



Arctic sea ice thickness and topography in winter 2007 mapped from a submarine

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In March 2007 the UK submarine, HMS “Tireless”, equipped with a Kongsberg EM3002 multibeam sonar which generates a 3-D digital terrain map of the ice underside, undertook a transect of the Arctic Ocean from Fram Strait to the Beaufort Sea. The multibeam sonar generated data along a swath of average width 100 m showing the shapes, orientation and block structure of ridges as well as the difference in critical statistical parameters between first- and multi-year ice undersides. The data were supplemented by a narrow-beam upward sonar profile which can be matched against similar profiles collected by UK submarines in recent years (e.g. 1987, 1996, 2004) to detect thinning rates. In this paper we report on results from the comparisons of the upward sonar and show examples of under-ice topography recorded by the multibeam sonar.