^{230}Th inventories in new sediment cores from the eastern equatorial Pacific: Constraints on the ^{230}Th constant-flux proxy

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We have conducted an oceanographic survey in the eastern equatorial Pacific Ocean to assess the water and sedimentary budget of ^{230}Th along water flow paths into the Panama Basin. Our survey, along ~85°W, included bathymetric mapping, sub-bottom profiling, seismic reflection data acquisition, and collection of water and new sediment cores. Our goal is to address the controversy concerning the use of ^{230}Th activities as a constant-flux proxy in the Pacific Ocean. Proponents of the ^{230}Th technique maintain that sediment redistribution is widespread in the eastern equatorial Pacific and that the flux of laterally advected sediment can surpass the vertically rained flux by up to 2-4 times. Others suggest that there may be a discrepancy between the ^{230}Th flux and its rate of production which, in turn, causes accumulation rates to be underestimated due to potential lateral transport of ^{230}Th in the water column. The crux of the disagreement amounts to how one explains the larger-than-expected inventories of sedimentary ^{230}Th along the equator in the Pacific, inventories above those expected from a constant water column production rate.

The Carnegie gap region, bounding the southern border of the Panama Basin, is the main deep water flow path into the basin, and provides an ideal testing ground for investigating sediment advection. Our seismic and sub-bottom profiling surveys determined 'end-member' areas within this region with both thick and thin sediment cover, and several of these sites were multi- and piston-cored. The cores have been dated via radiocarbon and XRF-major-element correlation, which has enabled us to construct common stratigraphies in each survey region. A high-resolution assessment of a ^{230}Th deficit or excess from each end-member region (bathymetric highs versus lows; thin versus thick sediment piles) will be presented. The processes that control this distribution will be assessed in relation to the present-day ^{230}Th water column systematics, which we present elsewhere at this conference (Singh *et al.*).

Geochemistry of antigorite serpentinite and chlorite harzburgite from the Cerro del Almirez (S. Spain): Compositional constraints on fluids released by dehydration of mantle serpentinites

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In the Cerro del Almirez massif (Betic cordillera, S. Spain) hydrous antigorite (Atg)- serpentinite exceptionally records prograde dehydration to chlorite (Chl)- harzburgite under eclogite facies conditions (680-710°C and 1.6-1.9 GPa). Al_2O_3 contents of Atg-serpentinites and Chl-harzburgites match those of variable fertile mantle peridotites. SiO_2 is rather higher in some Atg-serpentinites than the values usually reported for oceanic peridotites, probably owing to normalization of the whole rock compositions after partial MgO loss during seafloor weathering.

The REE patterns of Atg-serpentinites are flat or LREE-depleted and show a negative anomaly in Eu. On the other hand, Chl-harzburgites have 'U-shaped' patterns enriched in LREE and HREE relative to MREE, or are depleted in LREE. Chl-harzburgites also show negative anomalies in Eu and their REE concentrations generally coincide with those of Atg-serpentinites except for lower abundances in MREE. The concentrations of lithophile trace elements are usually above 0.1 the values of the primitive mantle and well overlap those of abyssal peridotites from ocean ridges.

Chl-harzburgites have significantly higher Nb/La, Ta/La, Zr/Sm and Hf/Sm than precursor Atg-serpentinites. This indicates that fluids released during the formation of prograde Chl-harzburgites had complementary low Nb-Ta/LREE and Zr-Hf/MREE ratios. Zr and HREE concentrations of most Chl-harzburgites are similar to those of Atg-serpentinites, and these elements were hence effectively immobile during deserpentinization. The high Zr/Sm and Hf/Sm ratios of Chl-harzburgites are therefore due primarily to the preferential mobility of MREE into fluids. Additionally, Chl-harzburgites have also lower Ba/Th than Atg-serpentinites, consistently with the higher solubility of Ba in fluids compared to Th.