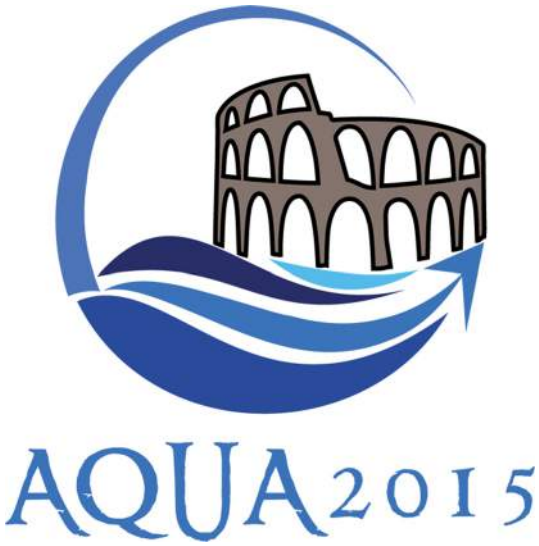
Terrestrial Laser Scanner Acquisition For Snow Depth and Groundwater Recharge Quantification in an Alpine Basin

THE INTERNATIONAL ASSOCIATION OF HYDROGEOLOGISTS



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ABSTRACT BOOK

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185 - TERRESTRIAL LASER SCANNER ACQUISITION FOR SNOW DEPTH AND GROUNDWATER RECHARGE QUANTIFICATION IN AN ALPINE BASIN

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Climate change is the main factor that induces alterations in the hydrological cycle and mountains represent its first indicators, because they respond rapidly and intensely to climatic and environmental modifications. Obtaining reliable scenarios on water resources availability is a prerequisite to planning management measures. The snowfall and the resulting seasonal snow cover represent an important source of water, including surface and subsurface flows.

A terrestrial laser scanning (TLS) was employed to measure snow depth and snow cover in the Mascognaz basin at 1850 m (Ayas municipality, Regione Autonoma Valle d'Aosta, Italy). We choose this site because the Politecnico di Torino installed an advanced meteorological station in 2010 (equipped with sensors measuring snow depth, snow density and snow water equivalent). Furthermore downstream the area are located two springs, both equipped with probes measuring water level, temperature and electrical conductivity.

The aim of this study is to recognize the accumulation areas from melting areas through the generation of high dense digital snow elevation model. In this way is possible better understand the snowmelt process that contributes widely to the groundwater recharge. We used the Riegl VZ 4000 that is very powerful for measurements of snow-covered surfaces in high alpine catchment thanks to the long-range acquisition.

The TLS monitoring consists in three phases: a summer acquisition, with the purpose to obtain a DSM (Digital Surface Model); a winter acquisition, that aims to evaluate accurately the snow cover and the snow accumulation areas and a spring acquisition with the purpose to investigate the snow-pack development and evaluate the available volume of water generate by snow during the melting phenomena.

Finally, we used the ArcGIS 10.2 software to improve spatial analysis evaluation, estimate the Snow Water Equivalent (SWE). and obtain important information on the amount of water resources available for human consumption.