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Radium isotopes to emphasize a hydrothermal plume in the South West Indian Ridge region

MORGANE LÉON[1], PIETER VAN BEEK[1], VIRGINIE SANIAL[2], MARC SOUHAUT[1], CATHERINE JEANDEL[3] AND HELENE PLANQUETTE[4]

[1]Laboratoire d'Etudes en Géophysique et Océanographie Spatiale (LEGOS), Université de Toulouse, CNES/CNRS/IRD/Université Toulouse III Paul Sabatier

[2]Univ Toulon, Aix Marseille Univ., CNRS/INSU, IRD, UM 110, Mediterranean Institute of Oceanography

[3]CNRS (LEGOS)

[4]Univ Brest, CNRS, IRD, Ifremer, LEMAR

Presenting Author: morgane.leon@legos.obs-mip.fr

If hydrothermal sources are now known as important vectors of various chemical elements to the ocean, including trace elements and radioisotopes, hydrothermal inputs are still largely overlooked and underestimated. Radium is a naturally occurring radionuclide present in low concentrations in the ocean but that is significantly enriched in hydrothermal fluids. Additionally, radium is slightly impacted by scavenging or biological removal, which makes it a valuable tracer to evaluate the fate of chemical elements released by hydrothermal vents. Thanks to their wide range of half-lives, radium isotopes can be used to study physical and chemical processes at different temporal and spatial scales along the hydrothermal plume.

Here, we present the Ra quartet activities (^{223}Ra, ^{224}Ra, ^{226}Ra and ^{228}Ra) determined at two stations located on the South West Indian Ridge (SWIR) and sampled during the SWINGS cruise (GEOTRACES GS02). Despite that these two stations were located in the open ocean, they displayed elevated activities of short-lived ^{224}Ra and ^{223}Ra radium isotopes suggesting the presence of a nearby source. The particular signatures in ^{224}Ra/^{223}Ra and ^{224}Ra/^{228}Ra activity ratios measured at the bottom of these two stations led us to conclude to that these waters interacted with nearby hydrothermal vents. Additional radionuclides were also determined such as ^{227}Ac and ^{210}Pb, which both displayed higher activities than expected for open ocean waters confirming the occurrence of hydrothermal vents in the region. These results also highlight the need to locate and characterize these vents in future studies, as these hydrothermal vents have the potential to trigger massive phytoplankton blooms in the Southern Ocean [1;2].

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