



Relationship between snow, temperature, rainfall and the North Atlantic Oscillation on the Moroccan Atlas

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In semi-arid Mediterranean areas, Snowpack represents a significant source of water for many people living downstream. The objective of this work was: to re-investigate the well-known impact of the North Atlantic Oscillation (NAO) on rainfall and temperature in Morocco and to evaluate, for the first time, linkages between NAO and snow cover areas (SCA) derived from remote sensing observations. For this purpose, we analyzed daily SCA products (2000-2013) from the MODIS sensor, meteorological data from 37 stations (1993-2011), NCEP re-analysis of surface air temperature and rainfall rate and a monthly NAO index. The linear linkages sought using simple correlation analysis demonstrated that negative (positive) NAO (1) is associated to enhanced (reduced) rainfall in December and February for the northern part of the country; (2) comes with above-normal (below-normal) temperature and, by contrast with rainfall, correlation persists far inland and late in the season. These results highlight a possible competing influence of NAO on snowpack dynamic through rainfall and temperature. Indeed, negative (positive) NAO tends to favor earlier (latter) melting and lower (increases) snow cover extent in spring (April-May) through milder temperature. Results have direct implications for seasonal forecast of SCA in Morocco.