



Hydrological drought in cold climates: new drought types

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The previous winter (2013-2014) was warm and dry in many regions of Europe, leading to serious problems in water supply in for example Kosovo. This winter was not an exception. Analyses of drought-related impacts on nature and society indicate that not all drought impacts occur in summer, during periods with below-normal rainfall and connected heat waves. We found that several drought impacts are a consequence of anomalies in winter-related processes, such as snow accumulation and melt. The hydrological drought typology (Van Loon & Van Lanen, 2012) was developed based on analysis of the processes underlying drought propagation in catchments in Norway, Czech Republic and Slovakia. In this typology, two drought types were distinguished that are caused by anomalous winter processes: cold snow season drought and warm snow season drought. In a recent study in the Alpine region, however, we found drought events that could not be classified into one of the types of the existing hydrological drought typology. We could reveal the processes underlying these drought events with further detailed analysis of an extensive dataset of observations and simulations of hydrometeorological variables for a large number of catchments in Austria. In this paper we present two new hydrological drought types related to snow and glacier melt. We discuss the processes underlying these drought types and show that besides precipitation, temperature plays an important role. Furthermore, we discuss the differences between hydrological droughts in the Alpine region and the previously studied regions in North and Central Europe, and investigate the relationship with the impacts of hydrological drought, both in the ancient (1500-1950) and in the recent past (1970-2010).

Van Loon, A.F., and Van Lanen, H.A.J.: A process-based typology of hydrological drought, *Hydrology and Earth System Science*, 16, p. 1915–1946, doi: 10.5194/hess-16-1915-2012, 2012