Ocean Science

*Supplement of*

# Observations of tracer ventilation in the Cape Basin, Agulhas Current Retroflection

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**Rossby number calculation**

The Rossby number (Ro) was calculated as the ratio between the relative vorticity ($\zeta$) and the Coriolis parameter ($f$):

$$Ro = \frac{\zeta}{f},\tag{S1}$$

where the relative vorticity was estimated along the glider track as the horizontal gradient of the geostrophic velocity:

5  $$\zeta = \frac{\partial u_g}{\partial x},\tag{S2}$$

with $u_g$ the geostrophic velocity component perpendicular to the track.

**Vertical velocity calculation**

Vertical velocities were estimated using the Q-vector version of the Omega equation:

$$N^2 w_{xx} + f^2 w_{zz} = -2(u_x b_x)_x,\tag{S3}$$

10   where the subscripts indicate the derivatives, $N^2$ is the Brunt–Väisälä frequency, $w$ is the vertical velocity, $f$ is the Coriolis parameter, $u_x$ is the gradient of geostrophic velocity along the glider track, and $b_x$ is the horizontal buoyancy gradient. The equation was solved using a differential equation solver with boundary conditions $w = 0$ at the surface and bottom, and $\partial w/\partial x = 0$ at the minimum and maximum distances along the glider's track.
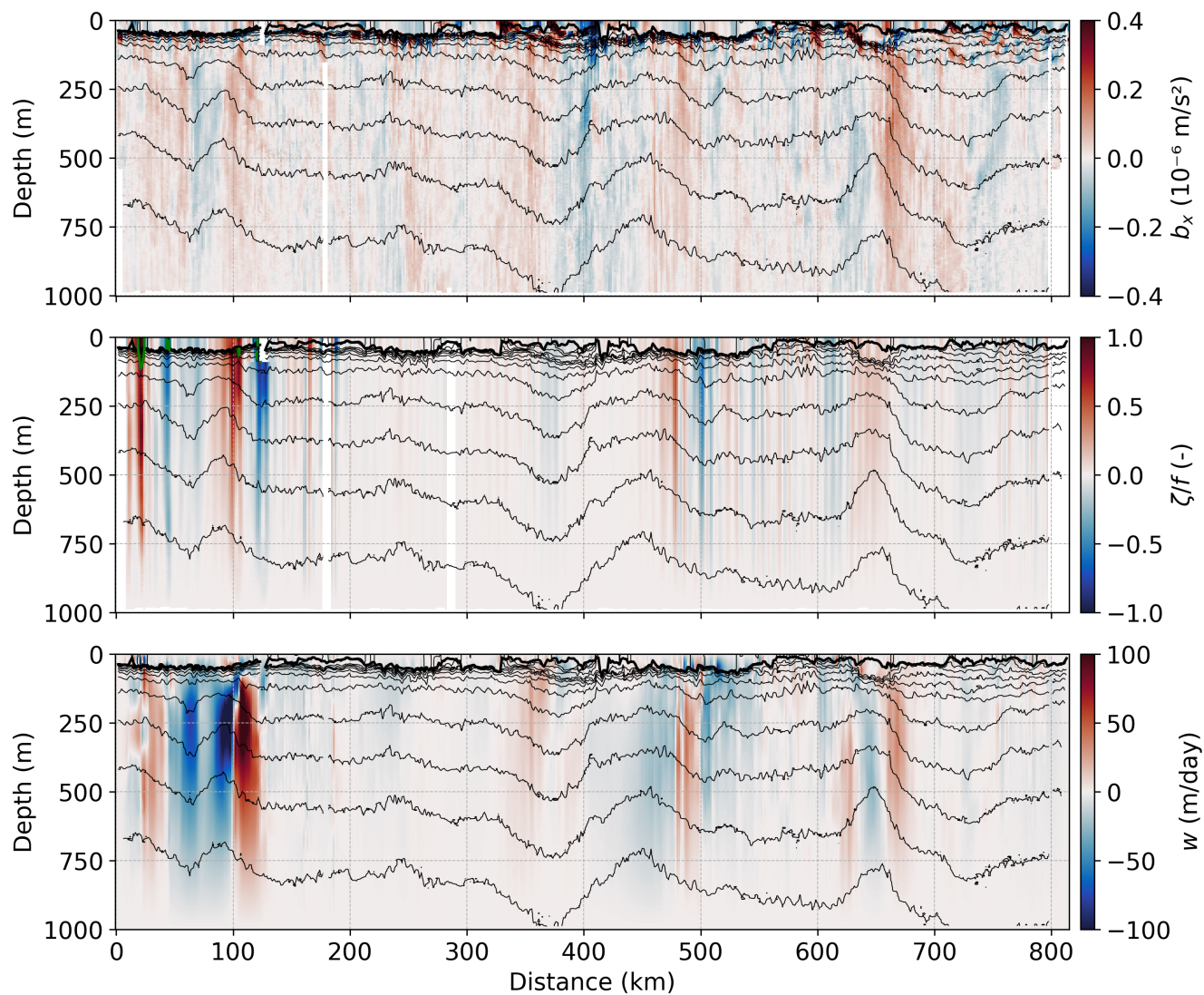
**Figure S1.** Glider sections showing (a) horizontal buoyancy gradient, (b) normalized relative vorticity, with green contours showing Ro $\sim$ 1, and (c) vertical velocity. Isopycnals are overlaid using thin black contours and the MLD is depicted with the thick black line.
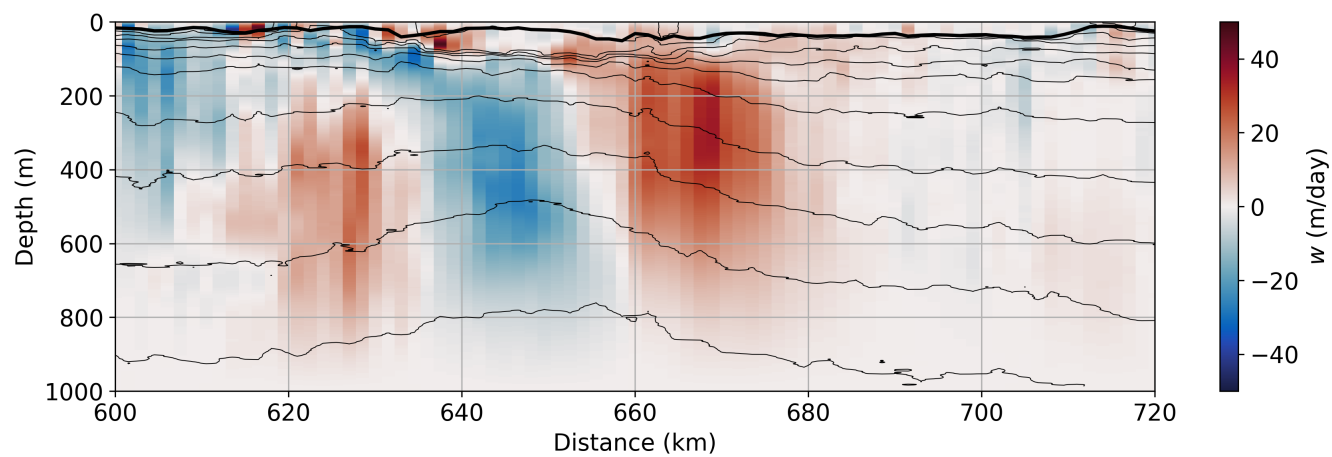
**Figure S2.** Glider section showing the vertical velocity. Isopycnals are overlaid using thin black contours and the MLD is depicted with the thick black line.