ABSTRACT

Assessing Tropical Pacific Decadal Variability in Climate Models

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It is well documented that the decadal variability in the tropical Pacific has substantial effects on marine ecosystems, the carbon cycle, and climate variations world-wide (e.g. Mantua et al. 1997; Trenberth et al. 2002; Feely et al. 2002). The role of tropical Pacific in long-term climate change remains controversial, however. The sensitivity of tropical Pacific to the anthropogenic forcing varies significantly in climate models. While permanent El Nino conditions are simulated in many climate models, La Nina-like conditions are also seen in other simulations (IPCC 2001; Cane et al. 1997; Boer and Yu 2003). In addition, the amplitude of decadal variations is generally smaller than natural variability observed. All of these cast questions on the amplitude of global warming predicted by these climate models. The PIs will investigate the oceanic and atmospheric processes associated with the decadal variability in the tropical Pacific, and their atmospheric and oceanic tele-connections in all the climate models in this program, and compare them to the observation. The PIs focus will be on the upper tropical Pacific above thermocline or pycnocline and the global surface winds, sea level pressure (SLP), and surface temperature. The aim is to quantify trends and the amplitude of decadal and multi-decadal variations in the tropical Pacific in the various climate models and compare these model results with data for the last 50 years. Model-data comparison will be relied on the historical hydrographic data compiled from NODC World Ocean Dataset, newly available WOCE and PMEL hydrographic sections and ARGO float profiles, data from TAO/TRITON moored array, XBTs, and island and coastal tide gauges, as well as NCEP-NCAR reanalysis. Results of the proposed research will have applications to understanding the Pacific decadal variability, and potential links between natural variability to the anthropogenic-induced global warming, thus to improving future climate projection.

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