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Dissolved rare earth element (REE) concentrations across the Amundsen Sea Continental Shelf

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The intrusion of relatively warm Circumpolar Deep Water onto the Amundsen Sea continental shelf is responsible for some of the highest basal melting rates observed along the Antarctic Ice Sheet margin [2,3]. The resulting meltwater delivers lithogenic trace-metal nutrients, such as iron, to local polynyas, influencing Southern Ocean productivity. The meltwater is also exported into the Ross Sea and potentially influences the formation of Antarctic Bottom Water [4]. As the Western Antarctic Ice Sheet continues to melt rapidly, it is more important than ever before to understand how the meltwater affects ocean circulation and regional trace-metal cycles [1,5]. However, tracing and quantifying meltwater fluxes and associated trace-metal inputs is challenging due to the complex interplay of seawater–sediment interactions, ice-ocean interactions, air-sea exchange, biological uptake, and water mass mixing. Using rare earth elements (REEs) as tracers for the lithogenic input and water mass mixing, we present new dissolved REE concentration data from water column profiles collected along Amundsen Sea continental shelf transects and a Southern Ocean crossover station during the US GEOTRACES GP17-ANT cruise. These data provide unprecedented details on REE cycling in this under-sampled region. We will discuss the processes controlling the observed REE distributions and their implications for trace-metal input and cycling on the Amundsen Sea shelf.

[1] Jenkins et al. (2018), *Nature Geoscience* 11, 733–738.
[2] Rignot et al. (2013), *Science* 341, 266–270.
[3] Rignot et al. (2019), *PNAS* 116, 1095–1103.
[4] Silvano et al. (2018), *Science Advances* 4, eaap9467.
[5] St-Laurent et al. (2019), *Journal of Geophysical Research: Oceans* 124, 1544–1565.