Novel algorithms based on active-passive data synergies to retrieve forest variables

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Ecosystems provide many benefits to society in the form of ecosystem services. Many them are provided by forests (i.e. flood and climate regulation, cultural), which are also some of the most biodiverse terrestrial ecosystems. Romania is the country with the most varied forms of forest growth of temperate Europe, and also contains its last and largest remnants of primary forest. They are affected by various natural (wind throws, wildfires, insects outbreaks) and anthropogenic disturbances (logging). The project EO-ROFORMON has the objective of developing algorithms for forest variables monitoring based on remote sensing. These variables are forest type, fractional canopy cover (FCC), forest condition and biomass. The specific objectives, methods envisaged, and expected results for each case vary:

- For mapping forest type the optimum input data, classification approach and classifier will be selected. The output of this research will be an algorithm for classification, information regarding the advantages and disadvantages of each component and a forest type map.
- TLS-derived (terrestrial LiDAR scanner) FCC field data will be linked to remote sensing inputs using a non-parametric regression approach. The expected results are an algorithm for FCC calculation and a fractional canopy cover map of the study area.
- Relationships between remote sensing data and three forest condition variables (LAI, water content and discoloration). These relationships will be examined using numerical models and statistical analysis, determining the optical metrics, their rate of change and its interaction with other variables, like the FCC.
- Forest total biomass will be modelled using inputs from optical and SAR sensors, forest variables (i.e. forest type, FCC) and environmental conditions, using regression approach. These results will be compared with numeric models to ensure their robustness.