The relation between the statistics of open ocean currents and the temporal correlations of the wind-stress GOLAN BEL, YOSEF ASHKE-NAZY, Ben-Gurion University of the Negev — We study the statistics of wind-driven open ocean currents. Using the Ekman layer model for the integrated currents, we investigate, analytically and numerically, the relation between the wind-stress distribution and its temporal correlations and the statistics of the open ocean currents. We find that temporally long-range correlated wind results in currents whose statistics is proportional to the wind-stress statistics. On the other hand, short-range correlated wind leads to Gaussian distributions of the current components, regardless of the stationary distribution of the winds, and therefore, to a Rayleigh distribution of the current amplitude, if the wind-stress is isotropic. We find that the second moment of the current speed exhibits a maximum as a function of the correlation time of the wind-stress for a non-zero Coriolis parameter. The results were validated using an oceanic general circulation model.

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