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Interannual variability of winter precipitation in the European Alps: relations with the North Atlantic Oscillation.

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Abstract. The European Alps rely on winter precipitation for various needs in terms of hydropower and other water uses. Major European rivers originate from the Alps and depend on winter precipitation and the consequent spring snow melt for their summer base flows. Understanding the fluctuations in winter rainfall in this region is crucially important to the study of changes in hydrologic regime in river basins, as well as to the management of their water resources. Despite the recognized relevance of winter precipitation to the water resources of the Alps and surrounding regions, the magnitude and mechanistic explanation of interannual precipitation variability in the Alpine region remains unclear and poorly investigated. Here we use gridded precipitation data from the CRU TS 1.2 to study the interannual variability of winter alpine precipitation. We found that the Alps are the region with the highest interannual variability in winter precipitation in Europe. This variability cannot be explained by large scale climate patterns such as the Arctic Oscillation (AO), North Atlantic Oscillation (NAO) or the East Atlantic/West Russia (EA/WR), even though regions below and above the Alps demonstrate connections with these patterns. Significant trends were detected only in small regions located in the Eastern part of the Alps.

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