Turbulence eddy dissipation rates in the boundary layer: a comparison of Doppler lidar and X-band radar estimate

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The main field campaign of Ultra Fast wind sensOrs (UFO), European project aimed at developing new generation of operational X-band radar and lidar sensors for wind hazards monitoring on airport, will take place at the Blagnac airport of Toulouse during the 2014 spring. In this context, a preliminary field campaign, devote to turbulence measurement, was conducted during the 2013 summer at the Meteo-France facility of Trappes (30 south-west of Paris). The principal aim was to define and establish algorithms to estimate eddy dissipation rates for turbulence (EDR), and compare observations of turbulent fluctuation by various sounders.

During this period, in addition of automatic weather stations and radio-sounding already present on the campaign site, two remote sensing measurement systems have been deploy: an X-band radar (CURIE radar, developed by LATMOS, UPMC/CNRS) and a Doppler lidar (Windcube v2 from Leosphere company). Both instruments allows fast wind measurements in the boundary layer along the vertical with a time resolution of a few seconds and a range resolution of ~ 20 m.

These wind measurements are used to infer EDR from statistics of the small scale wind fluctuations. We first compare several inference methods and time integration for each instruments: either from time series of the velocity fluctuations, or from the shape of Doppler spectra. Then, the radar and lidar estimates for the EDR are compared and discussed.

This work already allows to improve the sensibility of the CURIE radar. As it will be deploy on Blagnac airport during the 2014 springs, we will also present preliminary results of this main UFO campaign.