DOCTORAL COURSE
Land Environment Resources and Health (L.E.R.H.)

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CLIMATIC SENSITIVITY AND RESPONSE OF THE ALPINE CRYOSPHERE IN REMOTE MOUNTAIN AREAS

PhD program: Land, Environment, Resources and Health (L.E.R.H.)

Research area: Hydrology, water resources, land and soil conservation (snow and glacier hydrology)

Research unit: Cryosphere and Hydrology Group - University of Padova

(https://intra.tesaf.unipd.it/glaciology/)

Tutor: Luca Carturan - TeSAF Department - University of Padova (luca.carturan@unipd.it)

Co-tutor: Federico Cazorzi - DI4A Department - University of Udine

L.E.R.H. selection 2022:   Call opening: 8 April 2022

Call deadline: 13 May 2022 13:00, at p.m. CET (Italian time zone)

Keywords
Snow, mountain glaciers, mountain permafrost, climatic change, climatic sensitivity, energy balance, mass balance

Profile and skills required
Applicants need to have general knowledge in glaciology, physics and mathematics/statistics and preferably research experience in one or more of the following: meteorology, hydrology, climatology, glaciology, alpine cryosphere. Particular consideration will be given to candidates with skills in computer programming, proficiency in scientific English and familiarity with high-mountain environments. In the spirit of equality and inclusion, all qualified applicants are encouraged to apply.

Project description
The alpine cryosphere is deeply affected by climatic changes and its components (snow, glaciers and permafrost) are currently subject to rapid changes, with profound impacts on ecosystems and the human society. The mitigation of these changes and adaptation to their consequences, under projected climatic scenarios, require improved knowledge of the response of the alpine cryosphere to climatic variability. In particular, feedbacks from albedo, snow redistribution, boundary layer processes are still poorly understood and approximately modelled, due to the scarcity of field data in remote mountain areas.
During this PhD, we propose to study the climatic sensitivity of surface energy and mass balance at high-altitude locations in the Eastern Italian Alps, where rare data series of nivo-meteorological observations and mass balance exist and are being collected. The aims of the PhD project are: i) to calculate the surface energy and mass balance at selected locations, under variable meteorological conditions and weather circulation types; ii) to quantify the role of feedbacks in the climatic response; iii) to model the climatic response under different climatic conditions with field-based validation; and iv) to project the climatic response under future climatic scenarios.
Activities will include the joint analysis of climatological and nivo-meteorological data series (from manned and automatic weather stations), series of weather circulation types (from reanalysis data), surface mass balance datasets, and snow depth/snow cover datasets, using energy-balance and conceptual modelling tools.
The results of the PhD project will have significant impacts on the knowledge of climate-related transformations in the cryosphere, projection of their future behaviour, and adaptation to associated changes in ecosystems and socio-economic systems, such as tourism and water supply from melting snow and ice.