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Measuring carbon and oxygen isotope signals of photosynthesis and respiration: first field results from a chamber system coupled to tunable diode laser spectrometer

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Studying the carbon and oxygen stable isotope signals from plants and soils can help us gain insight to mechanistic processes responsible for the net exchange of CO_2 and water cycled between terrestrial ecosystems and the atmosphere. Chamber field measurements of component fluxes and their isotopic composition have been reported for very few ecosystems. These observations have revealed that isotopic signals for carbon and oxygen are dynamic over relatively short time scales (hrs and days) for both branches and soils, and are not fully explained by currently available models. Ecosystem isotope studies have been limited by flask sampling requirements in the past. To evaluate and refine our models of isotopic fractionation by plants and soil, we need high resolution continuous isotopic measurements over the growing season for different ecosystems. In this study, we coupled chambers with tunable diode laser spectroscopy techniques in the field to continuously capture the isotopic signals from the most important component fluxes contributing to the net ecosystem exchange of CO_2in a *Pinus pinaster* forest in south-west France. We obtained profiles of the carbon and oxygen isotope content of CO_2 within and above the forest canopy. In addition, we measured branch photosynthetic ^{13}C and ^{18}O discrimination alongside the ^{13}C and

^{18}O isotopic composition of branch, stem and soil respiration during a 6-month period in 2007. In this talk, we will present the first results from this pioneer field study.