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A high-resolution satellite-based climatology of heavy precipitating events over the Mediterranean region

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High impact weather phenomena are rather frequent in the Mediterranean region. Its geographical location, with latitudinal range from the subtropics to midlatitudes, the complex orography surrounding the Mediterranean sea, and the large supply of water vapor at low levels, are all factors that contribute to severe weather conditions. The large population density in the Mediterranean makes this region particularly vulnerable to such events which cause severe social and economical distress. In addition, the Mediterranean has been identified as one of the most responsive to global climatic change. For all these reasons, it is important to understand the climatological picture of these severe weather conditions. Severe weather encompasses conditions such as heavy precipitation and floods, strong winds and droughts. In our case we concentrate on the climatological study of heavy precipitation. Due to the scarcity of conventional observations, use is made of NOAA/METOP satellite observations, for which advantage can be taken of the time coverage differences between the platforms. A combination of AMSU-B (Advanced Microwave Sounding Unit-B)/MHS (Microwave Humidity Sounder) observations permit to investigate precipitating events while coincident AMSU-A (Advanced Microwave Sounding Unit-A) observations give insights into the larger synoptic-scale environment in which they occur.
The temporal and spatial distribution of moderate and heavy precipitation patterns over the Euro-Mediterranean region for the last decade will first be discussed. We find that the rain occurrence is widespread over the Mediterranean in wintertime while reduced in the eastern part of the basin in summer. The heavy precipitation is essentially located over land during wintertime and shifts to mostly over the sea during summer and autumn. Then, inter-comparisons with existing climatologies, like HOAPS (Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data), will be presented. There is generally a rather fair agreement between these climatologies for describing the large-scale patterns such as the strong latitudinal gradient of precipitation. However, the higher spatio-temporal resolution of AMSU measurements gives access to mesoscale details over some key areas like coastal regions. We will finally show how this climatology can be used to validate numerical simulations.