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Wall-to-Wall Mapping of Forest Biomass and Wood Volume Increment in Italy

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Abstract: Several political initiatives aim to achieve net-zero emissions by the middle of the twenty-first century. In this context, forests are crucial as a carbon sink to store unavoidable emissions. Assessing the carbon sequestration potential of forest ecosystems is pivotal to the availability of accurate forest variable estimates for supporting international reporting and appropriate forest management strategies. Spatially explicit estimates are even more important for Mediterranean countries such as Italy, where the capacity of forests to act as sinks is decreasing due to climate change. This study aimed to develop a spatial approach to obtain high-resolution maps of Italian forest above-ground biomass (ITA-BIO) and current annual volume increment (ITA-CAI), based on remotely sensed and meteorological data. The ITA-BIO estimates were compared with those obtained with two available biomass maps developed in the framework of two international projects (i.e., the Joint Research Center and the European Space Agency biomass maps, namely, JRC-BIO and ESA-BIO). The estimates from ITA-BIO, JRC-BIO, ESA-BIO, and ITA-CAI were compared with the 2nd Italian NFI (INFC) official estimates at regional level (NUT2). The estimates from ITA-BIO are in good agreement with the INFC estimates ($R^2 = 0.95$, mean difference = 3.8 t ha^{-1}), while for JRC-BIO and ESA-BIO, the estimates show R^2 of 0.90 and 0.70, respectively, and mean differences of 13.5 and of 21.8 t ha^{-1} with respect to the INFC estimates. ITA-CAI estimates are also in good agreement with the INFC estimates ($R^2 = 0.93$), even if they tend to be slightly biased. The produced maps are hosted on a web-based forest resources management Decision Support System developed under the project AGRIDIGIT (ForestView) and represent a key element in supporting the new Green Deal in Italy, the European Forest Strategy 2030 and the Italian Forest Strategy.

Keywords: forest biomass; National Forest Inventories; remote sensing; Mediterranean forest; forest increment

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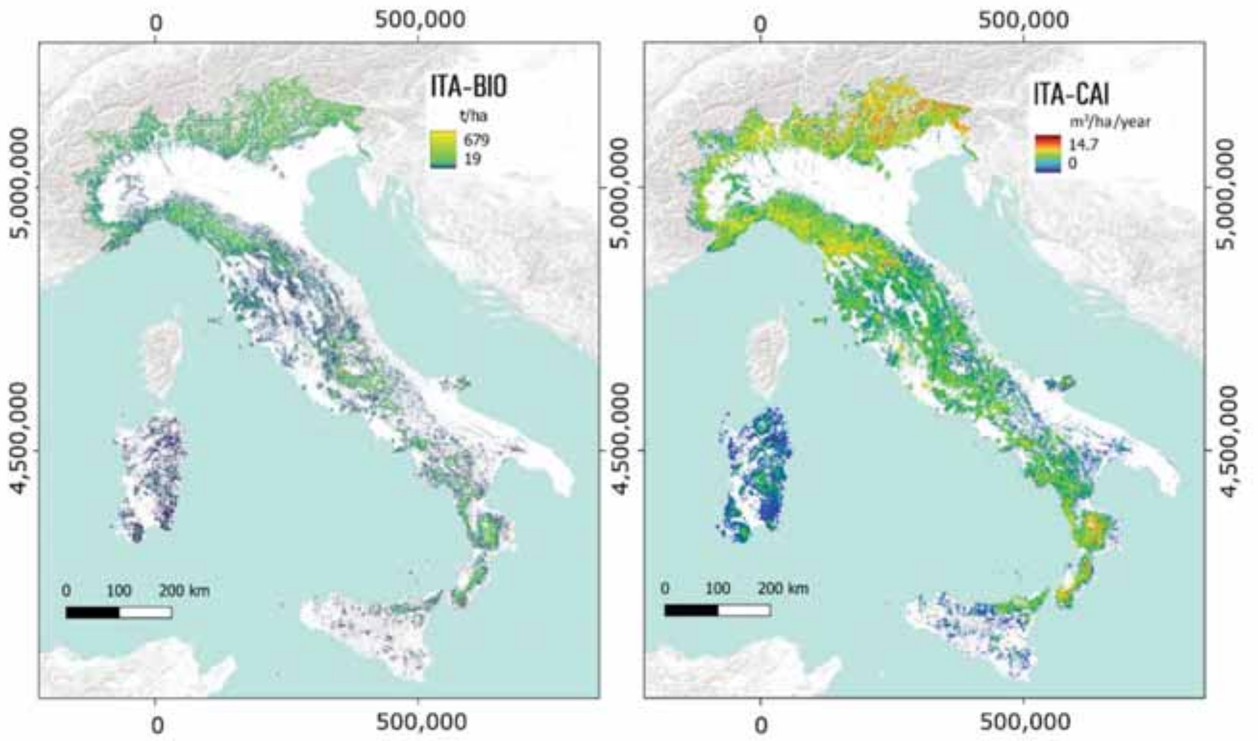
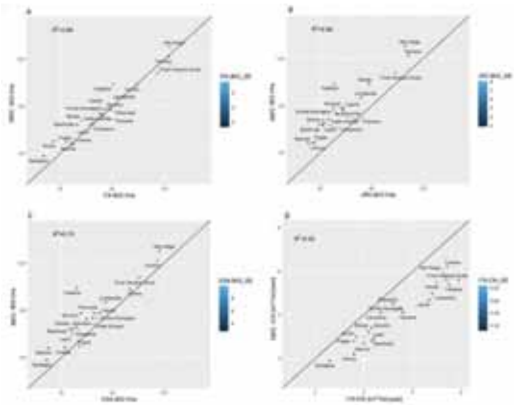
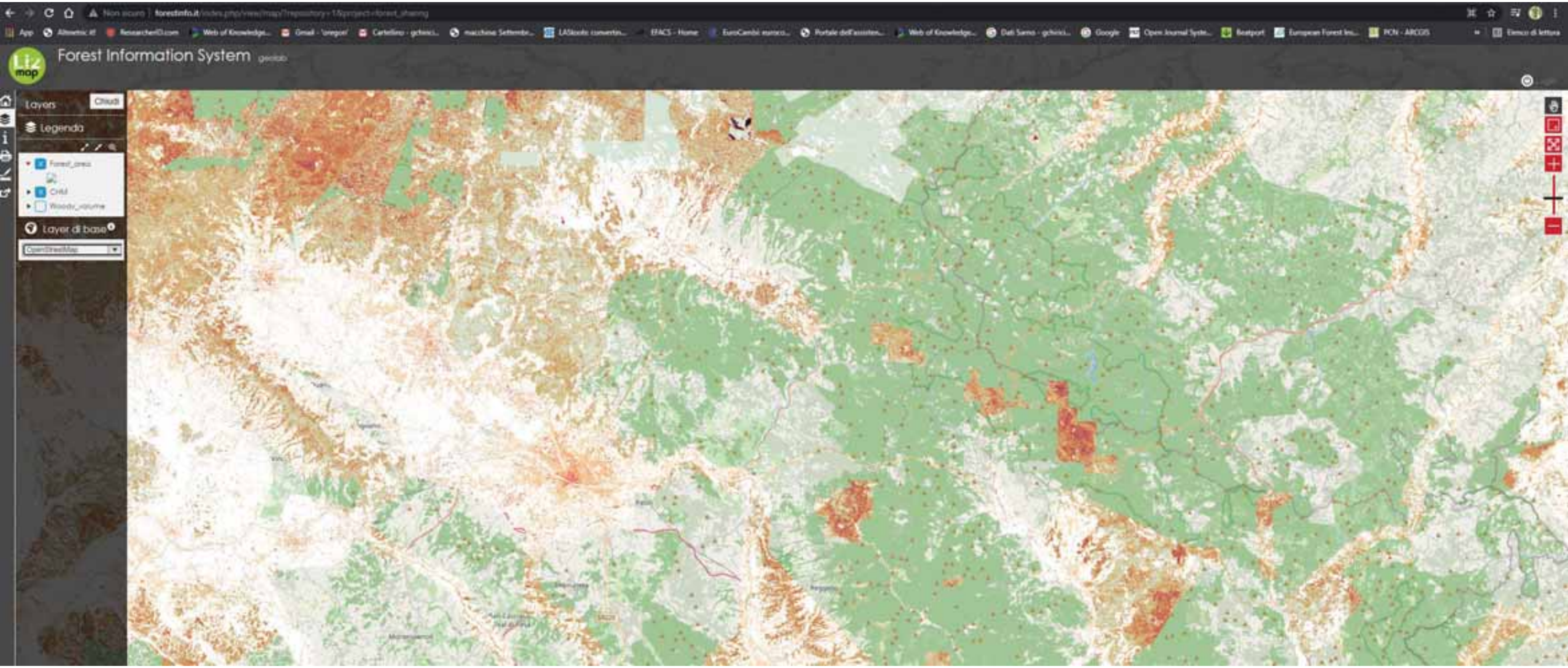
1. Introduction

Measuring the amount of CO_2 stocked in forest ecosystems is mandatory to support the new European (EU) Forest Strategy for 2030, a flagship initiative of the European Green Deal, in sight of achieving neutrality with respect to greenhouse gas emission in





Le mappe derivanti dalla spazializzazione possono essere facilmente condivise on line
Senza dover condividere la posizione geografica precisa delle aree di saggio



http://forestinfo.it/

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Large-area mapping of Canadian boreal forest cover, height, biomass and other structural attributes using Landsat composites and lidar plots

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ARTICLE INFO

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Forest structure
Monitoring
Imputation
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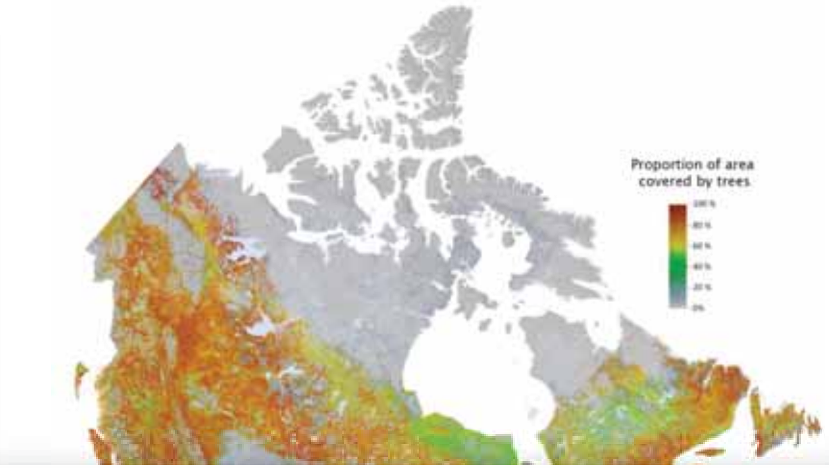
ABSTRACT

Passive optical remotely sensed images such as those from the L
spatially comprehensive, well-calibrated reflectance measures that
as an alternative to field plot data, the use of Light Detection and Ra
validation purposes in combination with such satellite reflectance
response variables has become well established. In this research, we
forest structural attributes over the ~552 million ha boreal fores
dependent validation we utilize airborne lidar-derived measuremen
plots) obtained in 2010 via a > 25,000 km transect-based national
lidar plot structural variables to wall-to-wall 30-m spatial resolution



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Remote Sensing Technologies for Enhancing Forest Inventories: A Review

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Abstract. Forest inventory and management requirements are changing rapidly in the context of an increasingly complex set of economic, environmental, and social policy objectives. Advanced remote sensing technologies provide data to assist in addressing these escalating information needs and to support the subsequent development and parameterization of models for an even broader range of information needs. This special issue contains papers that use a variety of remote sensing technologies to derive forest inventory or inventory-related information. Herein, we review the potential of 4 advanced remote sensing technologies,


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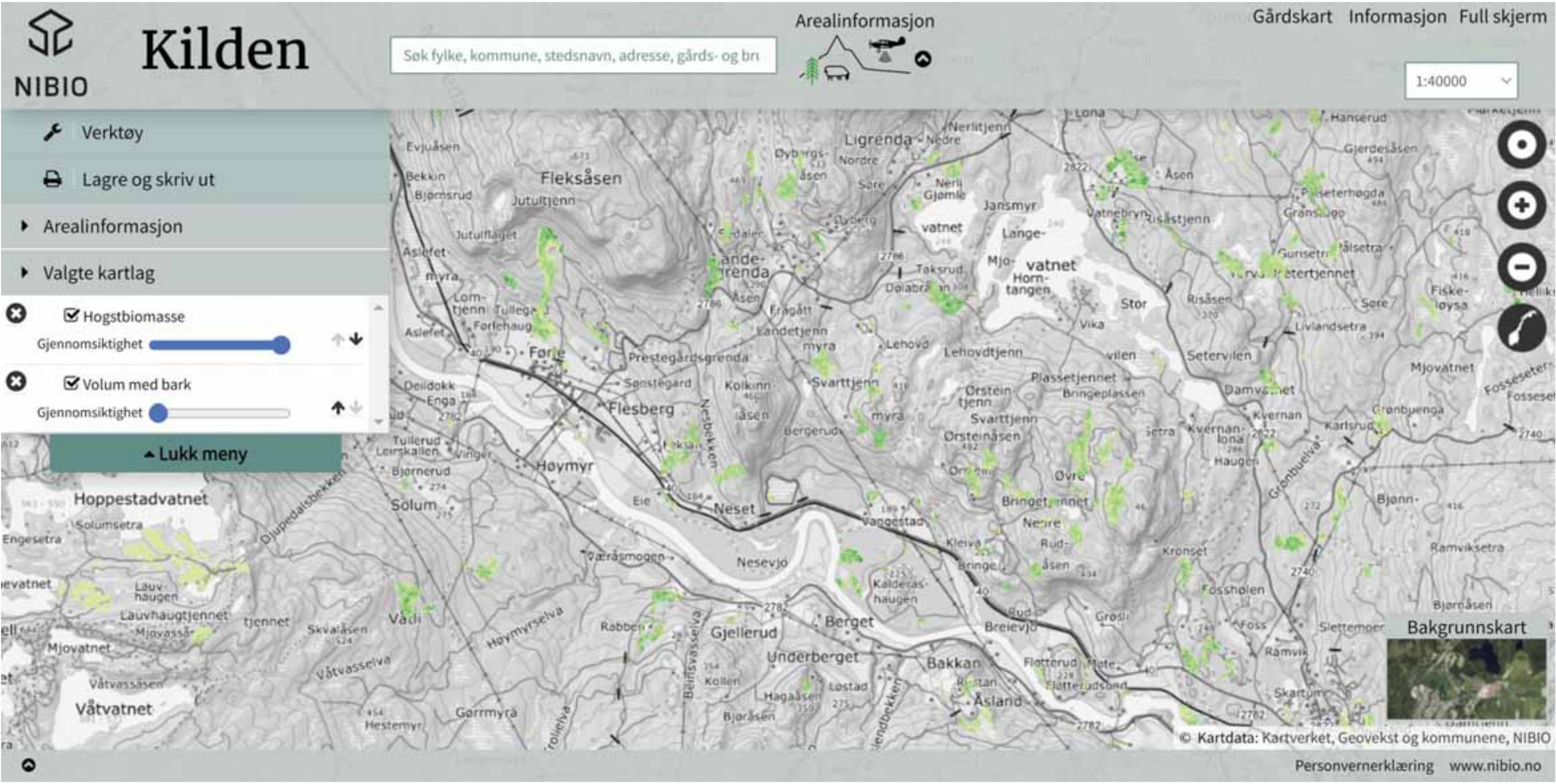
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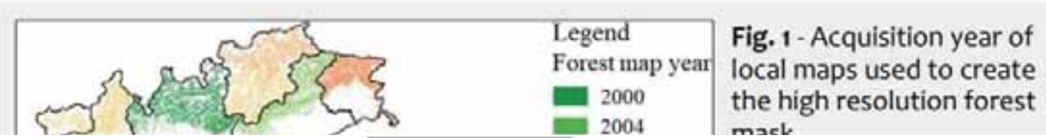
Legend
Forest map year
2000
2004
Fig. 1 - Acquisition year of local maps used to create the high resolution forest mask


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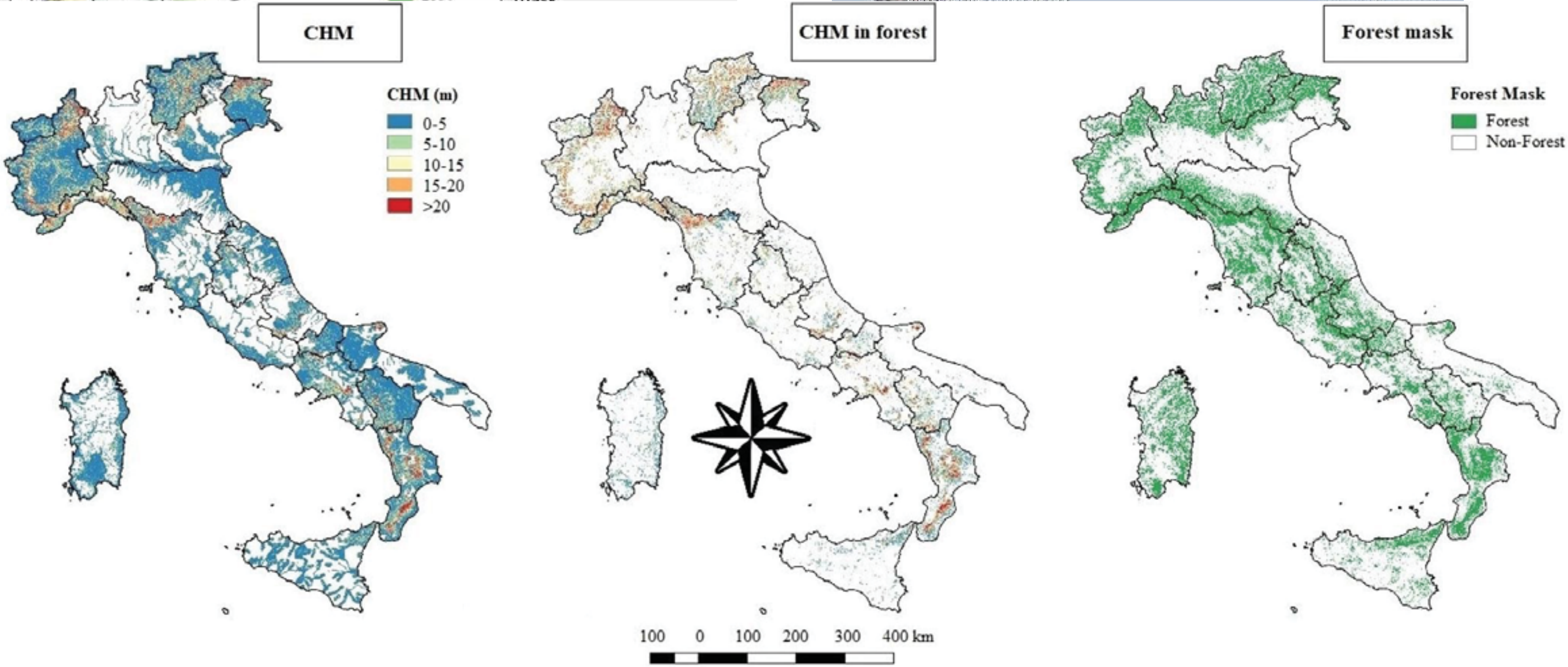
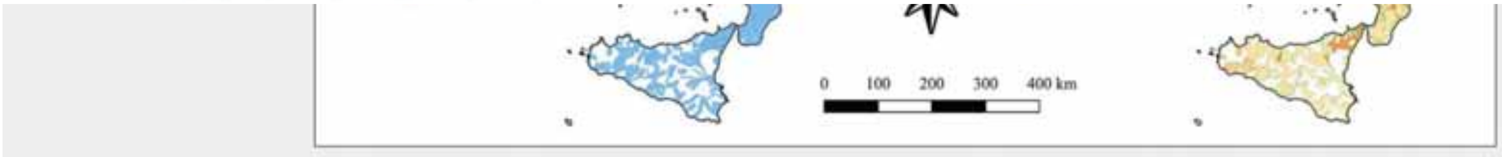
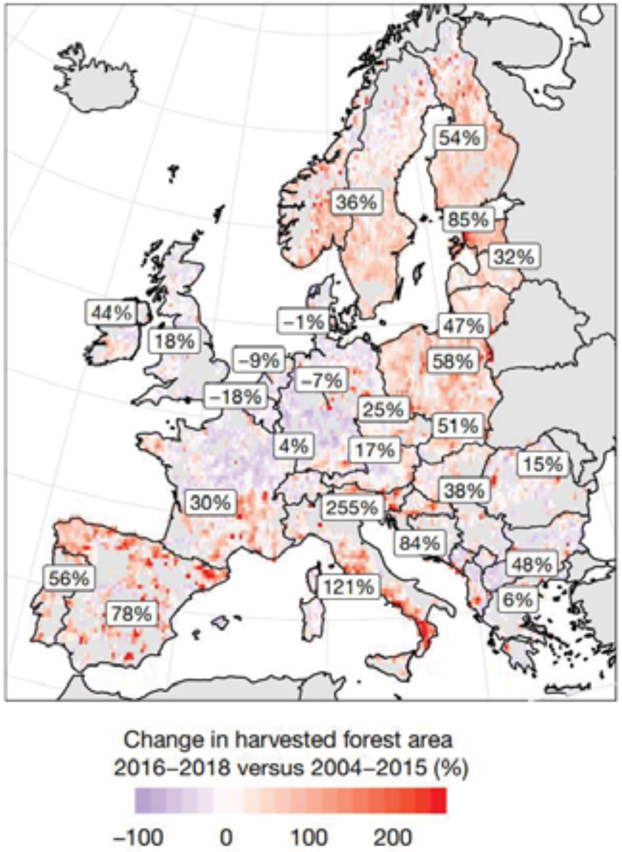

CHM
CHM (m)
0-5
5-10
10-15
15-20
>20
CHM in forest
Forest mask
Forest Mask
Forest
Non-Forest
100 0 100 200 300 400 km


0 100 200 300 400 km



Article

Abrupt increase in harvested forest area over Europe after 2015

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Check for updates

Guido Ceccherini[1]✉, Gregory Duveiller[1], Giacomo Grassi[1], Guido Lemoine[2], Valerio Avitabile[1], Roberto Pilli[1] & Alessandro Cescatti[1]

Forests provide a series of ecosystem services that are crucial to our society. In the European Union (EU), forests account for approximately 38% of the total land surface[1]. These forests are important carbon sinks, and their conservation efforts are vital for the EU's vision of achieving climate neutrality by 2050[2]. However, the increasing demand for forest services and products, driven by the bioeconomy, poses challenges for sustainable forest management. Here we use fine-scale satellite data to observe an increase in the harvested forest area (49 per cent) and an increase in biomass loss (69 per cent) over Europe for the period of 2016–2018 relative to 2011–2015, with large losses occurring on the Iberian Peninsula and in the Nordic and Baltic countries. Satellite imagery further reveals that the average patch size of harvested area increased by 34 per cent across Europe, with potential effects on biodiversity, soil erosion and water regulation. The increase in the rate of forest harvest is the result of the recent expansion of wood markets, as suggested by econometric indicators on forestry, wood-based bioenergy and international trade. If such a high rate of forest harvest continues, the post-2020 EU vision of forest-based climate mitigation may be hampered, and the additional carbon losses from forests would require extra emission reductions in other sectors in order to reach climate neutrality by 2050[3].

Matters arising

Quantifying forest change in the European Union

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Check for updates

Iddo K. Wernick[1✉], Philippe Ciais[2], Jonas Fridman[3], Peter Högberg[4], Kari T. Korhonen[5], Annika Nordin[4] & Pekka E. Kauppi[4,6]

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Breidenbach *et al. Annals of Forest Science* (2022) 79:2
https://doi.org/10.1186/s13595-022-01120-4

INRAE

Annals of Forest Science

OPINION PAPER **Open Access**

Harvested area did not increase abruptly—how advancements in satellite-based mapping led to erroneous conclusions

Check for updates

Johannes Breidenbach[1*], David Ellison[2,3,4], Hans Petersson[2], Kari T. Korhonen[5], Helena M. Henttonen[5], Jörgen Wallerman[2], Jonas Fridman[2], Terje Gobakken[6], Rasmus Astrup[1] and Erik Næsset[6]

Abstract

Key message: Using satellite-based maps, Ceccherini et al. (Nature 583:72-77, 2020) report abruptly increasing harvested area estimates in several EU countries beginning in 2015. Using more than 120,000 National Forest Inventory observations to analyze the satellite-based map, we show that it is not harvested area but the map's ability to detect harvested areas that abruptly increases after 2015 in Finland and Sweden.

Keywords: Global Forest Watch, Landsat, Remote sensing, National Forest Inventory, Greenhouse Gas Inventory

Matters arising

Concerns about reported harvests in European forests

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Marc Palahí[1,26✉], Rubén Valbuena[2,26✉], Cornelius Senf[3], Nezha Acil[4,5], Thomas A. M. Pugh[4,5,6], Jonathan Sadler[4,5], Rupert Seidl[3], Peter Potapov[7], Barry Gardiner[8], Lauri Hetemäki[1], Gherardo Chirici[9], Saverio Francini[9,10], Tomáš Hlásny[11], Bas Jan Willem Lerink[12], Håkan Olsson[13], José Ramón González Olabarria[14], Davide Ascoli[15], Antti Asikainen[16], Jürgen Bauhus[17], Göran Berndes[18], Janis Donis[19], Jonas Fridman[13], Marc Hanewinkel[17], Hervé Jactel[20], Marcus Lindner[21], Marco Marchetti[22], Róbert Marušák[11], Douglas Sheil[23], Margarida Tomé[24], Antoni Trasobares[25], Pieter Johannes Verkerk[1], Minna Korhonen[1] & Gert-Jan Nabuurs[12,23]

ARISING FROM G. Ceccherini et al. *Nature* https://doi.org/10.1038/s41586-020-2438-y (2020)

Conclusioni

- Integrazione INFC e Sistema Informativo Forestale Nazionale -> produzione di cartografie con telerilevamento
- Mappe UFFICIALI a 23 m di risoluzione da INFC2005 e INFC2015 saranno rilasciate a breve (collaborazione CUFA-AISF)
- Passaggio al nuovo programma permanente IFNI2025
- Maggiore collaborazione con enti di ricerca e accesso ai dati grezzi
- E’ necessario il completamento delle informazioni di base: LiDAR e carta forestale