DIPARTIMENTO DI INGEGNERIA
CORSO DI DOTTORATO IN INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE -
PHD COURSE IN INDUSTRIAL AND INFORMATION ENGINEERING - 37TH CYCLE

Title of the research activity:	**Satellite Remote Sensing for hydrological applications**
State of the Art:	Remote sensing has the capability of observing several variables for hydrological applications over large areas on a repetitive basis, allowing the modelling of hydrological phenomena. These variables include surface soil moisture, rainfall, surface temperature, water depth, flow velocity, and river discharge. In particular, river discharge is fundamental to the hydrologic cycle, flood forecasting, hydraulic risk mitigation, and water resources management. Improving discharge monitoring for various flow conditions at river sites can be accomplished by leveraging new technologies developed for ground measurements and remote sensing, thus enhancing the understanding of the surface hydrologic processes. Satellite platforms have paved the way for the development of new approaches for discharge monitoring from space at ungauged river sites. In this context, research efforts have focused on multiple remote sensing platforms thanks to the growing data availability for Earth Observation and the advanced processing techniques. The extensive availability of the different satellite missions represents a huge enhancement in the hydrology field, allowing their temporally continuative use on a global scale.
Short description and objectives of the research activity:	The research activity will be based on the following tasks, aimed to assess the effective support of satellite data to hydrological studies and their benefit with respect to ground measurements: - Definition of the sites of interests - Choice of the satellite platforms and sensors (e.g. multispectral radiometers) at different spatial resolution (MODIS, Landsat, Sentinel-2, etc…) - Integration of multi-sensor observation - Reflectance processing and computation of spectral indices for river discharge and flow velocity estimation applying different methodologies - Comparison with ground-based measurements Novel and original results are expected: the starting point is the study of the broad existing literature.
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