International Cooperative For Aerosol Prediction Global Multi-Model Ensemble (ICAP-MME)

W. Sessions[a,b], J.S.Reid[a], P. Lynch[a], Sarah Lu[c]*, J.M. Baldasano[d,e], S. Basart[d], Angela Benedetti[f], M. Brooks[i], P.R.Colarco[g], A. da Silva[g], O. Jorba[d], Henry Juang[c], J.-J. Morcrette[f], Shrinivas Moorthi[c], Y. Pradhan[i], M. Razinger[f], M. Spada[d], T.T. Sekiyama[h], T.Y. Tanaka[h], Jun Wang[c]

[a] *Naval Research Laboratory, Monterey, CA, USA*
[b] *University of Wisconsin, Madison, WI, USA*
[c] *NOAA National Centers for Environmental Prediction, MD, USA*
[d] *Earth Sciences Department, Barcelona Supercomputing Center-Centro Nacional de Supercomputación, Barcelona, Spain*
[e] *Environmental Modelling Laboratory, Technical University of Catalonia, Barcelona, Spain*
[f] *European Centre for Medium-Range Weather Forecasts, Reading, UK*
[g] *NASA Goddard Space Flight Center, Greenbelt, MD, USA*
[h] *Japan Meteorological Agency/Meteorological Research Institute, Tsukuba, Japan*
[I] *Met Office, Exeter, UK*

* *Corresponding authors: Sarah.Lu@noaa.gov*

The International Cooperative for Aerosol Prediction (ICAP) is a grass-root initiative from several operational centers to coordinate efforts in global aerosol forecasting activities.

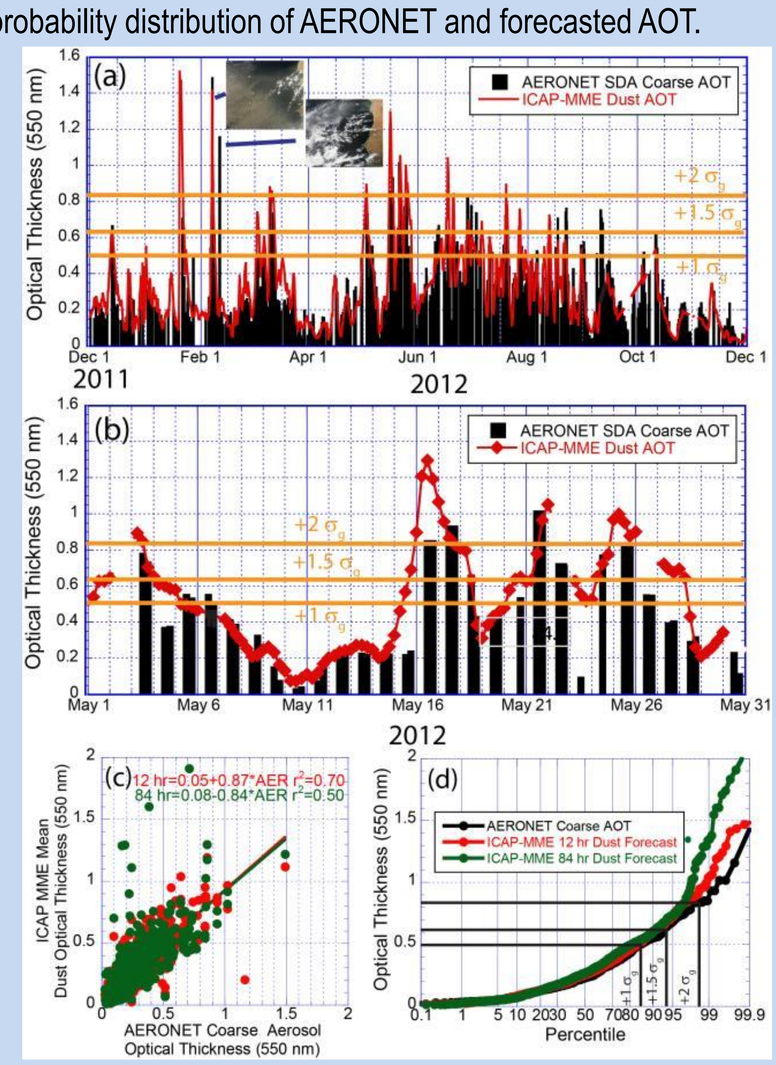
ICAP-MME activities are led by the Naval Research Laboratory, Monterey, CA

ICAP-MME input models:

- BSC Non-hydrostatic Multi-scale Meteorological Model (NMMB/BSC-CTM)
- ECMWF Monitoring Atmospheric Composition and Climate Model (MACC)
- FNMOC/NRL Navy Aerosol Analysis and Prediction System (NAAPS)
- JMA Model of Aerosol Species IN the Global AtmospheRe (MASINGAR)
- NASA Goddard Earth Observing System version 5 (GEOS-5)
- NCEP NEMS GFS Aerosol Component (NGAC)
- UKMO Unified Model

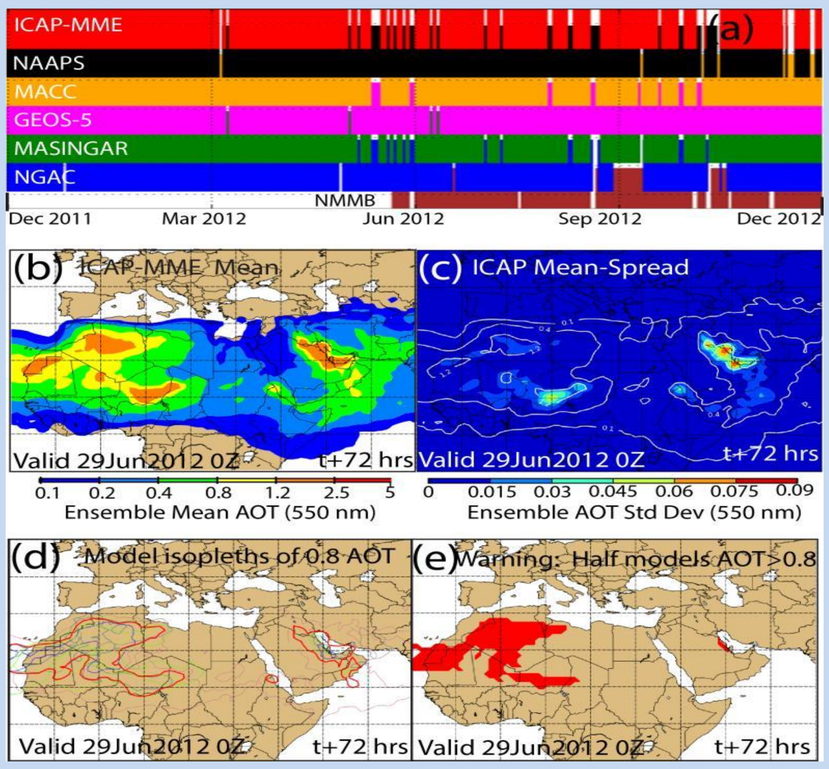
Derivation of threat scores for the Cape Verde

(a) One year Time series of first day forecasted ICAP-MME mean AOT with corresponding AERONET coarse mode AOT. Insets are MODIS RGB images for an actual and artifact dust event. (b) enlargement of (a) for the month of May, 2012. (c) Scatterplot of forecasted AOT against AERONET; (d) probability distribution of AERONET and forecasted AOT.



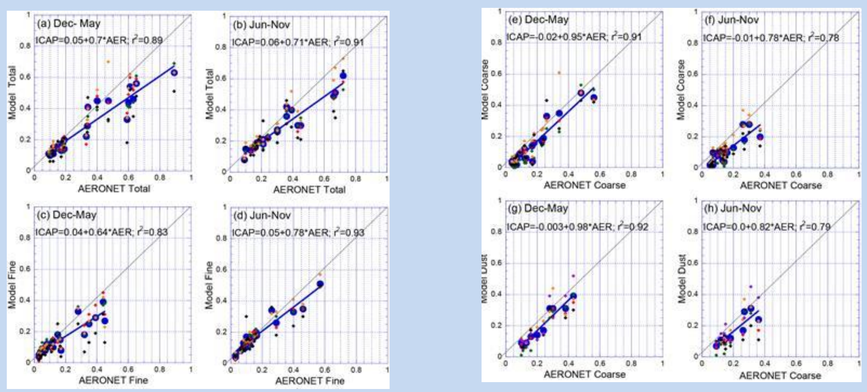
Typical Products

a) Timeline of available data within this paper's study period ; (b)-(e) examples of ICAP-MME products expected to be released to the public at publication of this paper for an example 72 hour forecast of 2012's most significant dust events plus a secondary event over the Arabian Gulf using all 6 dust members. (b) Ensemble Mean 550 nm AOT; (c) "Mean/Spread" of the 6 ensemble members; (d) "spaghetti plot" of AOT0.8 isopleth; 9e) dust warning areas where more than half of the models predict AOT>0.8.

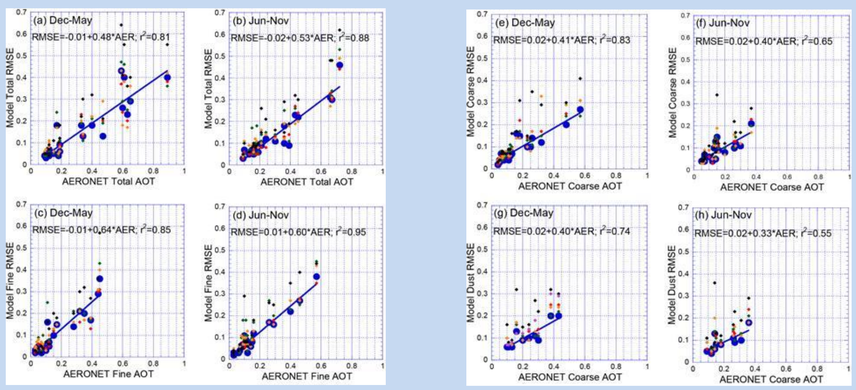


Comparison with AERONET data

The first 24 hours bias:
All models underestimate AOT



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



● Ensemble mean

ICAP website http://icap.atmos.und.edu/