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Dust and hurricanes

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Tropical Cyclones (TCs) belong to the most extreme events in nature. In the past decade, the impact of dust on Atlantic TCs (hurricanes) receives growing interest. As mineral dust is able to absorb radiation and therefore warm up its surrounding air, the presence of dust can lead to a reduction of sea surface temperature (SST) and an increase in atmospheric stability. Furthermore, resulting baroclinic effects and the dry Saharan easterly jet lead to an enhanced vertical wind shear of the horizontal winds. SST, stability, moisture and vertical wind shear are known to potentially impact hurricane activity, this was shown in observational studies by e.g. Dunion and Velden (2004) and Lau and Kim (2007).

An adequate framework for investigating the dust impact on TCs is by comparing the hurricane seasons of 2005 and 2006. 2005 was the most active season ever recorded while dust loading was below average. On the contrary, 2006 was a normal season concerning hurricane activity, however the dust loading was clearly above average. Here we evaluate the possible impact of dust on hurricanes by applying a TC detection and tracking method (Kleppek et al., 2008) to high resolution simulations (T255) with the general circulation model ECHAM6, coupled to the aerosol model HAM (Stier et al., 2005). Instead of the five aerosol species it normally contains, HAM will be reduced to dust because of computational time. Also due to computational reasons we do not take the effect of dust on the SST into account.

It is planned to perform four simulations: 2005 and 2006 nudged to ERA-Interim data, as well as 2005 with the dust loading of 2006 and vice versa. It is hypothesized that the higher dust loading of 2006 will weaken the simulated hurricane activity in 2005 and the lower dust loading of 2005 should lead to more and more intense hurricanes in 2006. Therefore, we will investigate the background state of the atmosphere, including e.g. windshear and stability, which finally impacts number, duration, location and intensity of the simulated hurricanes.

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