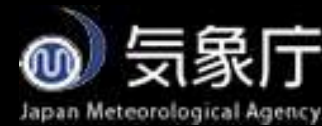


ICAP-Multi Model Ensemble Preliminary Analysis



27-29 April, 2010
Monterey CA

<http://bobcat.aero.und.edu/jzhang/ICAP/>

Send comments to

jeffrey.reid@nrlmry.navy.mil

angela.benedetti@ecmwf.int

peter.r.colarco@nasa.gov



Rationale



Experience has shown that ensembles of independent models tend to outperform their members for events forecasting and climatological baselines provided:

- Models are independent
- Model errors are similar
- No weighting!

An ensemble is a good way to gauge how well the community is doing and where problem areas exist.

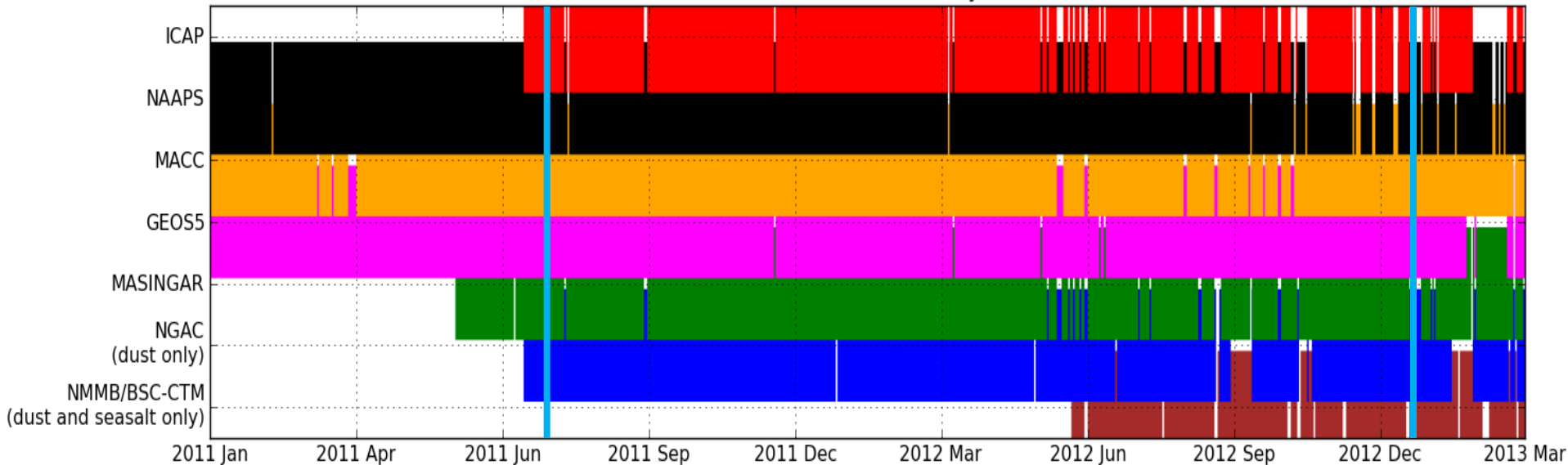


The Unglamorous Engineering Side: Gathering all of the world's forecast data



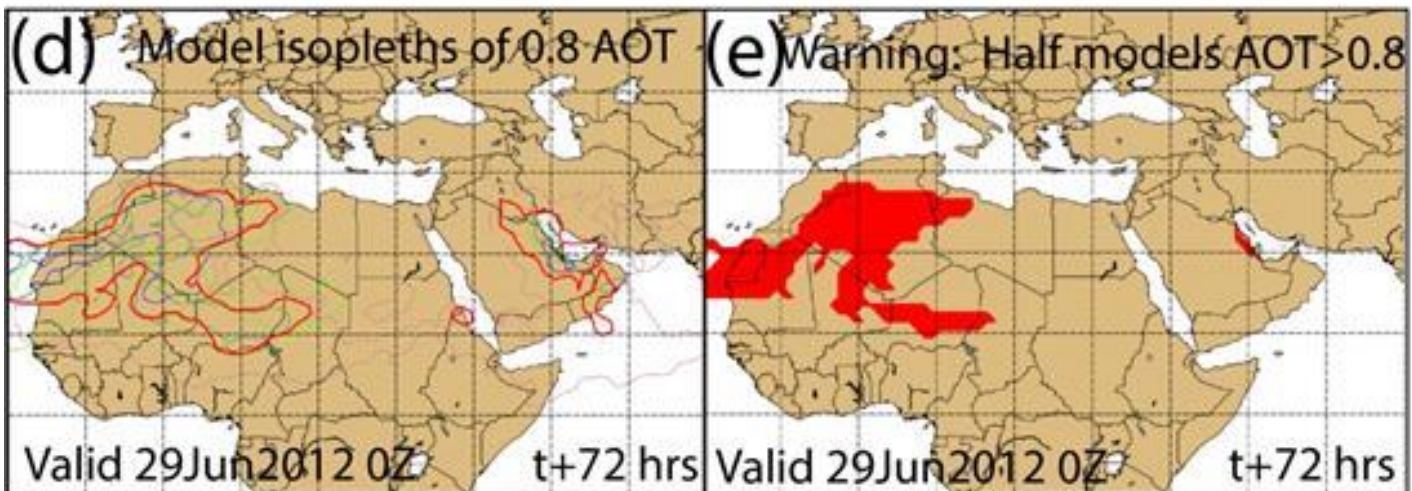
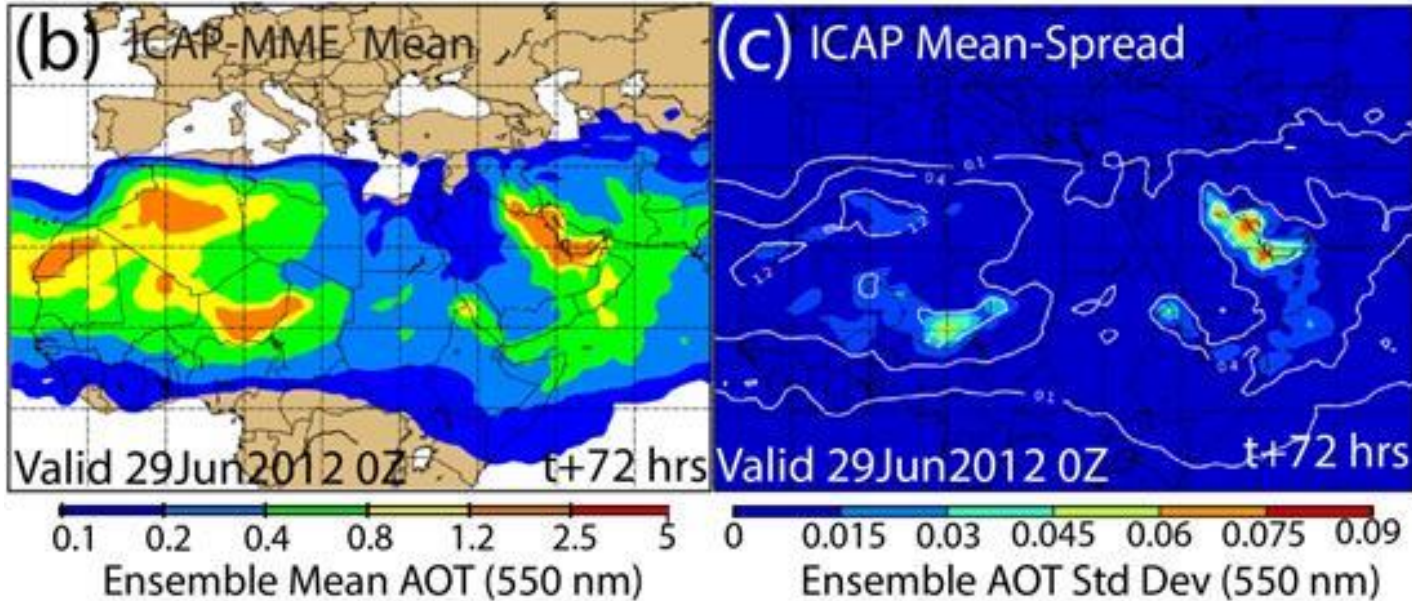
- NRL is warehousing all the world's global aerosol forecast data to feed the ICAP multi-model ensemble. UKMO is hopefully coming soon.
- While July 2011-Dec 2012 is our focus, we are still collecting data.
- Thanks to Hogan and Mclay we have a much more contiguous NOGAPS ensemble.
- NASA also has rerun for the MME

Current ICAPS Forecast Availability at NRL-MRY





Typical products





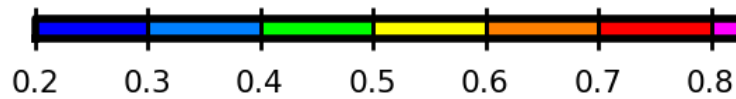
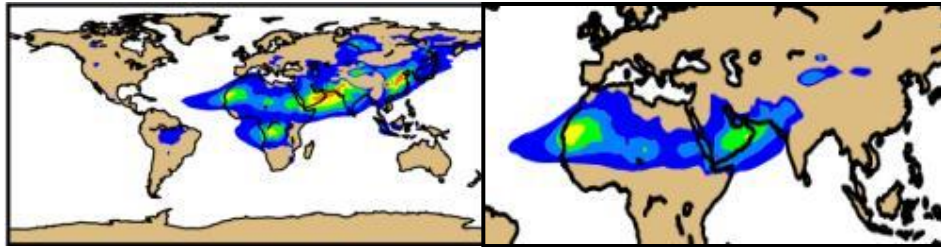
ICAP Multi-model ensemble: How do models compare on average?



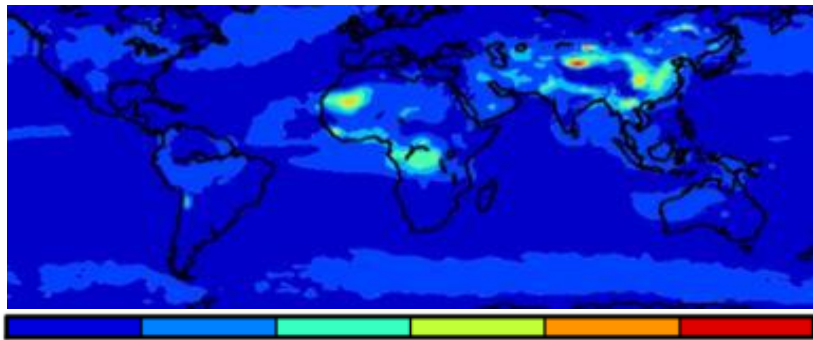
ICAP MMD Jun-Dec 2012 6 hr Statistics

Total AOT

Dust AOT



Aerosol Optical Thickness (550 nm)



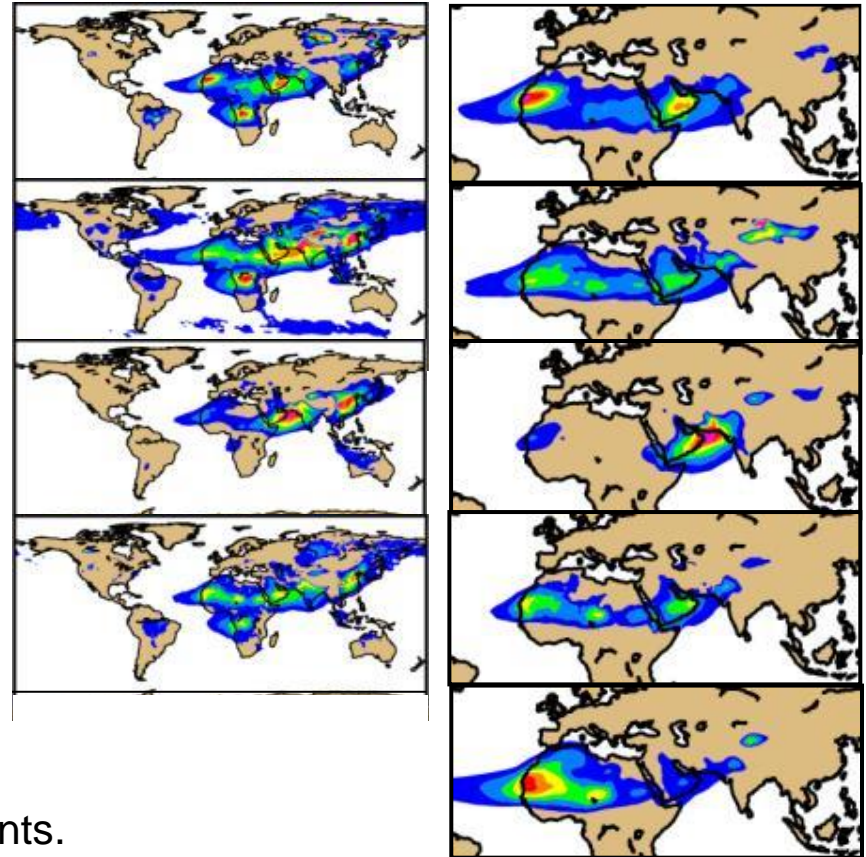
0 0.03 0.06 0.09

Average AOT Standard Deviation (550 nm)

Individual Models

Total AOT

Dust AOT



- Often large differences between individual events.
- Most models underestimate dust/smoke and overestimate sea salt AOT.
- Large differences between species in heterogeneous environments.
- Tendencies to tune the climatological averages and the MME mean.



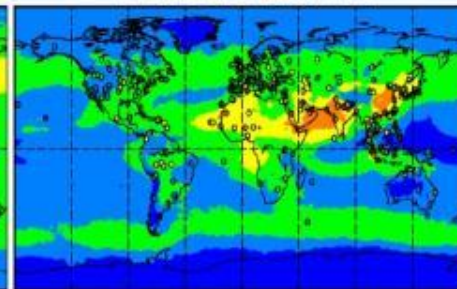
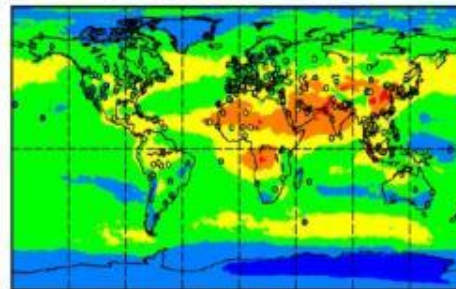
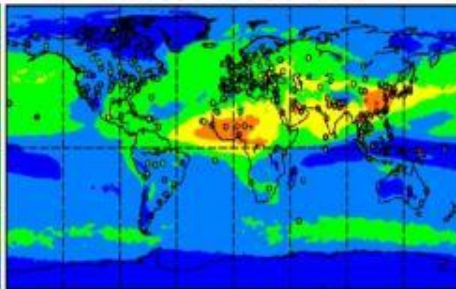
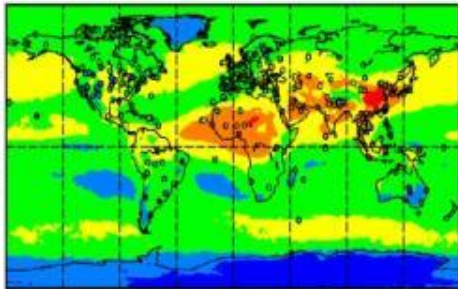
2012 Climatological Min/Maxs



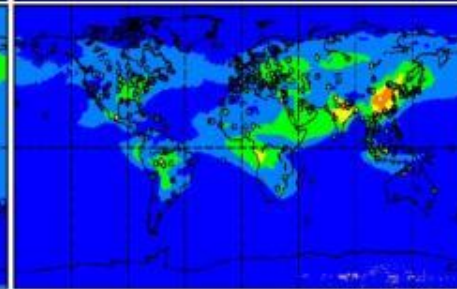
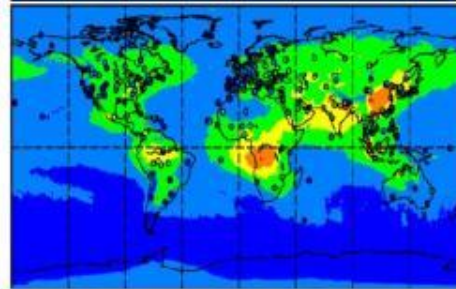
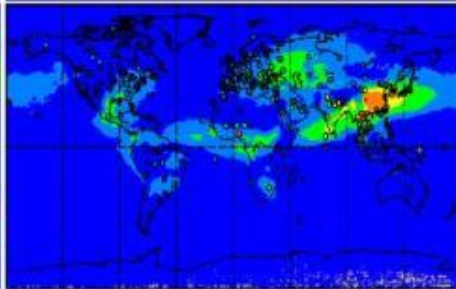
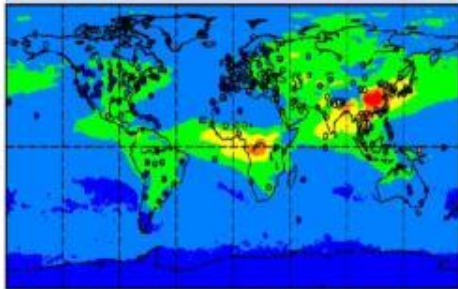
Boreal Winter/Spring: Dec-May
Maximum
Minimum

Boreal Summer/Fall: Jun-Nov
Maximum
Minimum

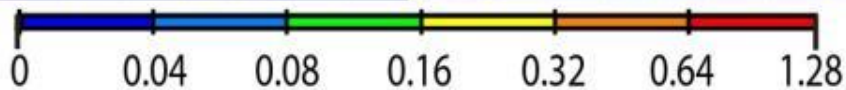
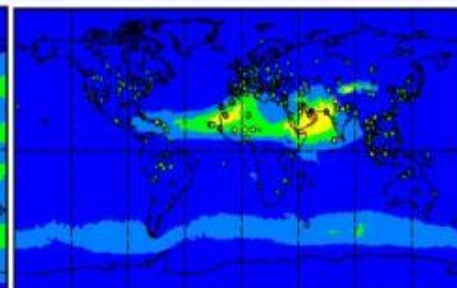
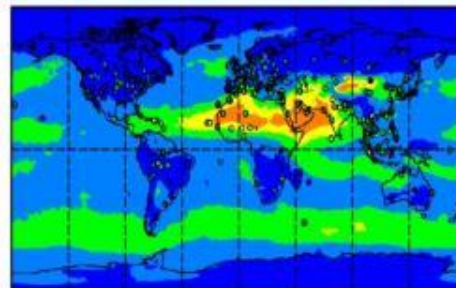
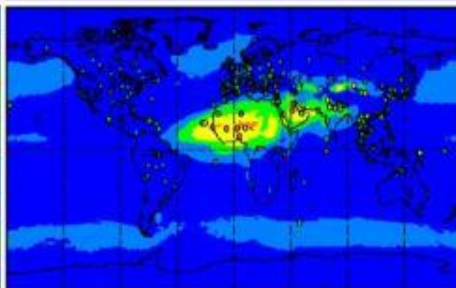
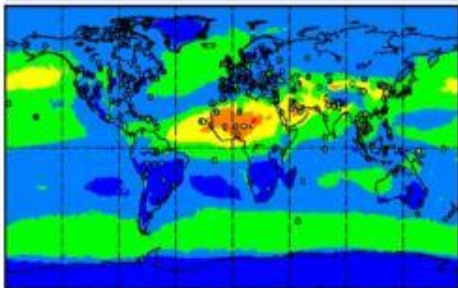
Total



Fine



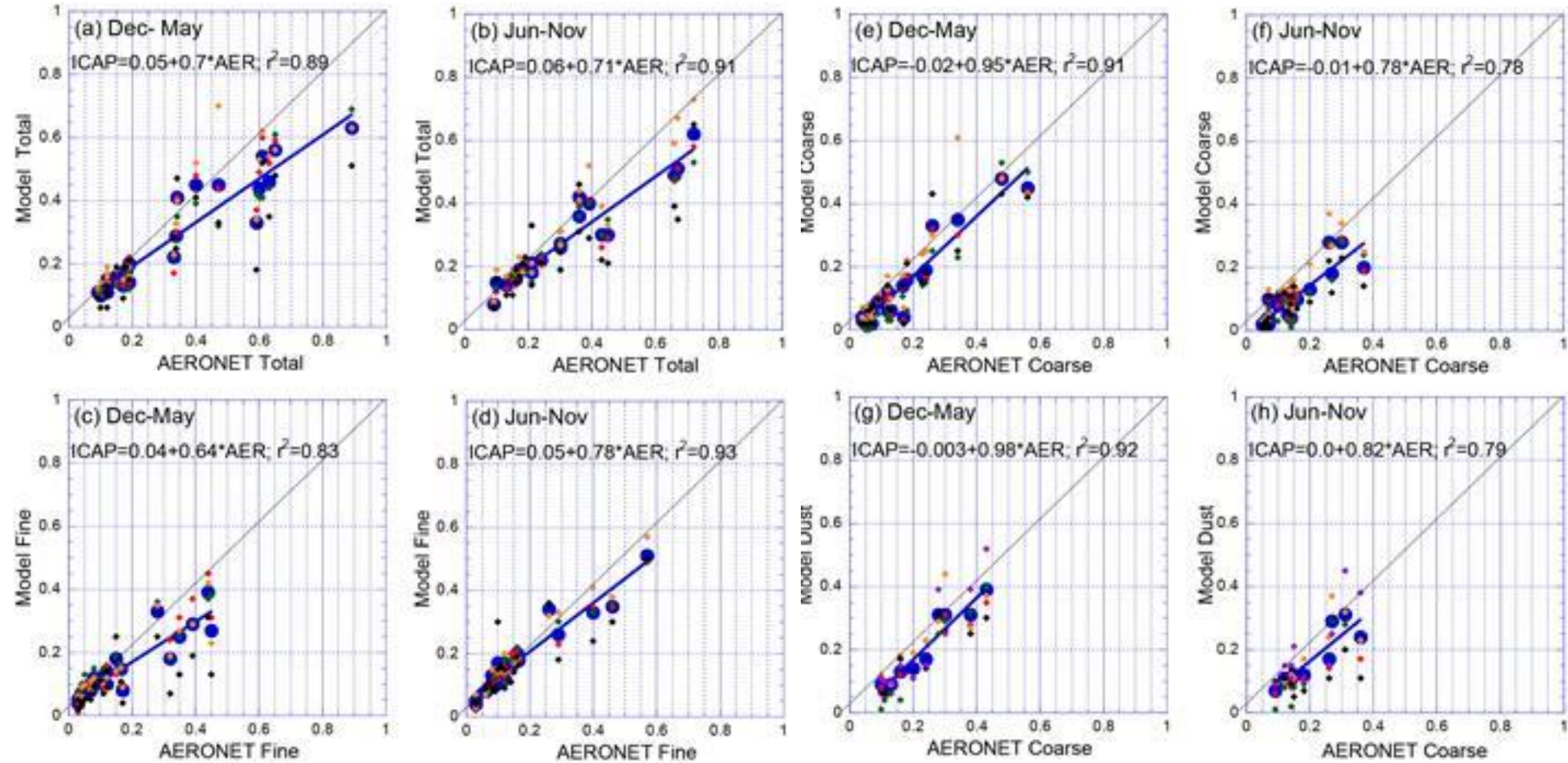
Coarse



Pointwise AOT Maximum and Minimum (550 nm)



The first 24 hours: All models underestimate AOT



● Ensemble mean

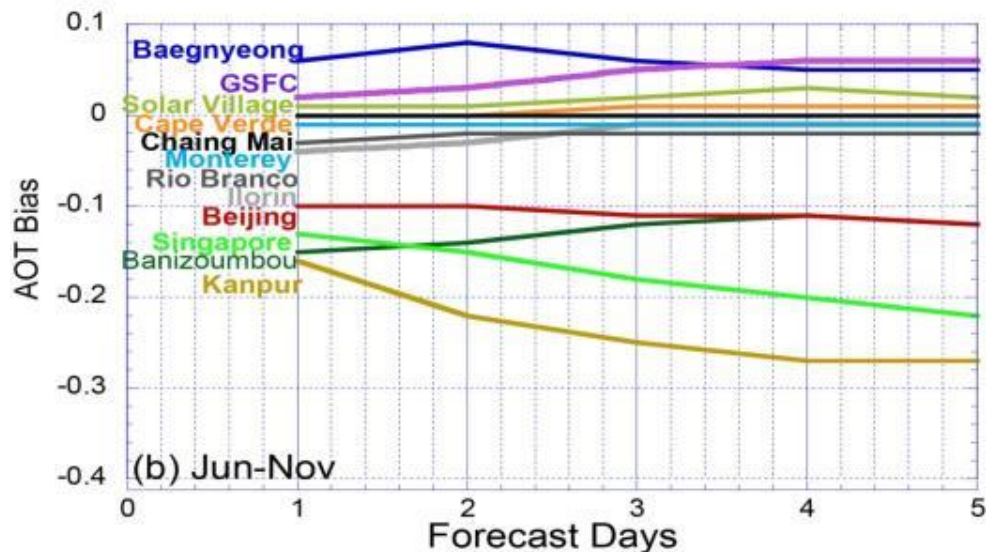
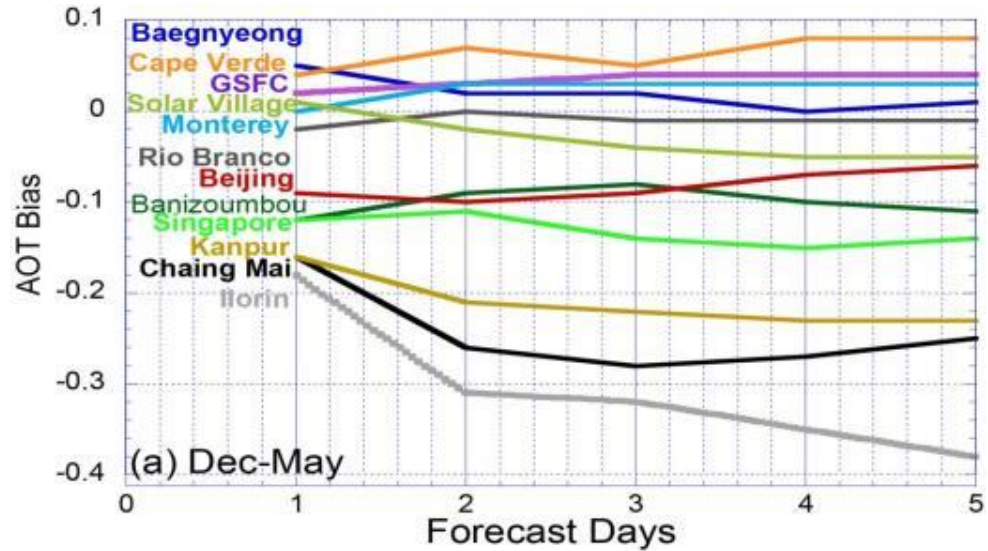


Biases in Time



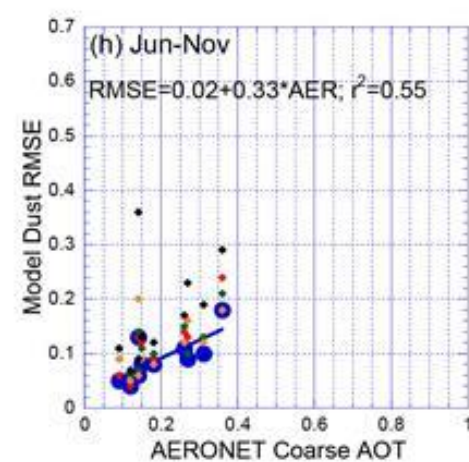
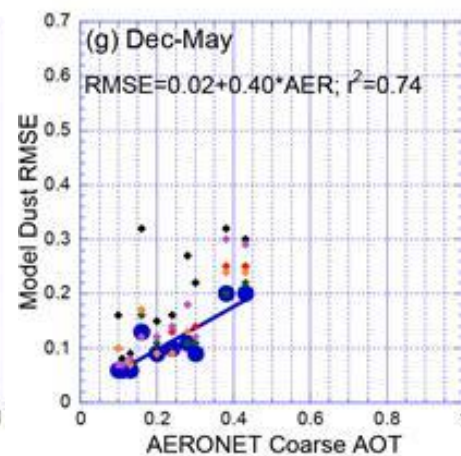
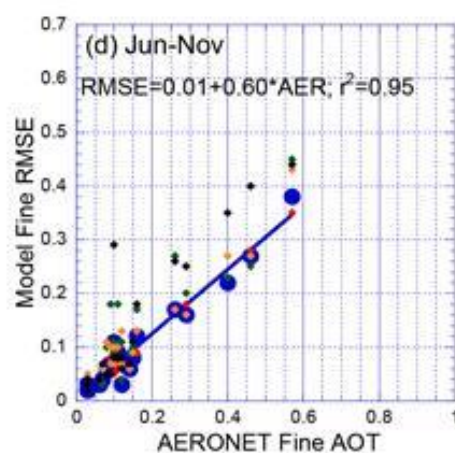
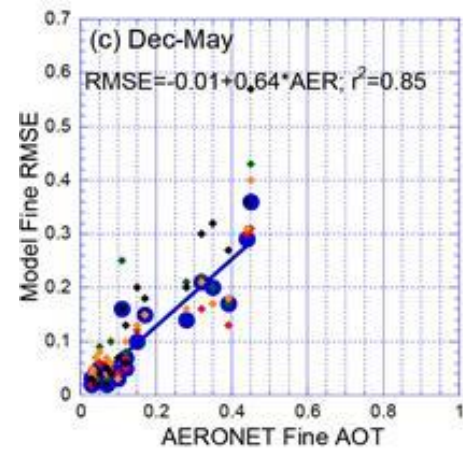
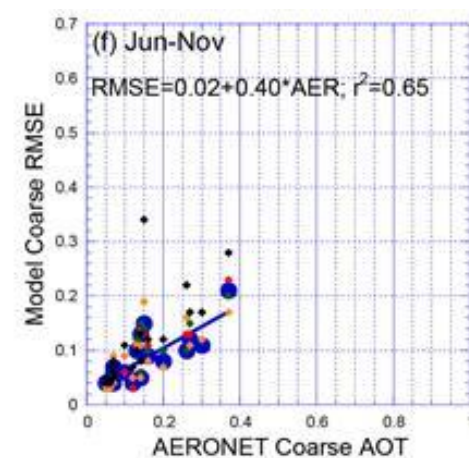
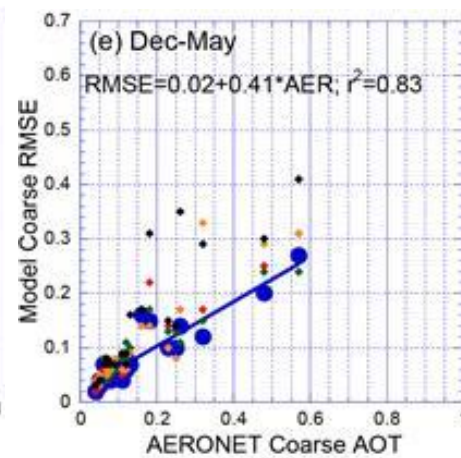
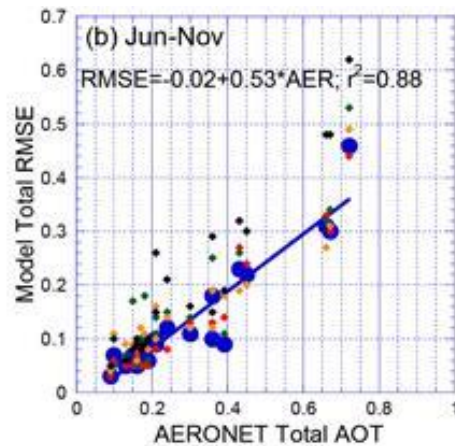
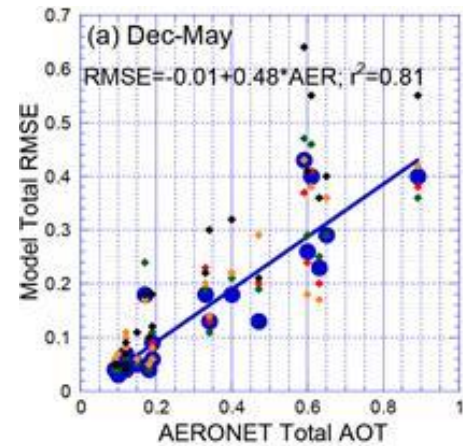
Sahelian Africa, India and Southeast Asia are the three big trouble spots.

As a fractional bias, marine environment is also problematic.





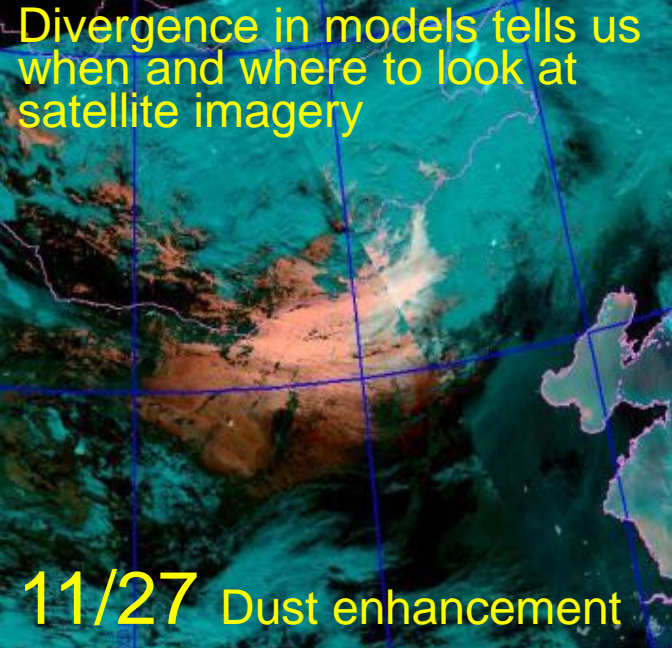
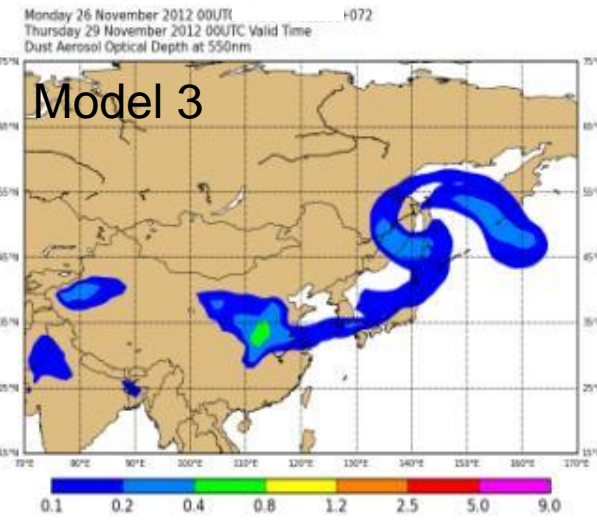
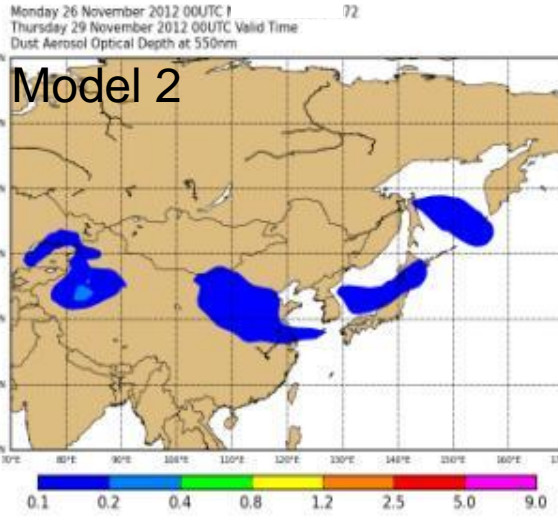
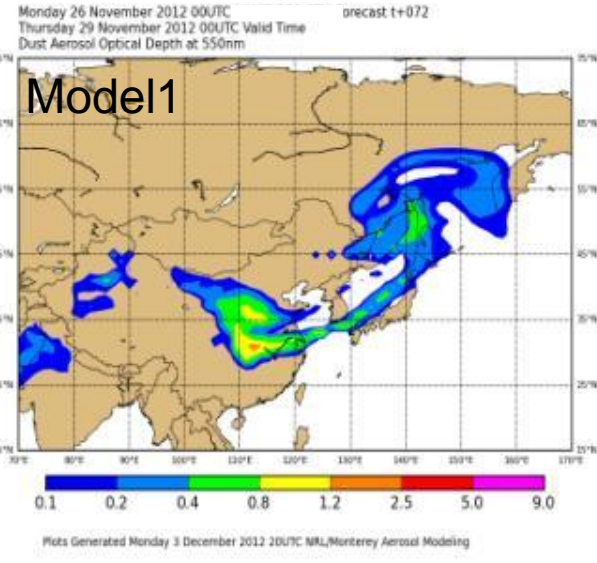
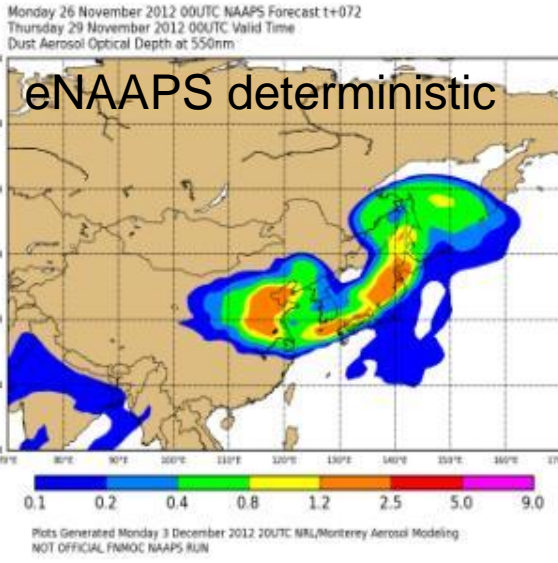
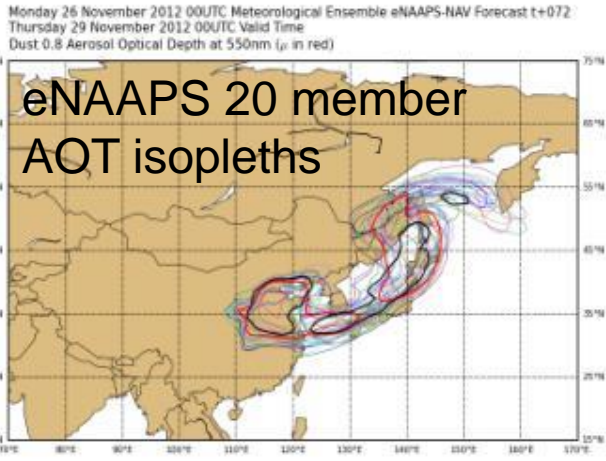
72 hour RMSEs: The ICAP-MME is the clear top performer



● Ensemble mean



Other Uses Example: November 29 2012 Dust AOT: 72 hour forecast of eNAAPS and MME.





Ensemble products ready for the web?



eNAAPS on aerosol page

PRODUCT	HELP	World	Sahara	Sahel	Med	E.Med	Eu
NAAPS 120-h Fcst	Model Info	●	●		(X-sect)		
NAAPS Ensemble Fcst	Model Info			●		Global	Byzantium
NAAPS Forecast Loop	Plot info GE info	●		●		(X-sect)	

ICAP-MME on unadvertised page

eNAAPS mean & deterministic, ECMWF, JMA, NASA, NOAA (dust), now BSCC-NMMB (dust), UKMO (dust coming)

