Sensitivity study of the ThermoFinnigan Neptune MC-ICPMS using different inlet systems

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The analytical sensitivity is one of the most important figures for high performance MC-ICPMS instruments. Important factors affecting the sensitivity of MC-ICPMS instruments are type of spraychamber and nebulizer, temperature, sample aerosol density and water content, structure of the interface cones, and the kinetic energy spread of the ions in the plasma. Thus, when comparing sensitivities of various MC-ICPMS instruments, one should take into account these factors. For isotope ratio measurements in geological applications the low flow nebulizers with uptake rates of 20 to 100 µl/min are preferred, because they give the best sample utilization. The use of a desolvating nebulizer instead of a standard wet spray chamber significantly increases the sensitivity and significantly reduces the oxide rate. Cooling the spray chamber reduces the oxide rate as well, since cooling takes away the water of the aerosol which finally enters the plasma.

Here we present sensitivity data of the ThermoFinnigan NEPTUNE using various sample inlet systems in combination with different skimmer cones. In particular we will investigate the performance of a cyclonic spray chamber, a Scott type spray chamber and a combination of both: the stable introduction system (SIS). The spray chambers will be operated at room temperature and at low temperatures down to about 2 ºC.

In addition to these wet plasma inlets systems we will investigate the performance of desolvating nebulizers. The performance of the Cetac ARIDUS desolvating nebulizer will be compared with a new type of desolvating nebulizer (APEX developed by ESI). The ARIDUS and APEX inlet systems are several factors more sensitive than the stable introduction system. Due to the removal of water vapour from the sample, the solvent load on the plasma is reduced, thereby leaving more energy for sample decomposition and ionization. An additional advantage is the reduction of interferences such as oxides and hydrides.

Biomarker flux in sinking particle from the Sea of Okhotsk: Comparison between organic and inorganic tracers

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The Sea of Okhotsk is one of the largest marginal sea and southern boundary region of seasonal sea ice (Kimura and Wakatsuchi, 2000) with high productivity. Shallow and broad continental shelf is spread out in the northwestern part of the sea where the mouth of Amur River, which is one of the largest rivers in the East Siberia, is located. During sea ice formation in the northwestern continental shelf, cold and brine water, so called dense shelf water (DSW) is rejected and sinks to bottom of shelf (Gladyshev et al., 2000). The DSW exists around 300-400m depth and spread to the south along the Sakhalin coast through the East Sakhalin Current. This intermediate water mass further penetrates into the North Pacific via Bussol Strait. Hence, the Sea of Okhotsk is the source region of the North Pacific Intermediate Water (NPIW) (Tally, 1991). Because of the DSW formation in the shelf, suspended and large amount of resuspended particle on the shelf is effectively transported to the southern deeper basin (Nakatsuka et al., 2002). In this study, we provide spatiotemporal distribution of terrestrial and marine biomarkers as well as inorganic tracers in the east coast of Sakhalin Island to understand seasonal dynamics of sinking particles in the western region of the Sea of Okhotsk.

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