



Dramatic changes in the dissolved ^{230}Th concentration of seawater in Canada Basin between 1995 and 2009: a transient Arctic circulation signal?

Roger Francois and Maureen Soon

University of British Columbia, Dept. Earth and Ocean Sciences, Vancouver, BC, Canada (rfrancois@eos.ubc.ca)

A dissolved ^{230}Th profile measured in the Arctic Ocean in 1983 under permanent ice cover (Alpha Ridge; $85^{\circ}50'\text{N}$, $108^{\circ}50'\text{W}$) documented concentrations substantially higher than in any other ocean basins, reflecting very low particle flux and scavenging intensity (Bacon et al., 1989). In contrast, similar measurements closer to the ice edge conducted in Canada Basin in 1995 ($72^{\circ}32'\text{N}$, $143^{\circ}50'\text{W}$, 3500 m) found much lower concentrations, reflecting higher rates of particle flux and particle scavenging (Edmonds et al, 1998). In November 2007, we measured dissolved ^{230}Th at two Canada Basin stations (KC2000; $71^{\circ}44'\text{N}$, $135^{\circ}30'\text{W}$, 1925m; KC2700; $72^{\circ}28'\text{N}$, $136^{\circ}56'\text{W}$, 2490m) and compared these profiles to that obtained in 1995. While the earlier ^{230}Th profile displayed a linear increase in concentration with depth, as predicted by a simple reversible absorption model which neglects water mass transport, the 2007 profile obtained at KC2700 documented very large deviations from linearity, with a prominent maximum centered within the Atlantic Water. The profile taken closer to the shelf (KC2000) did not show this feature. These observations suggested that the prominent maximum in ^{230}Th concentration at KC2700 could have been produced by entrainment of water from the permanently ice-covered Arctic interior into the warm Atlantic Water which is slowly penetrating into the eastern sector of Canada Basin and as such could provide information on the path of Atlantic Water intrusion. New data obtained from the same area in September 2009 during the Canadian IPY-GEOTRACES program documents the evolution of this signal.

Reference:

- Bacon et al. (1989), *Earth and Planet. Sci. Letters*, 95, 15-22.
Edmonds et al. (1998), *Science*, 280, 405-407.