Abstract Details

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Title: Decadal Variation and rapid Transition of Thermohaline Circulationinc finite-amplitude perturbation

Abstract:

Using a simple coupled ocean-atmospheric two-box model, the decac variation and rapid transition of thermohaline circulation (THC) is investigated by a new approach, i.e. conditional nonlinear optimal perturbation (CNOP). Firstly, the behavior of linear and nonlinear evo of finite amplitude perturbations is studied by using both linear and n models. In the nonlinear category, two different types of perturbation One is the freshwater flux perturbation, which is stronger comparison linear case. The other is salinity flux perturbation, which is weaker comparison with in linear case. Secondly, the transition of THC induce finite amplitude perturbation is also investigated by CNOP approach. I given magnitude of initial perturbations, the THC has different variati behaviors according to the initial perturbations being freshwater flux salinity flux types. At present climate, there are approximately 20-yr variations for the magnitude of perturbations limited to 0.05, which is 3% of steady mean value. The bigger the initial perturbation is, the lo the variation is. However, for the salinity type perturbations, they hav saturated variation time of about 40 years even perturbations are rela as big as 0.5, about 30% of steady mean value. When the magnitude CNOP becomes very large, it will have a rapid transition from present state to another climate state. The critical value is about 0.791 in this This implies that the THC is quite stable at present climate for finite amplitude perturbations.

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