Verification of mesoscale dust forecasts over the Sahara during FENNEC 2011

J.-P. Chaboureau (1), C. Flamant (2), C. C. Kocha (3), J.-P. Lafore (3), C. Lavaysse (4), F. Marnas (2), M. Mokhtari (3), J. Pelon (2), K. Schepanski (5), and P. Tulet (3)

(1) University of Toulouse/CNRS, Laboratoire d′Aerologie, Toulouse, France (jean-pierre.chaboureau@aero.obs-mip.fr, +33 561 332790), (2) Laboratoire Atmosphères, Milieux, Observations Spatiales, Paris, France, (3) Météo France, Toulouse, France, (4) McGill University, Montreal, Canada, (5) School of Earth and Environment, University of Leeds, Leeds, UK

FENNEC is an international program aiming at better understanding the Saharan climate system. In June 2011, about 18 flights of the French Falcon-20 equipped with a lidar and a dropsonde unit were operated over northern Mauritania and Mali. This allowed us to fully document the installation of the 6-km deep heat low over the western Sahara together with Atlantic inflows, Mediterranean surges and other mesoscale features. The aircraft was guided by a unique effort using numerical weather prediction (NWP) models fully coupled with the dust entrainment and deposition scheme. Four daily forecasts over domains covering most of the Sahara included two Meteo-France operational models, ALADIN (24 km, 72 h) and AROME (5 km, 48 h), and the research model Meso-NH operating at low (20 km, 48 h) and high (5 km, 24 h) resolutions. Verification of predicted temperature, water vapor and wind profiles against dropsonde data demonstrated the high quality of the forecasts. This was also shown for dust forecasts through direct comparison between the observed and forecasted vertical structure of the backscattered lidar signal. The benefits of high-resolution forecasts are highlighted here with observed and predicted mesoscale features related to local emission sources, low-level jets, convective downdrafts and oceanic inflows.