

Can the Tibetan Plateau warming influence winter Arctic oscillation?

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Using the state-of-the-art general circulation model (GCM), the effect of warming over Tibetan Plateau (TP) on the stationary planetary wave activities and Arctic oscillation (AO) is investigated. It is concluded that the TP warming causes significant hemispheric-scale climatic response over the Northern Hemisphere, which is characterized by a positive AO mode anomaly. The TP warming has a strong influence on the propagation of stationary planetary waves. The dipole perturbation of subtropical westerly jet induced by the TP warming could cause more equatorward propagation of stationary planetary waves in the middle latitudes as well as diminished upward propagation of stationary planetary waves over polar region, thereby leading to a positive AO mode anomaly. The composite analysis obtained from the Re-Analysis data confirms that the simulated perturbation of the subtropical westerly jet is closely related to the TP warming. However, the differences in high latitude AO mode responses to the TP warming in numerical experiments and Re-Analysis data imply that the net effect of TP warming only partly contributes to the interannual variations of AO mode.

Key words: GCM, Tibetan Plateau warming, Arctic oscillation, Stationary planetary waves