
Special Section

Mountain Waters: climatic and hydrological sensitivity

Mountains are an important source of freshwater and a sensitive link in the hydrological cycle. Access to freshwater is a crucial problem faced by many communities and likely to become critical in the near future. Whether in montane forests, alpine pasture or in high glacierised basins, both climate variability and human pressure, leading to land cover changes, are likely to have an impact on mountains as ‘Water Towers’ and on the feedbacks between mountains and climate. To face the challenges created by environmental changes in mountain regions it is necessary to achieve a full understanding of the climatic and hydrological coupling, the sensitivity of the system and its response to changing situations.

This special section in the present issue collects a selection of six papers presented at the EGU First General Assembly Session on *Mountain Waters: climatic and hydrological sensitivity*. The session was co-sponsored by Cryospheric Sciences, Hydrological Sciences and Atmospheric Sciences of the EGU and the International Glaciological Society, indicating its interdisciplinary interest.

The papers cover a broad range of issues related to mountains and associated water resources of which four focus on the Swiss and French Alps as well as on Snowdon, Wales, one on La Gomera Mountains in the Canary Islands and one on the High Atlas Mountains, Morocco. The first paper, by Viviroli and Weingartner, is a wide-scale assessment of the hydrological significance of mountains, where special attention is paid to the Rhine catchment in the Alps, to later extend the case studies to 22 river basins world-wide. As many mountain regions are lacking direct observations and data availability is a hindrance to most research attempts, welcome contributions are those dealing with applied global circulation models (GCMs) or remote sensing tools in mountain areas. The following two papers fall in this line; the first by Kunstmann, Schneider, Forkel

and Knoche assesses the impact of climate change on an Alpine catchment, while that of Essery presents a new tool for estimating shading and, therefore, for improving estimates of solar radiation in mountain regions. This tool is specially suitable for application to GCMs and, thus, is a useful aid to enhance the resolution of insolation modelling in complex terrain. The last three papers are more detailed case studies of particular mountain systems. Mathevet, Lepiller and Mangin perform a sophisticated time-series analysis to disentangle the intricate functioning of a karstic system in the pre-Alps, while García-Santos, Marzol and Aschan study the interactions between forest cover, rainfall, fog precipitation and evapotranspiration in a montane forest on the steep mountain slopes of La Gomera in the Canary Islands. Schulz and de Jong introduce the remote High Atlas Mountains; their study on snow ablation focuses particularly on sublimation based on a combination of field measurements, remote sensing and modelling.

This special section of HESS follows the diverse publishing tradition of the previous EGS / EGU mountain sessions, with a Special Issue of the journal *Hydrological Processes* devoted to “Mountain Hydrology” and a book published by Wiley on “Climate and Hydrology in Mountain Areas” in print soon. The common purpose of all these issues is to unite the sparse community of mountain researchers on hydrological and meteorological themes. For the present HESS issue, we are particularly thankful to the 12 independent reviewers and to Jim McCulloch that made this endeavour possible.

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