



Real-time measurements of the stable isotopes in water vapour by Fourier Transform Infrared spectroscopy

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The stable isotopes in water vapour are strongly influenced by atmospheric hydrological processes. For this reason, high-resolution time series of the stable isotopes in water vapour offer a continuous record of the processes related to atmospheric waters. Until recently the collection of high-resolution time series have been limited due to the lack of instrumentation capable of collecting large continuous datasets. We have developed a FTIR spectrometer that can be used to collect high resolution time series of both ^{18}O and ^2H isotopes in water vapour. The performance of this instrument is similar to that of the other available stable isotope instrumentation. Measurement precision for a 10 minute measurement is of the order of 0.4 and 1‰ for ^{18}O and ^2H isotopes, respectively. Measurement precision can be improved beyond this if consecutive measurements are averaged. The instrument is currently deployed in Sydney, Australia, where measurements are being collected to interpret the effect of synoptic scale weather patterns on the stable isotope values of water vapour. Here a snapshot of these measurements and results from some of the calibration procedures are shown to illustrate the instruments capabilities. The instrument is also capable of simultaneously measuring the atmospheric mixing ratio of a number of climatically sensitive trace gases including carbon dioxide, methane, carbon monoxide and nitrous oxide.