Synoptic Classification
Applications to Brazil AMF Deployment

Tom Ackerman, Stuart Evans, Roger Marchand
University of Washington
The question

- Can we establish a statistical relationship between dynamical forcing at the large mesoscale and cloud occurrence and properties?
- More specifically: can we do this in the convective tropics where variations in large-scale forcing fields may be more subtle?
Methodology

Input data (T, U, V, RH, SP) → Neural network classifier → Initial states

Distinctness Test:
- pass → Stability Test
- fail → Resort observations

Stability Test:
- fail → Delete / divide up to four bad states
- pass → Distinctness Test

Distinctness Test:
- pass → Final States
- fail → Resort observations
Example: Darwin classification

ECMWF reanalysis
- June 06 – Sept 10
- 8x daily

At each timestep
- 9 x 9 horizontal grid
- centered on Darwin
- 2° x 2.5° spacing
- 7 vertical levels

Variables at each point
- T, U, V, RH, SP

2349 variables = 1 event or observation
9 distinct states

Meteorology associated with each state

Cloud occurrence profiles associated with each state

Statistical distribution of associated physical properties
State 2 – heart of monsoon season
Plans for Brazil

- Before deployment: Develop
  - Technique to substitute CloudSat profiles for ground-based radar profiles
  - Classification for Amazon

- During/after deployment
  - Map observed conditions into existing classification
  - Use ARM data to compare with and expand on existing distributions of cloud properties
  - Compare observed class properties with distributions from regional models
State 6 – build up to the monsoon featuring isolated convection
State 9 – dry season with isolated convection