

MODIS dynamical and microphysical regimes as viewed by AIRS

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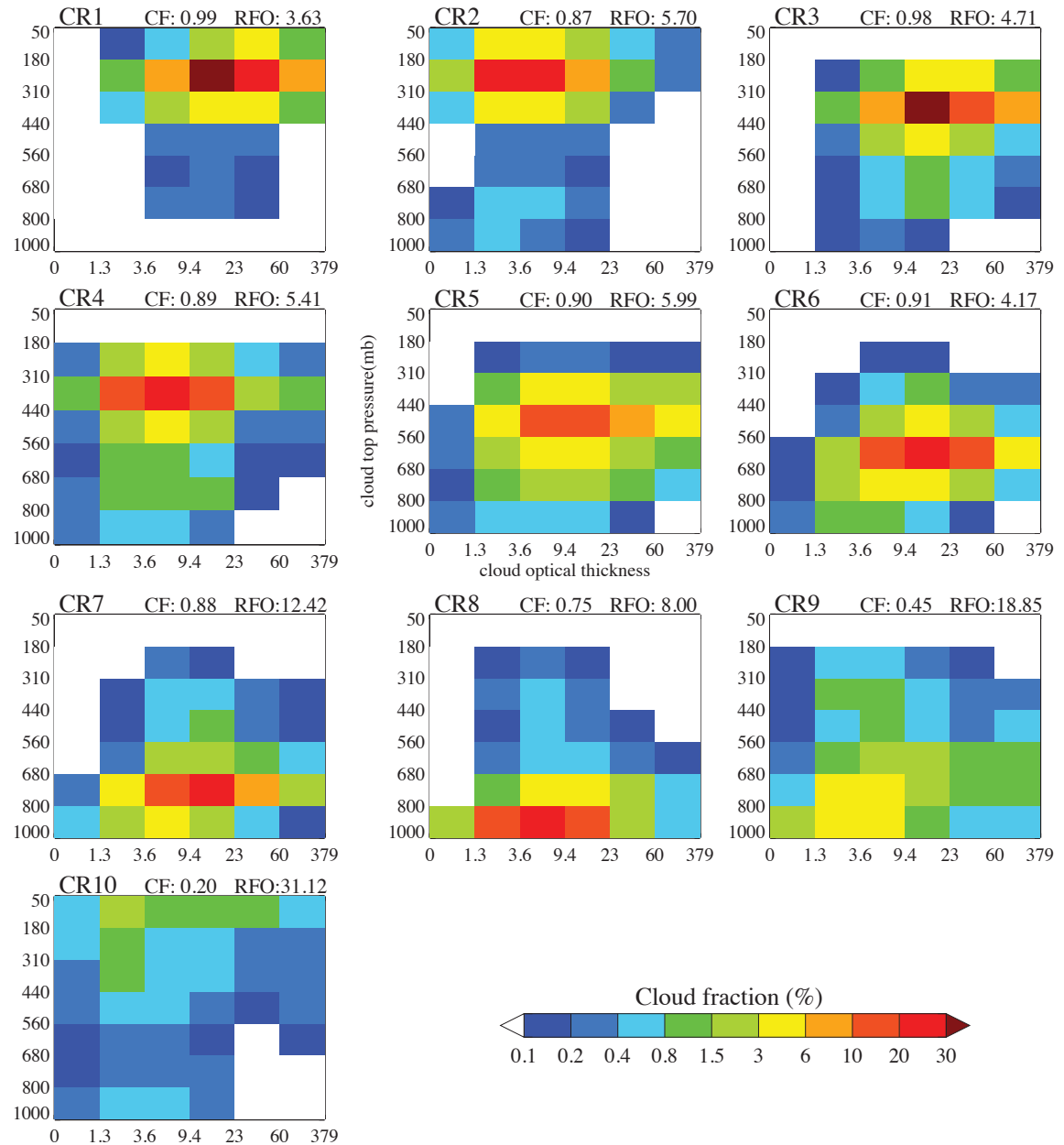


MODIS cloud regimes

Grouping systematic patterns in co-variations of cloud extinction and vertical location according to MODIS

About 12% of 1° gridcells have no retrievals (“clear” regimes)

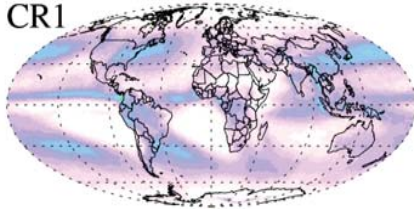
Oreopoulos et al. JGR, 2014



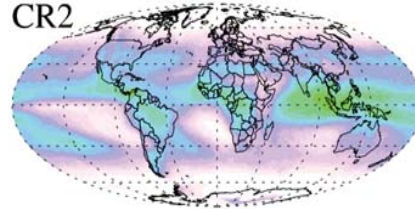


Where the CRs occur

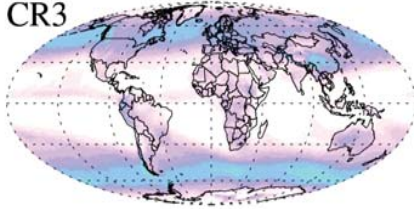
CR1



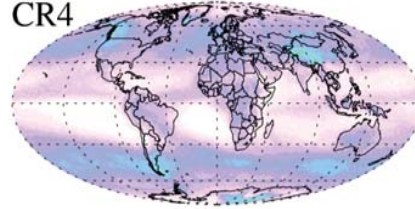
CR2



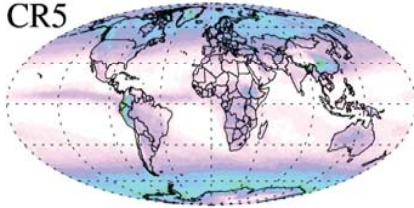
CR3



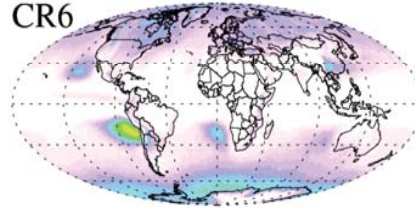
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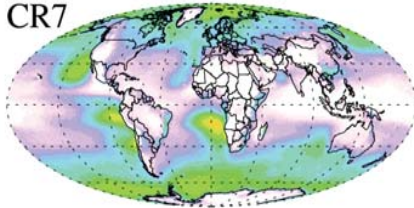
CR5



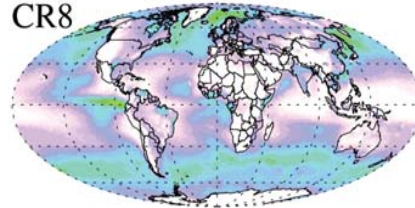
CR6



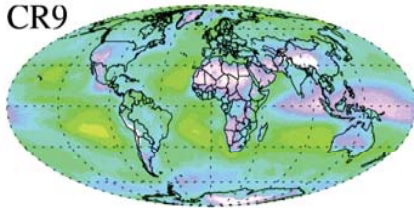
CR7



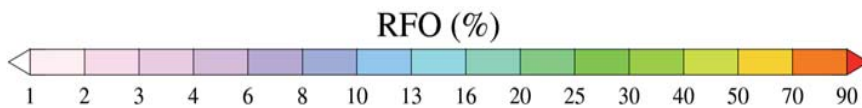
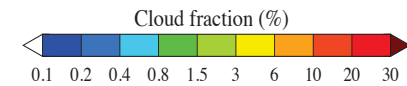
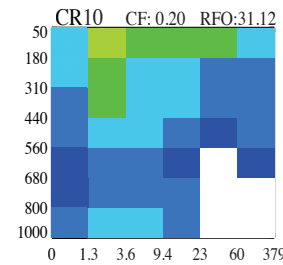
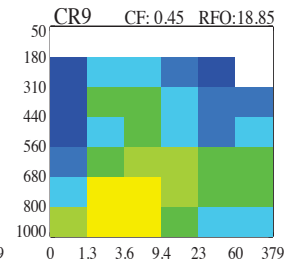
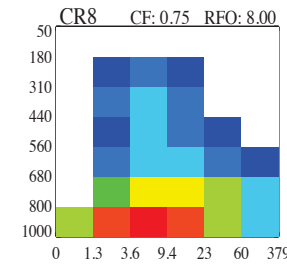
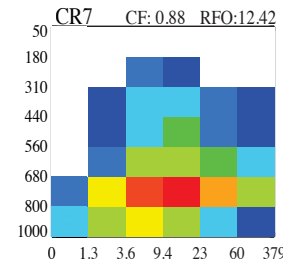
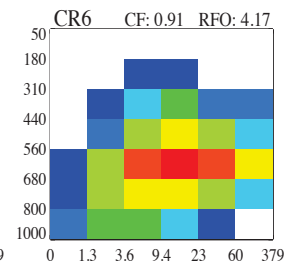
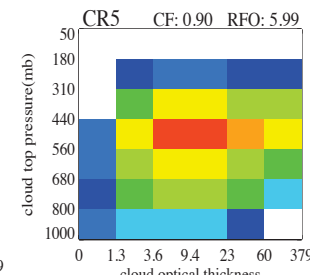
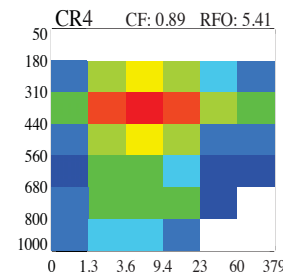
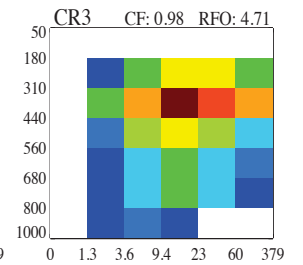
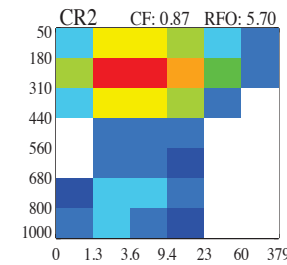
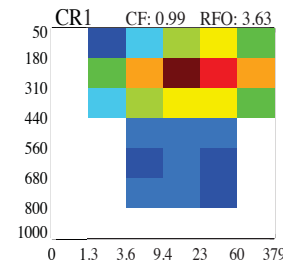
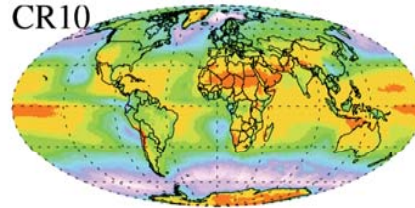
CR8



CR9

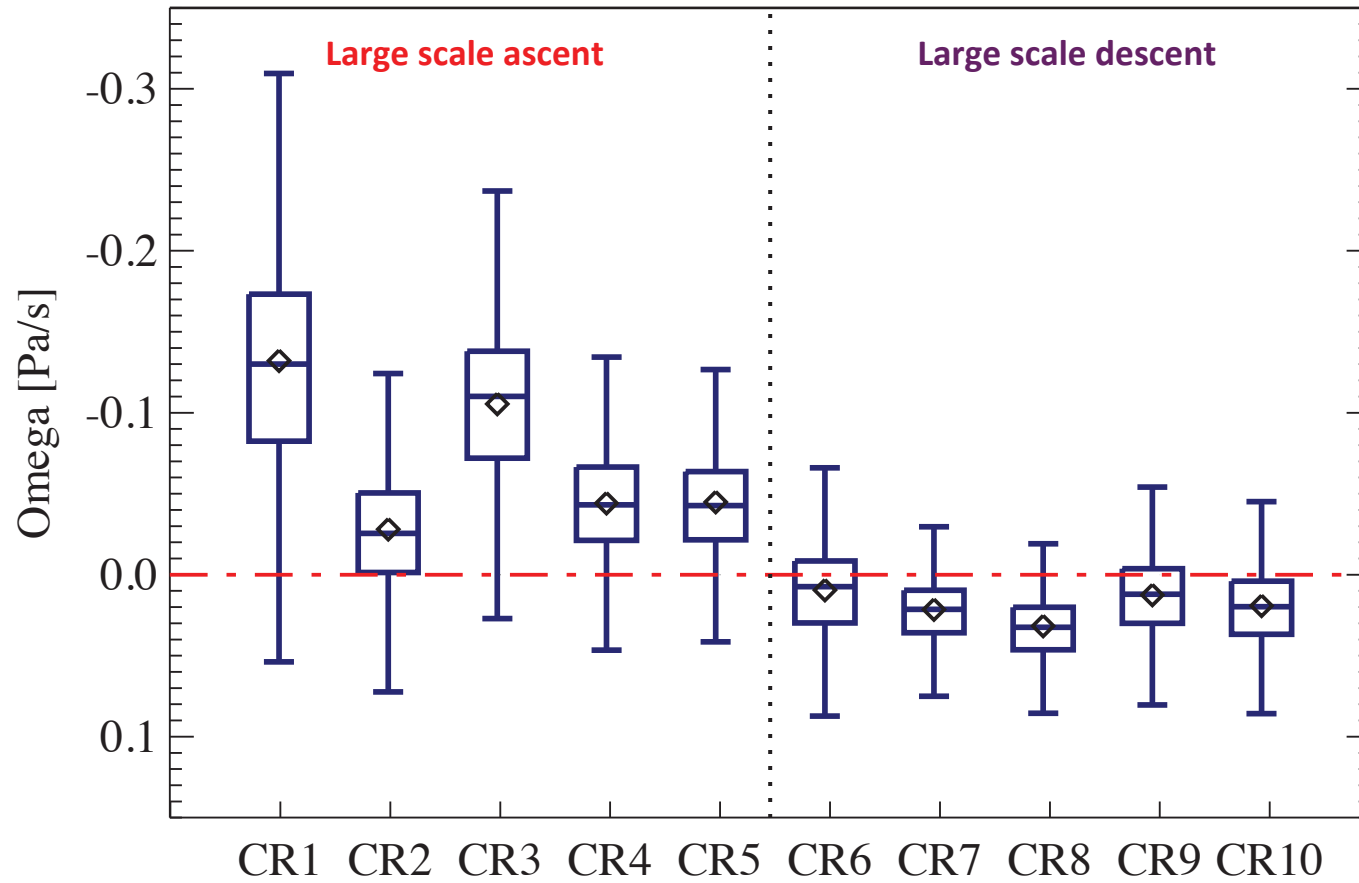


CR10



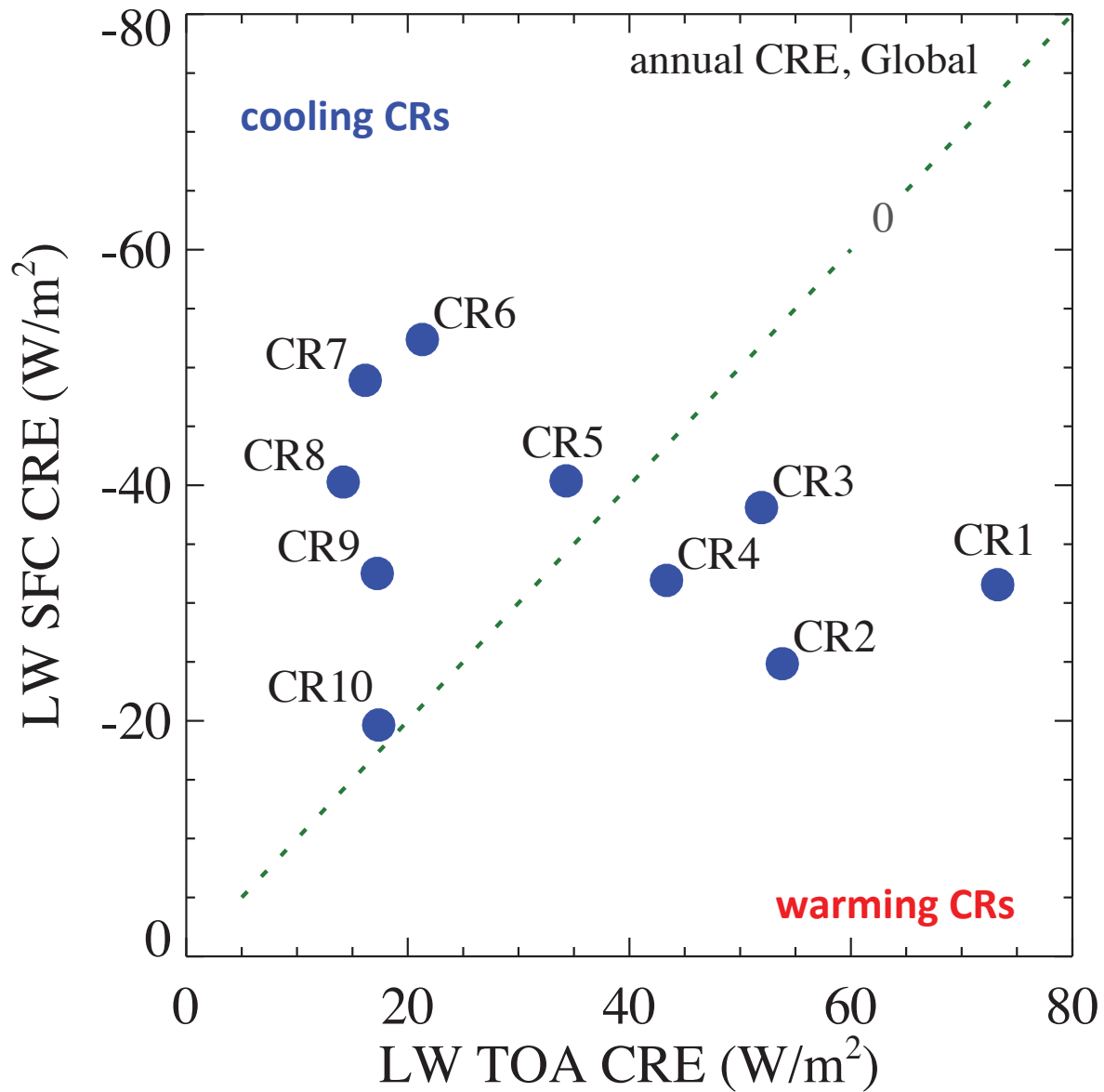


CRs in distinct dynamical environment





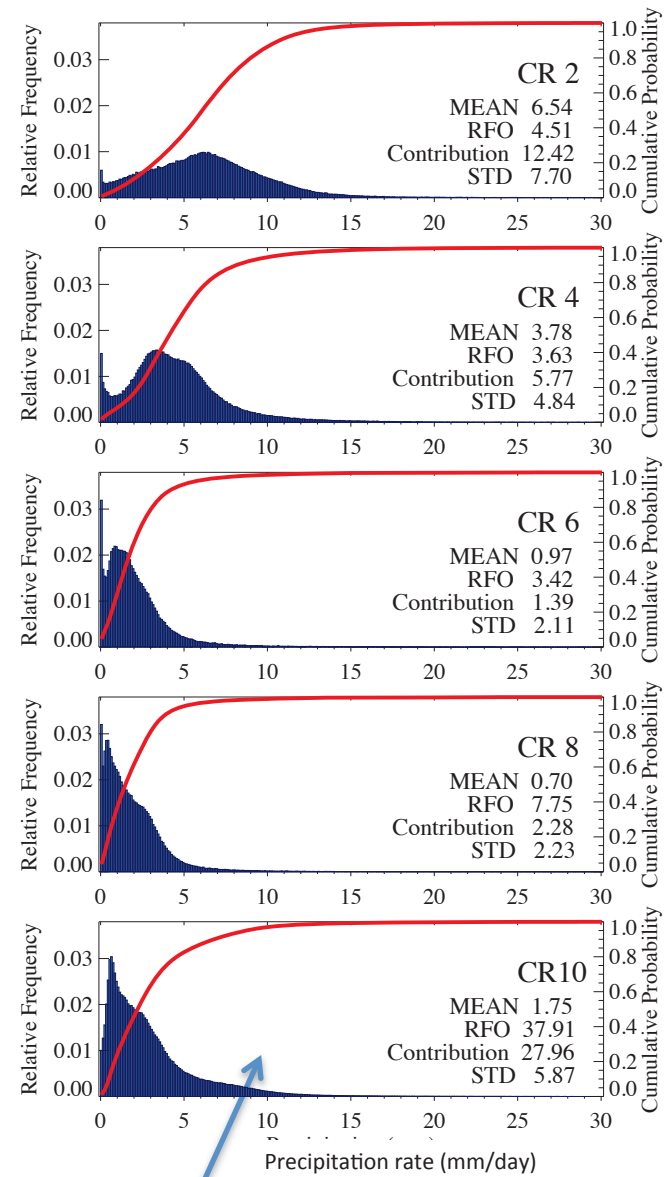
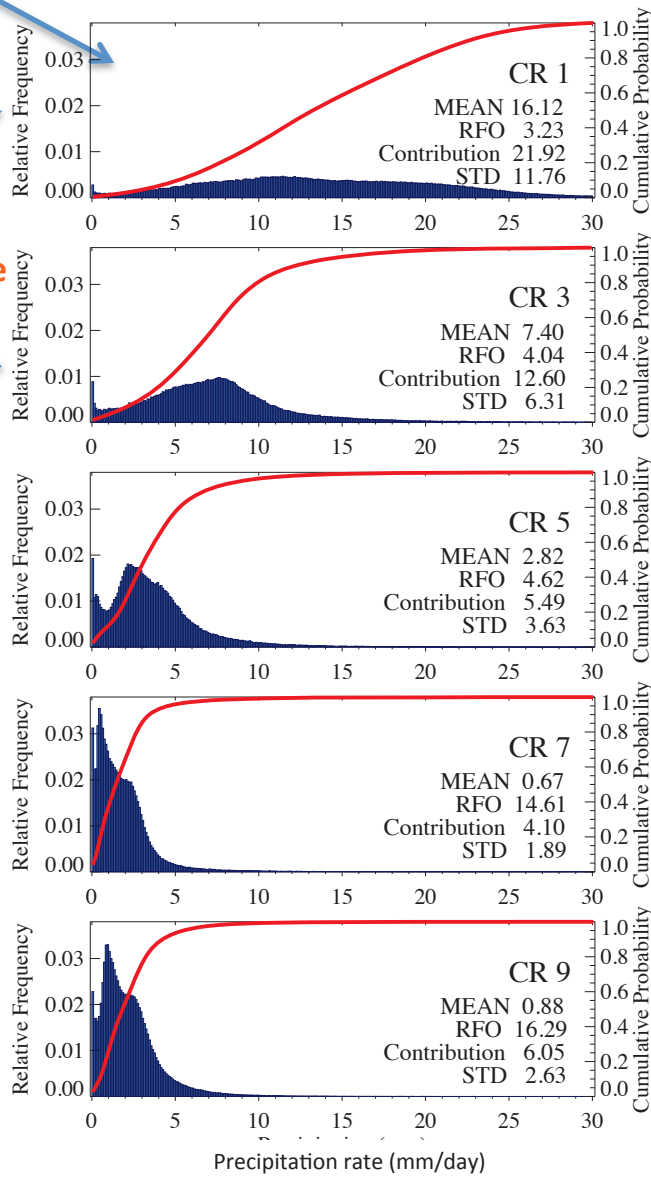
Cooling vs warming CRs



GPCP precipitation

Strongest PR

35% of global precip,
occur 14% of the time

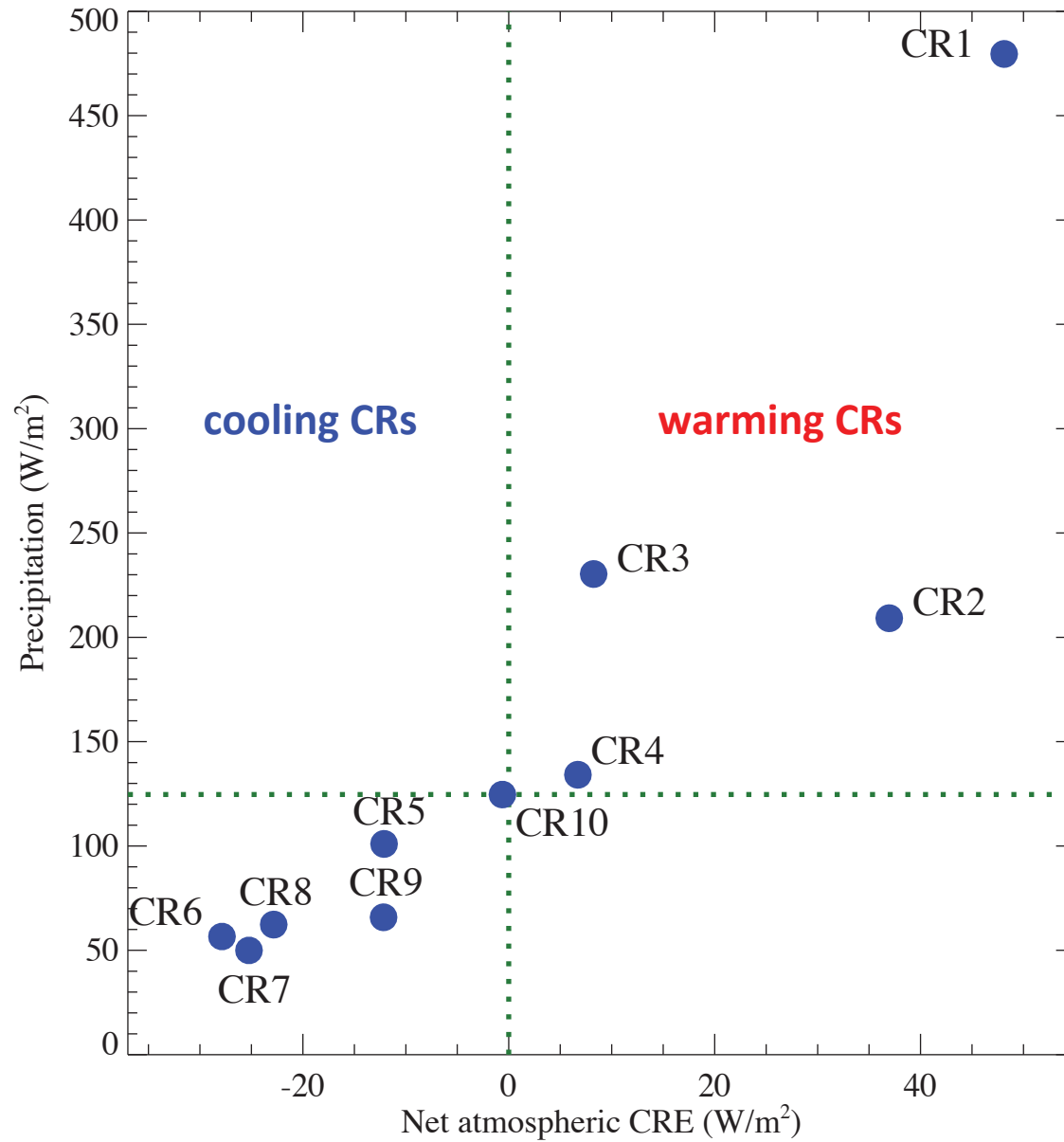


28% contribution
because of 31% RFO

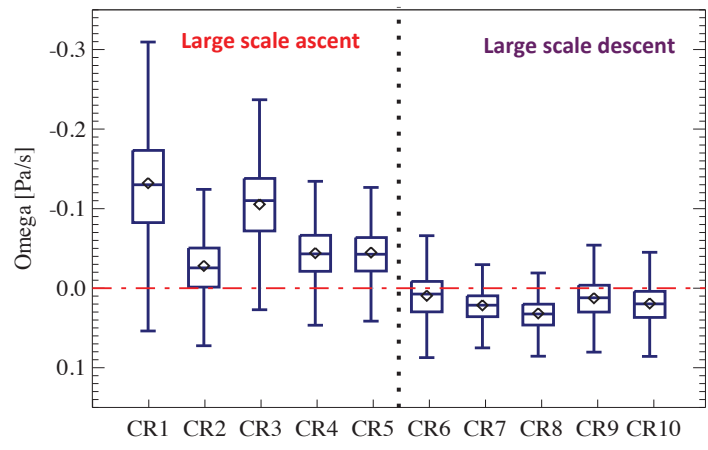
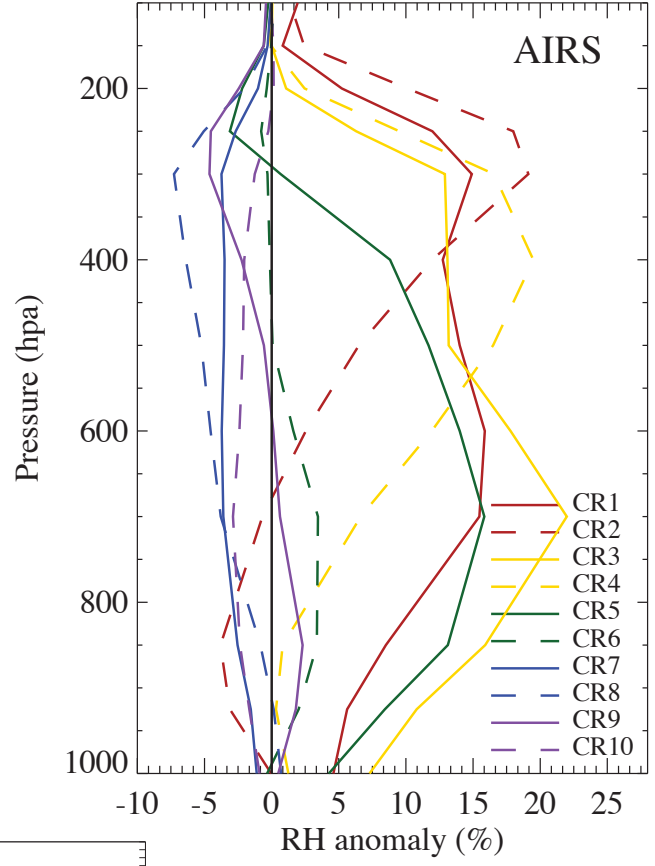
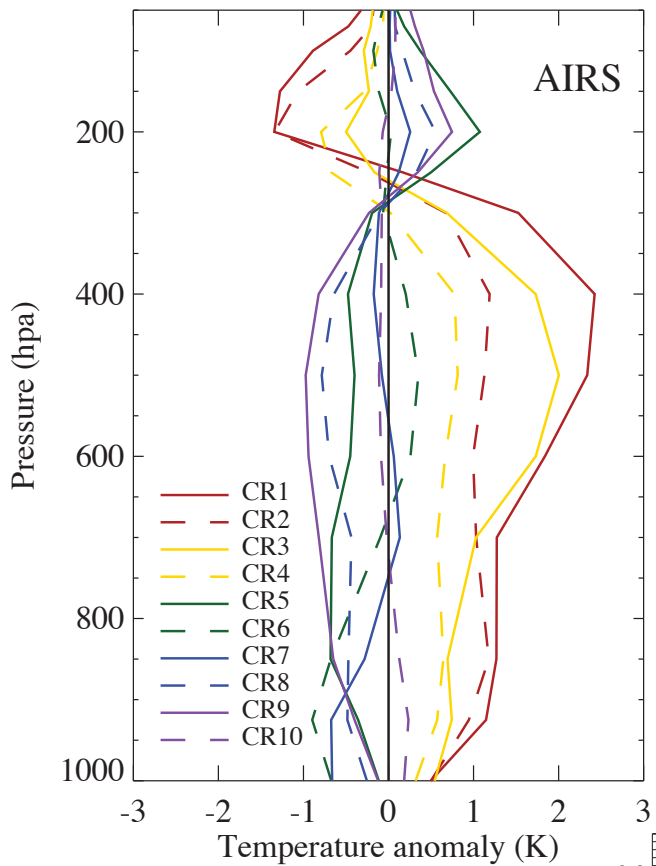




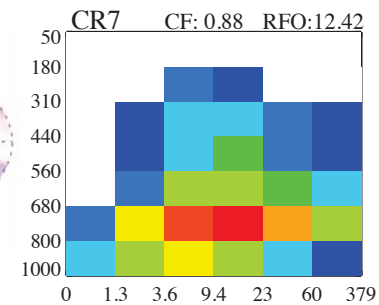
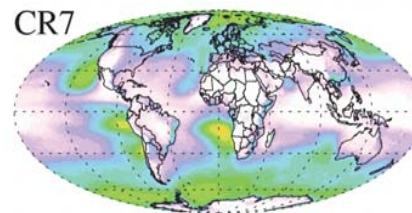
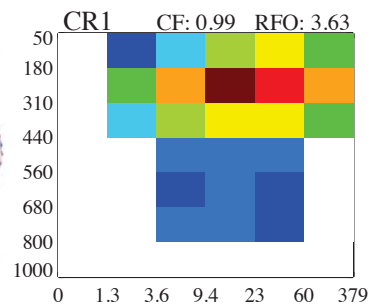
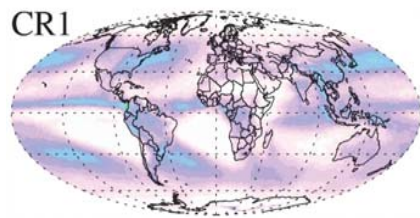
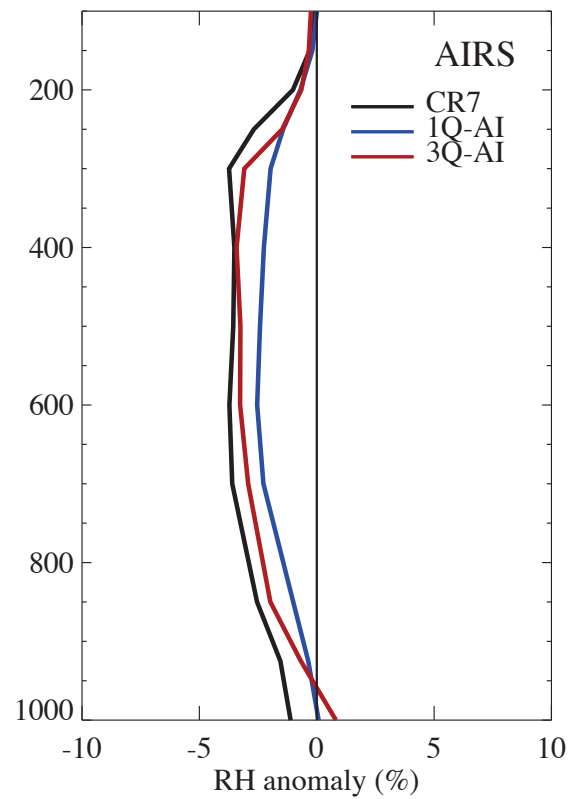
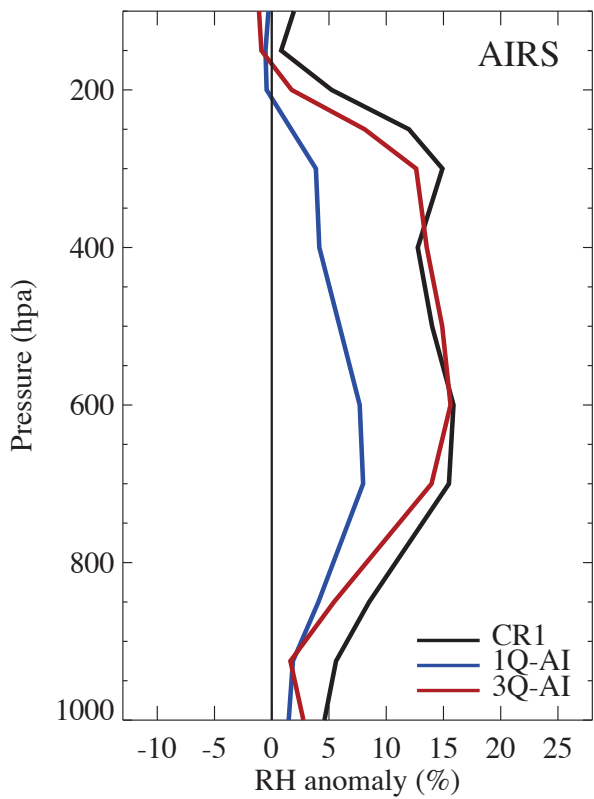
Net atmospheric CRE by CR



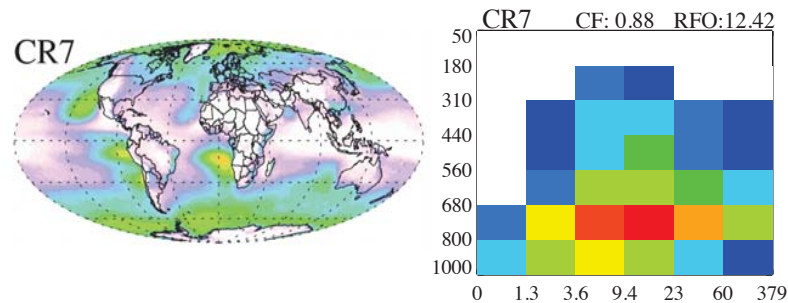
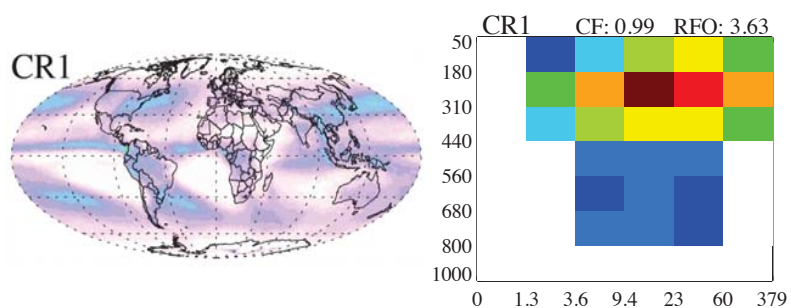
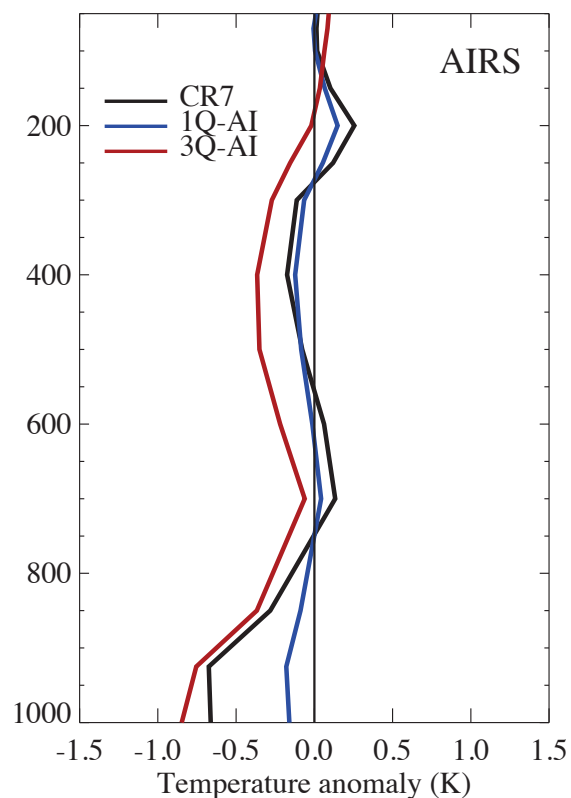
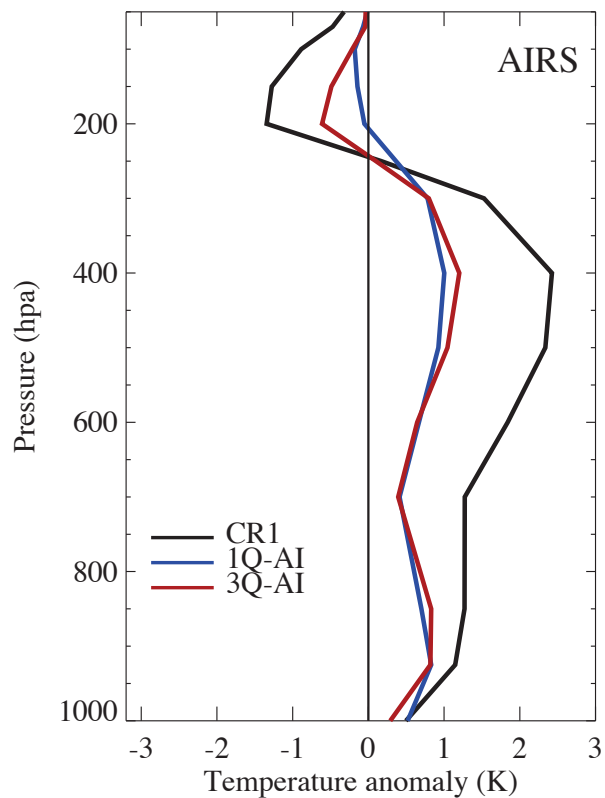
AIRS Temp and RH anomalies show distinct thermodynamic structure of MODIS regimes



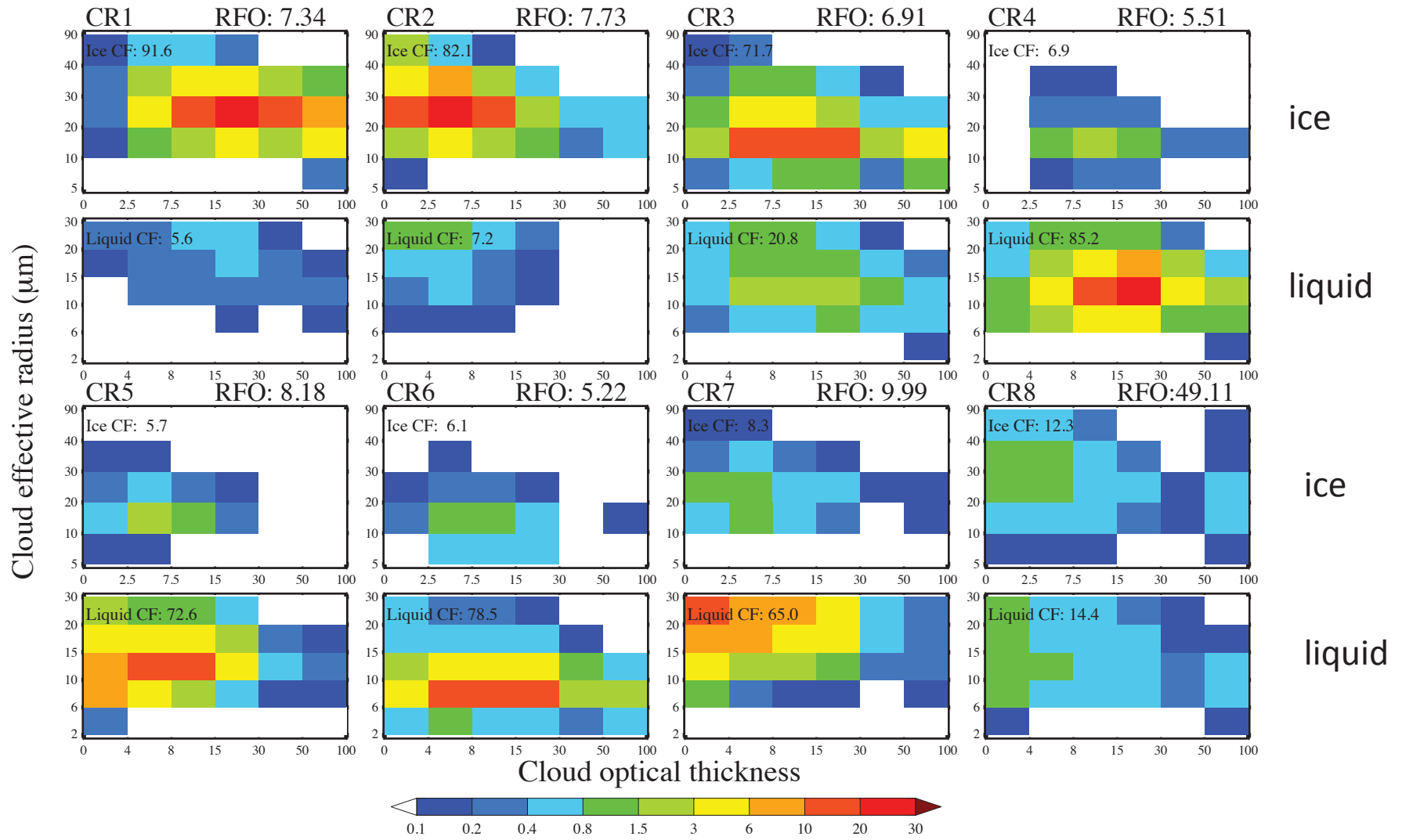
AIRS RH anomalies for untangling aerosol indirect effects



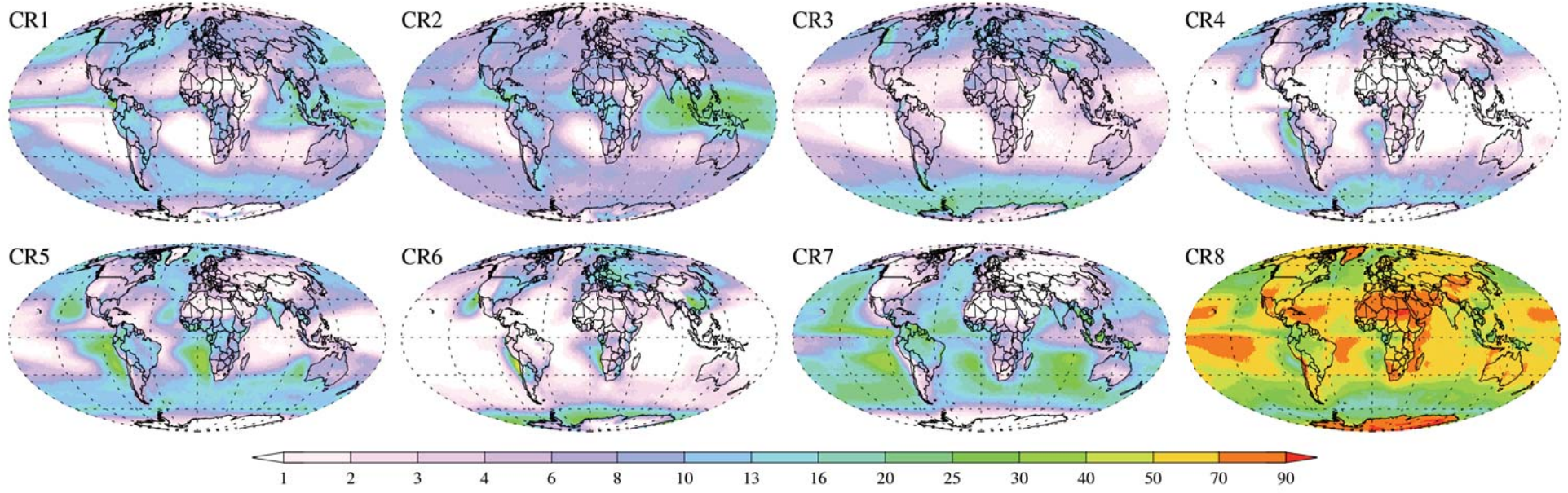
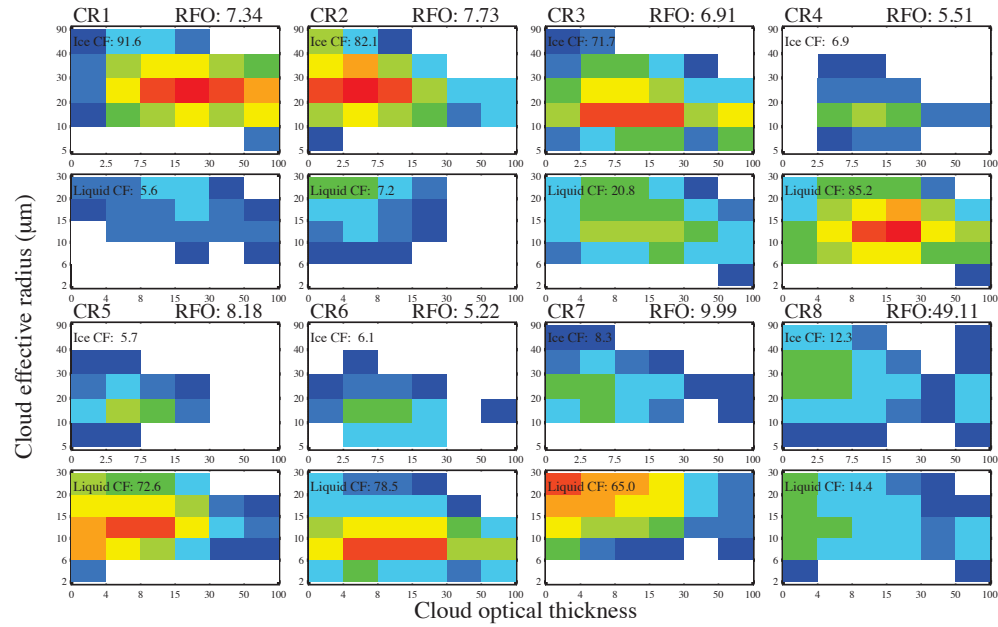
AIRS temp anomalies for untangling aerosol indirect effects



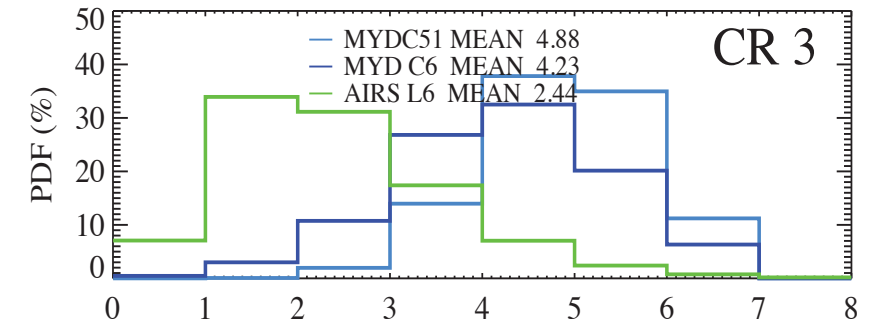
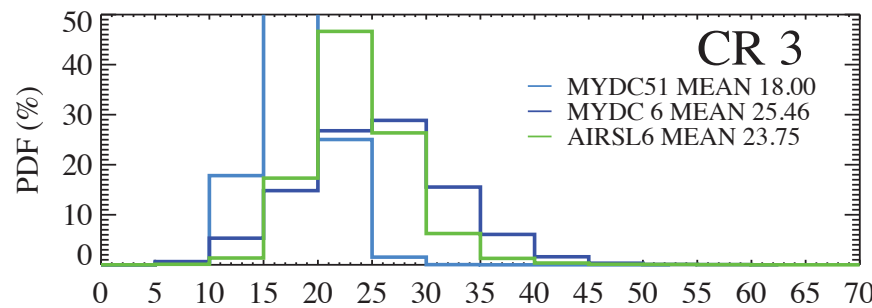
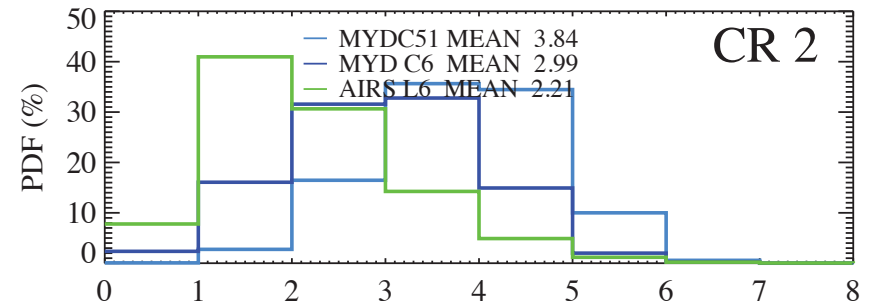
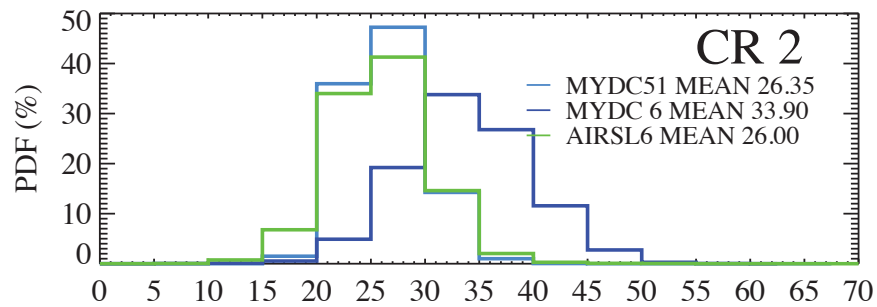
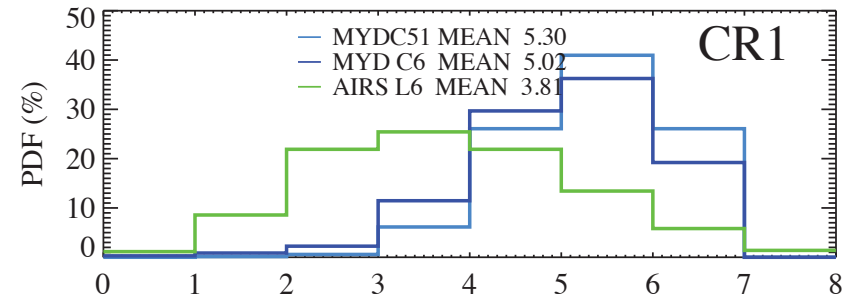
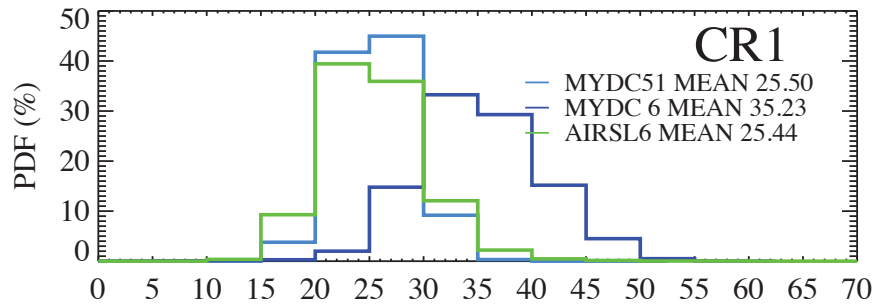
MODIS microphysical regimes (C5.1, prelim)



C5.1 MODIS microphysical regimes



AIRS r_{eff} and COD mapping into C5.1 ice micro regimes



Ice effective radius (μm)

Ice cloud optical depth



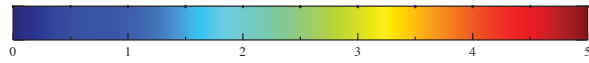
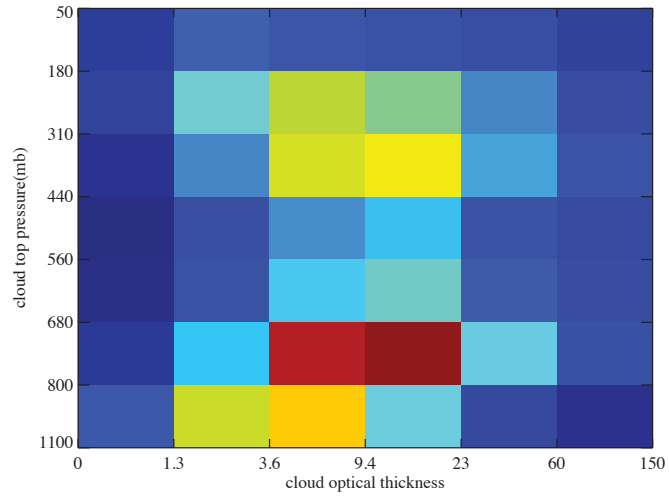
Take home messages

- We have introduced MODIS *global* “dynamical” regimes (CRs) from 10 yrs of obs (this is new; an ISCCP WS dataset also exists)
- The MODIS dynamical CRs have distinct precipitation and CRE characteristics and can be ranked in terms of global contributions
- The regimes can be clearly grouped to those that warm and to those that cool the atmosphere radiatively . The former also produce the largest latent heating.
- There may be also value in a new class of regimes, “microphysical” regimes, particularly for studying aerosol-cloud interactions
- Views from AIRS (and A-Train active sensors) are important for understanding the nature of both regime classes, cloud-aerosol interactions, and perhaps also the quality of AIRS cloud retrievals

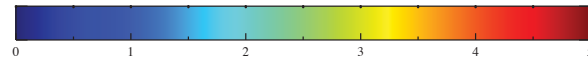
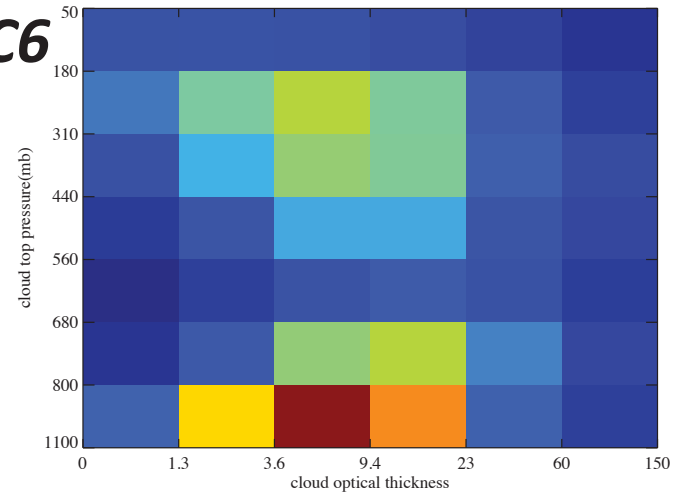
Additional slides

Aqua only

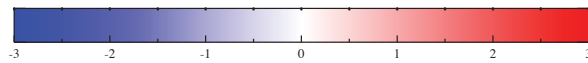
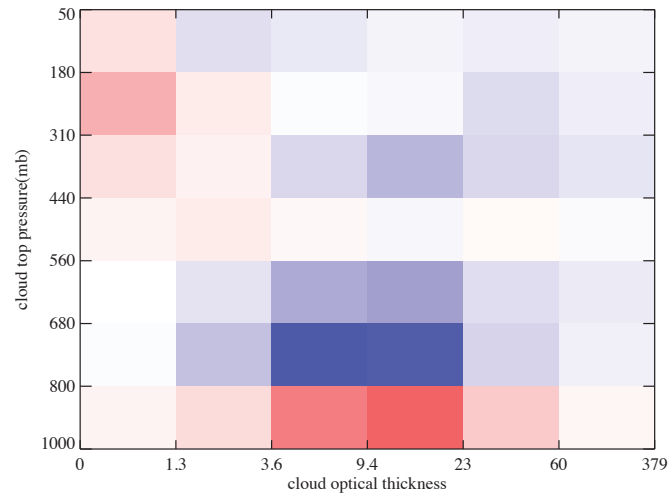
C5.1



C6

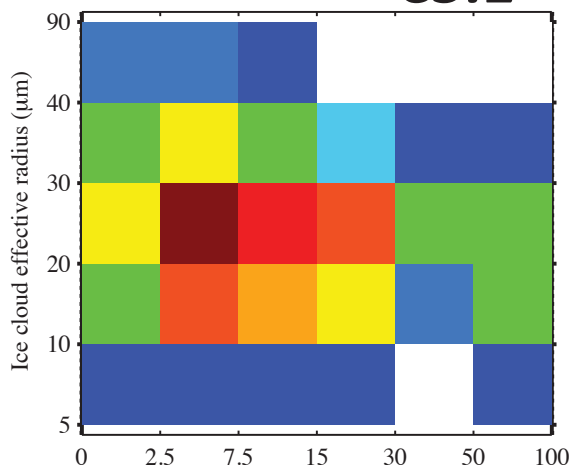


C6 - C5.1

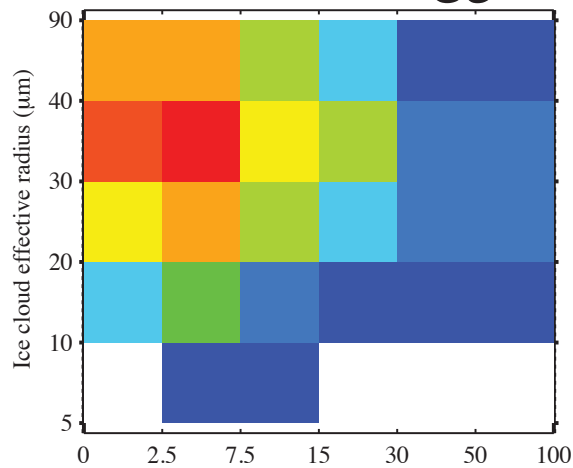


Ice regimes will change with Collection 6

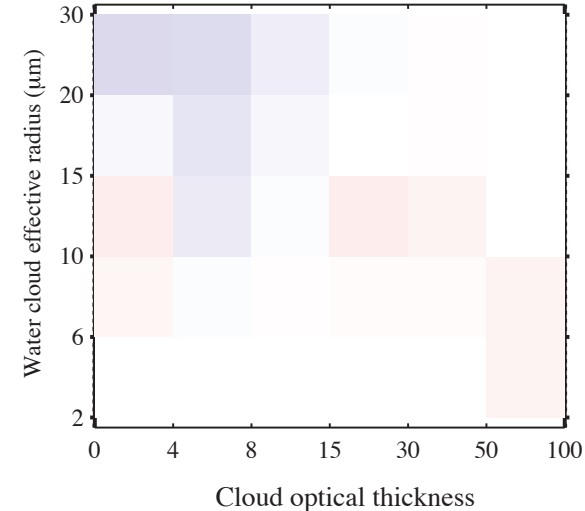
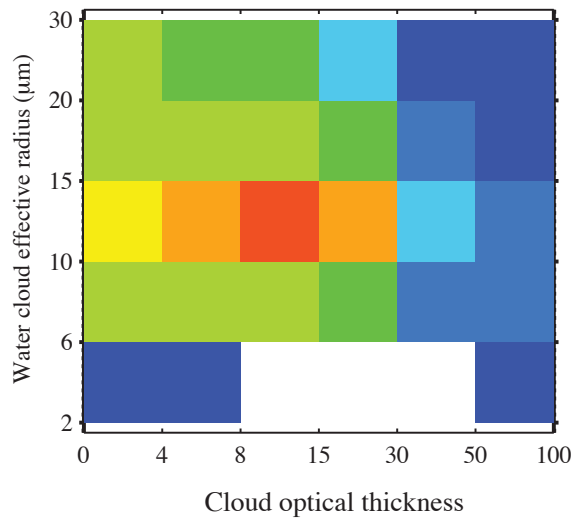
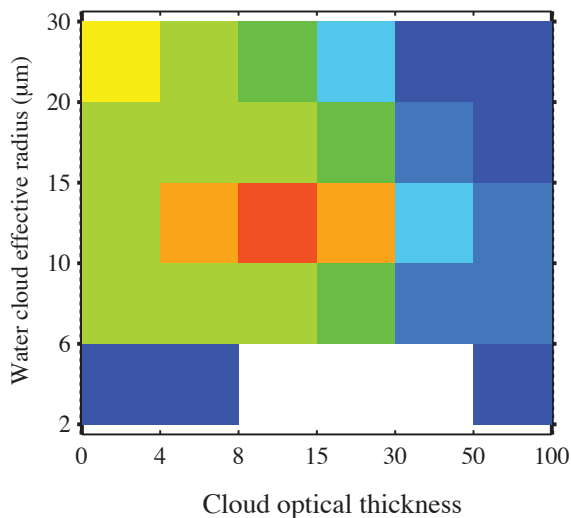
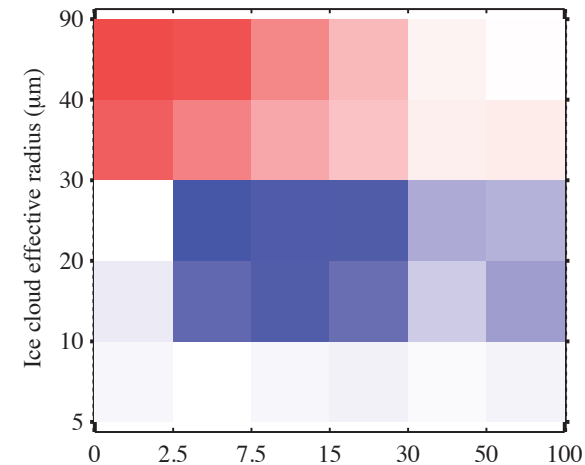
C5.1



C6

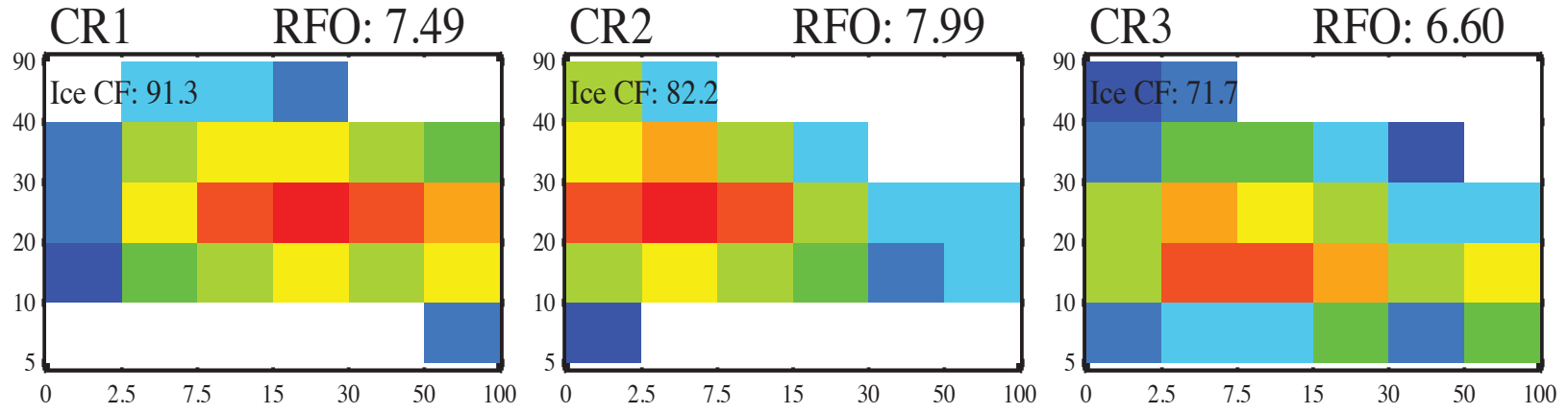


C6 – C5.1



Ice microphysical regimes sensitive to Collection

C5.1



C6

