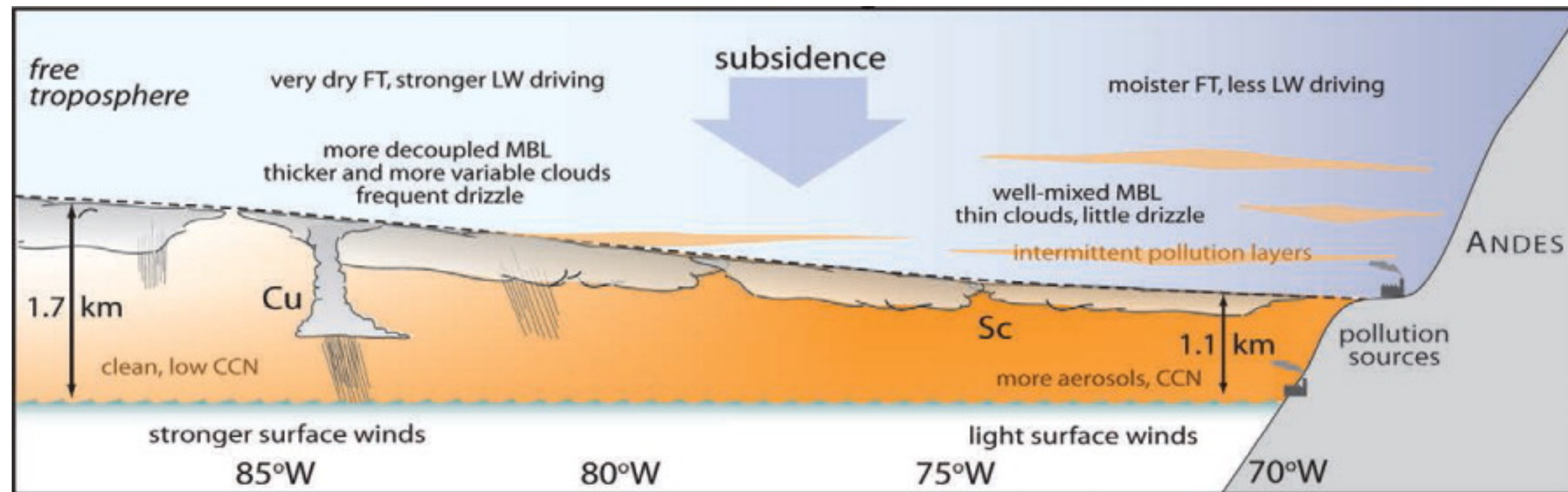# Aqua-Walker: Aquaplanet With Walker Circulation

Tapio Schneider

Much uncertainty in the low-cloud response to climate change stems from uncertainties about transitional regimes


(Mechoso et al., *BAMS,* 2014)

Cumulus ⟶ Stratocumulus

Aquaplanet simulations have illuminated Cu response but generally do not produce transition or Sc (e.g., Medeiros et al. 2008, 2011)

Imposing zonal asymmetries enables Walker circulation, Cu-Sc transition, and their investigation in GCMs

- Impose Gaussian ocean heat flux divergence dipole of ±50 W m^{-2} (Merlis & Schneider 2011)

- Alternatively, impose SST dipole of ±3 K

- Gives rise to Walker circulation, strong subsidence, and free-tropospheric dryness that is necessary for Sc

Ocean Heat Flux [W/m^{-2}]

Cloud Liquid Water
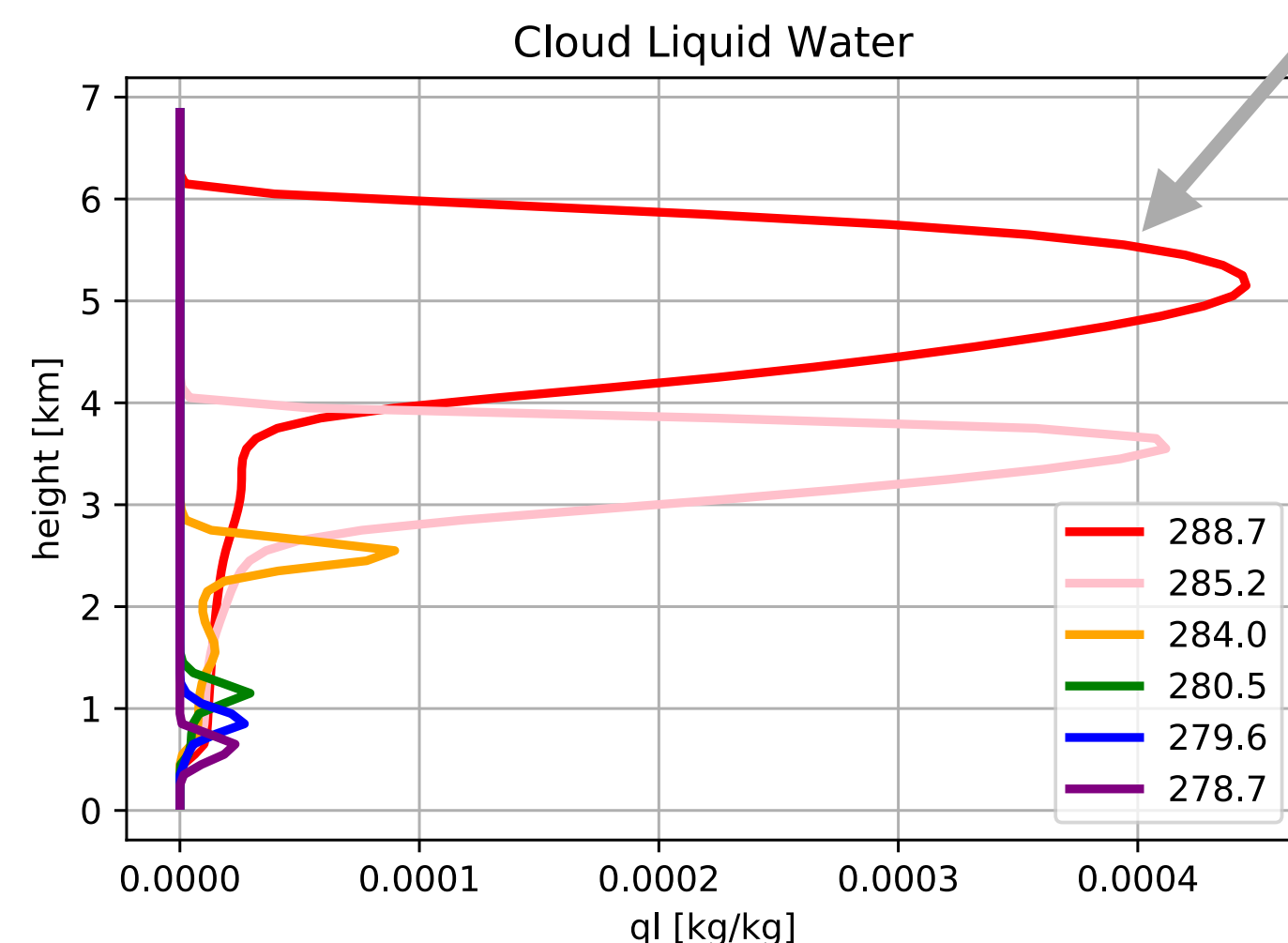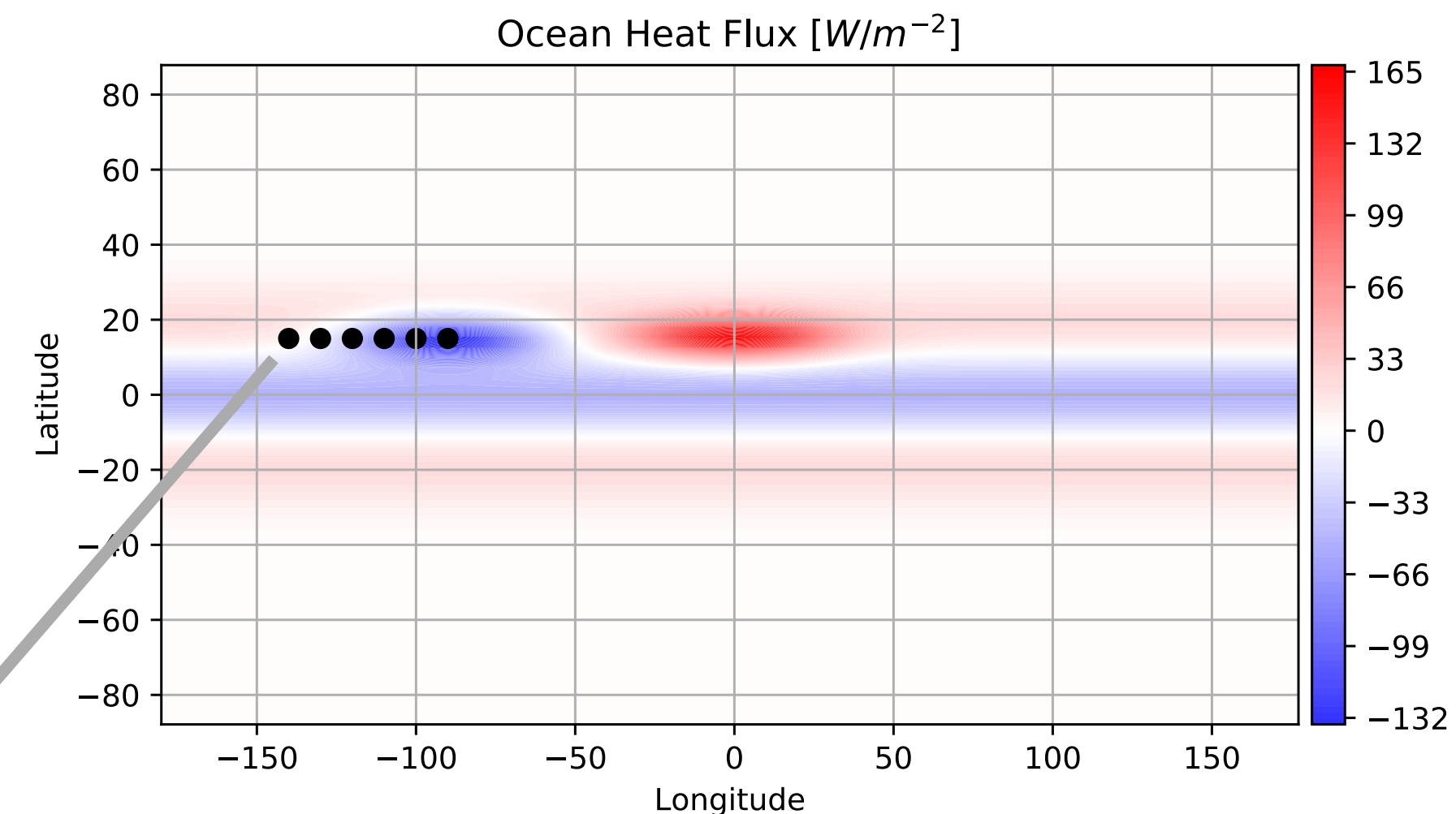
- We have used this setup in GCM (produces Cu-Sc transition, allows us to study parameterization performance)

- Using GCM large-scale fields to drive LES also produces transition (left)

- Ancillary benefit: can study response of stationary waves, zonal asymmetries in *P-E*, extratropical connections etc. to climate change