Geophysical Research Abstracts, Vol. 8, 06599, 2006
SRef-ID: 1607-7962/gra/EGU06-A-06599

The 16-18 September 2003 Tunisian Flood

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A devastating convective storm struck the northern part of Tunisia on 16-18 September 2003, producing severe precipitation over the Gulf of Tunis and the Gulf of Hammamet. In this study the mesoscale model MM5 is used to investigate the mechanism involved in the development of the storm. The model correctly simulates the convective storm and produces heavy rain over the whole area. The model results show that the storm results from a mixture of thermal and dynamical processes. The appearance of an upper level potential vorticity (PV) anomaly flowing over a low-level baroclinity, coupled with local diabatic processes (latent heat flux and surface heating) generates a plume of deep convection. The analysis also shows a strong tropopause fold interacting with a northward flow of warm air and sea surface temperature anomalies. Southward moving moist Mediterranean upper level air, advecting polar/lower-stratosphere high PV, comes in direct contact with dry desert air mass. Local orography also contributes to the development of the convective storm via: (1) combining ascent and upslope transport of water vapor causing an intensification of deep convection over the Gulf of Tunis, and (2) amplifying cyclonic vorticity on the leeward side of the mountain in the Gulf of Hammamet.