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Long-term trends (1987-2006) of Saharan dust over the Mediterranean and the Canary Islands with the DREAM regional dust model

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Airborne mineral dust from worldwide deserts makes a major contribution to the global tropospheric aerosol budget, with dust concentrations being particularly high over arid regions. The Sahara is the world's most important dust source; it is considered that northern Africa is responsible for more than half of the global mineral dust emissions. Measurements since the 1960s have shown strong daily, seasonal and interannual variations of dust concentration over the Atlantic (Prospero, 1999). Moulin et al. (1997) outlined the correlation between the NAO and the dust distribution over North Africa and the Atlantic using satellite data.

Due to their proximity to North Africa, the Mediterranean region and the Canary Islands are strongly affected by desert dust. In this contribution, a 20-year model simulation is used over the period 1987-2006 at 0.3x0.3 degree resolution (implemented in Marenostrum Supercomputer) in order to analyze the monthly, seasonal and year-to-year variation of the atmospheric dust load, surface concentration, deposition and the frequency and duration of the events over the region. For this purpose, the regional dust model DREAM, which has been providing daily dust forecasts over these regions in the last years, is implemented (http://www.bsc.es/projects/earthscience/DREAM/). This study also explores links of the simulated dust parameters to the variability of the large-scale circulation and possible positive trends of dust in the last years over

the Mediterranean, as recently suggested by Antoine and Nobileau (2006). The qualitative and/or qualitative validation studies performed so far, using data from lidar stations, sun photometers, satellite and ground level PM levels [e.g. Ansmann et al., 2003, Pérez et al., 2006] indicate the good skills of the model concerning both the horizontal and vertical extent of the dust plume in the geographic region of application. Moreover, in situ measurements of concentrations at the Izaña station (Canary Islands) for the period 1987-1999 and in southern Europe are used for model validation.

The preliminary results outline the capability of the model to reproduce the Izaña dust record from daily to yearly time-scales. Furthermore, it is found that the annual and seasonal dust average concentrations estimated from the simulations are highly correlated with the North Atlantic Oscillation (NAO) annual and wintertime (DJFM) indexes (r ˜ 0.6). The results also indicate that the wintertime NAO index also moderately correlates with springtime and summertime dust concentrations, and therefore it may contribute explaining the year-to-year variability of dust loads and concentrations over the Canary Islands.

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