In-situ high precision Hf isotope ratio measurement using laser ablation MC-ICPMS: Mass bias and isobaric interference corrections

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The application of in-situ isotope ratio measurements by laser ablation MC-ICPMS has been demonstrated for a number of radiogenic and stable isotope systems. The accuracy and precision of the in-situ data are dependent on a number of factors, including corrections for mass bias and spectral interferences, as well as matrix effects. One of the advantages of the MC-ICPMS technique is that overlap corrections can be made for isobaric interferences, however laser ablation is the ultimate test of these correction procedures as there is no sample purification. Mass bias corrections need to be applied to the isotopes of the interfering element as well as to the element of interest. In many systems the mass fractionation of interfering isotopes can be measured independently but in others this is not possible. The measurement of Hf isotopes is complicated by the isobaric inteferences of Yb and Lu on ^{176}Hf. The mass fractionation of Yb and Hf can be measured independently but Lu has only 2 isotopes, one of which is mass 176. Here the mass bias behaviour of Lu must be assumed to be the same as either Yb or Hf. Results obtained on a Nu Plasma MC-ICPMS will be presented to show the mass bias relationships between Er, Yb, Lu and Hf. Over a range of normal operating conditions the ratios of the mass fractionation coefficients for pairs of these elements remain constant, but non-equal. The long-term reproducibility of the ratios allows the adjustment of the 'true' isotopic ratio of Yb or Lu, or the use of a mass fractionation 'factor' for external mass bias normalisation to Hf. The results will also be used to show the dependency of mass fractionation coefficients on factors such as plasma operating conditions (nebuliser gas flow, gas composition, torch position), plasma loading (matrix effects) and extraction lens settings.