



Monitoring Drake Passage with elephant seals: Frontal structures and snapshots of transport

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ABSTRACT: Conductivity-temperature-pressure satellite relay data loggers (CTD-SRDLs) were attached to southern elephant seals (*Mirounga leonina*) on the island of South Georgia. During the animals' migration the CTD-SRDLs recorded and transmitted hydrographic profiles at a rate of approximately two profiles per day to an average depth of about 547 m, representing transect-type sections with a spatial resolution of 16-47 km along the migratory routes of the seals. Two sections are used to clearly identify the locations of the Antarctic Circumpolar Current fronts across Drake Passage, providing in situ data complementary to satellite and other techniques. An empirical relationship between upper ocean temperature and baroclinic mass transport is used to determine the transport through Drake Passage at the times of the sections, and these transports are compared with estimates derived by other techniques. An absolute geostrophic velocity section across Drake Passage is calculated using CTD-SRDL data and data of absolute geostrophic surface velocities from altimetry. The mean total baroclinic transports in June 2004 and April 2005 are estimated to be $124 \times 10^6 \pm 14 \times 10^6 \text{ m}^3 \text{ s}^{-1}$ and $112 \times 10^6 \pm 14 \times 10^6 \text{ m}^3 \text{ s}^{-1}$ respectively.

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