

ANA-OR-30 Determination of YLOID, Zr and Hf in seawater by ICP-MS technique: method validation and evaluation of measurement uncertainty

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In the last years many researches were focused on behaviour and naturally abundances of Y, La, Lanthanoids (YLOID), Zr and Hf in marine systems increasing the attention to their capability to trace geochemical processes occurring along the water column, ocean circulations and at the solid-liquid interface [1-2]. In contrast YLOID and Zr-Hf behaviour can have a geochemical significance only if their contents in seawater is analysed according to a robust, reliable and comparable chemical analytical approach. Therefore the ability of an analytical protocol to obtain reproducible values is paramount. Unfortunately, the analysis of these metals in natural waters is often complicated by their ultra low concentrations (0.5–100 pmol/L), the high matrix concentration and a wide range of severe spectral interferences (*e.g.*, Ba²⁺, seawater salts).

To perform simultaneous ultra-trace YLOID, Zr and Hf analyses in seawater, we developed a preconcentration method based on coprecipitation with Fe(OH)₃ and determination by ICP-MS. In this study the metals behaviour was quantitatively investigated during coprecipitation and estimation of composed uncertainty associated to measurements was evaluated with a rigorous metrological approach based on method validation and quality data control. These goals were achieved using spiked natural seawater samples where YLOID, Zr and Hf had concentrations as occurring in natural seawater, (20 pg/mL).

Under these conditions the metals were quantitatively recovered from seawater with good precision (2–5%), apart for La (10%). Composed measurement uncertainty was expressed in terms of precision, recovery, reference materials and instrumental calibration uncertainty (Fig.1). The obtained results were critically discussed on the basis of the different contributions and confirm the quadrupole ICP-MS technique as highly sensitive to determine very low YLOID, Zr and Hf concentrations.

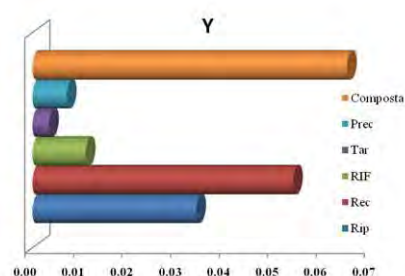


Fig. 1

[1] D. S Alibo. and Y. Nozaki Deep- Sea Research, 51, **2004**, 559–576.

[2] P. Möller, P. Dulski and Luck J. Spectrochimica Acta, 47,**1992**, 1379.