



## **231Pa / 230Th fractionation in the ocean by dust and Particulate Organic Matter (POM)**

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We combine particle fields (dust, biogenic opal, CaCO<sub>3</sub>, POM) derived from observations with the Bern3D intermediate complexity ocean model and an equilibrium-scavenging model for isotopes. The equilibrium partition coefficient for particulate versus dissolved isotope activity is varied with particle type. The model can explain many of the features of the global <sup>231</sup>Pu and <sup>230</sup>Th distribution. The success of such a simple model at representing the global pattern of <sup>231</sup>Pu / <sup>230</sup>Th activity ratio supports the use of this proxy in paleoceanographic studies. Remaining subtle discrepancies between the model output and observations show the need to better understand the effects of dust and POM on the oceanic fractionation of <sup>231</sup>Pu / <sup>230</sup>Th. Using the characteristic global distributions of POM and dust in our model we estimate their effects on the <sup>231</sup>Pu / <sup>230</sup>Th fractionation.