



Numerical simulations of circulations near the Bransfield Strait, Antarctica

Zhaoru Zhang¹, Martinho Marta-Almeida², and Guangqian Du¹

1. Institute of Oceanology, Shanghai Jiao Tong University, Shanghai, China

2. University of Aveiro, Aveiro, Portugal



1. Introduction

The Bransfield Strait and Gerlache Strait in Antarctica are the spawning and nursery grounds of Antarctic Krill, and circulations in this area play an important role in the transport of krill larvae. The major circulation feature in this region is a strong, northeastward-flowing current along the northern slope of the Bransfield Strait, which is fed by the return flow of the southwest currents along the Antarctic Peninsula, the northeastward currents flowing from the Gerlache Strait into the Bransfield Strait, and the southward currents through the Boyd Strait. A numerical model based on ROMS is preliminarily built up to simulate the circulation system in the Bransfield Strait.

2. Observed seasonal circulations in/near the Bransfield Strait

Dataset: Joint Archived Shipboard ADCP (JASADCP)

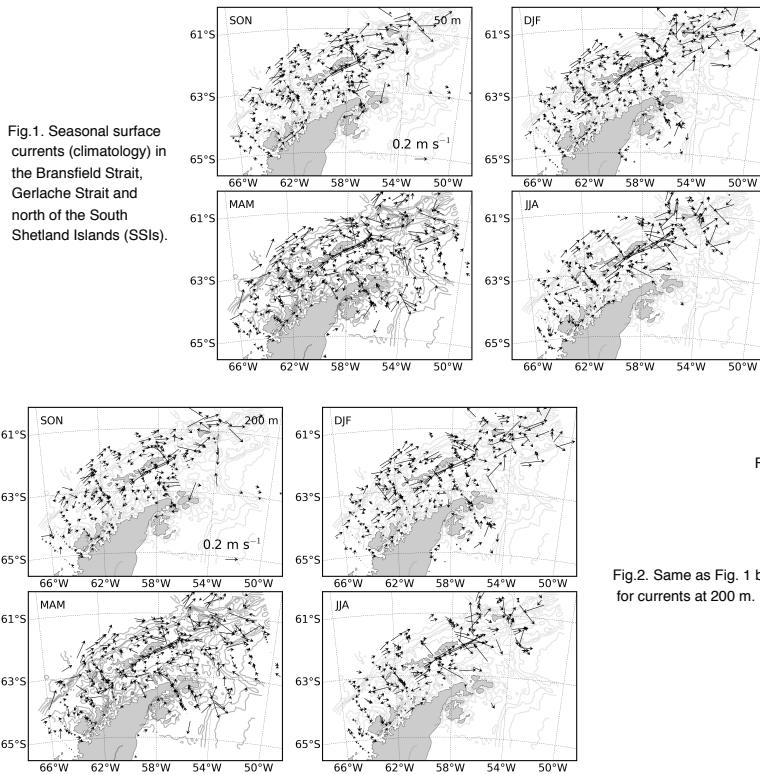


Fig.1. Seasonal surface currents (climatology) in the Bransfield Strait, Gerlache Strait and north of the South Shetland Islands (SSIs).

3. The Antarctic Slope Current

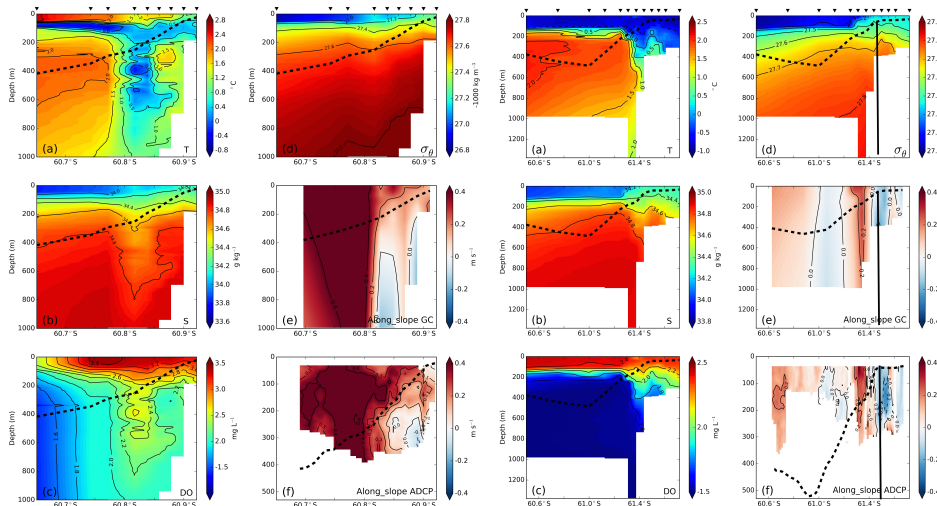


Fig. 3. (Left) Vertical profiles of (a) potential temperature, (b) salinity, (c) dissolved oxygen, (d) potential density, (e) calculated geostrophic current and (f) measured along-slope current on a cross-slope transect north of the Elephant Island (EI) during an austral summer cruise. (Right) Same as left but for variables on a cross-slope transect north of the SSIs during an austral winter cruise.

4. Numerical Model

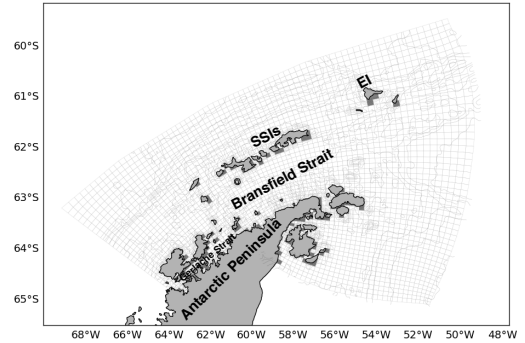


Fig. 4. The model domain. The grid is plotted every 10th model point.

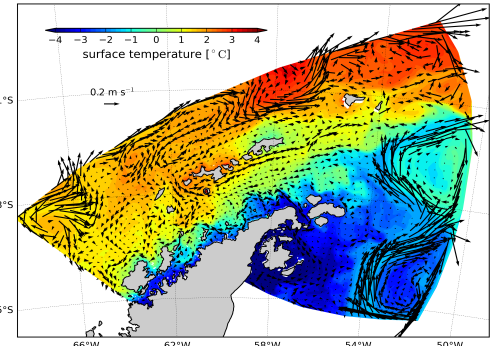


Fig. 5. Model simulated December mean sea surface temperature (color) and surface currents (vector).

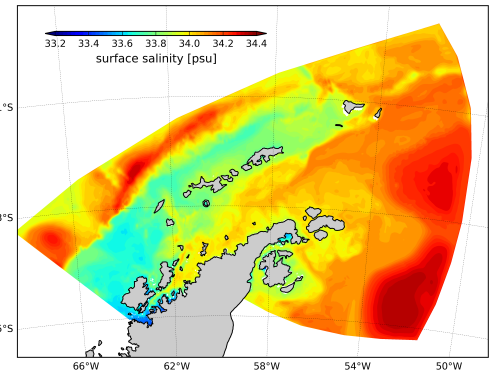


Fig. 6. Model simulated December mean sea surface salinity.

6. Summary

1. The model could qualitatively reproduce the observed circulation system in the Bransfield Strait. The slope current in the northern strait is underestimated by the model, and the simulation needs to be improved.
2. Future work includes using the model to study the mechanisms for the slope currents in the Bransfield Strait and north of the SSIs, which are important for the Krill Larvae transport.

Acknowledgement This research is funded by the National Natural Science Foundation of China (Grant no. 41406006).