

GEOTRACES

An Introduction to the GEOTRACES Programme

SCOPE:

GEOTRACES is an international marine chemistry programme. Its goal is:

To identify processes and quantify fluxes that control the distributions of key trace elements and isotopes in the ocean, and to establish the sensitivity of these distributions to changing environmental conditions

“Key trace elements and isotopes” are those that are:

- o micronutrients essential to life in the ocean (e.g. Fe, Zn, Cd, Cu, Co)
- o tracers of modern processes in the ocean (e.g. Al, Mn, $\delta^{15}\text{N}$, Ra isotopes)
- o significantly perturbed by human activities (e.g. Pb, Hg, Sn)
- o used as proxies to reconstruct the past (e.g. ^{231}Pa , ^{230}Th , $\delta^{13}\text{C}$, $\delta^{30}\text{Si}$, Nd isotopes)

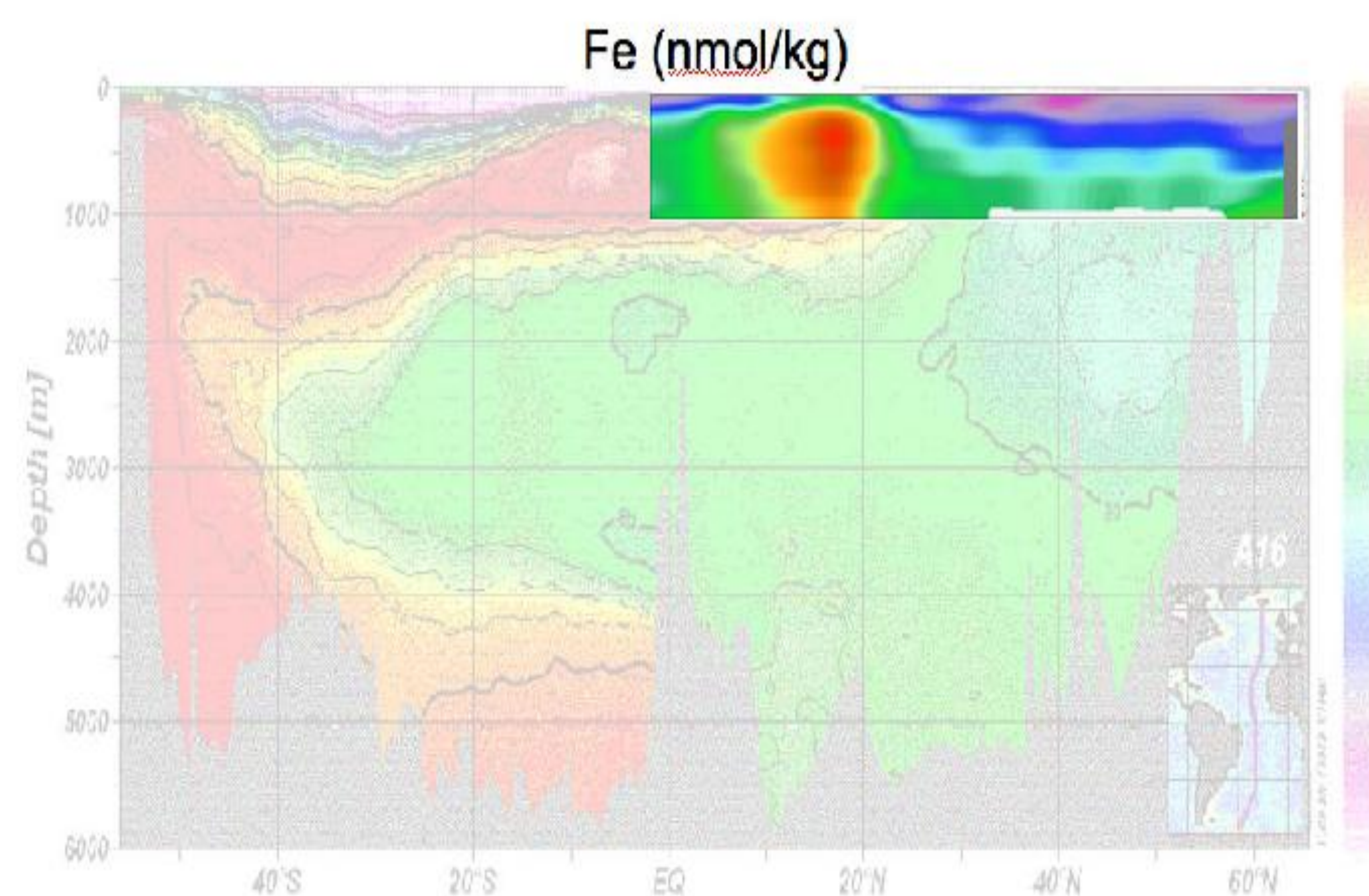
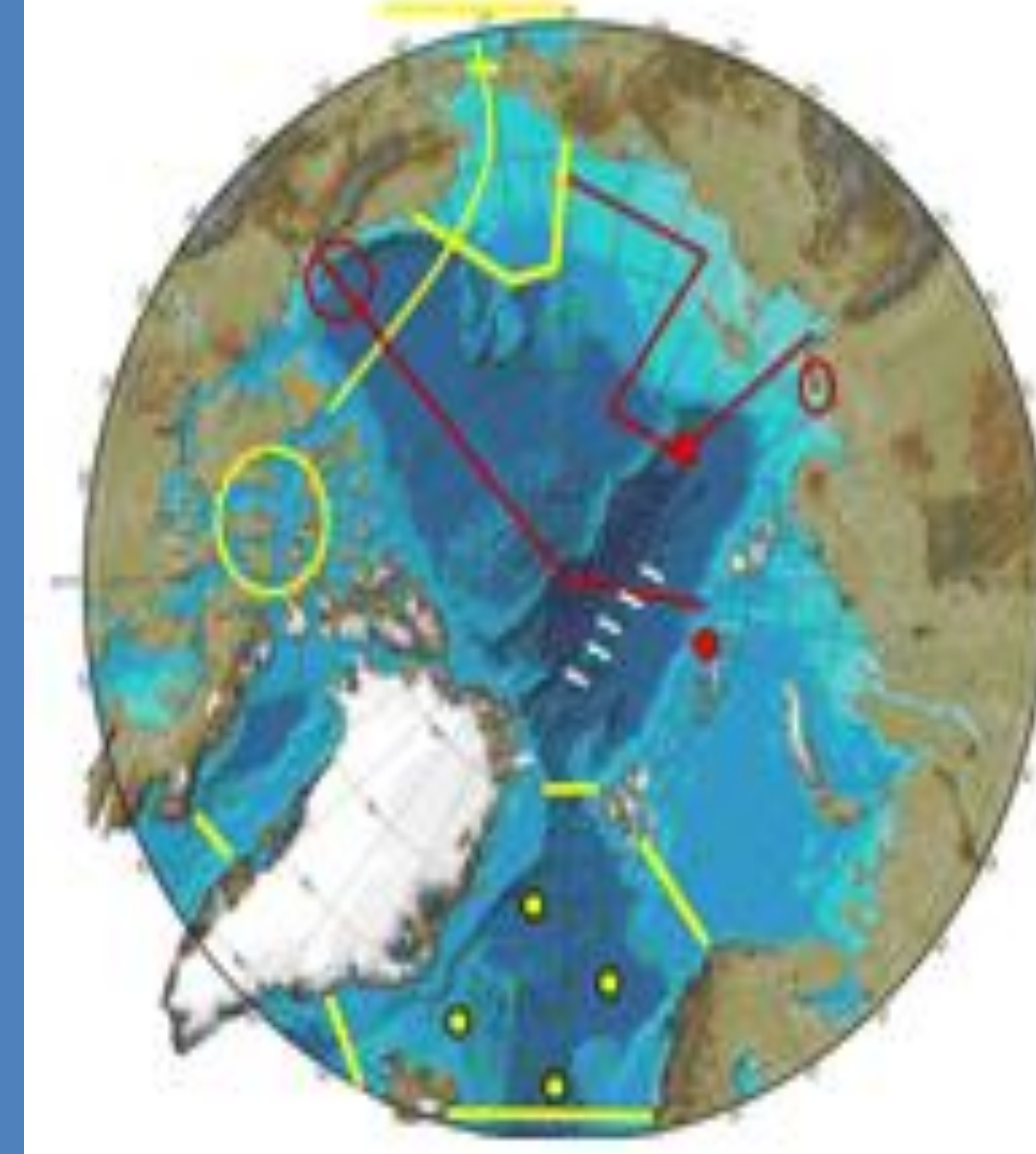


Figure 1: Phosphate data from WOCE line A16 (faint back-ground) illustrates the power of ocean sections to provide information about ocean chemical cycling. Such data has established our basic understanding of the pattern and cycling of macronutrients. Data for micronutrients is much sparser, particularly in the deep ocean. The bold data in the shallow North Atlantic is the first published high-resolution section of Fe concentrations (Measures and Landing, 2008) and demonstrates the richness of information in micronutrient distributions. By extending such information to the global ocean, GEOTRACES will transform our understanding of the cycling of micronutrients, of great relevance for IMBER. GEOTRACES will play a similarly important role in understanding pollutant cycles, and the tracers used to assess past and present ocean processes.

Arctic Planning:

1. **GEOTRACES Arctic Cruise Planning Meeting June 2009, Delmenhorst, Germany:**



Summary map of recommended Arctic sections and process studies

2. **US Arctic GEOTRACES Workshop! Washington D.C, Sept 29-Oct 1, 2010**

Goal: To establish collaborative US-International Arctic studies

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Interactions with other programs

IMBER-mutual interest in micronutrients

SOLAS-impacts of atmospheric inputs on ocean chemistry

IPY- The first GEOTRACES sections were operated in the Southern and Arctic Oceans

GEOTRACES Sections

- Three international workshops in 1997 identified ~35 sections in the Atlantic, Pacific and Indian Oceans. Fifteen nations plan to stage expeditions

- Arctic Planning underway