



Using measurements on a meteorological tower to understand local carbon dioxide cycling

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Carbon dioxide CO₂ is the most important greenhouse gas in the earth's atmosphere. For understanding and predicting climate change, a thorough and quantitative knowledge of the natural and anthropogenic processes affecting the atmospheric CO₂ concentration on a global scale is crucial. Many of these processes occur on regional scales, with a considerable variability depending on local climate, ecosystem and infrastructure. Thus, detailed process understanding is often gained from investigations on local scales.

CO₂ measurements made in a rural area around Jülich, Germany, on a meteorological tower at 100 m altitude display typical diurnal and seasonal cycles caused by plant photosynthetic activity, as well as emission signatures from local anthropogenic sources such as power plants and traffic. We attempt to quantify these and other CO₂ fluxes relevant at our measurement site in a top-down approach, employing a simple model of meteorological and transport processes at the local scale.