Abstract View

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Initial Conditions for a General Circulation Model of Tropical Oceans

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ABSTRACT

A general circulation model of the tropical Pacific Ocean, which realistically simulates El Niño of 1982–83, has been used to determine how different initial conditions affect the model. Given arbitrary initial conditions (not in equilibrium with the wind) the model takes almost a year to return to a state in which the currents and density gradients are in equilibrium with the winds. Errors in the absolute value of the temperature persist far longer, however, indicating that accurate density data are essential initial conditions. If the correct density field is specified initially, but no information is provided about the currents, then the model recovers the currents within an inertial period, except for the eastern equatorial region. That region is affected by equatorial Kelvin waves which are excited because the model is initially in an unbalanced state. The currents associated with these waves are relatively modest and do not affect the density field significantly. Because of the large zonal scale of the thermal field in the tropical Pacific, three or four high resolution meridional density sections appear adequate for the initialization of the model. This result, however, takes into account neither the energetic waves, with a scale of 1000 km, that are associated with instabilities of the equatorial currents nor other high frequency fluctuations in the ocean.