Probability Distribution Function of the Upper Equatorial Pacific Current Speeds

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The probability distribution function (PDF) of the upper (0-50 m) tropical Pacific current speeds (w), constructed from hourly ADCP data (1990-2007) at six stations for the TOGA-TAO project, satisfies the two-parameter Weibull distribution reasonably well with different characteristics between El Nino and La Nina events: In the western Pacific, the PDF of w has a larger peakedness during the La Nina events than during the El Nino events; and vice versa in the eastern Pacific. However, the PDF of w for the lower layer (100-200 m) does not fit the Weibull distribution so well as the upper layer. This is due to the different stochastic differential equations between upper and lower layers in the tropical Pacific. For the upper layer, the stochastic differential equations, established on the base of the Ekman dynamics, have analytical solution, i.e., the Rayleigh distribution (simplest form of the Weibull distribution), for constant eddy viscosity K. Knowledge on PDF of w during the El Nino and La Nina events will improve the ensemble horizontal flux calculation, which contributes to the climate studies.

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