Role of giant and ultragiant aerosols in the initiation of precipitation

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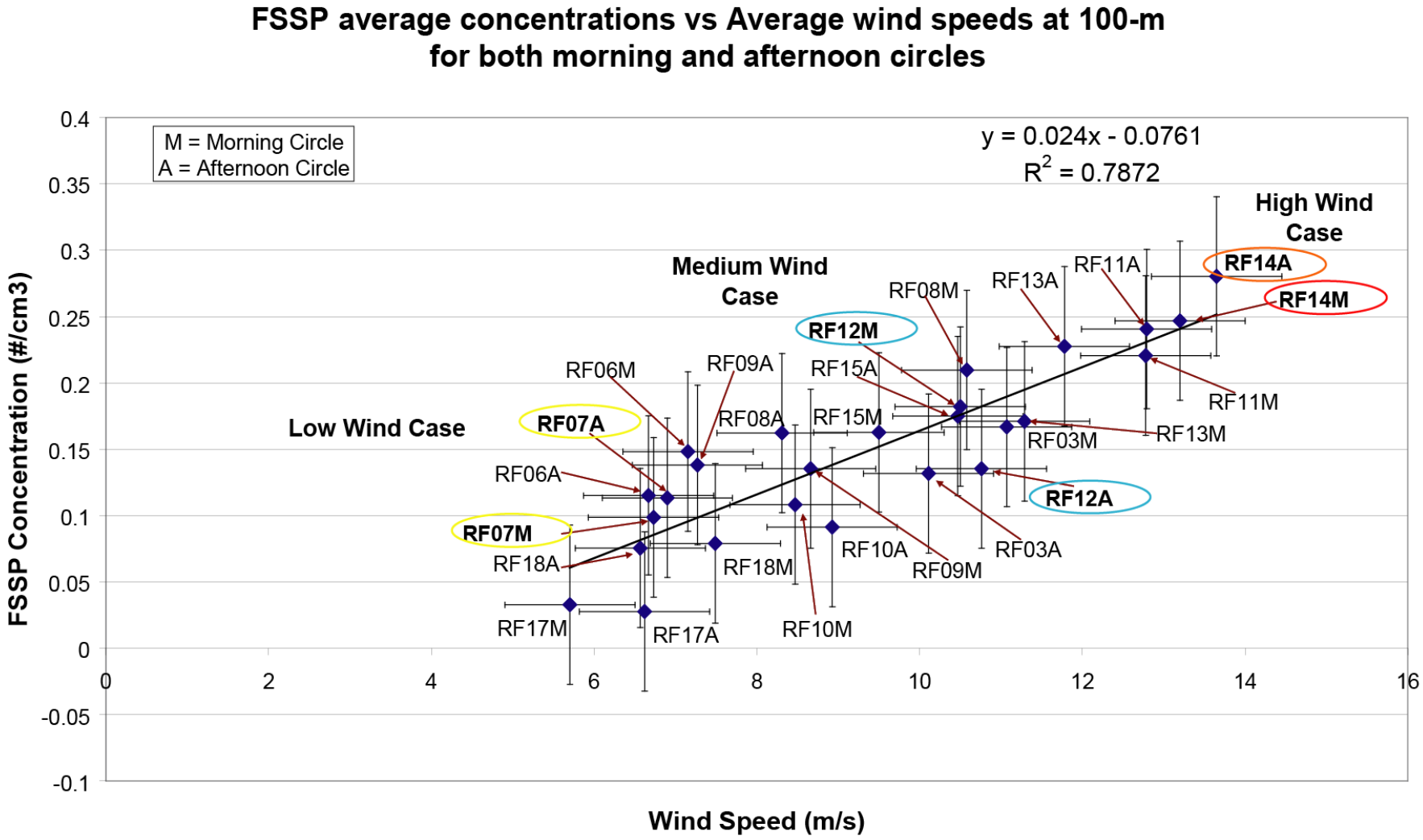
What data are we using?

- NCAR C-130
  - Giant and Ultragiant nuclei slides (Jensen)
  - Aerosol probes, CN counters,
  - Forward Looking Video
- Gerber LWC Probe – LWC of each cloud

How are we approaching the problem?



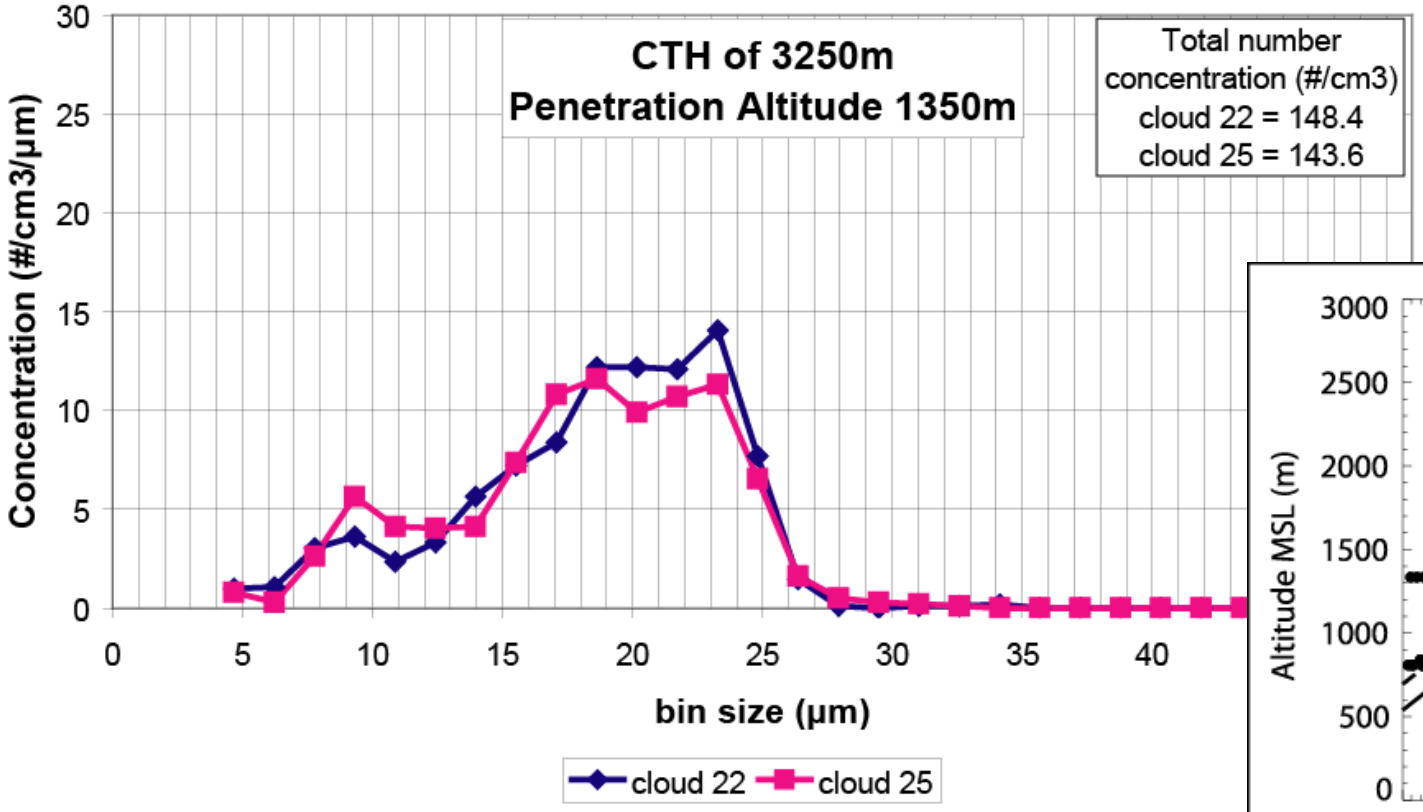
How are we approaching the problem?

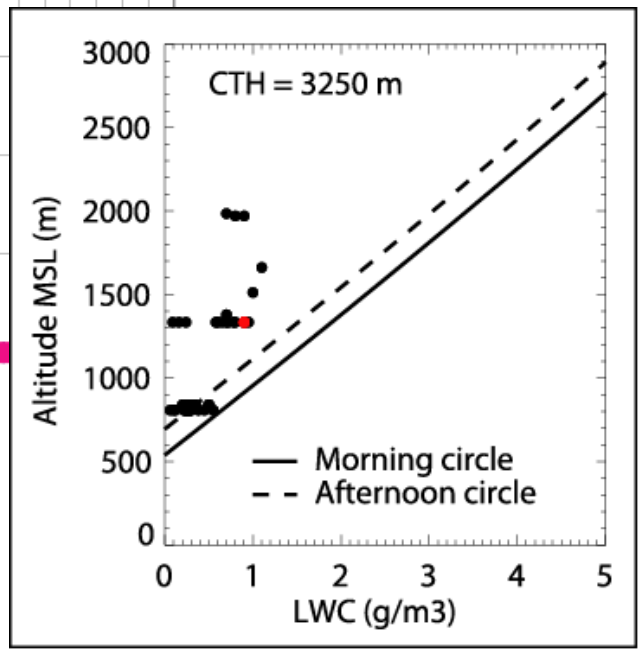
1. Linear relationship of wind speed and giant aerosols – Three cases were selected
   - High – Medium and low wind speeds

2. Obtain, for each cloud penetrated, the droplet spectra (restricted to areas of highest liquid water content)

How are we approaching the problem?

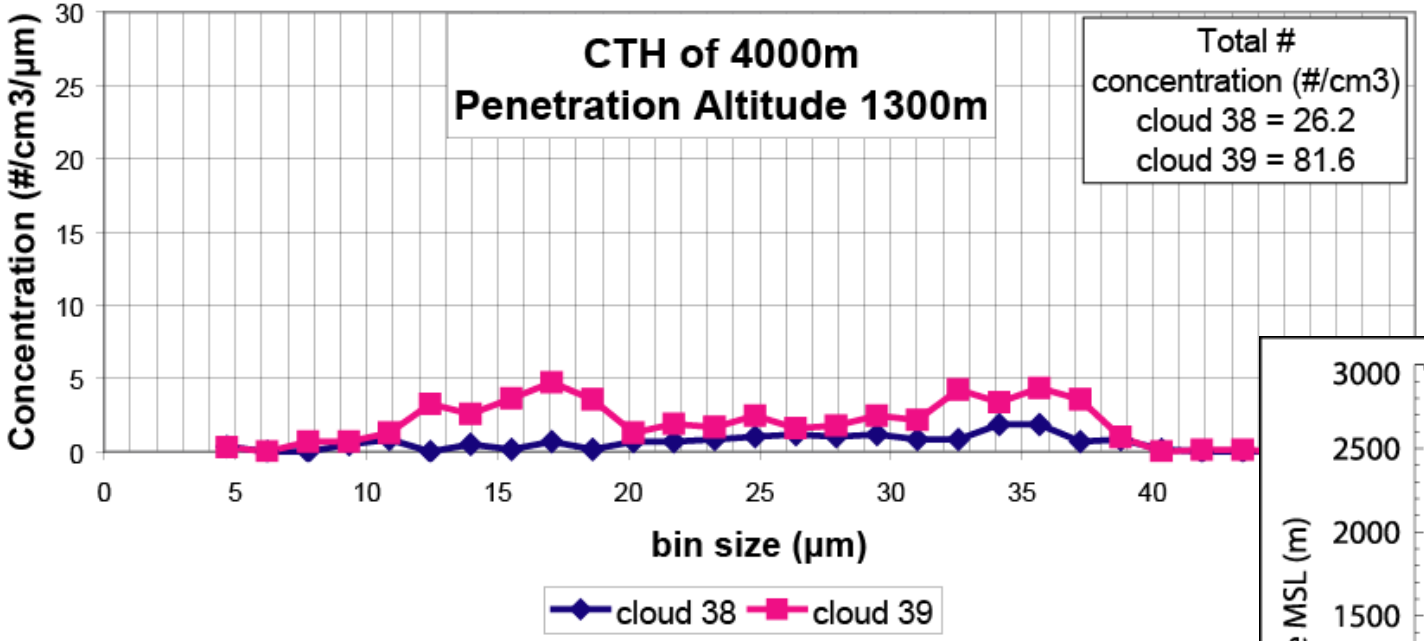
Example of Data
RF14 – High Wind Case

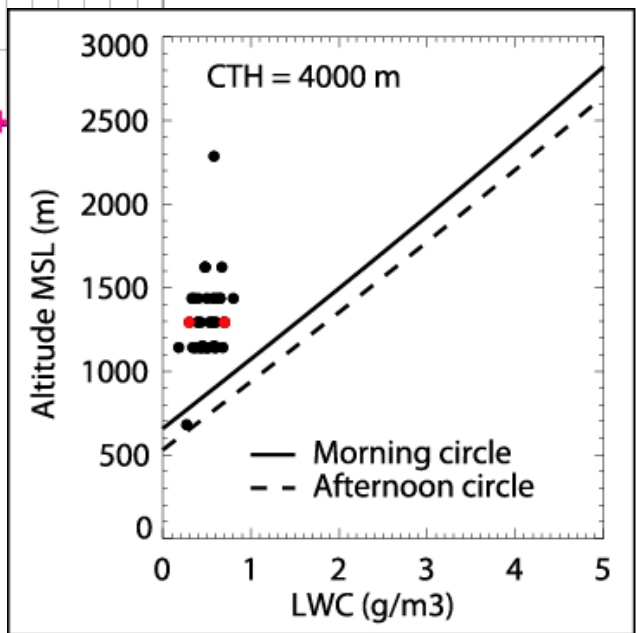




How are we approaching the problem?

Example of Data
RF07 – Low Wind Case





Collaborations and Future Work

- Jørgen Jensen – Concentrations and distributions of giant and ultragiant aerosols
- Jim Hudson – CCN concentrations
- Sabine Göke – Radar data

- Future Work
  - Process more flights with High-Medium-Low wind speeds and obtain droplet spectra and LWC
  - Analyze 2-DC and 2-DP data
  - Aerosol spectra of the Giant and Ultragiant aerosols near cloud base from slides
  - Compare flights with similar CCN concentrations

Discussion - High Wind Case (RF-14)

- High concentrations of deliquessed giant (> 3 um diameter) aerosols in clear air near the ocean surface
- High total droplet concentrations (average of 141.6 cm-3) in the clouds.

- The droplet spectra were typically characterized by
  - Single narrow mode around 10-15 µm.
  - There were no droplets greater than 25 um in these spectra.

Discussion - Low Wind Case (RF-07)

- Low concentrations of deliquesed giant (> 3 um diameter) aerosols in clear air near the ocean surface
- Low total droplet concentrations (average of 63.1 cm-3) in the clouds.

- The droplet spectra were
  - typically wide (3-45 μm) and characterized by either a single mode or two modes.
  - When bimodal
    - first mode was near 15-20um diameter
    - second near 32-35um diameter.