Geophysical Research Abstracts, Vol. 8, 08935, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08935

Enlisting marine mammals as oceanographic explorers: unique CTD profilers for IPY

M. Fedak (1), P. Lovell (1), J. Nicholson (2), M. Biuw (1), L. Bohme (1) and K. Kovacs (3)

(1) NERC Sea Mammal Research Unit (SMRU), University of St Andrews, KY16 8LB, U.K. (maf3@st-and.ac.uk)

(2) Valeport Ltd, St Peter's Quay, Totnes, Devon TQ9 5EW, UK

(3) Norwegian Polar Institute, Polar Environmental Centre, N-9296 Tromsø, Norway

The requirements for polar oceanographic data are expanding rapidly with demands increasing for higher spatial and temporal resolution and also for near real-time monitoring of ocean processes. The IPY will add challenges to ocean observation with its emphasis on under sampled, logistically difficult Polar Regions. Recent developments in sampling and data retrieval devices and improved knowledge of marine mammal behaviour have provided a new approach for ocean observation. The SMRU have developed Satellite Relayed Data Loggers (SRDLs) with integrated CTD. These are attached to marine mammals that move freely throughout the polar oceans diving repeatedly, even in regions of heavy ice cover. Because of their unique diving abilities, seals can provide CTD profiles to depths to 2000 m. The SRDL carries specially designed sensors (Valeport Ltd) that use a PRT for temperature and an inductive cell for conductivity measurements. When user-specified conditions of time and depth are met, the SRDL's software responds by detecting the deepest point of a dive, and then initiating rapid sampling of temperature, conductivity and depth throughout the ascent. A combination of predefined depths and inflection points from a "broken stick" algorithm are then used to provide 20 depth-temperature-conductivity points, which are relayed and located using System Argos. Concurrent records of dive times, depth profiles and swim speeds are also sent, providing detailed records of the animals' behaviour.

The recent SeaOS project (Southern Elephant seals as Oceanographic Samplers-

http://www.smru.st-and.ac.uk/research/SEaOS/SEaOS.htm) brought together oceanographers and biologists from France, Australia, US and UK to demonstrate the feasibility of this approach. Between 2003 and 2005, SEaOS tracked elephant seals from Macquarie, Kerguelen, South Georgia and the Antarctic Peninsula throughout their winter migrations. The seals ranged widely across the entire Southern Ocean, collectively circling the globe. Each animal relayed data for an average 160 (max 315) days (10276 seal days at sea), providing cross-sectional samples along and across the main circum-Antarctic fronts and water masses. We also obtained long temporal series in the seals' chosen foraging areas, ranging from the Subtropical Convergences down to areas deep within the marginal ice zone. The seals have contributed extensive oceanographic temperature and salinity data from places and seasons that were previously extremely data sparse, while simultaneously providing new insights into how the seals utilize their deep ocean environment.

The multinational IPY project, MEOP (Marine Mammal Exploration of the Oceans Pole to Pole) proposes to apply this approach during 2007/08. Thanks to these technological developments in data collection, storage and communication, the "50th anniversary celebration" of the IGY will have the polar animals themselves as part of the exploratory team and synergistically combine oceanographic and biological studies