



Fig. 1.1. The colors show sea surface height as a function of position — red is higher, while blue is lower than the equilibrium geopotential. In geostrophic balance, the flow is along the isoclines, whose deviations show the complex meanderings of the currents and their tendency to form vortices. Geostrophically balanced vortices about  $300\text{ km}$  in diameter appear in this numerically generated figure as confined regions of local elevation and depression of the sea surface height. The dark regions are the continents of South America, Antarctica and Africa, as well as Madagascar and a few other islands. In the Southern Hemisphere, the Antarctic Circumpolar Current (ACC, appearing here in blue, green and purple) flows rapidly in the only globally open channel. The ACC interacts with the Agulhas Current off the tip of South Africa to produce a sequence of vortices (shown in red, being elevations that circulate anticlockwise in the Southern Hemisphere). These anticlockwise vortices retain their integrity as they drift northwestward across the South Atlantic. The recirculation at the western boundary (near South America) rejoins the ACC to form the eastward flowing Malvinas Current in the Southeast Atlantic. Several other anticlockwise vortices emerge due to the meanderings of the ACC and the Malvinas Current.