

Observing Dynamics of the Southern Ocean

SPEAKER: Dr. Don Chambers (University of South Florida)

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WPR Building, 2nd Floor
3925 W. Braker Lane, Suite 200, Austin, Texas 78759

ABSTRACT: The Southern Ocean contains one of the largest current systems in the world, the Antarctic Circumpolar Current (ACC). The ACC is the largest current system in the world, and connects the three major oceans. This allows an interbasin exchange of heat, salt, carbon, and other chemical and biological properties. The ACC isolates Antarctica from much of the poleward heat transport in the ocean, so knowledge of how this transport is changing in time is vital to understanding future climate change in Antarctica. As important as the ACC is, however, measurements of how its transport varies in time has been limited by the difficulty of obtaining in situ measurements in the extreme environment of the Southern Ocean. The majority of observations have been made across the Drake Passage, where the width of the ACC is limited and regular scientific cruises travel between South America and the Antarctic Peninsula.

In this presentation, I will summarize recent work that I have done with students and other colleagues on using satellite observations to study the variability of the ACC in regions away from the Drake Passage. The satellite measurements include altimetry to measure eddy-kinetic energy and upper ocean baroclinic transport, gravimetry from the GRACE mission to study full-depth transport variability, and satellite winds. We have found a significant increase in eddy-kinetic energy in the Indian and Pacific Oceans over the last twenty years connected to increasing wind stress. Over the last decade, we find a deceleration in the ACC transport in the Indian Ocean and an acceleration west of the Drake Passage which is connected to regional wind changes. Based on altimetry and in situ full depth hydrographic measurements, we have found this deceleration has been occurring since the mid 1990s.

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