

## **Determination of dissolved iron (dFe) concentration in seawater using High Resolution Magnetic Sector Inductively Coupled Mass Spectrometry (HR-ICP-MS): “ SOSCEX III winter vs summer dFe profiles”**

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A novel method, combining isotope dilution with standard additions, was developed for the analysis of dissolved iron (dFe) and other trace elements eight elements (Mn, Co, Ni, Cu, Zn, Cd and Pb) in seawater. The method requires just 14mL of sample and employs an off-line pre-concentration step using the commercially available chelating resin Ethylenediaminetriacetic acid (EDTriA) and Iminodiacetic acid (IDA) prior to determination by high resolution inductively coupled plasma magnetic sector mass spectrometry (ICP-MS). Acidified samples were spiked with a multi-element standard of six isotopes (<sup>56</sup>Fe, <sup>60</sup>Ni, <sup>63</sup>Cu, <sup>66</sup>Zn, <sup>112</sup>Cd and <sup>208</sup>Pb) enriched over natural abundance. Ammonium acetate buffer was used to raise the pH of the 12mL sub-samples (off-line) to pH 6.4±0.2 prior to loading onto the chelating resin. The extracted metals were eluted using 1.0M-Q-HNO<sub>3</sub> and determined using ICP-MS. The method was verified through the analysis of certified reference material (NASS-5) and the SAFe inter-comparison samples (S1 and D2; GEOTRACES), the results of which are in good agreement with the certified and reported consensus values. We also present seasonal contrast of vertical profiles of dFe concentration taken from the south Atlantic region of the Southern Ocean during the Southern Ocean Seasonal Cycle Experiment III (SOSCEX III) in winter and summer 2015/16.