Geophysical Research Abstracts
Vol. 14, EGU2012-12549, 2012
EGU General Assembly 2012

High Resolution Double-Focusing Isotope Ratio Mass Spectrometry

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In recent years isotope ratio mass spectrometry has extended to the capability of quantifying very small isotope signatures related with low abundances and simultaneously detecting molecular masses such as isotopomers and isotopologues containing clumped isotopes. Some of those applications are limited by molecular interferences like different gas molecules with the same nominal mass, e.g. Ar/O_2, adducts of the same molecule or of different molecules, and very small isotope abundances.
The Thermo Scientific MAT 253 ULTRA is the next generation of high precision gas isotope ratio mass spectrometry, which combines a 10 KV gas ionization source (Thermo Scientific MAT 253) with a double focusing multi-collector mass analyzer (Thermo Scientific Neptune) and reduces those limitations by measuring isotope ratios on a larger dynamic range with high precision.
Small ion beam requirements and high sensitivity are achieved by signal-to-noise improvements through enhanced ion beam amplification in faraday cups and ion counters. Interfering backgrounds, e.g. interfering isotopologues or isobaric ions of contaminants, are dramatically decreased by a dynamic range increase combined with high evacuation leading to undisturbed ion transmission through the double-focusing analyser. Furthermore, automated gain calibration for mathematical baseline corrections, switchable detector arrays, ion source control, analyser focusing and full data export is controlled under Isodat data control. New reference/sample strategies are under investigation besides incorporation of the continuous-flow technique and its versatile inlet devices.
We are presenting first results and applications of the MAT 253 Ultra.