UNIVERSITÀ DEGLI STUDI FIRENZE
DAGRI
DIPARTIMENTO DI SCIENZE E TECNOLOGIE AGRARIE, ALIMENTARI, AMBIENTALI E FORESTALI

geo LAB
laboratory of forest geomatics

Unione di Comuni Montana Lunigiana

Stime spazialmente esplicite di volume e biomassa

Mappatura dei disturbi forestali con dati satellitari

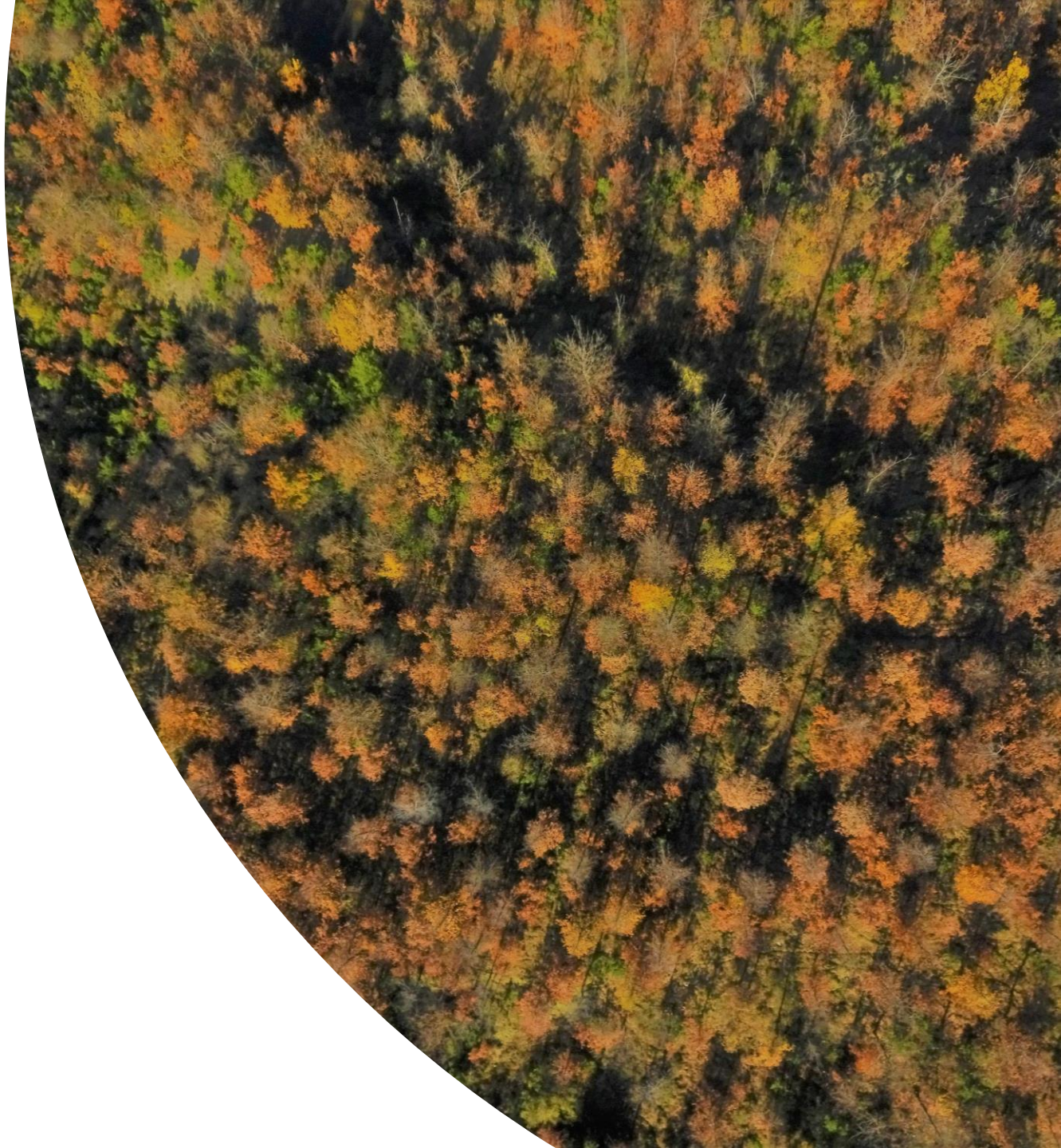
Giovanni D'Amico

Sassalbo di Fivizzano (MS)
19 gennaio 2024

Stime spazialmente esplicite di volume e biomassa

Materiali

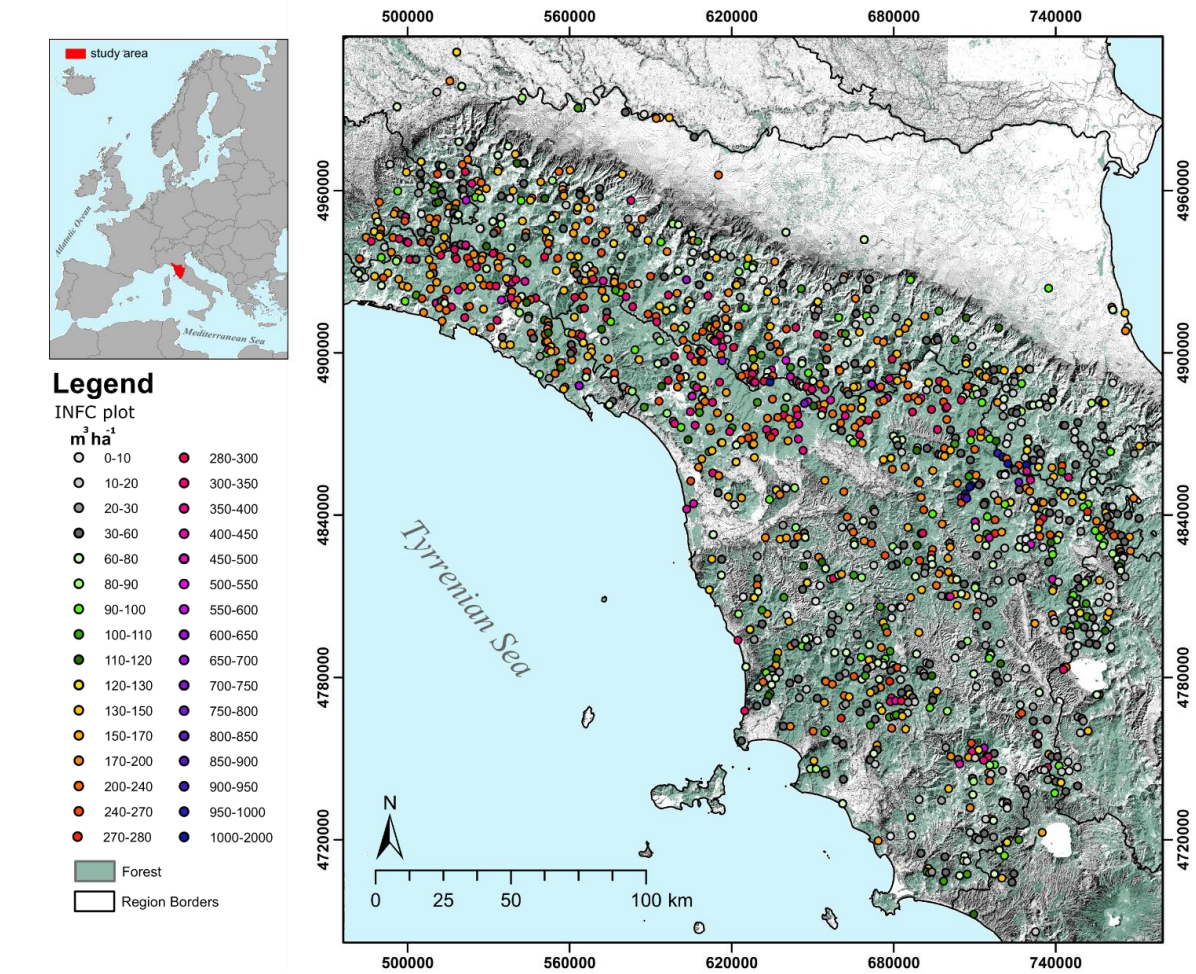
- Dati Inventario Forestale Nazionale 2015
- Dati satellitari telerilevati Sentinel-2
- Variabili ausiliare (clima, suolo, ….)
- Serie temporali Sentinel-2 2016-2023



Stime spazialmente esplicite di volume e biomassa

INFC2015

https://www.inventarioforestale.org/it/



Int J Appl Earth Obs Geoinformation 84 (2020) 101959

Contents lists available at ScienceDirect

Int J Appl Earth Obs Geoinformation

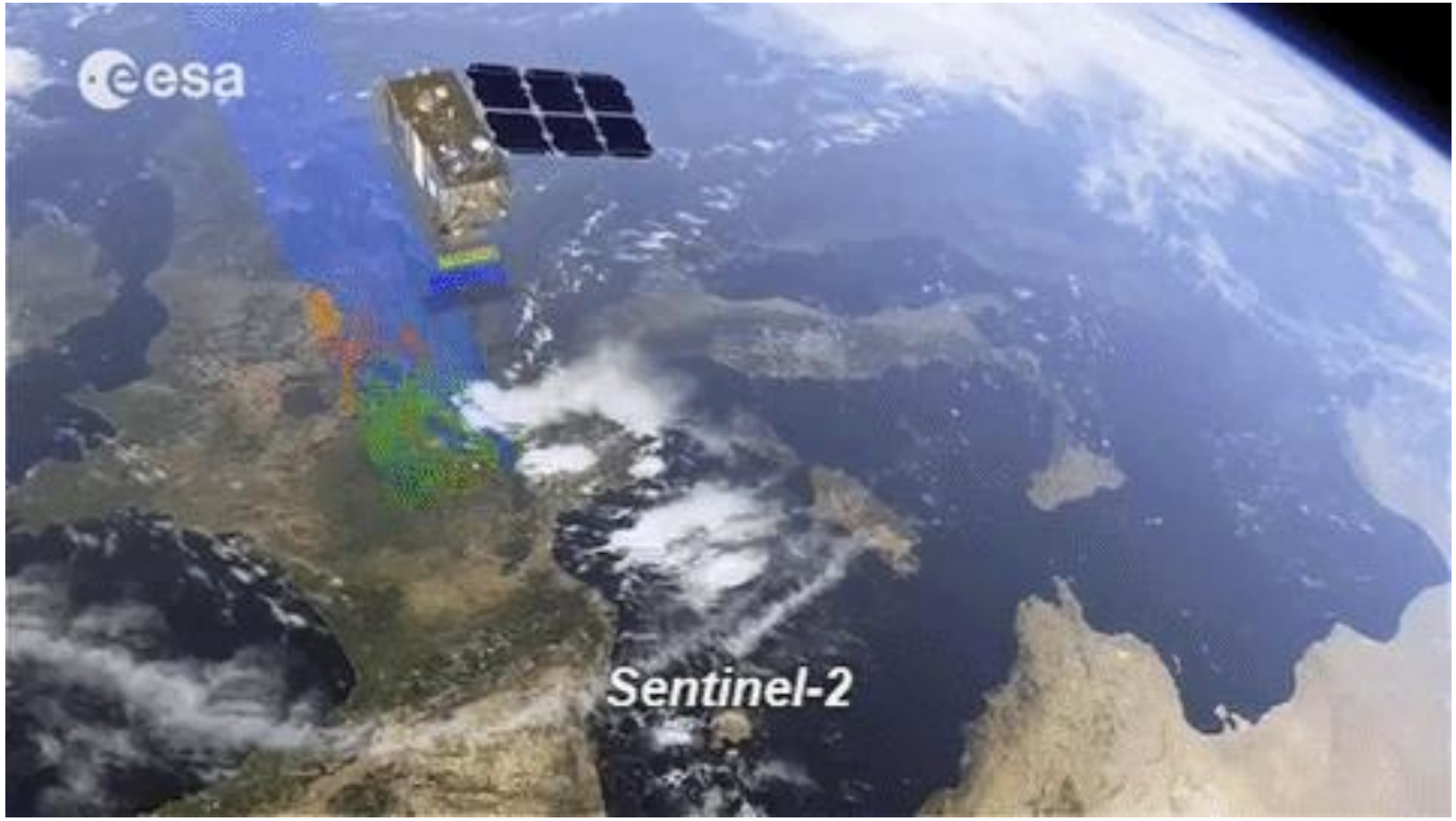
journal homepage: www.elsevier.com/locate/jag

Wall-to-wall spatial prediction of growing stock volume based on Italian National Forest Inventory plots and remotely sensed data

Gherardo Chirici[a], Francesca Giannetti[a], Ronald E. McRoberts[b,c], Davide Travaglini[a], Matteo Pecchi[a], Fabio Maselli[d], Marta Chiesi[d], Piermaria Corona[e]

Stime spazialmente esplicite di volume e biomassa

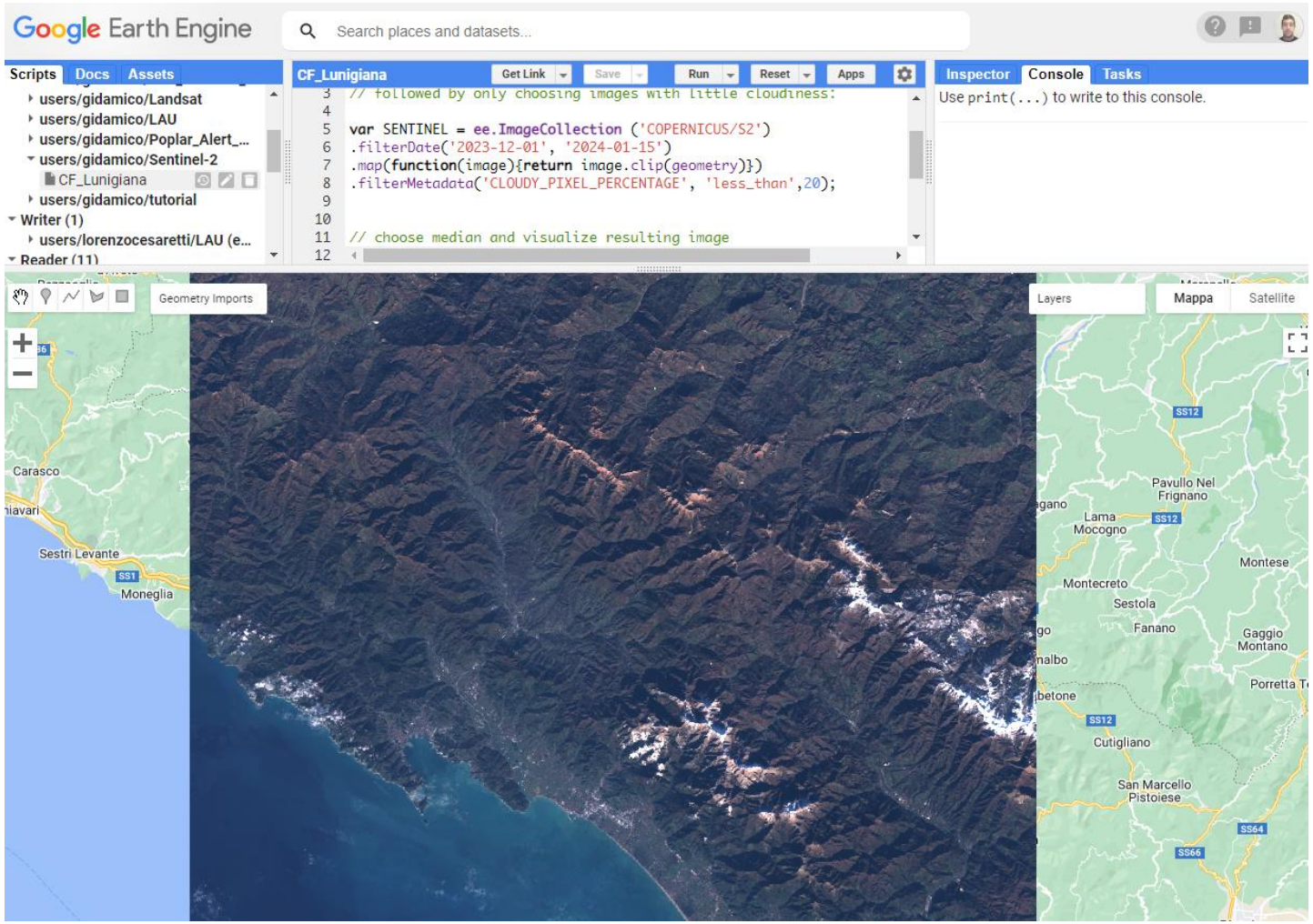
Sentinel-2



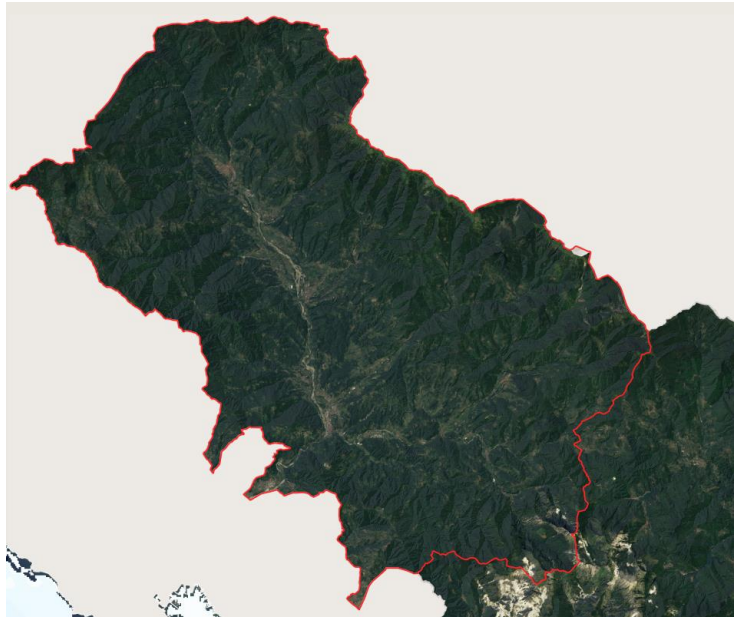
Sentinel-2 Bands	Central Wavelength (µm)	Resolution (m)
Band 1 - Coastal aerosol	0.443	60
Band 2 - Blue	0.490	10
Band 3 - Green	0.560	10
Band 4 - Red	0.665	10
Band 5 - Vegetation Red Edge	0.705	20
Band 6 - Vegetation Red Edge	0.740	20
Band 7 - Vegetation Red Edge	0.783	20
Band 8 - NIR	0.842	10
Band 8A - Vegetation Red Edge	0.865	20
Band 9 - Water vapour	0.945	60
Band 10 - SWIR - Cirrus	1.375	60
Band 11 - SWIR	1.610	20
Band 12 - SWIR	2.190	20

Stime spazialmente esplicite di volume e biomassa

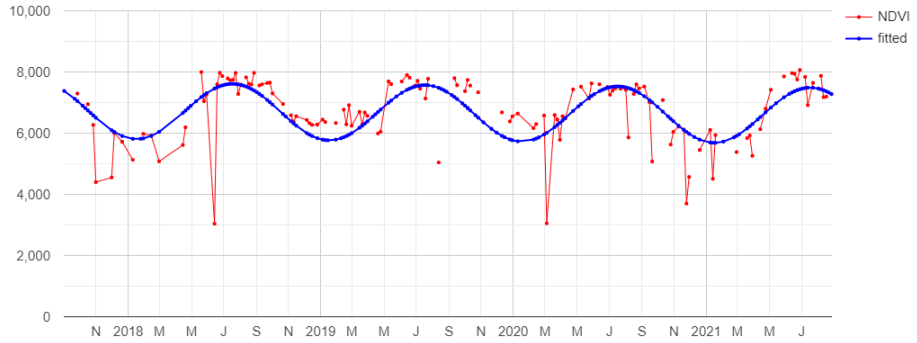
Sentinel-2



Immagini estiva cloud-free



Metriche multitemporali

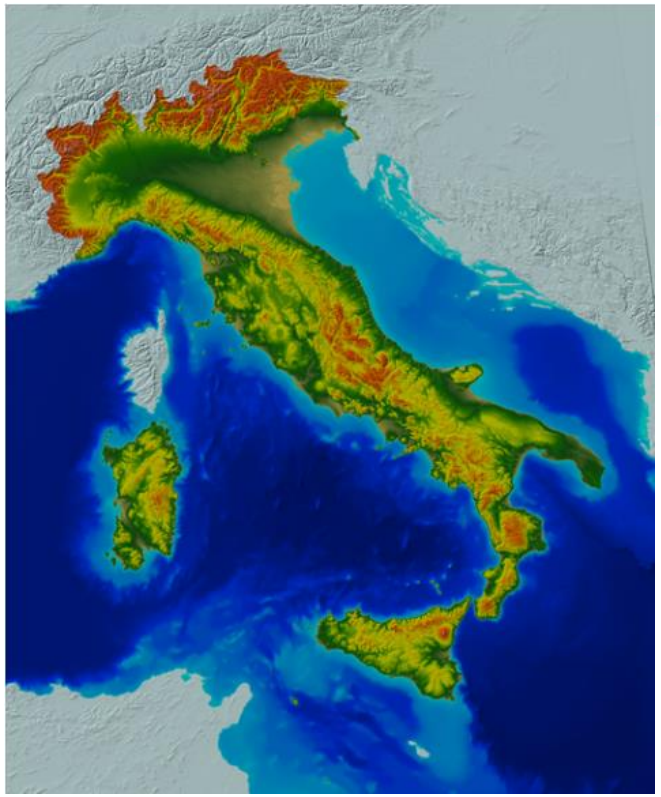


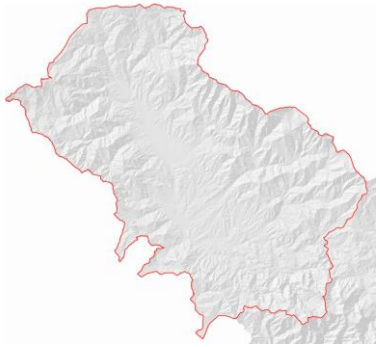
Stime spazialmente esplicite di volume e biomassa

Variabili ausiliarie

DTM Tinitaly

(Tarquini and Nannipieri, 2017)





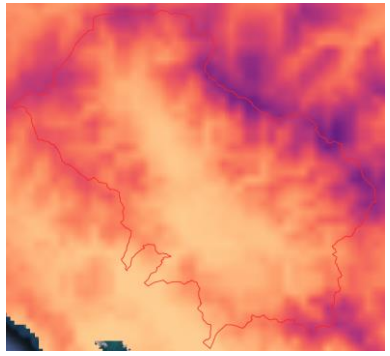
Risoluzione spaziale: 10m

Dati climatici

(Maselli et al. 2012)

- Precipitazioni totali annue
- Temperature minime
- Temperature massime
- Temperatura media

Temperatura massima



Dati del suolo

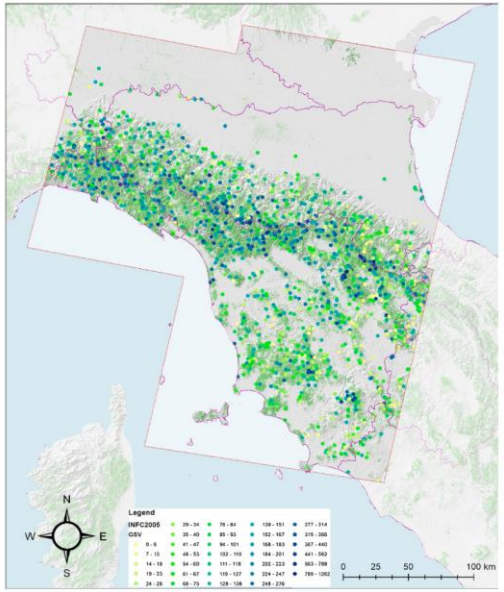
European Soil Database

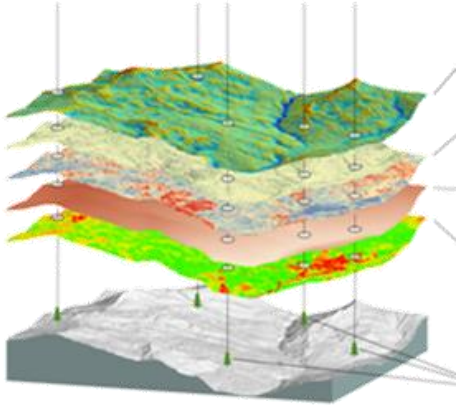
- Capacità idrica disponibile del sottosuolo
- Capacità idrica disponibile del topsoil
- Rocciosità
- Profondità del suolo
- Capacità di scambio cationico del sottosuolo
- Capacità di scambio cationico del topsoli
- Capacità di scambio del suolo

Stime spazialmente esplicite di volume e biomassa

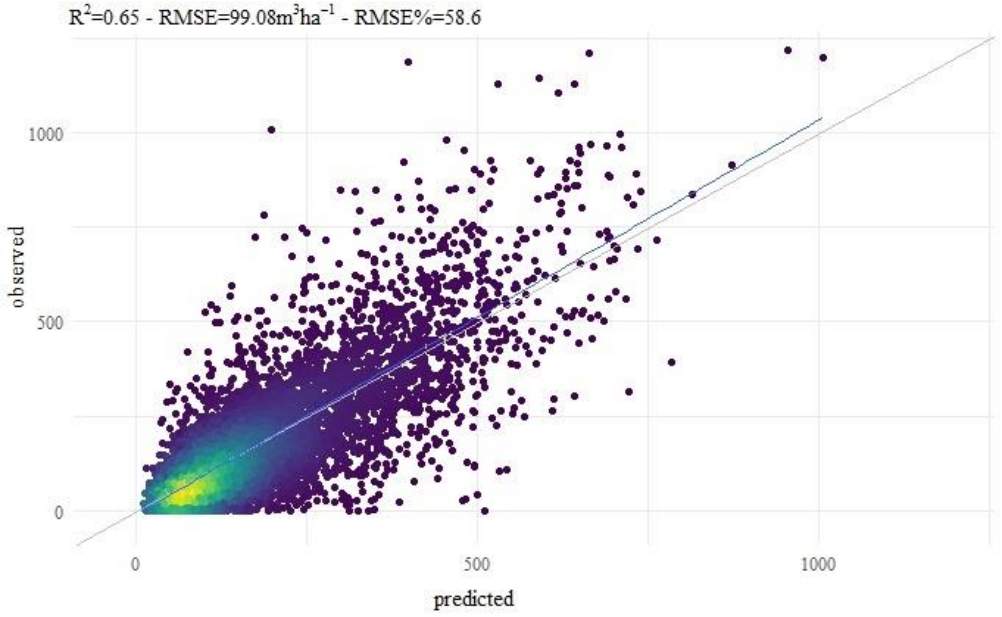
Dati INFC 2015
- Volume legnoso
- Biomassa

- Dati Sentinel
- Dati clima
- Dati suolo
- Dati DTM
- Dati GSV 2005



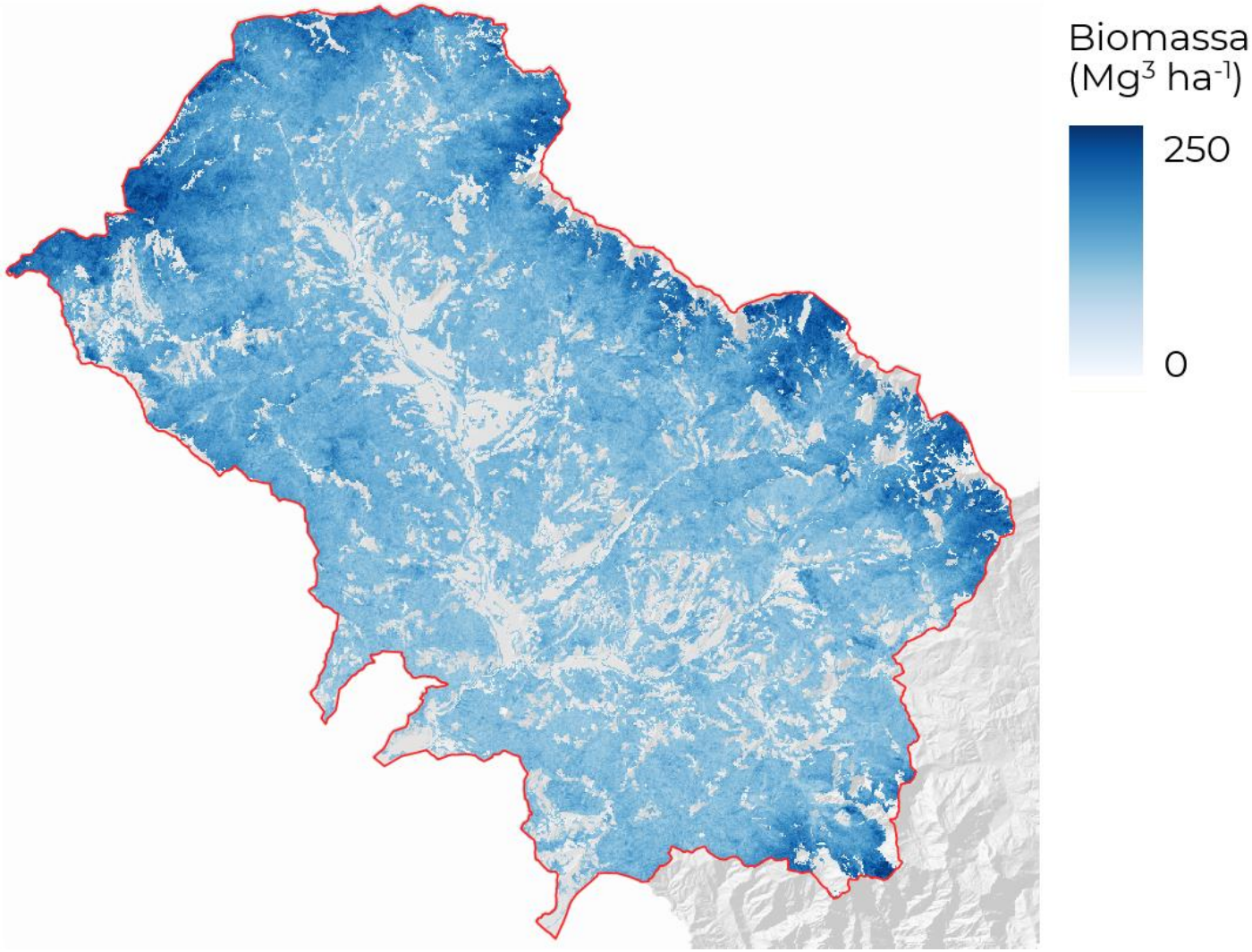


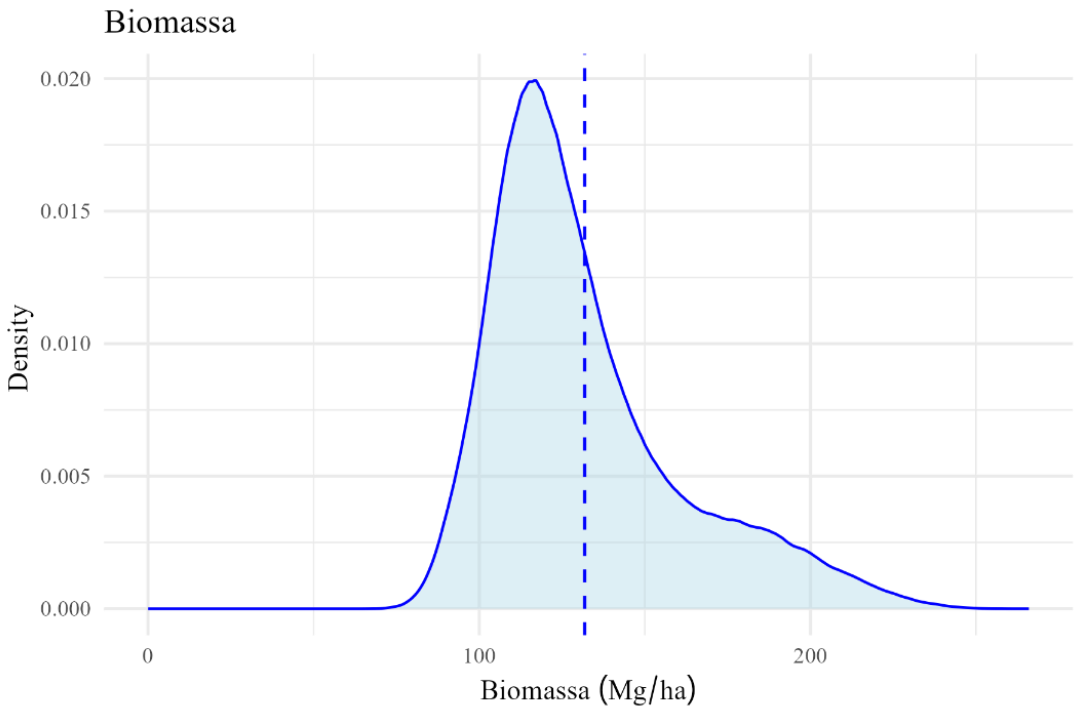
Modello Random Forest e spazializzazione della provvigione legnosa su tutta la superficie regionale da cui abbiamo estratto la mappa della Lunigiana



Stime spazialmente esplicite di volume e biomassa

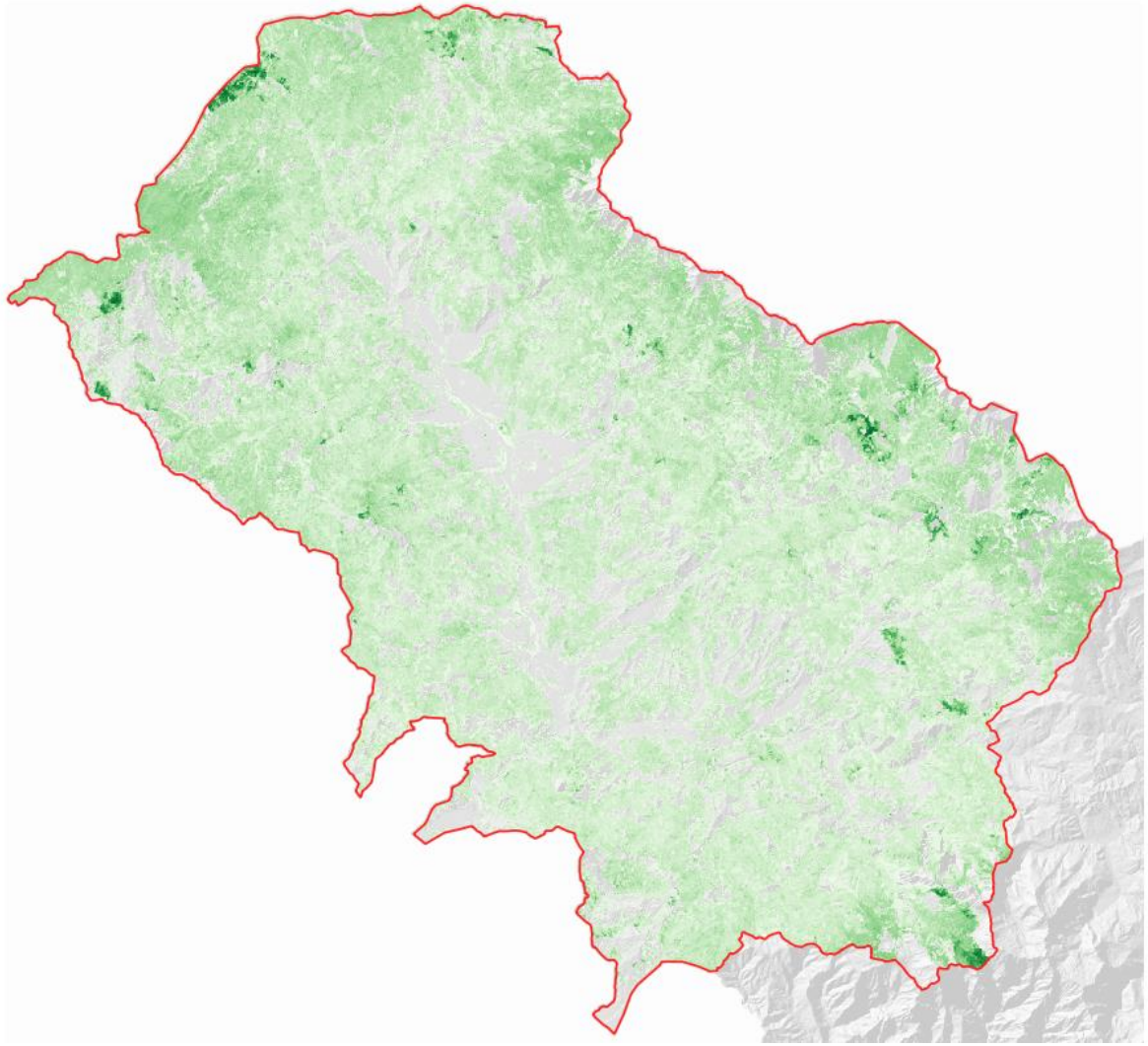
Mappa della biomassa forestale

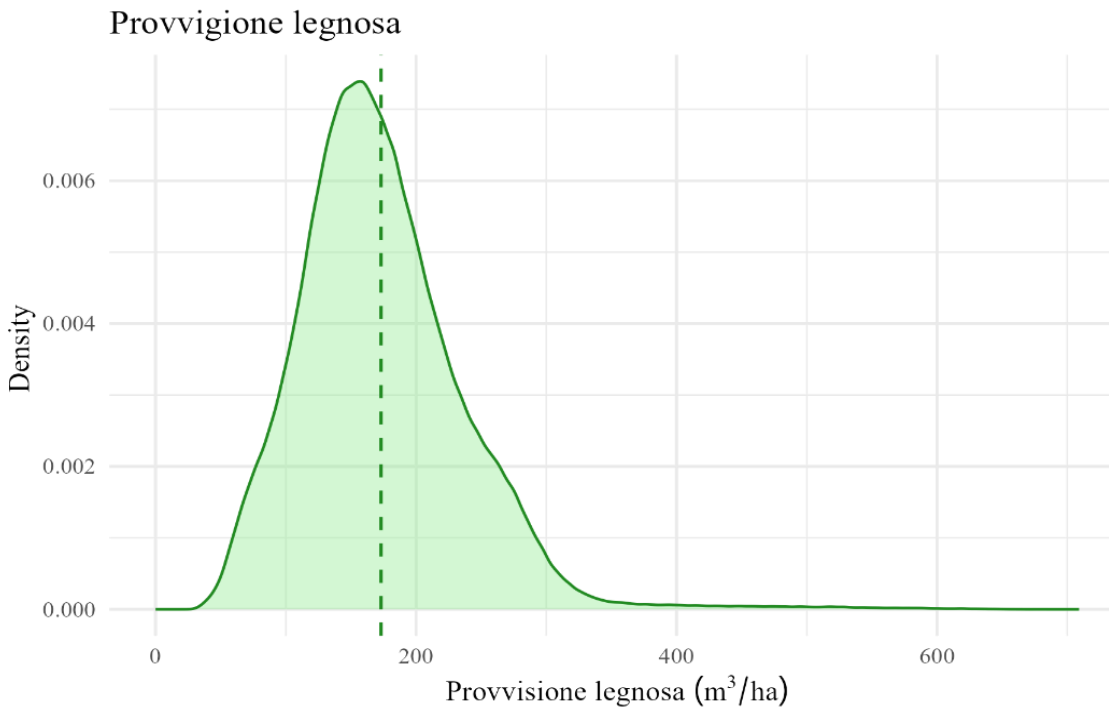




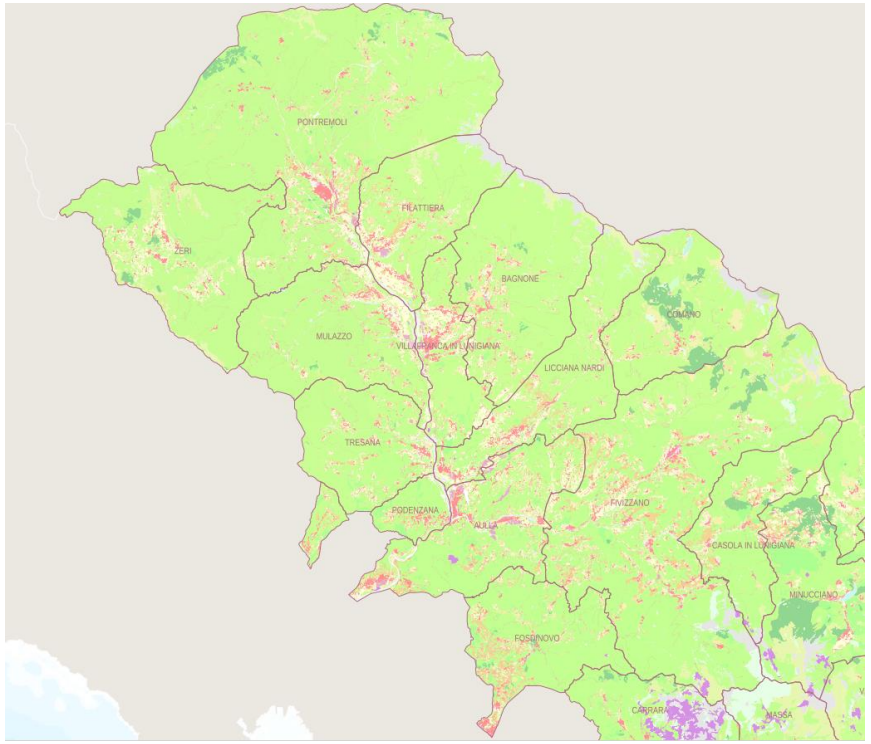
Stime spazialmente esplicite di volume e biomassa

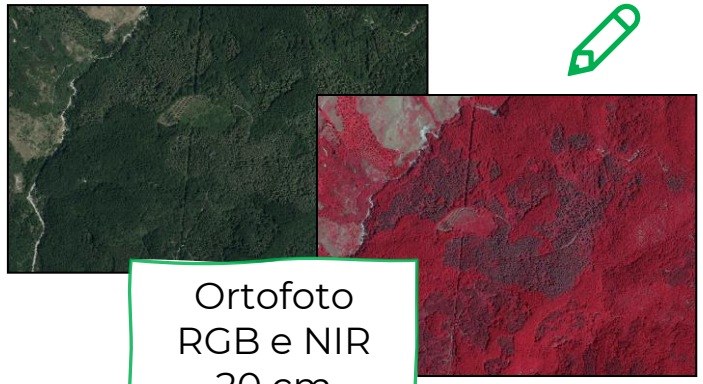
Mappa della provvigione legnosa forestale



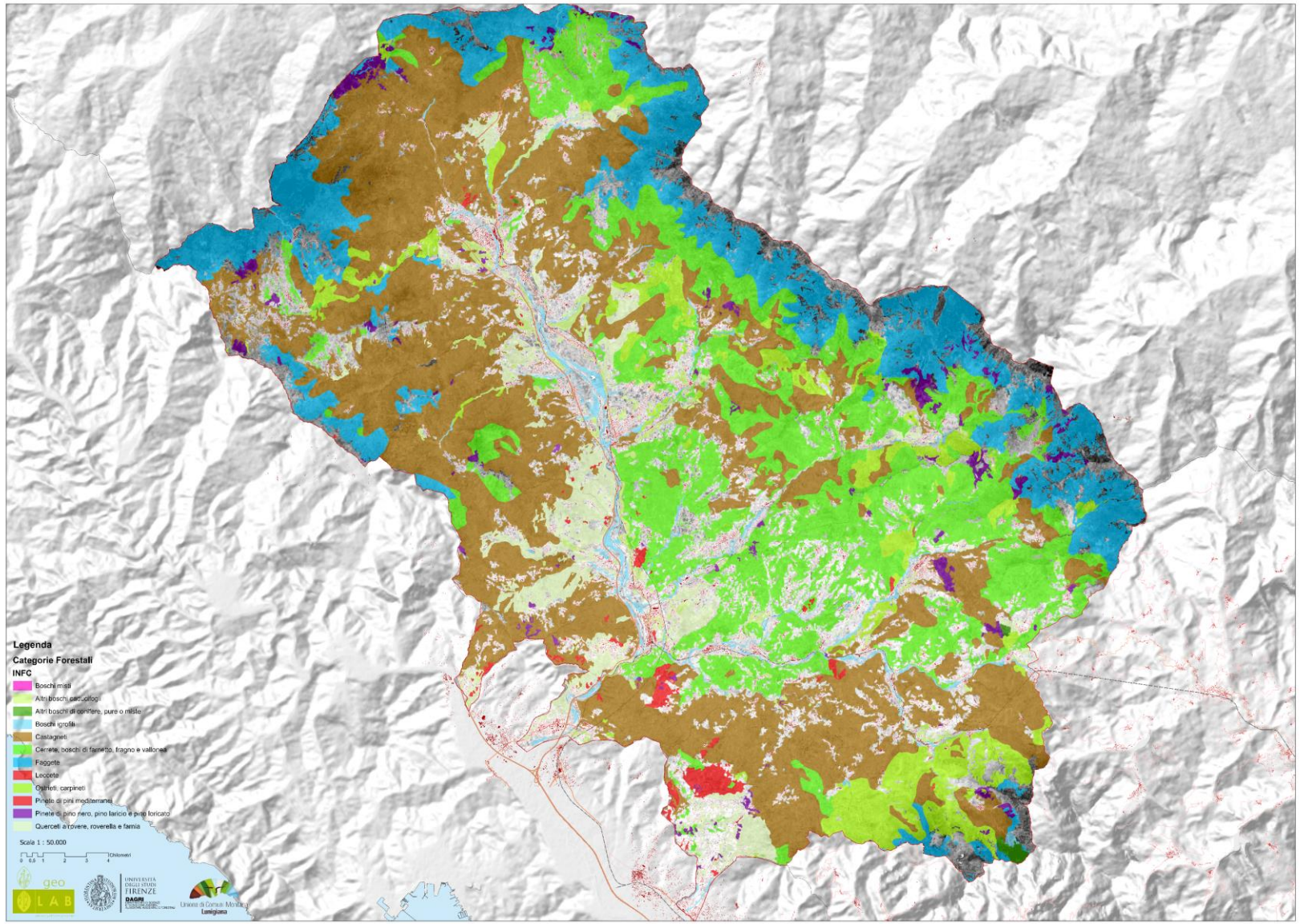


Aggiornamento Carta forestale



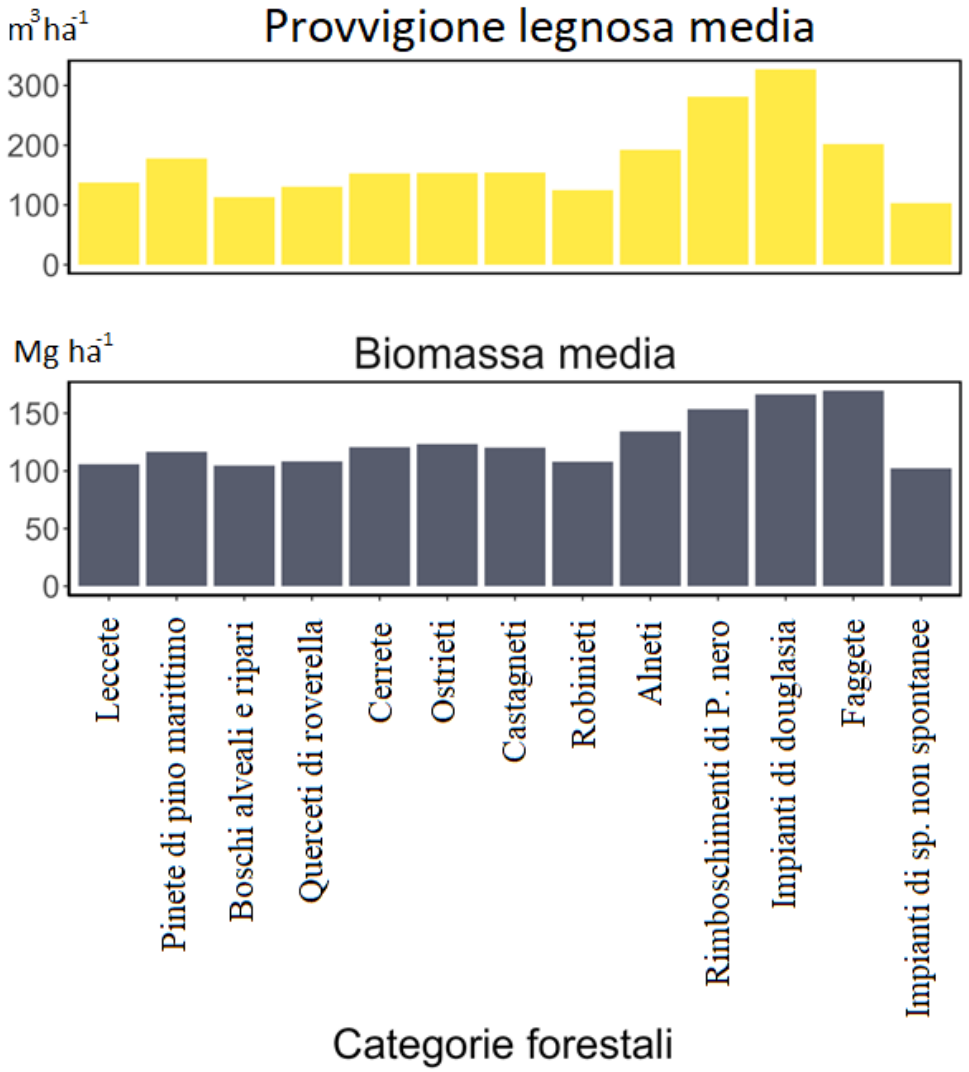


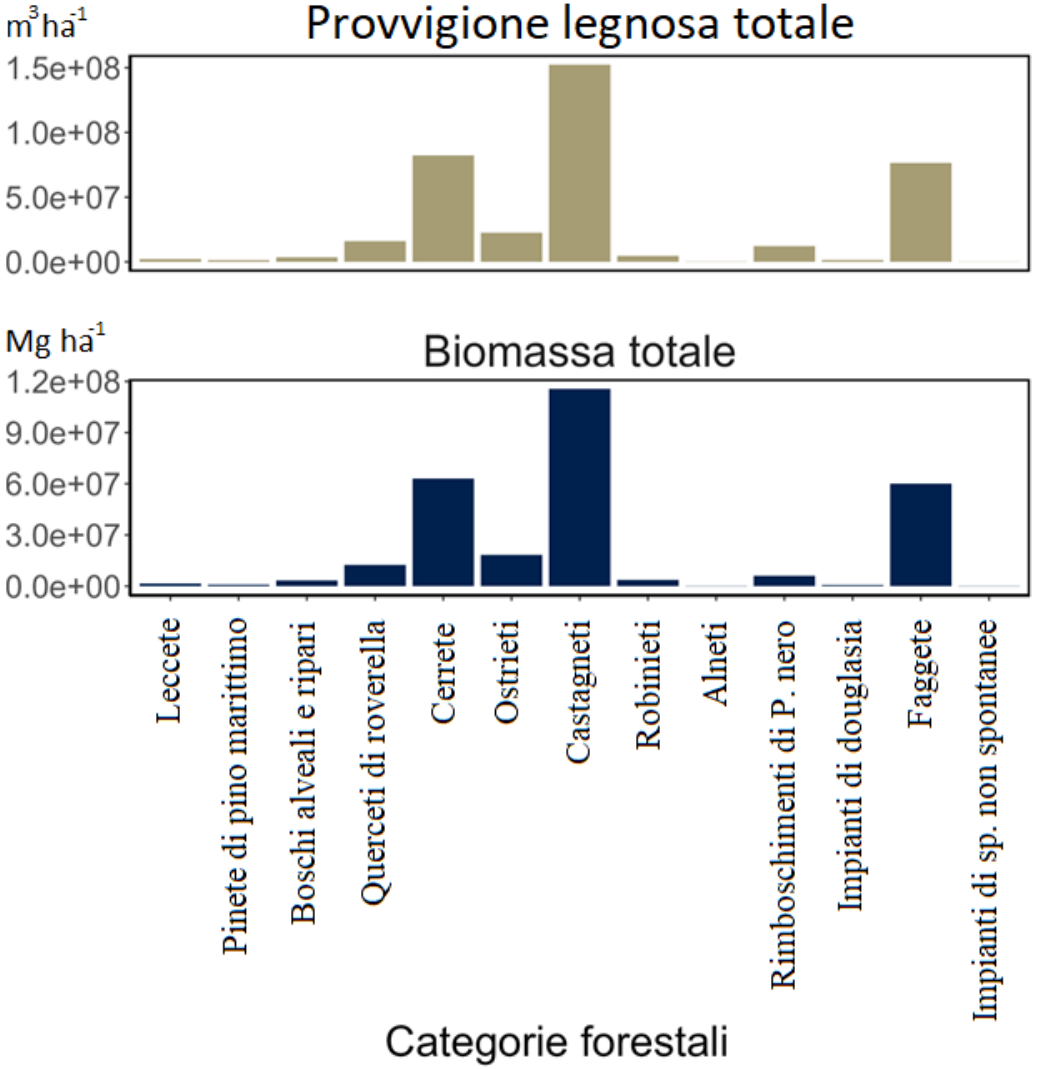
Ortofoto
RGB e NIR
20 cm



Stime spazialmente esplicite di volume e biomassa

GSV mean $m^3\ ha^{-1}$	GSV sum $m^3\ ha^{-1}$	AGB mean $Mg\ ha^{-1}$	AGB sum $Mg\ ha^{-1}$
167,72	375.656.041,36	123,73	286.173.742,14





Mappatura dei disturbi forestali con dati satellitari

Stato dell'arte

Contents lists available at ScienceDirect

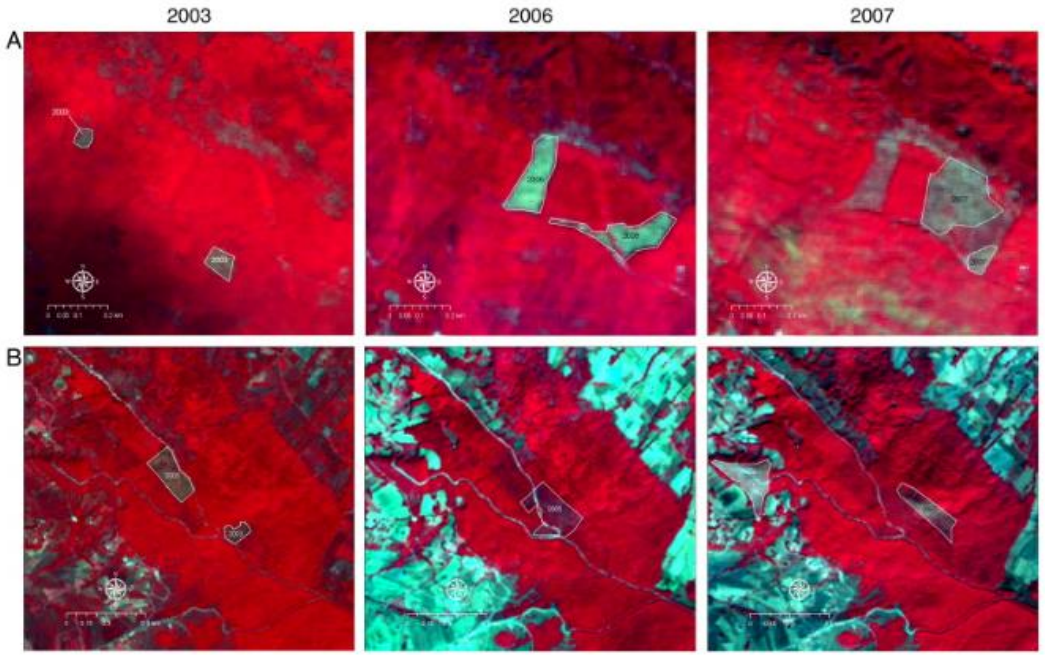
Remote Sensing of Environment

journal homepage: www.elsevier.com/locate/rse

Large-scale monitoring of coppice forest clearcuts by multitemporal very high resolution satellite imagery. A case study from central Italy

Gherardo Chirici [a,*], Diego Giuliarelli [b], Daniele Biscontini [c], Daniela Tonti [a], Walter Mattioli [b], Marco Marchetti [a], Piermaria Corona [b]

[a] ECOGEOFOR — Laboratorio di Ecologia e Geomatica Forestale, Dipartimento di Scienze e Tecnologie per l'Ambiente e il Territorio, University of Molise, Contrada Fonte Lappone, I-86090 Isernia, Pesche, Italy
[b] DISAFRI — Dipartimento di Scienze per l'Ambiente Forestale e delle sue Risorse, University of Tuscia, Via San Camillo de' Lellis, I-01100, Viterbo, Italy
[c] E-Geos spa, Roma, Italy



EUROPEAN JOURNAL OF REMOTE SENSING
2020, VOL. 53, NO. 1, 233–244
https://doi.org/10.1080/22797254.2020.1806734

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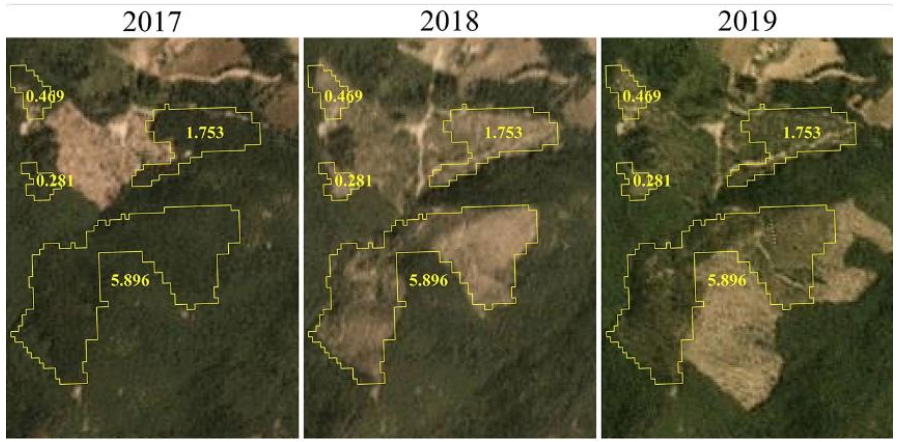
Near-real time forest change detection using PlanetScope imagery

Saverio Francini[a,b,c], Ronald E. McRoberts[d], Francesca Giannetti[a], Marco Mencucci[e], Marco Marchetti[b], Giuseppe Scarascia Mugnozza[c] and Gherardo Chirici[a]

[a]Department of Agriculture, Food, Environment and Forestry, Università degli Studi di Firenze, Firenze, Italy; [b]Dipartimento di Bioscienze e Territorio, Università degli Studi del Molise, Isernia, Italy; [c]Dipartimento per l'Innovazione dei Sistemi Biologici, Agroalimentari e Forestali, Università degli Studi Della Tuscia, Viterbo, Italy; [d]Department of Forest Resources, University of Minnesota, Saint Paul, MN, USA; [e]Reparto Carabinieri Parco Nazionale Foreste Casentinesi, Arezzo, Italy



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Landtrendr

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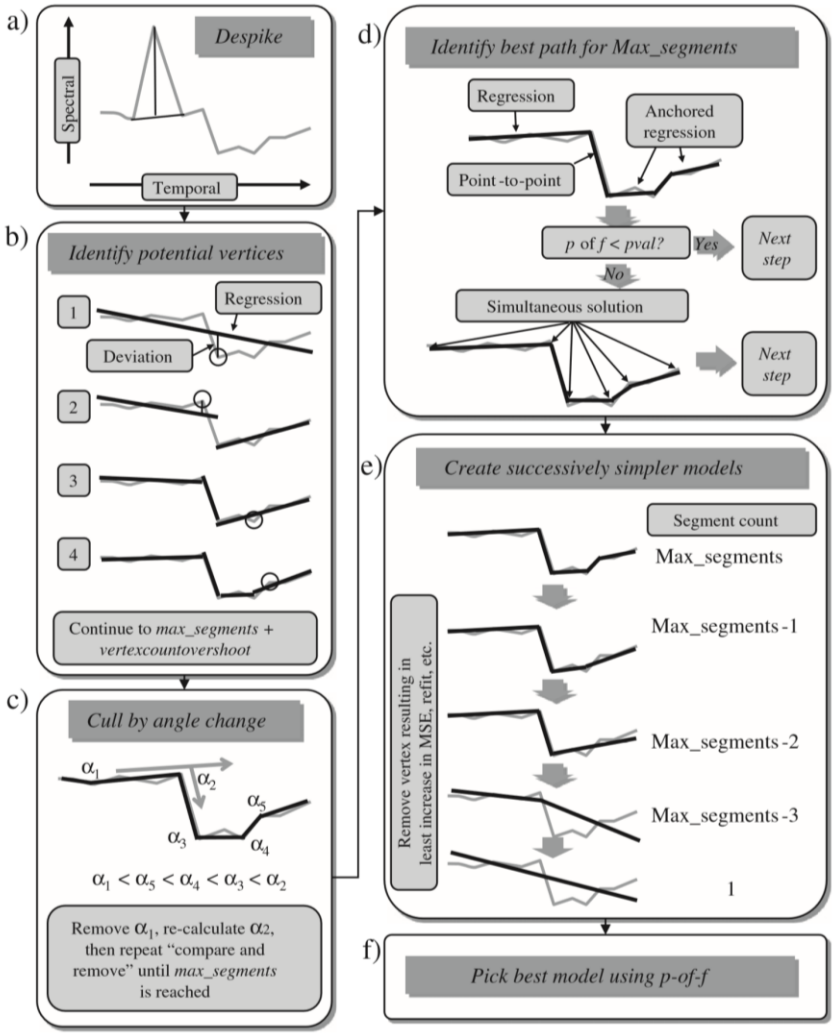
Remote Sensing of Environment

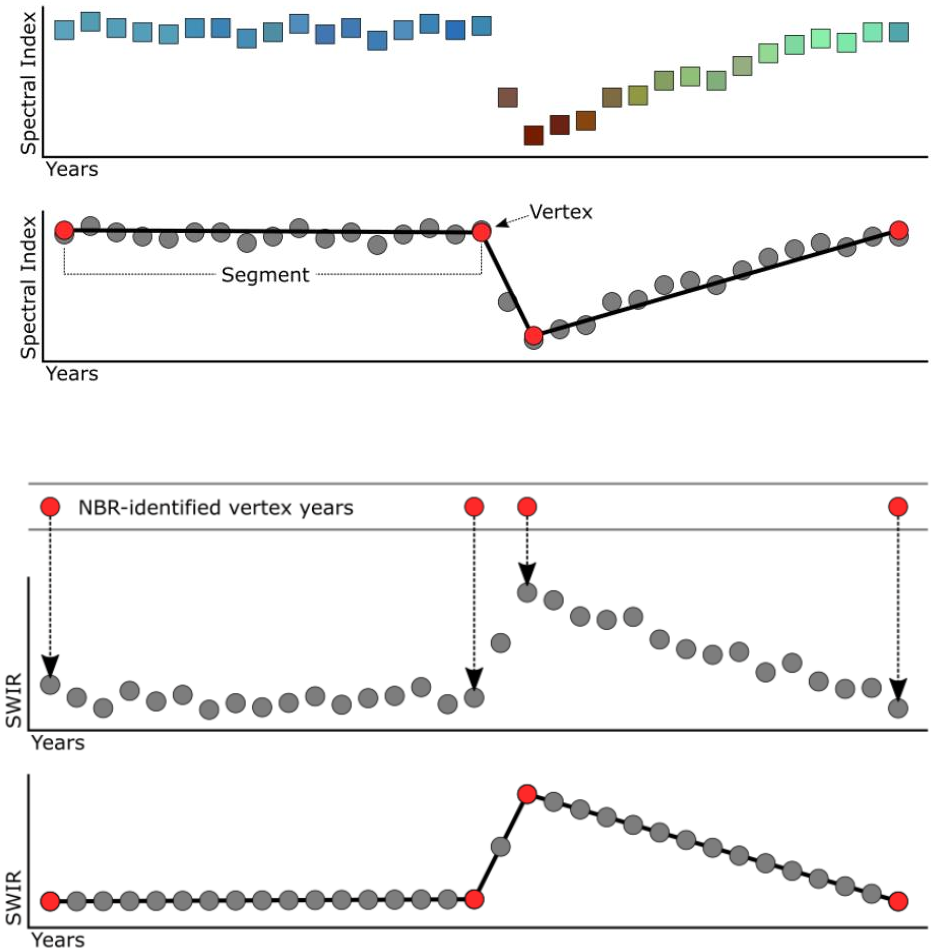
journal homepage: www.elsevier.com/locate/rse

Detecting trends in forest disturbance and recovery using yearly Landsat time series: 1. LandTrendr – Temporal segmentation algorithms

Robert E. Kennedy [a,*], Zhiqiang Yang [a], Warren B. Cohen [b]

[a] Department of Forest Ecosystems and Society, Oregon State University, 321 Richardson Hall, Corvallis, OR 97331, United States
[b] Pacific Northwest Research Station, USDA Forest Service, Corvallis, OR 97331, United States



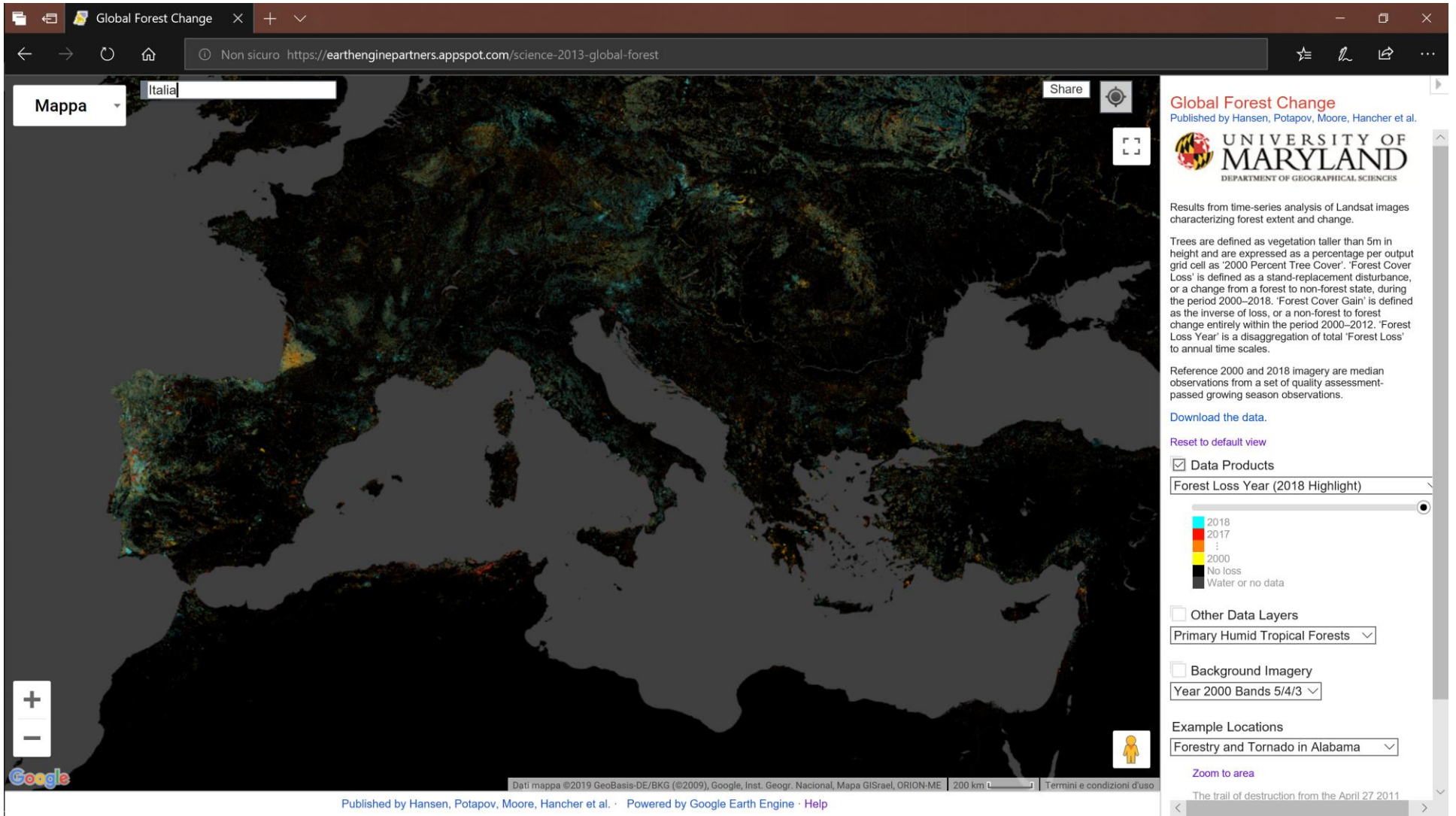


Stato dell’arte

High-Resolution Global Maps of 21st-Century Forest Cover Change

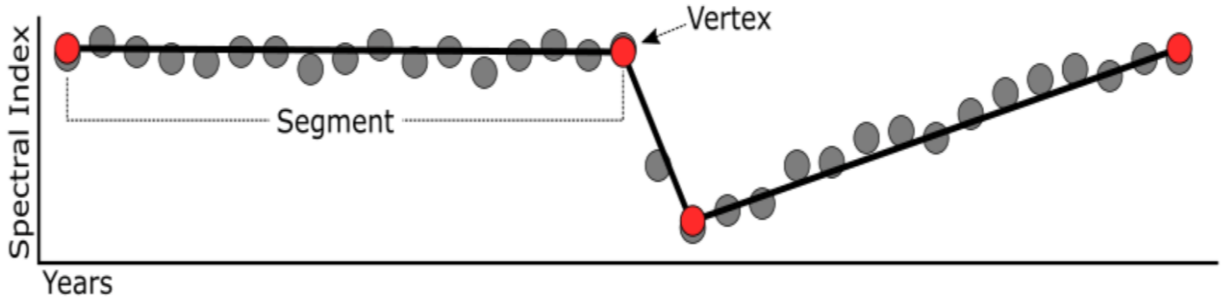
M. C. Hansen[1,*], P. V. Potapov[1], R. Moore[2], M. Hancher[2], S. A. Turubanova[1], A. Tyukavina[1], D. Thau[2], S. V. Stehman[3], S. J. G...
+ See all authors and affiliations

Science 15 Nov 2013:
Vol. 342, Issue 6160, pp. 850-853
DOI: 10.1126/science.1244693

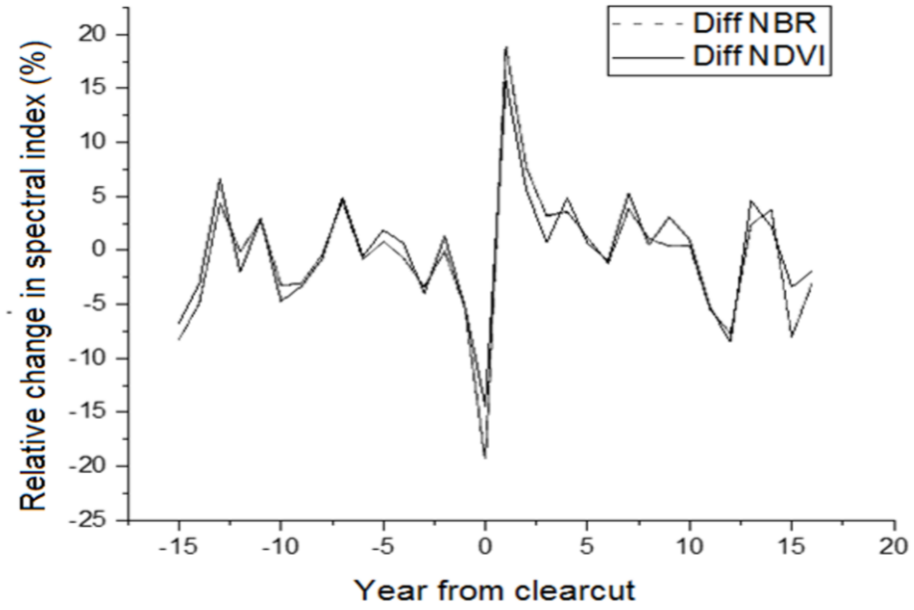


Stato dell'arte

Taglio raso in foresta boreale



Taglio raso ceduo mediterraneo



Annals of Forest Science (2020) 77: 40
https://doi.org/10.1007/s13595-020-00936-2

RESEARCH PAPER

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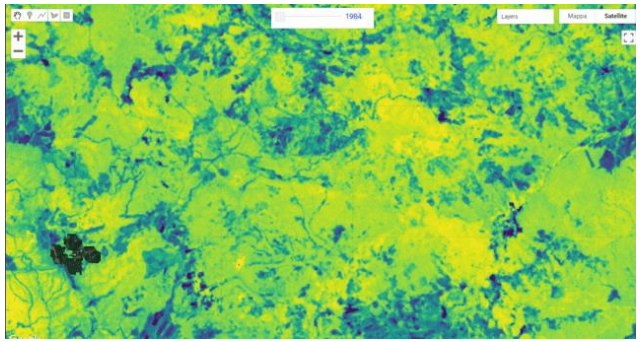
Monitoring clearcutting and subsequent rapid recovery in Mediterranean coppice forests with Landsat time series

Gherardo Chirici[1] · Francesca Giannetti[1] · Erica Mazza[1] · Saverio Francini[1] · Davide Travaglini[1] · Raffaello Pegna[1] · Joanne C. White[2]

Mappatura dei disturbi forestali

Serie multitemporale S2

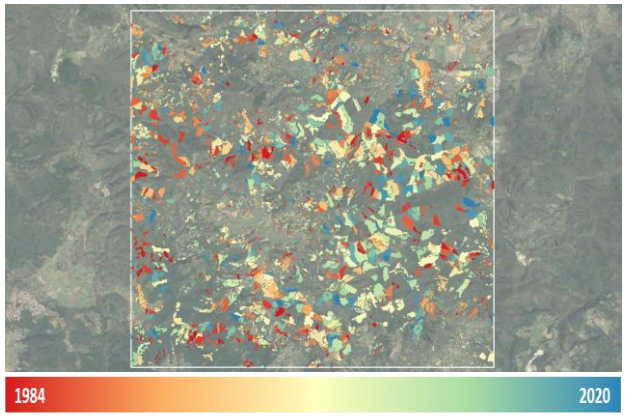


NDVI
$$\frac{NIR - RED}{NIR + RED}$$

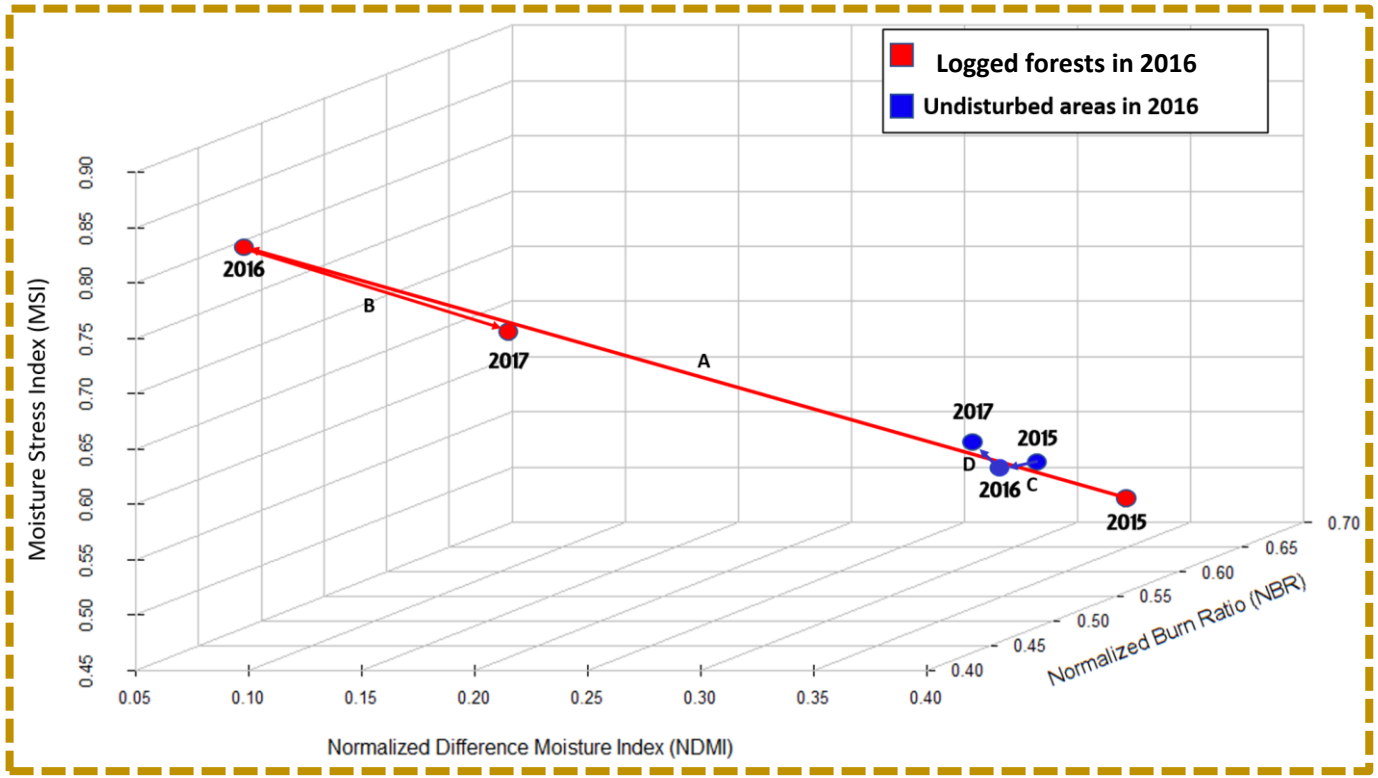
NBR
$$\frac{NIR - SWIR}{NIR + SWIR}$$

MSI
$$\frac{SWIR}{NIR}$$

Forest disturbance map



3I3D



INTERNATIONAL JOURNAL OF REMOTE SENSING
2021, VOL. 42, NO. 12, 4693–4711
https://doi.org/10.1080/01431161.2021.1899334

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The Three Indices Three Dimensions (3I3D) algorithm: a new method for forest disturbance mapping and area estimation based on optical remotely sensed imagery

Saverio Francini [a,b,c], Ronald E. McRoberts [d], Francesca Giannetti [a], Marco Marchetti [b], Giuseppe Scarascia Mugnozza [c] and Gherardo Chirici [a]

International Journal of Applied Earth Observations and Geoinformation 106 (2022) 102663

Contents lists available at ScienceDirect

International Journal of Applied Earth Observations and Geoinformation

journal homepage: www.elsevier.com/locate/jag

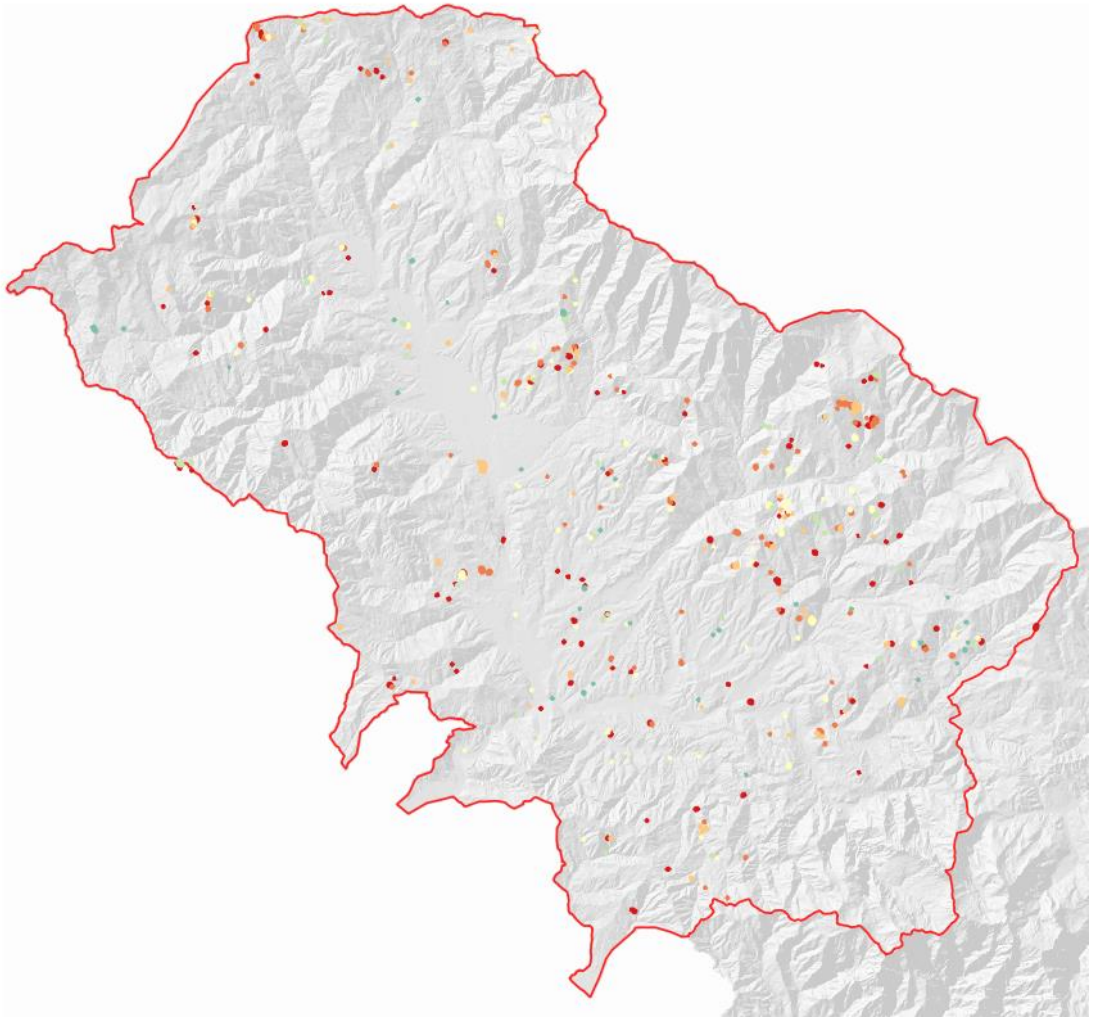
ELSEVIER

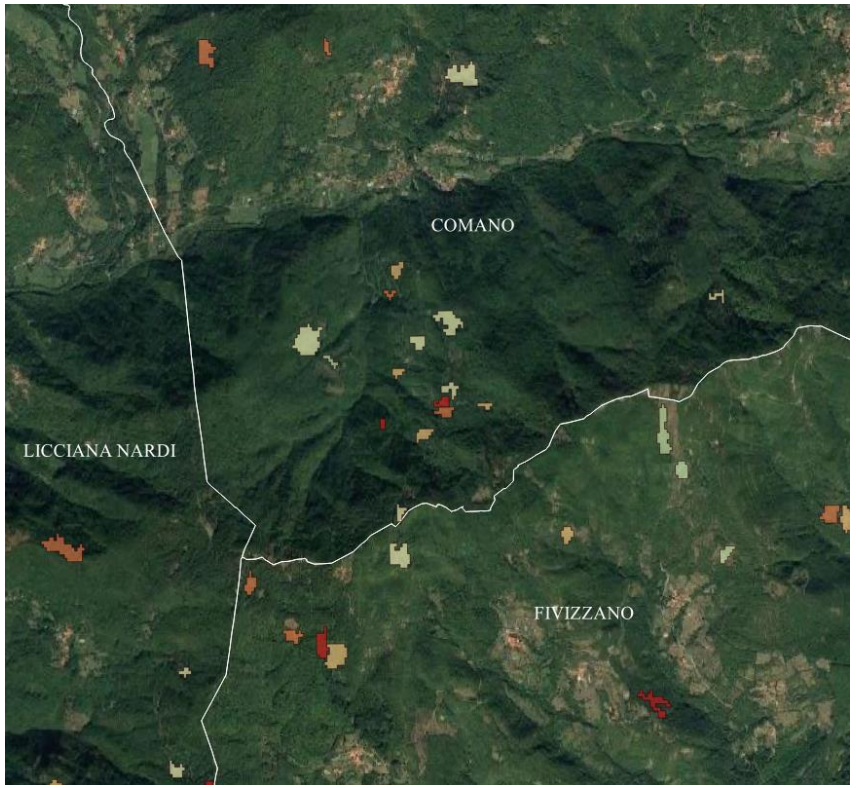
An open science and open data approach for the statistically robust estimation of forest disturbance areas

Saverio Francini [a,b,c,*], Ronald E. McRoberts [d], Giovanni D'Amico [a], Nicholas C. Coops [e], Txomin Hermosilla [f], Joanne C. White [f], Michael A. Wulder [f], Marco Marchetti [b], Giuseppe Scarascia Mugnozza [c], Gherardo Chirici [a]

Mappatura dei disturbi forestali

Risultati 3I3D





2017
2018
2019
2020
2021
2022

Anno	Numero disturbi	Superficie Totale (ha)	Superficie Media (ha)
2017	89	66.69	0.75
2018	83	60.47	0.73
2019	70	57.22	0.82
2020	71	44.62	0.63
2021	45	27.90	0.62
2022	34	16.94	0.50

Green Community e Servizi Ecosistemici: verso una Gestione Sostenibile e Responsabile del patrimonio forestale

Giovanni D'Amico

Email – giovanni.damico@unifi.it

𝕏 @giova_damico

www.geolab.unifi.it

UNIVERSITÀ DEGLI STUDI FIRENZE

DAGRI DIPARTIMENTO DI SCIENZE E TECNOLOGIE AGRARIE, ALIMENTARI, AMBIENTALI E FORESTALI

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