



Nonlinearity Modulating Central Pacific- and Eastern Pacific-El Niño Events in Intensities and Spatial Structures

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The influence of nonlinearity on the intensities and spatial structures of central Pacific (CP-) El Niño and eastern Pacific (EP-) El Niño is comparatively investigated in the intermediate-complexity Zebiak-Cane model. The nonlinear component of the perturbed temperature advection (NTA), as the source of nonlinearities in the Zebiak-Cane model, shows warming rate in the central equatorial Pacific for CP-El Niño events and makes less contributions to the CP-El Niño structure selection; but it presents warming rate in the eastern equatorial Pacific for EP-El Niño event and significantly promotes EP-El Niño events in El Niño-type selection. The NTA associated with CP- and EP-El Niño events also shows to be different in amplitudes and the former is smaller than the latter, which causes that CP-El Niño are weakly modulated by small NTA in intensities and may be controlled by weak nonlinearity while EP-El Niño are significantly enhanced by large NTA in amplitudes and likely to be modulated by relative strong nonlinearity. Then the CP-El Niño is often weaker than the EP-El Niño. In terms of the NTA associated with CP- and EP-El Niño having different characteristics in spatial structures and intensities and its role in selecting El Niño modes, it can be thought of as that the diversity of El Niño events may be closely related to the change of nonlinear characteristics in the tropical Pacific.