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Dust Mobilization and Transport in the Northern Sahara during SAMUM 2006

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The Saharan Mineral Dust Experiment (SAMUM) field campaign in southern Morocco in May and June 2006 provides valuable data to study the emission, and the horizontal and vertical transports of mineral dust in the northern Sahara. Radiosonde and lidar observations show differential advection of air masses with different characteristics during stable nighttime conditions and up to 5-km deep vertical mixing in the strongly convective planetary boundary layer during the day. Lagrangian and synoptic analyses of selected dust periods point to a topographic channel from western Tunisia to central Algeria as an important source region and transport path. Significant emission events are related to cold surges from the Mediterranean in association with the eastward passage of an upper-level wave and lee cyclogenesis south of the Atlas Mountains. Other relevant events are local emissions under a distinct cut-off low over northwestern Africa and gust fronts associated with dry thunderstorms over the Malian and Algerian Sahara. The meteorological source identification is consistent with estimates of optical and mineralogical properties of dust samples. The representation of moist convective dynamics in one of the investigated cases is unsatisfactory in both analyses from the European Centre for Medium-Range Weather Forecasts and

in a regional dust model. This aspect needs further study.