

EGU2020-20226

<https://doi.org/10.5194/egusphere-egu2020-20226>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Offsets and inputs of natural uranium isotopes in the Mediterranean Sea

Evan Border¹, Norbert Frank¹, Pieter van Beek², Gideon Henderson³, and Joseph Tamborski^{2,4}

¹Institute of Environmental Physics, Heidelberg University, Heidelberg, Germany (eborder@iup.uni-heidelberg.de)

²LEGOS Observatoire Midi Pyrénées, Toulouse, France

³Department of Earth Sciences, University of Oxford, Oxford, UK

⁴Department of Marine Chemistry and Geochemistry, WHOI, Woods Hole, MA, USA

High precision measurements of natural uranium isotopes in the Atlantic Ocean, Mediterranean Sea, and Black Sea reveal isotopic makeups which differ significantly from the well-known oceanic composition. In the Mediterranean, water masses are strongly differentiated to the extent that they are able to be fingerprinted on the basis of $\delta^{234}\text{U}$. Mediterranean deep water masses show the highest enrichment, with an offset with respect to oceanic $\delta^{234}\text{U}$ values of just over 1 ‰. The Black Sea shows an even higher offset of up to ~40 ‰. This offset provides an opportunity to look into the as of yet largely unstudied uranium inputs to the Mediterranean, in particular rivers and submarine groundwater discharge (SGD), which are thought to play key roles in uranium input to the global ocean. A simple box model, incorporating the Mediterranean and Black Sea data from this study is constructed to provide a first estimate of the U concentration and $\delta^{234}\text{U}$ signature of rivers and SGD necessary for this offset to arise. These estimates are then compared with new measurements of various coastal and submarine springs from along the French Mediterranean Coast as well as with existing riverine data exists to speculate on which inputs may be most responsible for this offset.

How to cite: Border, E., Frank, N., van Beek, P., Henderson, G., and Tamborski, J.: Offsets and inputs of natural uranium isotopes in the Mediterranean Sea, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-20226, <https://doi.org/10.5194/egusphere-egu2020-20226>, 2020