An improved particle representation in ocean models by differential particle remineralisation rates, and its effect on Pa-231/Th-230

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Trace elements are used as tracers of ocean circulation and biogeochemical cycles in the oceans. They are removed from the water column by reversible scavenging onto particles. Insight into these processes is important for the transfer of matter in the ocean, including organic and inorganic carbon. The trace elements Th-230 and Pa-231 are especially useful as paleoproxies. Its ratio in the water column and in the sediments gives information on both adsorptive scavenging and ocean circulation.

Biogeochemical general circulation models are used to arrive at an integrated view of these processes. The biogeochemical model PISCES had been used to model Pa-231/Th-230, but the simulation needed an unrealistically strong scavenging [1] because of an underestimation of particle concentrations. For our study we use an updated version of PISCES [2] with an improved parameterisation of particle dynamics. To this end we used the so called « lability spectrum ». Instead of assuming a constant rate of remineralisation, this parameterisation uses a continuum of remineralisation rates, accounting for the whole spectrum from very reactive to refractory particles. We will present our first results with the lability spectrum. The particles will be compared with measurements from the recent U.S. GEOTRACES North Atlantic cruise [3]. The Th-230 and Pa-231 measurements from Hayes *et al*. [4] from the same cruise will be used as a comparison with the modelled concentrations.

[1] Dutay *et al*. (2009) *Geochem. Geophys. Geosyst.*, **10**, Q01011 [2] Aumont *et al*. (2015) *Geosci. Model Dev. Discussions*, **8(2),** 1375–1509 [3] Lam *et al*. (2015) *Deep-Sea Res. Pt* ***II***, in press [4] Hayes *et al*. (2015) *Deep-Sea Res. Pt* ***II***, in press