

## Realtime carbon dioxide isotope ratios ( $^{13}\text{C}$ , $^{18}\text{O}$ ) measured in ambient air, and from plant processes.

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Isotopes of carbon dioxide are a very useful tool to determine the sources of this important greenhouse gas in the atmosphere. The measurement of both  $^{13}\text{C}$  and  $^{18}\text{O}$  isotope ratios allows the discrimination between  $\text{CO}_2$  from anthropogenic and biogenic sources. Traditionally  $\text{CO}_2$  isotope ratios have been measured using mass spectrometry, however this is time consuming and recently continuous measurements have become possible providing more information on the dynamic processes occurring in the atmosphere.

Ambient air was measured continuously in Nagoya university campus over a 10 day period in December 2008 using a laser spectroscopic technique to monitor the  $^{12}\text{C}^{16}\text{O}_2$ ,  $^{13}\text{C}^{16}\text{O}_2$ , and  $\text{C}^{18}\text{O}^{16}\text{O}$  isotopes in the mid-IR region. Along with the  $\text{CO}_2$  isotope measurements, a number of local meteorological conditions were monitored. Generally a diurnal variation in the  $\text{CO}_2$  mixing ratio and the isotopic composition were observed. A meteorological temperature profiler was employed to identify the temperature inversion associated with stable nocturnal boundary layer formation which inhibits vertical mixing. A significant build up of plant respiratory  $\text{CO}_2$  and depletion of the heavy isotopologues was observed during repeated temperature inversions. The results from these measurements will be discussed with the aid of sonic anemometer and flask sample measurements, and previous measurements in July 2008.

In separate experiments, the realtime change in  $\text{CO}_2$  concentration and isotope ratio within a chamber during photosynthesis and respiration of plants watered with  $\text{H}_2^{18}\text{O}$  enriched water was measured using the laser instrument, with simultaneous measurements by the mass spectroscopic method. The results of these measurements will also be discussed.