



Explaining the inter-annual variability in the ecosystem fluxes of the Brasschaat Scots pine forest: 20 years of eddy flux and pollution monitoring

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Because of their ecological and recreational value, the health of forest ecosystems and their response to global change and pollution are of high importance. At a number of EuroFlux and ICOS ecosystem sites in Europe – as the Brasschaat forest site – the measurements of ecosystem fluxes of carbon and other gases are combined with vertical profiles of air pollution within the framework of the ICP-Forest monitoring program. The Brasschaat forest is dominated by 80-year old Scots pines (*Pinus sylvestris* L.), and has a total area of about 150 ha. It is situated near an urban area in the Campine region of Flanders, Belgium and is characterized by a mean annual temperature of 9.8 °C and an annual rainfall of 830 mm. In this contribution we report on a long-term analysis (1996-2016) of the ecosystem carbon and water fluxes, the energy exchanges and the pollutant concentrations (ozone, NO_x, NH₃, SO₂). Particular interest goes to the inter-annual variation of the carbon fluxes and the carbon allocation patterns. The impact of the long-term (aggregated) and the short-term variability in both the meteorological drivers and in the main tropospheric pollutants on the carbon fluxes is examined, as well as their mutual interactive effects and their potential memory effect. The effect of variability in the drivers during the phenological phases (seasonality) on the inter-annual variability of the fluxes is also examined. Basic statistical techniques as well as spectral analyses and data mining techniques are being used.