Jeff – AOT and radiation verification

Develop a dust AOT consensus

Develop and AOT own analysis

ICAP AOT clipper as a verification baseline

Top visibility verification sites

Coordinate with Luke on AERONET verification

Problems with “bad” datasets – products need to be of assimilation grade

MODIS & MISR bias corrections

Bad products degrade analysis

Ex: south america – MODIS overestimates, MISR underestimate (AOD> 0.7 multiple scattering important)

Shi et al: product cross comparison – to be submitted

BIG DIFFERENCES between Deep Blue and MISR over desert

AERONET sites are not in the spots where they would be needed....

First results from 3D-Var of CALIOP data –better forecast...

GEWEX: our voice is getting heard – product developers will have to refine their error definitions with their products.

NASA/JPSS:
launch date still in October
have to do product verification ourselves
MODIS team was picked to ensure MODIS technology persistence
NASA very supportive of effort, but no good data from VIIRS until after one year after launch – biggest problem is radiance calibration, cloud mask looks pretty bad too

Lidar: continuity is looking much better than it did last year

-thanks LaRC
- EarthCARE alive (2016)
- ADM is a possibility (2013)
-HSRL on the Space Station (Judd- 2013)!!!!

Verification of multi-model ensemble is well on its way!

Every model comes on top for certain parameters – GEOS5 is the best for dust,
while MACC is for sulphate

MACC way too low in dust!!!

Often there is a problem with verification data (lacking for big events for example that are correlated to clouds...) – use sensitivity of ensemble to understand observations need

Ed Hyer – asking LANCE to run NRL algorithm for MODIS bias correction of land and ocean product

Southern ocean bias due to cloud contamination

Land - problem of bright surface, try to improve signal to noise by only using longer paths

Strong systematic bias with surface albedo – NRL product corrects negative bias in S. America, positive bias over arid surfaces using albedo data

Microphysical bias –

+ regional trends,
- uncaptured variability in aerosol properties

NRL L3 product has a regional correction applied

Error estimation: average data to get AOD standard deviation, average land error 0.15!!!! Not too far from our empirical tuning!!!

Miha – surface verification

PM10 observations from MACC near-real time observations and EMEP

Motivated by Regional Air Quality activities in MACC

Hourly data from MACC partners

6 regional models to compare with MACC global:
HUGE problem with sea salt, low bias over populated areas

ICAP ensemble – would be great to also look at surface concentrations

First results – sea salt bias very bad

Looking at urban vs polluted sites does not help...still terrible correlations

Able to capture dust episodes from comparison with EMEP – timing well captured but too low

Some skill for large scale events like biomass burning and dust

data thinning of high density networks
stronger criteria for background station class needed
use of PM2.5 and PM1 to diagnose problems further
Look at EMEP daily
Other datasets (AirNOW, HTAP, ..)

Randall Johnson – verification with own analysis

Calculate absolute differences between forecast and NAAPS analysis grouped according to forecast range:
Mean Absolute Error
Root mean square error

Chose any date to analyize

Specify range of AOD to be included

Options for: Over Land only, Over Ocean only, and Over Land and Ocean

First steps: use AERONET data to calculate the analysis error, then repeat for 6-hour, 12-hour forecasts, etc. (have to be within 30 minutes of analysis/forecast time)

Mean Error increases as a function of range, but plateaux at certain forecast times (between 12 and 18h forecasts and between 36-42)

Further investigation showed that at certain forecast ranges the verifying AERONET observations were not overlapping at all with the most recent assimilated MODIS data due to the daytime shift (obs are only taken during the daytime!)

On with OWN analysis verification – first assess mean error of analyses wrt to AERONET, then continue to look at forecast error wrt own analysis

Mean Absolute Error increases as a function of forecast range, relatively large errors in region with large sources such as Africa and East Asia

Own analysis verification has the benefit of examining the regional growth of errors

Use of CALIPSO lidar data in the analysis to constrain the aerosol analysis also vertically (Zhang et al, 2011, Geophys. Res. Lett) using the intermediate step of retrieving the extinction profile using the model AOD as constraint

Another AERONET comparison showed that the assimilation of CALIOP data really improved the analysis error with respect to AERONET