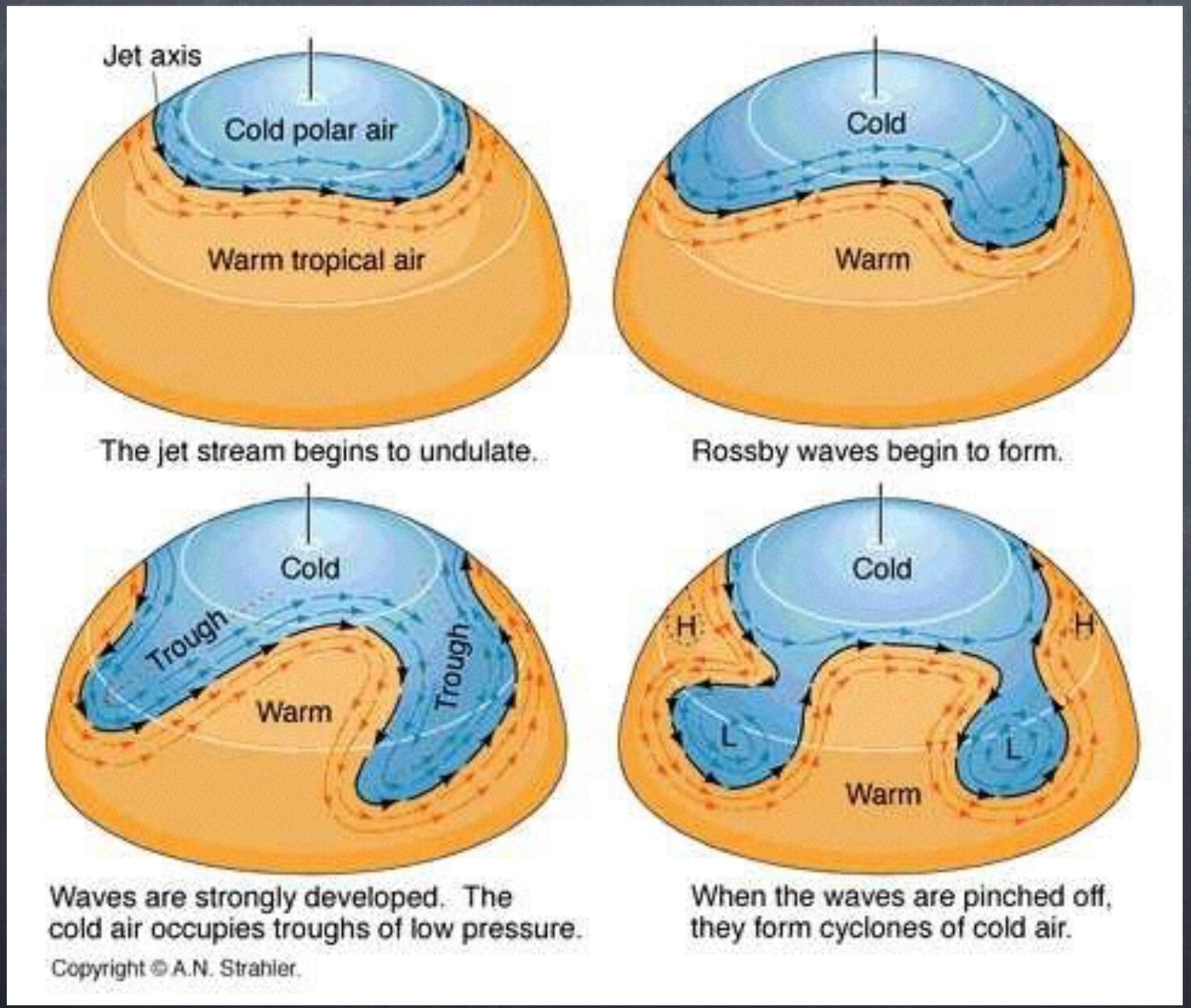
Planetary Waves

rotation is important

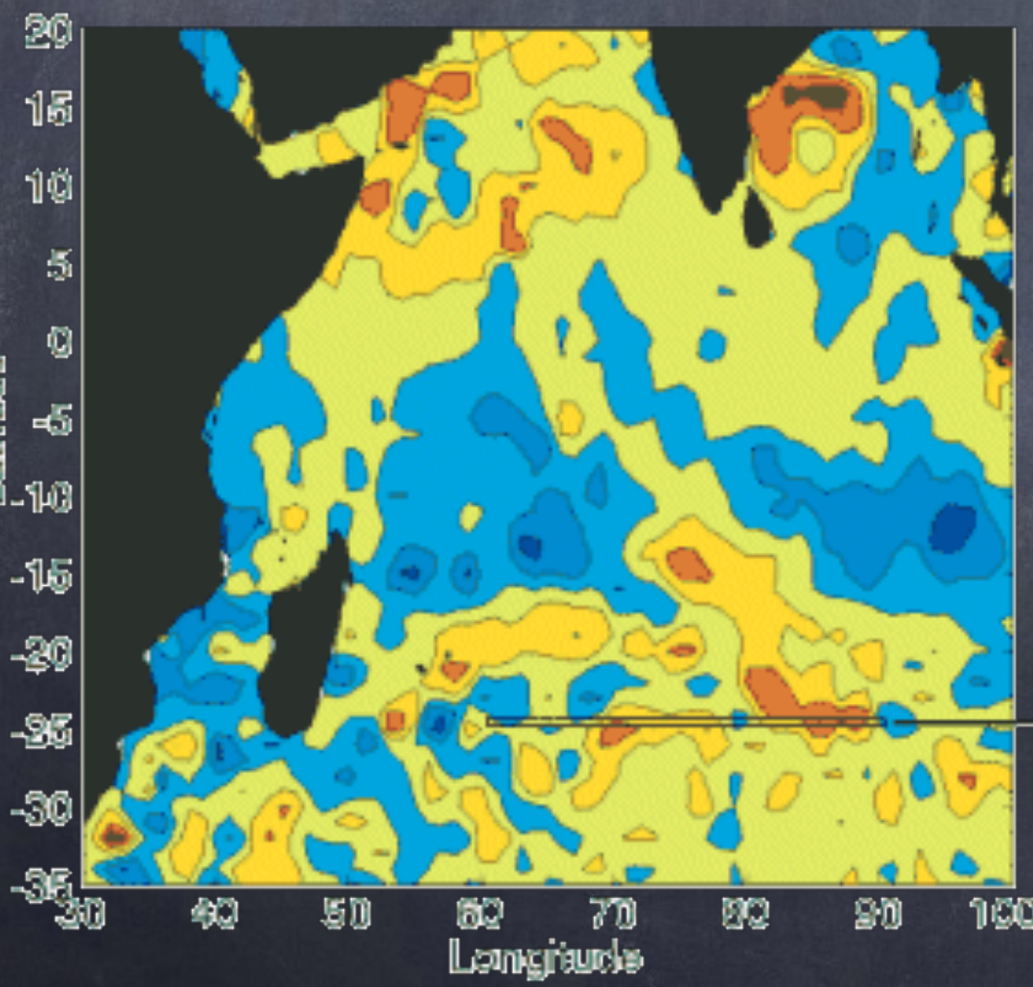
Rossby waves in atmosphere

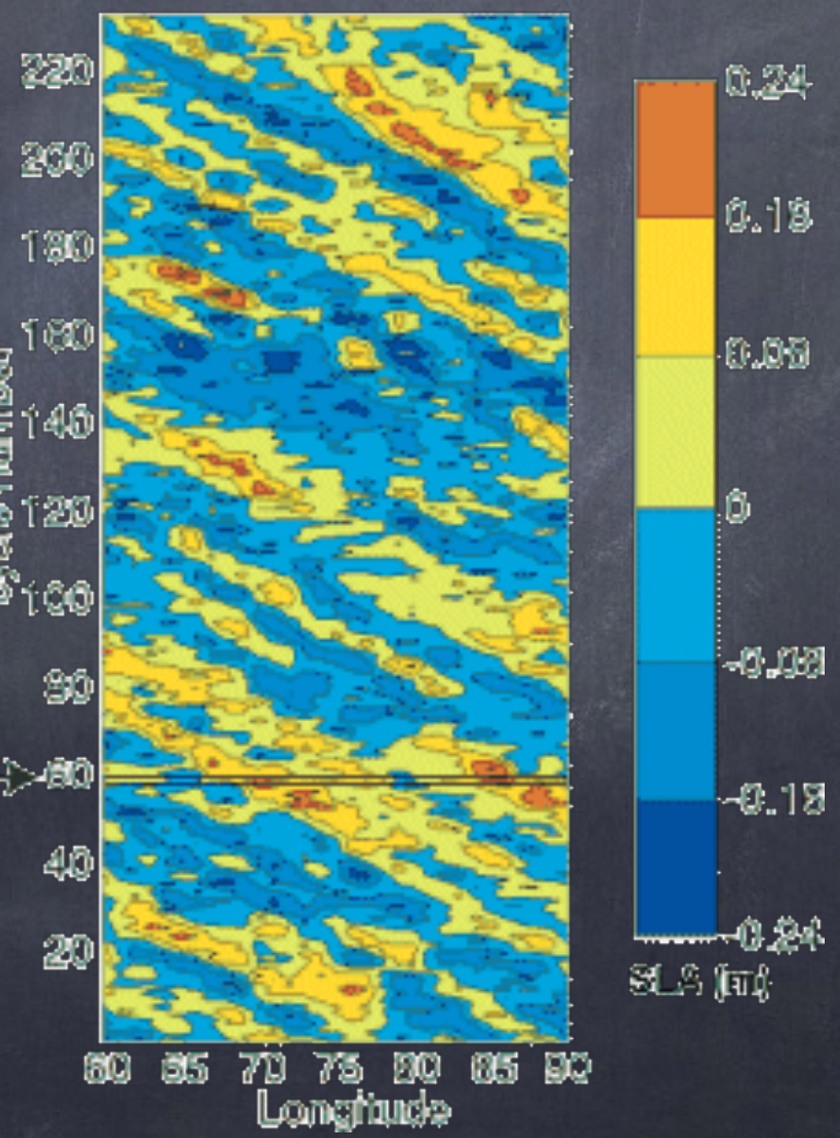


Rossby waves in ocean

Sea level anomalies in western Indian Ocean

Hovmuller longitude-time plot along latitude 25 S





westward propagating Rossby waves

eastward propagating Kelvin waves

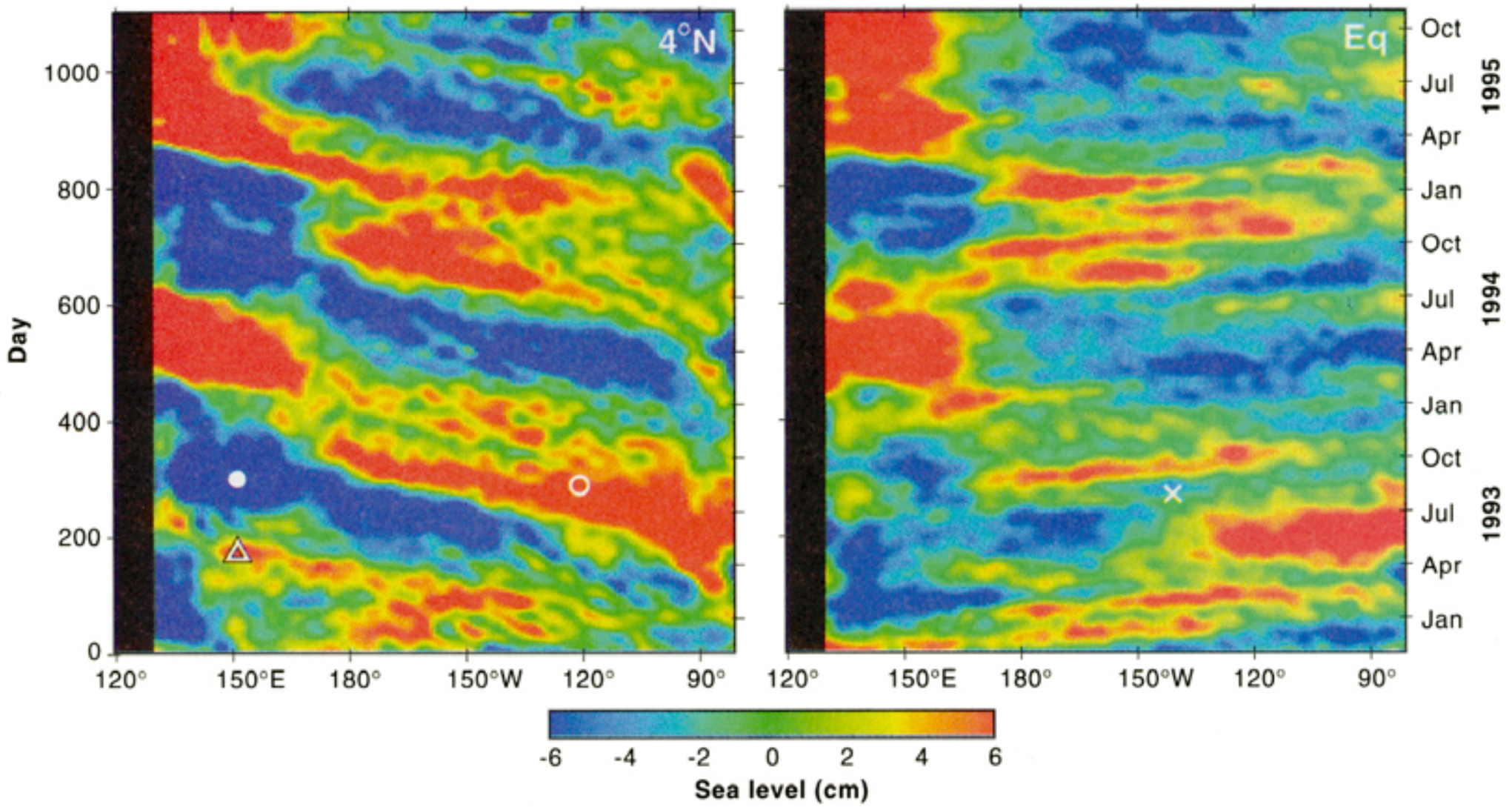


Fig. 3. Time-longitude sections of filtered sea level (*22*) in the Pacific Ocean along 4°N and the equator. A section along 4°S is almost identical to the 4°N section. The time axis is stretched compared with Fig. 2 to aid in the identification of the rapid eastward- and westward-propagating tropical sea level signals. The symbols correspond to the times and locations of the matching symbols in Fig. 4.

Chelton and Schlax, 1996

Rossby Wave Dispersion

$\omega_{max} = \frac{\beta R_d}{2}$

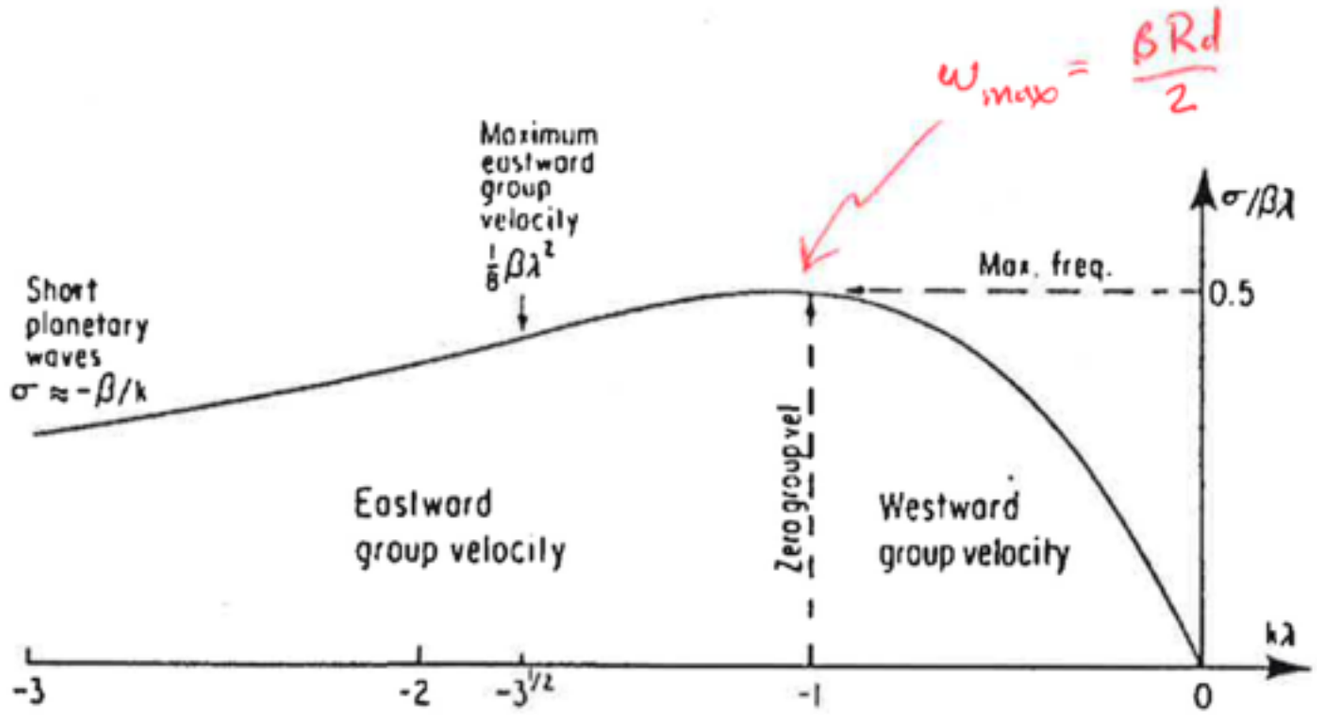


Figure 3.6. A dispersion diagram for Rossby waves that can be written as $\sigma/\beta\lambda = -k\lambda/(1 + (k\lambda)^2)$, where σ is frequency and $\lambda = c/f$ is the radius of deformation. [From Gill (1985).]

Notation: $\sigma \equiv \omega$ (frequency)

$\lambda \equiv R_d$ (radius of deformation)

Dependency of Rossby wave propagation speed on latitude

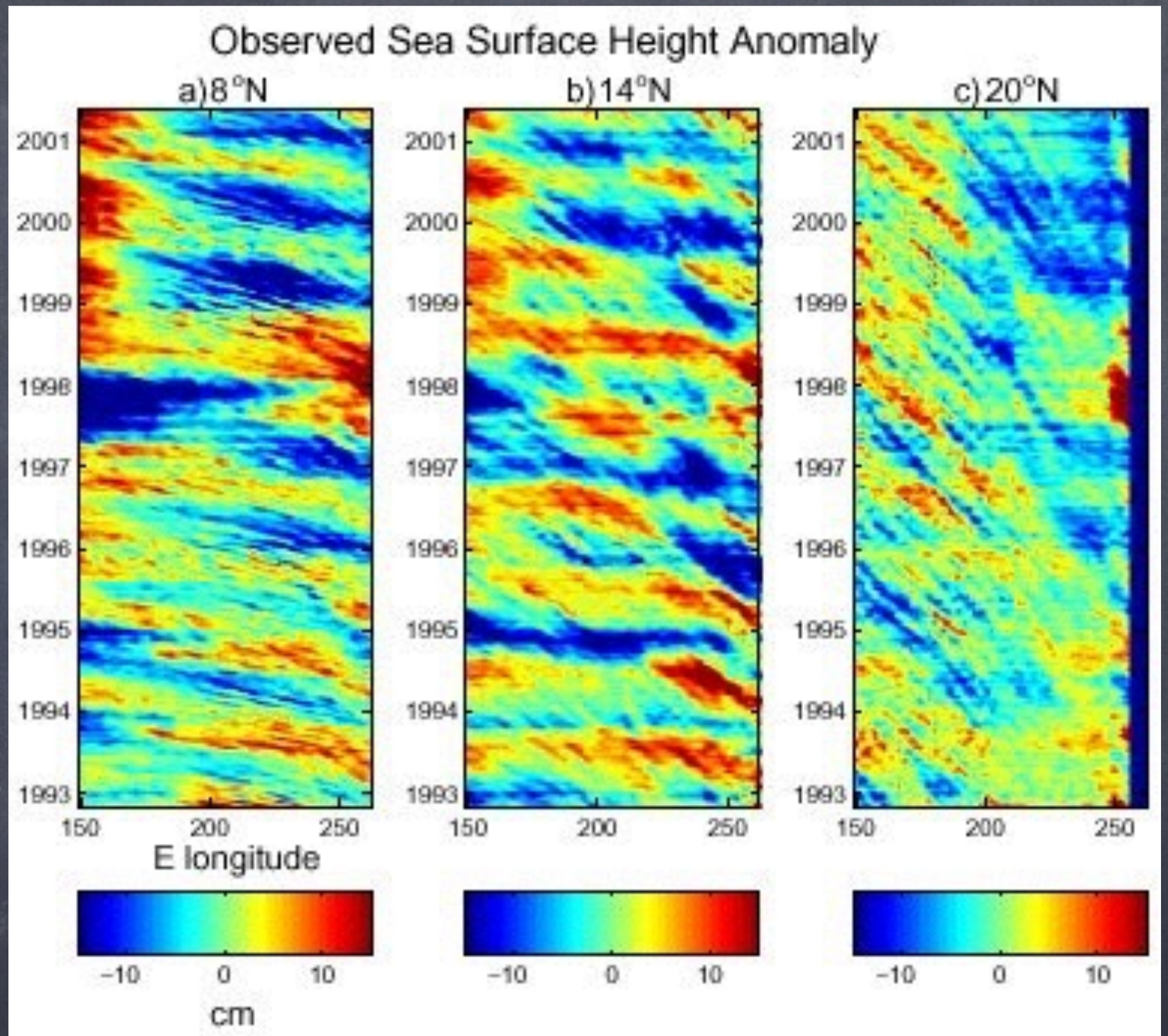


Figure 1. Time-longitude plots of SSH anomalies at (a) 8, (b) 14, and (c) 20°N from the TOPEX/POSEIDON altimeter. Units are meters.