

Research options available for topic B

Research topics a) and b) offered by every Doctoral Course involved in UNIPH_D are frameworks within which every applicant has to present an original research project in collaboration with a Supervisor at the University of Padua.

Potential Supervisors at Unipd have proposed the following detailed research options, which are related to the research topic. They are offered as a guideline and should facilitate your contact with potential Supervisors. Supervisors' e-mail is specified in every research option table. You are welcome to contact them directly.

Note that this research option list is not at all exhaustive and, within the topic you have chosen, you are free to propose a different research project.

Doctoral Course	LAND, ENVIRONMENT, RESOURCES AND HEALTH
Macro-area	Cross-domain Physical Sciences and Engineering / Life Sciences
Department name	Department of Land, Environment, Agriculture and Forestry
Webpage	http://www.tesaf.unipd.it/en/lerh
Research topic B	The Vaia flood event: observations and prediction of sediment and large wood dynamics
Link to the UNIPH_D Call (Academic Year 2022/2023)	https://www.unipd.it/en/uniphd
Latest Update	12.01.2022
#Number of available Research Options	2 <i>Scroll down to see all the Research Options</i>

#1 Research Option Description

Doctoral Course	Land, Environment, Resources And Health (LERH)
Department name	Land, Environment, Agriculture And Forestry (LEAF)
Research topic B	The Vaia Flood Event: Observations and Prediction of Sediment and Large Wood Dynamics
Research option	Monitoring and modelling of runoff and sediments transport associated to large scale debris-flow and debris-flood events
Supervisor	Supervisor: CARLO GREGORETTI carlo.gregoretti@unipd.it Members of the research group: MATTEO BERTI matteo.beriti@unibo.it ALESSANDRO SIMONI alessandro.simoni@unipd.it STEFANO LANZONI stefano.lanzoni@unipd.it
Webpage	https://it.didattica.unipd.it/off/dolomites/59C7EBD0E17BB2F23B7B9F94F08BC3B5
Context of the research activity and objectives	The research aims to enhance understanding of rainfall-triggered large scale debris flows (DF) and debris flood (DFD) events in mountainous areas, with two specific objectives: i) to monitor these events using observations from specific sites in the Italian Dolomites; ii) to exploit the collected data for testing numerical models for the prediction and forecast of these events. The monitoring will be carried out by means of field surveys, topographical measurements and monitoring stations. Three specific catchments in the Italian Dolomites will be surveyed: the Liera torrent, subjected during the 2018 VAIA event to large DF and DFD activities (more than 700.000 cubic meters of sediments mobilized and transported downstream), the Rovina di Cancia and the Rio Gere subjected to large scale DF activity that caused damages and deaths. Results from the Liera torrent site will be used for determining the relations for identifying initiation areas and magnitude of DFs occurring during large extreme storms, as the transport capacity of DFD. Results from Rovina di Cancia and Rio Gere sites will be used for exploring the role of runoff in DF occurrence and magnitude, the dynamics (surge velocity, deposition and entrainment) of fully developed DF and its interaction with the control works. The collected data and observations will be used for testing rainfall-runoff models for DF and DFD triggering in headwater basins and for DF and DFD routing.
Infrastructures	<ul style="list-style-type: none"> i) Field monitoring stations at Rovina di Cancia and Rio Gere (Venetian Dolomites, Northeast Italy); ii) state-of-the-art numerical models for DF and DFD simulation; iii) data archive on DF and DFD events in the Dolomites.
Skills and competencies for the development of the activity	<ul style="list-style-type: none"> i) Knowledge of programming skills (matlab, fortran, c++, python) ii) Proficiency in spoken and written English

	<ul style="list-style-type: none"> iii) Good organizational, problem-solving skills and practice in mountainous environments iv) Proven experience with hydrological and/or hydrodynamic models, GIS software, and topographical surveying instrumentation.
<p>Training offer</p>	<p>The LERH PhD course offers extensive training opportunities, with a number of compulsory and eligible courses. At least 20 ECTS are expected to be acquired by the PhD students during the 1st year. The courses are updated each year.</p> <p>Those available on the academic year 2021-2022 are described at https://www.tesaf.unipd.it/en/research/doctoral-degrees-phd-lerh-program/teaching. Amongst them, the following are particularly relevant for this research option:</p> <ul style="list-style-type: none"> • Data collection: from questionnaires to participatory approaches” (2 ECTS) • Spatial statistics (2 ECTS) • Spatial statistics in socio-economic research (2 ECTS) • Econometric models to inform environmental resources management and food policies (1 ECTS) <p>Other courses can be useful:</p> <ul style="list-style-type: none"> • e-learning course on “Green Care: from academic theory to entrepreneurial practice” • MOOC course on “Introduction to Sustainable Bioeconomy” (PerForm project) • MOOC on “Social innovation in marginalized rural areas” (SIMRA project) • Training on standards and certification for ecosystem services (e.g. offered by external organizations such as the Forest Stewardship Council – FSC) <p>Additional on-demand training to be identified in collaboration with the PhD candidate and with the possible secondment options</p>
<p>Possible Secondments</p>	<ul style="list-style-type: none"> 1) WSL Switzerland (3 months) 2) CAE (6 months)

#2 Research Option Description

Doctoral Course	Land, Environment, Resources And Health (LERH)
Department name	Land, Environment, Agriculture And Forestry (LEAF)
Research topic B	The Vaia Flood Event: Observations and Prediction of Sediment and Large Wood Dynamics
Research option	Study on the generation and modeling of runoff triggering debris flows for risk management purpose
Supervisor	Supervisor: CARLO GREGORETTI carlo.gregoretti@unipd.it Members of the reseach group: MATTEO BERTI matteo.beriti@unibo.it ALESSANDRO SIMONI alessandro.simoni@unipd.it STEFANO LANZONI stefano.lanzoni@unipd.it
Webpage	https://it.didattica.unipd.it/off/dolomite/59C7EBD0E17BB2F23B7B9F94F08BC3B5
Context of the research activity and objectives	<p>This proposal aims to analyse the generation of runoff triggering debris-flows. In the instrumented basin of Cancia near to Cortina d'Ampezzo (Eastern Italian Alps) where debris flows have been documented for more than 100 years, a 3D anemometer and a disdrometer will be installed close to a couple of rain gauges. These sensors will measure the 3D component of the wind velocity and the fall velocity of the precipitation respectively. The rainfall rate estimated by the disdrometer will be compared with that from the rain gauge and with the components of the wind velocity to study the influence of the wind on precipitated rainfall. Results will be used for the determination of rainfall- threshold for debris-flow triggering and for a rainfall-runoff modeling that consider the influence of the wind pattern. The incorporation into a rainfall-runoff model or rainfall-threshold of a component that simulate the effect of wind is very important as the extreme precipitation of VAIA occurred together a wind storm. Both rainfall threshold and the hydrological model can be used in early warning systems. The hydrological model could also be used for hazard assessment and for the design of control works mitigating the debris-flow risk.</p>
Infrastructures	<ul style="list-style-type: none"> iv) Field monitoring stations at Rovina di Cancia and Rio Gere (Venetian Dolomites, Northeast Italy); v) state-of-the-art numerical models for DF and DFD simulation; vi) data archive on DF and DFD events in the Dolomites.

Skills and competencies for the development of the activity	<ul style="list-style-type: none"> v) Knowledge of programming skills (matlab, fortran, c++, python) vi) Proficiency in spoken and written English vii) Good organizational, problem-solving skills and practice in mountainous environments viii) Proven experience with hydrological and/or hydrodynamic models, GIS software, and topographical surveying instrumentation.
Training offer	<p>The LERH PhD course offers extensive training opportunities, with a number of compulsory and eligible courses. At least 20 ECTS are expected to be acquired by the PhD students during the 1st year. The courses are updated each year.</p> <p>Those available on the academic year 2021-2022 are described at https://www.tesaf.unipd.it/en/research/doctoral-degrees-phd-lerh-program/teaching.</p> <p>Additional on-demand training to be identified in collaboration with the PhD candidate and with the possible secondment options</p>
Possible Secondments	<p>Academic secondment: WSL Switzerland (3 months)</p> <p>Non-academic secondment: CAE (6 months)</p>