Supplemental Information (SI)

The Turbulent Enhancement Ratio as a novel Approach for Characterizing Local Emission Sources in Complex Environments

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1. Wind rose analysis of the fieldsite for the long-term campaign

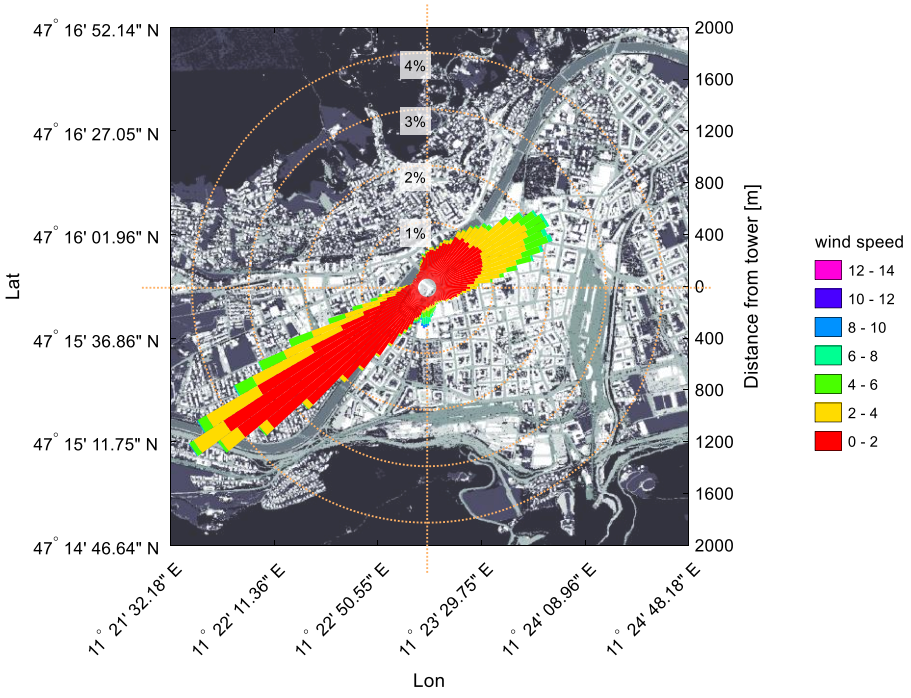

Figure 1S: Wind rose plot for the IAO field site during the long-term campaign. The orientation of the coloured bars indicate the predominant wind directions, while the length of each bar represents the frequency of occurrence (orange dashed circles assist in quantification). Wind speeds range from 0 m/s (red) to 14 m/s (magenta), with each colour corresponding to a specific wind speed interval. The base layer shows the city of Innsbruck, with the IAO flux tower positioned at the centre of the image. Landuse data were aggregated from various spatial datasets from Land Tirol (https://data.tirol.gv.at, which are available under a CCBY licence).

2. Turbulent Flux Footprint of the fieldsite for the long-term campaign

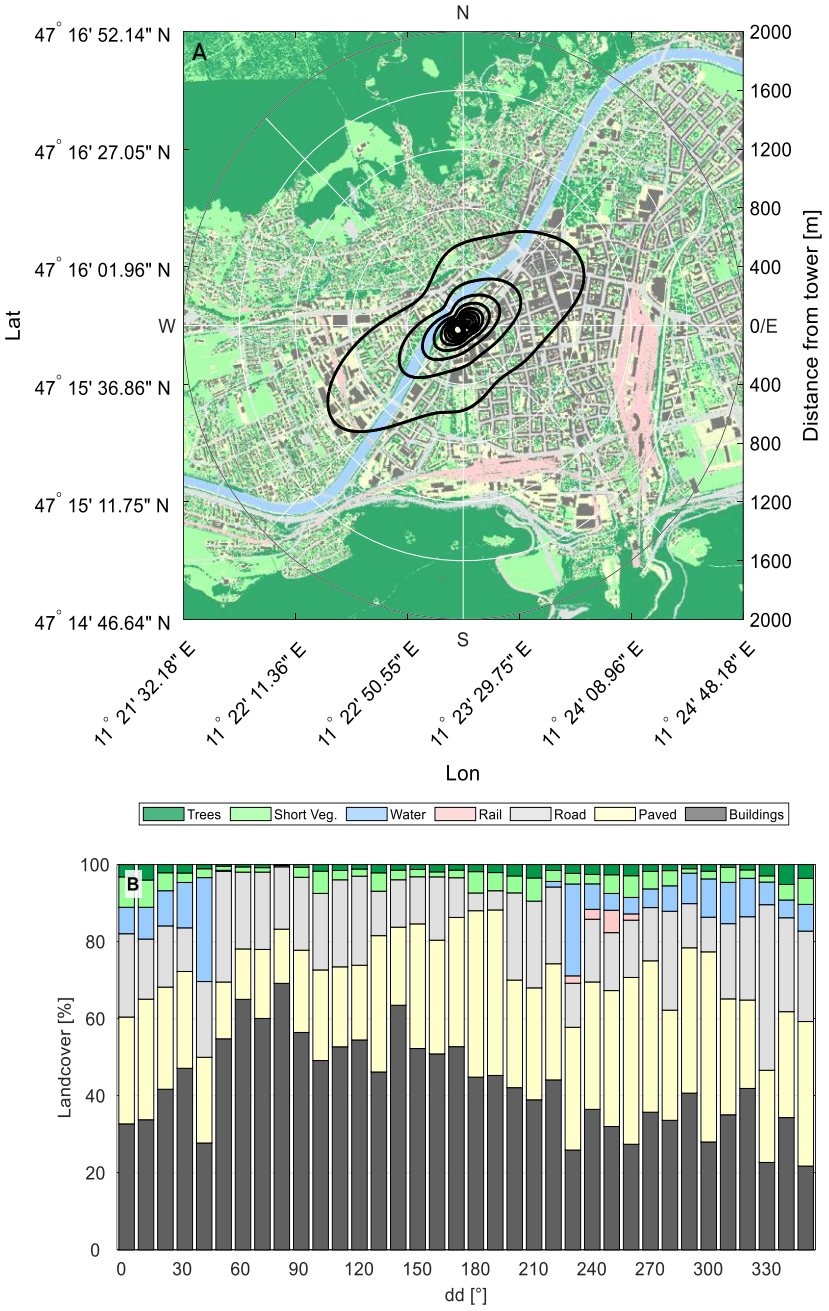

Figure 2S: (A) Climatological flux footprint analysis based on Kljun et al. (2015). The background layer depicts a land use map with a dimension of 4 x 4 km and a resolution of 1 m, derived from data provided by the government of Tyrol. The centre of the domain marks the location of the IAO flux tower. The isolines represent the flux source area in 10 % increments, ranging from 10 % to 90 %. White circles indicate distances from the centre of the image at 200 m intervals and the black circle the maximal distance of

2000 m (B) Land use statistics at the IAO, weighted by the climatological flux footprint in 10 ° intervals. Landuse data were aggregated from various spatial datasets from Land Tirol (https://data.tirol.gv.at, which are available under a CCBY licence).

References

Kljun, N., Calanca, P., Rotach, M. W., and Schmid, H. P.: A simple two-dimensional parameterisation for Flux Footprint Prediction (FFP). Geosci. Model Dev., *8*(11), 3695–3713. https://doi.org/10.5194/gmd-8-3695-2015, 2015.