High resolution particulate trace metals dispersion from the TAG hydrothermal vent (Mid-Atlantic Ridge)

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The global mid-ocean ridge system houses hydrothermal vents that are considered a significant source of trace elements (TE) in the deep ocean inventory [1]. New insights brought into Pacific basin TE cycling along the fast spreading East Pacific Rise (EPR) discovered the persistence of iron (Fe) in the distal hydrothermal plume over length scales of thousands of kilometres into the ocean interior [2], supported by dissolved–particulate exchange [3]. To pursue the understanding of TE cycling in the vicinity of hydrothermal vents, we focused our study on the slow spreading Mid-Atlantic Ridge (MAR), which hosts a series of black smokers, including the TAG hydrothermal seamount, at 26°08' N. During the HERMINE cruise (GEOTRACES GPrA07), the seawater column was sampled right above the vent, at 500m, 1km, 2km 5km, 10km, 30km and 75km, following the plume. Particulate trace metals (>0.45µm) were analyzed by SF-ICP-MS [4], on a suite of 19 elements, including Fe, Mn, Cu, Ni, Co and Zn. Particles were examined with scanning electron microscope coupled with energy dispersive X-Ray spectrometer (SEM-EDS). Along this transect, particulate Fe concentrations varied from picomolar concentrations to 395 nmol L^{-1} right above the vent. TAG field particulate data will be complemented with dissolved Fe samples obtained by SeaFAST[5]. The HERMINE sampling strategy will allow evaluation of the particulate trace metal 2D dispersion of the TAG plume at high resolution for the first time, providing the first hydrothermal inter-basin comparison of TEI cycling at vent sites.

[1] Tagliabue et al., 2010. Nature Geoscience 3 ;252–256 (2010) [2]Resing et al., 2015. Nature, volume 523, pages 200–203 ; [3]Fitzsimmons et al., 2017. *Nat. Geosci*, **10**, 195–201; [4] Planquette and Sherrell, 2012. *Limnol. Oceano. Meth.* **10**, 367-388 ; [5] Lagerström et al., 2013 *Mar. Chem*, **155**, 71-80.