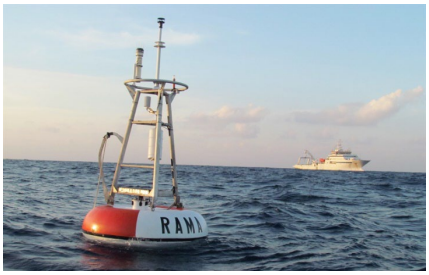
TROPICAL PACIFIC OCEAN PROCESS STUDIES

Decoding the Tropical Pacific for Observing and Models

The Tropical Pacific Observing System (TPOS)[1] redesign will deliver a capable, multi-discipline system to improve subseasonal and longer forecasts. Process studies to fill knowledge gaps in ocean-atmosphere connections are essential to refine TPOS and enhance connections with predictive models[2] To make progress and realize the goals of national and international initiatives[3], we need to observe processes that have never been measured and translate this knowledge into observing networks and modeling systems advancements. CPO's Climate Variability and Predictability (CVP) Program is furthering modeling and pre-field planning in support of these recommendations.

[1] TPOS is supported by NOAA's Global Ocean Monitoring and Observing Program (GOMO), Pacific Marine Environmental Laboratory (PMEL), Climate Program Office (CPO), with significant engagement from the National Weather Service and international partners, [2] The First Report of TPOS 2020, [3] NOAA PPGC, WCRP GPEX



Process studies can leverage the new features of the redesigned observing system: buoys, satellites, and autonomous instruments propel the forecast system.

NOAA Programs advance community activities for TPOS.

4 technology development pilot studies funded in FY16

8 phase 1 pre-field modeling studies funded in FY18

8 phase 2 pre-field modeling studies funded in FY22

2 Workshops with USCLIVAR

Advancing Planning for Process Studies in the Tropical Pacific

Pacific Upwelling and Mixing Physics (PUMP)

Upwelling/mixing physics and parameterization in ocean circulation and climate models, and on the minimum sustained observations needed to quantify the Pacific upwelling and monitor changes over time
(see the white paper)

Air–sea Interaction at the Eastern Edge of the Warm Pool (EEWP)

Air-sea interactions and the role of upper ocean salinity layers in maintaining warm surface waters at the eastern edge of the west Pacific warm pool, focusing on air-sea coupling on intraseasonal timescales
(see the white paper)

PUMP Projects

Anna-Lena Deppenmeier, Mixing and upwelling processes in the Equatorial Pacific Cold Tongue

Matthew Mazloff, Mixing processes and larger scale forcing of upwelling in the Tropical Pacific Ocean

Andrew T. Wittenberg, Equatorial Pacific Climate Processes via Hierarchical Coupled Modeling

Both PUMP & EEWP Projects

Hyodae Seo, Ocean-atmosphere-wave interactions in the Tropical Pacific

Yolande Serra, Capabilities of Uncrewed Surface Vehicles to study ocean phenomena in a virtual setting

Chidong Zhang, Combined Uncrewed Systems deployed in a modeling framework to study the Air-Sea Transition Zone

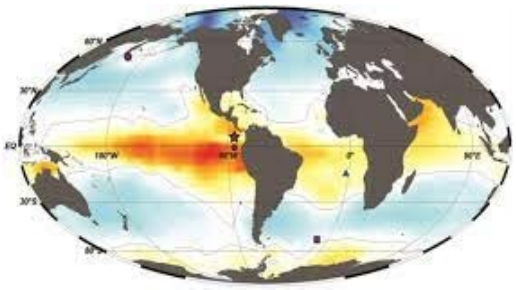
EEWP Projects

Aneesh Subramanian, Reducing systematic errors in modeling the coupled ocean-atmosphere boundary layer

Carol Anne Clayson, Field measurement strategy for the eastern edge of the warm pool in the tropical Pacific Ocean

Current projects build upon previous investments to prepare for a field campaign.

	2022	2023	2024	2025	2026	2027
CVP-funded working group	Pre-field Modeling II and Planning				Field Campaign	
Science Community	**Lead** science plan development, **build** international collaborations, **engage** agency program managers, leverage US CLIVAR and other organizing mechanisms, **champion** and build awareness and support in community					
NOAA Programs	Programs **facilitate** and **coordinate** funding, securing observational assets (with labs), coordinate international and interagency engagement and support with community					



Partnerships are vital to the Tropical Pacific Ocean process studies.

TROPICAL PACIFIC OBSERVING SYSTEM

US CLIVAR

NOAA GLOBAL OCEAN MONITORING & OBSERVING

NASA Ocean Biology & Biogeochemistry

What are we working towards together?

Broad community and NOAA support for a science plan that has clear mutual benefits to participating nations

International partner engagement from the scientist to agency level to bring resources and observing assets to the field for research yielding outcomes

US federal agency awareness and participation in areas relevant to their missions

Saildrones (left) are equipped to measure ocean and weather variables. (NOAA)