



Extratropical severe storms and UTLS Potential energy surges

Gregory J. Tripoli

University of Wisconsin - Madison, Atmospheric and Oceanic Sciences, Madison, Wisconsin, United States
(tripoli@aos.wisc.edu)

The relationship between energy released by moist processes within tropical convective activity and the build up of potential energy and low potential vorticity in the upper tropical troposphere – lower stratosphere (UTLS) has been shown. We refer to this energy anomaly as the tropical potential energy bubble that can be quantified by the total positive anomaly of mass stored between the 340 and 410 K isentropic layer. Recent studies have shown that this energy periodically surges into the extratropics, resulting in subtropical jets that connect into the Rossby wave train where an energy transfer is initiated. This upper level surge drives an accompanying lower level surge of moisture, often referred to as an atmospheric river, that can destabilize the atmosphere to deep moist convection. These surges are sometimes called tropical plumes.

The energy transfer process not only invigorates the polar jet stream, but gives rise to strongly veering wind shear profiles in the low to mid troposphere that are conducive to severe storm organization. Because of the combined impact of the atmospheric river, shearing and QG forcing associated with these surges outbreaks of particularly significant severe storm activity are often associated with UTLS energy surges. Documentation of tropical plume events showing their relation to the formation of severe storm activity will be presented at the oral presentation.