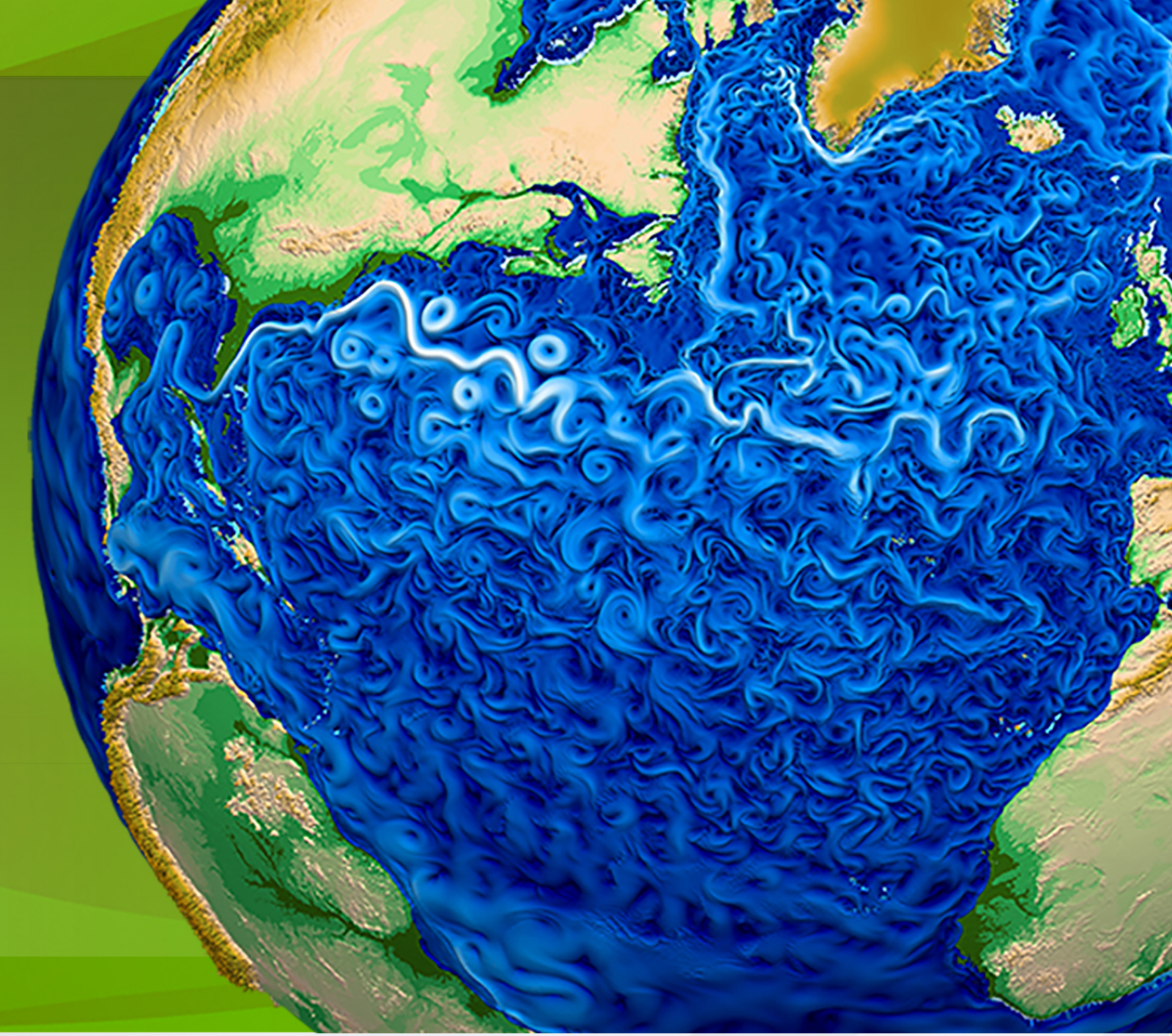


R:

Process Oriented Diagnostics in Candidate ACME Atmosphere Configurations

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Objectives

Overview

- Current (and future) options for the atmospheric physics configurations need to be examined for fidelity in order to determine the best model configuration
- Existing climate-type simulations do not give a compact assessment of the different role of physics parameterizations (CAPT-type simulations improve on this somewhat)
- New compact diagnostics are needed to distinguish scheme performance in different climate regimes at a high enough frequency to probe the mechanisms underlying the schemes
- Diagnostics package will be included into the ACME UVcdat tier 1b package

Methodology

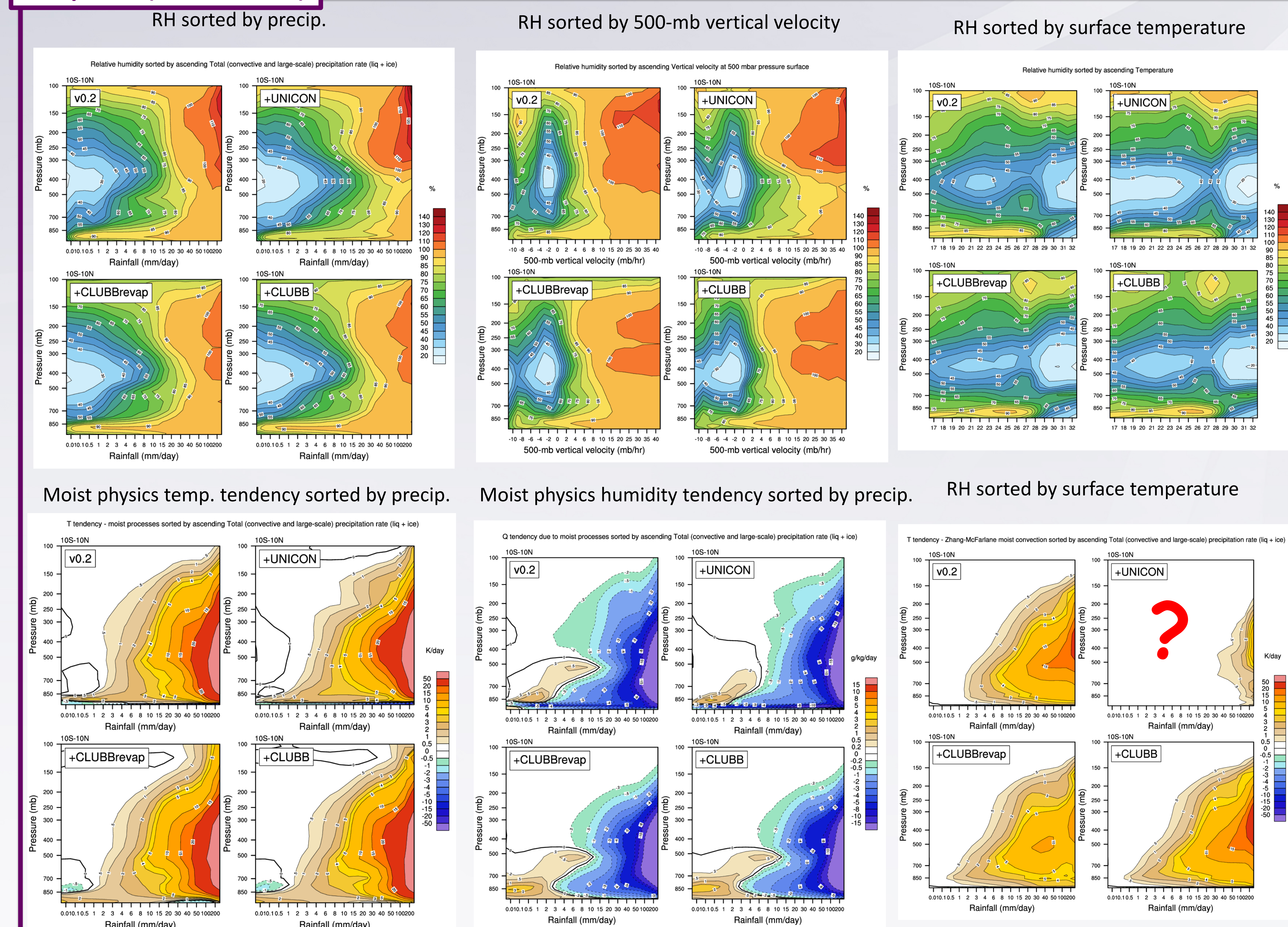
- Process-oriented diagnostics are applied to high frequency daily output from simulations using the Cloud Layers Unified by Binormals (CLUBB) and Unified Convection (UNICON) scheme, as well as a default v0.2 (CAM5) configuration.
- Vertical profiles of states and tendency quantities are determined as functions of precipitation, surface temperature and mid-tropospheric vertical velocity
- The response are examined as functions of domain (tropics; 10N-10S, central US), land and ocean, and vertical resolution for 1-year, 1 deg AMIP simulations

Results

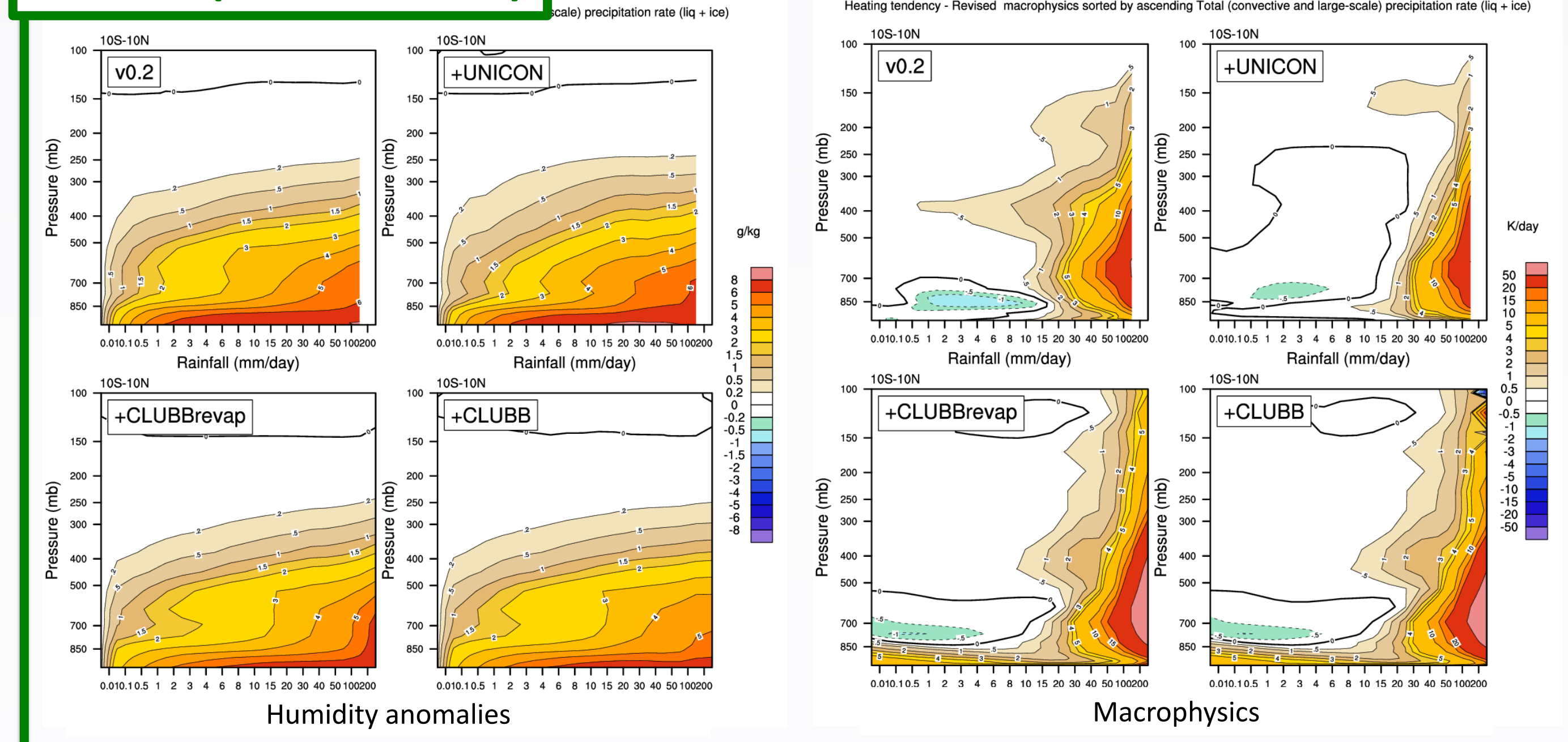
Overview

- **Tropics:** Evolution of relative humidity (RH) first in PBL then through whole column with increasing precipitation (PRECT)
- Weaker relationship to OMEGA500 and TS
- UNICON more humid in upper troposphere; CLUBB smoother
- Total physics tendencies: *Temperature*, UNICON more elevated, but smoother in lower troposphere
- Deep convection temp. tendencies lower with rainfall re-evaporation in CLUBB. w/o re-evaporation more similar to v0.2
- **Land:** more rapid moistening, with strong moistening near surface
- **Ocean:** macrophysical cooling differences at low precip. rates
- **Central US:** Moistening increases more coherently in the vertical
- **L72:** Elevated moistening and deep convection heating profile weakening but with increased elevation

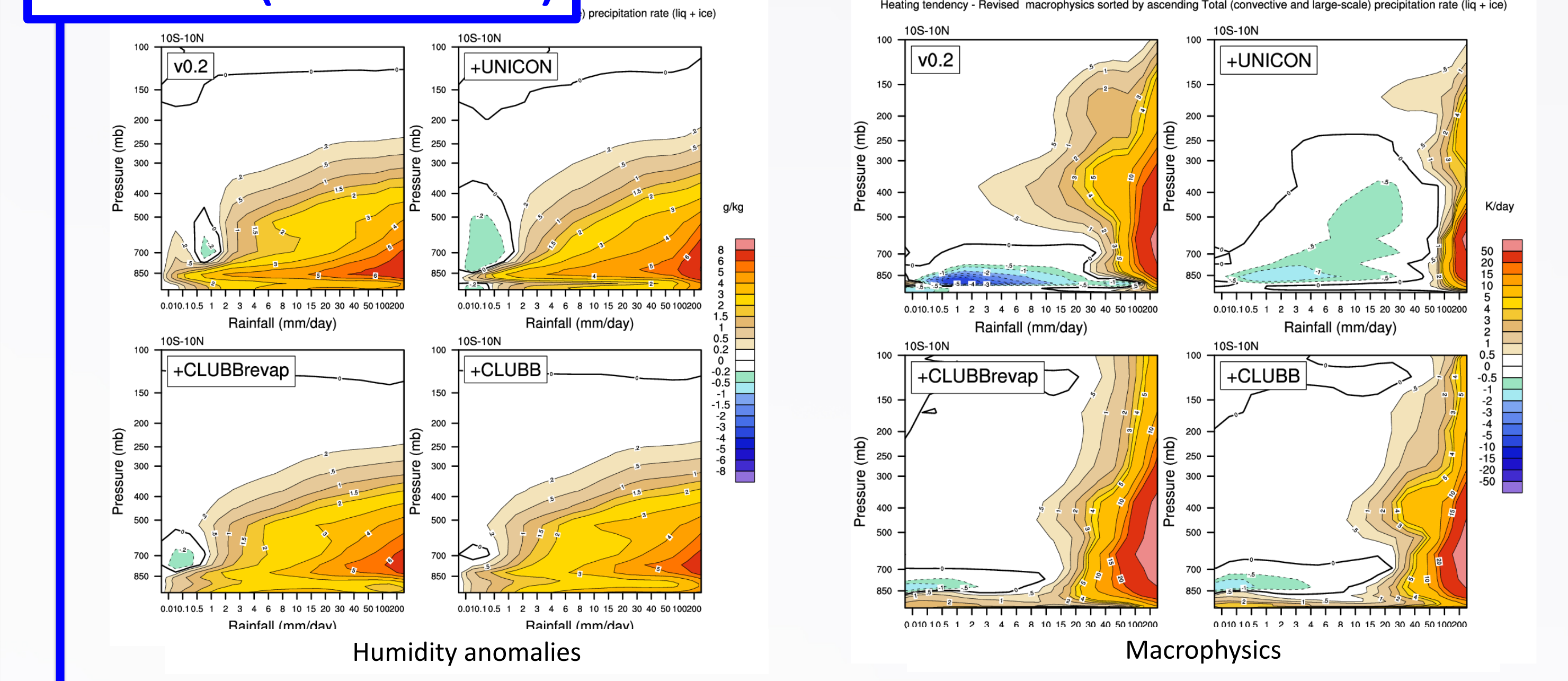
Tropics (10N-10S)



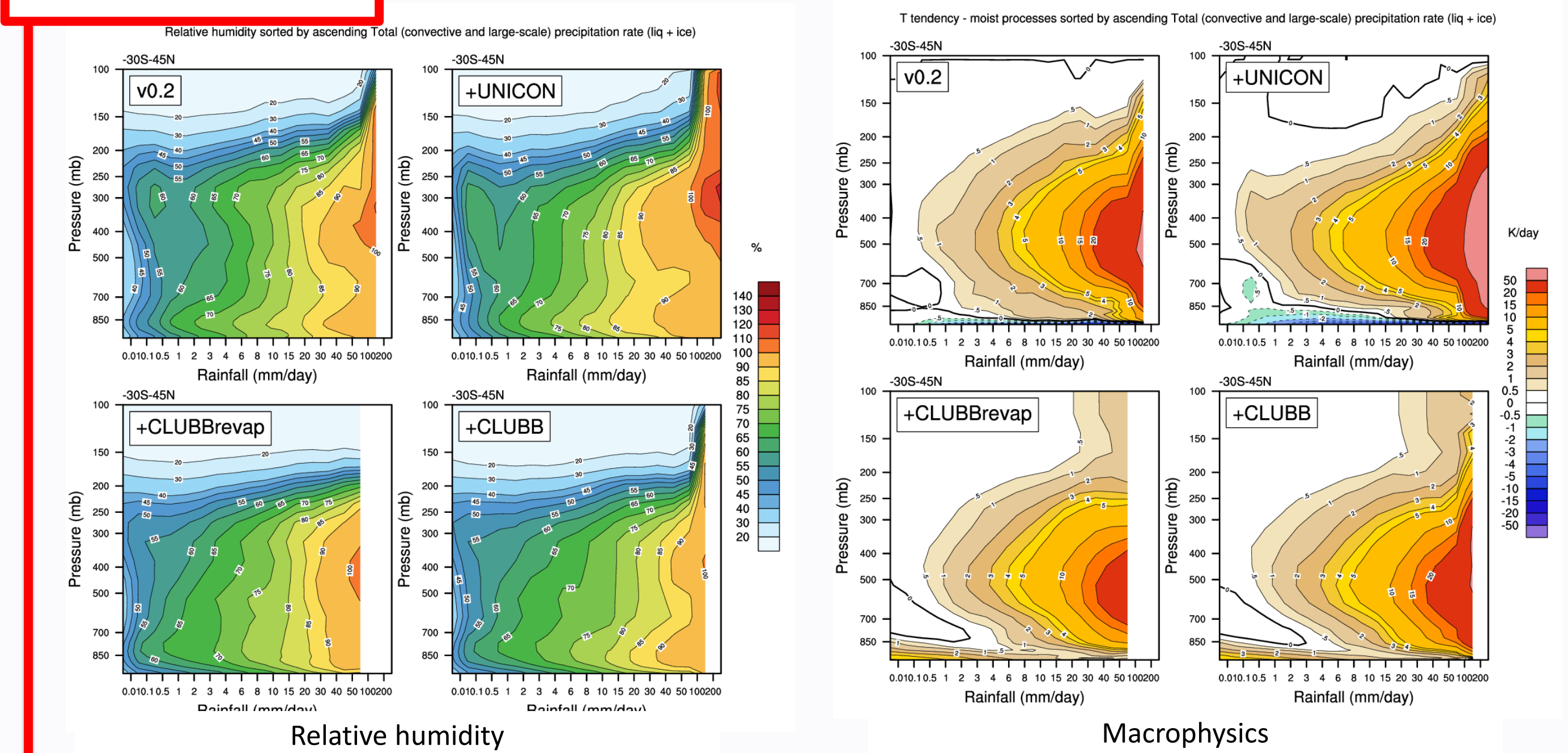
Land (10N-10S)



Ocean (10N-10S)



Central US



Vertical Resolution (L72 vs. L30)

