

Mini-école « fluides géophysiques »

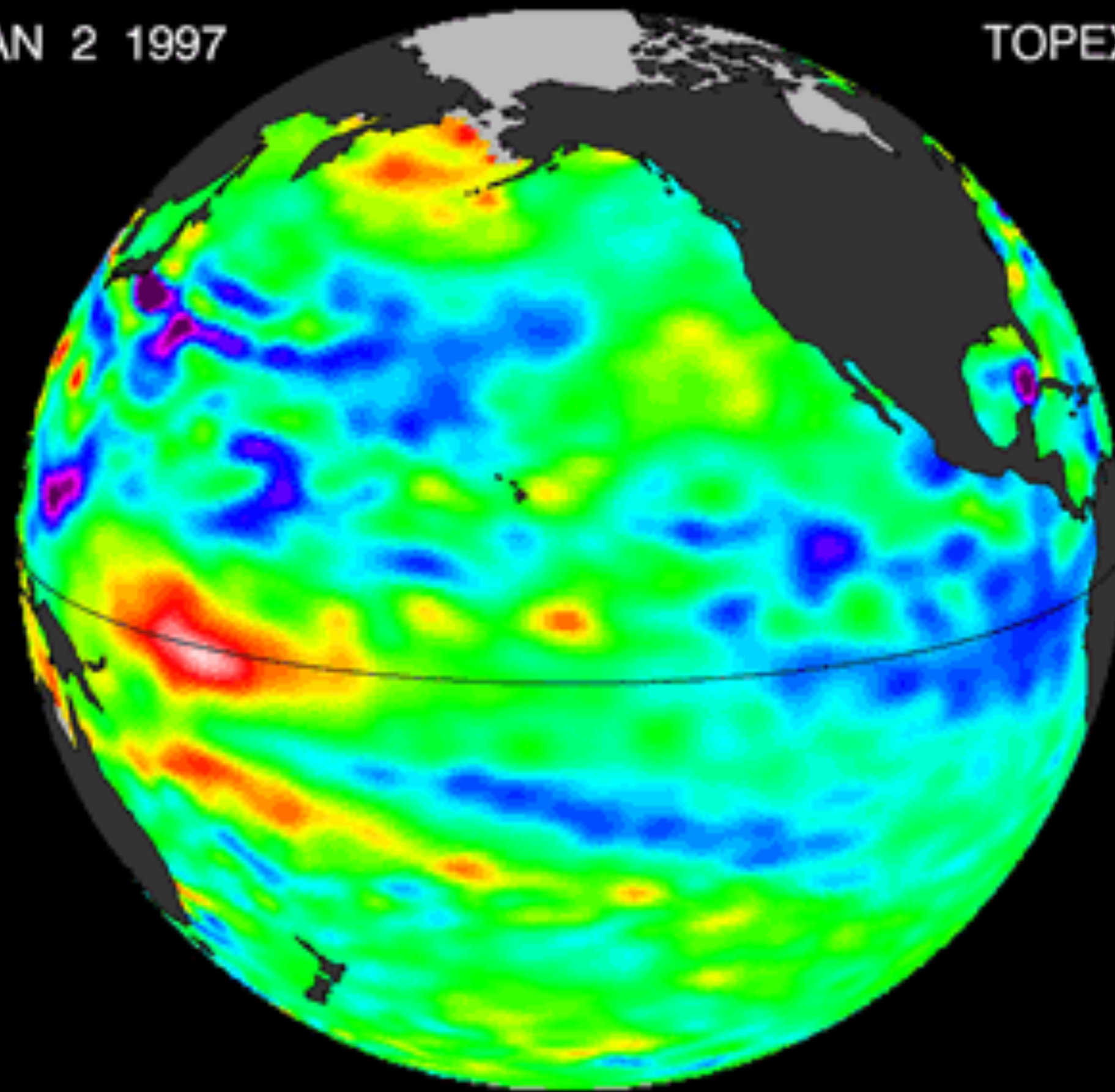
M2 Physique ENS de Lyon, 16-20 janvier 2023

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Geophysical Waves

JAN 2 1997

TOPEX/POS

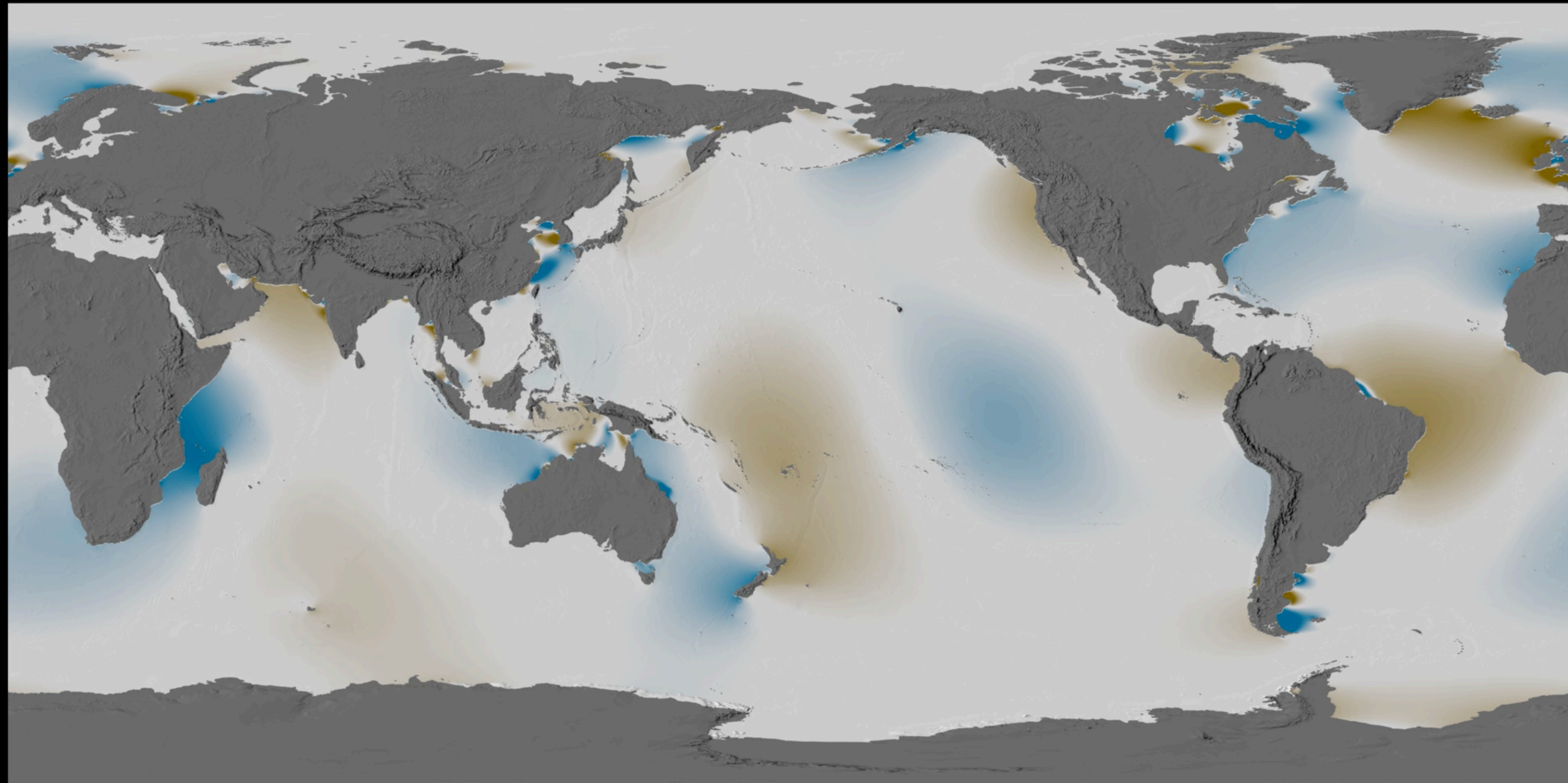
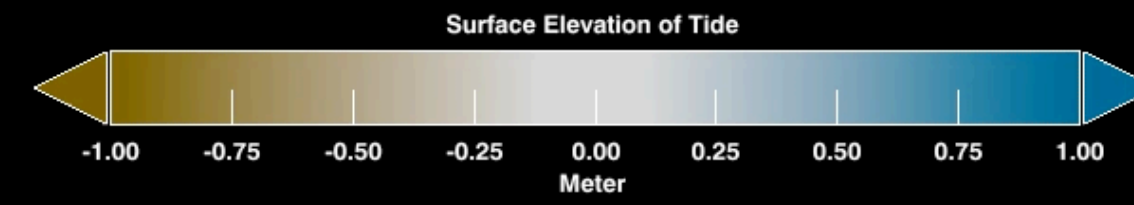


**Equatorial
wave guide**

TOPEX/Poseidon 1997

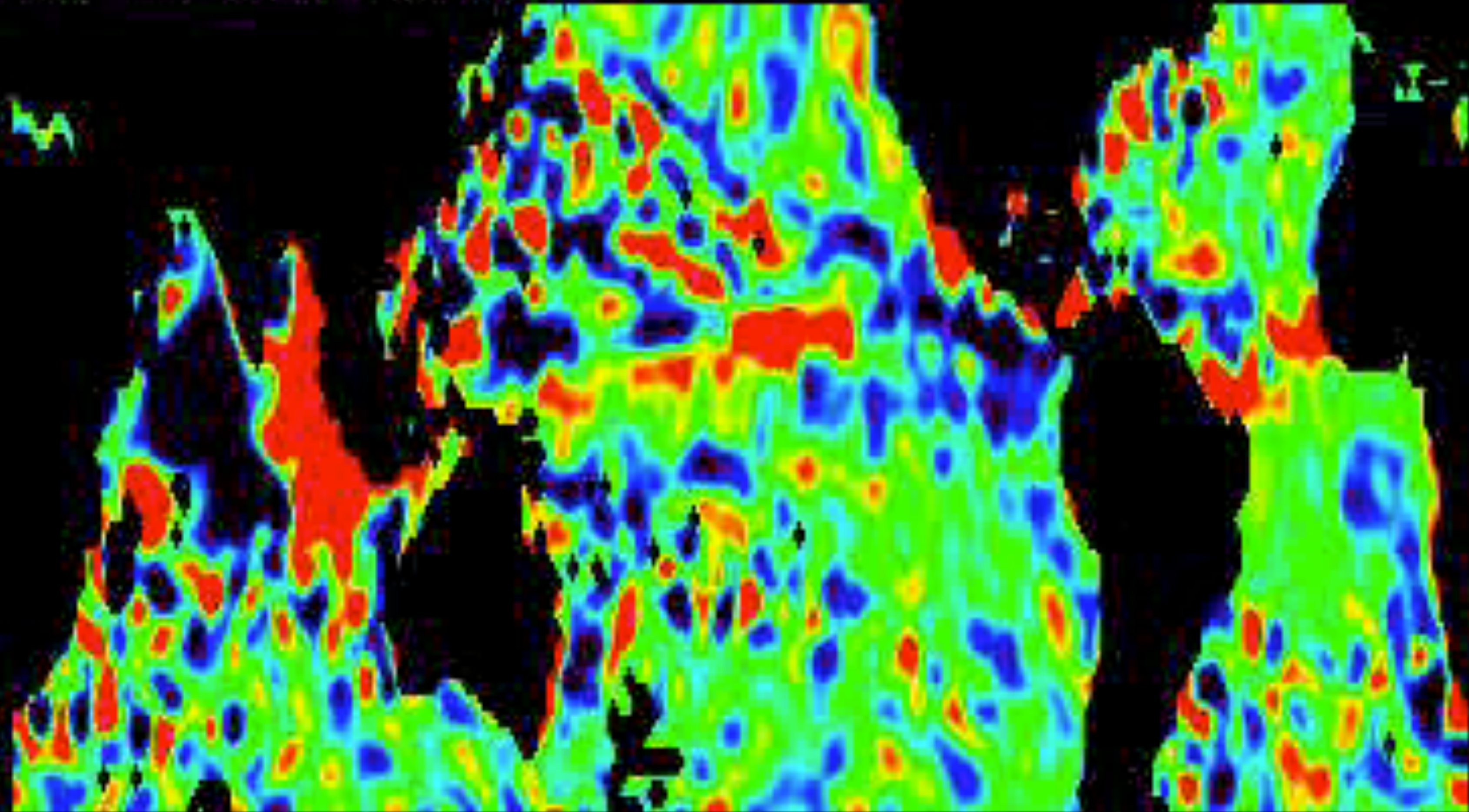
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Surface Elevation of M₂ Ocean Tide



Planetary surface waves, **Tides**

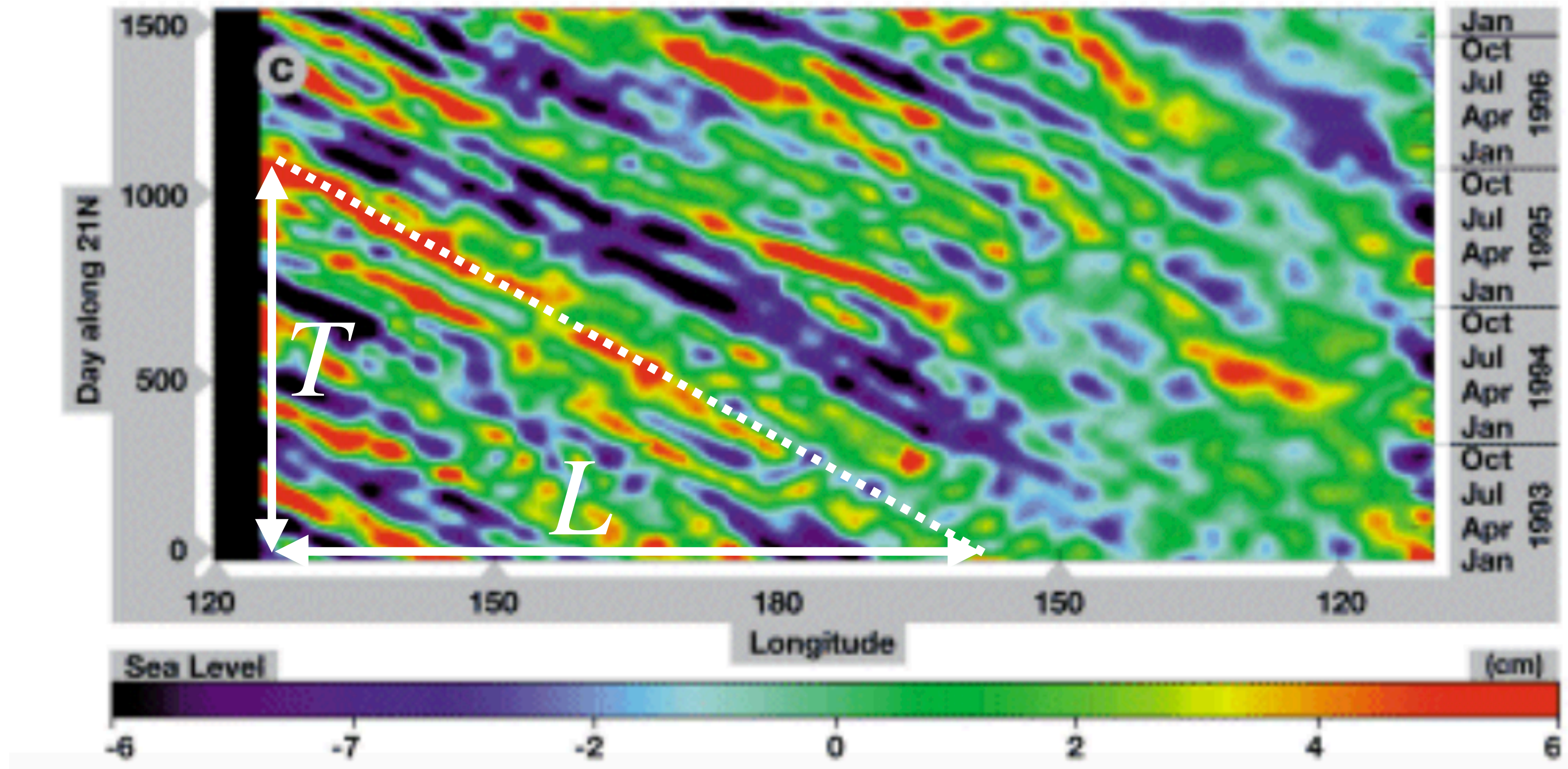
TOPEX Sea Level



Cycle 5 Nov 6 1992

Rossby waves Westward propagation at midlatitudes

Rossby waves

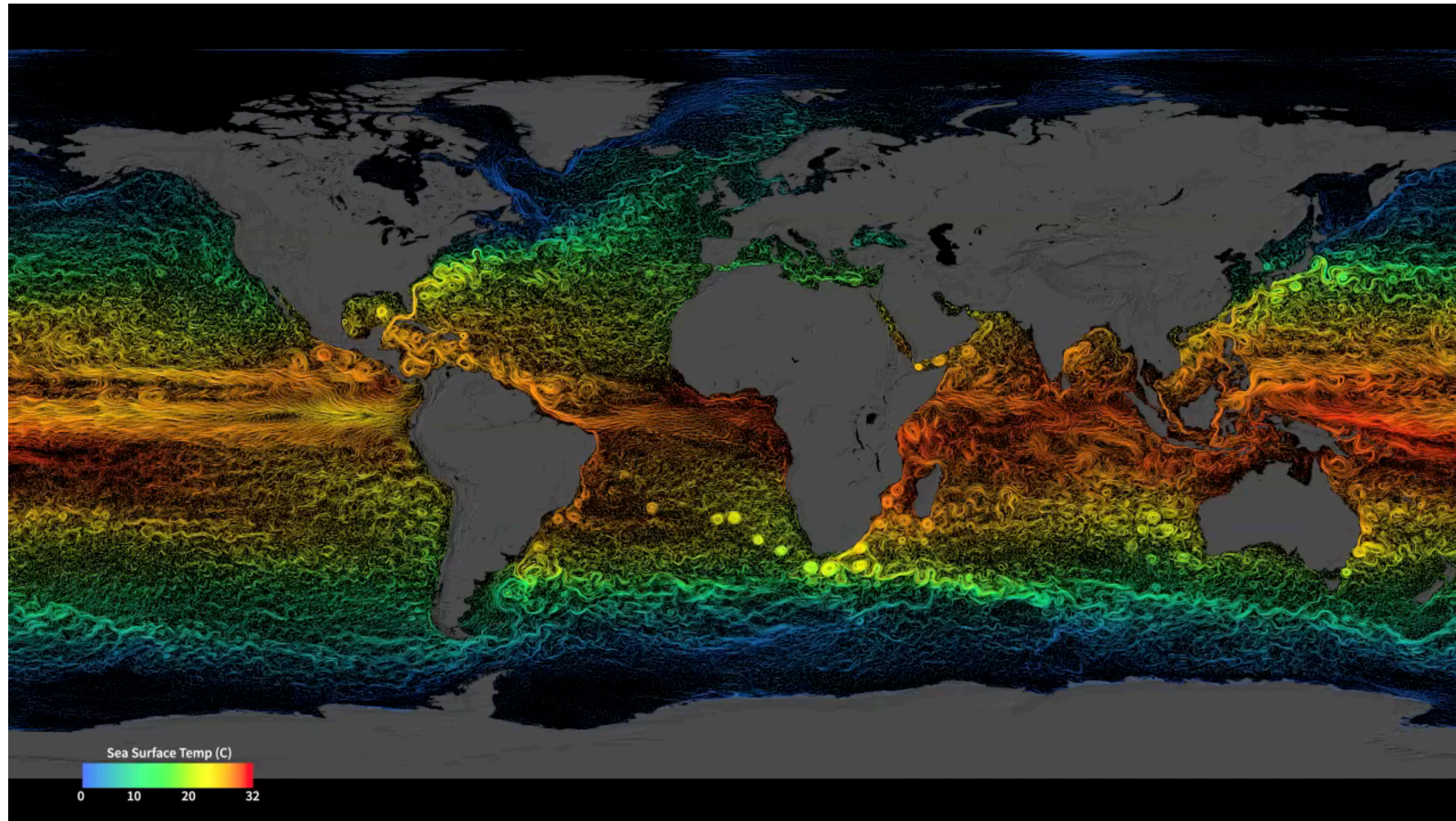


$$\frac{L}{T} \approx 0.1 m/s$$

Chelton and Schlax, Science 1996

Ocean currents

<https://svs.gsfc.nasa.gov/3912>



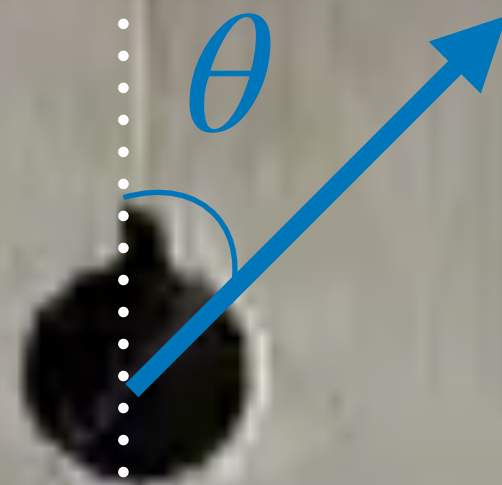
There is a huge number of scales involved in the dynamics

Internal gravity waves in stably stratified flows



Internal gravity waves in stably stratified flows

$$\omega = \pm N \cos \theta$$



Wheeler-Kiladis Spectra for the equatorial waveguide

Convectively Coupled Waves in the Troposphere

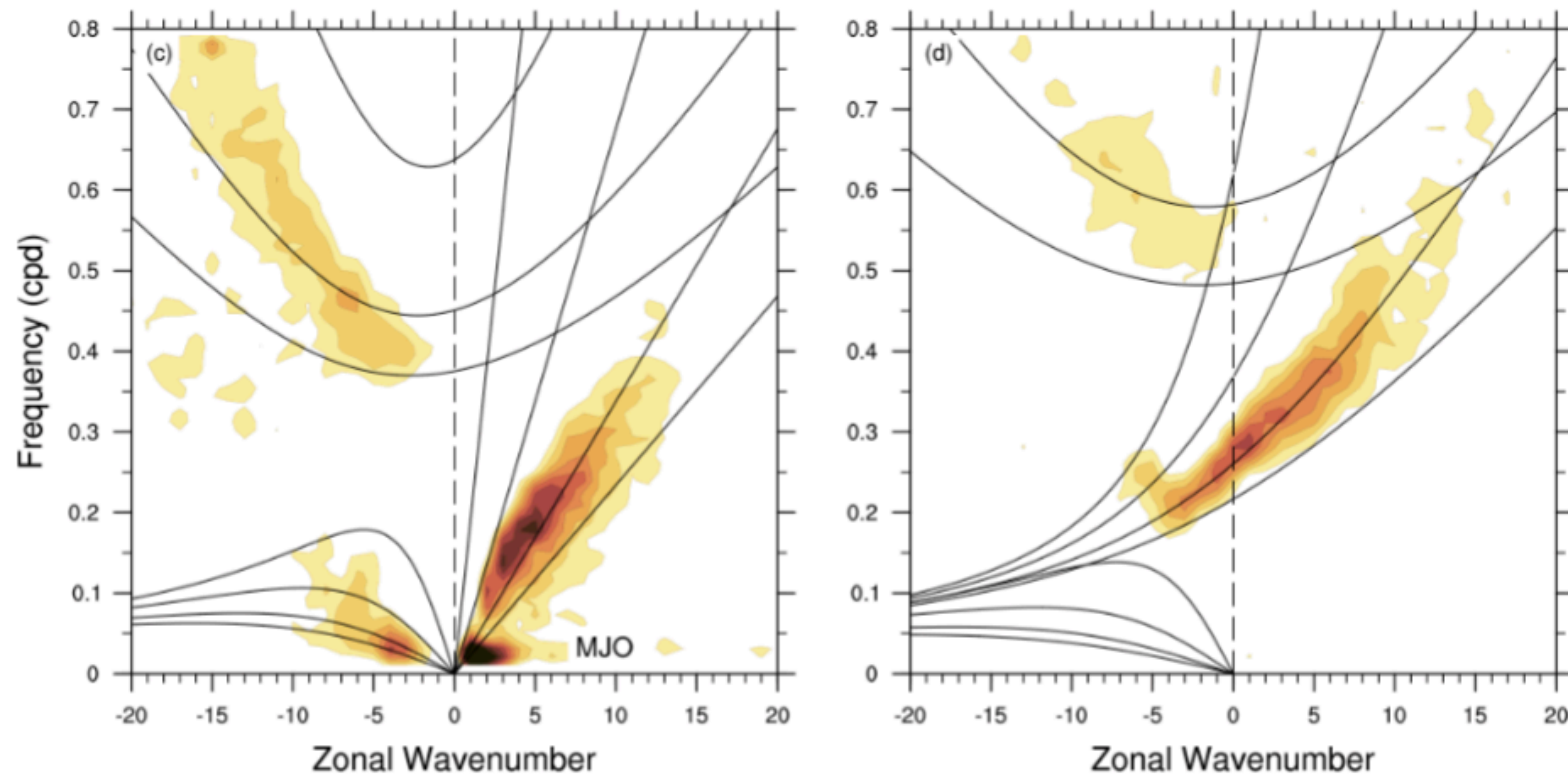
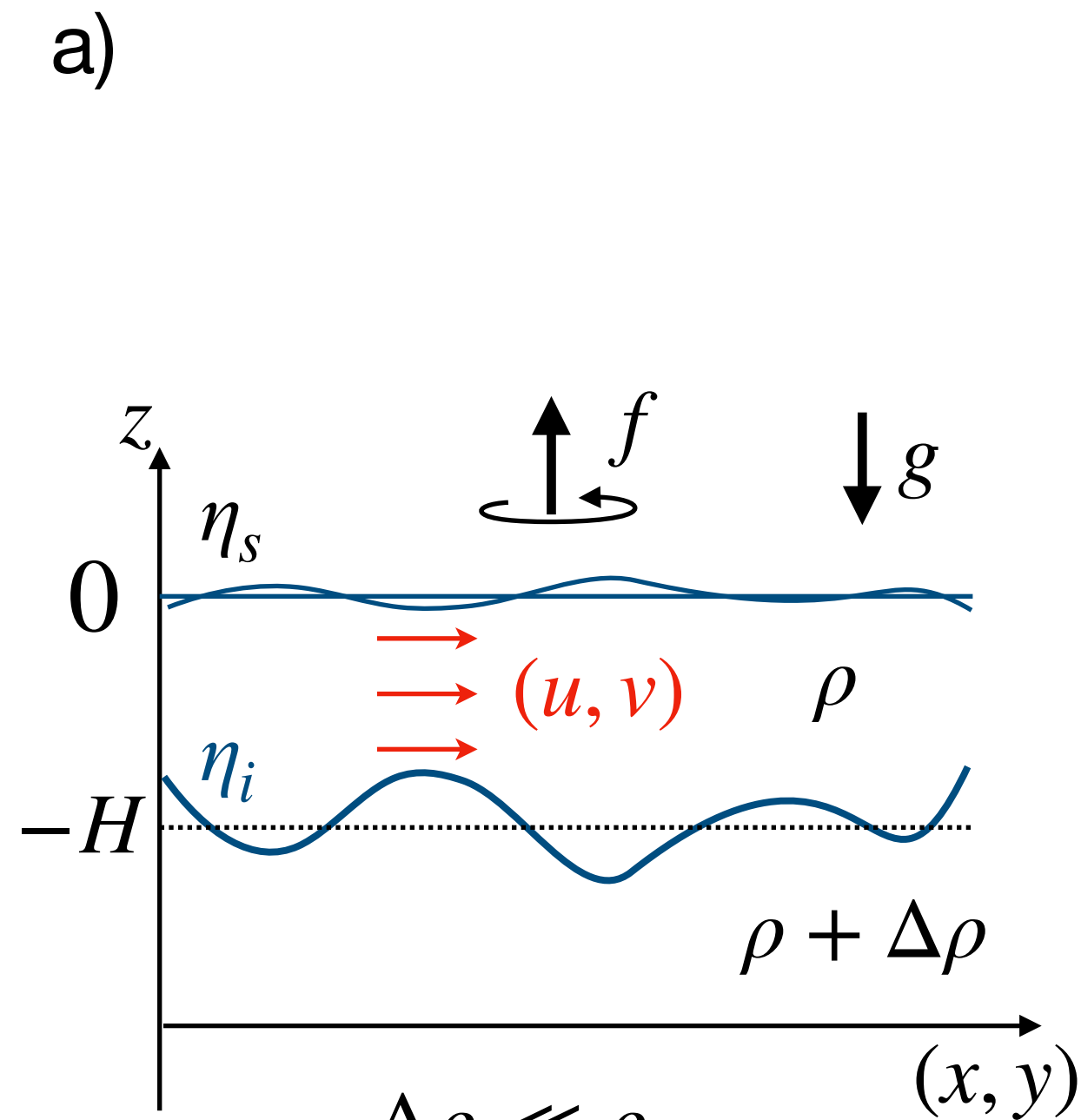


Figure by Juliana
Dias and Yuan-
Ming Chen

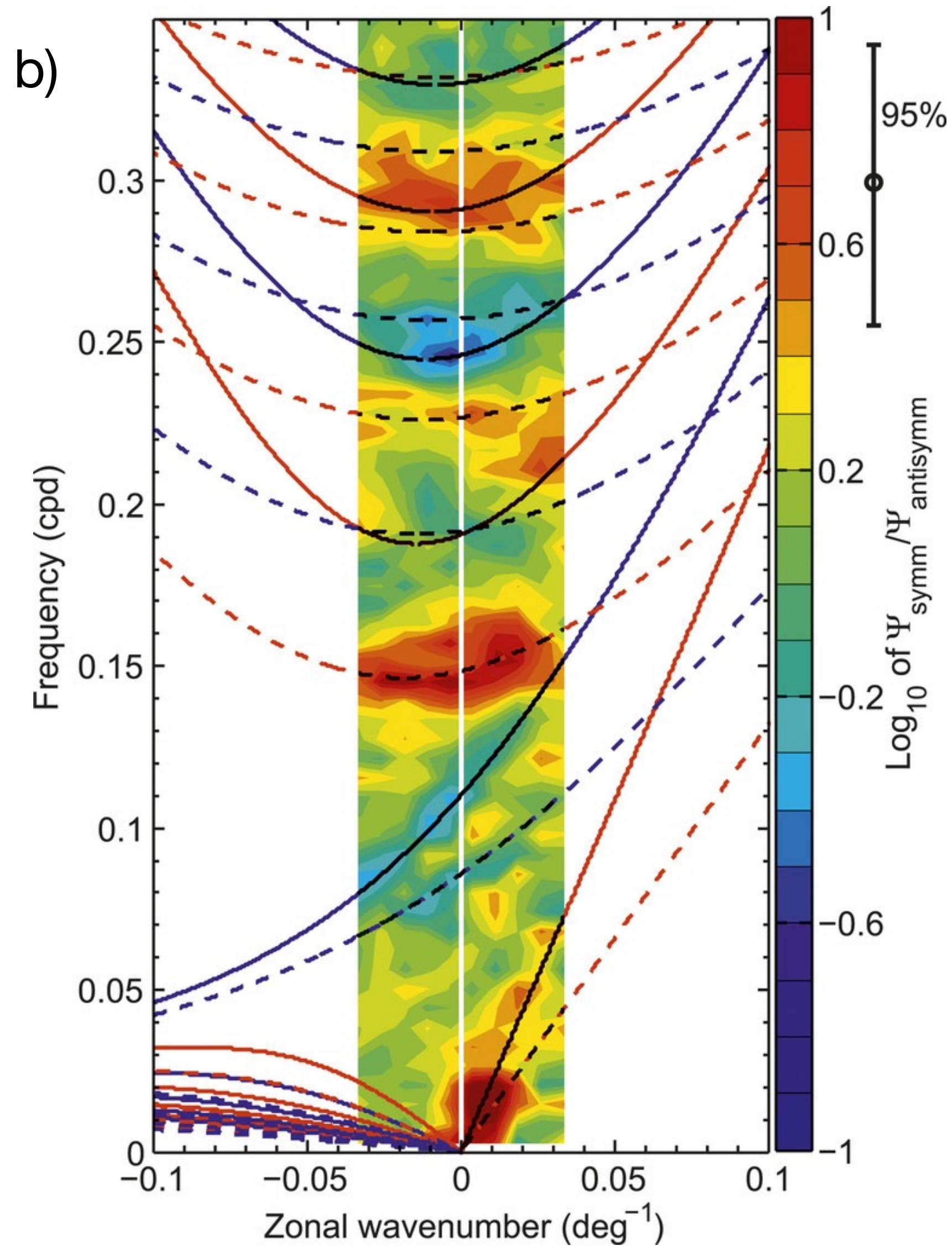
Oceanic waveguide



$$\Delta\rho \ll \rho$$

$$\eta = -\eta_i \gg \eta_s$$

$$c = \sqrt{\frac{\Delta\rho}{\rho} gH}$$



Farrar and
Durland JPO
2012

[https://
journals.ametsoc.org/
view/journals/phoc/42/11/
jpo-d-11-0235.1.xml?
tab_body=fulltext-display](https://journals.ametsoc.org/view/journals/phoc/42/11/jpo-d-11-0235.1.xml?tab_body=fulltext-display)

Kelvin Wave: horizontal structure

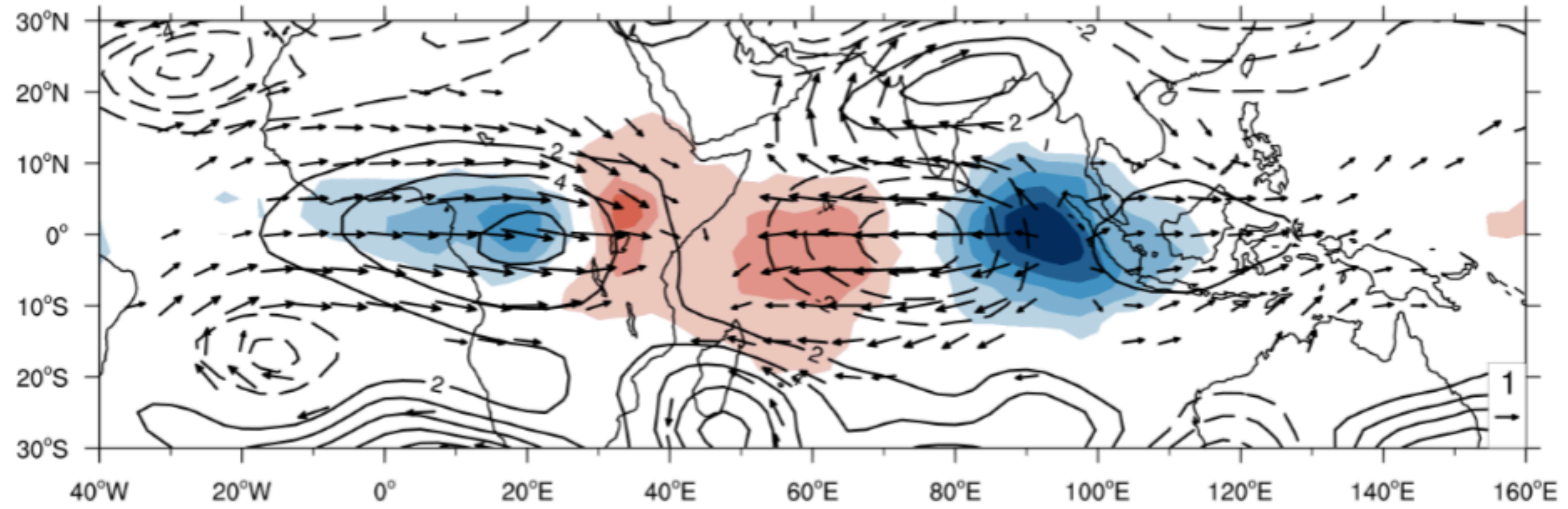


Figure by Juliana Dias and Yuan-Ming Chen