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Connecting European snow cover variability with large scale atmospheric patterns and changes.

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This study aims to investigate the temporal and spatial variability of snow cover extent in Europe and their possible dependence with large scale atmospheric patterns affecting European weather and climate.
The temporal variability and the volume of winter snowfall are important factors in the development of water management strategies for snow-dominated regions. In fact, they affect both the volumes of available water, especially during the warm season which relies on snowmelt, and the temporal stability of the streamflow regime, influenced by the timing of snow accumulation and melt. For this reason, and also with respect to the debate on the anthropogenic effects on the climate variability, the detection of snow cover natural variability and possible driving causes assumes a major importance.
The EASE Grid Weekly Snow Cover and Sea Ice Extent database is used to reconstruct European snow cover fields for the period 1972-2006. In order to evaluate the snow cover temporal behavior and its spatial distribution, frequencies of occurrence are derived for different aggregation time scales while snow cover persistency, intended as a measure of the probability of having snow cover, is taken into account to separate regions permanently covered by snow during winter and regions affected by higher variability. A seasonality notion in snow cover is introduced for this purpose. In order to investigate if there exist atmospheric mechanisms leading to the extension of continental snow cover, the variables obtained from the previous step are related to the North Atlantic Oscillation (NAO), the Arctic Oscillation (AO) and the East Atlantic West Russia (EA/WR). These large scale atmospheric patterns, known for their effects on European Climate, are used for correlation analyses considering different temporal lag and time scale of aggregation. The aim is to identify specific regions where the influence of the different atmospheric patterns appears and possible feedbacks are detected between snow cover persistency and atmospheric circulation anomalies.
Introductory results present interest even though do not clearly answer the questions because of the high heterogeneity found in the European region, where different climatic systems, as the Mediterranean, the continental, the polar and the Atlantic, play a role and interact in a complex way.