DEEP FREEZE 73 OPERATIONS

GLACIER's operations began on 15 November 1973 when she sailed from Long Beach, for even during the transit to Tahiti and New Zealand, water and air samples were being gathered by a team of scientists from the Naval Research Laboratory. Among the results was the interesting thesis that the oceans are a source of carbon dioxide to such an extent as to imply that industrial and automotive production of carbon dioxide is only a miniscule contribution compared to that produced by the oceans.

Upon reaching New Zealand the ship came under the control of the Commander of United States Naval Support Forces, Antartica, and as her first task in the new status transported two scientists to the U.S. Research Station at Hallett Peninsula, in the Ross Sea near Antartica's perimeter. Hallett Station is located in the midst of the largest penguin rookeries in the world.

Moving south to McMurdo Sound, the two days before Christmas saw the ship in the company of **USCGC NORTHWIND,** carving her way through the last sixty miles of ice separating McMurdo Station from the open waters of the Ross Sea.

The station is located on Ross Island, near the edge of the vast ice shelf which fills the southernmost basin of the Ross Sea. It is run by the U.S. Navy to support scientific research activities both in the Ross Sea and throughout Antartica.

Upon completing the channel breaking, it was necessary to keep the broken ice from refreezing while waiting for a southerly wind to blow the channel free of ice. To this end, the days between Christmas and departure on December 29th were spent moving up and down the final nine miles of the channel to keep the ice fluid.

On December 29th, the channel was left to **NORTHWIND** as **GLACIER** sailed for Punta Arenas to meet the scientific party for the Weddell Sea operations. The researchers were sixteen in number and hailed from places as diverse as Scripps Institute of Oceanography, Oregon State University, The University of Bergen, Norway, and the University of Ottawa, Canada. Their interests were many and required a number of services from the ship.

Starting south on a line across the eastern part of the Weddell Sea, the Scripps' team placed a series of nine current meters with the intent that these might help them determine the original source and ultimate destination of Weddell Sea bottom water. Also along this line, they began a series of 96 oceanographic stations which involved temperature, salinity, and chemical analysis of the Weddell Sea water column. The information from these measurements will supplement the current meter data to complete the information needed to understand the water flow pattern in the Weddell Sea. Since the water from the Weddell Sea provides the bottom water for most of the Atlantic Ocean, the knowledge they gain will have important consequences.

The Oregon State team took water property measurements by lowering instruments from the ship's helicopters to obtain data on heat layering phenomenon in the subsurface waters. The helicopters also broadened the range of bird observations made by the Canadian team. By the combination of icebreaker and helicopter, they were able to observe birds in locations previously inaccessible to humans.

The University of Bergen team had a two-fold mission. The first was to determine if the presence of ice at great depths, which occurs only at the face of an ice shelf, will produce ice crystal formation below the surface. This study was accomplished while the ship was moored to a sheet of sea ice frozen to the edge of the Filchner Ice Shelf, the southern boundary of the Weddell Sea.

The second mission hinged on the fact that this same group of researchers had come to the Weddell Sea in 1968 aboard **GLACIER** and had placed four current meters near 74-00 degrees South latitude and 40-00 degrees West longitude in 2000 feet of water. Efforts to recover these devices in subsequent years had been thwarted by heavy ice in the area. This year, the ship approached the current meter site to make one last attempt at recovery before the devices were to be abandoned altogether. Fortunately ice conditions were very favorable and **GLACIER** arrived to find calm, ice free waters, and almost perfect conditions to conduct dragging operations which would be necessary to recover the instruments. The drag lines finally hooked onto two of the four current meters after thirty hours of dragging making the operation a success.

GLACIER's Antartic operations were concluded by the recovery of seven of the nine Scripps current meters which were set upon arrival in the Weddell Sea and a final bird study foray to the South Orkney Islands on her way out of Antartic waters. By the 1st of March **GLACIER** had completed her assigned missions and was headed for Valparaiso, some well deserved liberty, and eventually home.