

Mahowald, Natalie

DE-SC00006735 Improving the representation of soluble iron in climate models (lead PI: Perez, Columbia, ~400\$K to Mahowald at Cornell; only work that DOE funding directly to Mahowald has contributed to is listed here)

Funding from this grant supported Rachel Sanza, Yan Zhang and partially Samuel Albani. Substantial progress has been made on inclusion of mineralogy, showing the quality of the simulations, and the impact on radiation in the CAM4 and CAM5 (Scanza *et al.*, 2015). In addition, the elemental distribution has been evaluated (and partially supported by this grant) (Zhang *et al.*, 2015), showing that using spatial distributions of mineralogy, improved representation of Fe, Ca and Al are possible, compared to the limited available data. A new intermediate complexity soluble iron scheme was implemented in the Bulk Aerosol Model (BAM), which was completed as part of Rachel Sanza's PhD thesis. Currently Rachel is writing up at least two first author papers describing the general methods and comparison to observations (Scanza *et al.*, in prep.), as well as papers describing the sensitivity to preindustrial conditions and interannual variability. This work lead to the lead PI being asked to write a commentary in Nature (Mahowald, 2013) and two review papers (Mahowald *et al.*, 2014, Mahowald *et al.*, submitted) and contributed to related papers (Albani *et al.*, 2016, Albani *et al.*, 2014, Albani *et al.*, 2015).

Albani S, Mahowald N, Murphy L *et al.* (2016) Paleodust variability since the Last Glacial Maximum and implications for iron inputs to the ocean. *Geophysical Research Letters*, **43**, 3944-3954; doi:10.1002/2016GL067911.

Albani S, Mahowald N, Perry A, Scanza R, Zender C, Flanner MG (2014) Improved representation of dust size and optics in the CESM. *Journal of Advances in Modeling of Earth Systems*, **6**, doi:10.1002/2013MS000279.

Albani S, Mahowald N, Winckler G *et al.* (2015) Twelve thousand years of dust: the Holocene global dust cycle constrained by natural archives. *Climate of the Past*, **11**, 869-903; doi:810.5194/cp-5111-5869-2015.

Mahowald N (2013) All dust is not equal. *Nature*, **498**, 302-303.

Mahowald N, Albani S, Kok J, Engelstaedter S, Scanza R, Ward DS, Flanner M (2014) The size distribution of desert dust aerosols and its impact on the Earth System. *Aeolian Research*, **15**, 53-71; <http://dx.doi.org/10.1016/j.aeolia.2013.09.002>.

Mahowald N, Scanza R, Braheyy J, Goodale C, Hess P, Moore JK, Neff J (submitted) Aerosol deposition impacts on land and ocean carbon cycles *Current Climate Change Reports*.

Scanza R, Mahowald N, Ghan S, Zender C, Kok J, Liu X, Zhang Y (2015) Dependence of dust radiative forcing on mineralogy in the Community Atmosphere Model. *Atmospheric Chemistry and Physics*, **15**, 537-561.

Scanza R, Mahowald N, Perez C, Miller R, Al. E (in prep.) Simulation of soluble iron within the CAM: sensitivity to formulation.

Zhang Y, Mahowald N, Scanza R *et al.* (2015) Modeling the global emission, transport and deposition of trace elements associated with mineral dust. *Biogeosciences*, **12**, 5771-5792; doi:5710.5194/bg-5712-5771-2015.