



## **A small-diameter CTD-Rosette for sampling through sea ice**

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Some polar regions are difficult to sample from ships or ice breakers because of thick multiyear ice ridges. These regions are accessible by aircraft, submarines and drifting ice camps. However these working environments preclude the use of large CTD-Rosette systems typically used in oceanographic research. We have developed a lightweight vertical CTD-Rosette that can be deployed through a 12-inch hole in sea ice. The rosette is modular, consisting of one CTD module and multiple water sampling modules. The CTD module includes a SeaBird 19 plus CTD with a SBE 43 Dissolved Oxygen sensor and a modified SeaBird rosette controller. Each water-sampling module has four 4-liter bottles and the associated release mechanism for each bottle. The modules are about 1 m high and 27.9 cm (11 inches) in diameter. The CTD module is attached to the end of the conducting cable and one, two or three water-sampling modules are attached above it. The modified rosette controller and cabling between the water sampling modules and the CTD module enable selective closing of each sampler by command from the surface. Temperature, salinity, and oxygen are acquired in real time and displayed on a laptop computer and bottles are tripped on the up cast as in a typical CTD-Rosette cast. At the completion of a station, each module is placed in an insulated container to prevent heating or freezing and the modules are returned to a base camp for sampling of a variety of substances under well-controlled conditions. The system has been used from Twin Otter aircraft on the Switchyard project, which is part of SEARCH (Study of Environmental Arctic Change) and coordinated with the North Pole Environmental Observatory program. It has provided high quality data for salinity, oxygen, nutrients, CFCs, helium isotopes, oxygen isotopes, barium,

and I-129, demonstrating its capability of collecting high quality water samples for a variety of measurements.