Geophysical Research Abstracts
Vol. 15, EGU2013-10868, 2013
EGU General Assembly 2013

Automatic identification of sources and trajectories of atmospheric Saharan dust aerosols with Latent Gaussian Models

Christoph Garbe and Fabian Bachl
University of Heidelberg, IWR, Heidelberg, Germany (christoph.garbe@uni-heidelberg.de)

Dust transported from the Sahara across the ocean has a high impact on radiation fluxes and marine nutrient cycles. Significant progress has been made in characterising Saharan dust properties (Formenti et al., 2011) and its radiative effects through the 'SAharan Mineral dUst experiMent' (SAMUM) (Ansmann et al., 2011). While the models simulating Saharan dust transport processes have been considerably improved in recent years, it is still an open question which meteorological processes and surface characteristics are mainly responsible for dust transported to the Sub-Tropical Atlantic (Schepanski et al., 2009; Tegen et al., 2012).

Currently, there exists a large discrepancy between modelled dust emission events and those observed from satellites. In this contribution we present an approach for classifying and tracking dust plumes based on a Bayesian hierarchical model. Recent developments in computational statistics known as Integrated Nested Laplace Approximations (INLA) have paved the way for efficient inference in a respective subclass, the Generalized Linear Model (GLM) (Rue et al., 2009). We present the results of our approach based on data from the SIVIRI instrument on board the Meteosat Second Generation (MSG) satellite. We demonstrate the accuracy for automatically detecting sources of dust and aerosol concentrations in the atmosphere. The trajectories of aerosols are also computed very efficiently. In our framework, we automatically identify optimal parameters for the computation of atmospheric aerosol motion. The applicability of our approach to a wide range of conditions will be discussed, as well as the ground truthing of our results and future directions in this field of research.