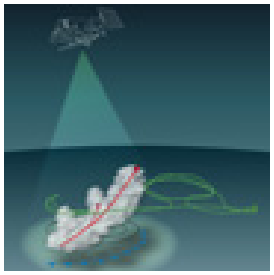

Contribution ID: **19** Type: **Oral presentation**

How do diabatic processes in warm conveyor belts influence circulation and Rossby waves at tropopause level?

Wednesday, 11 March 2020 10:45 (20 minutes)

Different mechanisms for the influence of diabatic heating on the dynamics of the jet stream include: i) radiative maintenance of potential vorticity (PV) contrast across the tropopause, ii) sharpening of jet stream maximum wind by the "non-advective PV flux", iii) amplification of baroclinic wave growth rate through lower "effective static stability"and iv) diabatic mass transport into tropopause ridges. Latent heat release in warm conveyor belts (WCBs) is important to the last 3 mechanisms. This talk explores the fourth mechanism and uses Kelvin's circulation theorem to argue that the primary diabatic influence is not a change to the value of PV in WCB outflow, but the additional transport of mass into higher isentropic layers and the associated expansion in ridge area. This results in a stronger anti-cyclonic flow anomaly as deduced through conservation of circulation. NAWDEX cases are used to quantify the effects in a variety of situations. It is shown that diabatic mass transport can achieve a change in large-scale flow configuration that is unlikely to occur in an adiabatic flow, and its relation to dipole block onset is discussed.

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Session Classification: Session 6

Track Classification: Workshop: Warm Conveyor Belts –a challenge to forecasting