



Beyond CO₂ - Tackling the full greenhouse gas budget of a sub-alpine forest ecosystem

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In order to tackle the full greenhouse gas (GHG) budgets of forest ecosystems, it is desirable but challenging to quantify the three major GHGs, i.e. CO₂, CH₄ and N₂O simultaneously in-situ. At the long-term forest research site Davos (Candidate Class I Ecosystem Station within the Integrated Carbon Observation System - ICOS), we have recently installed a state-of-the-art measuring system simultaneously to observe the three GHGs on a high temporal resolution and both within and above the forest canopy. Thereby, we combine above-canopy eddy covariance flux measurements and forest floor chamber flux measurements (using five custom-made fully automated chambers). Both systems are connected to a quantum cascade laser absorption spectrometer (QCL, Aerodyne) and measurements are switched between three hours of above-canopy and one hour of forest floor GHG flux measurements. Using this approach, we will be able to study the full GHG budget as well as the dynamics of the individual fluxes on two vertical levels within the forest using a single instrument. The first results presented here will highlight the suitability of this promising tool for quantifying the full GHG budget of forest ecosystems.