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International Polar Year GEOTRACES: An international study of the biogeochemical cycles of trace elements and isotopes in the Arctic and Southern Oceans

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Trace elements and their isotopes play an important role in oceanography as participants in, and as tracers of, processes of fundamental interest. Some trace elements (e.g., Fe, Co, Zn) serve as essential micronutrients, the availability of which influences the physiological state and biochemical activity of marine organisms. This, in turn, controls the structure of ocean ecosystems and their biological productivity. For example, Fe is the key limiting trace nutrient in the Southern Ocean. Moreover several natural stable and radio- isotopes in the oceans serve as tracers of specific ocean processes like mixing, biogenic export, or adsorption. Quantification of such processes is feasible via mass fractionation or decay rate of the selected isotope. In context of worldwide GEOTRACES, scientists of 19 nations are developing an intensive observation program during the International Polar Year to detect and understand a suite of trace elements and isotopes in the Arctic and Antarctic marine environment.