POLITECNICO DI MILANO

PhD in INGEGNERIA AMBIENTALE E DELLE INFRASTRUTTURE / ENVIRONMENTAL AND INFRASTRUCTURE ENGINEERING - 40th cycle

Research Area n. 1 - Water Science and Engineering

THEMATIC Research Field: MAPPING IRRIGATION VOLUMES AND GROUNDWATER RECHARGE BY COMBINING SATELLITE DATA AND HYDROLOGICAL MODELING ACROSS ITALY

Monthly net income of PhDscholarship (max 36 months)
€ 1450.0 In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Agriculture is the largest consumer of water worldwide, accounting for 24% of total freshwater use in Europe, with 80% in the southern regions. Irrigated croplands account for 25% of global cultivated areas and 70% of all freshwater consumption. Climate change and increasing human pressure together with traditional inefficient irrigation practices are exacerbating trade-offs between water dependent sectors and potential conflict in water use, also in countries traditionally rich in water. Despite its importance in the management and optimization of the distribution of agricultural water, irrigation volumes are still a mostly ungauged quantity, whether at the field or larger scales like river basins. Uncertainty in irrigation water use persists in numerous vital irrigated regions, posing a significant challenge in regional and global assessments of irrigation water consumption and its sustainability. The objective of this doctoral scholarship is to develop a methodology to estimate the irrigation volumes actually used and their impact on the hydrological cycle, analyzing the changes of the last 30 years in Italian agricultural areas.

Methods and techniques that will be developed and used to carry out the research	The methodologies that will be implemented to estimate the actual irrigation volumes and its impact on the water cycle are based on the integration of satellite data of soil moisture, land surface temperature, vegetation indices into energy and water balance models. Different irrigation strategies will be implemented to account for the differences in the Italian agriculture and to take advantage of the different satellite information. The methodologies will also be improved in the evapotranspiration component, allowing the model not to neglect the impacts of diurnal water stress and radiative flux interaction on sub-daily ET dynamics. The developed estimates of the components of the water cycle will be subjected to uncertainty evaluation and trend analysis.
Educational objectives	The PhD program is oriented to improve the scientific background of each student, preparing the basis for a university researcher as professional specialist careers. The participation to dedicated courses will be encouraged.
Job opportunities	Main opportunities in the job market include Universities, Research Centers, top level management in Authorities involved in environmental policy, and senior consultants for engineering companies.
Composition of the research group	0 Full Professors 1 Associated Professors 2 Assistant Professors 2 PhD Students
Name of the research directors	Chiara Corbari

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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	725.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Educational activities: financial aid per PhD student per year. The Ph.D. course supports the educational activities of its Ph.D. students with an additional funding equal to 10% of the scholarship, starting from the first year.

Teaching assistantship: there are various forms of financial aid for activities of support to the teaching practice.The PhD is encouraged to take part in these activities, within the limits allowed by the regulations.

Computer availability: each Ph.D. student has his/her own computer for individual use.

Desk availability**:** each Ph.D. student has his/her own desk, cabinet and locker.