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Variability in seawater Cr concentration and stable isotope composition along Atlantic Meridional Transect 29 (AMT29)

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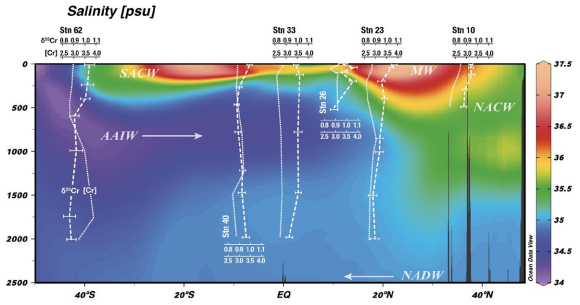

Over the last decade, chromium (Cr) stable isotope composition has emerged as a potential paleoproxy for recording past oxygenation changes in the atmosphere and oceans. Although Cr is a promising paleoproxy, the modern marine Cr cycle remains poorly understood, with some important oceanic regions such as large swaths of the Atlantic Ocean with few data available. This project presents the dissolved Cr concentration ([Cr]) and its stable isotope (δ^{53}Cr) data across a transect from the North to the South Atlantic (AMT29). The samples were collected at 12 oceanographic stations along a meridional transect extending from 47.2°N; -9.2°E to 41.54°S; -35.26°E during October and November 2019. Previous Cr data in open ocean appeared to have a strong linear relationship between δ^{53}Cr and Ln([Cr]), suggested that a limited number of mechanisms are responsible for the isotopic fractionation of Cr in the ocean (such as productivity and/or dissolution of sinking particles). Regarding the AMT 29 data, this linear relationship is weak and Cr in the Atlantic appears to have a distinct behavior from previous oceanic Cr data. Indeed, Cr in this part of the Atlantic Ocean seems to be mainly impacted by horizontal advection and mixing. Therefore, [Cr] and δ^{53}Cr distribution may reflect the legacy from different water masses and their mixing/evolution. In addition, we investigate the potential impact of dysoxic environments (10°S to 18°N) and biological productivity on Cr, and find no clear evidence of consequences on Cr distributions. This is likely explained by insufficiently depleted oxygen concentrations and relatively low biological productivity, resulting in these processes being of secondary importance relative to mixing.