Mediterranean high mountain meteorology from continuous data obtained by a permanent meteorological station at Sierra Nevada, Spain

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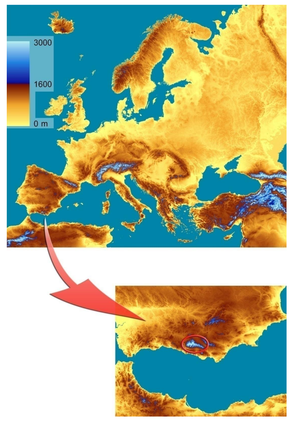
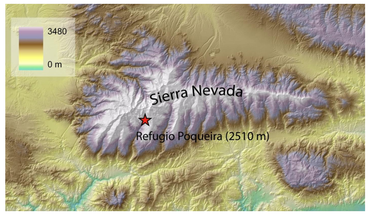
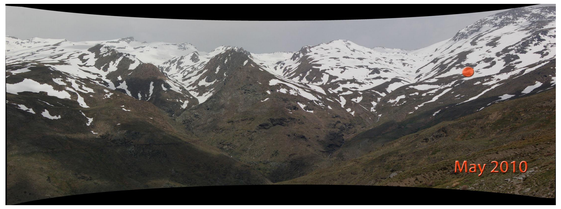
STUDY SITE



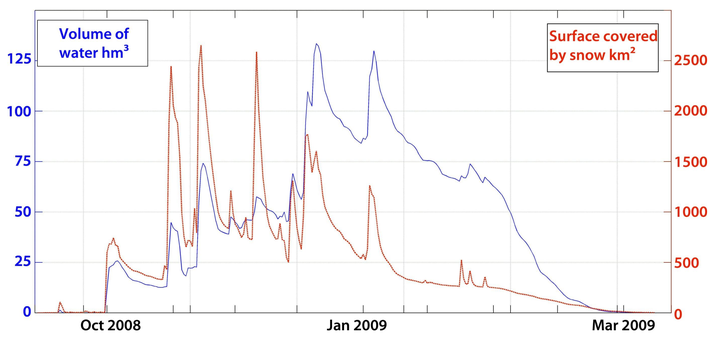
The meteorological station of *Refugio Poqueira* is located at **Sierra Nevada**, in South-Eastern Spain. Data are being recorded since Nov 2004 at **2500 m.a.s.l.**, where **snow** processes are dominant. Installation and proper maintenance of a high mountain installation are difficult and, hence, this station is a source of valuable data. Sierra Nevada's heights play an essential role in basin hydrology, but the **lack of accurate data** causes great uncertainty not only in model predictions but also on knowledge itself.

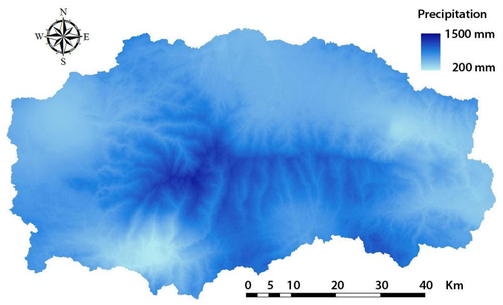




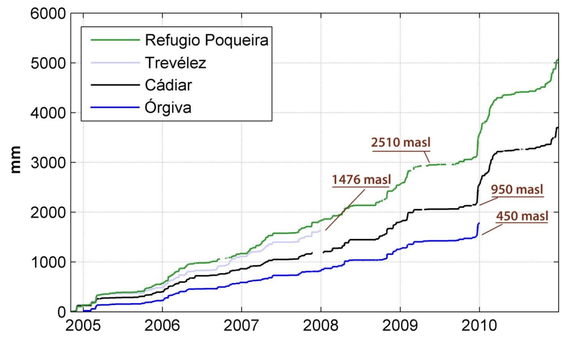
MODELLING

The recorded meteorological data were used to calibrate and validate a **ditributed hydrological model** (WiM-Med, Herrero *et al.*, 2009b) and conduct studies on baseflow recession (Millares et al., 2009) and erosion. Interpolation of precipitation, temperature and other meteorological variables with the elevation trends detected at different temporal scales, allows to simulate the strong **spatial heterogeneity** of this **high mountain Mediterranean** region. The snowmelt submodel (Herrero *et al.*, 2009a) allows to calculate the surface covered by the snow and the instant amount of volume of water stored as **snow water equivalent** in Sierra Nevada.

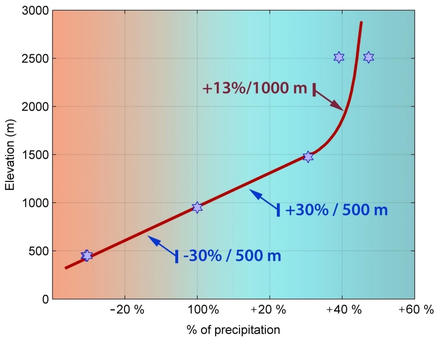




RESULTS

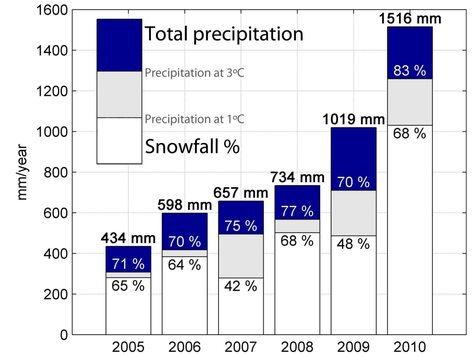


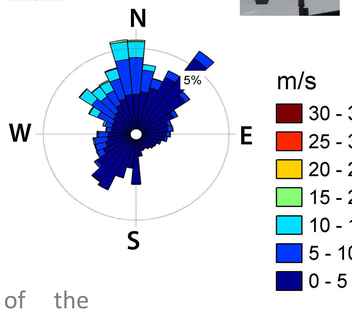
Precipitation is the most critical variable to measure. It is gauged with a **Geonor T200-B** equiped with Alter shields. Daily oscillations in the data due to the sensitivity of the vibrating wire to temperature have to be **corrected**. It shows a proper operation both with and without oil and antifreeze, so this last option is preferred.



Characteristics of precipitation:

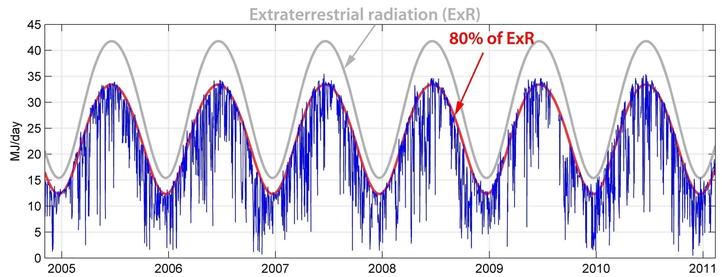
- Clear **trend with height** , linear under 2000 m.a.s.l.
- Mean value of 825 mm/year with **extreme temporal variability** in annual precipitation from 434 to 1516 mm.
- **70%** as snowfall at 2500 m.a.s.l.

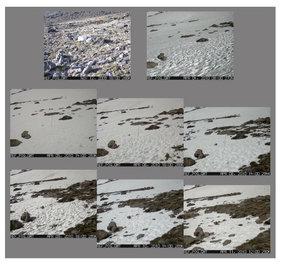




Under stable atmosphere, light adiabatic uphill (NE direction) and katabatic downhill (SW direction) **winds** prevail during daytime and nightime respectively. Under **storm** conditions and higher wind speeds, N and NW **directions** are clearly **predominant**, even exclusive.

Solar radiation is **high** because of the combination of elevation and low cloudiness (Aguilar *et al.*, 2010). Clearness index values of 80% are dominant even during winter.





The CS-CC640 **camera** installed in 2009 captures quick snow melting cycles and the **spatial heterogeneity** of **snow cover** related to microtopography.

CONCLUSIONS. The results show the importance of including these monitoring systems in high mountain Mediterranean watersheds, where meteorological behaviour is highly variable in space and time. The installed equipment performed well in these rough conditions, but require a real-time connection to watch possible misfunctioning.

References and Acknowledgements

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