

PROJECT INFORMATION

Project title: Improved estimation of forest C sequestration from PRISMA retrieval of canopy N and photosynthetic potential

Project ID: 233

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PROJECT DESCRIPTION

In the proposed project, hyperspectral images from the PRISMA sensor, recently launched by the Italian Space Agency (ASI), will be used to estimate leaf nitrogen (N) concentration at a number of ICP Forests (<http://icp-forests.net/>) and FluxNet (<https://fluxnet.fluxdata.org/>) sites in Italy and across Europa. Several approaches will be compared for the estimation of leaf N concentration, based

- (a) on SWIR (2200-2300 nm) normalized indices,
- (b) on canopy reflectance in the NIR region,
- (c) on the estimation of leaf chlorophyll content and its correlation with N,
- (d) on the entire VIS-SWIR spectrum by PLSR (Partial Least Square Regression) techniques,
- (e) on the application of a canopy energy transfer model.

The analysis will make it possible to spatialize direct measurements from the ICP Forests project, in anticipation of hyperspectral satellites currently planned by the European Space Agency.

The same approaches will be applied to estimate from PRISMA imagery canopy photosynthetic potential (I_{max} , V_{cmax}), as estimated by the inversion of a C exchange model on eddy-covariance data from FluxNet sites.

Results will be compared with those based on Copernicus Sentinel 2 multispectral images.

The local variability in canopy N concentration will be also assessed in situ at two ICP Forests sites (ABR-01, Collelongo-Selva Piana; LAZ-01, Monte Rufeno), so as to estimate the effects of PRISMA spatial resolution and geolocation errors.

Finally, the relevance of EO for the prediction of forest C eddy covariance fluxes will be assessed from the improvement in the accuracy of a C exchange model, when assimilating canopy N concentration estimates derived from PRISMA imagery as described above.