

Investigating variability in the Antarctic Circumpolar Current – Project GoodHope/AX25

Scientific Rational:

The Antarctic Circumpolar Current (ACC) connects the Indian, Atlantic and Pacific oceans and is therefore an important link in the global thermohaline circulation. As a component of the Meridional Overturning Circulation (MOC), the Southern Ocean plays a major role in the global ocean circulation and it is hypothesised that it has an important impact on present day climate. However, our understanding of its complex three-dimensional dynamics and the impact of its variability on the climate system remain to this day rudimentary. The newly constituted, international GoodHope research venture aims to address this knowledge gap by establishing a programme of regular observations across the Southern Ocean between the African and Antarctic continents.

The objectives of this programme are five-fold:

- (1) To gain a better understanding of Indo-Atlantic inter-ocean exchanges and their impact on the global thermohaline circulation and thus on global climate change;
- (2) To understand in more detail the impact these exchanges have on the climate variability of the southern African subcontinent;
- (3) To monitor the variability of the main Southern Ocean frontal systems associated with the Antarctic Circumpolar Current;
- (4) To study air-sea exchanges and their role on the global heat budget, with particular emphasis on the intense exchanges occurring within the Agulhas Retroflexion region south of South Africa, and
- (5) To examine the role of major frontal systems as areas of elevated biological activity and as biogeographic barriers to the distribution of plankton.

To date 14 GoodHope/AX25 lines have been completed onboard a number of international research vessels including the SA Agulhas. The data obtained from these transects between the African and Antarctic continents have helped us to better understand the physical dynamics of the Antarctic Circumpolar Current which flows to the south of South Africa.

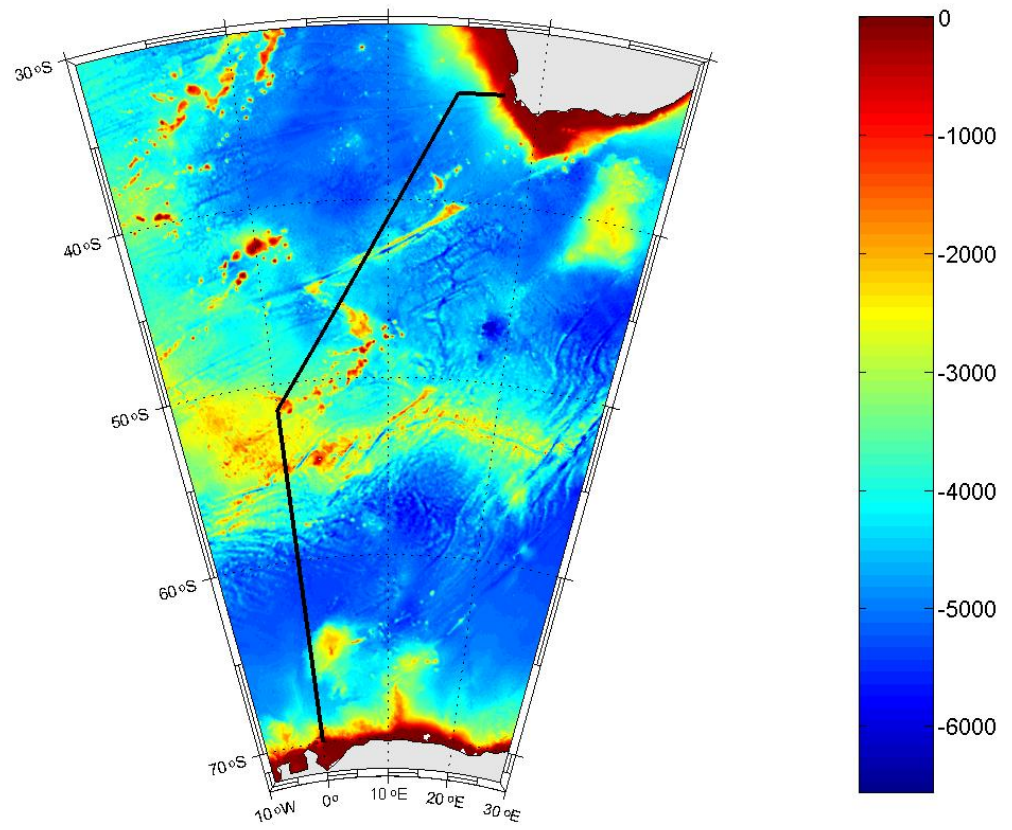


Figure 1: The GoodHope/AX25 cruise track overlaid onto the bathymetry of the region.