Geophysical Research Abstracts
Vol. 14, EGU2012-13154, 2012
EGU General Assembly 2012

Assimilating data from an unmanned aircraft into a local-scale numerical weather forecast

M.O. Jonassen (1,2), H. Ólafsson (1,3), H. Ágústsson (2,3), Ó. Rögnvaldsson (1,3), and J. Reuder (1)

(1) Bergen School of Meteorology, Geophysical Institute, University of Bergen, Norway, (2) University of Iceland and the Icelandic Meteorlogical Office, (3) Institute for Meteorological Research, Iceland

In this paper, it is demonstrated how temperature, humidity and wind profile data of the lower troposphere obtained with ultra light weight Unmanned Aerial System (UAS) can be used to improve high resolution numerical weather simuluations by four dimensional data assimilation (FDDA). The combined UAS and FDDA system is applied to a case study of a weak northeasterly flow in Southwest Iceland which took place during the international MOSO field campaign on 19 July, 2009. The situation was characterised by high diurnal boundary layer temperature variation leading to thermally driven flow, predominantly in the form of sea breeze. The main improvement of the simulation using FDDA is the mitigation of a boundary layer temperature deficit of 1-2 K. The corresponding deepening of a South-west Iceland thermal low leads both to a more accurately simulated and stronger sea breeze and an enhancement of the local part of the synoptic flow. In addition, a fog residing over the Reykjanes pensinsula to the southwest of Reykjavik in the control simulation, causing a temperature underestimation of up to 8 K is largely corrected for through the data assimilation. The assimilation of temperature and humidity profiles has clearly a larger effect than assimilating only the wind profiles. UAS represents a novel instrument platform with a large potential within the atmospheric sciences. The presented method of using UAS data for assimilation into a high resolution numerical weather simulation is likely to have a wide range of future applications, wind energy and improvements of targeted weather forecasts for search and rescue missions being some of them.