Modelling mineral dust in CRESCEND-ESMs

10th AeroCom workshop. 8th AeroSAT workshop

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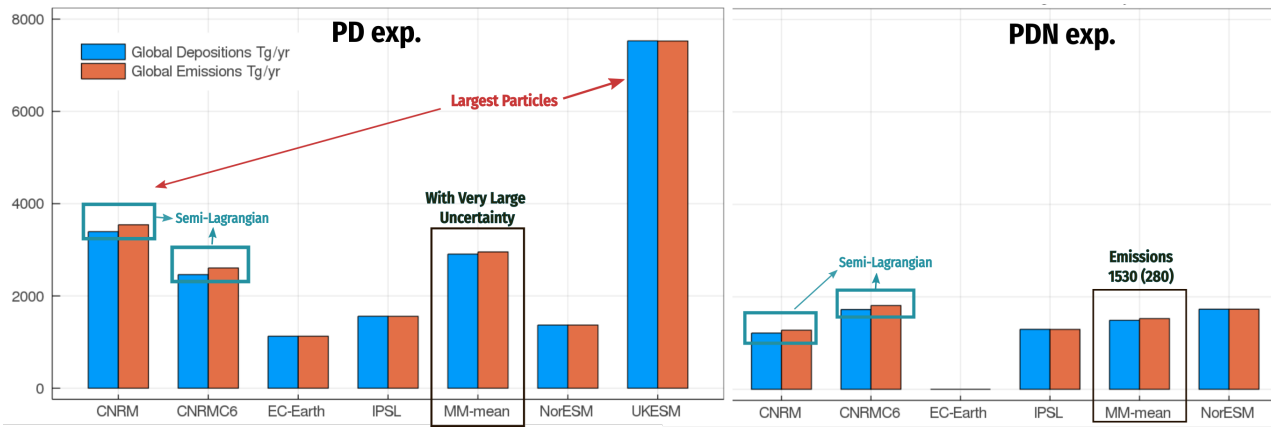
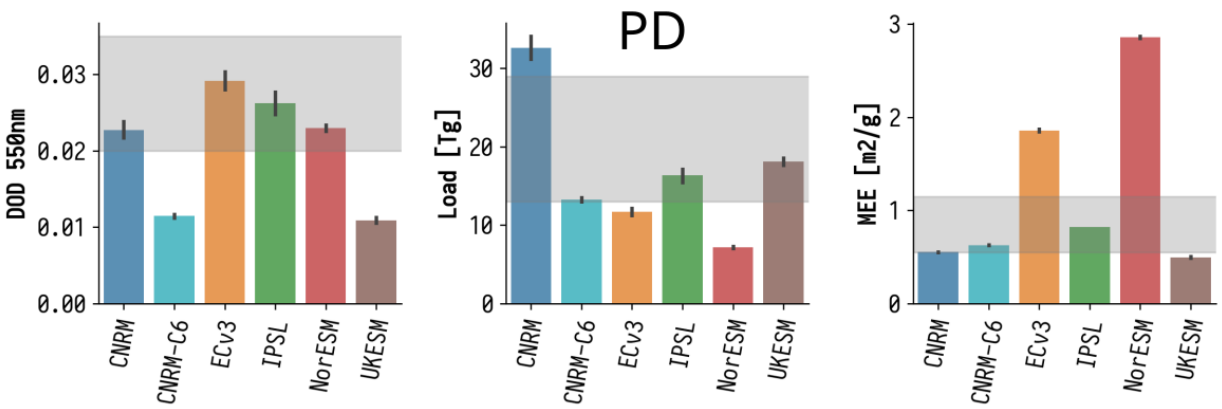
Mineral Dust: Global emissions and depositions



..but for impacts... $\Rightarrow$ $\underbrace{n(D;\mathbf{r},t)}_{\text{atmos}} \propto \underbrace{n_{emi}(D;\mathbf{r},t)}_{\text{at emission}} \underbrace{\tau(D;\mathbf{r},t)}_{\text{lifetime}}$

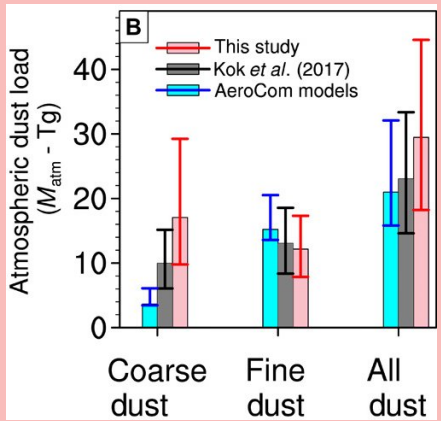


Multimodel Emissions (Tg/yr)

PD-(all)	**2954 ± 2400**
PD-(4)	**2268 ± 1000**
PDN-(4)	**1530 ± 280**
Zender, 2003	**1500**
Tegen , 1994	**3000**

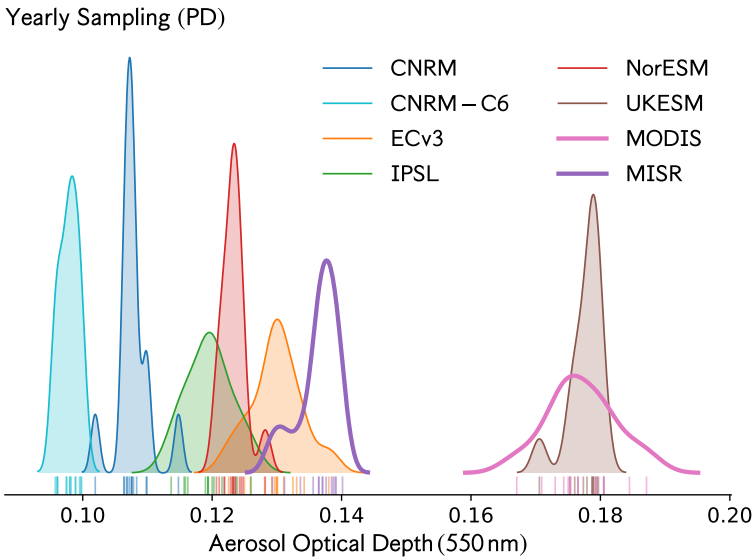
Global Constrains?

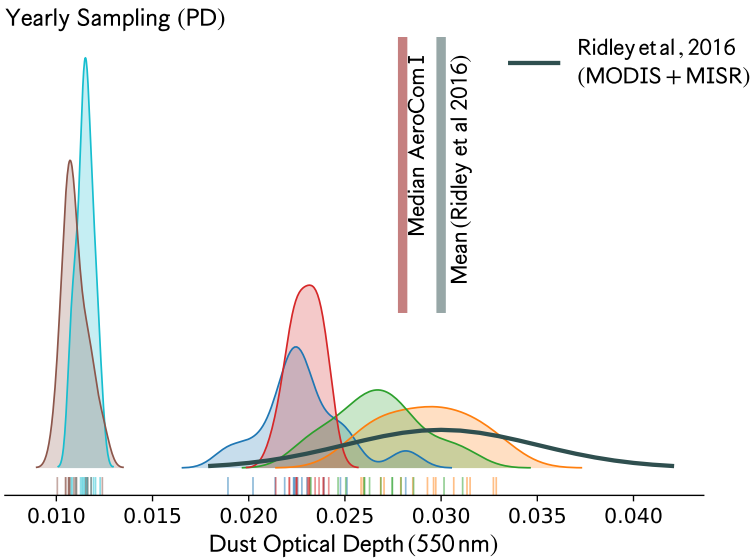
Grey region: constrains by Kok et al, 2017 without largest particles.

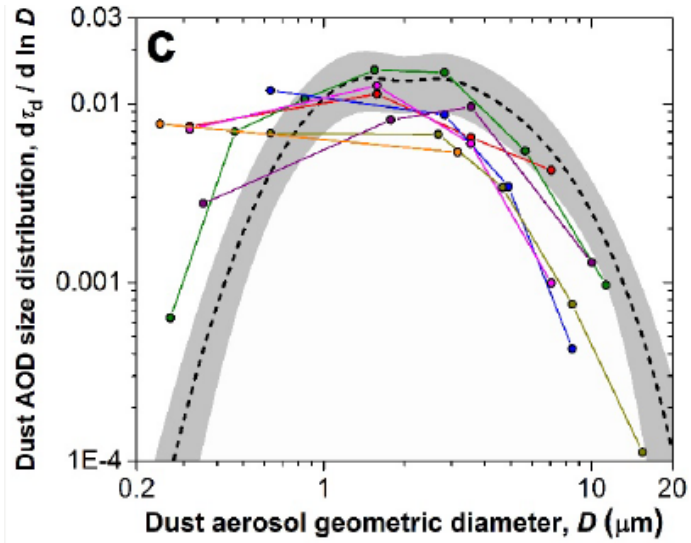


Source: Adebiyi et al, 2020 (Science).

Mineral Dust: Dust Optical Depths



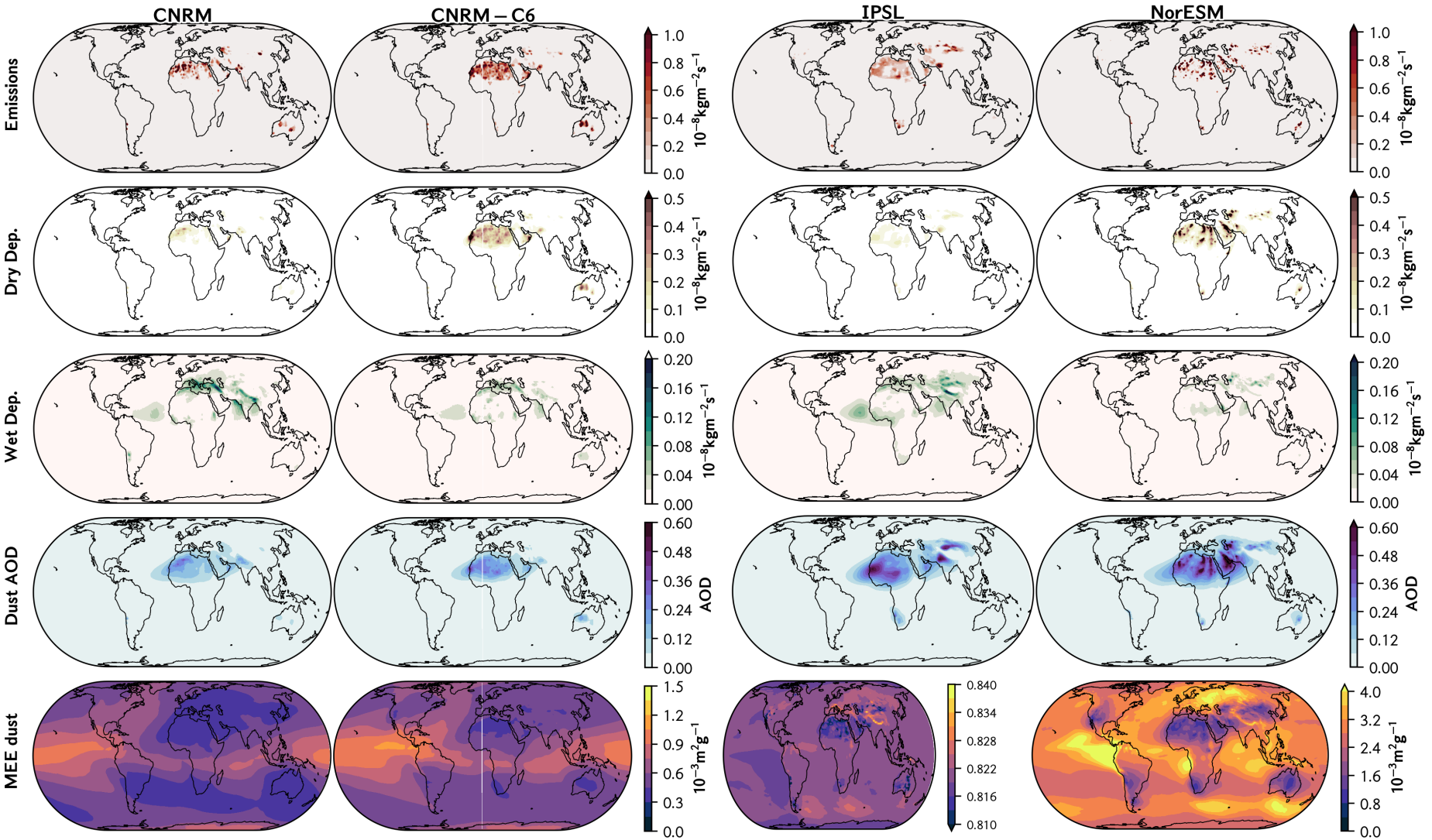




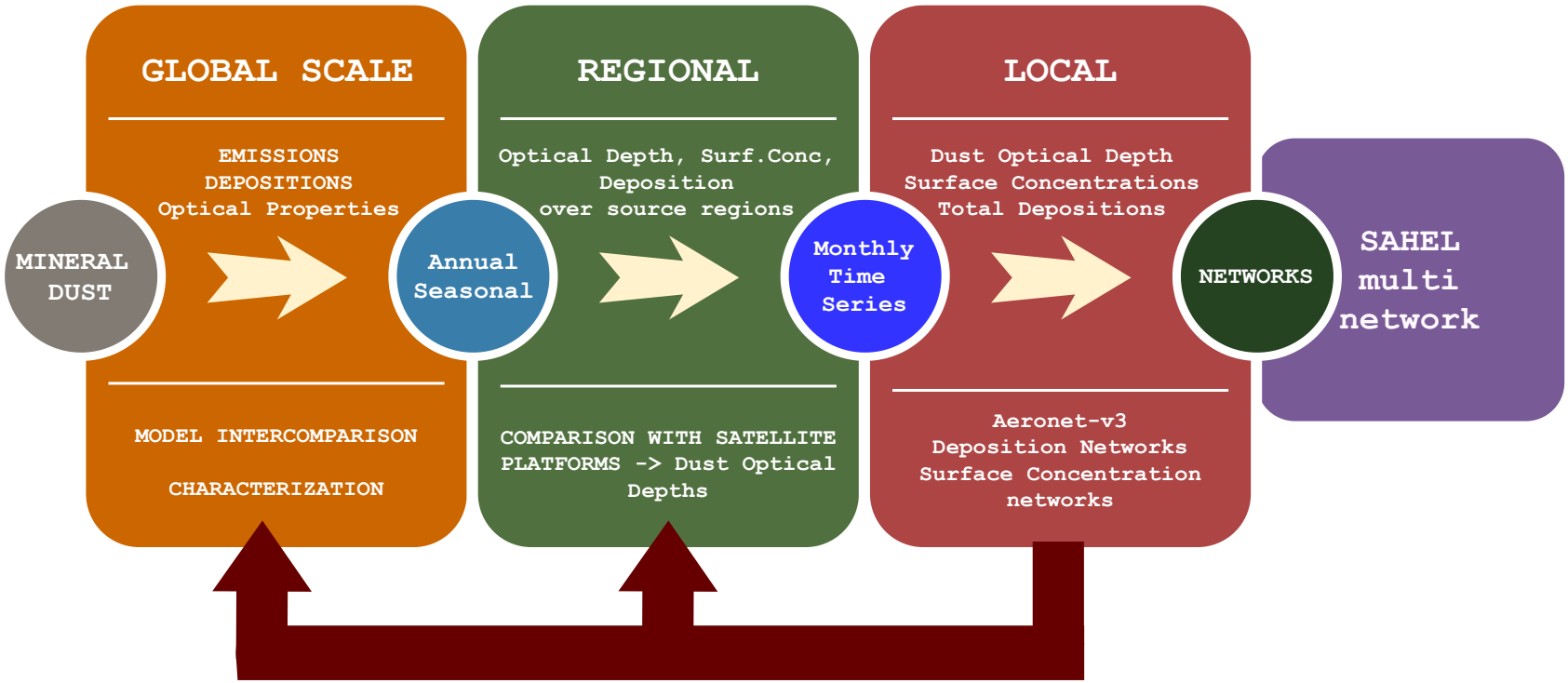
Smaller desert dust cooling effect estimated from analysis of dust size and abundance, Nature Geosciences(2017).

Interesting to investigate $\tau_{dust}(D)$ to understand contribution per size to Dust AOD for each model to know where/how/why.

Mineral Dust: Comparision of ESMs (PDN experiment)



Natural Aerosols: Scales of comparison of Mineral Dust



How better constrain Mineral Dust Cycle with Observations?

- Specific simulations? ▶ Other observations? ▶ How to compare with satellite data?
- Dust event frequencies? ▶ Combine Observations and models?