

## REMOTE SENSING OF TRENTINO FOREST BIOPHYSICAL VARIABLES USING IRS SATELLITE DATA

Loris Vescovo\*, Sergio Tonolli\*, Michele Dalponte\*, Markus Neteler\*, Lorenzo Bruzzone°, Damiano Gianelle\*

\*Fondazione Edmund Mach, CRI, Viote del Monte Bondone, 38040, Trento (Italy). Tel.+39 461 939555  
E.mail: [vescovo@cealp.it](mailto:vescovo@cealp.it)

°Dept. of Information Engineering and Computer Science, University of Trento, Via Sommariva 14,  
38050, Povo, Trento, (Italy)

Remote sensing of biophysical variables is a key step for the quantification of the carbon fluxes of forests. Forests are rather challenging targets, due to their architectural heterogeneity, understory vegetation effect, plant shadows, etc. [1]

This work evaluated empirical predictive models between vegetation indices (VI) derived from IRS LISS-III 4-band (1: 0.52-0.59, 2: 0.62-0.68, 3: 0.77-0.86, and 4: 1.55-1.70  $\mu\text{m}$ ) multispectral sensors data (23.5-meter spatial resolution) and field measurements of biophysical forest stand variables.

More than 800 ground-truth plots were selected on a random basis within the forested areas of Trentino province, in the southern Alps (Trento, Italy). This mountane area is characterised by a wide altitudinal range (200-3500 m a.s.l.), an extreme topographic complexity, and is covered by heterogeneous forests; main species are *Picea abies*, *Larix decidua*, *Pinus* sp., *Fagus sylvatica*, *Abies Alba*, and *Quercus* sp.

During 2003 and 2004, at each plot, measurements of leaf area index (LAI) were carried out using the hemispherical photographs approach (5 shots/plot), while above ground biomass was estimated by means of angle count sampling (5 observations/plot).

The image data were geometrically, topografically and atmospherically corrected. At first, relationships between the forest stand variables and single band values were examined.

The biophysical parameters were significantly correlated with most of the investigated bands. The stand variables were most strongly correlated with LISS III band 3 and 4. Best VI in relation with biophysical parameters were mostly based on water absorption features as shown by many authors [2], [3], [4]. Also, better results were obtained analysing the different forest types on a separate basis.

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[2] Brown L., Chen J.M., Leblanc G., Cihlar J., "A shortwave infrared modification to the simple ratio for LAI retrieval in boreal forests: an image and model analysis". *Remote Sensing of Environment*, 71, 16-25, 2000

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[4] Ustin S.L., Zarco-Tejada P.J., Jacquemod S., Asner G.P., "Remote Sensing of the Environment: State of the Science and New Directions". In: Remote Sensing for Natural Resources Management and Environmental Monitoring: *Manual of Remote Sensing*, 3ed., Vol.4, 2004.