Briefly: The (pending) UW Ensemble

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HFIP Regional Ensemble Team Call

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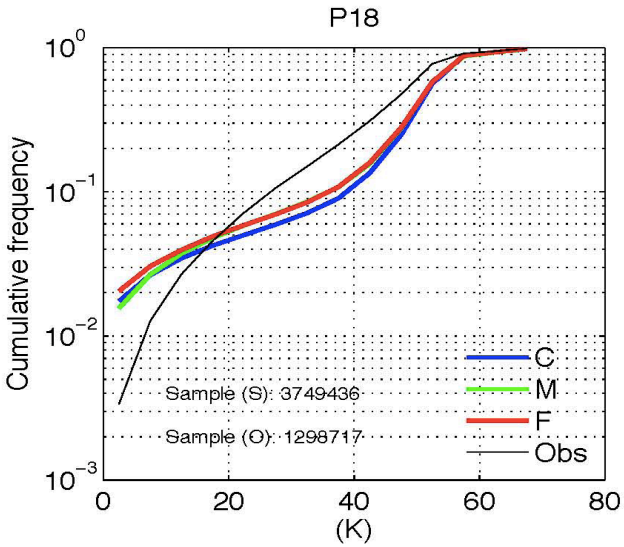
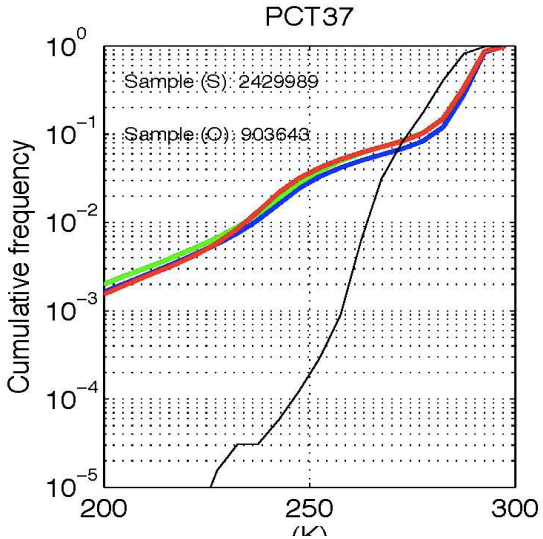
Motivation

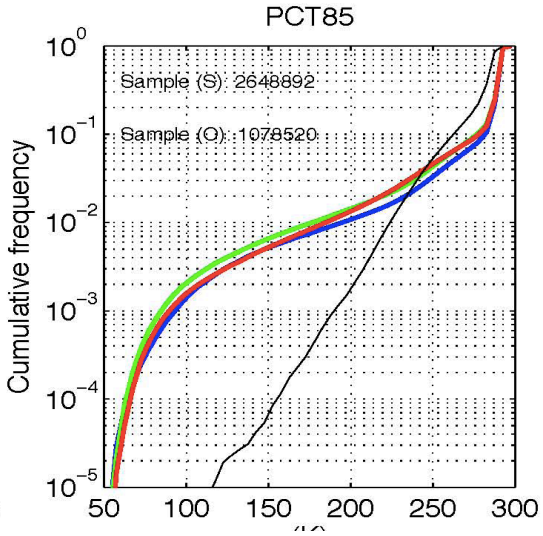
- The high-resolution hurricane test (HRH) made clear that incremental increase in model resolution did produce incremental increase in intensity forecast skill.
- After finishing (HRH), we were interested what impact increasing resolution might have on the (microwave) radiative signature of TCs.
- In particular, how would simulated PCTs from an intense Atlantic TC compare with climatology? What might this tell us about how well the model is doing microphysics?
- Implications for satellite DA?

Microwave PCTs from UW-NMS Wilma simulation compared to Cecil et al. climatology (Hashino et al., 2010)

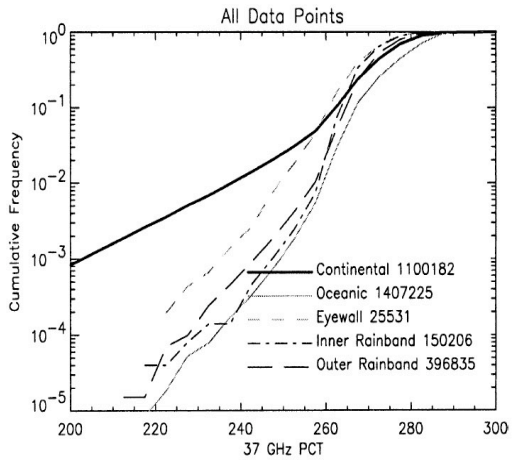
12km spacing 4km spacing 1km spacing

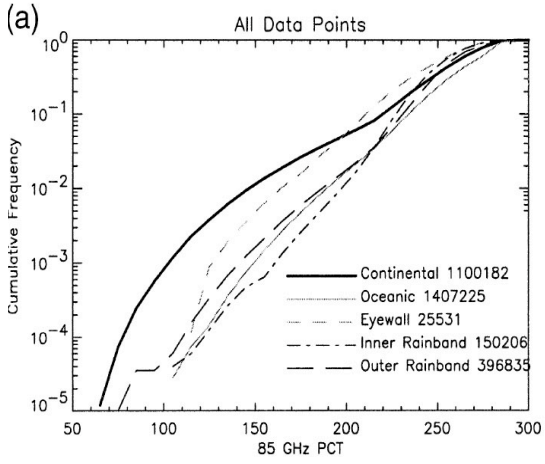




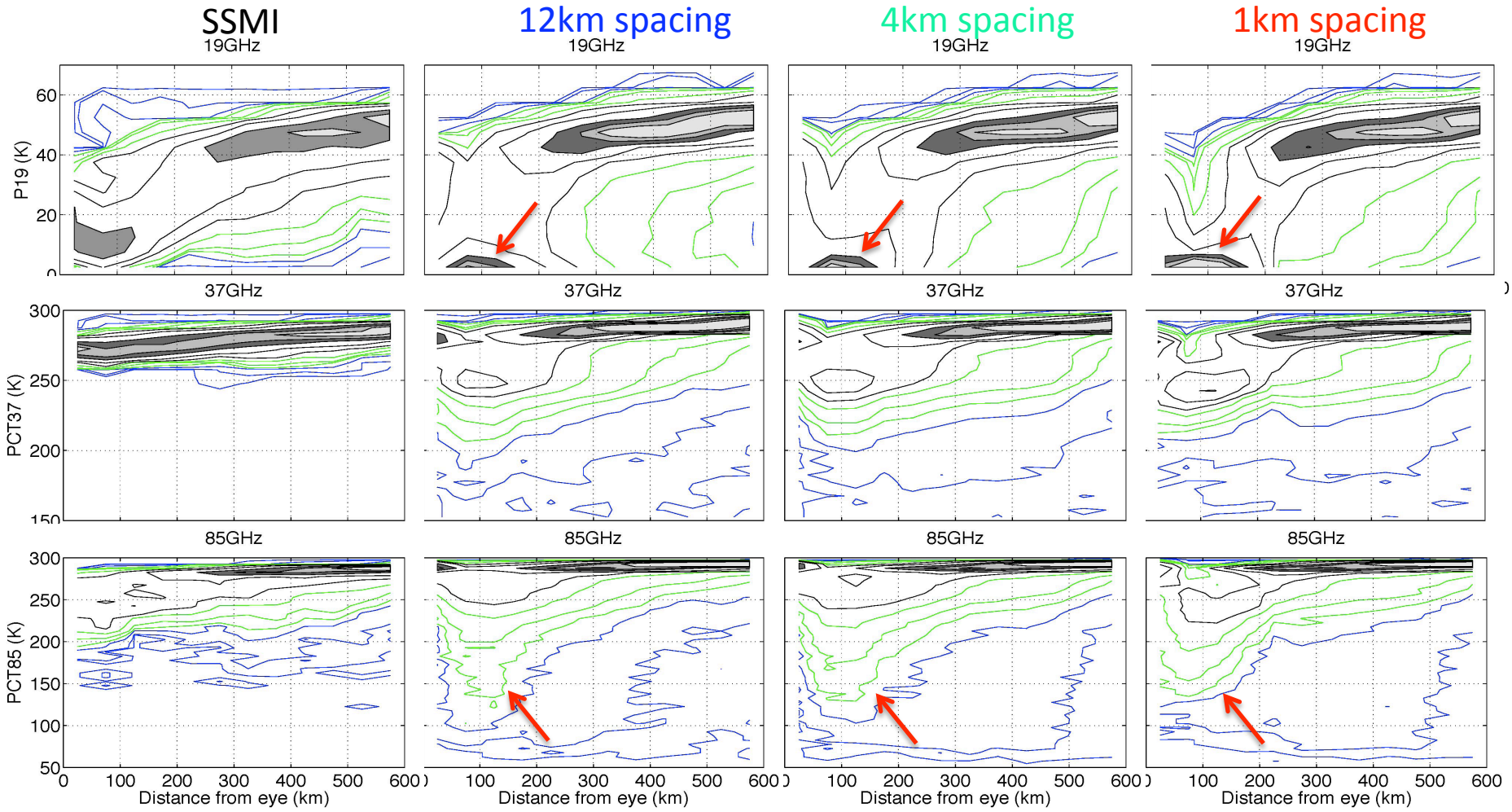


Simulated brightness temperatures are more characteristic of continental convection than oceanic or TC cloud systems!





CFDs for given distance from TC center



While the far-field (>300km) structure is fairly reasonable, ,the core region has too much water (liquid and solid).

Conclusions and Current Plans

- Hashino et al. (2010) demonstrate that there are likely serious deficiencies in the ability of current generation models / microphysical schemes to properly depict the statistical properties of TC convection. This has implications for the assimilation of satellite data.
- We seek to use a single-model regional ensemble with microphysics perturbations (both parameter and scheme) to discern the impact on simulated satellite radiances (IR and microwave).
- In particular, what degree of sophistication is necessary to optimally represent observed radiances (with respect to RMS error, cumulative distribution, etc.)?
- While the primary goal is to prepare the foundation for satellite data assimilation, the resulting dataset may be used to clarify the impact of microphysics on *storm structure and evolution* (*particularly with regard to rapid intensification and secondary eyewall formation*).*
- Target: run on 2011 Atlantic TC cases during offseason 2011-2012; if time permits, run some/all Retrospective test cases.

*consonant with HFIP ensemble products goals

Future Plans

- Evaluation of ensemble results; selection of optimal scheme, parameters
- Real-time, GEO-assimilating EnKF using UW-NMS during 2012 season (preliminary testing underway locally)
- Parameter estimation within EnKF could/should be used to fine-tune results.
- Same methodology obviously extensible to other physics parameterization / estimation problems as well (cumulus, PBL, etc.)
- Use Advanced Microphysical Prediction System, i.e. AMPS (Hashino and Tripoli, 2007,2008, 2011) to investigate importance of aerosols and representation/evolution of ice crystal habits (supported by conclusions of recent HFIP physics workshop). While cost-prohibitive in 3D, 2D simulations initialized from 3D model (azimuthal mean, mean sounding) may be illuminating.