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Stable water isotope measurements in an Australian forest ecosystem

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High resolution diurnal measurements of the stable water isotopologues HDO and $H_2^{18}O$ in a range of environmental samples were taken in a cool-temperate forest in S.E. Australia near Tumbarumba, during two observational field campaigns in March 2005 and November 2006. The datasets obtained are an important research tool in weather forecast and climate change studies and are an Australian contribution to the Moisture Isotopes in the Biosphere and Atmosphere International Atomic Energy Agency Collaborative Research Program.

Samples were collected from a range of storage pools within the soil-plant-atmosphere system, including soil cores, sub-surface soil, plant material (leaf and twig/stem) and atmospheric water vapour. Two techniques were employed for water vapour: an ANSTO-developed dry-ice-cooled cryogenic water vapour sampler was used to collect samples for isotope ratio mass spectrometry analysis, and a Fourier Transform InfraRed (FTIR) spectrometer provided real-time analyses. The FTIR system is described in an accompanying paper in this session (Griffith *et al.*). Snow, precipitation, dew and other incident water were also sampled. This paper details the methodology and sampling protocol used to characterise the fractionation of deuterium and oxygen-18 in each storage pool during the November 2006 field campaign.

Mechanisms governing the movement of stable water isotopes at the Tumbarumba field site are under investigation. We present a conceptual model used to make *a priori* estimates of the expected δ^2H and δ^{18}O value in each measured storage pool.

Preliminary data from the March 2005 campaign conform approximately with the *a priori* estimates: we demonstrate that there is value in constructing a conceptual model to predict the behaviour of stable water isotopes prior to field observation campaigns.