Supplementary material: Importance of fossil fuel emission uncertainties over Europe for CO_2 modeling

March 10, 2011

This supplementary material provides additional figures to illustrate the results of the paper "Importance of fossil fuel emission uncertainties over Europe for CO_2 direct and inverse modeling: Model intercomparison".

1 Emission inventories

Figure 1 illustrates the spatial differences between "IER_hourly" and "EDG_hourly" emission maps. Figure 2 illustrate for two countries the temporal variation of the aggregated fluxes for the different emission maps.

2 $FFCO_2$ concentration time series

Figures 3 and 4 illustrate the differences in daytime mean simulated concentrations between the different simulations. Figures 5 and 6 illustrate the hourly concentration differences for two particular weeks in July and January.

3 Comparison with $FFCO_2$ based on $^{14}CO_2$ observations

Figure 7 compares model $FFCO_2$ simulations with observations derived from $^{14}CO_2$ measurements.

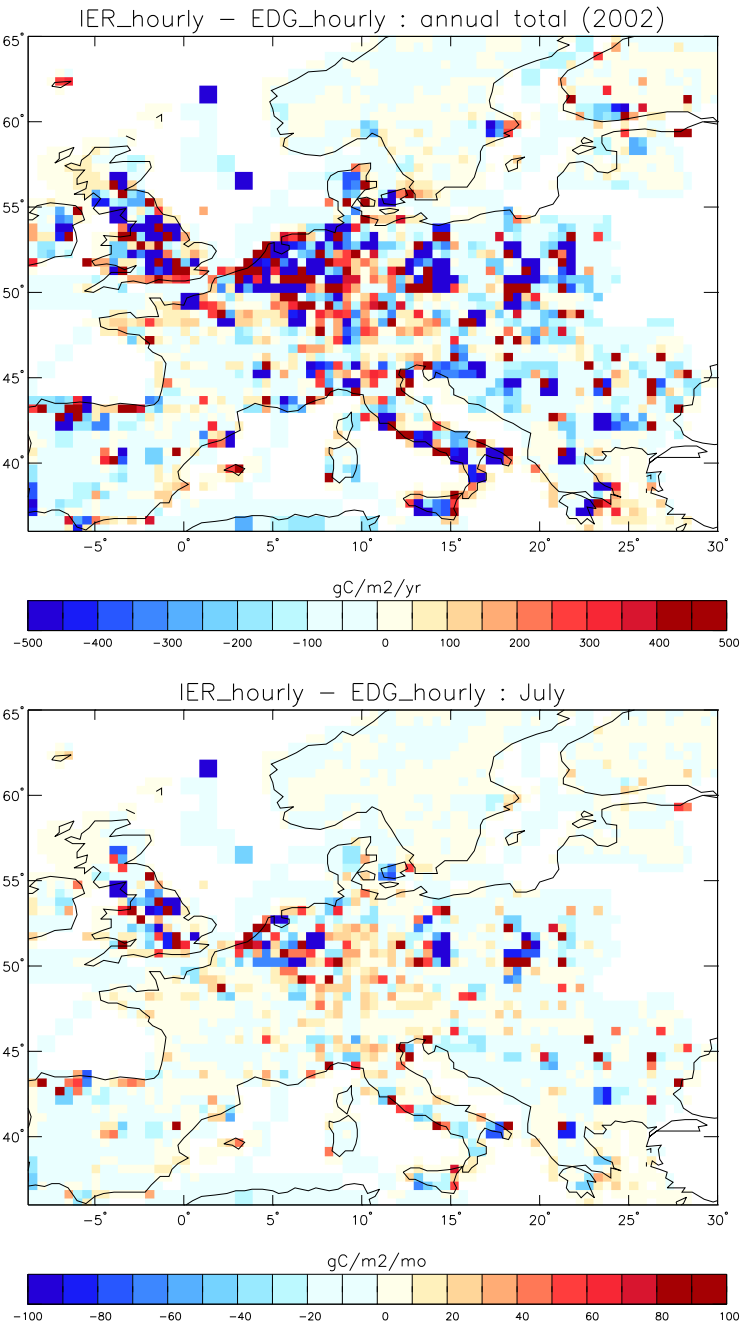

Figure 1: Annual (top) and July (bottom) differences in fossil fuel emissions between "IER_hourly" and "EDG_annual" estimates.

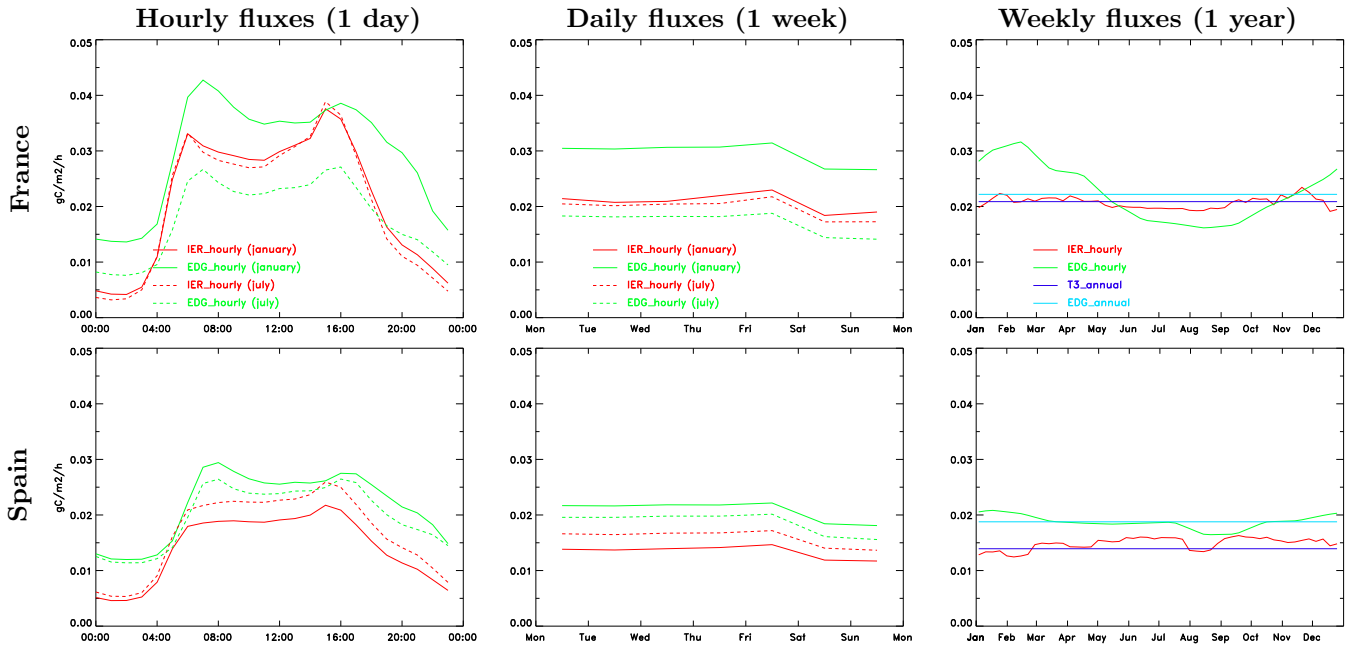

Figure 2: Temporal variation of the aggregated fluxes over different regions: France (top) and Spain (bottom). First and second columns represent the mean diurnal cycle and the mean weekly cycle, respectively, for "IER_hourly" and "EDG_hourly" in July and January; Third column represents the seasaonal variations (weekly means) for the four emissions maps.

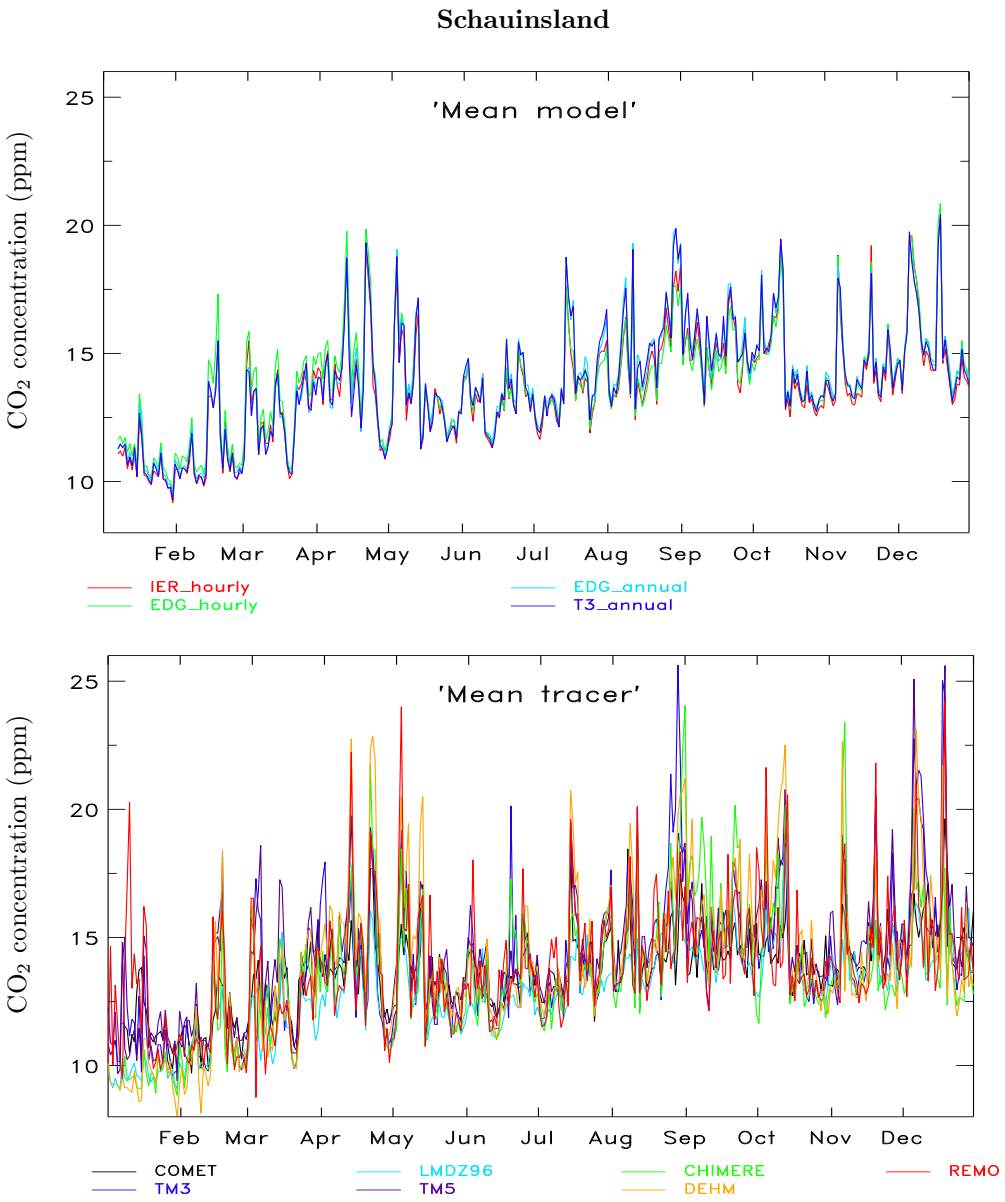

Figure 3: Daytime mean simulated concentration at Schauinsland (SCH): mean across all transport models for each emission map (top) and mean across all emission map for each transport model (bottom).

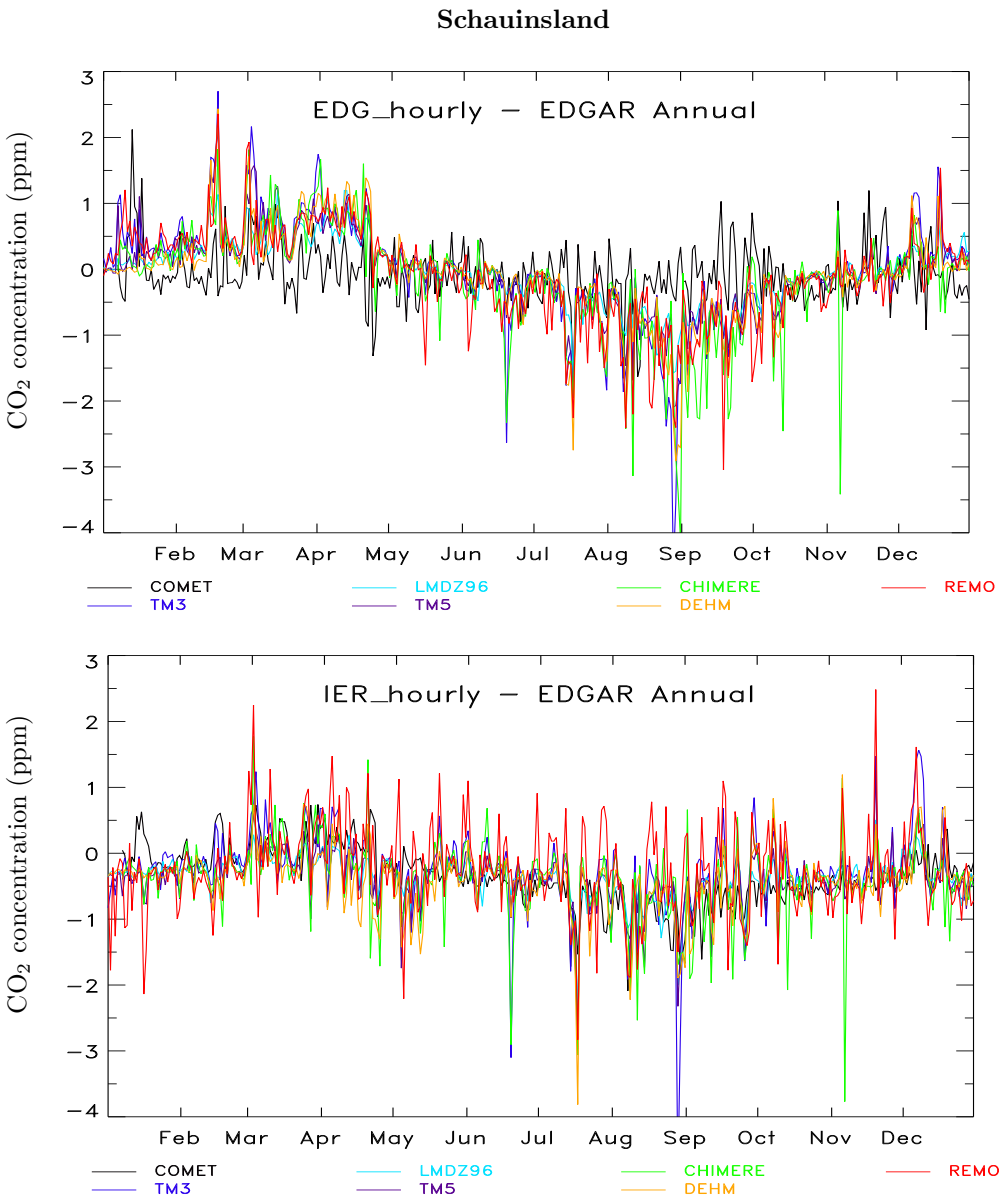

Figure 4: Daytime mean simulated concentration difference at Schauinsland (SCH) between "EDG_hourly" and "EDG_annual" fluxes (top) and between "IER_hourly" and "EDG_annual" fluxes (bottom).

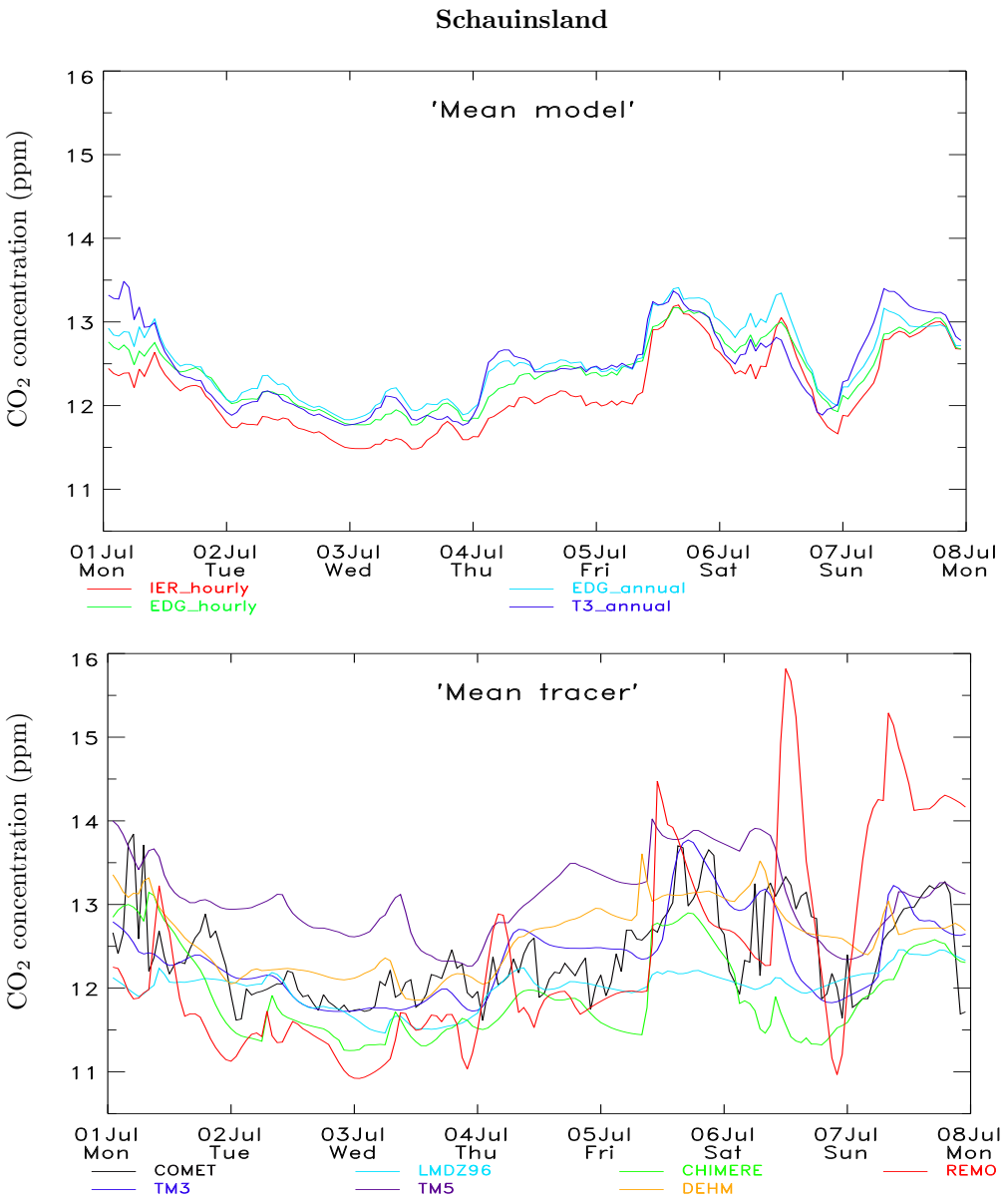

Figure 5: Hourly simulated concentrations at Schauinsland for 1 week in July: Top: Mean across all transport models for each emission map; Bottom: Mean across all emission maps for each transport model.

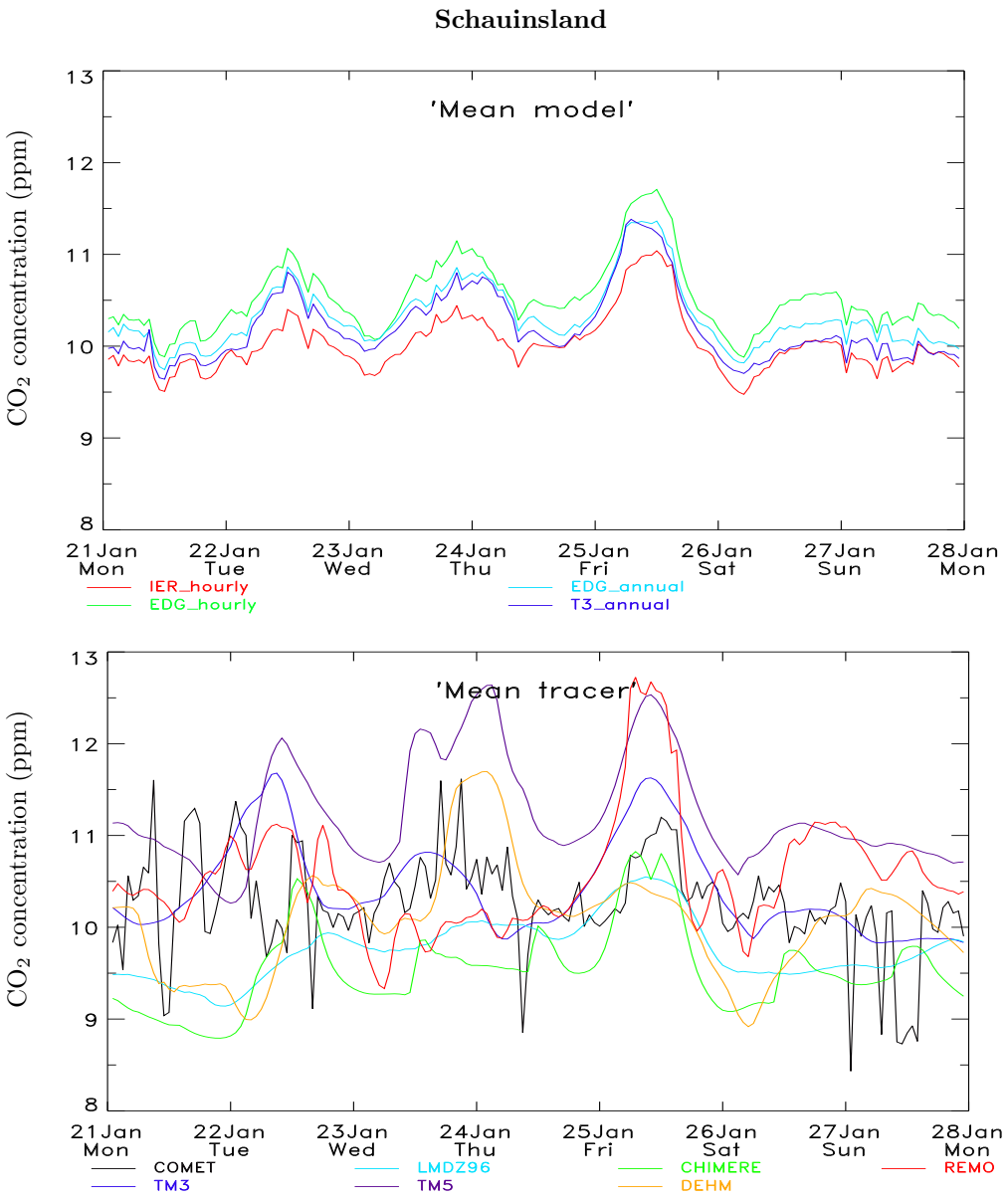

Figure 6: Hourly simulated concentrations at Schauinsland for 1 week in January: Top: Mean across all transport models for each emission map; Bottom: Mean across all emission maps for each transport model.

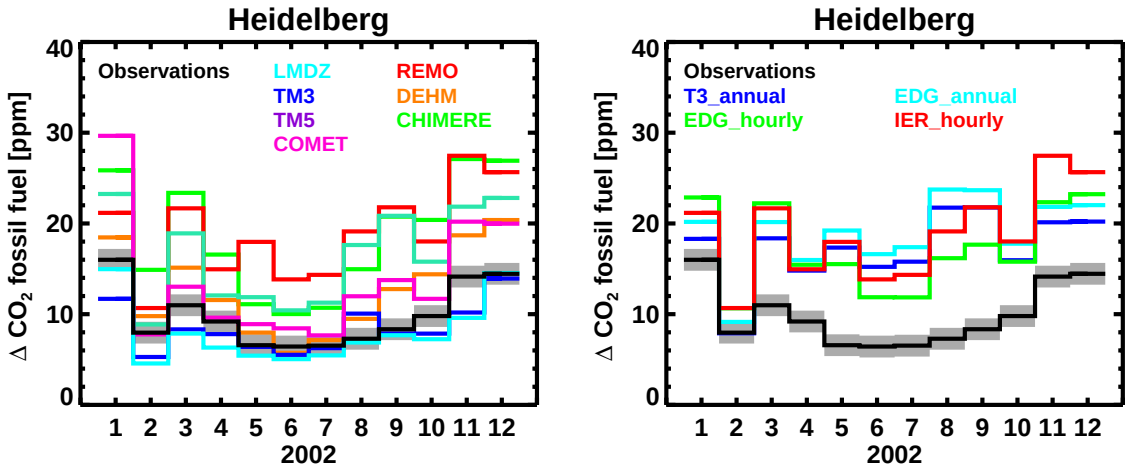

Figure 7: Comparison of monthly-integrated fossil fuel $CO2_2$ (relative to Jungfraujoch) at Heidelberg based on $^{14}CO_2$ observations with simulations of all transport models using the "IER_hourly" emission map (left panel) and with simulations of the regional model REMO using the four different emission maps (right panel). An uncertainty estimate of observed monthly mean fossil fuel CO_2 is included (grey shading).