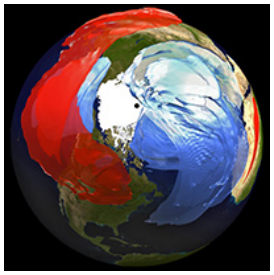

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On the dynamics of stratosphere-troposphere planetary-wave coupling

Monday, 18 November 2019 17:00 (30 minutes)

Early ideas on the dynamics of stratosphere-troposphere coupling involved planetary-waves directly coupling both regions. However, recent work has largely focused on coupling via the zonal-mean flow as observed during Stratospheric Sudden Warmings (SSWs). Here, the dynamics of planetary-wave coupling is revisited in the context of extreme positive and negative wave-1 stratospheric heat flux events which are associated with an equatorward and poleward shift of the North-Atlantic jet, respectively. Ensemble spectral nudging experiments in a dry-dynamical core model are performed to determine the mechanisms underlying the events, including their coupling with the tropospheric circulation and their links to SSWs. The results suggest extreme stratospheric wave-1 heat flux events are consistent with the paradigm of linear vertically propagating waves but also reveal an unexpected role for non-linearities involving higher-order wavenumbers. It is argued that planetary-wave coupling is a key dynamical pathway linking the stratosphere with the troposphere and provides insight on the dynamics of zonal-mean flow coupling.

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