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Assessing correlation between footprint size and exogenous variables for eddy covariance stations in Po Valley, Italy

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Eddy covariance stations provide the actual evapotranspiration (latent heat flux) through high frequency measurements of the vertical component of wind velocity and the air water content in the constant flux layer. The flux detected from the station is originated from a representative area called footprint. Prediction of footprint size is fundamental when new eddy covariance stations have to be installed to assess evapotraspiration for a given target surface.

This work aims to correlate footprint size, estimated by a hybrid model, with the main exogenous variables measured by two eddy covariance stations located on maize fields in the Po Valley, Italy. The hybrid model is assessed using algorithm stochastic models and dimensional analysis techniques. As well known this approach express in an analytically form the link about the atmospheric stability, measurement and surface roughness height. The main purpose is to find simple equations to estimate footprint size in order to correctly locate eddy covariance stations in the field. Although direct relationship between footprint size and exogenous variables was not satisfactory, comparison between exogenous variables and stability parameter of the atmosphere lead to definition of empirical relations that can be universally applied to the whole Po Valley.