



A microdrop generator for the calibration of a water vapor isotope ratio spectrometer

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The design and performance of a microdrop generator to produce water vapor with a known isotopic composition and volume mixing ratio is described. A commercial piezo-electrically driven nozzle (Microdrop GmbH) is used to inject water droplets of known size at a preset repetition frequency into a stream of dry nitrogen or synthetic air. The water mixing ratio of the air stream is controlled by the repetition rate and gas flow. The microdrop generator is able to reach much lower water vapor mixing ratios than the direct, non-diluted output of a dew-point generator or bubbler device, while still able to reach mixing ratios typical of near-surface air, and is characterized by the absence of isotope fractionation between the supplied liquid phase water and the produced moist air stream, due to complete evaporation of the small droplets. It is also compact and requires a minimum amount of water, making it ideal to calibrate an atmospheric moisture isotope spectrometer, also in field situations.

Here the device is used in the calibration procedure of a near-infrared diode laser water isotope ratio spectrometer. By cryogenic trapping of its moist vapor output, its isotopic composition is independently verified against conventional isotope ratio mass spectrometry.