Local-scale controls on ferromanganese crusts: Tropic Seamount, NE Atlantic

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Ferromanganese (Fe-Mn) crusts are extensive in the marine realm and form through precipitation onto the hard substrates of seamounts, plateaus and ridges. Mineralogies are dominated by Mn oxides and Fe oxyhydroxides. The enrichment of economically important elements in these crusts is driven by very high specific surface areas and slow growth rates. These include "critical" E-tech elements that are vital for the growing green technology sector and that are susceptible to low security of supply. In particular, extreme enrichments in cobalt (Co), tellurium (Te) and the rare earth elements and yttrium (REY) make Fe-Mn crusts a potentially important source of raw materials for cleaner renewable energy technologies. To optimise the sustainability of seabed mining for Fe-Mn crusts, a greater understanding of the factors affecting variations in "critical" element concentrations at the scale of individual seamounts is required.

Here, we report trace-element characteristics for Fe-Mn crusts collected from across Tropic Seamount, NE Atlantic, during cruise JC142. Ferromanganese crusts from a variety of depths, morphologies and substrates were systematically sampled across four flanks of the seamount, from depths between ~1000 – 4000m, using the *ROV ISIS*. These samples were analysed alongside standard reference materials NOD-A-1 and NOD-P-1 (manganese nodules, US Geological Survey). Primary results are presented alongside preliminary Fe-Mn crust mapping from ROV dive footage of Tropic Seamount. Combining outcrop mapping with major and trace elemental concentration distributions can be used to identify spatial trends in elemental variation and to detemine sites of interest for further analysis and exploration.