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Winter precipitation and temperature anomalies in Italy stratified by solar activity

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In the recent years many areas of the northern hemisphere and Central Mediterranean basin in particular experimented an increasing risk of both floods and droughts especially in fall and winter seasons: this probably also due to global warming. Floods and droughts can have high potential damages causing severe economic and environmental losses in social-ecological systems so vulnerable to these extremes. So long-term climate forecasts could be very useful instruments for adapting to these extreme events. Many climate drivers affect the extreme variability in seasonal precipitation and in this work we investigated the possible effects of solar activity. Recent literature has in fact emphasized that solar activity can impact on tropospheric blocks occurrence and its locations with a greater persistence of blocks in the eastern Atlantic during periods of low solar activity. Solar activity has been also found to be strongly correlated with long-term variations in northern hemisphere surface temperature and in particular with the wintertime anomalies in Europe. After the "grand maximum" of the twentieth century the solar activity has recently fallen to levels of early nineteenth century with high probability of low solar activity in the present and future solar cycles. An investigation of the possible impact of solar activity on winter temperature anomalies in Italy and the occurrences of Cold Air Outbreak (CAO) is presented.

The main result shows a statistically significant stratification of the temperature and precipitation anomalies with respect to solar activity described by open solar flux