

Water drought problems concerning mountain aquifers are increasing. They are caused by evolution of climate conditions and pluviometric regimes that are favoring less winter snowpack, more intense and less frequent rainfall. Permanent cryosphere bodies melting are helping several mountain aquifers resources, although they are an unreliable source of water because once they are extinct they take thousands of years to reconstitute themselves.

The increasing drought problems concern more the territorial planning aimed to water resource management, since most of drinkable water comes directly from groundwater resources. Climate change has affected largely the cryosphere evolution: snow, ice, frost is subjected to a sharp cycle trends of temperature, causing their intense melting and being source of instabilities, water unbalance and solid transportation.

Increasing temperature cycles frequency have already caused several disasters driven by large cryosphere bodies melting and moving. Sometimes, lot of melted water infiltrates leading to slope saturation and possible collapse.

Here comes the intention to study cryosphere process as snow melting by cross-correlating spring and weather station information with the help of hydrogeochemical surveys and statistical analysis of time series, resulting in a whole comprehension of snow and ice behaviors.

Hydrogeologic equipment will be necessary to establish new relationship between cryosphere melting and the effective water release from this system.

The main goal of this research is to distinguish which aquifers do not perceive contributions from the permanent cryosphere and thus suffer from the new precipitation regimes, and instead the mountain aquifers whose water crisis is hidden by contributions from glacier and permafrost melt.

So initially a hydrogeological input output analysis will be carried out, among five monitored springs and their weather stations, to understand the compliance of the spring response to rain and snow amounts. After which, an attempt will be made to trace the spring anomalies with the extraordinary melting phenomena in the surrounding environment resulting from glacier and permafrost.

Moreover, in this thesis work, some laboratory experiment will be presented to understand the role of snow melting, which is becoming faster according to Climate Change effect, as a triggering factor for shallow landslides.