Groundwater resources of the Pyrenees in the global change context
The PIRAGUA Project

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Objectives

1. Characterize the water resources and their seasonal evolution, and evaluate the future scenarios
2. Develop and promote adaptive strategies against the effects of climate change in the region
3. Develop tools to knowledge about the impacts of climate change on the water cycle of the Pyrenees

Water uses

Contrasted water abstractions

Regional heterogeneity of groundwater use

Time series variability

Groundwater recharge modeling of the Ordesa & Monte Perdido karstic system (case study)

Isotopic characterization

Detailed hydraulic and geochemical monitoring of surface and groundwater flows over the Ordesaesa & Monte Perdido karstic systems to estimate the climate change and tourism activity on the groundwater bodies status. Based on the results, adaptation strategies will be designed in order to maintain this outstanding natural site in good conditions in the future.

Conclusions

The PIRAGUA project will provide the first quantitative assessment of the groundwater resource at the Pyrenean scale. The hydrogeological processes description involved in the water cycle, will allow highlighting the contribution of this mountainous water tower to the water resource supply of both French, Andorran and Spanish sides. The future evolution assessment of this contribution will provide recommendations for proper design of adaptation strategies to face climate change.

Potential groundwater recharge computation (Pyrenean scale)

Groundwater recharge modeling of mainly carbonate river basins (Pyrenean scale)

Visa IBALAN & GIS-BALAN modelling tools

Up to 8 river basins mainly covered by carbonate and karstic systems in Spain and France are simulated over 1981-2015. The different groundwater flows (recharge, discharge) are simulated for present and future conditions.

Groundwater bodies definition

Effective precipitation infiltration ratio

Ongoing computation of effective rainfall based on multiple water balance methods. The effective precipitation computed is then transformed into potential groundwater recharge using the effective precipitation infiltration ratio.

Detailed maps of groundwater bodies definition and effective precipitation infiltration ratio

Groundwater recharge modelling of mainly carbonate river basins (Pyrenean scale)

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Detailed maps of groundwater recharge modelling of mainly carbonate river basins (Pyrenean scale)