Statement of interest – Claire Till

I am interested in obtaining filtered surface samples from the towed fish along the entire transect and analyzing them for a suite of dissolved trace metals: several elements that have recently been shown to be relevant to GEOTRACES goals (Sc, Y, La; *Parker* et al., 2016 and *Till* et al., in prep) and the GEOTRACES key elements (Fe, Mn, Cd, Co, Cu, Ni, Zn, Pb). I will also measure Ce and Ga.

I am also interested in obtaining water for a few full profile stations to use for intercalibration with Jessica Fitzsimmons. She and I plan to submit a proposal together where our two laboratories will serve as intercalibration for each other. She will interpret that data for the GEOTRACES key elements, and I will focus on Sc, Y and La.

Along the 2011 NAZT, Till et al. (in prep) found a strong (R^2=0.99) correlation between surface Y/Sc and La/Sc concentration ratios and the shape of the gyre. They propose that this correlation could be due to increased scavenging in the gyre boundaries and therefore preferential drawdown of Sc (relative to Y and La). In this case, Y/Sc and La/Sc ratios could be used as scavenging indicators, potentially of export production. And with an R^2 of 0.99, they have the potential to be good indicators.

We want to determine whether this same correlation exists in the North Pacific, which would help both constrain the potential indicator and determine whether the trend is widespread.

As this work investigates a potential scavenging indicator, it fits with the GEOTRACES goal of evaluating sinks and internal cycling of key elements. Scandium has been shown to be similar in distribution and reactivity to Fe (*Parker* et al, 2016), and therefore could be useful in tying down attributes of the Fe cycle. Furthermore, for the GEOTRACES goal of understanding how processes such as scavenging could change and impact the carbon cycle, additional scavenging indicators will be useful. Finally, as per the GP15-specific goal, we will directly compare the high productivity and oligotrophic regions, both in terms of the elements we measure and the degree of scavenging suggested by our potential indicator.

References:

Parker, C. E., M. T. Brown, and K. W. Bruland (2016), Scandium in the open ocean: A comparison with other group 3 trivalent metals, Geophys. Res. Lett., 43, 2758–2764, doi:10.1002/2016GL067827.

Till, C. T., R. U. Shelley, W. M. Landing, and K. W. Bruland (in prep), Dissolved scandium, yttrium and lanthanum in the surface waters of the North Atlantic: potential use as an indicator of scavenging intensity