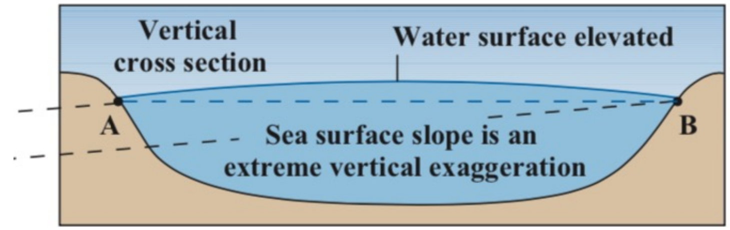
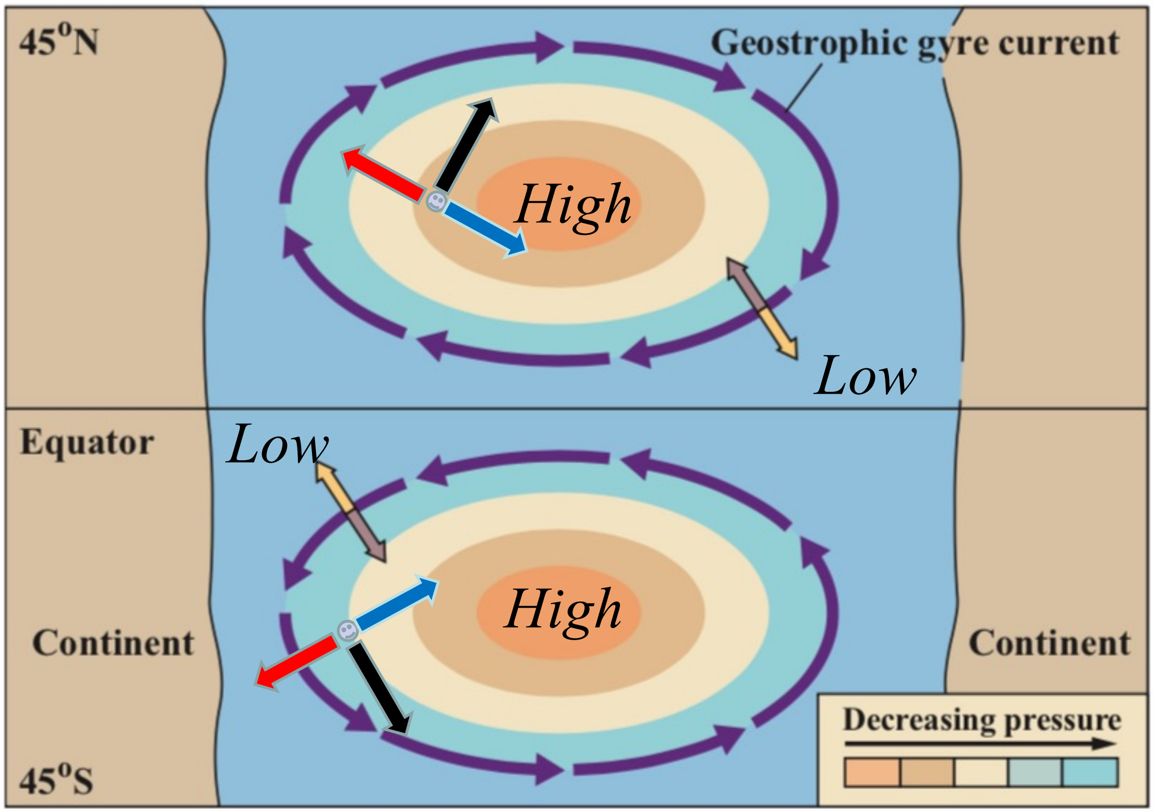
Wind-Driven Ocean Gyres
^Geostrophic





(b) Pressure gradient force Coriolis deflection

North of Equator:
clockwise around
high pressure

At Equator: No Coriolis

South of Equator:
counter-clockwise around
high pressure

Fig. 8.8

Western Intensification
Western Boundary Currents

Explanation requires angular momentum, or vorticity arguments

West:
large slope
strong current
narrow current

East:
small slope
weak current
wide current

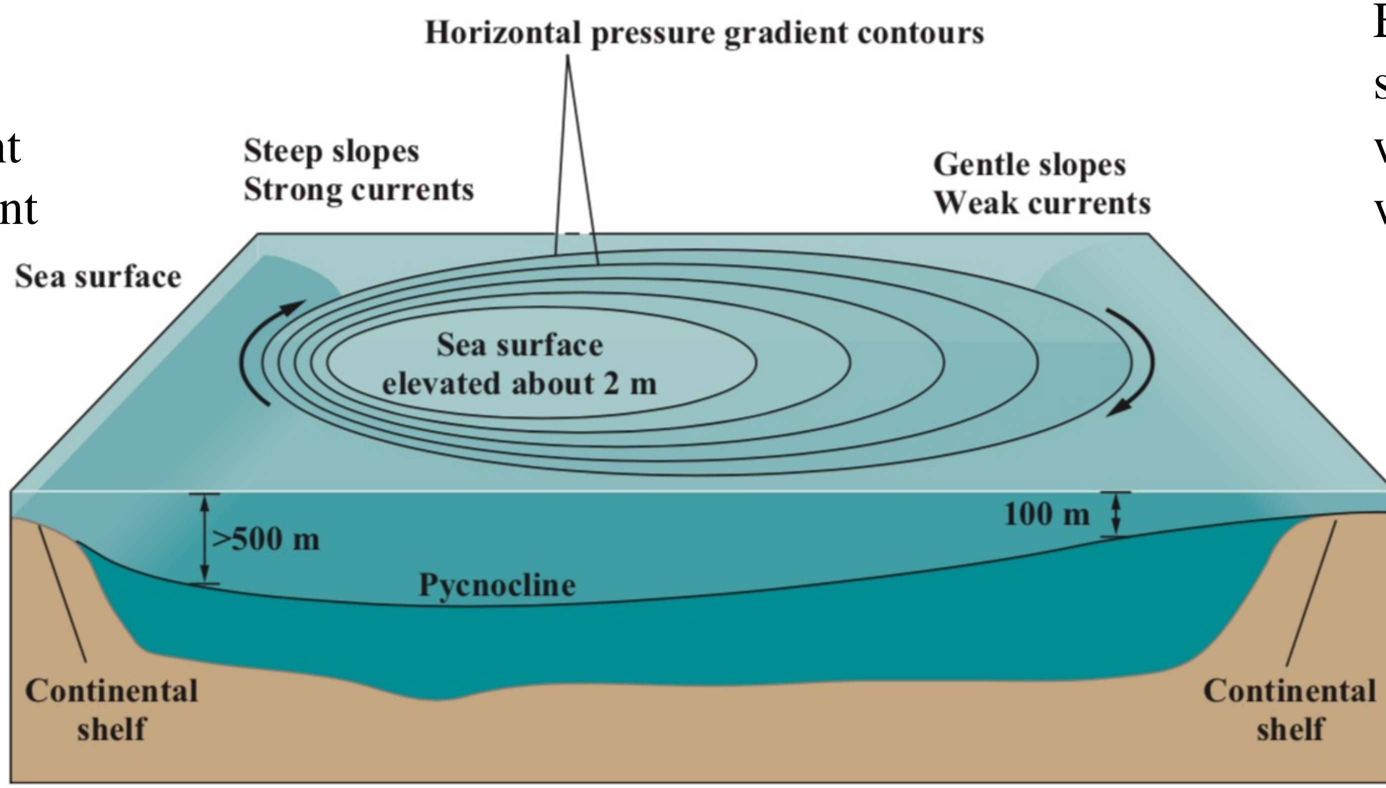


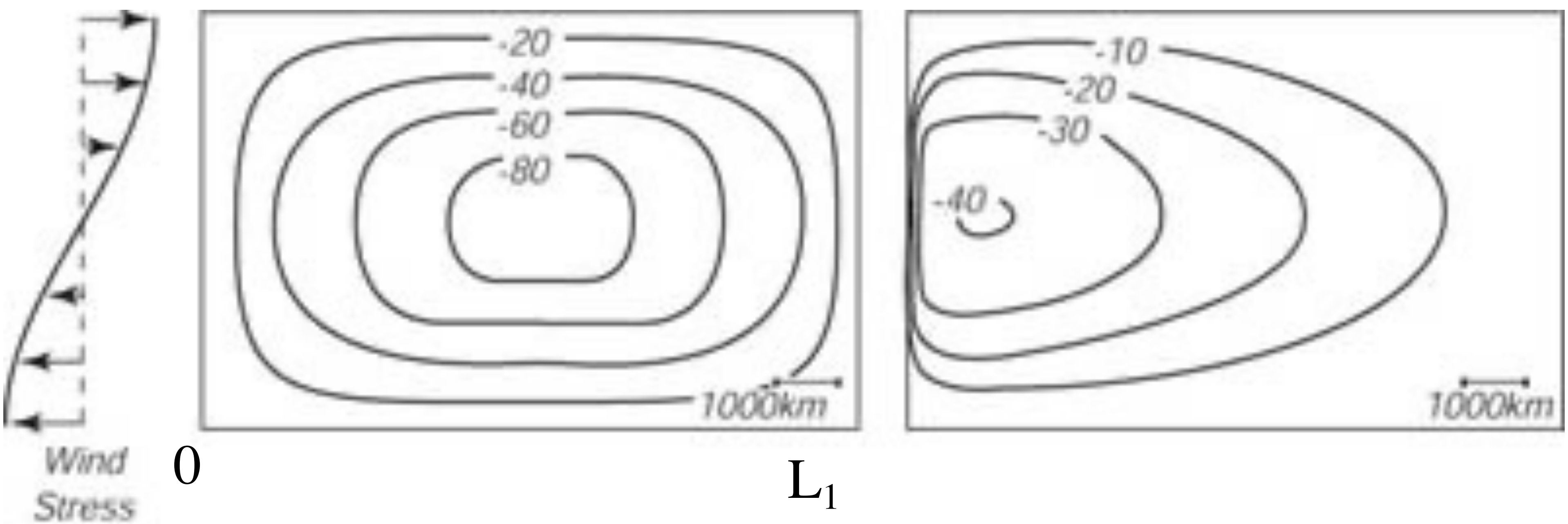
Fig. 8.10

Sverdrup interior

Vorticity: $\nabla^2 p + [(2*H*\beta_0)/(d*f_0)]\, \partial_x p + [2/d]\, \partial_y \tau^{(x)} = 0$

Stommel boundary

p(x,y)



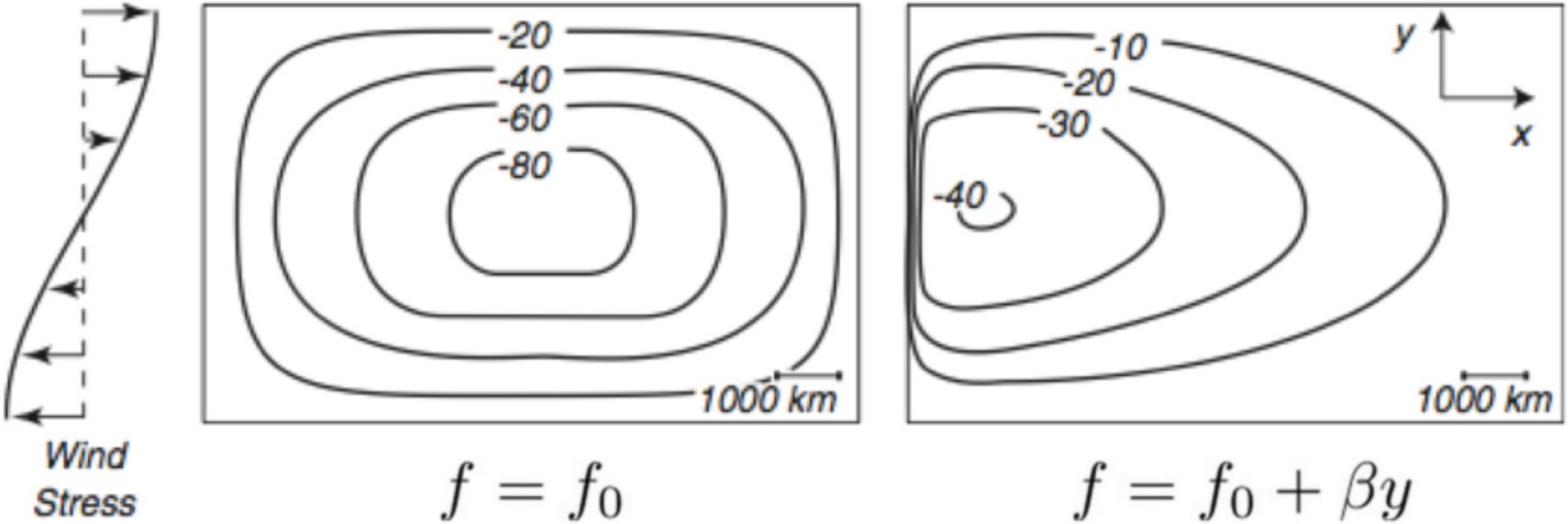
0

L_1

$\tau^{(x)}$

$\beta_0=0$

$\beta_0>0$

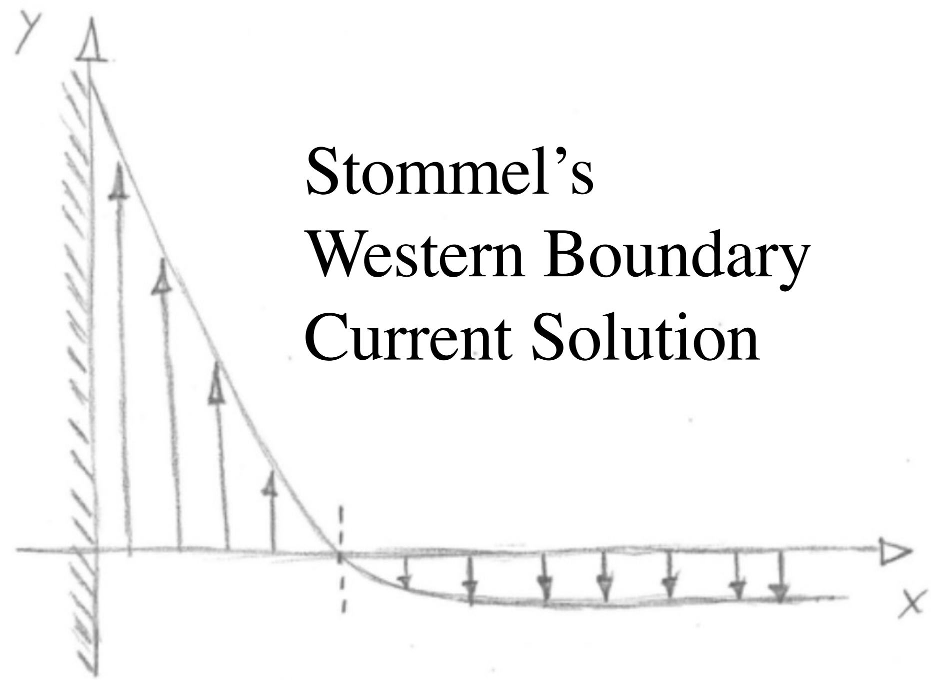


$f = f_0$ $\qquad$ $f = f_0 + \beta y$

Every "Sverdrup Gyre" in the ocean
has a western boundary current;

Clockwise gyre gives northward WBC

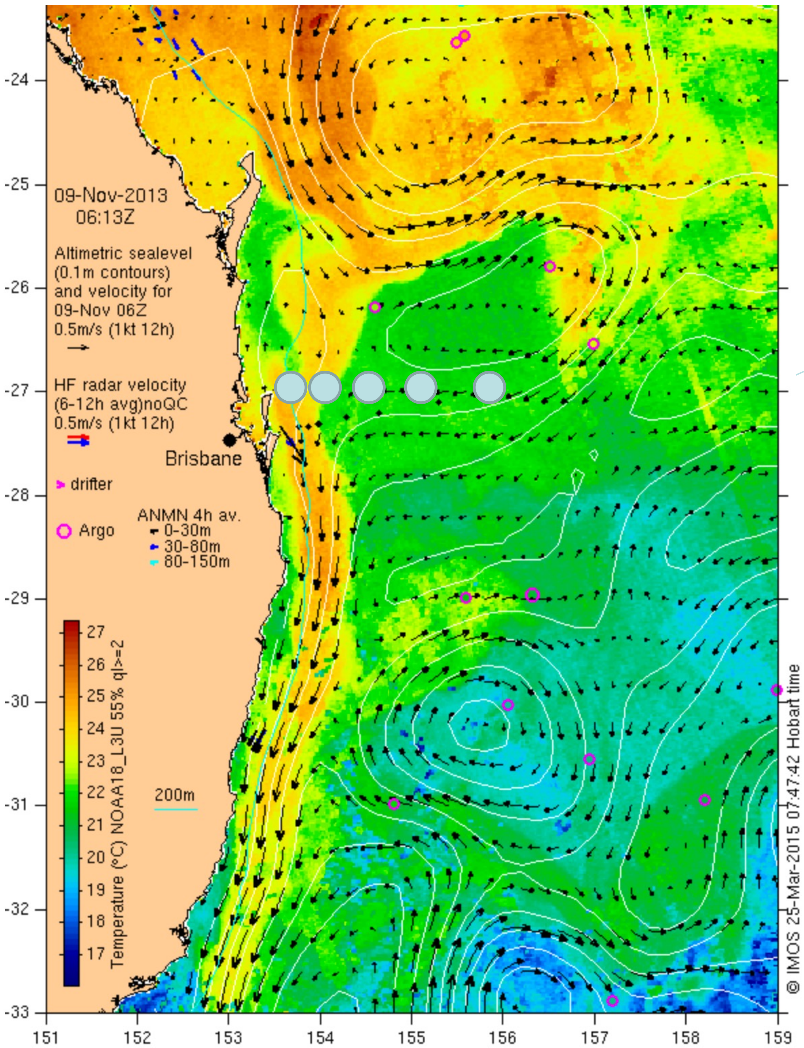
Counter-clockwise gyre gives southward WBC



Stommel's
Western Boundary
Current Solution

adapted from
Stommel (1948)

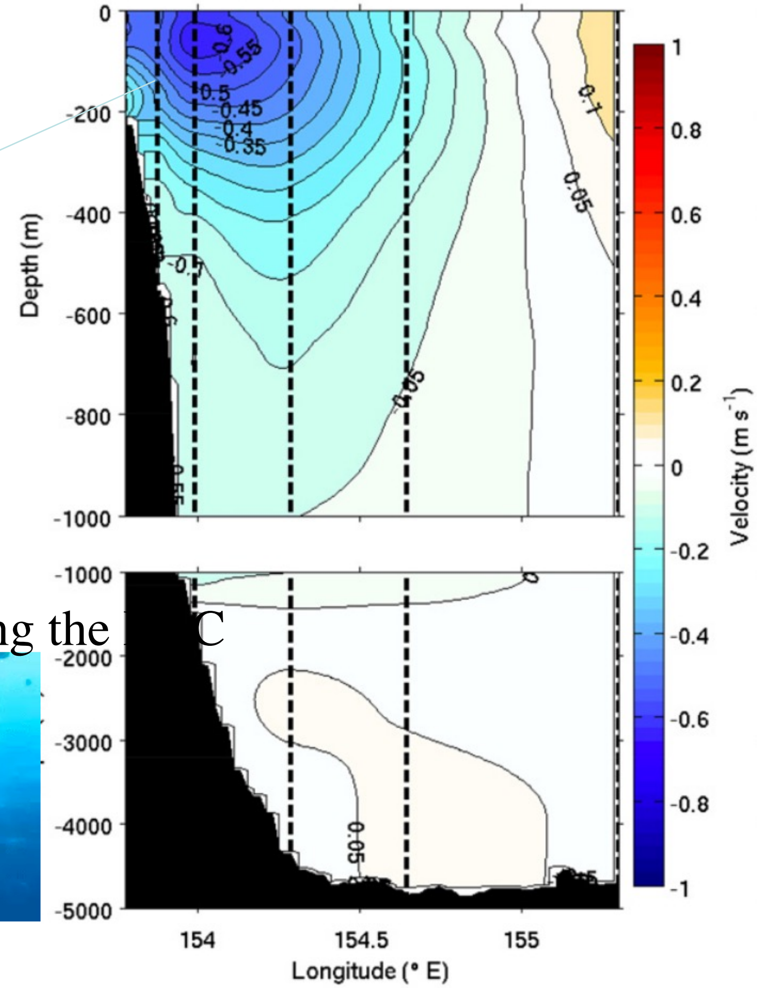
Remote Sensing of Surface Currents



East Australian Current

Mooring Locations
@ 27 South latitude

Mean Current (18 months)



Marlin & Crush riding the C

http://oceancurrent.imos.org.au/

Sloyan et al. (2016)