EMS Annual Meeting Abstracts
Vol. 16, EMS2019-660-1, 2019

Opportunistic sensing with recreational hot-air balloon flights

Evert I. F. (Cisco) de Bruijn, Steven Knoop, Fred C. Bosveld, and Siebren de Haan
Royal Netherlands Meteorological Institute (KNMI), Observations and Modelling, De Bilt, Netherlands
(cisco.de.bruijn@knmi.nl)

Numerical Weather Prediction (NWP) models with a horizontal resolution of 2 km or less need detailed information for estimating the initial state of the atmosphere. Ground-based remote-sensing instruments like Sodars, Doppler lidars and Profilers provide already meteorological information of the Atmospheric Boundary Layer (ABL). The observational network has been extended over the years, but there are still gaps and it is not cost-efficient to extend the network infinitely.

Therefore we have commenced research to investigate data from third parties. We focus on wind-information of the ABL from recreational Hot-air Balloon (HAB) flights. In the basic equipment of a HAB pilot there is a professional navigator, which is compulsory for safety reasons. Similarly to routinely launched weather balloons, the Global Navigation Satellite System (GNSS)-data from consecutive positions and the elapsed time are the basis of the calculation of the horizontal wind vector. On a yearly basis about 6000 flights are taken place in the Netherlands, mainly during the morning- and evening transition.

We will validate the HAB data with observations from the meteorological site of Cabauw during 2018. We compare the HAB winds with mast data and Doppler lidar observations. We also compare the HAB data with a NWP model and we will report about a first attempt to assimilate the HAB data in a NWP model. To explore the possibilities of this new type of wind observation in other countries than the Netherlands, we will present intriguing HAB flights in Lapland, Austria and Spain. We will show interesting phenomena like a low level jet, a mountain-valley circulation and a typical urban wind regime.