The Multi-Model International Cooperative for Aerosol Prediction (ICAP) Perspective on the Massive June 2020 Saharan Dust Event

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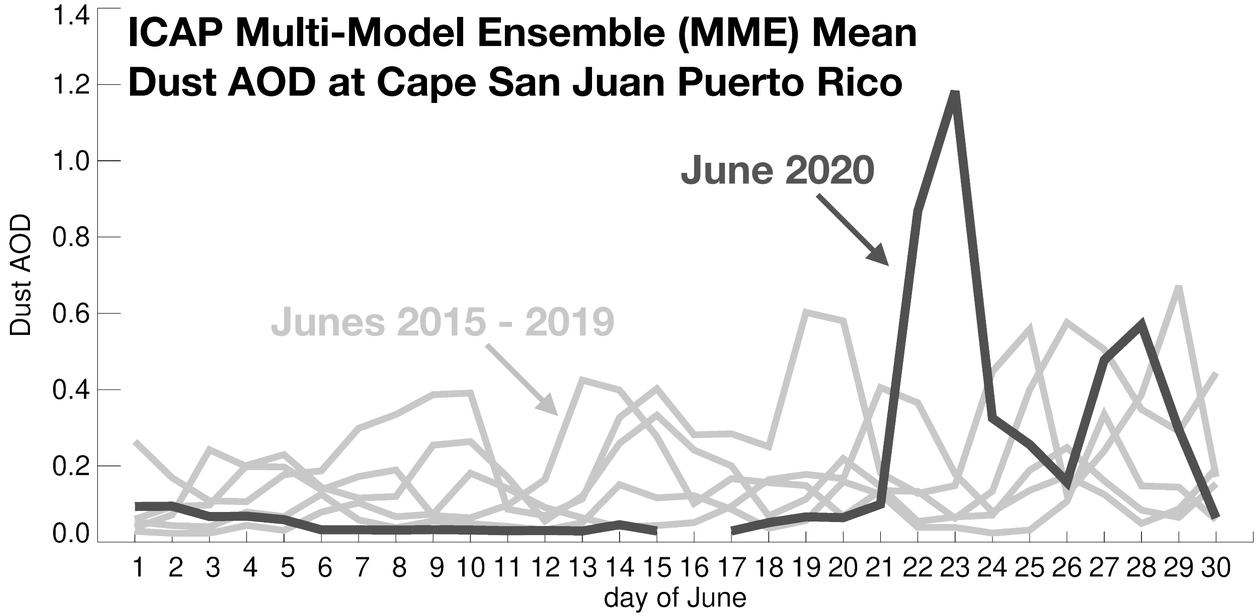
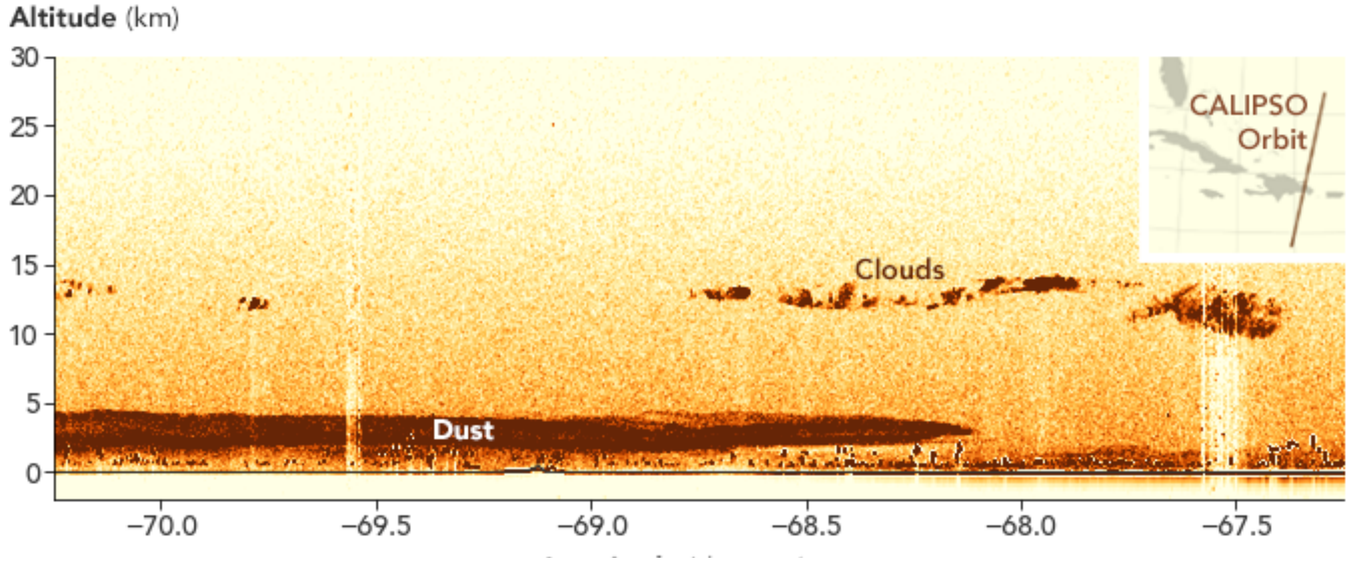
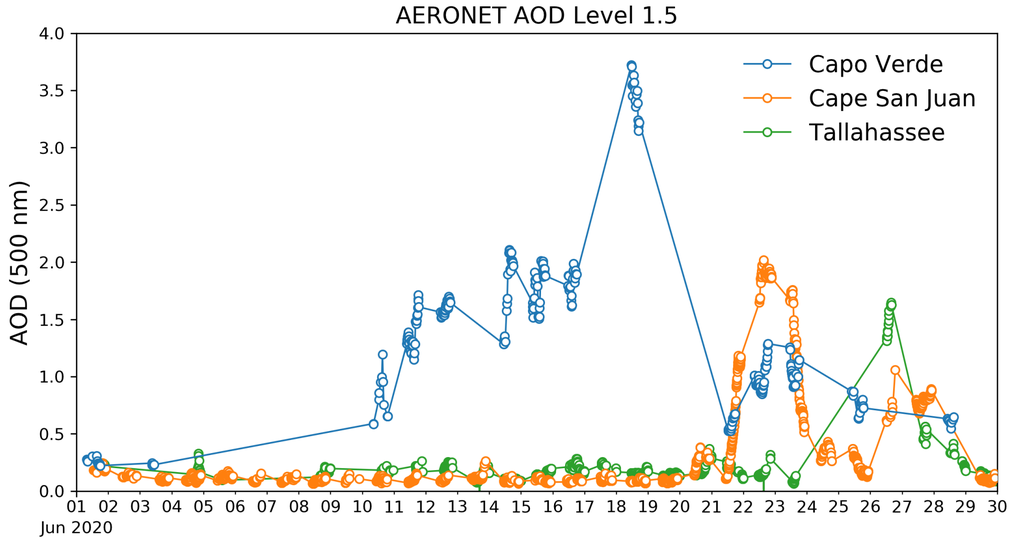
Acknowledgements: *Peng Xian, Jeff Reid (NRL), Oriol Jorba, Carlos Perez (BSC), Taichu Tanaka (JMA), Anton Darmenov, Arlindo da Silva (NASA), Zak Kipling, Melanie Ades, Angela Benedetti (ECMWF), Melissa Brooks (UKMO), Jeff McQueen (NCEP)*

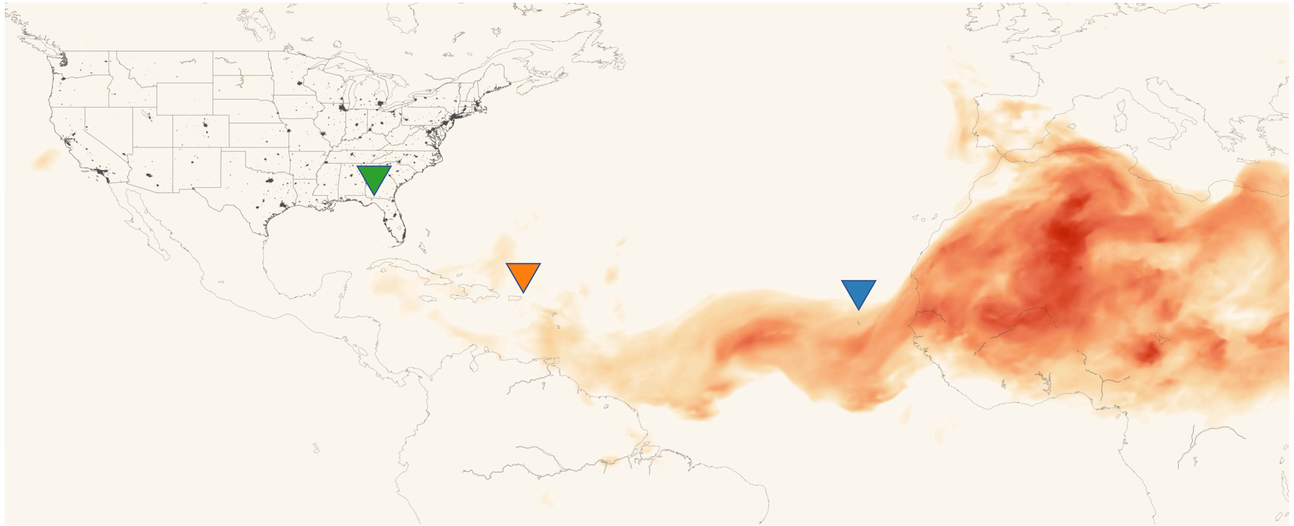
- The ICAP multi-model ensemble (MME) shows the June 2020 dust event results in dust AOD in Caribbean a factor of ~2 larger than any other June episode in the last 6 years
- Intermodel variability (7 models) for this event is high, also nearly a factor of 2 greater than what has been seen over the comparison period
- Models with aerosol data assimilation better match the AOD observed than models without



June 2020 Massive Dust Event

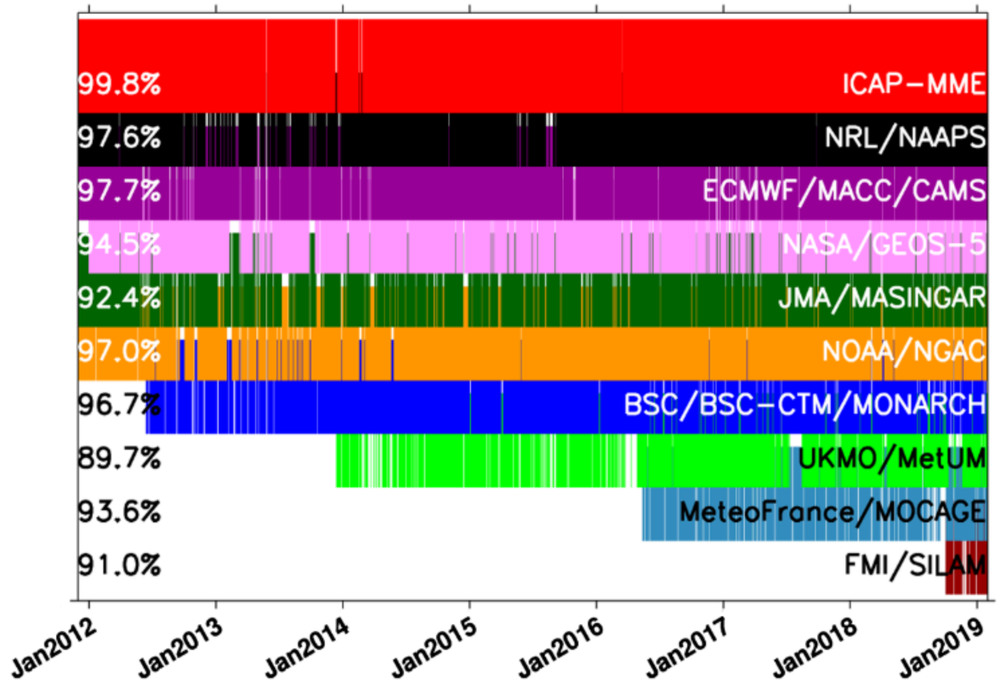


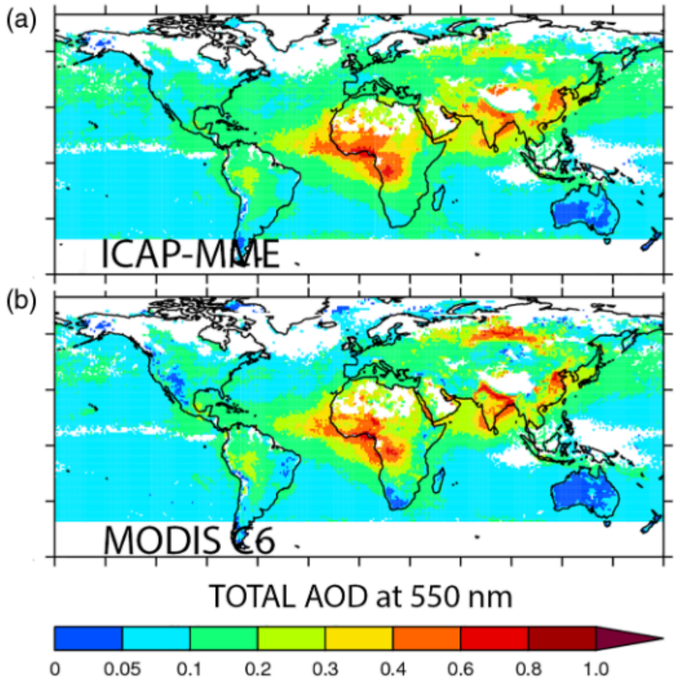




A high-pressure system off the west coast of Africa trapped enormous amounts of Saharan dust near their continental source regions. The break-down of this weather system in mid-June sent large pulses of dust traveling 1000s of kilometers westward across the Atlantic Ocean.

ICAP

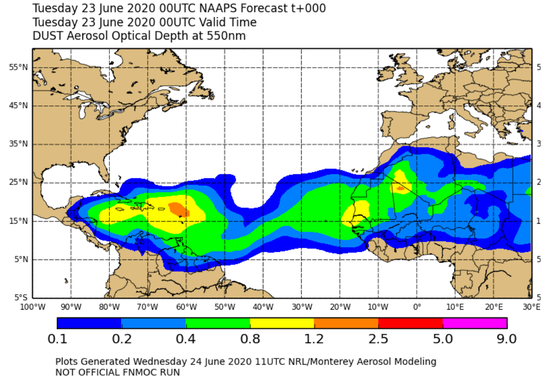


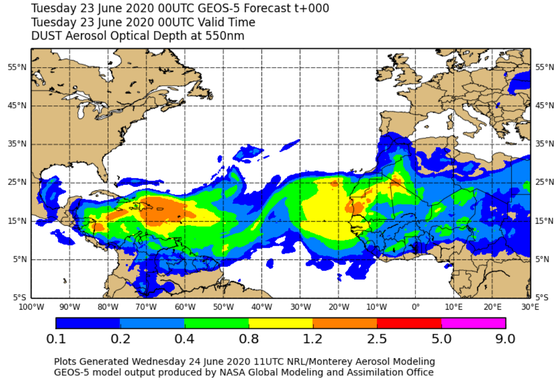


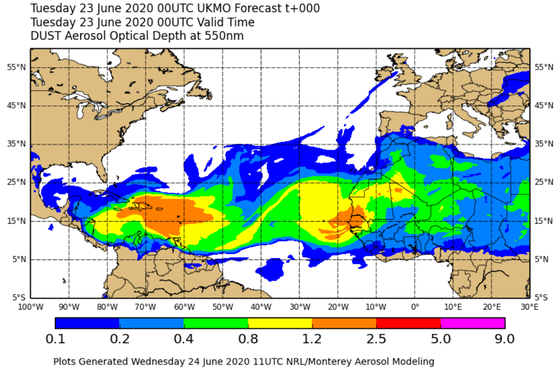
Xian, P., Reid, J., Hyer, E., Sampson, C., Rubin, J., Ades, M., Asencio, N., Basart, S., Benedetti, A., Bhattacharjee, P., Brooks, M., Colarco, P., Silva, A., Eck, T., Guth, J., Jorba, O., Kouznetsov, R., Kipling, Z., Sofiev, M., Garcia-Pando, C., Pradhan, Y., Tanaka, T., Wang, J., Westphal, D., Yumimoto, K., Zhang, J. (2019). **Current state of the global operational aerosol multi-model ensemble: An update from the International Cooperative for Aerosol Prediction (ICAP)** Quarterly Journal of the Royal Meteorological Society https://dx.doi.org/10.1002/qj.3497

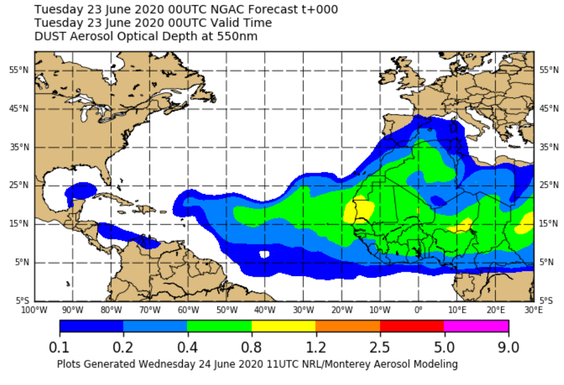
- The International Cooperative for Aerosol Prediction (ICAP) is a grassroots community of model developers, data providers, and NWP center reps founded in 2010 and focused on global, near real-time aerosol prediction
- The ICAP Multi-Model Ensemble (MME) aggregates inputs from (currently) nine global modeling centers
- The MME is produced with a ~1 day latency and provided at a global 1° x 1° horizontal resolution
- ICAP MME skill versus AERONET observations typically exceeds the skill of individual models

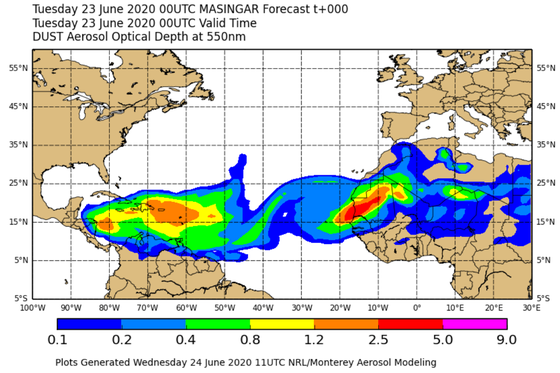
Dust AOD June 23, 2020

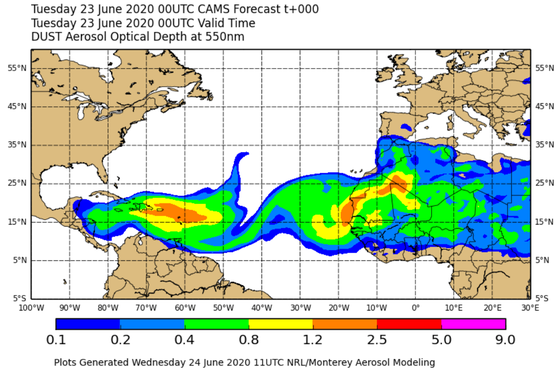


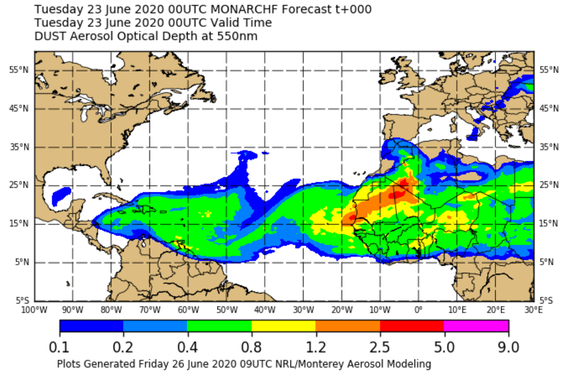








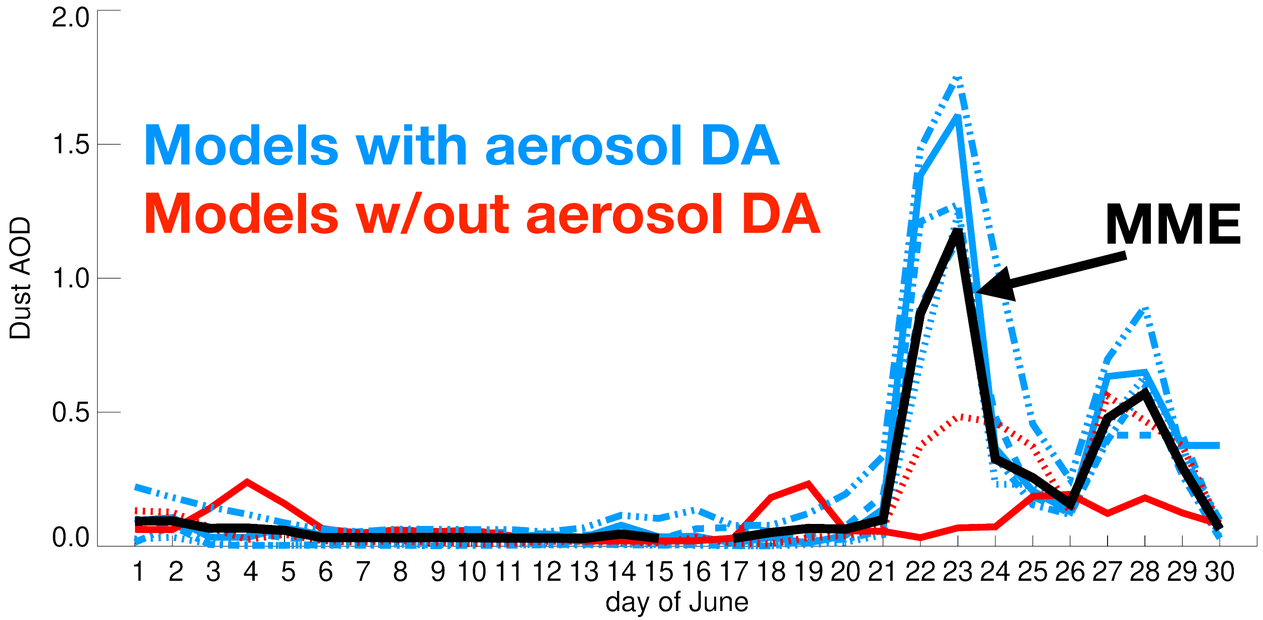


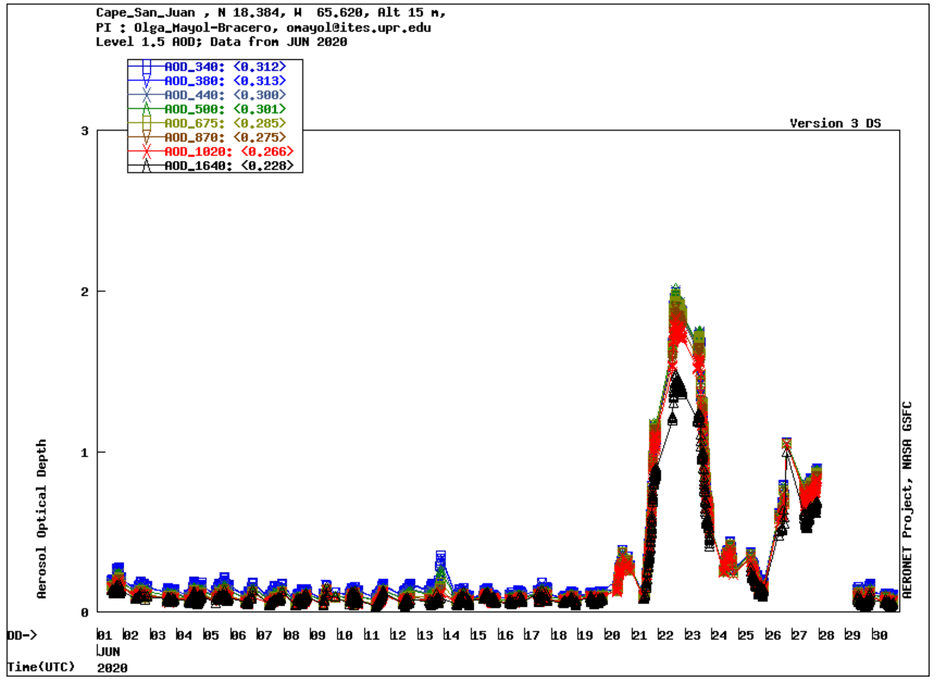


Models with aerosol data assimilation

Models with <u>no</u> aerosol data assimilation

AOD at Cape San Juan, Puerto Rico





ICAP MME Individual Members Dust AOD

ECMWF/CAMS
NASA/GEOS
NRL/NAAPS
JMA/MASINGAR
UKMO/UM

BSC/MONARCH
NCEP/NGAC

AERONET Level 1.5 AOD

Summary

- June 2020 event results in dust AOD in Caribbean a factor of ~2 larger than any other June episode in the last 6 years (at least)
- Intermodel variability for this event is high, also nearly a factor of 2 greater than what has been seen over the comparison period
- Models with aerosol data assimilation show better match the observed AOD peak than those without
- Further work is needed to unravel individual model's dust schemes and sensitivity to driving meteorology to untangle this diversity