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CHANGES IN FLOE SIZE DISTRIBUTION IN THE WEDDELL SEA DURING NOVEMBER-DECEMBER 2004

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The Ice Station Polarstern (ISPOL) was a drifting ice station experiment in the western Weddell Sea during November and December 2004. The objectives of the program were to observe changes in the physical and biological properties of the sea ice in this region during the onset of the summer melt season. Air temperature during the study period was very mild, averaging only a few degrees below zero, with generally light, although cyclical, winds.

An array of Langrangian drifting buoys was established in the multi-year ice zone in a triangle approximately 70 km along each side. The relative buoy locations provide information on the dynamic nature of the pack ice during the study period and show regions and periods of convergence and divergence. The differential movement of the ice floes can result in changes in the open water fraction of the pack ice and the size and shape distribution of the floes. To monitor this we conducted an aerial photography program around the edge of the buoy array on three occasions, using a downward-looking digital camera mounted on the skid of a helicopter from an altitude of 5000 feet. The sequential images have been processed using purpose-designed software to determine the open water fraction and floe size distribution. The technique is based on an erosion/propagation technique to separate floes, and determining floe sizes by area using the number of pixels assigned to each floe.

The results show that during the experiment there was a significant decrease in floe size distribution. A number of dynamic and thermodynamic factors were the cause of this, including the nett divergence of the pack and an increase in surface melting. The relative importance of these will be presented.