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A multitemporal database of optical and structural data for the calibration of remotely-sensed information in temperate broadleaved forests

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Remote sensing provides a unique way to obtain estimates of forest attributes at spatially extensive areas, from landscape to the global scale. Recent advances in airborne and spaceborne remote sensing technologies have provided a large amount of data with different spatial, spectral and temporal resolution over forest ecosystems. However, the analysis and extraction of quantitative information from remotely-sensed data require accurate cross-calibration with in situ forest measurements. This is particularly relevant in temperate broadleaved forests, which are characterized by high level of complexity, which can complicate the retrieval of vegetation attributes from remotely-sensed data.

In the framework of the Project LIFE FutureForCoppiceS (www.futureforcoppices.eu) we compiled an extensive database of optical and structural data from nine forest stands, being representative of three most commonly diffused European Forest Types (mountainous beech forests, thermophilous oak forests, evergreen broadleaved forests). Forest inventory data have been collected and available since the 1969 and repeated every 5-10 years. Twenty-five years (1992-2017) of annual measurements of leaf area index, litter production and its partitioning were collected using both indirect (LAI-2000 Plant Canopy Analyzer) and direct (Littertraps) methods. A comparison with remotely sensed data derived from MODIS and LAI, aboveground biomass measured in situ revealed a good correlation between satellite and ground truth data. We conclude that the database holds great potential for the calibration of long-term time series data, which can be used for application in phenology, global change and monitoring studies.