

Feedback from ITALY



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PEOPLE-EA, International Workshop,

Athens, 22 & 23 May 2024



Link to EU Regulation



The annual reports on the State of Natural Capital in Italy are drafted by the experts of a Committee set up by law in 2015. The law establishing it explicitly mentions "methodologies defined by the UN and the EU".



ISPRA carried out an experimental analysis of several ecosystem services (wood biomass supply, agriculture, fish, water availability, pollination, flood risk regulation, erosion control, hydrological regime regulation, water purification by soils, habitat quality, carbon sequestration, and recreational tourism) and their change between 2012 and 2018, both biophysical and connected monetary values.



Ecosystem accounts– amending Regulation (EU) No 691/2011 in 2024



An inter-institutional working group consisting of ISTAT, ISPRA, CNR, AGEA and CREA and various universities was established this year with the aim of implementing ecosystem accounts

National System for Environmental Protection (SNPA)

- ISPRA is part of a network known as National System for Environmental Protection, which is made up of 19 Regional and 2 Province's Environmental Protection Agencies (ARPA/APPA), established by Regional Laws.



National System for Environmental Protection (SNPA)

Methodology for the automatic detection of land consumption in Italy through EO

Methodology assumptions

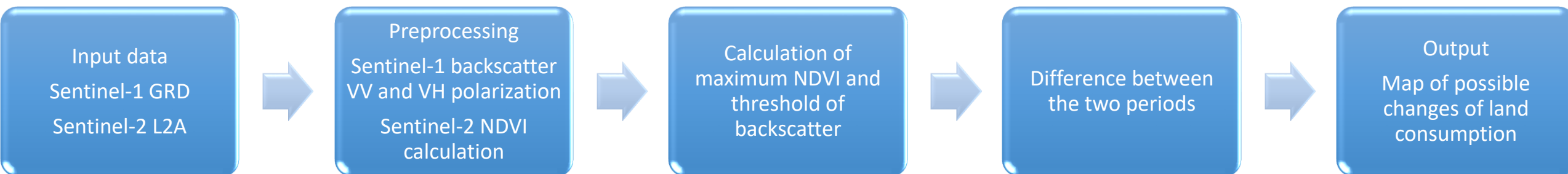
- Land consumption is linked to the removal of vegetation (where present) causing the decrease of values of Normalized Difference Vegetation Index
- Soil consumption due to the construction of buildings and infrastructures can increase the backscatter values detectable by SAR

Input data and processing

- Sentinel-2 images for calculating NDVI differences over the two years for changes involving the removal of vegetation cover
- Sentinel-1 GRD for calculating backscatter differences caused by buildings, infrastructures or construction sites
- Google Earth Engine used to process the data and integrate Sentinel-1 and Sentinel-2 processes to detect changes

Reference

- Luti, T. et al., 2021. Land Consumption Monitoring with SAR Data and Multispectral Indices. Remote Sensing, 13, doi:10.3390/rs13081586.



Italian Forestry Map



Currently available:

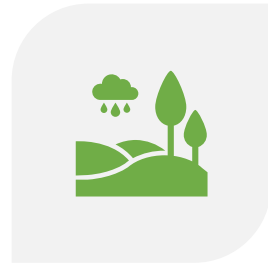
- Local (regional) forest maps
- Inventory data (INFC, IUTI)
- CLC – Forest component (regional)
- CLC - Forestry Component (national/EU)
- Testo unico in materia di foreste e di filiere forestali D.lgs.03/04/2018 n.34

Under development:

- Elaboration of the new **NATIONAL FORESTRY MAP**
- A detailed and functional vectorial representation, resulting from the updating and mosaicing of thematic, regional and local cartographies, based on the most recent AGEA orthophotos to date for the entire national territory, at a geometric resolution of 20 cm.

	Superficie forestale / copertura arborea all'ultimo anno disponibile (ha)	Espansione forestale / copertura arborea (ha)	Riduzione forestale / copertura arborea (ha)	Disturbi forestali / copertura arborea (ha)	Crescita annuale media (ha)	Riduzione annuale media (ha)	Disturbi annuale media (ha)
Uso suolo ISPRA 2012-2021	9.238.783	8.549	21.303		949		2.367
Copertura del suolo ISPRA 2012-2021	13.382.077	10.555	37.066		1.759		6.177
HRL 2015-2018	12.576.461	3.461	43.559		1.154		14.519
IUTI 1990-2016	11.732.622	1.334.398	399.453		43.176	12.525	12.525
Carta espansione forestale 1985-2019	ND	2.801.050	ND	ND	82.384		
INFC 2005-2015	11.054.458	586.925	ND	ND	58.693		
GLC 2015-2019	13.571.531	8.500	27.000		2.125	6.750	
Carta Sentinel 1-2 (2017-2018)	13.614.082	ND	89.596				89.596
Censimento aree incendiate 2004-2020	ND	ND		676.254			42.266
Carta disturbi forestali Francini et al. 2022 (1985-2019) - risoluzione 30 m	ND	ND					261.733 (1985) - 27.923 (2014)
Carta disturbi forestali Francini et al. 2022 (2013) - risoluzione 10 m	ND	ND		57.717			57.717

Forest Condition



FORESTS ARE EXPOSED TO NUMEROUS TYPES OF ENVIRONMENTAL DISTURBANCES, SOME OF WHICH ARE CONSIDERED NATURAL (SUCH AS PATHOGENS, INSECTS OR ATMOSPHERIC AGENTS), OTHERS ANTHROPOGENIC (FIRES, DEFORESTATION OR TIMBER AND LUMBER LOSSES).

IN ADDITION TO THE NUMBER OF DISTURBED HABITATS, THERE ARE ALSO ALIEN ORGANISMS THAT THREATEN DIFFERENT SPECIES OF TREES AND PLANTS PRESENT IN THE NATIONAL TERRITORY.



Forest Condition

The latest Italian forest inventory (2015) recorded that 3.3% of the wooded area was affected by more or less evident damage on a portion of tree cover between 30% and 60%.

Climate change has also fueled, directly or indirectly, the damage caused by fires in recent years. Since the end of the 1990s, the number of fires recorded in Italy has been more than 4,000 events per year; however, there were also years in which the number of fires was considerably higher, between 6,000 and 8,000 cases.

Every year, approximately 60,000 hectares of forests and woodlands have been burned, with an average surface area per event of just over 10 hectares, slowly growing over time.



Forest Condition



In Italy, on the basis of the data obtained thanks to the semi-automatic classification procedure of land cover, it was possible to quantify the reduction in the forest area affected by natural disturbances between 2017 and 2018



It is estimated that the area affected by fires and other forest disturbances between 2017 and 2018 concerned 89,596 hectares. The result shows that 12.4% of the disturbances are due to burned areas, while 87.4% are caused by other events;

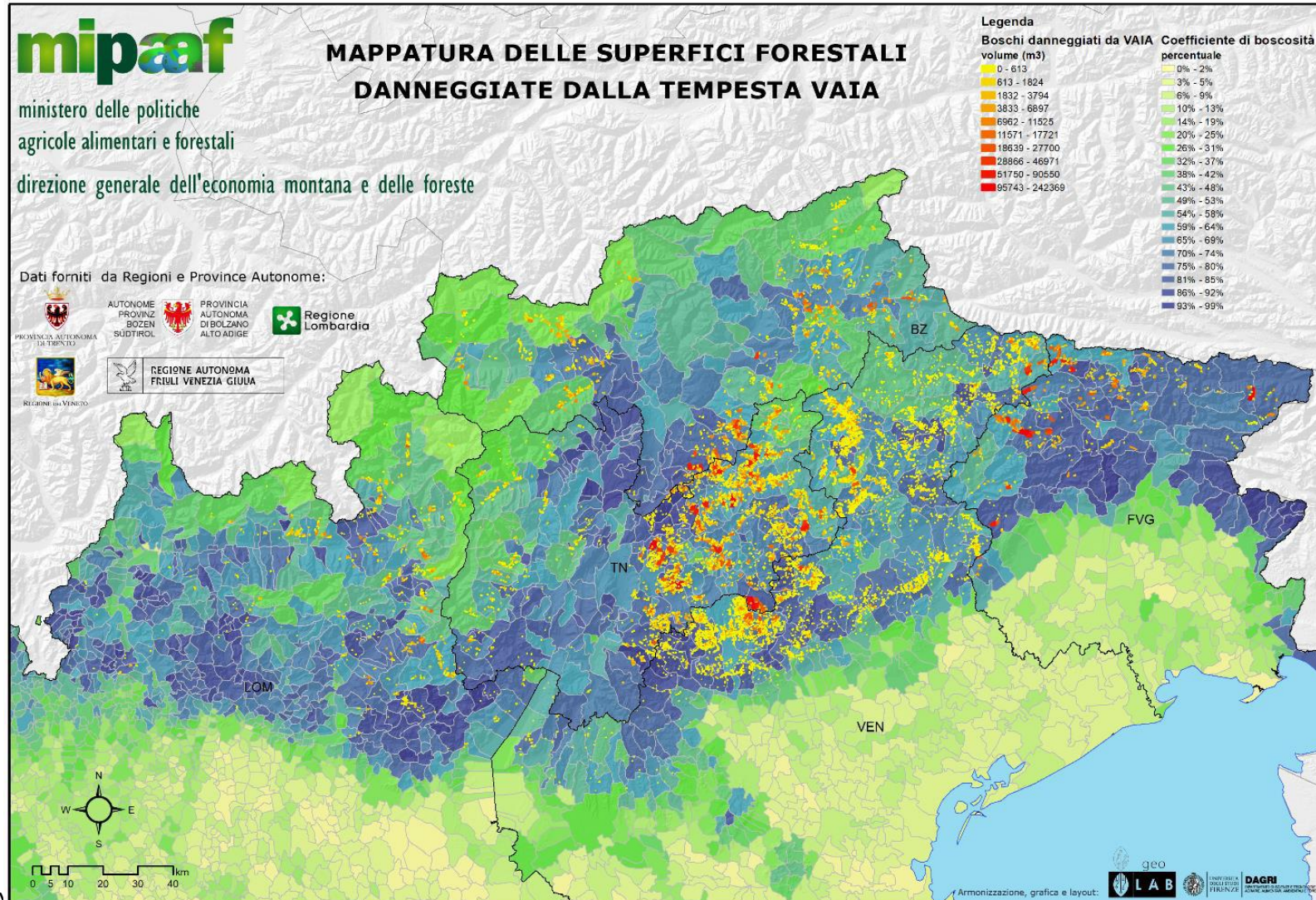


Data are available on tree crashes (VAIA storm) that occurred in 2018 in a fairly large area of woods in northern Italy between Veneto, Trentino, Friuli and Lombardy due to a very strong storm that hit those areas.



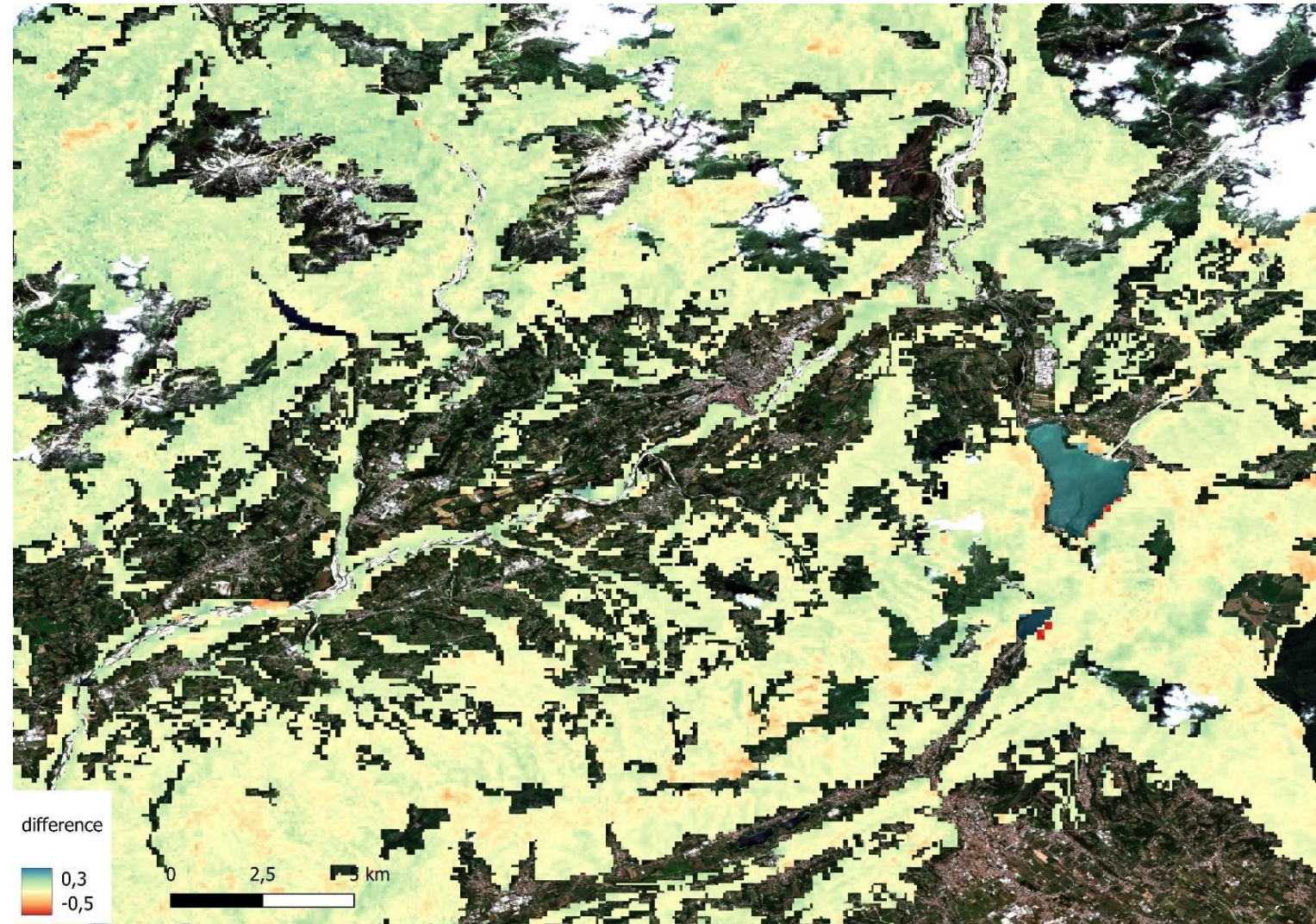
For the Veneto region we have the forest areas that were infested by bark beetle for the years 2021, 2022, 2023

Forest Condition



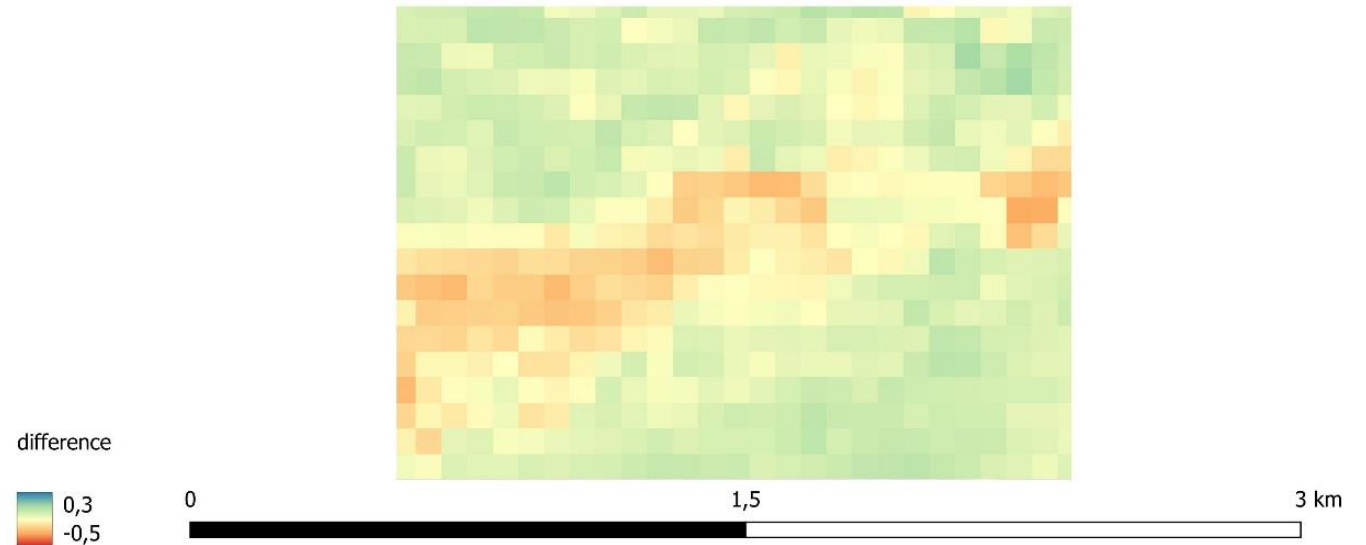
Evaluation of Forest Condition Index

- The application developed by PEOPLE-EA was tested for the calculation of the Forest Condition index for 2018 and 2022
- Then, the difference of values was computed to detect increasing or decreasing values in the time period



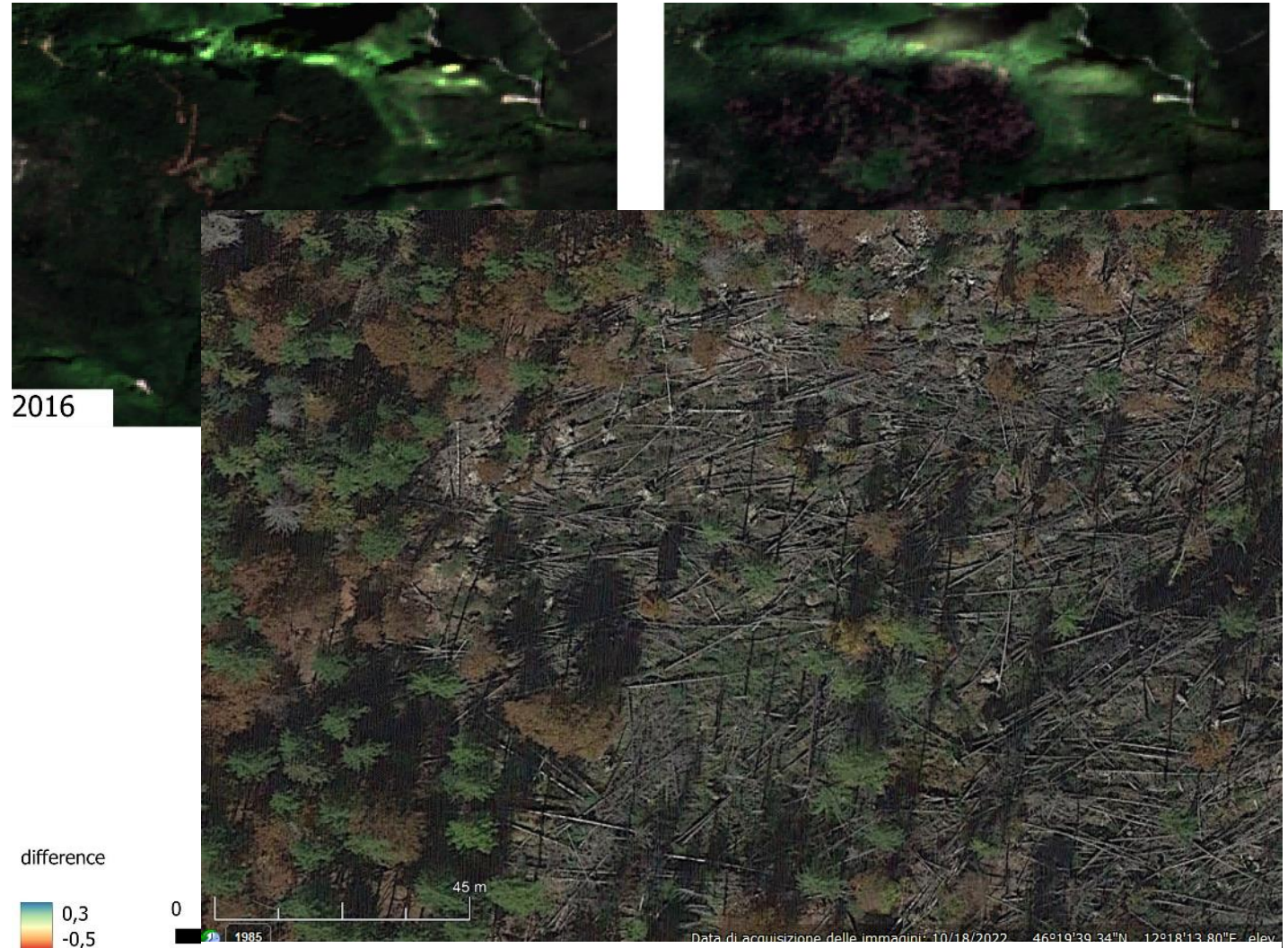
Evaluation of Forest Condition Index

- The forest condition index does not take directly into consideration the phenomenon of forest disturbances due to various phenomena, fires, storms or insect attacks, but some spectral indices used can highlight forest disturbances such as the removal of vegetation
- From the difference raster, several cases where values decreased correspond to the removal of vegetation



Evaluation of Forest Condition Index

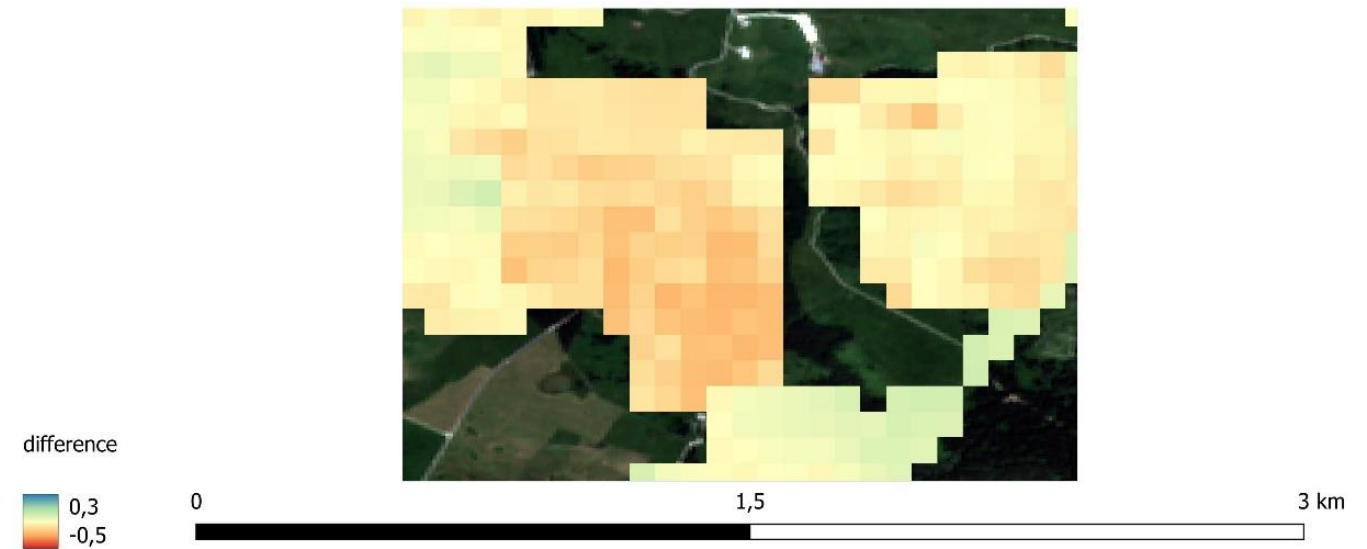
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A zoom over a pixel of the area with decreasing values shows fallen trees (Google image).

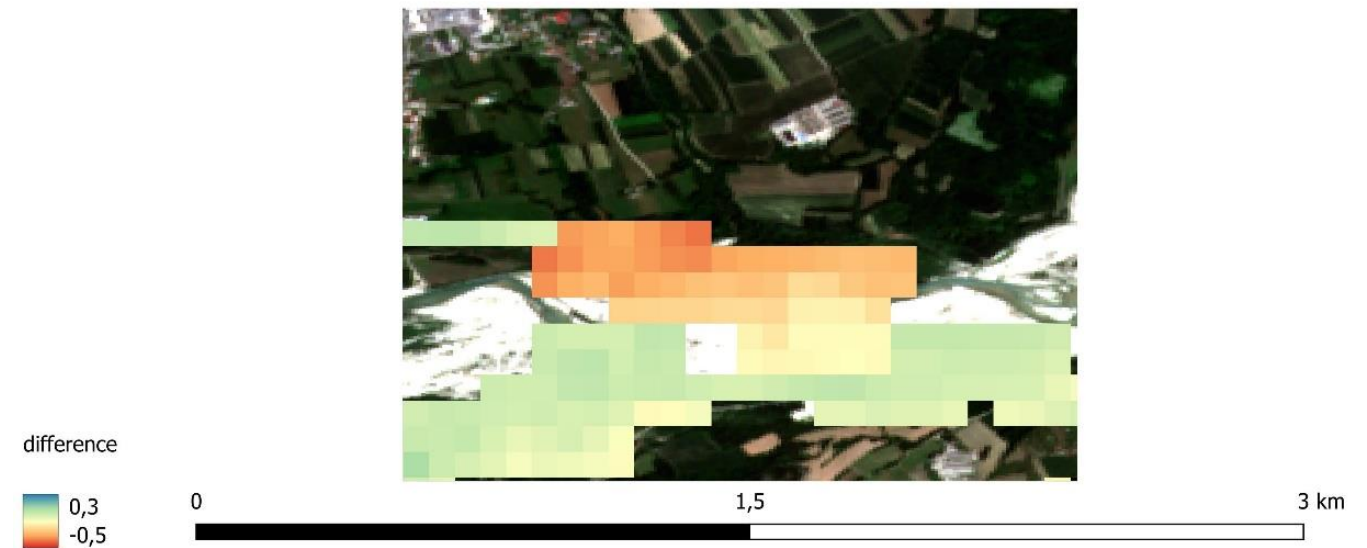
Evaluation of Forest Condition Index

- In some cases, the index was decreasing although no apparent change in vegetation cover



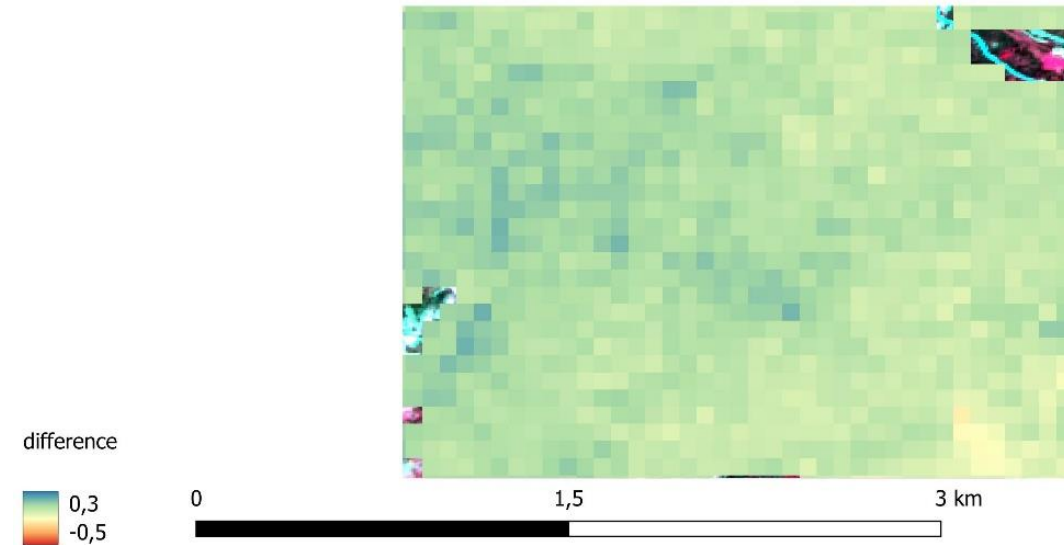
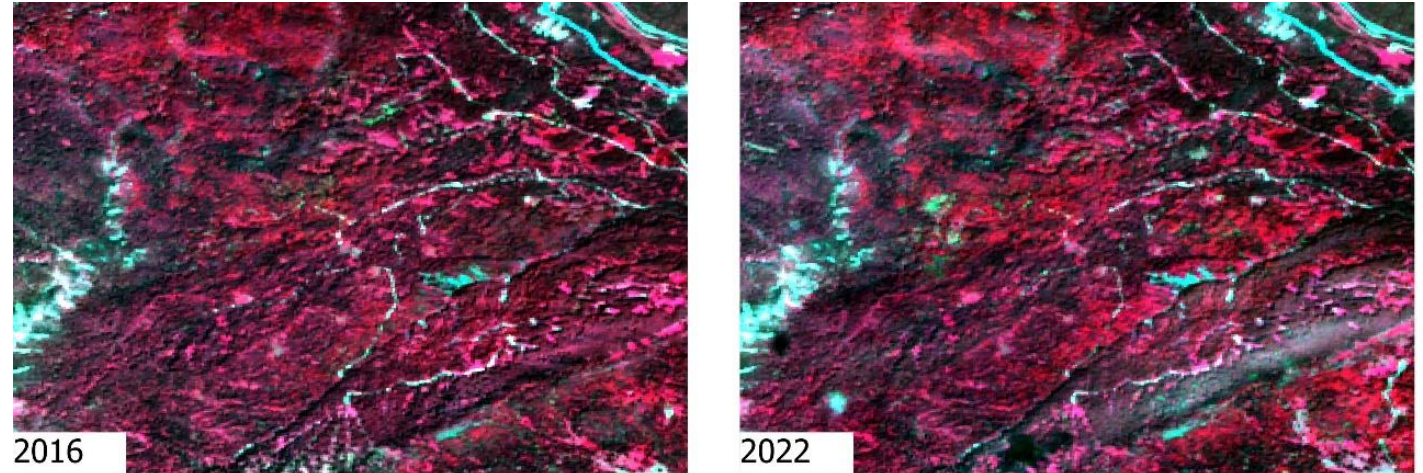
Evaluation of Forest Condition Index

- A few errors can be detected in proximity of the border of the forest layer, such as river area, which is probably a limit of input data used for the definition of forest boundaries



Evaluation of Forest Condition Index

- Several areas showed increasing values of the index between 2018 and 2022
- However, it is difficult to evaluate case where the index value increased from the satellite images changes, as not particular changes or increasing vegetation cover between 2018 and 2022 are visible



Evaluation of Forest Condition Index

Main constraints

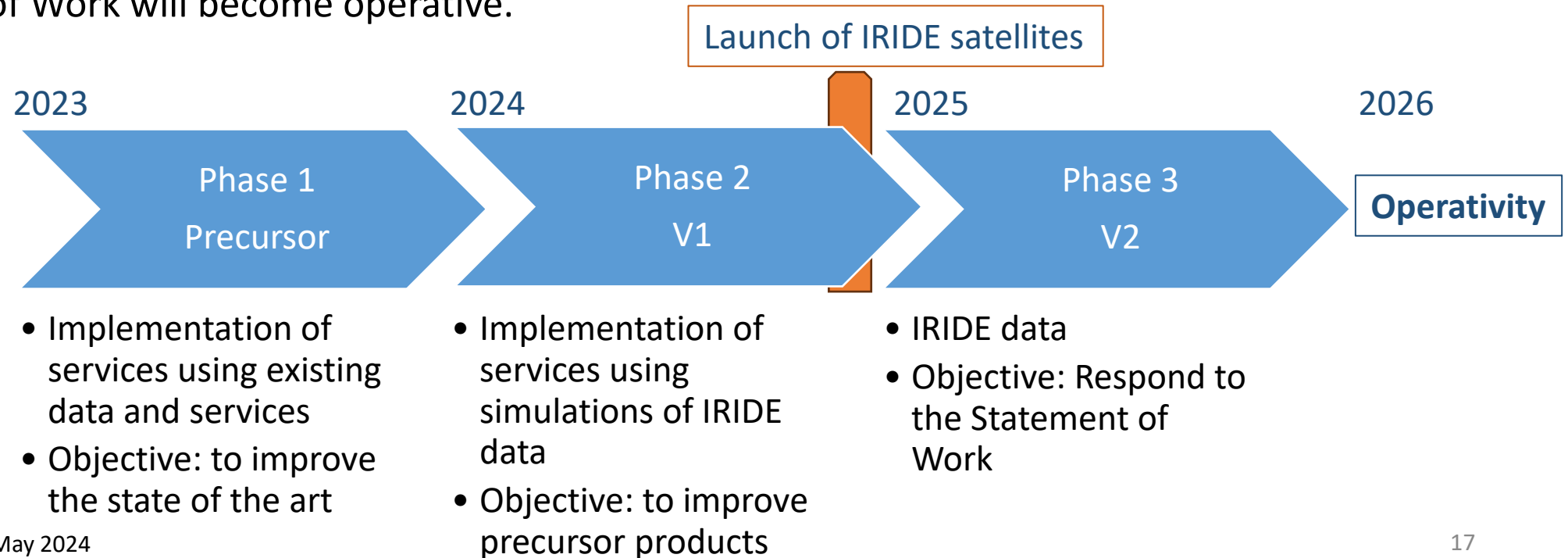
- Spatial resolution of CLC limits the assessment of small forest patches
- Unavailability of in situ data about forest condition to perform a quantitative evaluation of accuracy
- It can be difficult to understand the absolute value of Forest Condition index, but the difference can be used to compare different years

Main advantages

- Automatic calculation based on EO that can be performed frequently
- Good detection of forest removal
- Possibility to upload national data about land cover

EO in Italy: IRIDE Services Land Use/Land Cover

- As part of NRRP initiatives, IRIDE (International Report for Innovative Defence of Earth) is a program that aims to implement an End-to-End System, composed by the Upstream Segment, the Downstream Segment, and the Services Segment to provide geospatial-based services.
- Numerous services (called Service Value Chain – SVC), which are based on user requirements, focus on land use and cover monitoring. The project is organized in 3 phases with a gradual development of the services. Only the services reaching the requirements identified in the Statement of Work will become operative.



IRIDE Service Value Chains identified in the Statement of Work

Environment applications	Forest applications	Agriculture applications
Land Cover/Land Use mapping & monitoring	National Forest Mapping and Monitoring	Soil organic carbon (SOC) monitoring
Land consumption/soil sealing mapping & monitoring	Mapping of burnt areas	Erosion Risk Assessment
Habitat Mapping	Fire Damage Assessment	Crop Production Areas (CPA) Mapping and Monitoring
Urban Heat Island Monitoring	Forest health assessment indexes	Water needs and water volumes mapping
Green Urban Areas Characterization	Carbon stock indexes	Identification of indexes for crop health assessment
		Satellite based support to CAP (Common Agriculture Policy)