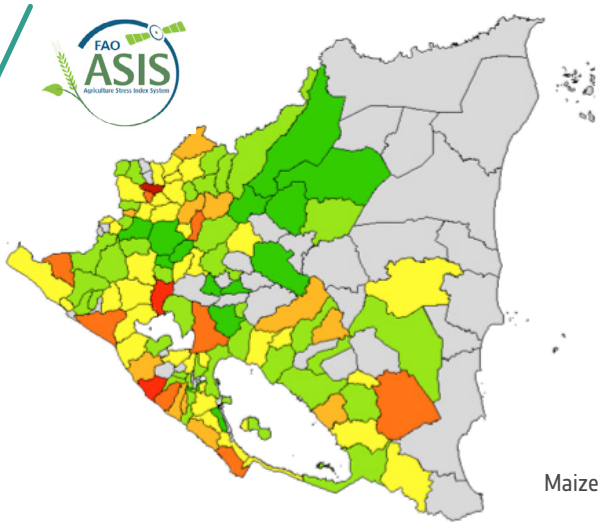
Recommendations and ideas

- Horizon Europe can contribute to a greener CAP through research priorities in earth observation and the Horizon Europe partnership "Agriculture of Data"
- Increased environmental and climate ambition of EU polices (e.g. CAP national strategic plans, DG-CLIMA, DG-ENV) calls for impact assessments.
  -Develop dedicated agro-environmental EO indicators for reporting e.g. soil carbon budget
  -Develop new CAP impact EO indicators aggregating from parcel to continental scale overviews
- Create an harmonised open-source database with in-situ data for crop types and agricultural practices across Europe
- Make accessible time series of EO markers at parcel level for practitioners and developers e.g. in an European Data Space
- Make available Analysed Ready Data sets of Sentinel-1 over Europe and globally

CLIMATE ADAPTATION

Chairs

Jose Moreno, Univ. Valencia
Belen Franch, Univ. Valencia/Univ. Maryland



Nicaragua
>20%
Maize area affected by drought

Session Highlights

- Country specific Agricultural Stress Index System (ASIS)
- Drought forecasting with ASIS 2.5 months in advance
- Predictability and characterization of drought impacts using VI, VOD and SIF S1 monitoring of crop lodging due to extreme weather
- Fluorescence as indicator for vegetation stress
- New Vegetation Productivity Monitoring Facility
- Upcoming EO4Agri project research agenda & roadmap
- Forecasting the impact of potential mitigation actions versus damage assessment for agro-insurance.

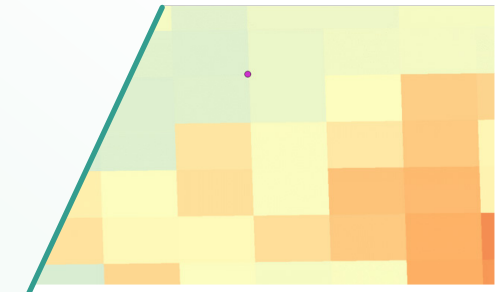
Recommendations and ideas

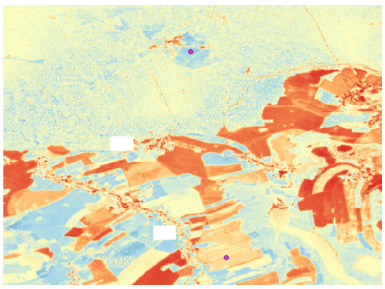
- Lack of in-situ data is main limitation for science development and applications, also in respect to quality check for EO products and services
- Need for a community action at European level to facilitate the availability, archive, distribution, accessibility and quality-check of validation datasets used in agro-services.
- Users will welcome output products more quantitatively validated, with more robustness and credibility for final end-user applications.
- Need of high granularity for EO products at national scale which is now available and should be fully exploited for e.g. drought monitoring.
- Guaranteeing accessibility for global users to local validation data at a global scale is at the moment a challenge: from local case-studies towards general methodologies and assessment methods.
- Exploit new EO techniques for monitoring different kind of stressors, under climate adaptations due to changing growing conditions and frequency of extreme events.

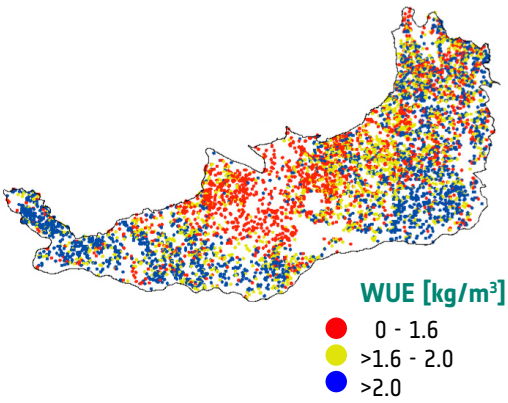
WATER RESOURCE MANAGEMENT AND PRODUCTIVITY

Chairs

Jippe Hoogeveen, FAO
Wouter Dorigo, TU Wien


Sentinel-3 LST


Fused LST



Session Highlights

- WaPRO as continental monitoring system (250 - 30m)
- Need for local knowledge on causes for interpretation of results
- S2-S3 synergy for downscaling ET validated over 11 flux towers
- Need for ET for CAP, Green Deal, Water Directive, SDG 6.4.1
- Agro-ecological modelling for optimising crop management & for scenarios understanding of policies impacts
- Early warning ASAP – visualization of S1&2 for local crop status

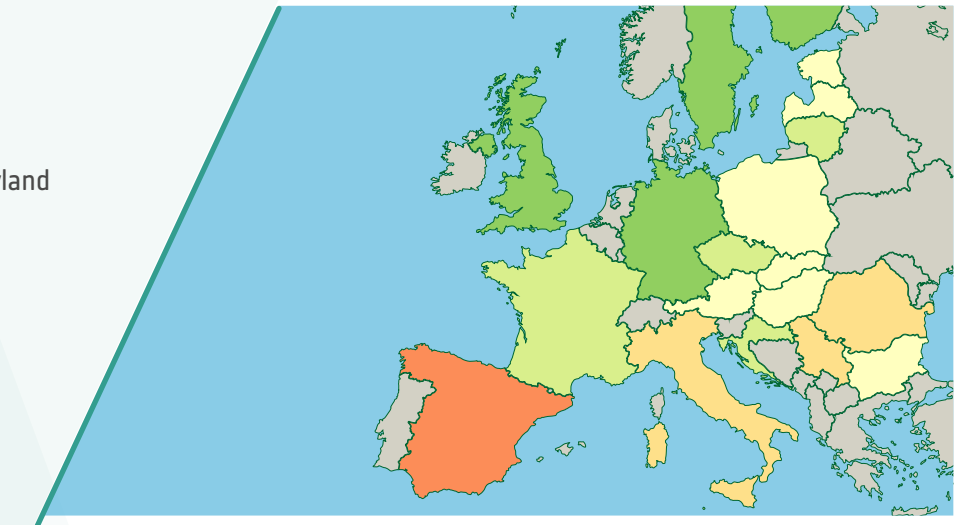
Recommendations and ideas

- Integration of Copernicus Sentinels and services in WaPOR continental production, upscaling to global coverage
- Need for capacity building to empower national users to interpret and exploit HR water productivity information
- Requirement for LST at field scale and high frequency for reliable ET time series at field scale – LSTM mission future game changer
- Interest in higher level products: irrigation water needs/scheduling, Water Use Efficiency, drought impact & mitigation
- Early Warning: Need for visualising EO information making information available to practitioners - user friendly, free/open

FOOD SECURITY AND SDG 2, SUSTAINABLE AGRICULTURAL PRODUCTION AND YIELD PREDICTION

Chairs

Alyssa Whitcraft, Univ. Maryland
Marie Weiss, INRAE



Europa 2020 Wheat

Session Highlights

- Definition of GEOGLAM Essential Agricultural Variables & related research agenda
- Pilots for integration of EO in national agricultural statistics - Increasing efficiency, granularity, timeliness
- Crop Monitor at global-regional-national scale following a co-development approach
- European commercial wheat yield forecasting based on crop growth modelling & crop type mapping EO products adapted to smallholder farming value chains

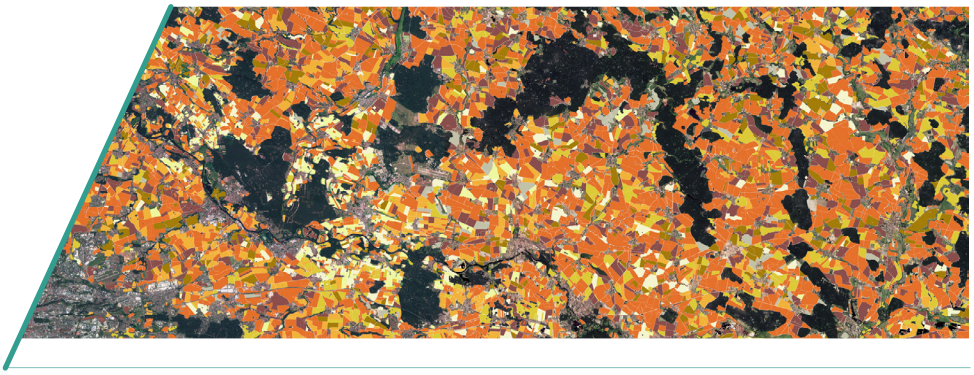
Recommendations and ideas

- Develop EO products for Essential Agricultural Variables at global scale, e.g. annual regional/global crop type maps, crop status and yield monitoring
- Interest in production of level2/level3 EO products, e.g. products directly used in crop models
- Develop EO products dealing with mixed crops species & agroecology for sustainable agriculture
- Need for higher resolution images (e.g. 1 x 1 m) to tackle small size parcels.
- Monitoring of agricultural practices for soil conservation to improve sustainable agriculture
- EO products for conservation agriculture, e.g. non-tillage practice is one of the key practice
- EO support for assessing soil carbon budget
- Develop tools for ensuring Data privacy for accessing national statistics in the cloud
- Interest in establishing to best practices and standards for data sharing e.g. GEOGLAM
- Methods for transferability between local/national/worldwide forecasting and the consistency between high to medium resolution products?

FUTURE AGRICULTURAL RESEARCH QUESTIONS IN EO: POSSIBLE ACTIONS IN HORIZON EUROPE / FUTURE-EO WHAT AND HOW?

Chairs

Espen Volden, ESA
Marjan van Meerloo, EC DG-RTD



Session Highlights

- World's largest EO program Copernicus expanding to respond to user requirements - Copernicus Service evolution and downstream sector benefit from EC & ESA R&D programs

- Horizon Europe will support EO for agriculture in many ways including Cluster 6, Missions & new Partnerships, e.g. Agriculture of Data (RTD & AGRI lead), and via GEO

- ESA's FutureEO program will support R&D exploiting existing missions and preparing for upcoming Copernicus and ESA missions, including through the new ESA-EC Earth System Science Initiative

Recommendations and ideas

- Further coordination by institutions funding EO R&D is welcomed
- Connect Space and ICT stakeholders communities and exploit synergies between Copernicus, Galileo/EGNOS and other programmes including non-space
- Funding of collaborative projects with research and development in focus should be continued; coordination activities are equally needed
- Regular EO for agriculture community gathering events are useful