Geophysical Research Abstracts,
Vol. 11, EGU2009-5266-2, 2009
EGU General Assembly 2009

Footprint variability analysis of a Large Aperture Scintillometer over a complex terrain

A. GUYOT, J.-M. COHARD, M. DOUKOURE, S. ANQUETIN, S. GALLE, and I. ZIN

LTHE - Laboratoire d'étude des Transferts en Hydrologie et Environnement - Université de Grenoble - 460, rue de la Piscine, 38 400 Saint Martin d'Hères, +33(0)4 76 63 58 67 - (Correspondence to : adrien.guyot@hmg.inpg.fr, guyot.adrien@gmail.com)

Surface flux measurement of scalar at a given height is representative of an area usually called « footprint ». Its extent is related to atmospheric conditions (Stability, wind speed, wind direction and wind diffusivity), to aerodynamic properties of the measurement site (Surface roughness), and to the instrumental setup (Sensor height). Several models have been developed to describe this function of inversion. Those provide a theoretical footprint.

This study is an application of the Hsieh model in the case of a Large Aperture Scintillometer (LAS). The footprint model is combined with the LAS weighed function to produce the LAS footprint. To take into account the land partition in the footprint area to calculate the aggregated aerodynamic parameters required by the Hsieh model, we apply an iterative procedure to calculate the final footprint.
A first sensibility analysis is presented. It shows that LAS are less sensible to wind direction if compared with eddy correlation measurement systems. In the framework of the « AMMA-CATCH » program, a LAS has been installed over an heterogeneous catchment in North Benin under a sudanian climate. The footprint analysis shows that the LAS footprint (∼1km2) and the catchment (12km2) have the same land partition whatever the wind conditions.

In the context of complex terrain, most of the parameters required in the Hsieh model are not constant along the scintillometer transect, because of the topography of the catchment under the scintillometer beam. Moreover, topography induces local deviation of the synoptic wind conditions. We propose a first sensitivity study to investigate the footprint variability induced by height variation of the beam over the ground. In addition, first results from Large Eddy Simulation are used to analyse surface wind deviations due to topography effect. All sensitivity studies are evaluated by their implication on the footprint extent and on its land use partition.