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On the snow precipitation variability in Western Alps and its links to large scale forcings

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Snow cover in the Alps influences the climate at local and large scale as a different distribution and amount of snow precipitation during the winter season may affect energy, radiation and hydrology budgets at the Earth's surface, as well as atmospheric circulation. For this reasons and for its environmental and socio-economical effects, the studying of climate and its variability in the Alpine region can not prescind from considering snow precipitation.
In this work three long term snow depth and snow precipitation time series recorded in Western Italian Alps, in Entracque Lago Piastra (1927-2009), Pontechianale Lago Castello (1943-2009) and Vinadio Riofreddo (1971-2009) manual stations, have been digitized and considered for the statistical analysis.
The time series are almost continuous except for Entracque Lago Piastra one-year gap. The Singular Spectrum Analysis technique based on temporal correlation of the time series (Ghil et al., 2001, Kondrashov et al., 2006) has been used to fill the missing value on seasonal basis. The so-obtained time series has been used to determinate and compare the climatological snow indices over different time periods and to evaluate the presence of trends in the seasonal snow precipitation, number of snowy days and snow depth.
The Singular Spectrum Analysis has been used to investigate the presence of significant oscillatory modes embedded in the seasonal snow precipitation time series. The identification of inter-annual and inter-decadal cycles allows to put in relation the snow precipitation over Western Alps and large scale forcings represented by the North Atlantic Oscillation (NAO) index, the Western Mediterranean Oscillation (WMO) index and the El Nino Southern Oscillation (ENSO) index. The aim is to explore the snow precipitation variability on different temporal scales in relation to large scale climate modes.