Comparison of ECMWF and NCEP reanalyses using synoptic classification
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Motivation

- Different models including different parameterization schemes are used in ERA-I and CFS-R reanalyses
- We want to understand if
  a) the models produce similar dynamical stats
  b) similar dynamical stats produce similar cloud properties
- Compositing model and observational data by atmospheric states allows us to compare cloud and radiative by state and identify possible source of error.

Examples of State analyses

The following states frequently occur in sequence, demonstrating the algorithm's ability to discern different stages of a passing front.

- High pressure, clear and cold
- Warm sector / cold front generating
- Arriving cold front
- Front has passed, cooling the region

Examples of State analyses

- Sets of states generated from CFSR and ERA-I
- Time series of synoptic events classified into clusters for both reanalyses and for time series of observation

Examples of State analyses

- ARM SGP radar data used to refine state definitions

Conclusion

- States with similar meteorology and cloud profiles are produced independently in each reanalyses. Time series show that these states can represent successive phases of synoptic events.
- By comparing the associated OLR profiles of matching states we are able to evaluate the ability of reanalyses to reproduce radiative fluxes. OLR agreement is generally good but model distributions tend to be narrower (have less variability) than those from data.
- Ongoing work includes comparing physical variables. Evaluating cloud parameterization is hampered by lack of cloud property values in reanalyses outputs.