The dissolved $\delta^{137}Ba$ signal of continental weathering

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The oceanic isotope geochemistry of barium (Ba) is studied in particular for tracing the paleo-productivity from marine sediment records. However only few data have been reported on dissolved Ba isotopes ($\delta^{137}Ba$) in large rivers systems, although they are the main input of dissolved Ba to the ocean. These river data show significant differences in $\delta^{137}Ba$ [1], suggesting that (a) Earth surface processes might fractionate barium isotopes and / or (b) source rocks might be heterogeneous in $\delta^{137}Ba$. Therefore the past ocean $\delta^{137}Ba$ might have changed with variation of continental weathering, challenging reconstruction of oceanic paleo-productivity.

To better characterize the $\delta^{137}Ba$ input to the ocean, as well as the controls on $\delta^{137}Ba$ during continental weathering, we report here the dissolved $\delta^{137}Ba$ values of two large river watersheds with different lithology, relief, erosion rates and climate: the Amazon and the Mackenzie rivers. Values of dissolved $\delta^{137}Ba$ range from 0.08 to 0.45‰, and correlate with Ca/Ba, Z^-/Ba, and HCO_3^-/Ba, suggesting that dissolved $\delta^{137}Ba$ results from a binary mixing between Ba released by silicate weathering and by carbonates+gypsum dissolution. Moreover, the Mackenzie displays systematically higher $\delta^{137}Ba$ values than the Amazon. We discuss the following hypotheses to explain this difference: i) a difference in bedrock; ii) a possible additional effect of weathering intensity when bedrocks are similar.

[1] Cao, Z., Siebert, C., Hathorne, E. C., Dai, M., & Frank, M. (2016). *Earth and Planetary Science Letters*, *434*, 1-9.