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Impact of Tropical Cyclones and Transient Polar Disturbances on the North Pacific Subtropical Jet: Downstream Baroclinic Development and a Subsequent Intense Cyclone Event over the United States

Hosted by Russ Schumacher

Thursday, March 22, 2012

**ATS room 101; Discussion will begin at 3:30pm
Refreshments will be served at 3:00pm in the coffee lounge**

Observations suggest that the latitudinal location, longitudinal extent, and overall strength of the North Pacific subtropical jet (STJ) can vary on intraseasonal and synoptic time scales in response to poleward-directed diabatically driven upper-level outflow associated with tropical heating anomalies and tropical cyclones (TCs), and equatorward-directed flow associated with the passage of higher latitude transient baroclinic disturbances. This presentation will focus on the role that tropical disturbance-related diabatically driven outflow over the Bay of Bengal and western North Pacific collectively played in conjunction with higher latitude transient disturbances in strengthening the North Pacific STJ. After this strong STJ entered western North America it helped to trigger a record-breaking intense cyclone event (< 960 hPa) downstream over the Upper Midwest on 25-26 October 2010 that is illustrated by a case study.

The record-breaking Upper Midwest cyclone originated from a lee trough east of the Rockies and rapidly developed as a very strong (150+ kt) zonally elongated North Pacific STJ crossed the Rockies. The associated zonally elongated STJ-related strong meridional thermal gradient in the upper troposphere was produced by the juxtaposition of poleward- and eastward-moving plumes of warm air that ascended from the planetary boundary layer in the vicinity of North Pacific TCs and tropical depressions to the level of the STJ and equatorward- and eastward-moving plumes of cold air that originated over northern Asia and remained in the middle and upper troposphere. A noteworthy aspect of the 25-26 October Upper Midwest cyclone was the relative absence of low-level baroclinicity in the storm environment. The development of this intense Upper Midwest cyclone will be compared and contrasted with the equally intense Ohio Valley cyclone of 25-26 January 1978 ("Cleveland Superbomb") that featured coupled upper-level jets and abundant baroclinicity throughout the troposphere.

Link to colloquium videos and announcement page: <http://www.atmos.colostate.edu/dept/colloquia.php>