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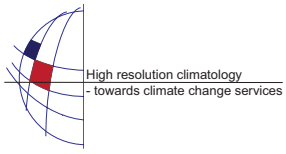

Warm conveyor belts and tropopause-level Rossby waves

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Intense extratropical cyclones are associated with coherent airflows, so-called warm conveyor belts (WCBs), which transport moist boundary layer air within 1-2 days poleward into the upper troposphere. Due to condensational latent heating, the potential vorticity (PV) evolution along WCBs is typically characterized by an initial increase from typical tropospheric values to enhanced values of 1-3 pvu, followed by a decrease of PV to fairly low values of less than 0.5 pvu. These low PV values in the upper-tropospheric outflow of WCBs constitute negative anomalies that have the potential to significantly impact upon the downstream flow evolution. After a summary of the background theory, examples will be shown that illustrate the potential of WCB-induced PV modifications to contribute to the downstream amplification and breaking of Rossby waves. In a second part, the Rossby wave evolution over the North Atlantic during summer 2008 will be investigated with a particular focus on the relationship with WCB outflows. It is shown that the evolution of several Rossby waves is strongly influenced by these intense cross-isentropic flows, and that in some situations WCBs act as the trigger process for the formation of new waves (mainly in the western North Atlantic) and the pronounced poleward breaking of high amplitude waves (typically over Northern Europe).