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# Stimulation of the Circumglobal Waveguide Pattern by tropical heating

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As has been demonstrated through analysis of observations and AGCMs, if one considers upper tropospheric fields, like streamfunction or the v wind component, that have significant variability in the subtropics as well as midlatitudes, then one of the dominant patterns of interannual wintertime variability is the so-called Circumglobal Waveguide Pattern (Branstator, 2002). This pattern consists of a zonally oriented chain of circulation features of alternating sign, largely trapped in the subtropical jet and extending completely around the Northern Hemisphere. Past work has concentrated on characterizing this pattern of variability as an intrinsic mode of the system. In this study we investigate how this pattern is stimulated from the tropics by interannual heating anomalies.

Analysis of observations and AGCM simulations indicates that the CWP is one of the main structures stimulated by interannual tropical events. Because of its existence local tropical precipitation anomalies can affect essentially the entire Northern Hemisphere. Furthermore SVD analysis and AGCM experiments indicate that stimulation of the CWP occurs only for very specific forcing locations, particularly the western tropical Pacific and Indian Ocean. One important consequence of this is that El Nino/La Nina events can be usefully subdivided into two categories: those with SST anomalies east of the average El Nino/La Nina position and those to the west of this position. The former events exciting a midlatitude wavetrain that is largely confined to the Western Hemisphere while those in the latter category tend to excite the CWP and thus affect the entire northern midlatitudes, including Europe and Asia. Several dynamical mechanisms appear to contribute to this sensitivity including interactions with the climatological waves and feedbacks from the synoptic eddies.