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Moderate and heavy precipitation 2001-2010 climatology over the European-Mediterranean region: an inter-comparison of several satellite observational data sets and atmospheric reanalyses

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The European-Mediterranean region is characterized by its vulnerability to changes in the water cycle. Hence, the impact of global warming on the water resources in the Mediterranean region is one of the major concerns for the scientific community. Precipitation is the best-known term of the Mediterranean water budget, although large uncertainties remain. The major drawback for its long-term assessment comes from the lack of suitable offshore observational data.
The availability of microwave instruments on satellite platforms allows high quality precipitation retrievals for improved understanding and evaluation of water processes in climate modelling.
We investigate the temporal and spatial distribution of the moderate and heavy precipitation patterns over the European-Mediterranean region, based mainly on NOAA Advanced Microwave Sounding Unit (AMSU) observations from 2001 to 2010. We used a combination of channels 3–5 of AMSU-B to identify precipitation. Firstly, rain occurrence climatology from NOAA-15, NOAA-16 and NOAA-17 are constructed. Except the failure of NOAA-16 measurements after 2007, a comparison of these three climatologies revealed a good, long continuity of observations.
We found 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 mostly located over land during wintertime and shifts to mostly over the sea during summer and autumn. An inter-comparison of AMSU, GPCP (Global Precipitation Climatology Project), and HOAPS (Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data) precipitation climatologies in the Mediterranean region is presented. AMSU climatology agree well with GPCP and HOAPS climatologies for describing the large scale patterns such as the strong latitudinal gradient of precipitation. In addition, the high spatio-temporal resolution of AMSU measurements provide mesoscale details over some key areas for the Mediterranean thermohaline circulation (e.g., Gulf of Lions, Aegean Sea,...). We will also discuss seasonal to inter-annual and sea-land variabilities of the rain occurrence in this region. Our results provide an important complementary information to constrain climate models.