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Supplement of

Particulate rare earth element behavior in the North Atlantic (GEOVIDE cruise)

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Particulate Rare Earth Element behavior in the North Atlantic (GEOVIDE cruise): supplementary material

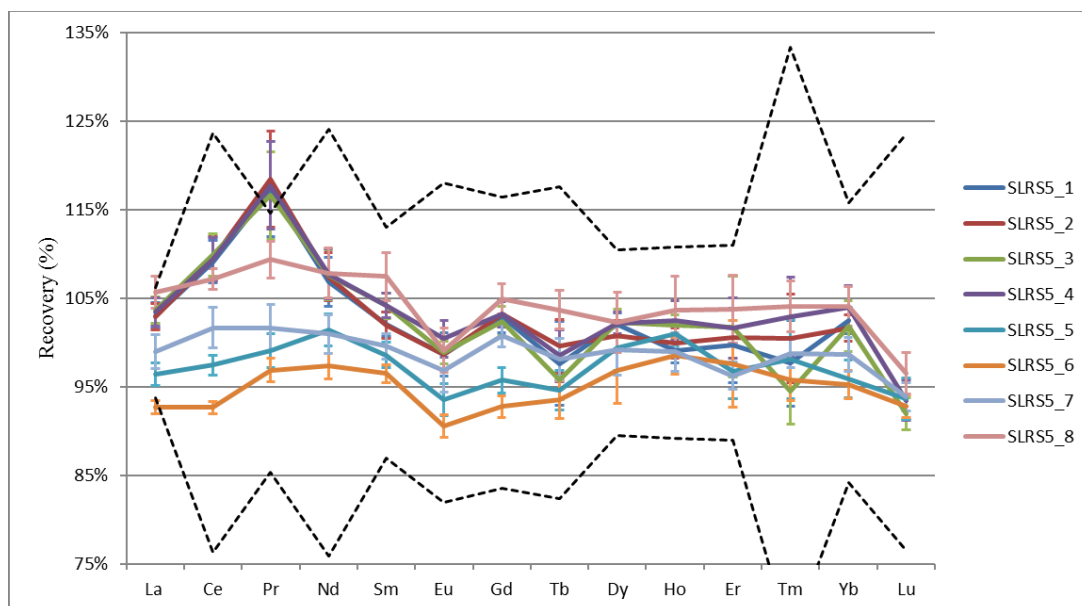


Figure S1: Percentage of recovery of the CRM SLRS-5 analyzed concomitantly with the samples of the study. The dotted lines bracket the consensual range from (Yeghicheyan et al., 2013).

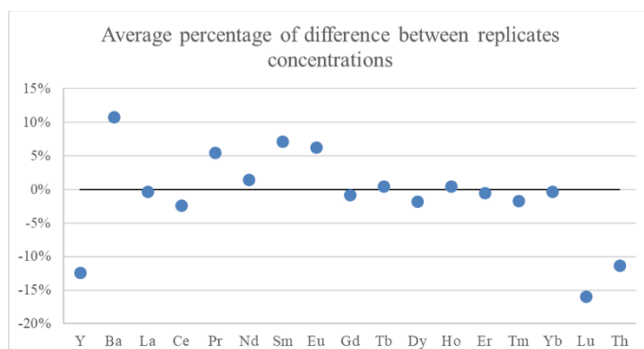


Figure S2: Average percentage of difference between concentrations measured two times in the same sample, per element, n=23.

Source of error	Determination	Mean % of the concentration
Volume of leachate	2sd calculated on the weight of all archive volume after 13 mL of HNO ₃ 0.32 M were added	0.6%
Volume taken for ICP-MS analysis	Average 2sd calculated on weight replicates for a sample	0.005%
ICP-MS measurement	2sd calculated on 5 spectra measured for a sample	3.3%

Figure S3: Averaged error on concentration ratio for each source of error

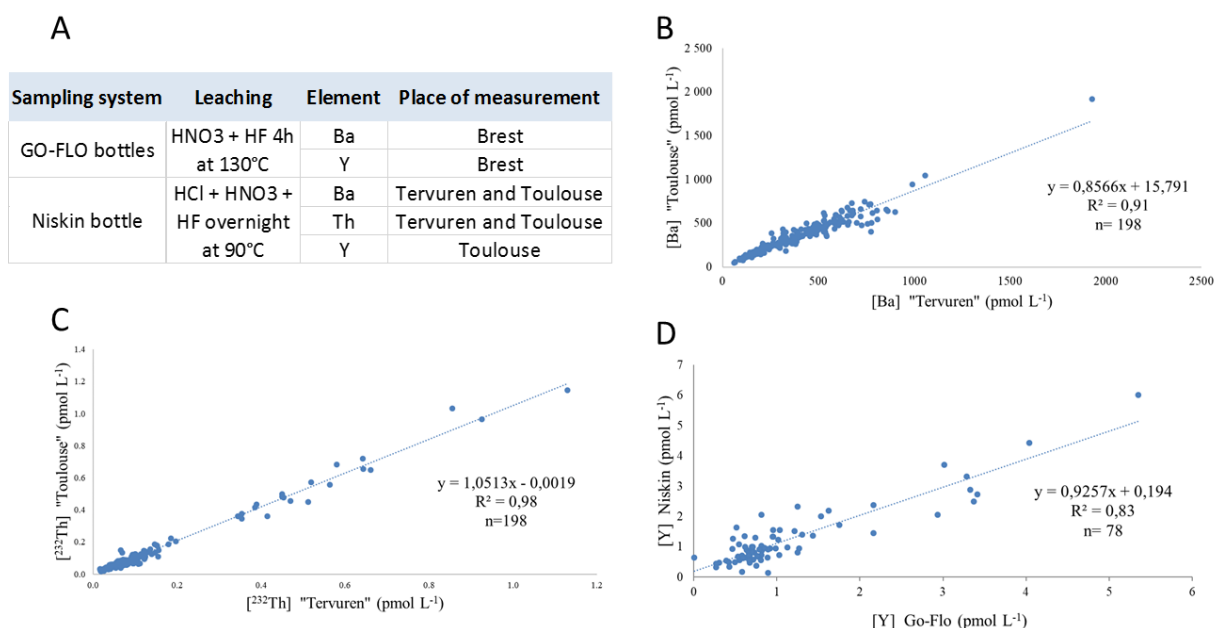


Figure S4: A. Summary of the differences between sampling systems and analytical protocols. B. Comparisons of Ba concentrations (pmol L⁻¹) measured in the same samples at Tervuren and at Toulouse. and C. Comparisons of ²³²Th concentrations (pmol L⁻¹) measured in the same samples at Tervuren and at Toulouse. D. Comparison of Y concentrations in particles collected with Niskin bottles analyzed in Toulouse and GO-FLO bottles analyzed in LEMAR.

Reference	Location	Sampling method	Nd (pmol L ⁻¹)	Ce (pmol L ⁻¹)	Yb (pmol L ⁻¹)
Kuss et al. (2001)	Along the 20°W meridian between 30°N and 60°N	Samples pumped and centrifuged from several m ³ of water at a depth of 7 m (n=24)	0.17 to 2.16 Average 0.67	0.2 to 4.9 Average 0.82	0.03 to 0.47 Average 0.13
Tachikawa et al. (1999)	Tropical northeastern Atlantic (20°N, 18-31°W)	<i>In-situ</i> pumps at 3 stations (an eutrophic (E), a mesotrophic (M) and an oligotrophic (O) sites), filtration of 30 to 995 L	E: 0.7 to 10.5 M: 0.3 to 2.6 O: 0.1 to 0.5	E: 2.5 to 24.6 M: 1.0 to 5.5 O: 0.4 to 1.1	E: 0.04 to 0.5 M: 0.02 to 0.09 O: 0.05 to 0.03
This study	Subpolar North Atlantic (40-60°N, 10-55°W)	Niskin bottles	0.1 to 6.1	0.2 to 16.3	0.01 to 0.50

Figure S5: Comparison of PREE available data in the North Atlantic, including this publication. Data from (Kuss et al., 2001; Tachikawa et al., 1999)

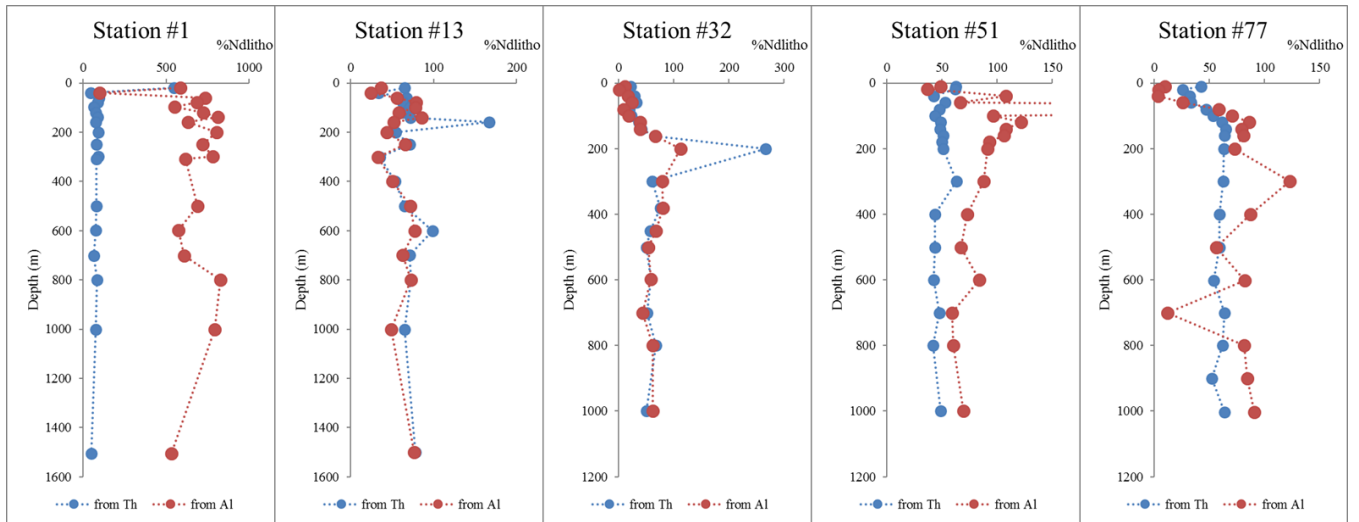
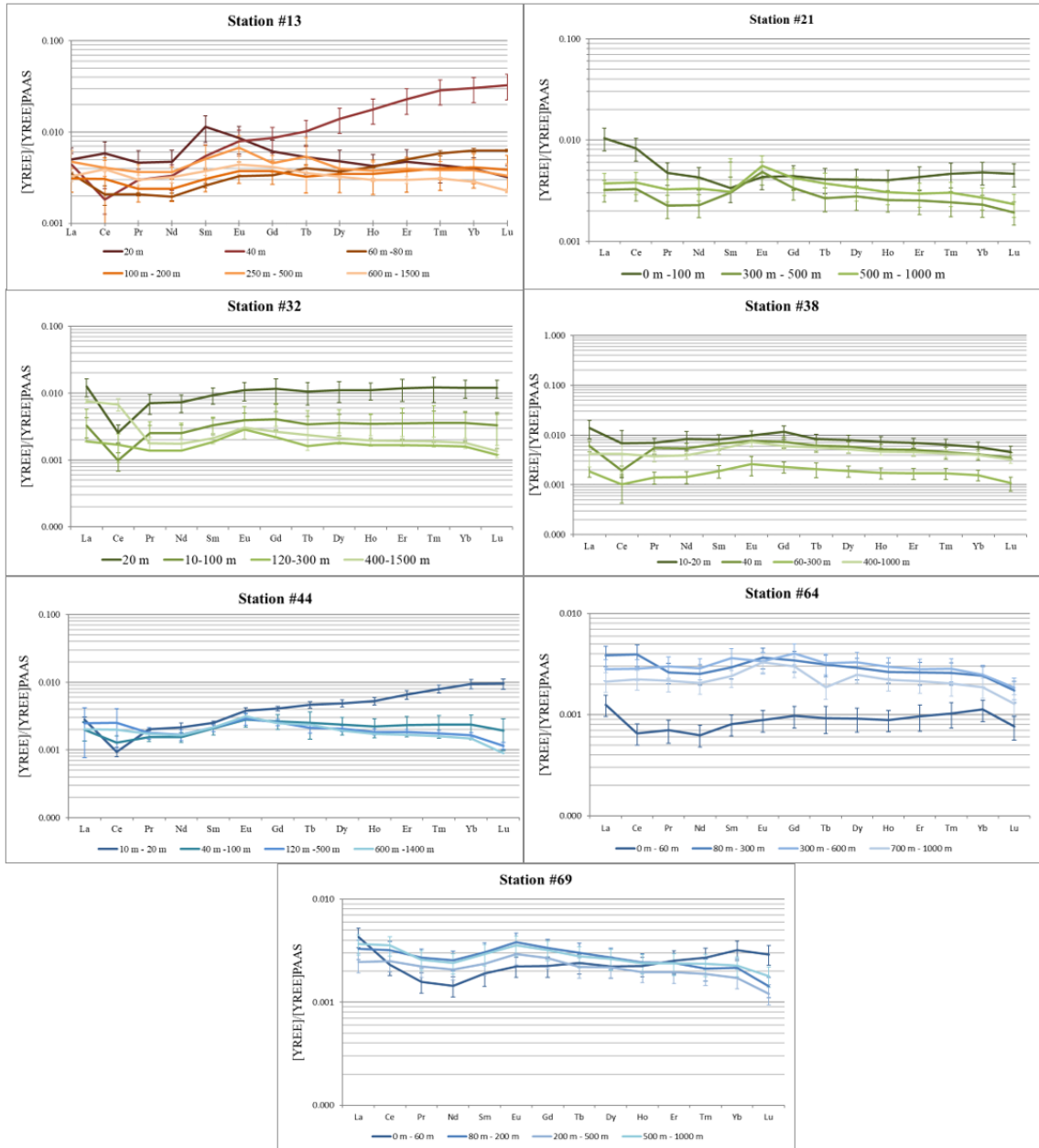


Fig. S6 Comparison of lithogenic fractions calculated from ^{232}Th (in blue) and Al at different stations (in red, data from (Gourain et al., 2019))

A



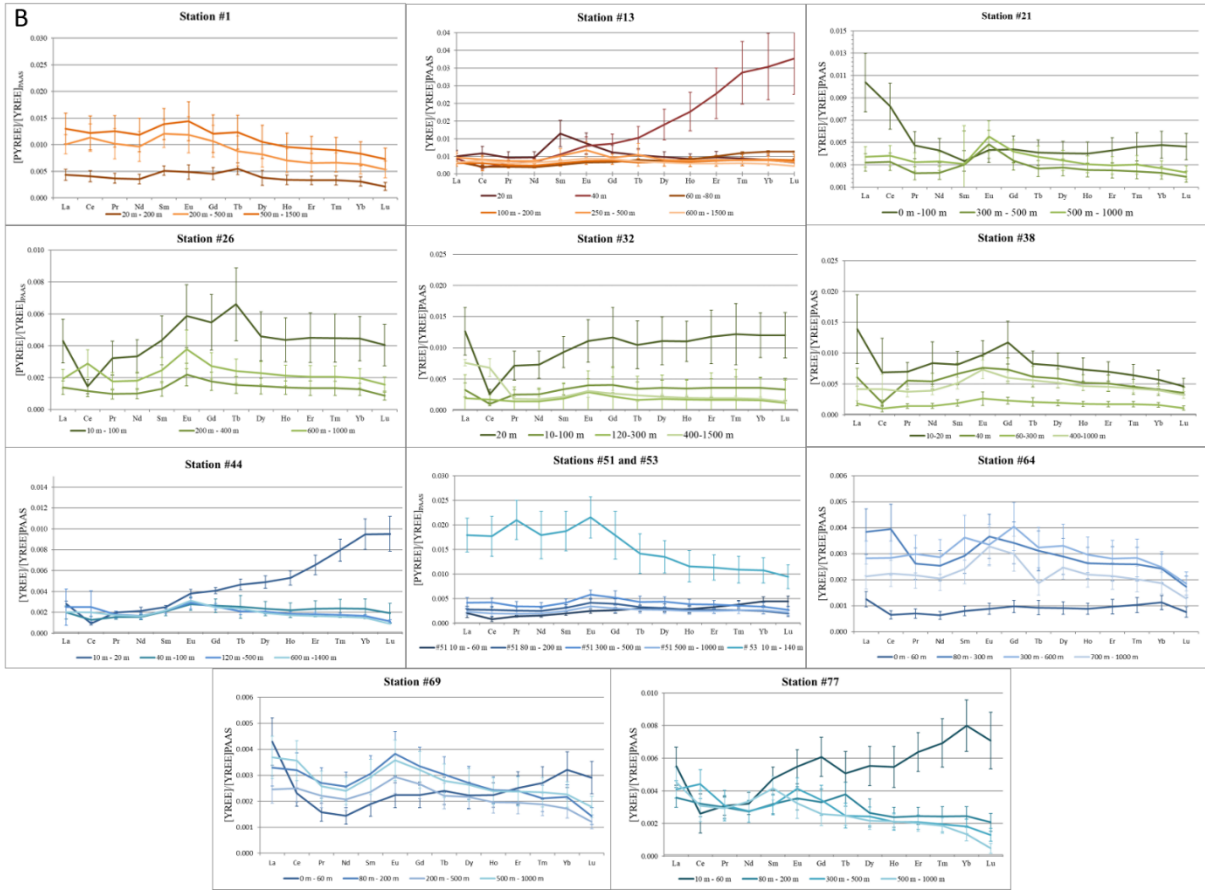


Figure S7: A. PAAS-normalized REE patterns of the total fraction, averaged at several depths and depth layers, at stations #13, #21, #32, #38, #44, #64 and #69 and B. REE patterns averaged at several depths and depth layers at all stations.

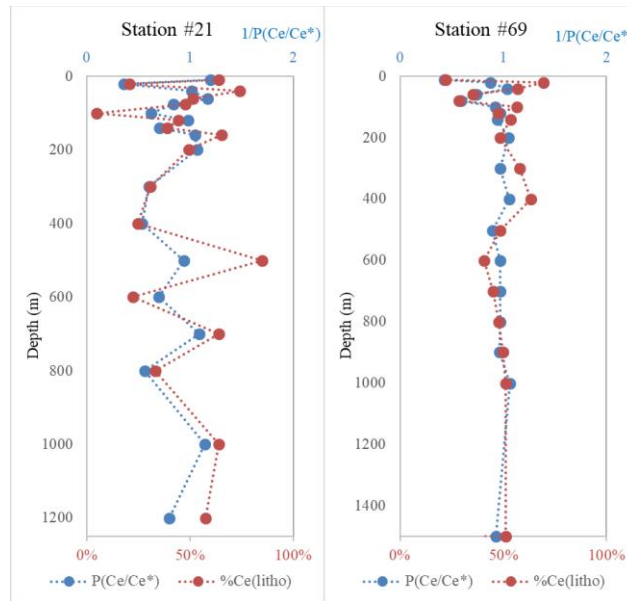


Figure S8: Vertical profiles of $1/PCe$ anomalies and Ce lithogenic contributions (in %) at stations #21 and #69.

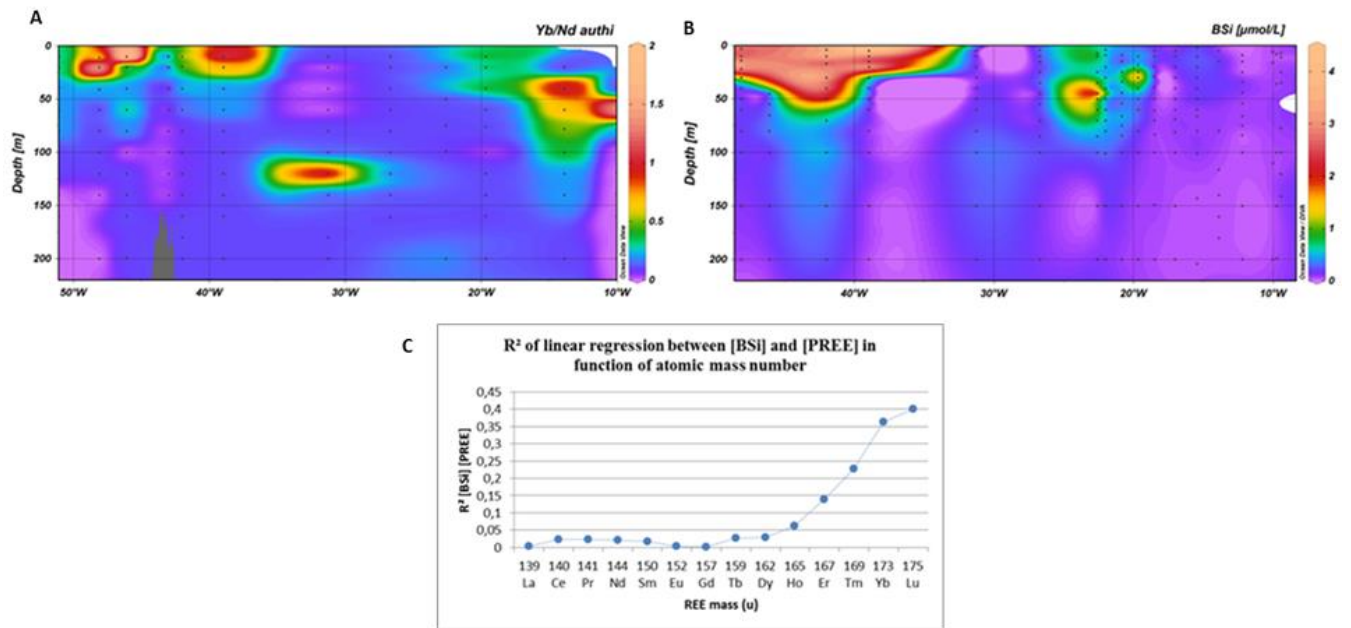


Figure S9: A. PYb/PNd ratio in the authigenic fraction B. Biogenic silica concentrations in the upper 200 m, and C. Correlation coefficient between biogenic silica concentrations and PREE concentrations per REE.