# The Six-Month Rhythm: Bridging the Ocean's Saltiest and Freshest Zones

The tropical "fresh pools" ($S_{min}$) and subtropical "salt deserts" ($S_{max}$) are not separate features. They are two ends of a seasonally synchronized system, with near-equatorial salinity anomalies carried poleward by wind-driven Ekman transport and reaching the equatorward flank of Smax about six months later.

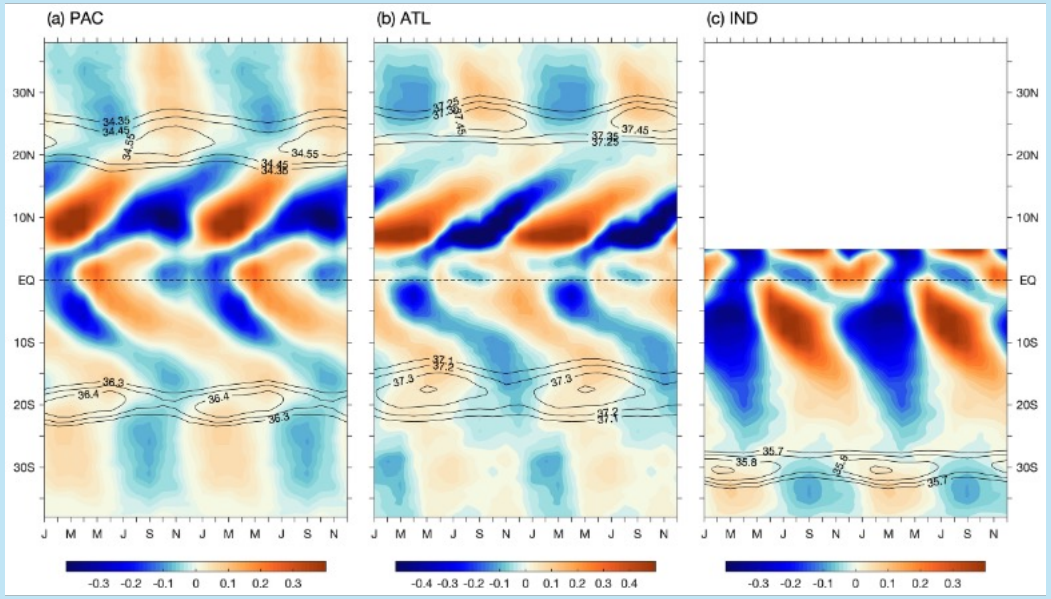


Fig. 1 **The seasonal cycle in motion.** Diagonal bands in time–latitude plots show near-equatorial salinity anomalies propagating poleward across the Pacific, Atlantic, and Indian Oceans. The $S_{max}$ contour marks where the traveling signal meets the subtropical maximum.

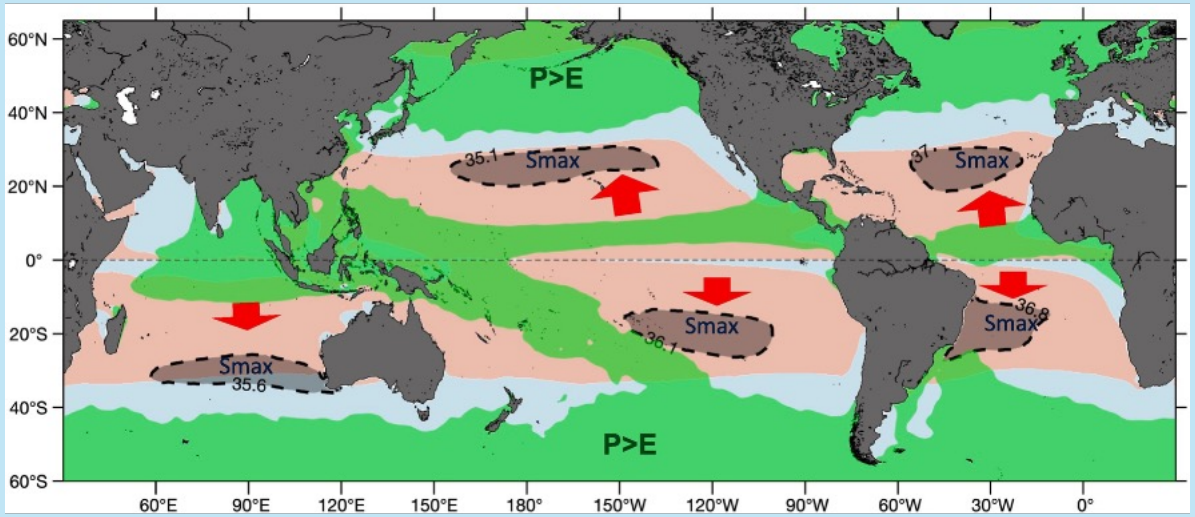


**Fig.2 The tropical gateway that shapes where Smax can exist.** Smax forms within net evaporation (E > P), but its equatorward flank lies in the Ekman impact regime, where poleward Ekman transport can import tropical salinity anomalies. Together, the Ekman and E–P boundaries act as gates that constrain the location and extent of the subtropical salinity maximum.

**Why it matters**

- A predictable oceanic delay: Tropical freshwater forcing shows up in subtropical salinity about six months later.
- A clearer water-cycle signal: Subtropical SSS reflects both local E–P and imported tropical anomalies.
- Climate relevance: ENSO signals can reach the subtropics, affecting stratification, ecosystems, and heat and carbon uptake.


Yu, L., (2023). Connecting subtropical salinity maxima to tropical salinity minima: Synchronization between ocean dynamics and the water cycle. *Progress in Oceanography*, **219**, 103172, https://doi.org/10.1016/j.pocean.2023.103172.