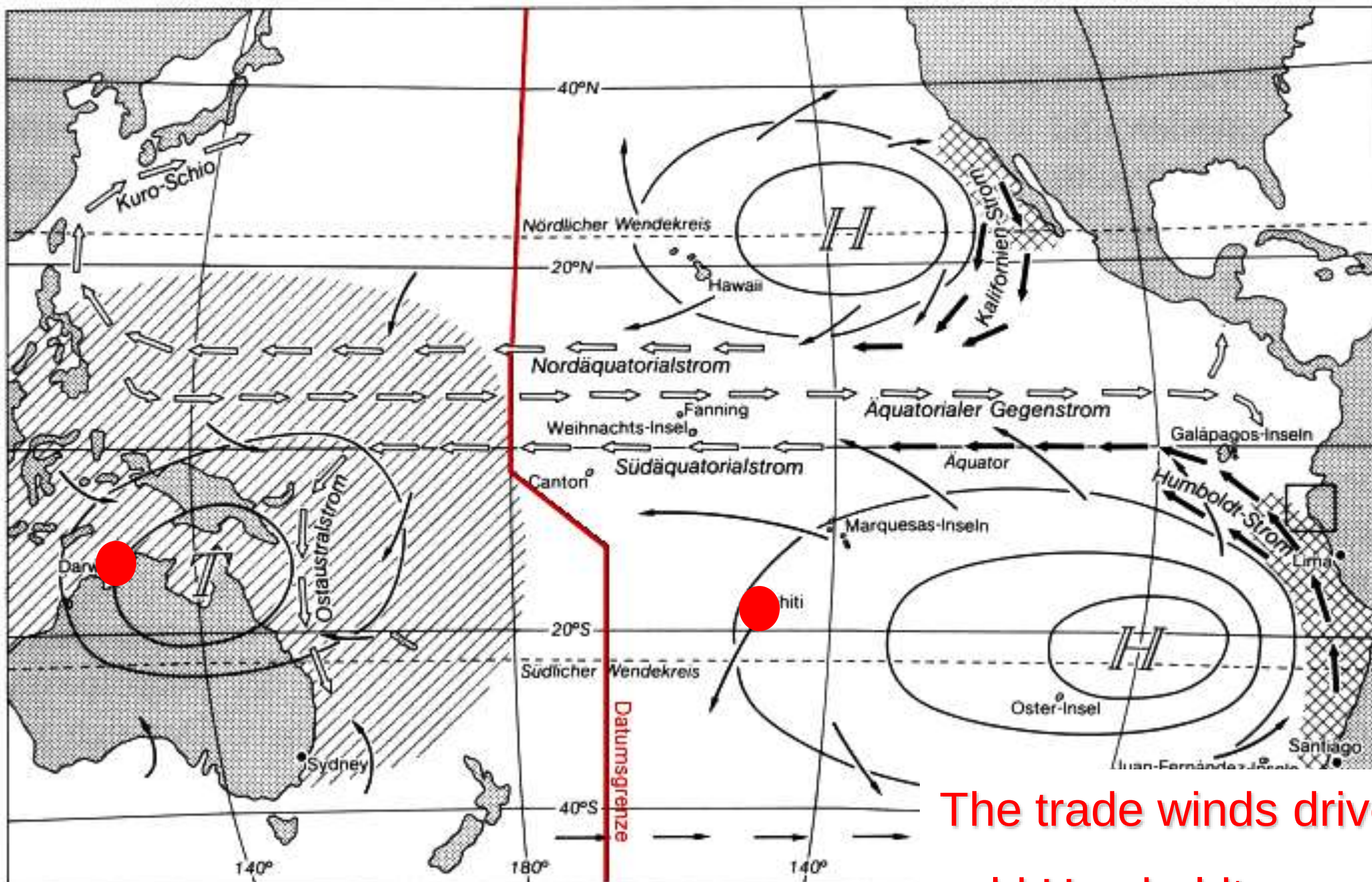
El Nino Southern Oscillation add ons

Walker circulation

Oceanic and atmospheric circulation

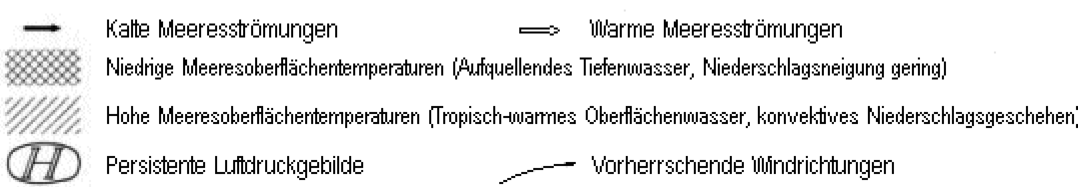
W



E

The trade winds drive the cold Humboldt current

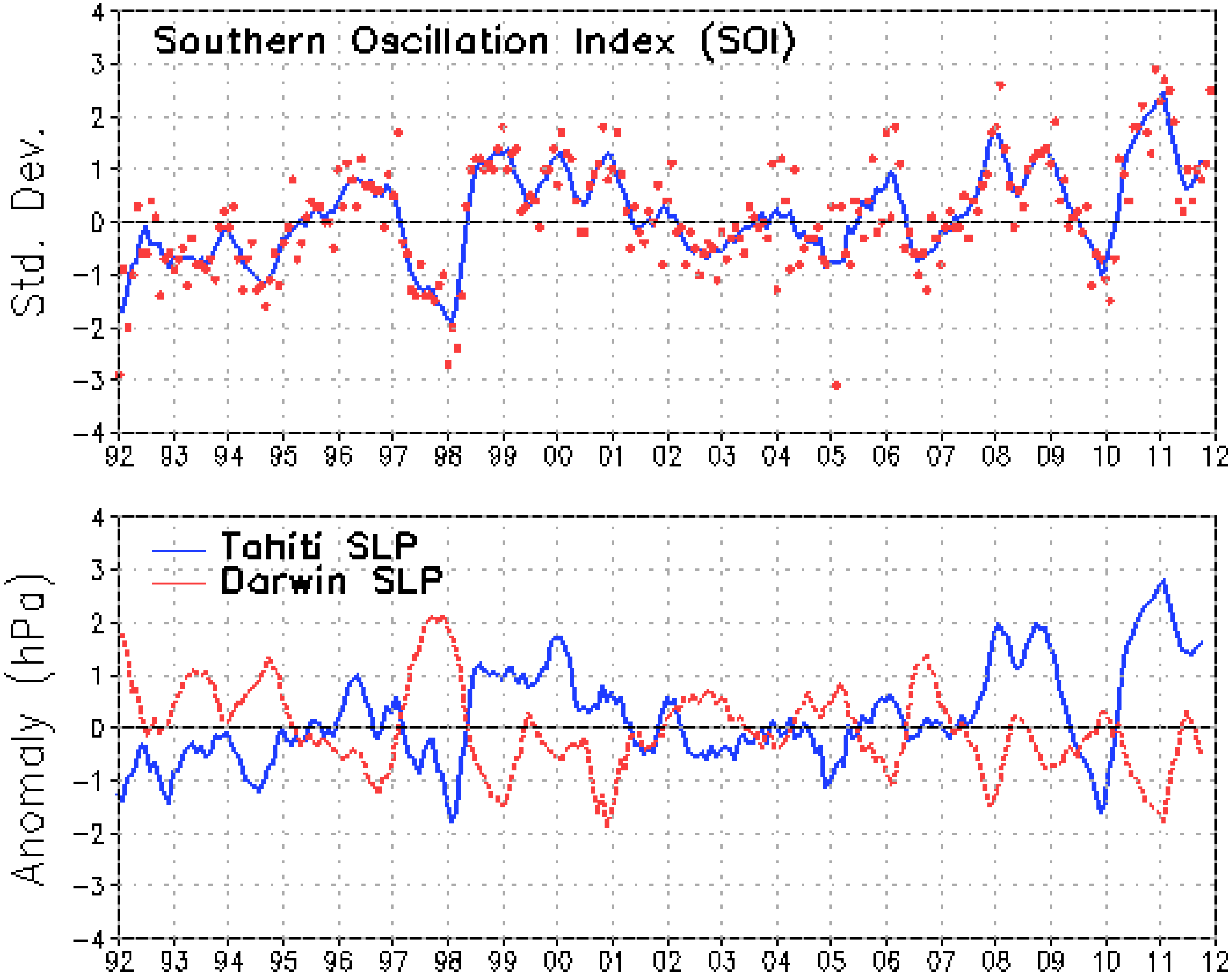
● Southern Oscillation Index (SOI): for the most part $p_{\text{Tahiti}} – p_{\text{Darwin}} > 0$



www.enso.info/enso.html

SOI: 1992–2011

$$SOI = 10 \cdot \frac{\Delta P - \Delta P_{avg}}{s_{\Delta P}}$$

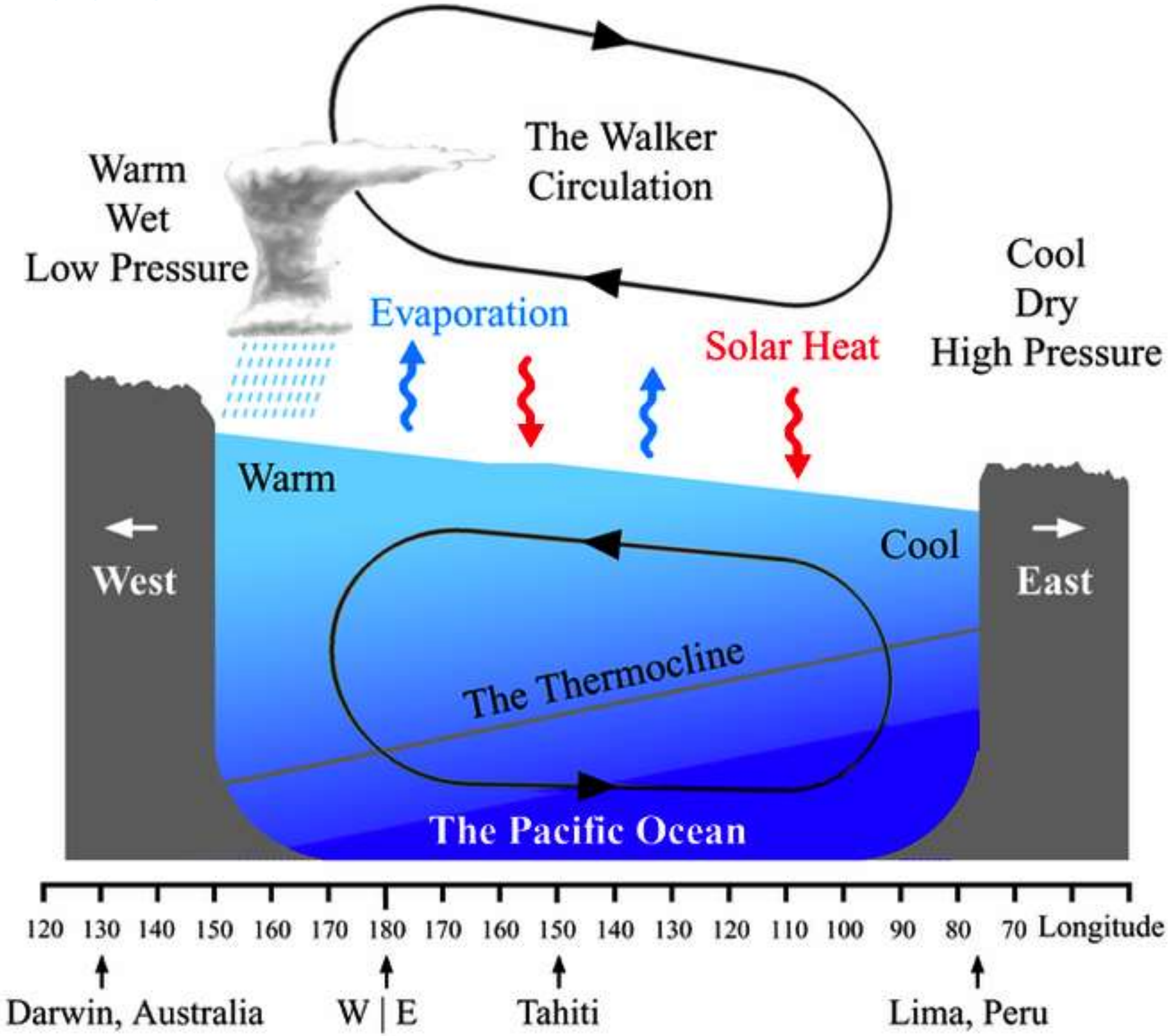


SOI>0:
below normal air pressure at Darwin and above normal air pressure at Tahiti

SOI<0 : below normal air pressure at Tahiti and above-normal air pressure at Darwin.

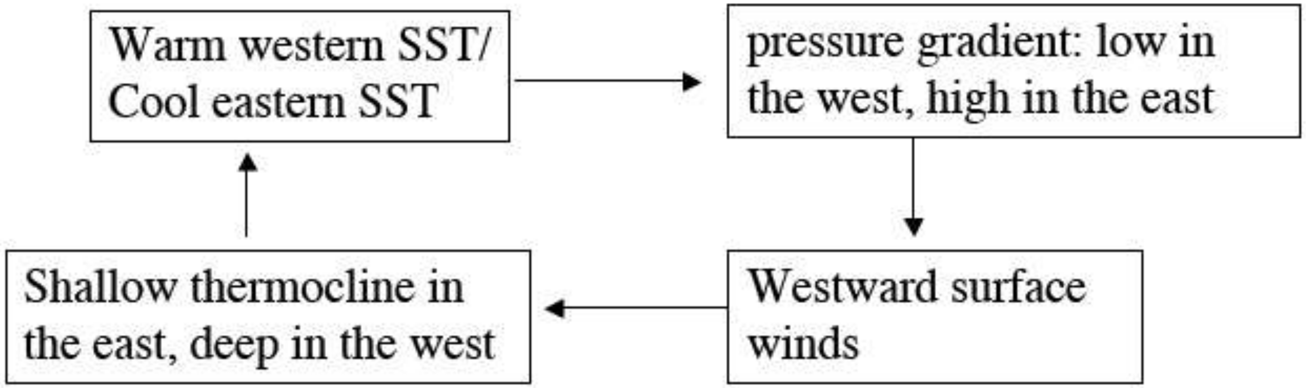
www.cpc.ncep.noaa.gov

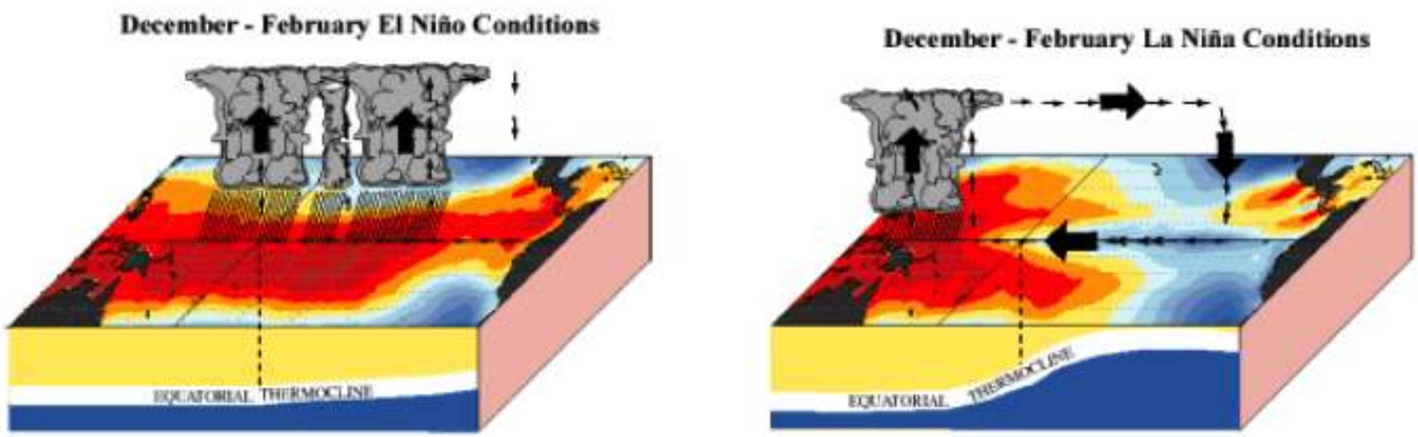
Walker circulation



http://en.wikipedia.org/wiki/File:LaNina.png

Bjerknes Feedback





positive feedback

trade winds <-> east-west temperature gradient

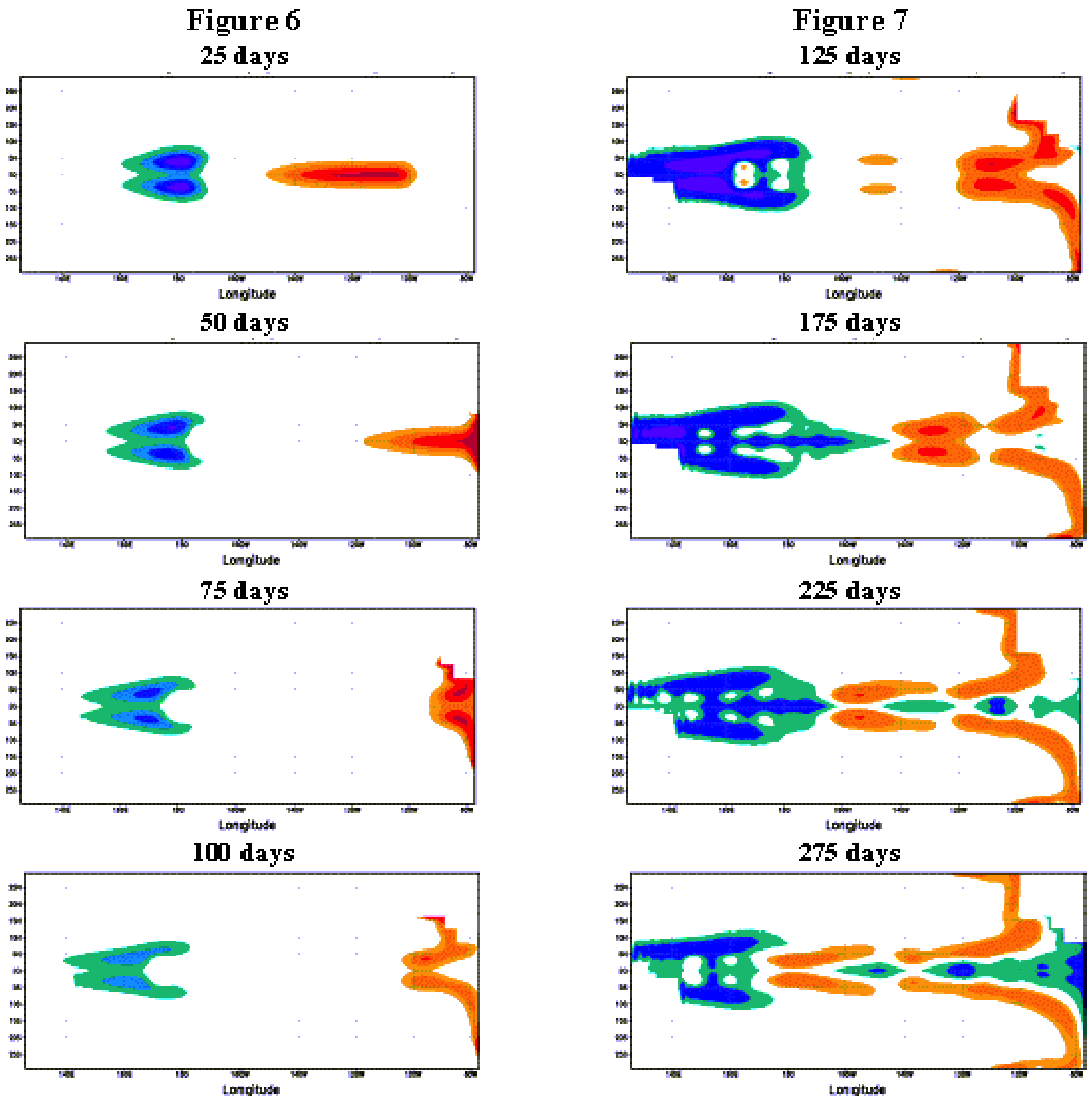
Onset of El Nino - Bjerknes Feedback

- deepening of the thermocline in the EEP
- reduced west-east SST-gradient
- anomalous wind blowing from west to east
- shift of convection cell to central Pacific
- flow of warm surface waters from west to east Pacific (= positive Bjerknes feedback)

Termination of El Nino - Delayed Oscillator

- initial wave deepening the EEP thermocline also generates a shoaling westward wave
- this wave reflects at the western boundary of the Pacific and propagates back toward the east -> TCL shoaling
- this shoaling wave arrives the EEP about 7-9 months later, terminating El Nino

Delayed Oscillator



http://orca.rsmas.miami.edu/~melicie/krw2.gif