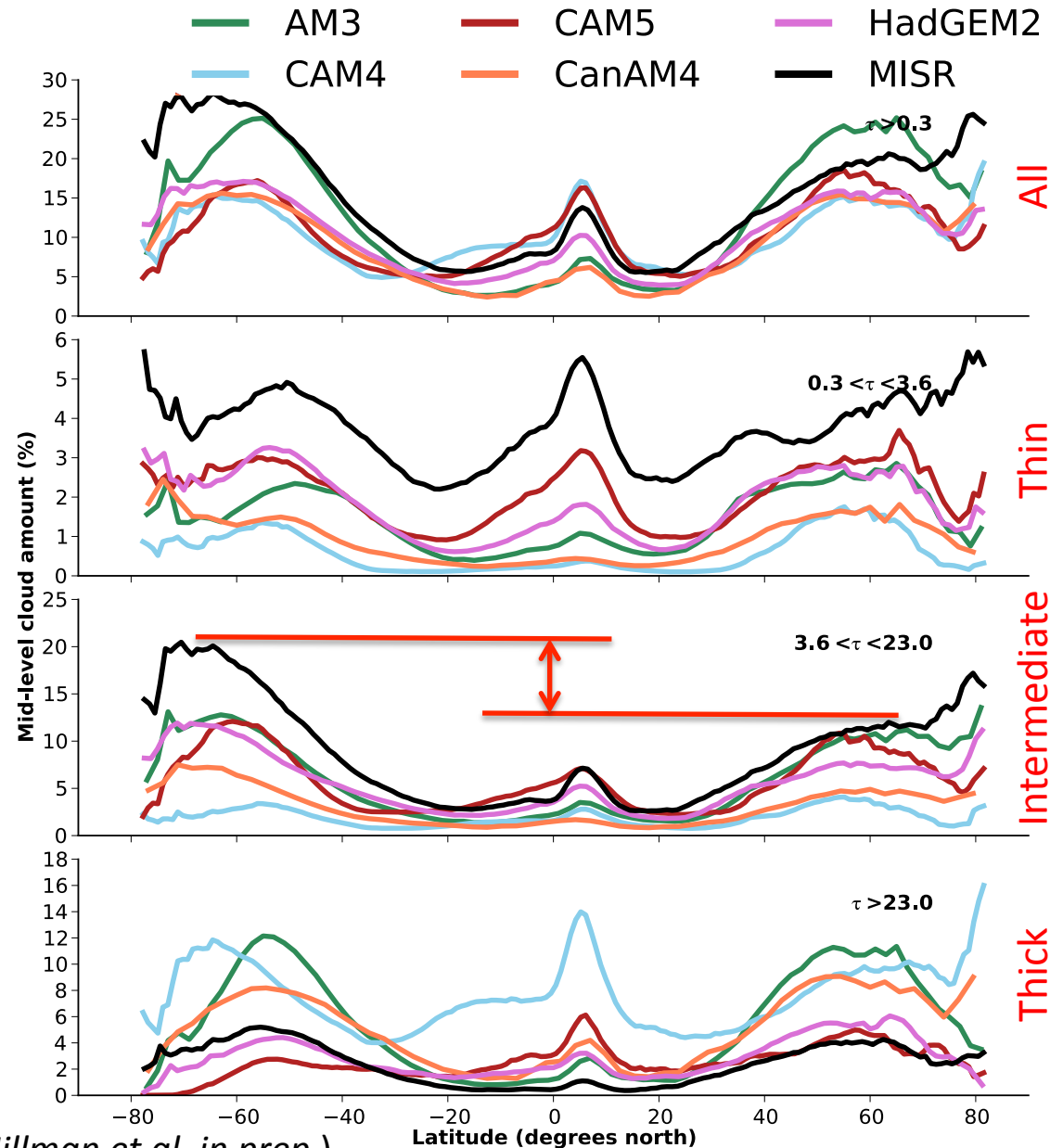


Climate Model Evaluation

[MISR CTH-OD data are being used in evaluation of climate models]

Zonal profiles of MISR observed / simulated mid-level (3-7 km) cloud by optical-depth

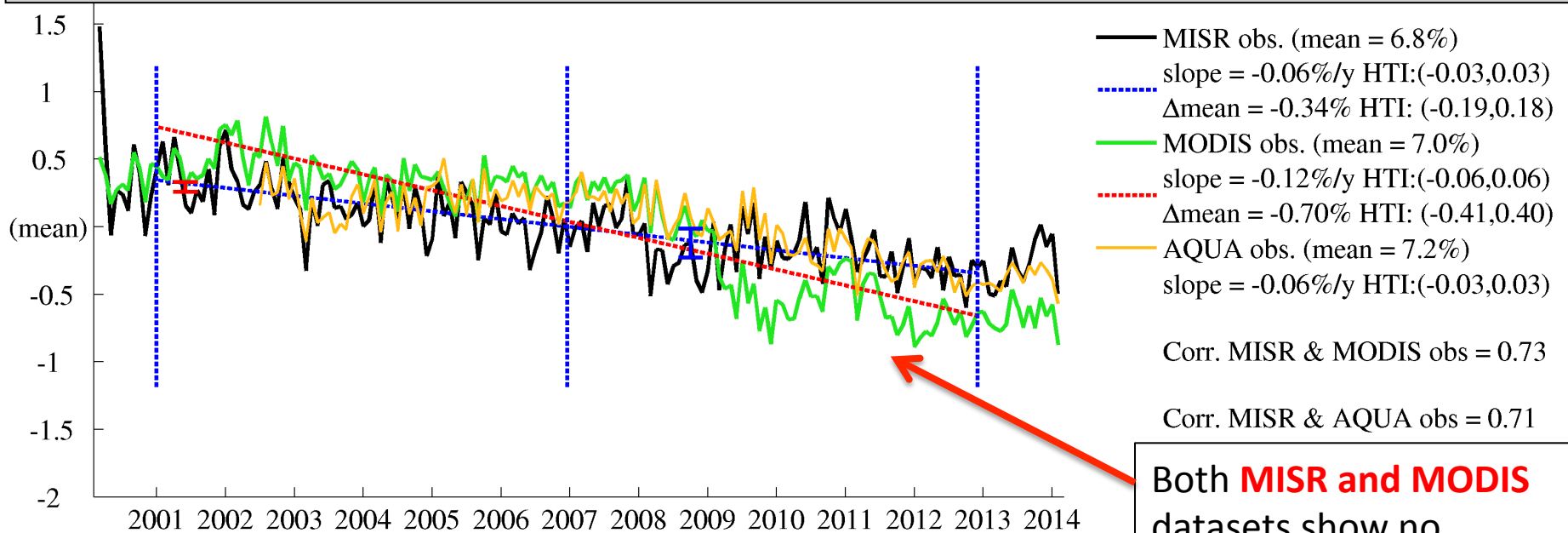
- Model output was obtained using the MISR-simulator which is part of the CFMIP Observation Simulator Package, COSP (*Bodas-salcedo et al. 2011, Marchand and Ackerman 2010*).
- MISR retrieval of cloud-top-height (CTH) is based on a geometric (stereo) technique and provides unbiased retrievals for mid-level clouds.
- All CMIP5/CFMIP2 models shown here under predict optically-thin mid-level cloud amount and frequently over predict optically thick mid-level cloud.
- The models produce roughly the same total amount of mid-level cloud in the southern and northern hemisphere extratropics. MISR show greater amounts of mid-level cloud, due principally to optically-intermediate cloud, in the southern hemisphere.



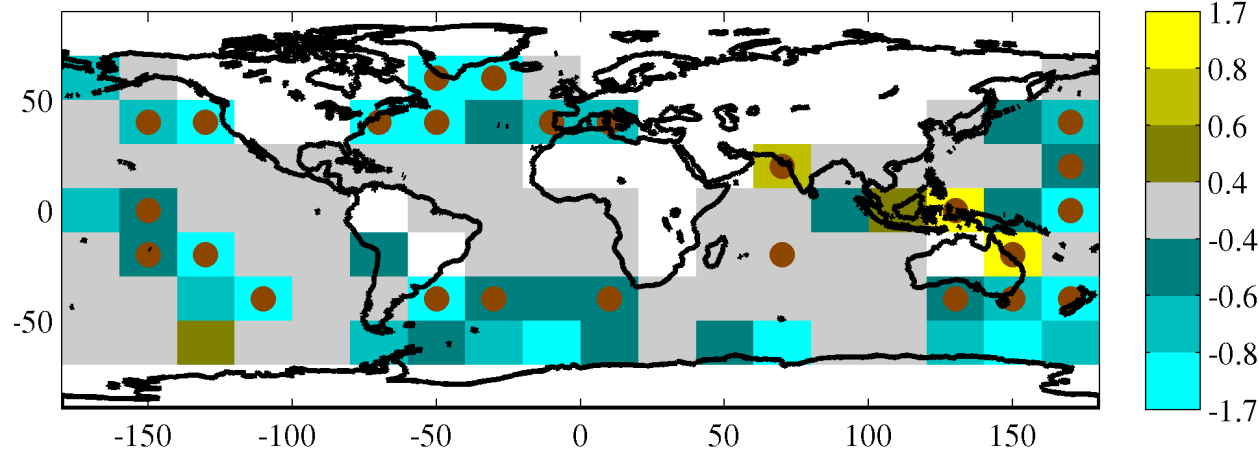
(Hillman et al. in prep.)

Trends/Changes in Optically-Thick ($OD > 23$) Cloud Amount

[MISR and MODIS datasets are revealing small decadal changes in some cloud properties]



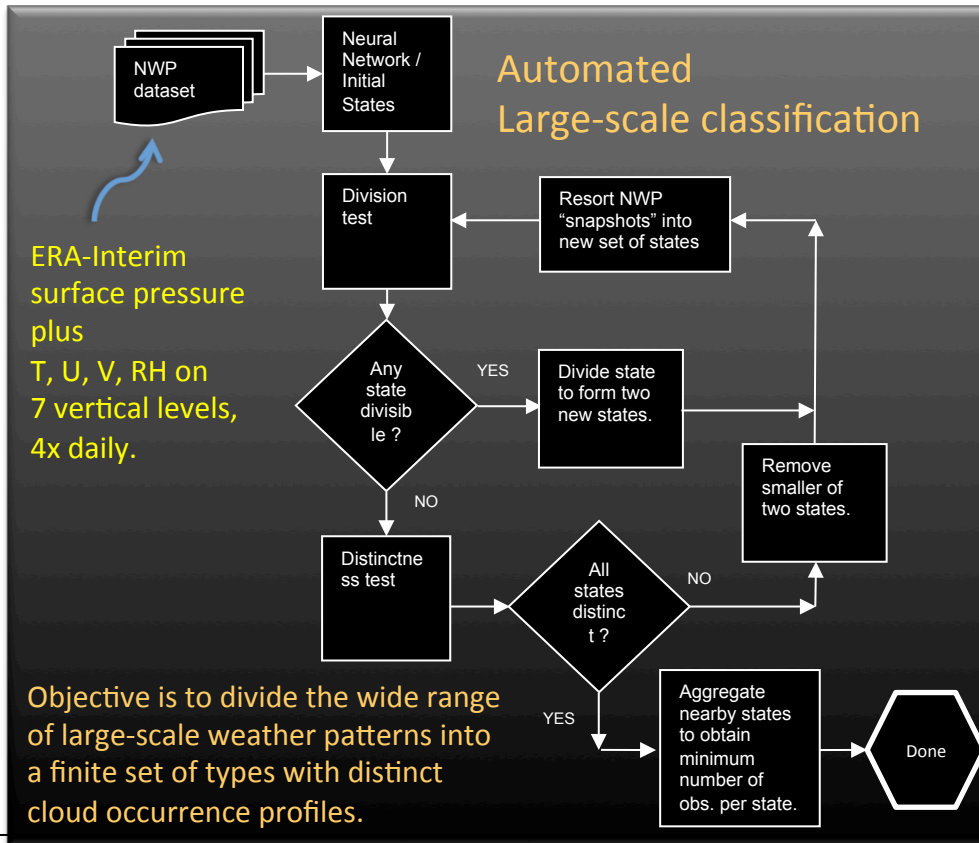
Both **MISR and MODIS** datasets show no statistically significant change in total cloud fraction over ocean over the last 13 years, but do **show a decrease in the area covered by the optically thickest clouds** (Marchand, JGR 2013).



The change in optically thick cloud **has occurred primarily in the extratropics of both hemispheres** (dots represent changes that are significant at the 95% level of confidence).

Analysis of South Pacific Cloud Trends using Synoptic Classification

[Changes in MISR cloud amounts are associated with the Southern Annular Mode]



- An automated objective classification approach has been used to examine MISR trends as a function of large-scale dynamic states / patterns.
- Observed changes in cloud amount are **NOT due to a change in the distribution of dynamical states**, but relatively subtle **changes in position and strength of baroclinic systems** consistent with an overall strengthening of the **Southern Annular Mode (SAM)**.

Decomposition of change in thick cloud

