Seagliders in a multi-purpose acoustic network in the Fram Strait

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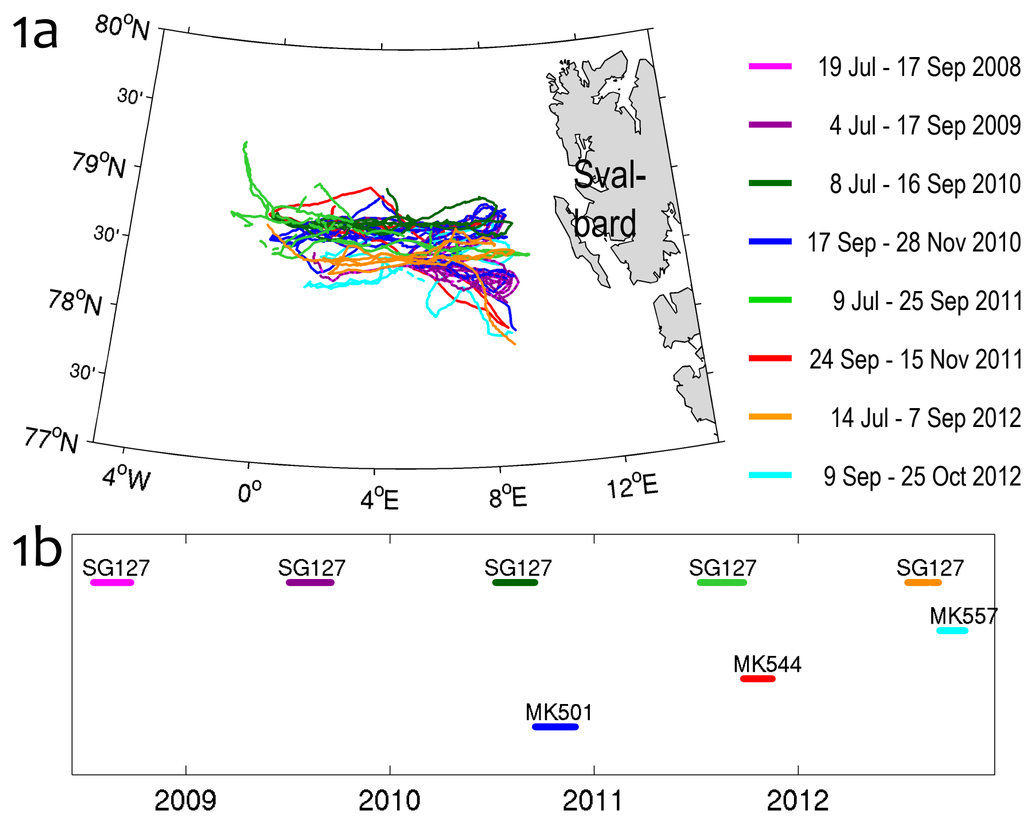

Figure 1. (a) Map and (b) time line showing coverage of Seaglider data from the Fram Strait used in this study.

Introduction: UNDER-ICE

The project 'Arctic Ocean under Melting Ice' (UNDER-ICE), running from 2014 to 2017, aims to improve our knowledge of ocean circulation, water mass distribution, fluxes, mixing processes, sea ice processes, and net community primary production in the Fram Strait, the deepest gateway to the Arctic Ocean. A multi-purpose acoustic system combined with oceanographic instrumentation will be deployed in the Fram Strait in September 2014.

Acoustic tomography data from an earlier project showed strong temperature variability on time scales associated with the oceanic mesoscale. In the present study we use four years of Seaglider data to investigate mesoscale eddies and meanders along the frontal zone in the Fram Strait with a view to augmenting the analysis of acoustic thermometry data.

Data: ACOBAR Seagliders

In an earlier project, ACOBAR, a multi-purpose system for acoustic thermometry, low-frequency passive acoustics, and glider navigation was deployed in the Fram Strait for two years.

Here we use Seaglider data collected in the Fram Strait from 2008 to 2012 as part of the ACOBAR project. The gliders, operated by the Alfred Wegener Institute, repeated a roughly zonal section along 79°N, profiling down to 1000 m.

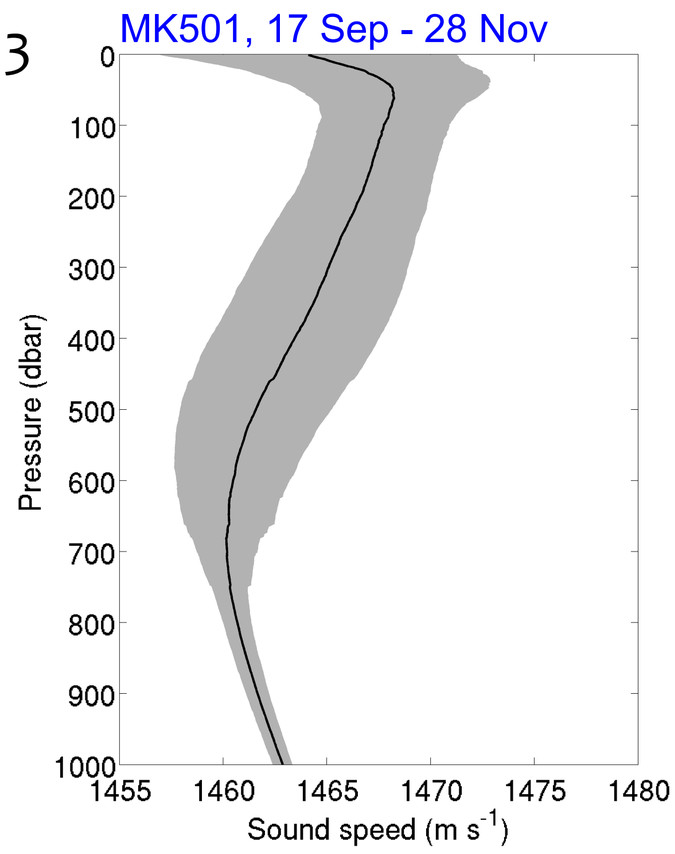

Figure 3. Vertical sound speed profile in the upper 1000 m, mean over the whole MK501 glider mission in Sep-Nov 2010 (black line). The shaded area shows ± 1 standard deviation.

Preliminary results

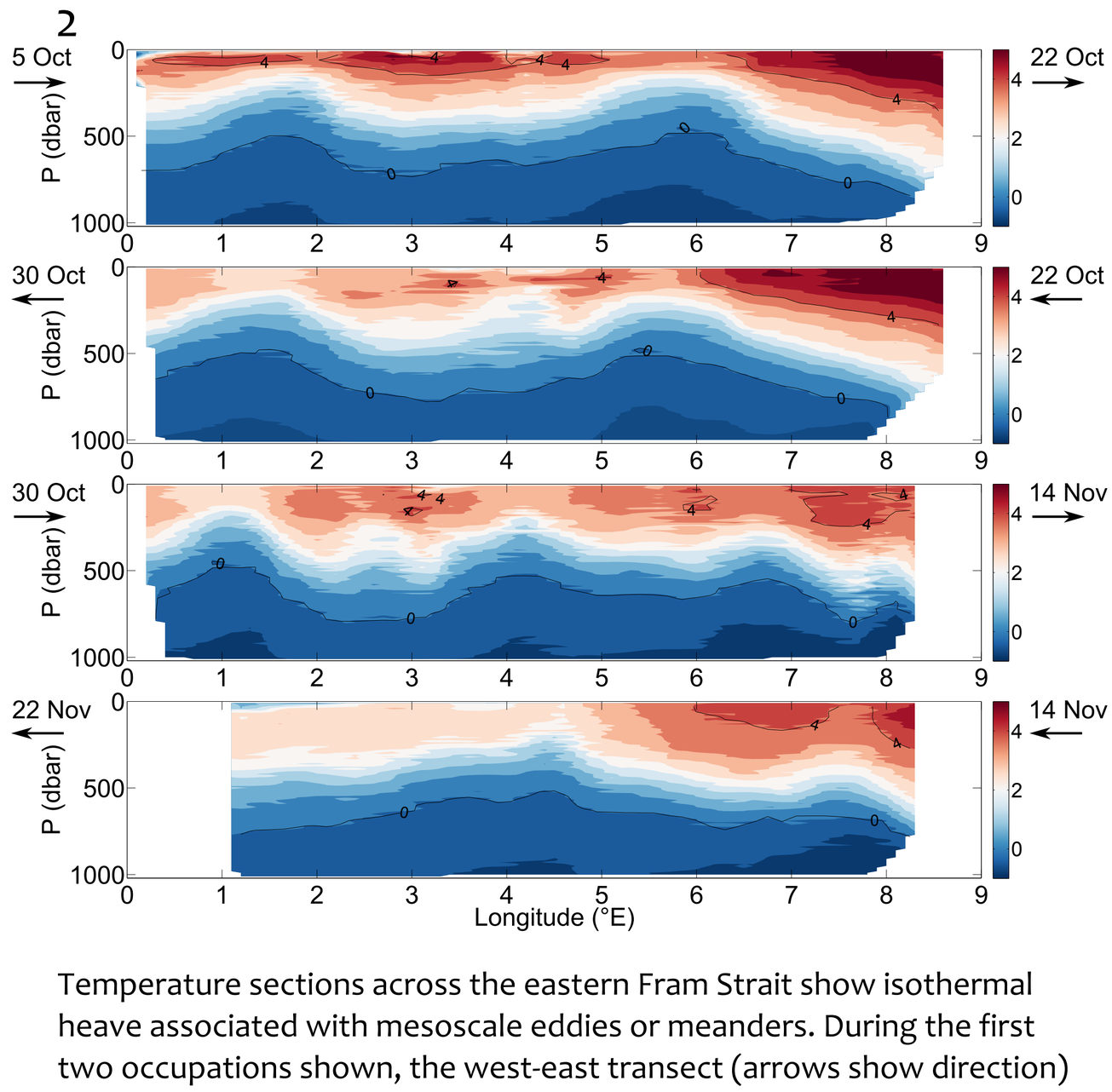

Figure 2. Temperature contours (0.5°C intervals; 0° and 4° C isotherms in black) from four successive quasi-zonal transects in the Fram Strait in 2010.

Temperature sections across the eastern Fram Strait show isothermal heave associated with mesoscale eddies or meanders. During the first two occupations shown, the west-east transect (arrows show direction) of 5-22 Oct and the return transect of 22-30 Oct, the thermal structure was similar, suggesting that eddies were rather stationary over this period. Several more small-scale features appeared in the next transect.

Summary

Gliders can be a useful complement to acoustic thermometry. They supply the information with high spatial resolution that we need in order to better understand the mesoscale variability in the Fram Strait and its effect on the acoustic field.

Acknowledgements

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