Evaluation of CFMIP2 models using COSP: the role of clouds in the radiation budget over the Southern Ocean

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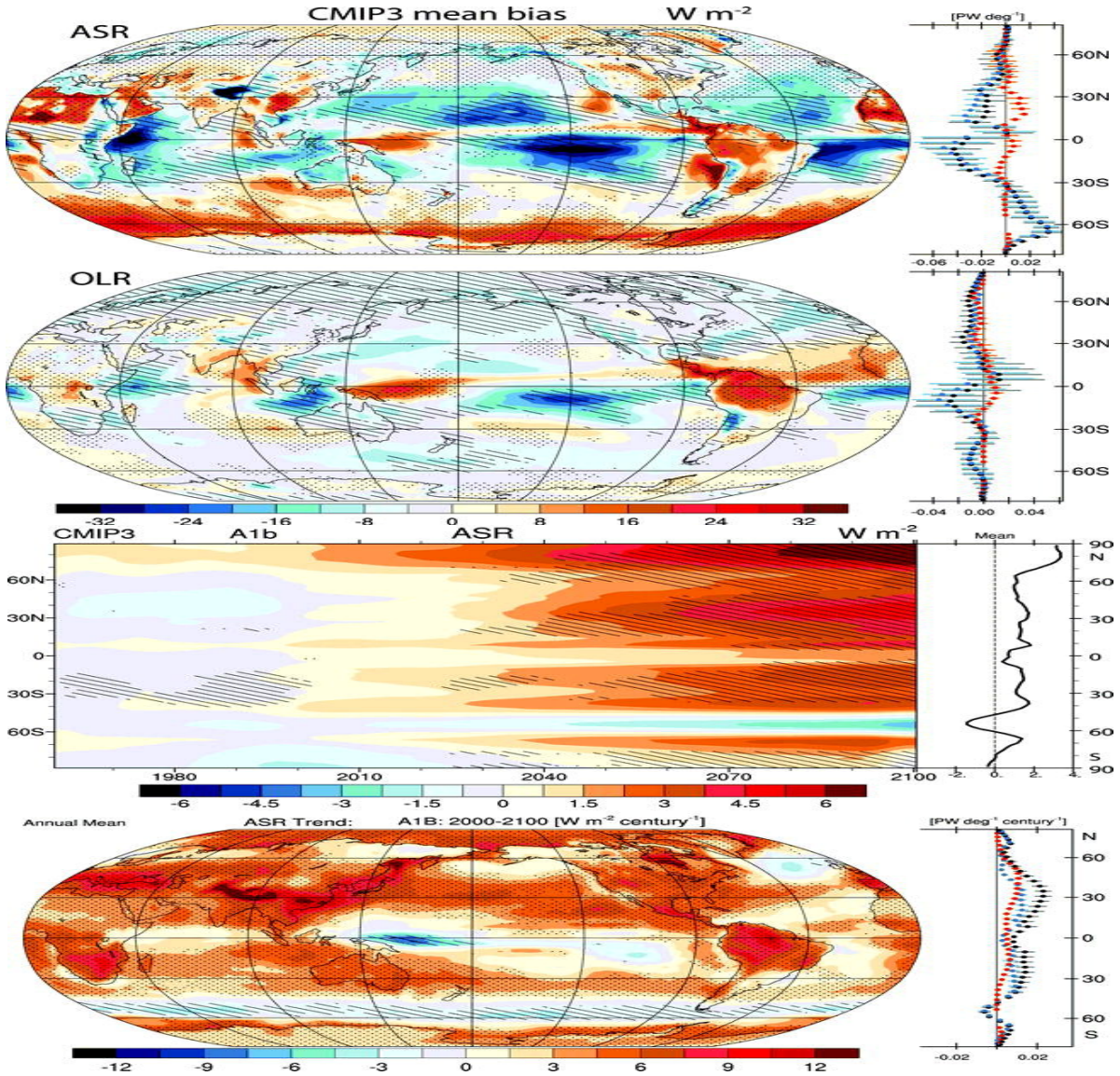
EUCLIPSE-CFMIP meeting, Paris, May 29 2012

CMIP3 coupled models

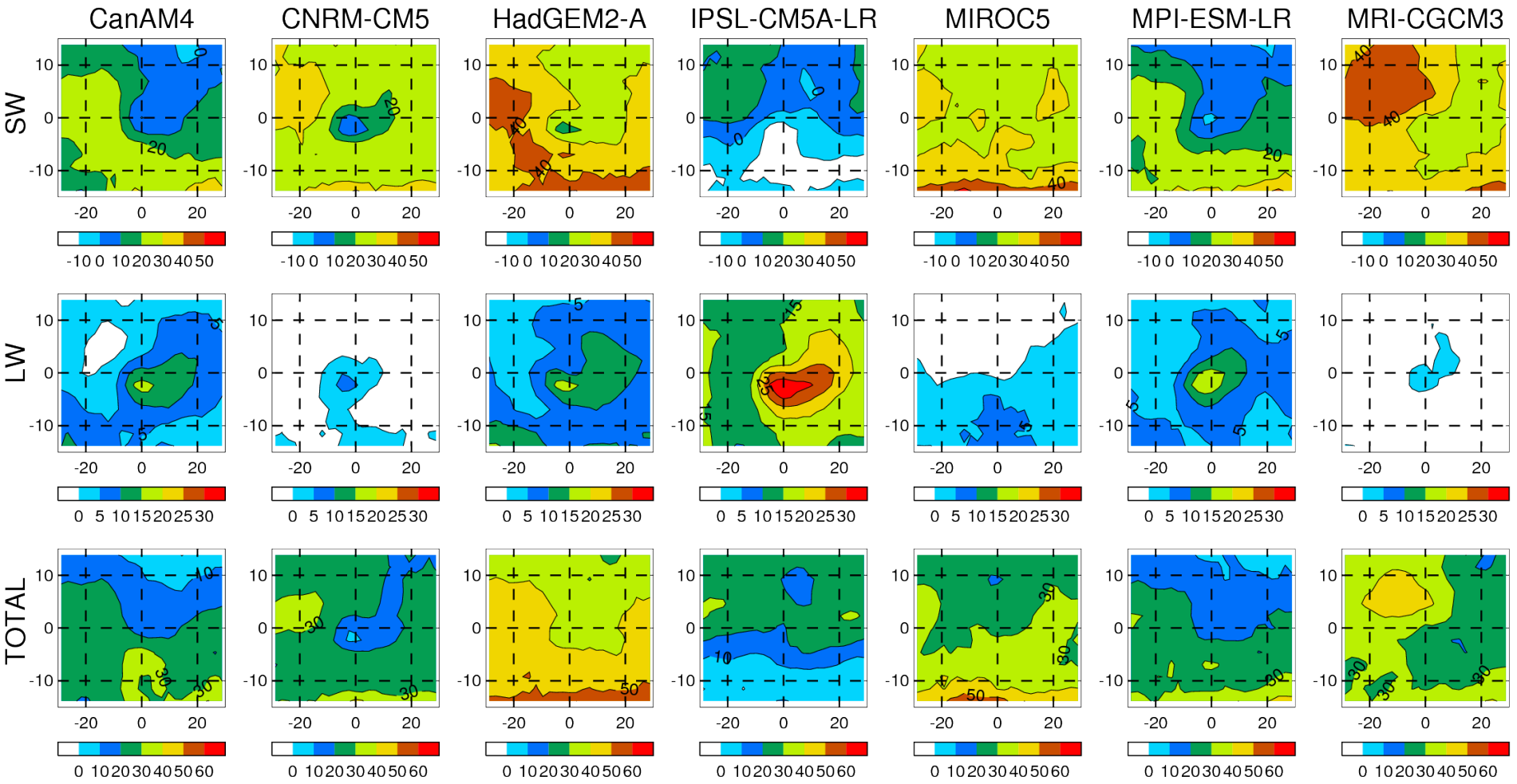


(Trenberth and Fasullo, J. Clim., 2010)

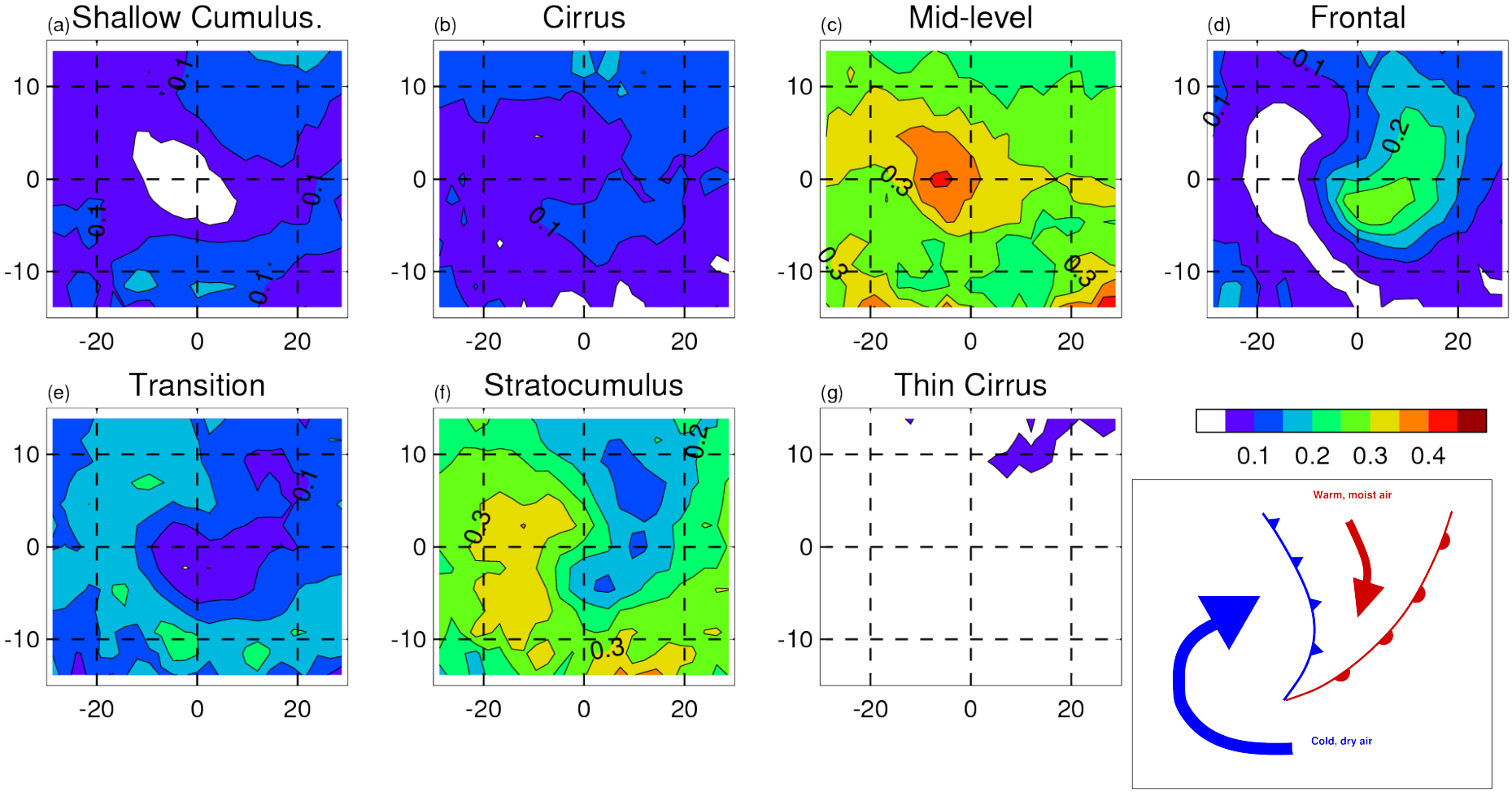
Data and methodology

- **AMIP experiment. Daily-means of ISCCP simulator outputs, radiative fluxes and MSLP. Additional COSP diagnostics for some models.**
- **Daily ISCCP-FD radiative fluxes and ERA40 MSLP.**
- **Region 40S – 70S.**
- **Projection onto ISCCP clusters from *Williams and Webb, Clim. Dyn., (2009)*. Compositing around cyclone centres following *Field and Wood, J. Clim., (2007)*. Example of this methodology in *Bodas-Salcedo et al., J. Clim., (2012).***
- **Preliminary results.**

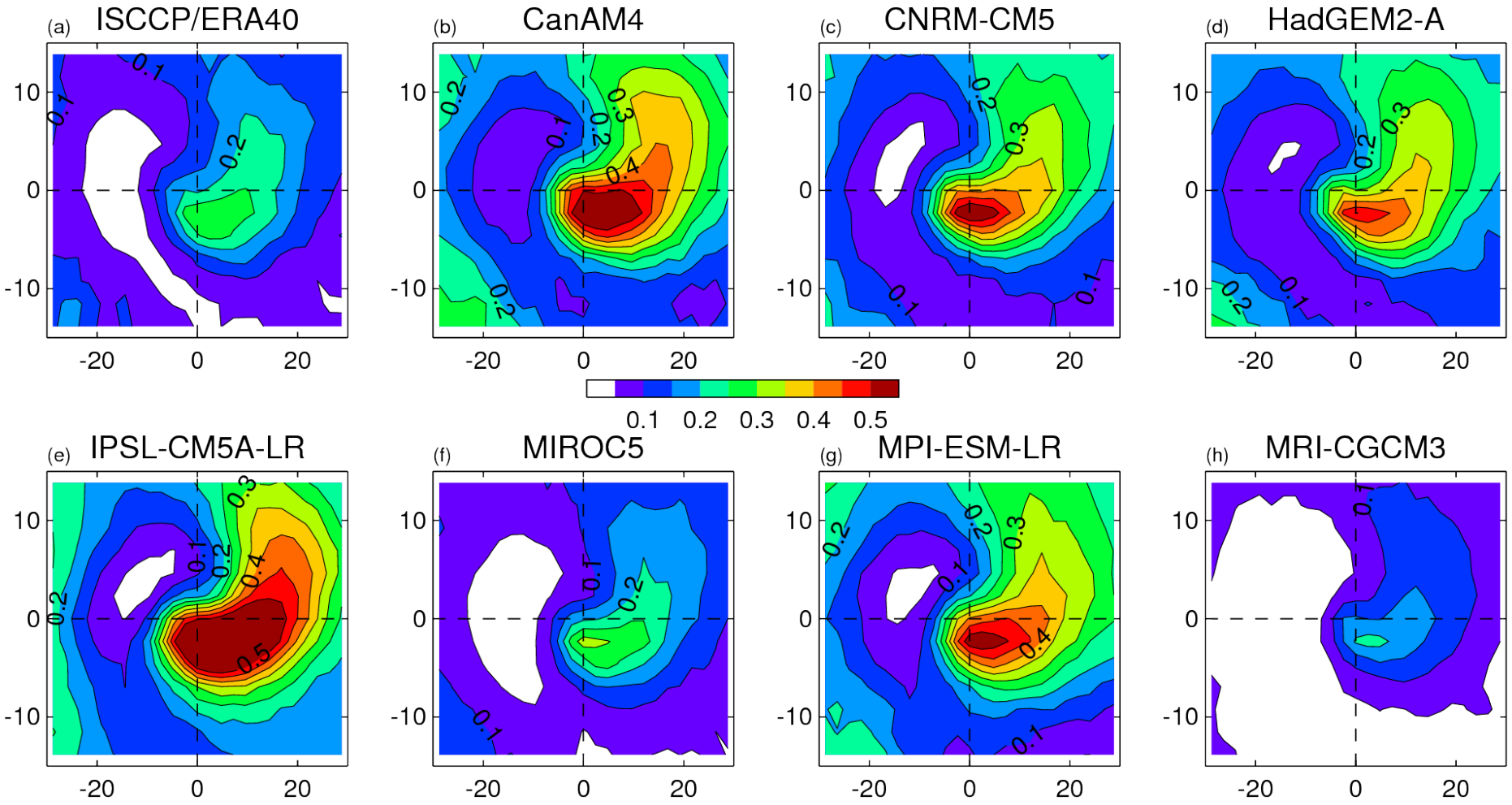
CRE bias around cyclone centres



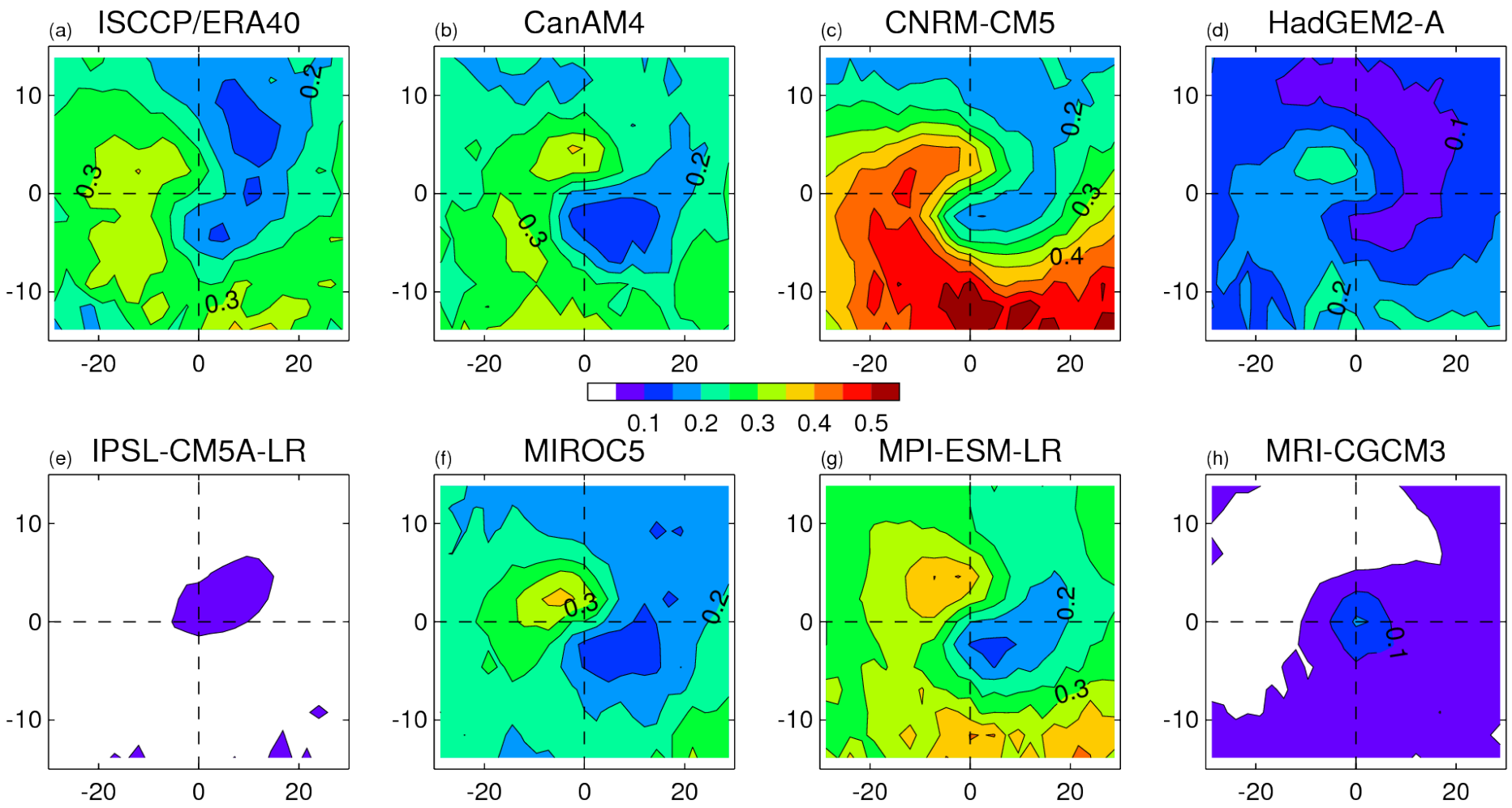
Cluster RFO: ISCCP



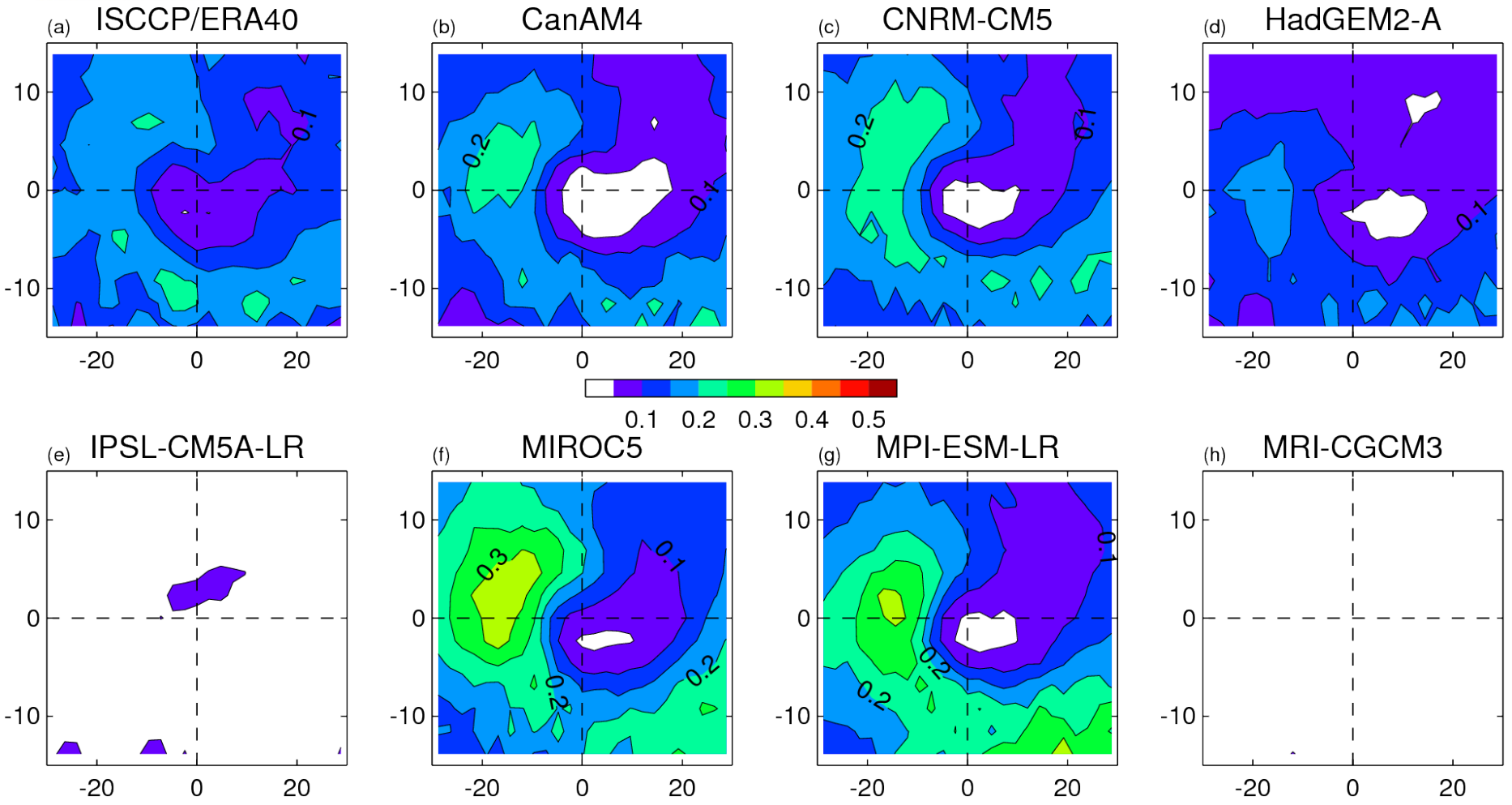
Frontal



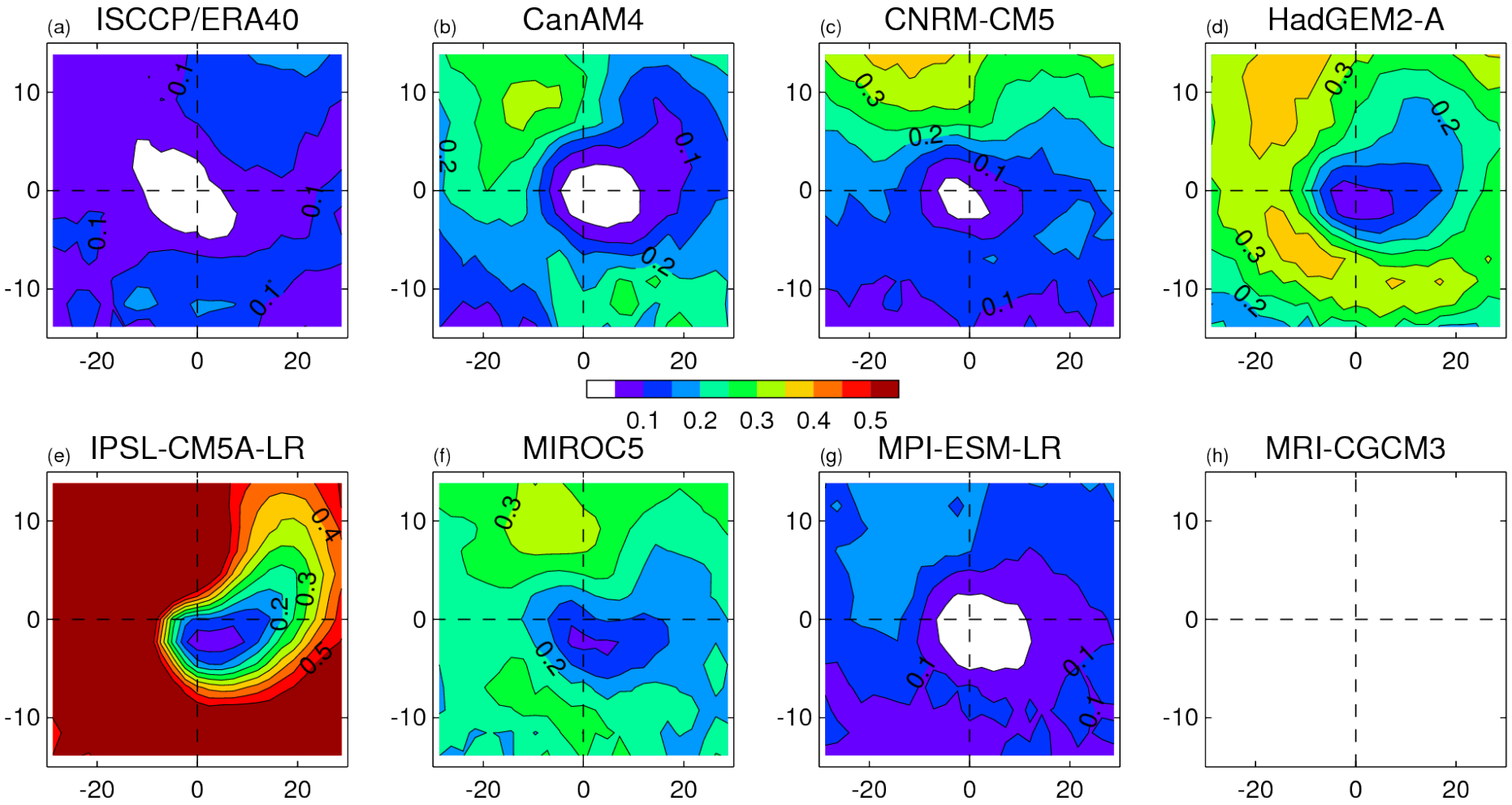
Stratocumulus



Transition

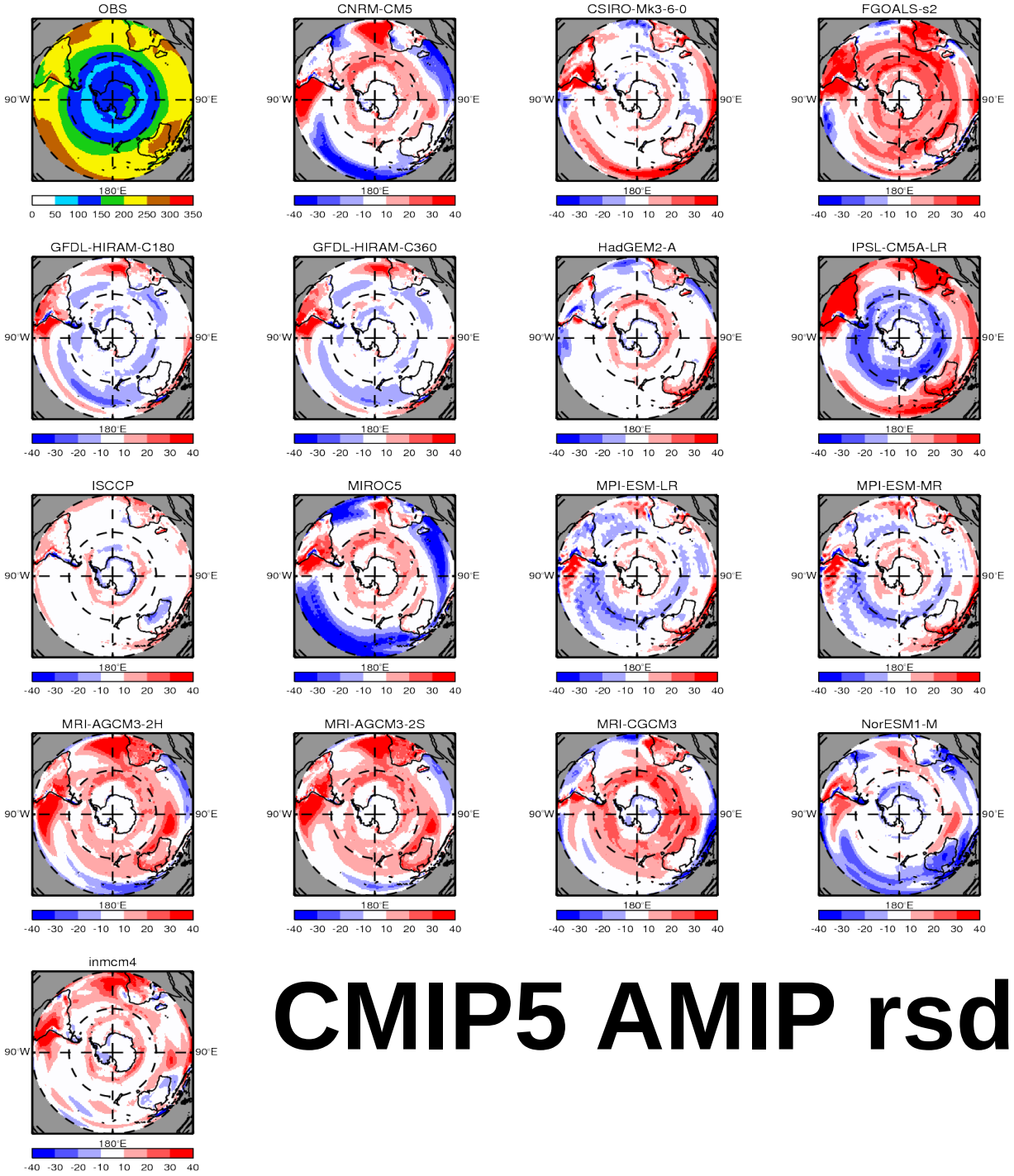


Shallow Cumulus



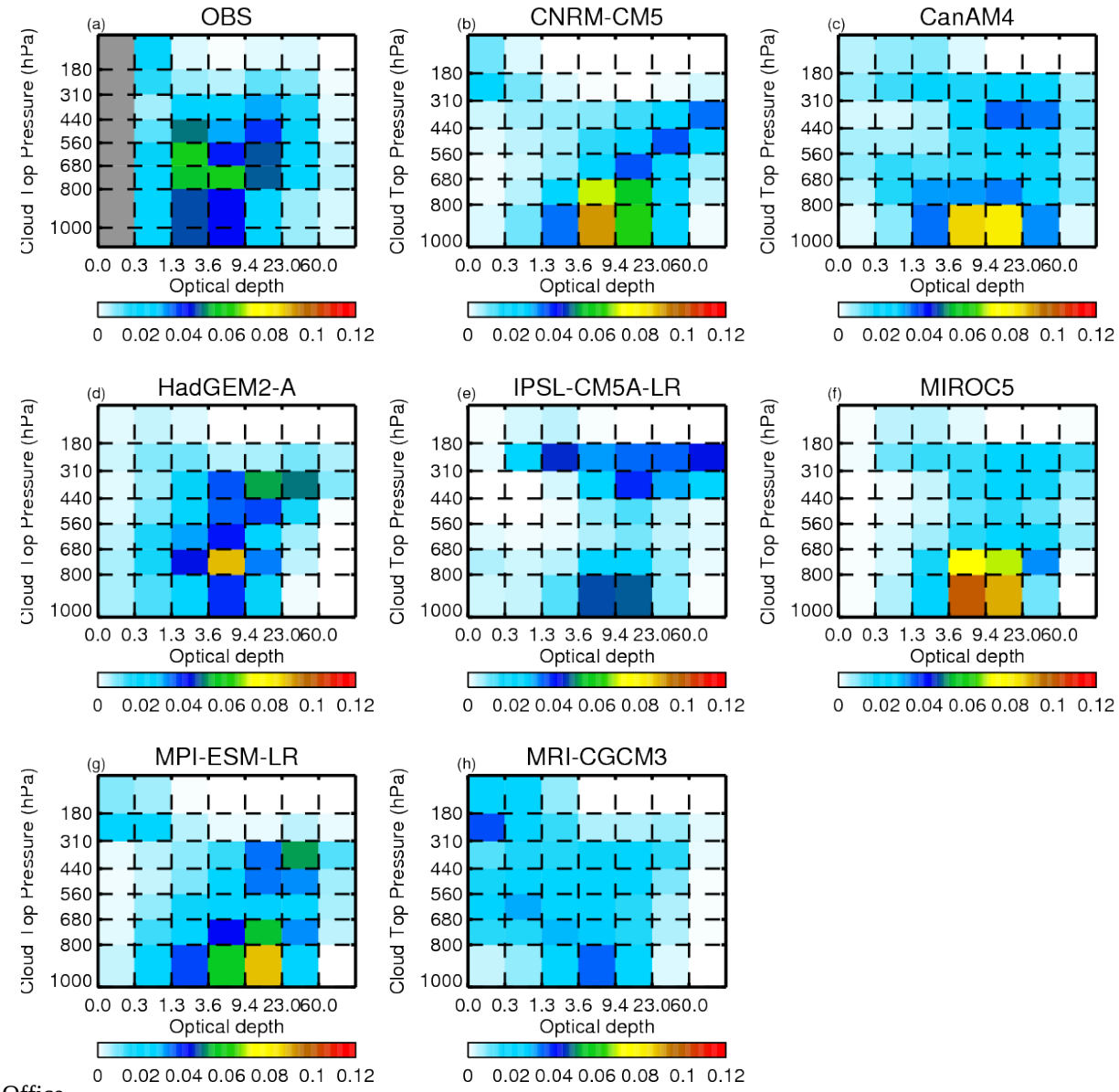
Summary

- Methodology that combines clustering and compositing, linking cloud radiative properties and synoptic conditions.
- Preliminary results from analysis of AMIP experiment:
  - Spatial structure in CRE errors in cyclones, related with errors in cloud regimes.
  - Too frequent frontal cloud seems to explain most of the error in LW CRE.
  - Some models show some similarities: too much shallow cumulus and too little stratocumulus.
  - In some cases, the results suggest compensation of errors between frequency of occurrence and radiative properties.

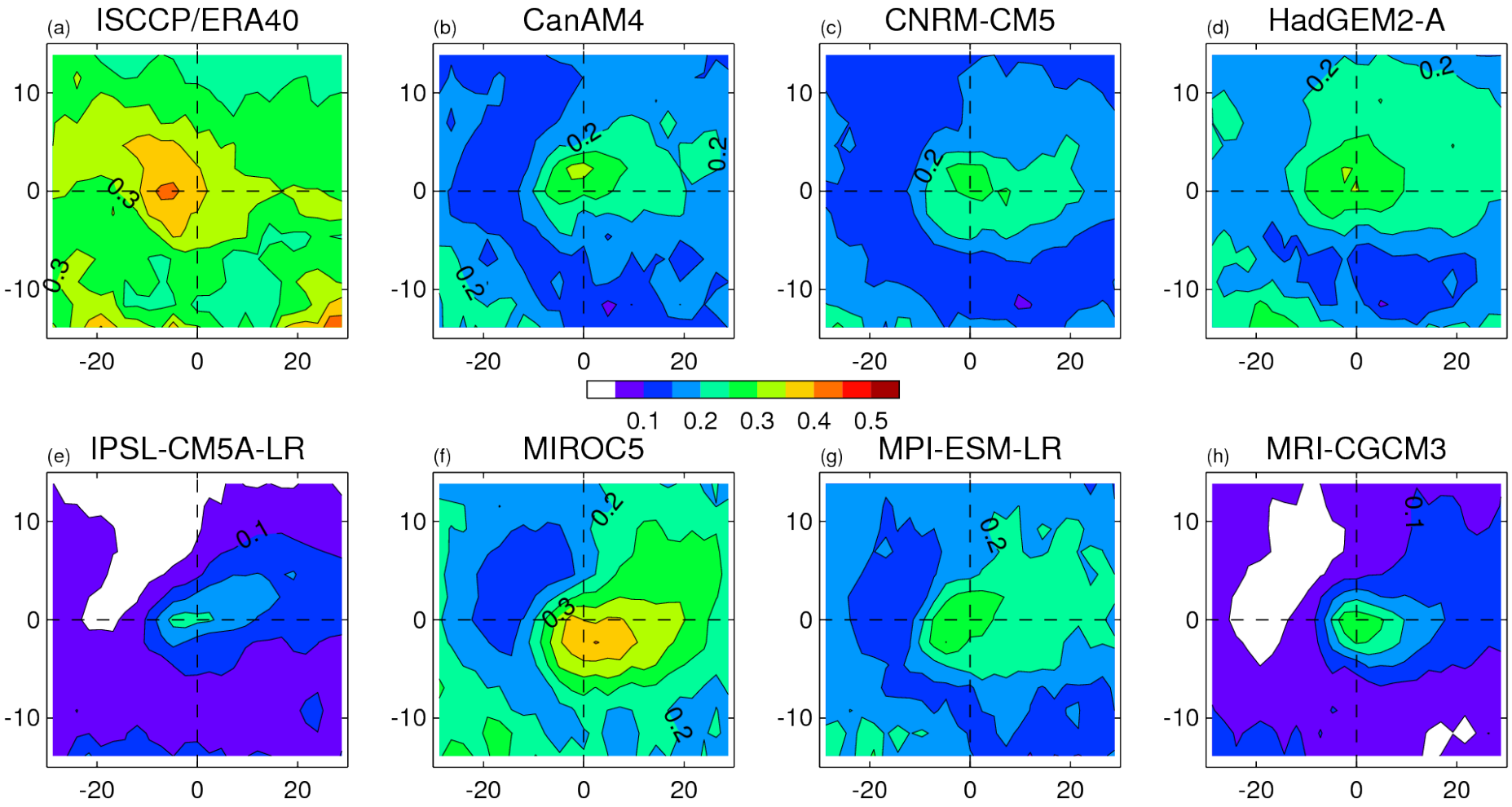


CMIP5 AMIP rsds

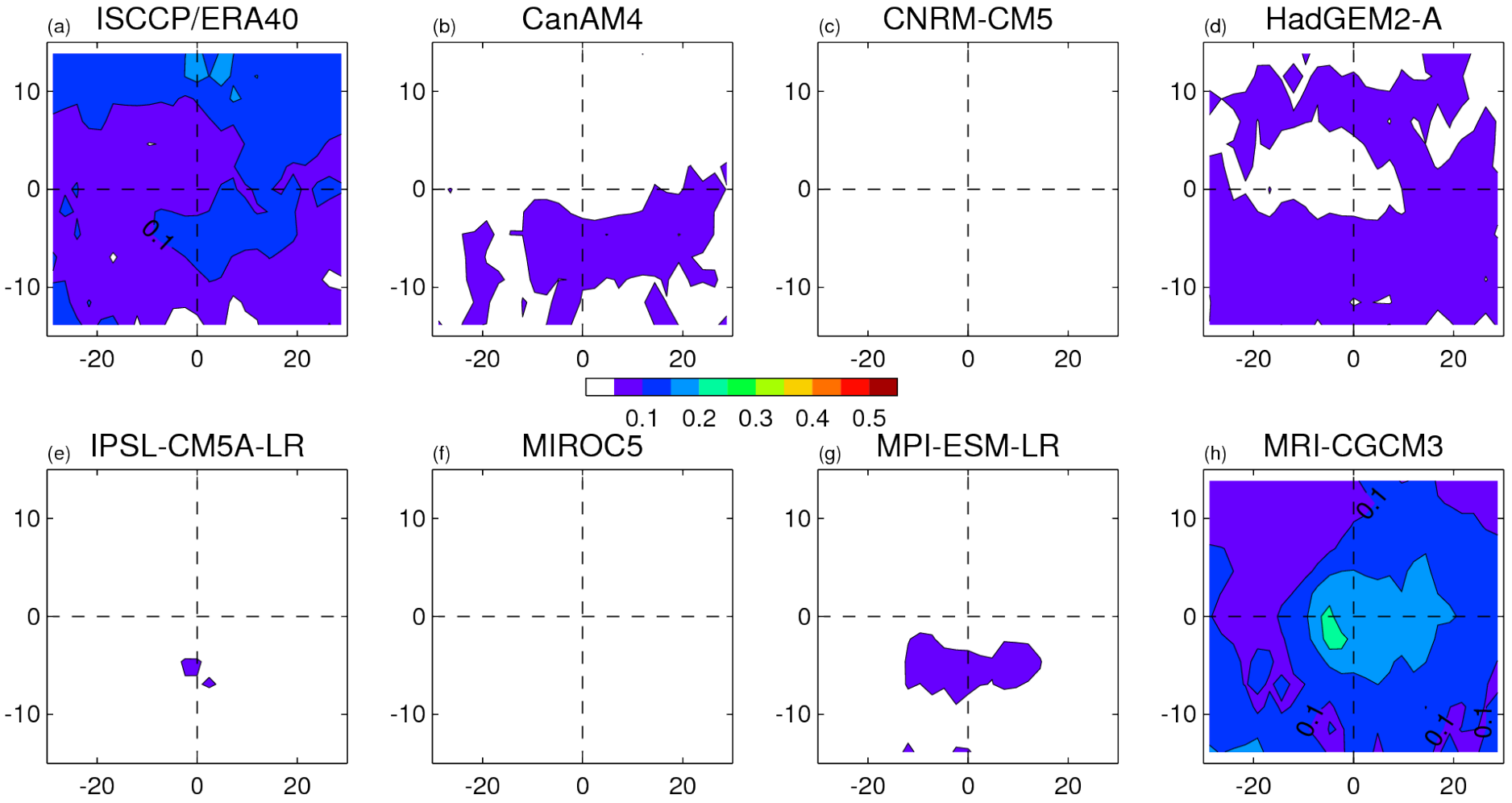
ISCCP cloud: SO climatology



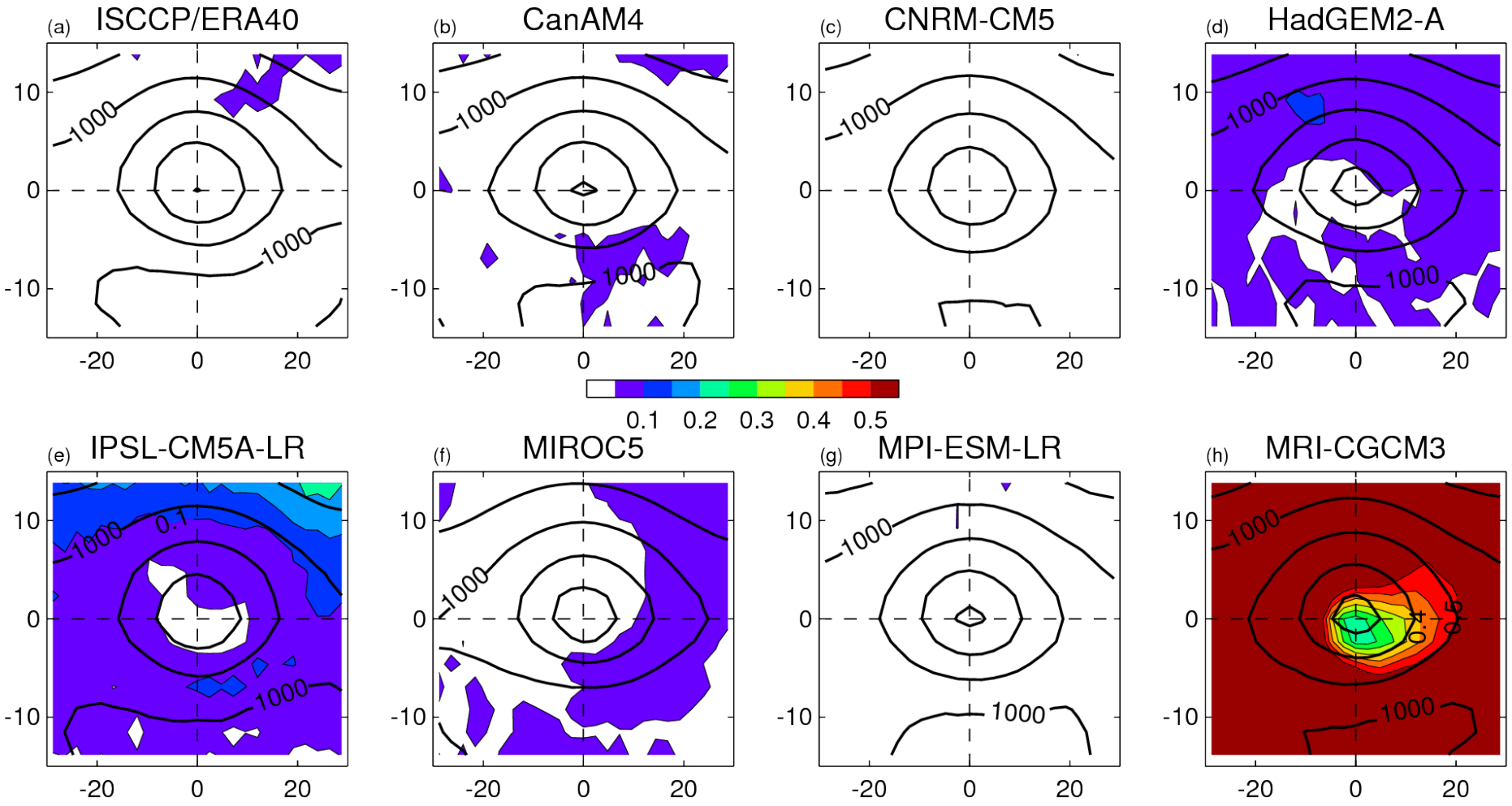
Mid-level



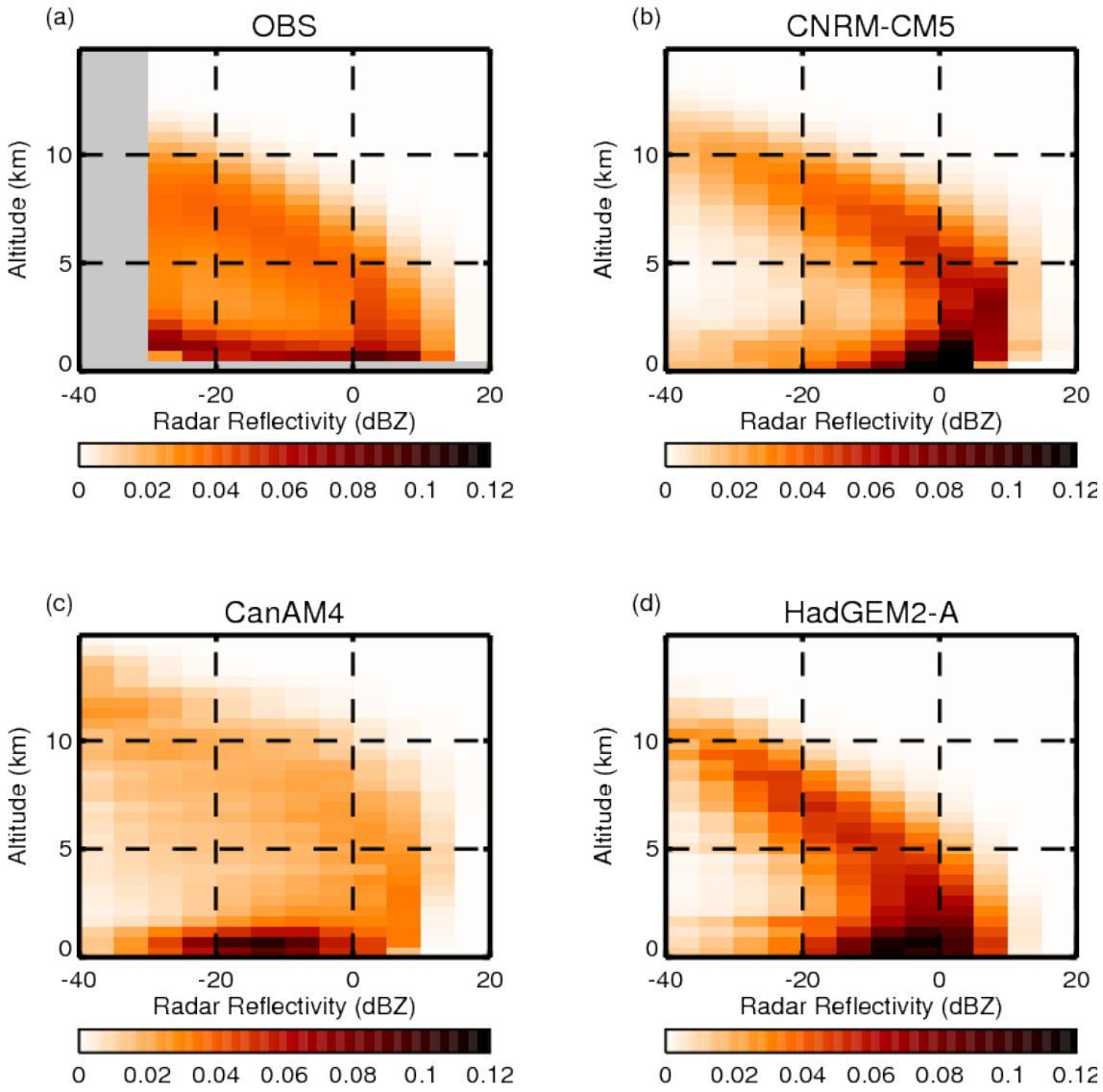
Cirrus



Thin Cirrus



CloudSat reflectivities



CALIOP Scattering ratio