Prioritization of VAPs within CAPI

Background

- Many, many new instruments were recently or are being deployed
  - These complement the instruments we already have
- There is a need to have higher order data products derived / retrieved from these instruments
  - What do we really need?
  - Is the algorithm developed? Is research needed?
- Infrastructure is almost saturated, thus prioritization of these efforts is required
  - There are efforts underway to help streamline the VAP development process and free up some additional resources
  - There will always be too much for the infrastructure to do

How to prioritize?

- One suggested idea was to consider the problem from a geophysical variable point-of-view
  - Which variables do we need (ignoring how they are determined)?
  - What is the prioritization of these variables?
- A list of 100+ variables was created
- CAPI steering group members (Cziczo, Fridlind, McFarlane, Feingold, Wood, Ghan, Turner) individually prioritized the list
  - Ranked High, Medium, Low
  - Only 25% could be high, 25% medium, the rest were low
  - Assigned numerical values (1,2,3) to these classifications
- The scores were tallied, and the results I'll soon show you
- Other WGs did the same exercise, and interestingly, there was a lot of similarity in the top 20-30 variables

CAPI Ranking: (1)

Water vapor mixing ratio	1.00
Temperature	1.00
Liquid Water Path	1.00
Pressure	1.14
CCN concentration at several S below cloud base	1.14
Cloud Optical Depth	1.14
Cloud Location	1.29
Broadband SW Flux at surface	1.29
Cloud mean droplet number concentration	1.29
Aerosol Optical Depth (several wavelengths)	1.29
Ice Water Path	1.29

CAPI Ranking: (2)

Precipitation rate at surface	1.29
Vertical wind speed	1.29
IN concentration as f(T,Si)	1.29
Broadband LW Flux at surface	1.43
Surface Temperature	1.43
Surface Pressure	1.43
aerosol bulk hygroscopicity	1.43
Cloud thermodynamic phase	1.43
Sensible Heat Flux	1.57
Latent Heat Flux	1.57
Liquid Effective Radius	1.57

CAPI Ranking: (3)

Liquid Water Content	1.71
Horizontal wind speed profile	1.71
Aerosol size distribution	1.71
Ice particle concentration	1.71
drizzle rate	1.71
Spectral SW Flux at surface	1.71
Spectral LW Flux at surface	1.71
Precipitaiton type at surface	1.71
Wind speed at surface	1.71
Wind direction at surface	1.71
Horizontal wind direction profile	1.86

CAPI Ranking: (4)

aerosol size distribution	1.86
Aerosol mixing state	1.86
Aerosol Extinction 355, 532, 1064 nm	1.86
Advective tendency of temperature	1.86
Advective tendency of water vapor	1.86
Large-scale pressure vertical velocity	1.86
total cloud fraction	1.86
PBL height	1.86
Liquid Water Path precipitating conditions	1.86
ice crystal size distribution	1.86
Ice fall speed	1.86

Implications

- Many of the highly ranked variables are already being produced by existing VAPs
  - Q: are these VAPs providing the accuracy and resolution needed?
  - Q: do they need to be upgraded?
- Clearly some new VAPs are needed
  - Q: do algorithms exist to derive these variables?
  - Q: is a PI willing to ‘volunteer’ to help with the development?
  - Q: how do these ranks relative to the existing VAPs?

Existing VAPs of High Priority

- MergedSounding
  - Upgrade this with Miloshevich corrections?
- MWRRET
  - Upgrade to use the 90 GHz channel on new MWRs
- ARSCL
  - Importance of microARSCL ?
  - Importance of 3D-ARSCL ?
- Cloud optical depth from MFRSR
- Broadband radiative flux analysis
- Cloud classification (currently only at SGP)
- Vertical velocity profiles (directly from Doppler lidar and radars)
- CCN at multiple S at surface
- Aerosol hygroscopicity at surface
- Aerosol size distribution at surface
- Aerosol optical depth and Angstrom coefficient
- Aerosol mixing state (from HTDMA)

Possible New CAPI VAPs

- CCN at cloud base (following Ghan et al. 2006)
- Precip rate at surface
  - Scanning radar approaches
  - Disdrometer approaches
- Boundary layer height
- Profiles of LWC and Reff in non-precipitating conditions
  - Microbase not accurate enough?
  - Several approaches possible
- Improved IWP, IWC, Reff in ice-only clouds
  - Microbase not accurate enough?
  - Several approaches possible
- Drizzle water content
- Others?

What sites ?

What level of “continuity” ?