Dissolved, Particulate, and Sedimentary Th and Pa Isotopes on GP17

I am interested in collaborating to measure the long-lived U-series isotopes $^{230}$Th, $^{231}$Pa, and $^{232}$Th on the GP17 transect. My thesis work on measuring these isotopes in the South Pacific, from the northern end of the subtropics, through the heart of the subtropical gyre, and across the Antarctic Polar Front in the Southern Ocean. My main scientific objectives are as follows:

1) Determine the importance of advection, isopycnal diffusion, and scavenging in setting the local budgets of $^{230}$Th and $^{231}$Pa. My recent work has found that diffusion along upward-sloping isopycnals is critical for transporting both $^{230}$Th and $^{231}$Pa southward into the Pacific Southern Ocean. High-resolution meridional transects of Th and Pa will allow for quantifying this transport, and determining the importance of lateral processes in the 1-d mass budgets of $^{230}$Th and $^{231}$Pa. The results of objective 1) are critical for achieving objectives 2) and 3).

2) Quantify the input rates and removal rates of a wide range of dissolved and particulate TEIs along the entirety of the GP17 section using Th isotopes. This will require using the results of objective 1) to understand the complete mass budget of Th, particularly in the complex dynamics of the Southern Ocean.

3) Quantify the sedimentary burial rates of $^{230}$Th and $^{231}$Pa to better understand their paleoclimatic applications in both slow-accumulating gyre sediments and in fast-accumulating margin and polar sediments.

4) Using the estimates of TEI input rates from dust dissolution quantified in objective 2), parse the relative roles of dust input and release from reducing shelf sediments along the Chile Margin from for supplying redox-sensitive trace elements into the South Pacific and Southern Oceans.

These (and many other) goals can be achieved using 5L seawater samples from the ODF rosette, $\frac{1}{4}$ filter cuts from PES filters on the in-situ pumped particles, and surface sediments from the NIOZ monocorer. I hope to collaborate with other groups (e.g. Anderson, Edwards, Hayes) planning to measure Th and Pa isotopes on GP17.