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SEISMIC STUDIES OF THE AMERY ICE SHELF, EAST ANTARCTICA

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The initial aim of the research, beginning in the 02/03 season, was to undertake some regional mapping of the ice shelf, and to determine if marine ice could be differentiated from meteoric ice employing the seismic technique. In 2002/2003, regional surveys were completed every 10 km along the north-south line running down the centre of the AIS. A 50 km perpendicular line was carried out across the centre of the north-south line, and a 1 km detailed seismic reflection line was carried out just north of this intersection. The resulting seismic section showed two distinct reflections around the ice-water boundary, which delineated a ~20 m thick marine ice layer. The 03/04 season extended the coverage of regional data and a second detailed line was completed.

In the 04/05 season, not only was regional mapping continued, as well as a 3km detailed survey across a flowline, the scope of the project was extended to include research into deformation and fracturing of the AIS. The major aim of the research was to ascertain whether the ice showed anisotropic properties, i.e. whether strain along stream margins had led to a realignment of ice particles, causing a difference in seismic ice velocity between the direction of flow propagation compared to the normal to the flow direction. The anisotropy surveys completed were undertaken over flowline margins, as picked from Landsat images. Surveys were undertaken in sets of three, one survey spot in the middle of the “strained” area (i.e. on the flowline) and two spots either side of the flowline, approximately 1-2 km from the centre spot. This distance was used so as to be outside any influence of where strain had occurred, resulting in what we hoped to be measurable difference in seismic velocity, with central anisotropic ice, and isotropic ice to either side. Processing is still being done on data obtained during 04/05, and results so far are inconclusive as to whether the seismic velocity variations are great enough to be outside the error margin. During the 05/06 season, surveys will be completed across high strain regions closer to the edge of the ice shelf near Gillock Island.