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Oral
(Virtual Talk)
Diabatic heating affects the evolution of individual mid-latitude systems and the configuration of the storm-tracks themselves. Anomalies in tropical diabatic heating ultimately drive mid-latitude teleconnections on time scales as short as 10-15 days.

Yet diabatic heating is NOT an observable, is not reported in standard reanalysis data sets, and is also not saved as standard output for most weather prediction models. OLR and precipitation are routinely used as a proxy for diabatic heating in the tropics,
but the vertical structure of the heating is not accessible

We propose a Diabatic heating diagnostic, computed as a residual in the full thermodynamic equation at all levels; with vertical integration over layers of the atmosphere yielding more robust results.

In ensemble forecasts, the scale-dependent pathway of forecast spread can be traced from the uncertainty in tropical diabatic heating to the uncertainty in the Rossby wave source to the uncertainty in mid-latitude circulation regime probability. We present results from extensive MJO-related experiments using ECMWF's IFS.

Diagnosing heating is useful in model development. Heating differences resulting from changes in ECMWF’s stochastic parameterization scheme from SPPT to SPP in two broad vertical layers (850 – 500 and 500-200 hPa) show a modest but significant increase in tropical heating and a tightening of the oceanic ITCZs (see Figure). Current investigations of the Unified Forecast System of NOAA show excessive cooling at upper-levels over the boreal winter storm tracks compared to ERA5. Possible causes for this will be discussed.
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