Warm Conveyor Belts - a challenge to forecasting
Working group – Models

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How well do we represent the complex set of physical processes within a WCB, and what aspects deserve particular attention?

Can we formulate **specific** recommendations for ECMWF/NWP centres and the research community?

- Overall recommendations
  - More systematic assessment, rather than case studies.
  - Better use of existing observations

- Focus on four different aspects of WCBs
  - WCB inflow
  - Ice/mixed phase microphysics
  - Turbulent mixing at the tropopause
  - Embedded convection

1) WCB inflow

- Recommendations:

  (i) systematically assess the properties of the WCB inflow airmass against satellite and in situ observations.

  (ii) quantify moisture sources for the WCB inflow air-sea interaction, transport, boundary layer turbulent mixing, evaporating hydrometeors, convection.

  (iii) quantify the role of convection in modifying airmass properties in the WCB inflow

Ice/mixed – phase microphysics

- Recommendations:

  (i) Systematic (ensemble) modelling study to quantify impacts of microphysics assumptions/formulation on WCB development.

  (ii) Make more use of observations (active radar/lidar and passive – microwave) to constrain hydrometeor contents/fall speeds/cloud phase in models.

Turbulent mixing at the tropopause

- Recommendation:
  - Improve fundamental understanding of the role of turbulent mixing near the tropopause from observations (Doppler radar, in situ aircraft eddy dissipation rate) and in models (mixing, tropopause sharpening).
  - Test 3D turbulence scheme at high resolution at the tropopause to assess whether horizontal gradients of wind shear are important for the turbulence in this region.

Embedded convection

- Recommendations:
  - Systematic assessment of where, when and how often embedded convection occurs in WCB
  - Understanding the variability of impacts of embedded convection in different WCBs
  - Quantify the impacts of parametrised versus explicit embedded convection in model WCB.

- Also discussed…..
  - Representing uncertainty. Can we put more physical insight into the stochastic schemes?
  - Model intercomparisons. Need for common protocol/diagnostics/definitions across models. More diagnostics on diabatic processes.
  - The role of cloud-radiation interactions on cyclone evolution needs further study.
  - Improve understanding of local (WCB) versus non-local (e.g. MJO) influences on blocking.