Geophysical Research Abstracts
Vol. 12, EGU2010-15433, 2010
EGU General Assembly 2010

Hydro-geophysics for hillslope hydrology

Giorgio Cassiani (1), Rita Deiana (1), Jacopo Boaga (1), Giulio Vignoli (1), Matteo Rossi (1), Marco Marani (2), Mario Putti (2), Marta Altissimo (3), Alberto Bellin (4), and Oscar Cianelli (4)

(1) Dipartimento di Geoscienze, Università di Padova, Italy (Giorgio.cassiani@unipd.it), (2) Dipartimento IMAGE, Università di Padova, Italy, (3) Dipartimento DMMMSA, Università di Padova, Italy, (4) Dipartimento di Ingegneria Civile e Ambientale, Università di Trento, Italy

The description of water catchment responses is a fundamental issue in geoscience. In spite of recent major scientific advances, some of the basic governing physical processes, particularly the role of the subsurface, remain poorly understood. Recent experimental evidence shows that groundwater flow is an important component of the hillslope hydrological response. Since direct investigation of steep hillslopes is often infeasible, non-invasive techniques can play a major role. In this talk we present two examples of hydro-geophysical characterization of mountain catchments, both located in the Southern Alps. The catchments differ in size, geology, and hydrological response. In both cases we applied a combination of methods that aim at defining: (1) the geological/geometrical structure of the hydrogeological units, (2) the natural evolution of moisture content in the system via time-lapse monitoring, (3) the hydraulic characteristics of the main units (soil and bedrock) via local irrigation experiments monitored in time-lapse and used to calibrate local scale hydrological models. The geophysical tools include ERT, GPR, EM methods, refraction and surface-wave seismics, that all contribute to a different degree to the three characterization aspects defined above. The respective importance and role of each method depends also, as expected, on the site characteristics. We aim at showing how a combination of geophysical and traditional hydrological methods, together with local-scale hydrological model calibration, allow to build a comprehensive view of hillslope processes and catchment behaviour that ultimately feed into the improvement of hillslope-scale and catchment-scale distributed hydrological models.