



Spatial structures of CO₂, H₂O, temperature and vertical wind velocity observed by aircraft

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During the FLUXPAT campaigns in 2008 and 2009 the MetAir Dimona research aircraft performed several flights above a patchy, agricultural dominated landscape near Jülich/Germany. The measurements are aimed to capture the variability of water vapor and CO₂ and derive turbulent fluxes in the atmospheric boundary layer close to the ground. Flights took place at two main levels around 150 m and 250 m above ground. Agriculture in this region is dominated by two different crops: sugar beet and wheat. Flights were scheduled in April and August as at these times of the year strong contrasts can be found between different fields. In April sugar beet is usually just seeded whereas wheat already forms a closed canopy. In August wheat unlike sugar beet is already harvested.

We analyse the correlation lengths (L^*) of CO₂, H₂O, temperature and vertical wind velocity on flight legs. L^* is the median of the power spectrum i.e. 50 percent of the variance is in structures larger than L^* . For the different quantities L^* shows different behaviours during the day and between different flight levels. The structure lengthscales of CO₂ have a large dependency on daytime and strongly decrease during noon and afternoon. We will present some approaches to explain this behaviour.