P 521 Lecture 7 Motion in Noninertial Frame

$$m\left(\frac{d^2\vec{r}}{dt^2}\right)_{body} = \vec{F} - 2m\vec{\omega}\times\left(\frac{d\vec{r}}{dt}\right)_{body} - m\vec{\omega}\times(\vec{\omega}\times\vec{r})$$

Coriolis force — Centrifugal force

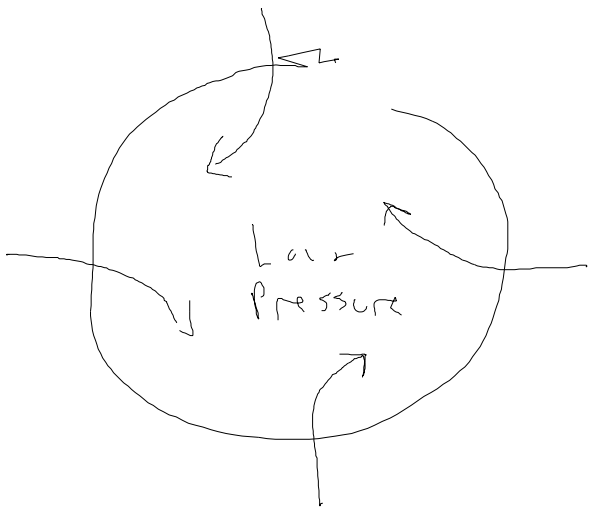
$$\omega = \frac{2\pi}{\text{"1 day"}} = 7.29 \times 10^{-5}\ s^{-1}$$

For rotating Earth. Above assumes $\frac{d\vec{\omega}}{dt} = 0$

Note $\tau_e \neq 24$ hours because of rotational motion around sun

$\tau_e = 86.62 \times 10^4$ s and $24h = 86.64 \times 10^4$ s

Hurricane



air motion

⊙ $\omega_\perp$ out of plane in Northern Hemisphere

Air from the north moves south and is to +/- East Deflects air to the west

$\vec{\omega}\times\vec{v}$ therefore $F_{Coriolis} = -2m\omega\vec{v}$

Therefor Hurricanes rotate rounter clockwise in Naither Hemisphere and Clockwise in Scuther Hemisphere.