

## Diurnal cycles of near-surface ocean velocities at five moorings across the tropical Pacific

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Enhanced sampling at five Tropical Atmosphere Ocean (TAO) moorings across the tropical Pacific are used to observe the near-surface ocean between 7 meters and 65 meters depth. We pair year-long records of ocean velocity, temperature and salinity with observations of surface wind and radiation to investigate the diurnal cycle of heat and momentum transfer between the ocean surface and the interior. Trapping of wind momentum in warm afternoon stratified layers can provide a mechanism that transfers wind forcing into the ocean interior. We find a diversity of this type of diurnal cycle across the five sites: some locations show transmission of wind forcing as deep as 65 meters, while some are limited to the top few meters of the ocean. Consistent with previous studies, we find that diurnal surface forcing penetrates deeper into the ocean interior in regimes that are marginally unstable to shear-flow mixing. However, we find that a marginally unstable flow alone cannot predict deep penetration of diurnal forcing; instead, a combination of significant near-surface background shear from a shallow Equatorial Undercurrent with strong wind and solar forcing must be present as well. Finally, recommendations for the Tropical Pacific Observing System (TPOS)-2020 project will be discussed.