227Ac in the deep south Pacific along the Peru-Tahiti GEOTRACES transect

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227Ac (22 yr half-life) diffuses from sediment and is mixed vertically and horizontally as it decays, providing a distribution that can be used to infer transport rates for other solutes in the deep ocean. Profiles were collected during the fall of 2013 at 19 stations along the US Peru-Tahiti GEOTRACES transect by pumping water through acrylic cartridges impregnated with MnO2, to trap Ac, Th and Ra. Because extraction efficiency has been found to vary in past efforts, two cartridges were deployed in series to allow estimation of extraction efficiency for each sample.

Results indicate that: 1. Cartridge extraction efficiency for Ac and Th was usually 0.65-0.70, quite good given the high pump rate through the fibers (~6.5 L/min), although some cartridges were anomalously low. 2. Profiles showed an increase toward the bottom, from activities of ~0.3 dpm/m3 at 2000 m (close to 231Pa parent activity) to >0.9 dpm/m3 near the bottom. 3. Some isolated maxima appear near 2500 m, west of the East Pacific Rise, which probably represents modest input of Ac from hydrothermal sources. In addition to dissolved Ac, there is particulate Ac associated with the Fe rich neutrally buoyant plume particles.

Estimates of vertical mixing, based in part on assumptions of the parent 231Pa activity, indicate 1-D diffusivities of 4-27 cm2/s. Integrated excess 227Ac is ~3-10x lower than expected from 231Pa in sediments and predicted biodiffusivity. Additional work is in progress to complete measurements of 231Pa and to integrate these results with those from 228Ra distribution.