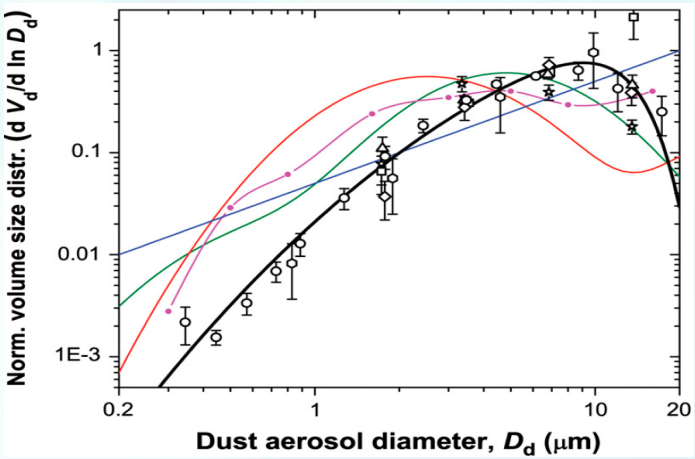
Improved Dust Aerosol Physics for V2

Yan Feng
Argonne National Laboratory

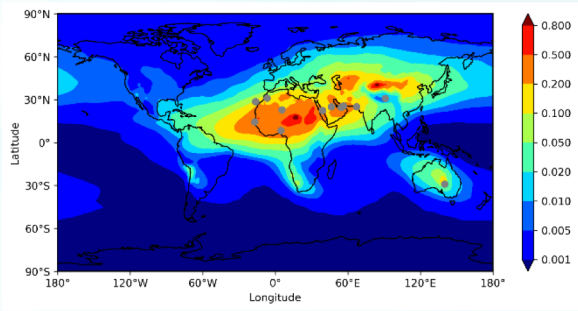
(1) Dust emission size distribution

Normalized Volume Size Distribution

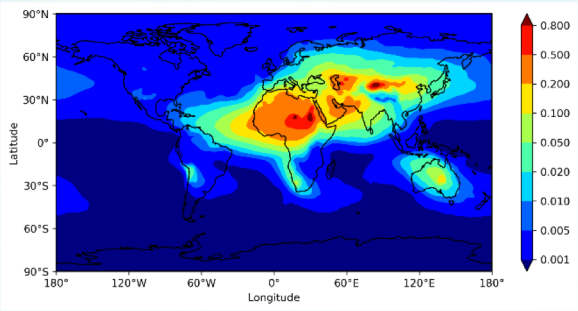


	V1	V2
Parameterization (0.1-20μm)	Zender et al 2003 (green line)	Kok 2011 (black line)
0.1-10μm	87%	73%
Coarse particles	96.8%	98.9%
AOD attributed to coarse particles	66%	82%
Impact		larger LW warming; major water cycle responses not expected

V1



V2



mean(corr)	AOD
V1	0.299 (0.91)
V2	0.284 (0.96)
AERONET	0.311

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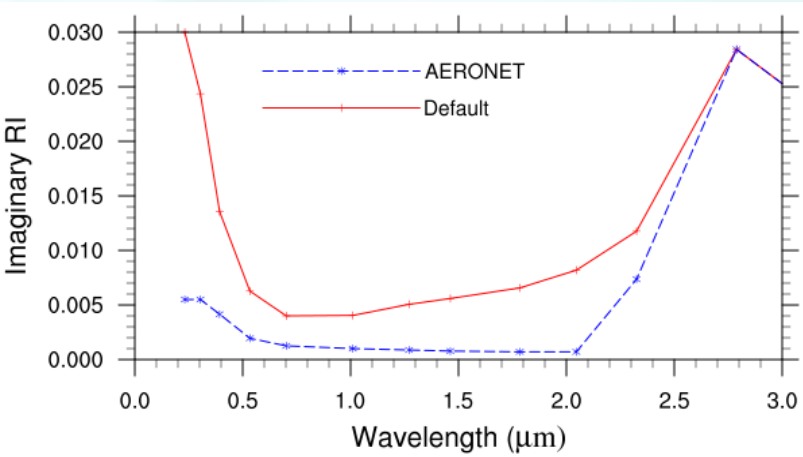
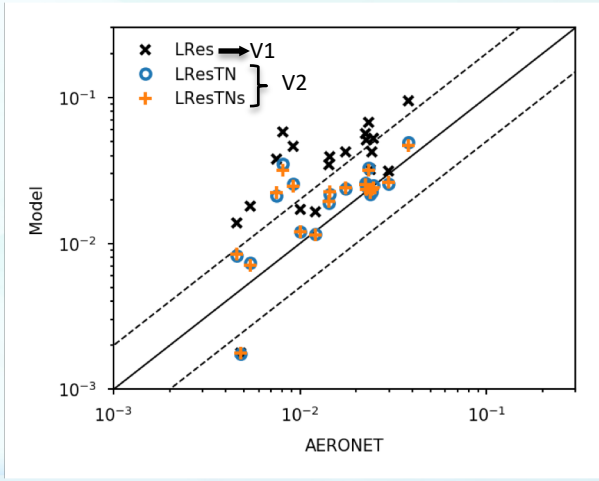
(2) Dust shortwave (SW) absorption

Imaginary part of dust SW RI



	V1	V2
Imaginary RI	OPAC (Hess, 1998)	AERONET
RI at 533nm	0.0063	0.002
Absorbing AOD	overestimated	Better agreement with obs
Impact	Strong atmospheric absorption (+1.02W/m2)	Less absorption (+0.24 W/m2) Some changes in energy balance, mainly in dust source regions



	AAOD
V1	0.04 (0.69)
V2	0.022(0.72)
AERONET	0.017

TOA forcing by dust

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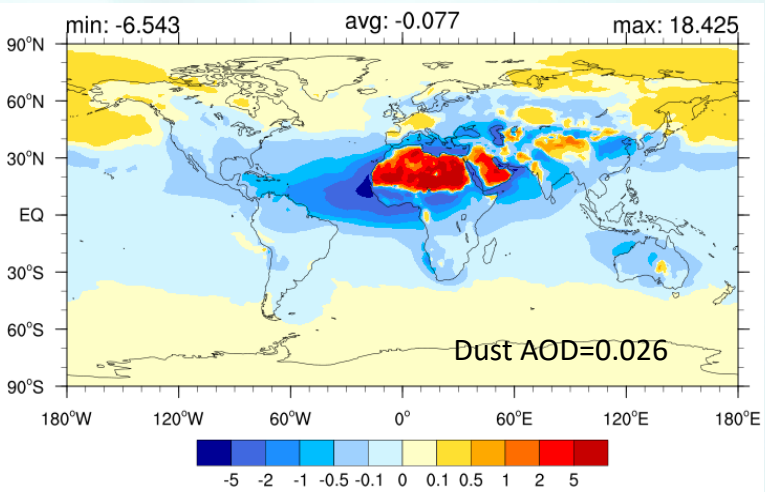
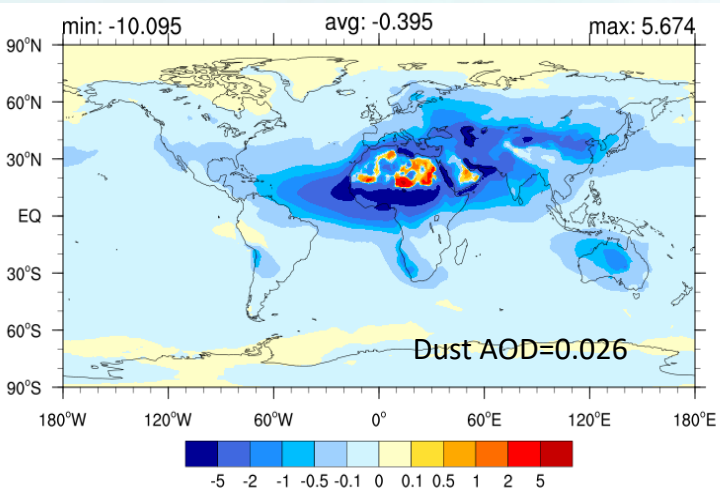
Argonne National Laboratory

Annual dust DRE at TOA

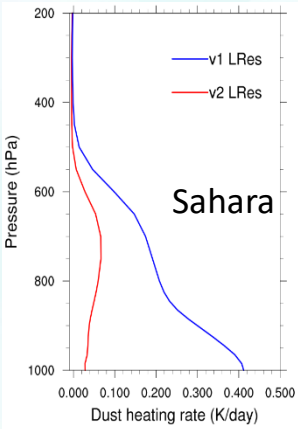
V1



V2



Heating rate



Larger (x5 times) cooling at TOA

	V1	V2	CAM5
TOA DRE (W/m2)	-0.08	-0.4 Less SW absorption (evaluated) -> larger SW cooling	-0.17 (Scanza et al 2015)

Retuning Dust Emissions for V2

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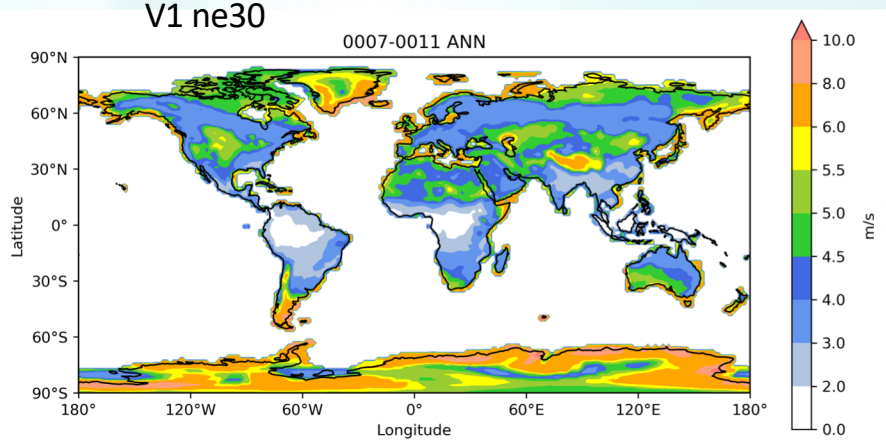
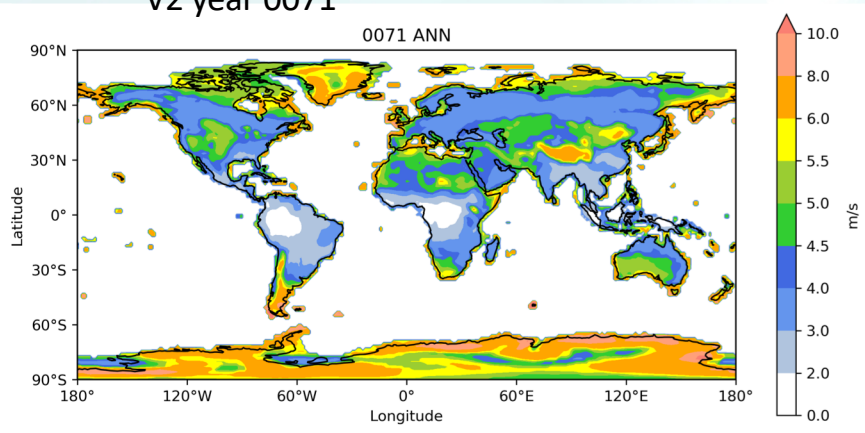
Argonne National Laboratory

10-meter wind speed (m/s)

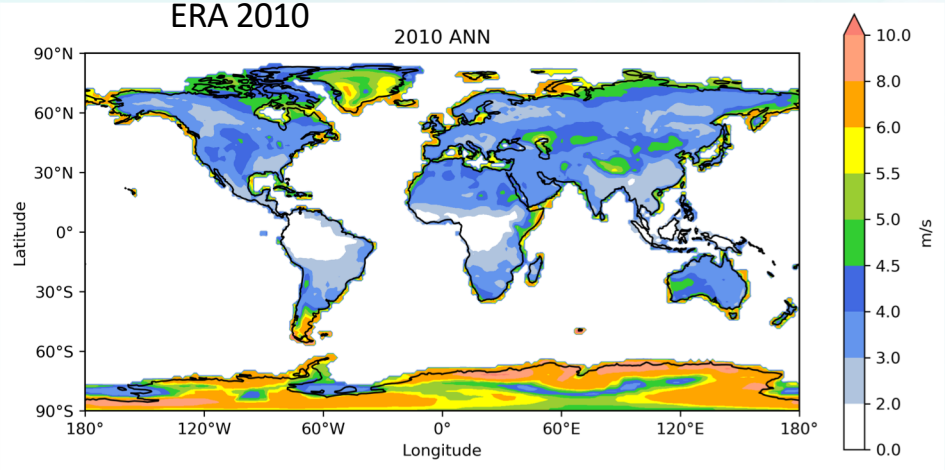
V1 ne30



V2 year 0071



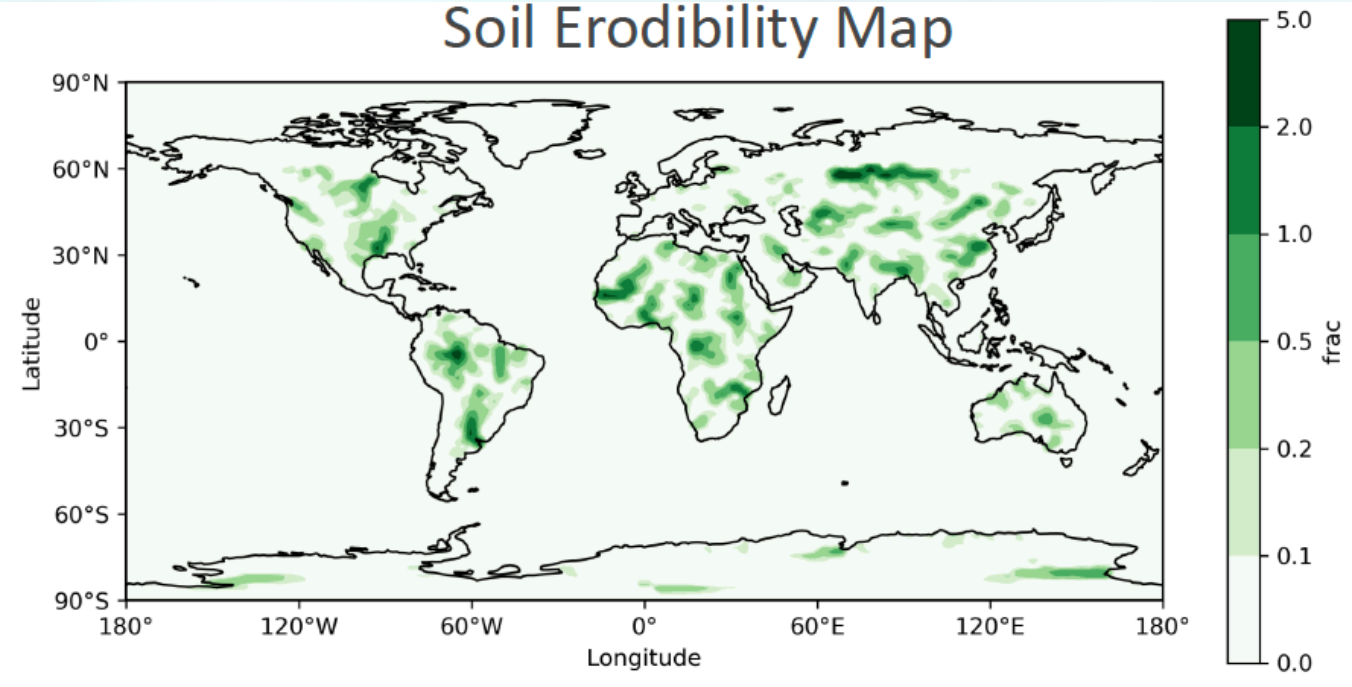
ERA 2010



Sensitive to

- Surface winds
- Resolution
- Size distribution
- Soil erodibility (on going)

Backup slides


Soil Erodibility Map
90°N
60°N
30°N
0°
30°S
60°S
90°S
Latitude
180°
120°W
60°W
0°
60°E
120°E
180°
Longitude
5.0
2.0
1.0
0.5
0.2
0.1
0.0
frac