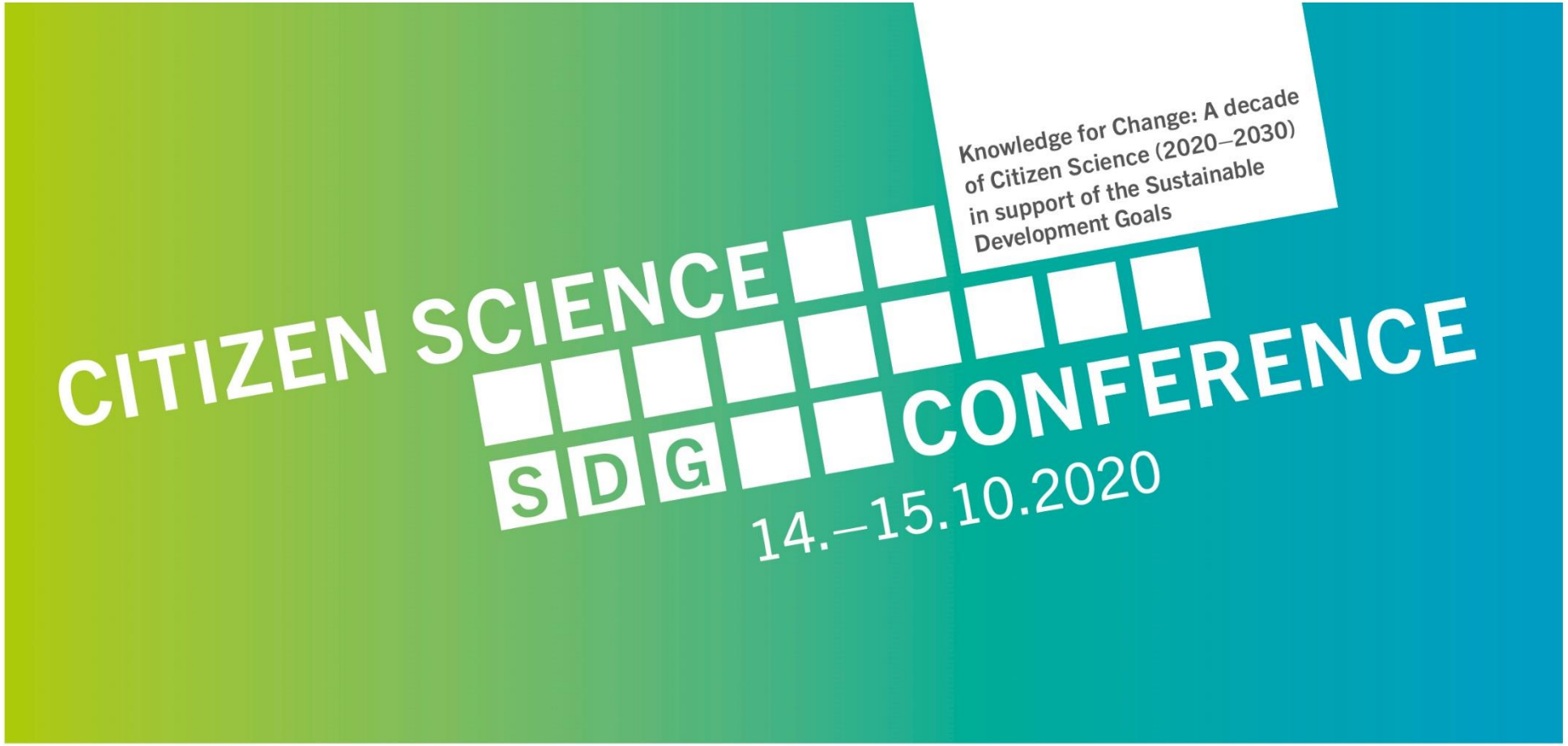

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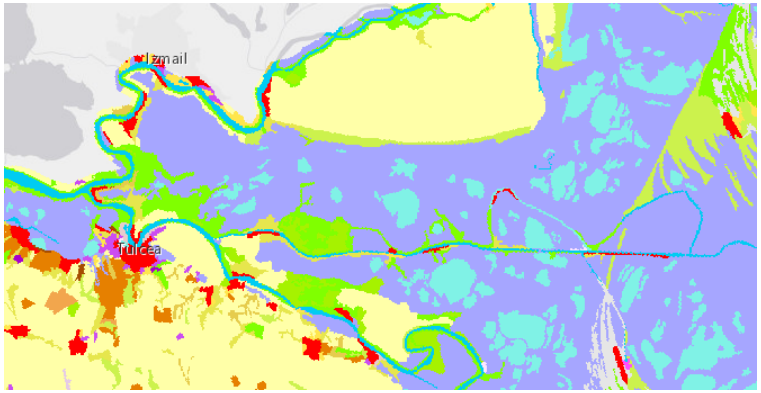
Citizen Observatories for Earth Observation: From examples to best practices

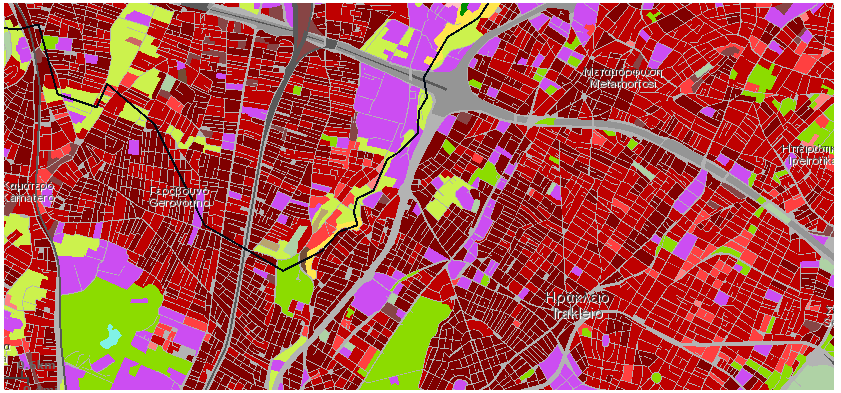
Valantis Tsiakos, Joan Masó, Linda See, Uta When, Catherine Cotton, Elizabth Gil-Roldán, Andy Cobley, Mel Woods, Drew Hemment, Rianne Giesen, Yannis Kopsinis, Athanasia Tsertou, Angelos Amditis, Inian Moorthy, Tobias Sturn, Matej Batic, Linda See, Grega Milcinski, Steffen Fritz, Mathias Karner, Juan Carlos Laso Bayas, Dilek Fraisl, Luca Zappa, Angelika Xaver, Wouter Dorigo

Citizen Observatories for Earth Observation

- Need for automatic assessment and monitoring of environment
- Importance to detect seasonal changes, natural disasters, and human-related area development
- Scarce updates of existing products, timely data validation procedures



Corine Land Cover product of 2012
for Danube Delta-Romania,
[Source: EEA]



Urban Atlas product of 2012
for Kifisos Basin-Greece,
[Source: EEA]

Citizen Observatories for Earth Observation

- Connecting citizen science data with conventional in-situ or remote sensing sources can be challenging
- Reasons:
  - the different nature of **sensors** used,
  - the lack of data **continuity**,
  - the difficulty in discovering and **accessing** data
  - the different methodologies for **data quality** assurance.

WeObserve CO4EO activities aimed to explore success stories and showcase best practices where citizen science data are combined with conventional sources of Earth observation data, including both remote sensing and in-situ.

Citizen Observatories for Earth Observation

- 1st CO4EO Workshop “Citizen Science and Conventional Earth Observation” was organised in the context of the 39th annual symposium of EARSeL, in Salzburg, Austria, on 2 of July 2019.

✓ Audience:

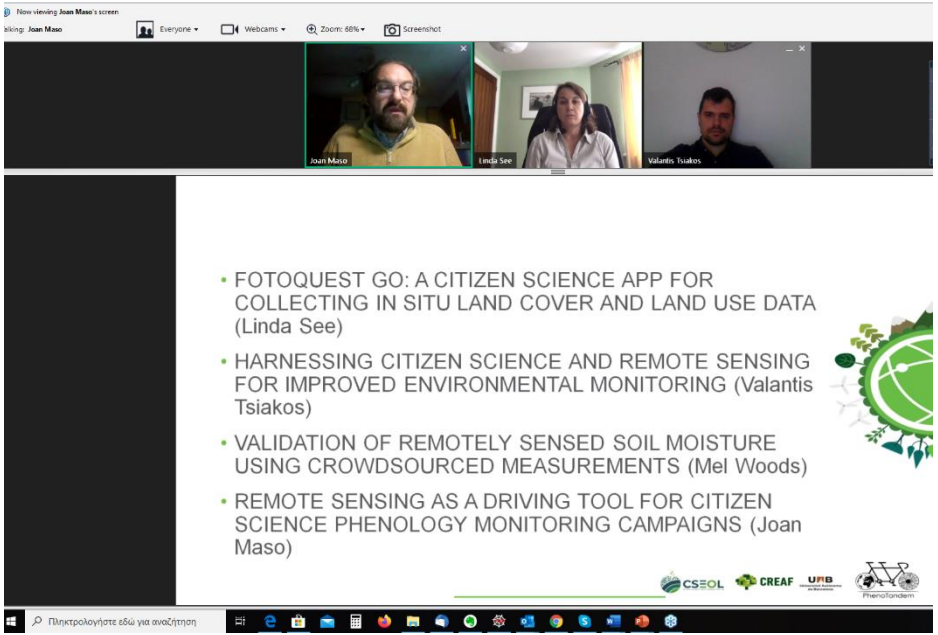
EO specialists, researchers, IT industry (computer vision, geo-information), policy officers

✓ Conclusions/ Discussions:

- Data collection approach
- CS data accessibility and quality assurance
- Sustaining the interest of volunteers

Citizen Observatories for Earth Observation

- CO4EO Webinar “Citizen Science in a remote sensing context” was organised on May 6 2020.



✓ Audience:

More than 50 participants joining the webinar

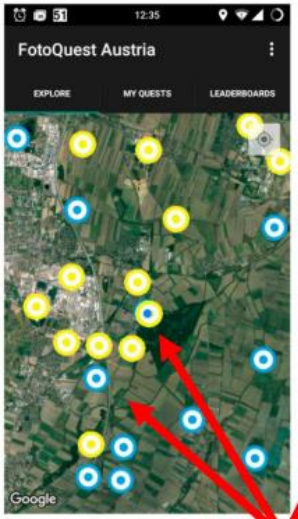
✓ Conclusions/ Discussions:

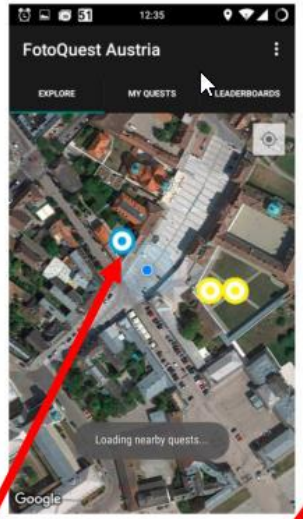
- Applicability of described approaches and tools in other cases
- Linkage with the Copernicus in-situ component
- Activities towards the selection of a pilot to illustrate the potential of citizen-science as a contributor to Copernicus.

Collecting In Situ Land Cover and Land Use Data

LandSense
A Citizen Observatory and Innovation Marketplace for Land Use and Land Cover Monitoring

- Engaging citizens to contribute with in-situ data and complement the Land Use Cover Area frame Survey (LUCAS)





Available locations to visit and number of points to earn by visiting

Improving Cloud Detection in Satellite Imagery

LandSense
A Citizen Observatory and Innovation Marketplace for Land Use and Land Cover Monitoring

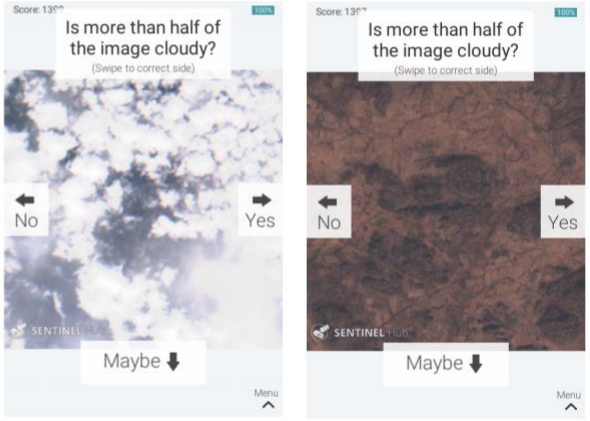
- Clouds are an unavoidable and persistent issue in satellite-based optical imagery
- Need for accurate and automated cloud and cloud shadow detection algorithms in the preprocessing phase

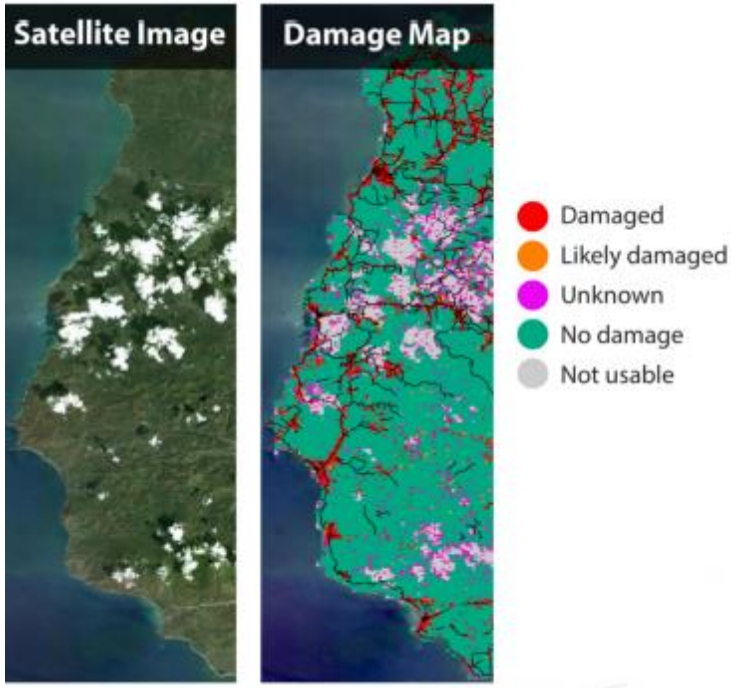
Picture Pile – Cloud Detection

97 volunteers

27K unique images

272K validations

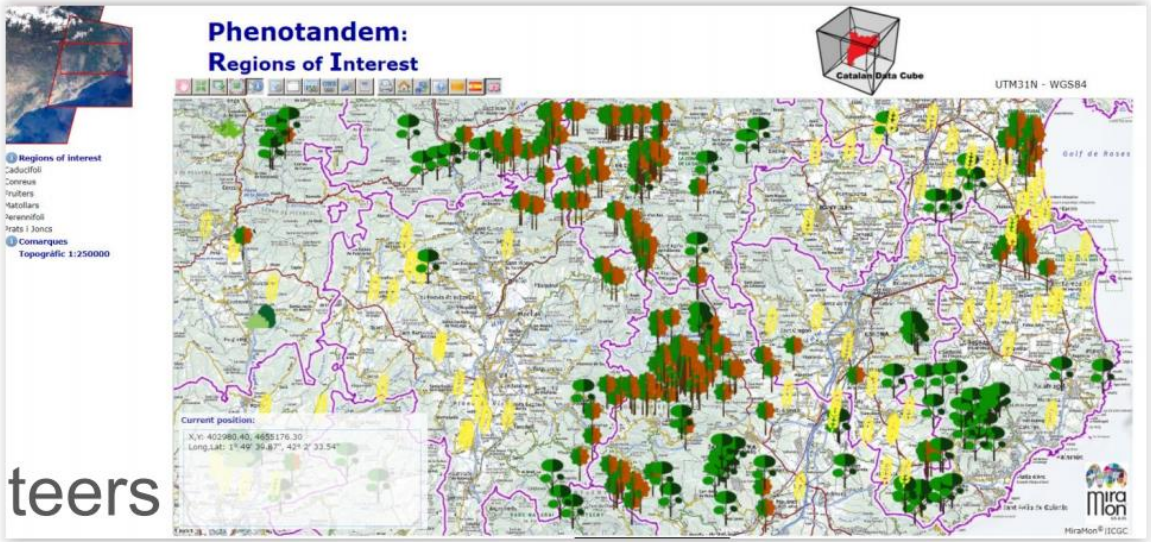




Citizen Science Phenology Monitoring Campaigns

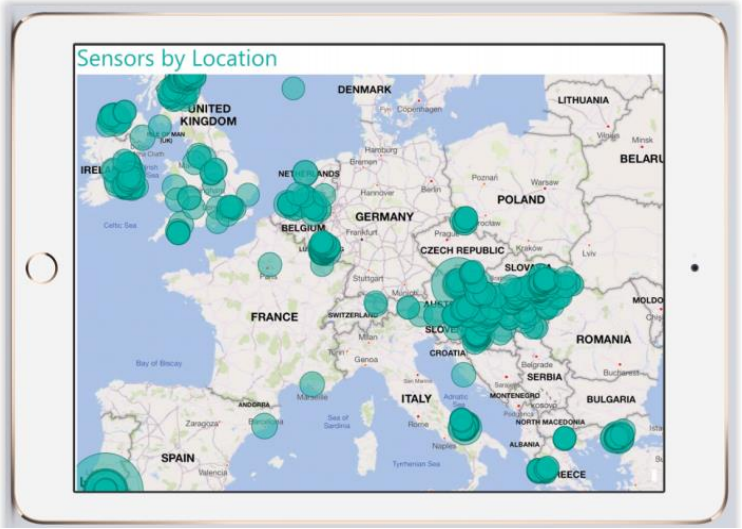
PhenoTandem

- Detect the phenological dynamics in well known homogeneous habitats
- Use citizen science observations to validate remote sensed Sentinel-2 observations and better calibrate the automated measurements.



Validation of remotely sensed soil moisture

- Crowdsourced observations were used to assess the temporal consistency of various satellite-derived soil moisture products
- It was found that calculating the average soil moisture from all the sensors covering the same satellite pixel results in higher accuracy than employing the most representative sensor.



Land cover maps with improved resolution

- Deep neural network architecture to allow the combination of CS data with EO
  - Assign a semantic class (Scent taxonomy) to each pixel, (i.e. convert the raw data to a semantically meaningful raster map),
  - Convert Scent taxonomy annotated points into annotated areas on the satellite/aerial maps
  - Characterize whole areas for which a land-cover/use description is not available.