Impact of using various prior flux models on the posterior NEE derived from the Jena Carboscope regional inversion system

Saqr Munassar¹, Christoph Gerbig¹, Frank-Thomas Koch², and Christian Rödenbeck¹
¹Max-Planck Institute for Biogeochemistry, Jena, Germany (smunas@bgc-jena.mpg.de)
²Deutscher Wetterdienst, Meteorological Observatory Hohenpeissenberg, Germany

Regional flux estimates over Europe have been calculated using the two-step inverse system of the Jena CarboScope Regional inversion (CSR) to estimate the annual CO₂ budgets for recent years, in cooperation with the research project VERIFY. The CSR system assimilates observational datasets of CO₂ mixing ratio provided by the Integrated Carbon Observation System (ICOS) across the European domain to optimize Net Ecosystem Exchange (NEE) fluxes computed from biosphere models at a spatial resolution of 0.25 degree. Ocean fluxes are assumed to be constant over time. Fossil fuel emissions are obtained from EDGAR_v4.3 and updated based on British Petroleum (BP) statistics. Therefore, only biosphere-atmosphere exchange fluxes are considered to be optimized against the atmospheric data.

In this study we focus on the impact of using a-priori fluxes from different biosphere and ocean models on the annual CO₂ budget of posterior fluxes. Results calculated using the Vegetation and Photosynthesis Respiration Model (VPRM) and Simple Biosphere/Carnegie-Ames Stanford Approach (SiBCASA) models show a consistent posterior interannual variability, largely independent of which prior fluxes are used, even though those prior fluxes show considerable differences on annual scales.