



Results from an experimental hot-air balloon flight for measuring low level winds in the surroundings of Cabauw

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A field experiment with a hot-air balloon was conducted in the vicinity of Cabauw (The Netherlands). Recreational hot-air balloon flights contain useful wind information (De Bruijn et al, 2016). To collect the data, an app for smart-phones has been developed. In this experiment we investigate the accuracy of smart-phones GPS using a Geodetic GNSS receiver as ground truth. Further we study the dynamic response of the balloon on variations in the wind by measuring the relative wind with a sonic anemometer which is mounted below the gondola. A comparison reveals that smart-phones equipped with a GNSS-chip are fairly inaccurate. However the position error can be improved by filtering and the processed data are suitable for the calculation of the horizontal wind vector. We have validated the balloon wind data with observations from the Cabauw tower and the results are encouraging. The dynamic response of the hot-air balloon on a changing wind is found to be in concord with a simple model for balloon dynamics. We have developed an adequate method which can process balloon tracks obtained from smart-phone GPS into valuable wind data.

Bruijn, E.I.F. de, S. de Haan, F.C. Bosveld, B. Wichers Schreur and A.A.M. Holtslag, Observing Boundary-Layer Winds from Hot-Air Balloon Flights, *Weather and Forecasting*, 2016, 31, 5, 1451-1463, doi:10.1175/WAF-D-16-0028.1