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CGD Seminar Series

Conditioning of Vertical Mixing and Heat Flux by a Front in the Brazil-Falkland Confluence

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Time: 11am – 12pm

For Zoom information, please contact Tracy Baker tbaker@ucar.edu

For live stream information, visit the CGD Seminar Webpage

ABSTRACT

The southwest Atlantic Ocean is one of the most energetic frontal systems in the world's oceans. Two near-surface currents dominate its circulation: southward flowing warm Brazil Current, and northward flowing cold Falklands (Malvinas) Current. These currents meet and form the Brazil-Falklands Confluence where intense mixing between the subtropical and subantarctic waters leads to significant water mass transformation. However, although there is a good understanding of synoptic scale processes in this region, little is known about mesoscale processes and their variability. Here, we address this gap using the seismic reflection technique, and present: (i) high-resolution acoustic imagery of the frontal system, (ii) two-dimensional distributions of diapycnal mixing, and (iii) estimates of vertical diffusive heat flux.

This technique, namely Seismic Oceanography, exploits acoustic equipment to image the water column. The methodology yields imagery with a resolution of 10's of meters along sections of 140 km length. Here we present results from a four-dimensional dataset that was acquired in water depths of 500-2000 m along the Uruguayan continental slope. Each seismic section is a vertical slice through the water column that is approximately normal to a front within the Brazil-Falklands Confluence. I present a total of 6 seismic sections that cover a period of 6 weeks.

The resultant acoustic images reveal sharp changes in temperature (~80 % contribution) and salinity (~20%). The imagery is spectrally analyzed and diapycnal mixing estimates are calculated. Combined with seismically inverted temperature profiles, we are able to estimate vertical diffusive heat flux. In the mean, the area is one of elevated mixing rates, whilst over time we observe the conditioning (i.e. modification) of mixing and heat flux by a front within the confluence. Thus, using the technique of seismic reflection imaging, the mesoscale evolution of water masses, mixing rates, and heat fluxes can be mapped out in the Brazil-Falkland Confluence.