Citation:

Dong, S., **M. O. Baringer**, **G. J. Goni**, **C. S. Meinen**, and **S. L. Garzoli,** 2014: Seasonal variations in the South Atlantic Meridional Overturning Circulation from observations and numerical models, *Geophys. Res. Lett*., 41, 4611-4618, doi:10.1002/2014GL060428.

Justification text:

The Atlantic MOC was identified as a near-term research priority by the Joint Subcommittee on Ocean Science and Technology in 2007. Interest in the Atlantic MOC has been steadily increasing over the last decade or so. However, majority of the observational and modeling efforts have been focused on the North Atlantic. The AOML XBT network through its AX18 transect, which runs between Cape Town and Buenos Aires, is the first sustained monitoring system, now in place for 12 years, for the South Atlantic MOC (SAMOC). This XBT transect provides estimates of the SAMOC and Meridional Heat Transport on a quarterly basis, which has provided critical information for SAMOC characterization and assessing climate numerical models.

Our previous studies have found that both the geostrophic and Ekman transports contribute equally to the SAMOC on seasonal scales. However, numerical models are unable to reproduce the significant seasonal variations in the geostrophic transport as observed by XBTs, where the seasonality in the modeled SAMOC is dominated by the Ekman transport. In this work, monthly climatologies of temperature and salinity from observations and numerical models (NCAR CCSM4 and GFDL ESM2M) are used to estimate the SAMOC at 34°S. The seasonality of the geostrophic transport from observations is largely controlled by the seasonal density variations at the western boundary. However, in the models the eastern boundary dominates. The observed density seasonality at the western boundary is linked to the intensity of the Malvinas Current, which is poorly reproduced in the models. Results presented in this work indicate that the weak seasonal cycle in the model geostrophic transport can primarily be attributed to excessively strong baroclinicity below the surface mixed layer, whereas the observations show a strong vertical coherence in the velocity down to 1200 m.

Results, such as the ones presented in this work, highlights the importance of the contribution of AOML to the global ocean observing system for climate studies.