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The Influence of spatial Resolution on forward and inverse Modeling of CO2 Exchange over Europe using the Network of tall Towers.

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Tall towers allow us to observe the integrated influence of carbon exchange processes from large areas on the concentrations of CO_2. The signal received shows a large variability at diurnal and synoptic timescales. Transport models can be used to extract the relevant source terms from the atmospheric signal. The question we posed ourselves concerns whether using higher spatial resolution in transport modeling improves the model performance and thus the eventual source apportionment.

We examined the influence of the resolution of meteorological fields (ECMWF), anthropogenic (EDGAR) and biogenic (FACEM) fluxes when going from a resolution of 2° to 0.2° lat-lon, using a simple Lagrangian 2D transport model. Model results will be compared to observations of the CHIOTTO/CarboEurope tall tower network in Europe. Results show that the relative influence of the different CO_2 exchange processes is very different at each tower and that higher model resolution pays off in better model performance.