MEETING

Monitoring the Antarctic Circumpolar Current in the Drake Passage

Oceanography in Drake Passage: Wherefrom, Whereto and What in Between? Liverpool, United Kingdom, 26–27 October 2009

PAGE 135

The Antarctic Circumpolar Current (ACC), the world's largest oceanic flow (~135 million cubic meters per second), is an important component of the ocean climate, as it connects the three major oceanic basins. Deep Atlantic water upwells between the ACC and Antarctica and returns to the Atlantic, thus contributing to the closure of the global overturning circulation.

The Drake Passage, between the southern tip of South America and Antarctica, is the region where the ACC is most constricted by landmasses and, owing to its narrowness, is the most convenient place to monitor the ACC. The Drake Passage also has considerable oceanographic interest because it lies along the cold, returning route of the global overturning circulation and is a region of strong deepwater mixing.

One of the longest oceanographic time series in the Drake Passage is the ongoing record of bottom pressures collected by the National Oceanography Centre (NOC) and the British Antarctic Survey (BAS). This time series provides invaluable information about the dynamics and variability of the ACC. To celebrate the 21st anniversary of the first deployment of bottom pressure recorders in the Drake Passage by NOC and BAS, a workshop held at NOC and funded by the United Kingdom's Strategic Ocean Funding Initiative brought together specialists from the United States, France, and the United Kingdom to discuss research in the area. The workshop program, list of participants, and presentation summaries can be found at http://www.pol.ac.uk/home/news/2009-11DrakePassageWorkshop.html.

One of the most important results of the past 20 years of ACC observations is that its transport varies remarkably little on interannual time scales. Why, then, should monitoring be continued? Workshop participants agreed that without complete understanding of the mechanisms that stabilize the current, scientists cannot know whether future large ACC changes are possible, so it is important that observations be continued. In addition, it would seem ill advised to halt monitoring at a time when global changes are pushing the ocean climate away from its preindustrial regime.

Participants acknowledged that ACC transport monitoring requires sustained measurement of sea level and bottom pressure at least at hourly intervals but noted the strong value of repeat hydrographic sections. These measurements are routinely undertaken by NOC and BAS and also less frequently by Spanish, German, and Russian groups. Participants also described projects of shorter duration, such as the American "cDrake" (http://tryfan.ucsd.edu/cpies/cpies.htm) and the French "Drake 2006–2009" (http://drake-ipy.ipsl.jussieu.fr/), which afford more comprehensive measurements, especially of currents and tracer distributions, but provide less information on interannual variability.

There was a consensus that annual hydrographic and sea level observations should be sustained and augmented with routine measurements of geochemical components, especially carbon dioxide, given ongoing climatic change and global ocean acidification. It is expected that some of these future observations will be carried out using autonomous devices (e.g., Argo floats and gliders) and marine mammals and will be used for model validation, assimilation, and operational forecast.

The workshop highlighted the existence of a strong Drake Passage research community, albeit a loosely organized one. There is, however, an aspiration toward a higher level of coordination, perhaps under the umbrella of an international Drake Passage observatory, starting with the creation of a unified portal for the wealth of data collected in the past few decades. Scientists interested in contributing to such an observatory or in analyzing the resulting data sets are encouraged to contact the authors of this report.

—MIGUEL ANGEL MORALES MAQUEDA, National Oceanography Centre, Natural Environment Research Council, Liverpool, UK; E-mail: mamm@pol.ac.uk; KAREN J. HEYWOOD, School of Environmental Sciences, University of East Anglia, Norwich, UK; and MICHAEL P. MEREDITH, British Antarctic Survey, Natural Environment Research Council, Cambridge, UK