



# Salinity-Induced Eastward Flow in Boreal Spring Favors Extreme El Niño

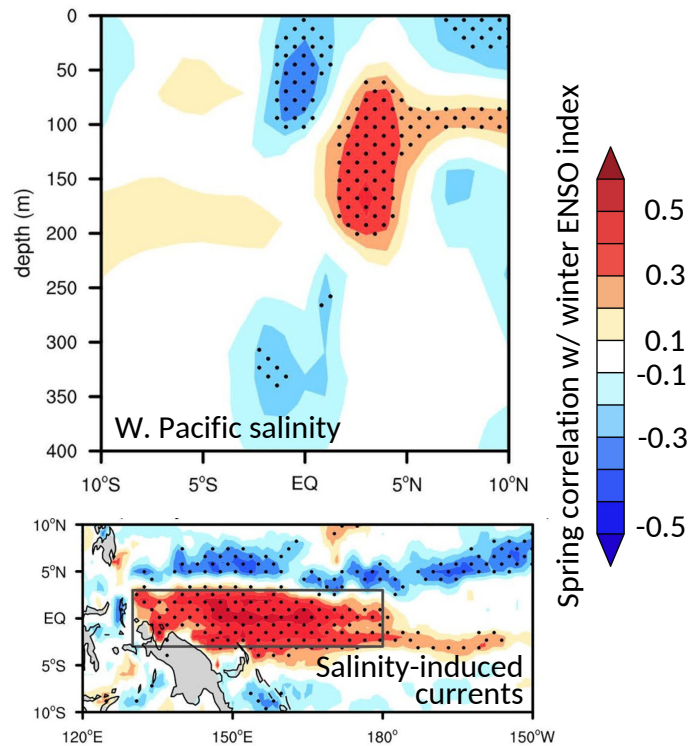


We identify a new ocean salinity precursor of extreme El Niño to potentially enhance El Niño forecast skill.

We analyze observations and conduct coupled model experiments to reveal a novel, previously overlooked mechanism that western Pacific ocean salinity anomalies can actively influence El Niño development through ocean currents. We demonstrate that this salinity mechanism can increase El Niño intensity by ~20% and make extreme events nearly twice as likely.

## Observations/Reanalysis

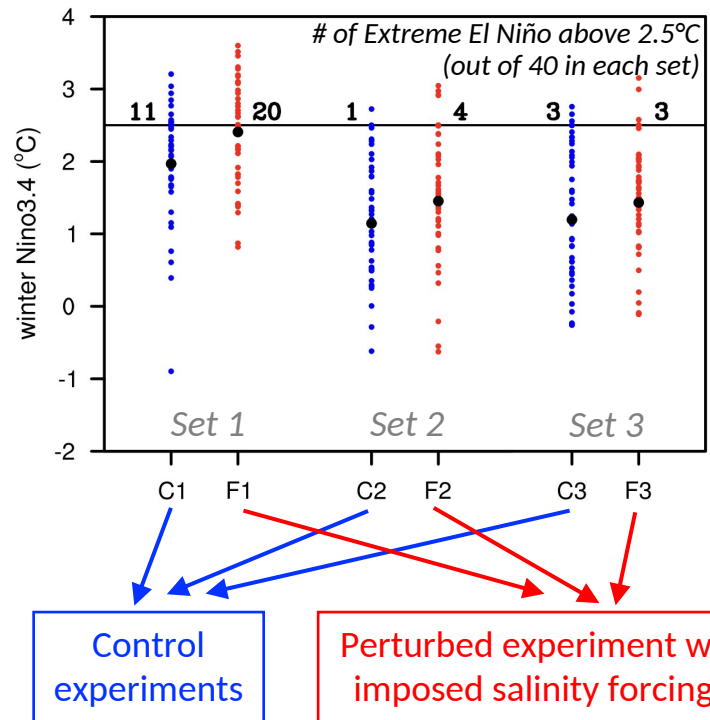
Observational correlation analysis reveals that El Niño is preceded by a spring salinity pattern and associated ocean currents in the western Pacific.



## Targeted Model Experiments

(Community Earth System Model 2)

Imposed spring salinity anomalies almost doubles the probability of extreme El Niño.



## Inter-Model Comparison

A model with a higher El Niño-Southern Oscillation (ENSO) sensitivity to salinity-induced currents tends to simulate a stronger ENSO.

