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Aeolian dust flux to the central equatorial Pacific during the Mid-Pleistocene Climate Transition

Gisela Winckler, Robert F. Anderson
Lamont-Doherty Earth Observatory, Columbia University, USA

Dust is one of the important variables in global climate change and probably the one whose potential influence is least understood. Mass accumulation rates of aeolian dust in ocean sediments provide an important climate record on different timescales. Helium isotopes can provide valuable information in this context. Helium-4 concentrations of marine sediments have been shown to be a promising measure of terrigeneous sediment contributions. The concentration of extraterrestrial Helium-3, delivered by interplanetary dust particles to the surface of the Earth, can be used to constrain the flux of various sedimentary components thereby avoiding potential complications due to sediment redistribution.

Here, we present a 1 million year record of helium isotopes for core TTN013-114 from the central equatorial Pacific (140W, 4N, 3700 water depth). We focus on the time interval from 560-800kyr largely coinciding with the Mid-Pleistocene Climate Transition (MPT) when the dominant period of the Earth's climate shifted from 41kyr to 100kyr. The Helium-4 concentrations from our study match very well with published titanium concentrations strongly supporting the use of Helium-4 as a monitor of continental dust. Normalizing Helium-4, titanium, and aluminum concentrations to Helium-3 suggests a significant reduction in the dust supply by approximately 30% during the MPT compared to the subsequent period (560-150 kyr). Helium-3 normalized barium, aluminum and phosphorus concentrations, trace elements with a predominantly biogenic source, are relatively constant indicating a relatively stable export productivity throughout the record. This is in contrast to previous studies that found an apparent increase in elemental ratios Ba/Ti, Al/Ti and P/Ti during the MPT at this site and – under the assumption of a constant dust (titanium) input - interpreted this as pronounced increase in productivity representing perhaps the largest biogeochemical response to climate change in the Pacific during the Pleistocene. Rather than a signif-

icant increase in productivity between 800 and 560kyr, we suggest that the dust flux was lowered and the export productivity was approximately constant.