range of temperatures encountered during the survey. Here, the performance has been measured for ten commonly used survey transducers versus water temperature ranging from 1 to 18 °C, using four different techniques. Temperature-dependent system gain corrections are proposed that can be used to minimize bias in multifrequency target identifications and biomass estimations. [Funding was provided by the NMFS Advanced Sampling Technology Working Group.]

2:05

1pAOa5. Calibrating split beam transducers at depth. Egil Ona and Geir Pedersen (Inst. of Marine Res., P.O. Box 1870, 5817, Bergen, Norway)

A new echo sounder probe for target strength measurements in deep water have been used to calibrate the depth performance of several pressure-stabilized split beam transducers. The probe carries three Simrad EK60 echo sounders and can be operated on 6500 m optical cable to about 1500-m depth. The transducers are mounted on a motorized, revolving platform. Digital angle sensors monitor transducer orientation, and an electronic compass also monitors transducer rotation. Calibration includes standard sensitivity parameters for split beam transducers, but also the equivalent beam angle and angle sensitivity at different depths. Examples of target strength data on marine animals will also be shown.

2:20

1pAOa6. Standard-target calibration of active sonars used to quantify aquatic organisms. Kenneth G. Foote (Woods Hole Oceanogr. Inst., Woods Hole, MA 02543)

The span of sonars being calibrated by the standard-target method continues to grow. In this retrospective of the past 25 years, the essence of the method is reviewed for both narrow-band and broadband systems. Applications to scientific echo sounders with operating frequencies from 18 kHz to 3.2 MHz are summarized. Applications to multibeam sonars that provide the water-column signal, with frequencies of 90, 200, 240, and 400 kHz, are also summarized. A planned application to a parametric sonar, with primary frequencies in the range 15–21 kHz and difference-frequency band 0.5–6 kHz, is described. The method is applicable to ordinary midfrequency sonars. In each example, particular standard targets are specified. Diameters vary from 10 mm for a sphere of tungsten carbide with 6% cobalt binder for use at low megahertz frequencies, to 60 mm for a sphere of electrolytic-grade copper for use at 38 kHz, to 280 mm for a sphere of aluminum alloy for use at low-kilohertz frequencies.

2:35

1pAOa7. New scientific multibeam systems (ME70 and MS70) for fishery research applications. Lars Nonboe Andersen, Sverre Berg, Ole Bernt Gammelster, and Even Borten Lunde (Simrad AS, P.O. Box 111, 3191 Horten, Norway, fish_research@simrad.com)

Fishery scientists have for many years been requesting calibrated multibeam systems specially designed for fishery research applications. Simrad AS, Norway, has, in cooperation with IFREMER, France, developed a new multibeam echo sounder (ME70) and with IMR, Norway, a new multibeam sonar (MS70) for fishery research applications. Both systems have 800 transmitting and receiving channels and are based on similar hardware and software platforms. The systems are characterized by calibrated narrow beams, low sidelobe levels, high instantaneous dynamic range, and operate in the frequency range 70–120 kHz. The echo sounder is designed for high operating flexibility, with a configurable fan of 1–45 roll/pitch stabilized split beams with opening angles ~2 to ~7. In addition, two configurable reference beams are available for comparison with standard echo sounder systems. The sonar is mounted on a drop keel, looking horizontally, covering a horizontal sector of 60 and a vertical sector of 45. This coverage matrix is generated using 500 roll stabilized beams, 25 beams horizontally with a resolution of ~3, and 20 beams vertically with a resolution of ~4. Both systems are designed for fish-stock assessment and fish-behavior studies. Results from system measurements will be presented.

2:50–3:10 Break

Invited Papers

3:10

1pAOa8. First results with the new scientific multibeam echo-sounder ME70. Verena Trenkel (Ifremer Ctr. de Nantes, BP 21105 44311, Nantes Cedex 03, France), Valerie Mazauric, and Laurent Berger (Ifremer Ctr. de Brest, Plouzane, France)

Multibeam echo-sounders and sonars are increasingly used in fisheries acoustics for studying school structure and behavior and for abundance estimation. However, data quality and a poor signal-to-noise ratio obtained with the existing multibeam echo-sounders preclude quantitative biomass estimation as carried out with the traditional single beam echo-sounders. In order to overcome these shortcomings, Ifremer and Simrad AS started in 2003 the development of the new and highly flexible calibrated multibeam echo-sounder ME70 designed for studying a wide range of scientific questions. This paper will present the full functionalities of the ME70 and preliminary results obtained with the system installed onboard the research vessel *Thalassa*. It will also provide first indications of its performance. Data have been collected on small pelagic fish species in the bay of Biscay, using simultaneously the traditional single beam echo-sounders and the ME70 with different beam configurations. Preliminary comparisons of fish school descriptors and biomass estimates based on single- and multibeam data allow us to quantify the effect of the gain in sampling coverage and the high angular resolution of the new system.

3:30

1pAOa9. First data from sea trials with the new MS70 multibeam sonar. Egil Ona, John Dalen, Hans Petter Knudsen, Ruben Patel (Inst. of Marine Res., P.O. Box 1870, 5817 Bergen, Norway), Lars Nonboe Andersen, and Sverre Berg (Simrad A/S, 3191, Horten, Norway)

The new multi-beam sonar, MS70, is a horizontally observing sonar yielding very high spatial resolution when operating all 500 beams, covering the frequency band 75–112 kHz. The sonar has undergone sea trials from *R/V G. O. Sars* from December 2005. The presentation includes preliminary results obtained during this period. Topics covered will be sonar performance objectives, calibration methods, and preliminary results from calibration and school data acquisition. Examples of raw and processed 3-D and 4-D data from a stationary and surveying vessel on small sprat schools and large herring schools will be shown.