



Antarctic Circumpolar Current variability – a combined analysis of in-situ Bottom Pressure, Altimetry, and GRACE gravity

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The Antarctic Circumpolar Current (ACC) constitutes the largest ocean current of the world. In the Atlantic sector of the ACC, an array of 9 Pressure sensor equipped Inverted Echo Sounders (PIES) is maintained by the Alfred Wegener Institute since 2002 / 2006. Here, the resulting timeseries are compared with altimetry and gravity field solutions of the GRACE satellite mission.

Barotropic transport anomalies of the ACC are captured by the high-resolution in-situ bottom pressure observations. Additionally, the acoustic traveltime data of the PIES can be matched with full-water column T/S profiles, using the Gravest Empirical Mode (GEM) method. Hence, also baroclinic transport variability and Sea Surface Height (SSH) are obtained from the PIES array.

For a comprehensive view of the ACC, the in-situ data are compared with altimetry estimates of the Topex/Jason satellite missions.

Furthermore, ocean bottom pressure, which is a measure of oceanic mass, is compared with gravity solutions of the GRACE satellite mission. Here, the 2-dimensional distribution of the PIES allows an improved detection of large-scale coherent bottom pressure patterns, which agree well with gravity anomalies found in the GRACE data.