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What are coarse dust aerosols, and how do they impact the Earth's climate system?

Adeyemi Adebiyi[1], Jasper Kok[2], Benjamin Murray[3], Claire Ryder[4], Jan-Berend Stuut[5], Ralph Kahn[6], Peter Knippertz[7], Paola Formenti[8], Natalie Mahowald[9], Carlos Perez García-Pando[10], Martina Klose[11], Albert Ansmann[12], Bjørn Samset[13], Akinori Ito[14], Yves Balkanski[15], Claudia Di Biagio[16], Manolis Romanias[17], Yue Huang[18], and Jun Meng[19]

[1]University of California Merced, Departmemt of Life and Environmental Sciences, Merced, United States of America
[2]Department of Atmospheric and Oceanic Sciences, University of California, Los Angeles, CA, USA
[3]School of Earth and Environment, University of Leeds, Leeds LS2 9JT, United Kingdom
[4]Department of Meteorology, University of Reading, Reading RG6 6BB, United Kingdom
[5]VU – Vrije Universiteit Amsterdam, Faculty of Science, Department of Earth Sciences, The Netherlands
[6]Earth Sciences Division, NASA Goddard Space Flight Center, Greenbelt, MD, USA
[7]Karlsruher Institut fu□r Technologie, Institut fu□r Meteorologie und Klimaforschung, Karlsruhe, Germany
[8]Universite Paris Cite and Univ Paris Est Creteil, CNRS, LISA, F-75013 Paris, France
[9]Earth and Atmospheric Sciences Department, Cornell University, Ithaca, NY, USA
[10]•Barcelona Supercomputing Center, Barcelona, Spain •ICREA, Catalan Institution for Research and Advanced Studies, Barcelona, Spain
[11]Karlsruher Institut fu□r Technologie, Institut fu□r Meteorologie und Klimaforschung, Karlsruhe, Germany
[12]Leibniz Institute for Tropospheric Research, Leipzig, Germany
[13]CICERO Center for International Climate Research, Oslo, Norway
[14]Yokohama Institute for Earth Sciences, JAMSTEC, Yokohama, Kanagawa 236-0001, Japan
[15]Laboratoire des Sciences du Climat et de l'Environnement, CEA-CNRS-UVSQ, IPSL, Gif-sur-Yvette, France
[16]Universit́ e Paris Cit́ e and Univ Paris Est Creteil, CNRS, LISA, F-75013 Paris, France
[17]Institut Mines-Telecom Nord Europe, Univ. Lille, Center for Energy and Environment, F-59000 Lille, France
[18]Department of Atmospheric and Oceanic Sciences, University of California, Los Angeles, CA, USA; California Air Resources Board
[19]•Department of Atmospheric and Oceanic Sciences, University of California, Los Angeles, •Dalhousie University, Dept Physics & Atmospheric Sci, Halifax, NS, Canada

Mineral dust is an important aerosol specie in the atmosphere that impacts the Earth's climate system through its interactions with radiation, clouds, hydrology, atmospheric chemistry, and biogeochemistry. Because dust sizes span more than three orders of magnitude in diameter and dust properties are size-dependent, most previous studies separate dust particles into different classes – broadly defined as fine and coarse dust – which could produce distinct impacts on the Earth system. However, there are general inconsistencies in the terminology, the diameter boundaries, and diameter ranges currently attributed to dust size classes across the literature. As part of a comprehensive review of coarse dust recently completed, we propose, with justification, a new uniform classification that defines coarse and super-coarse dust as particles between 2.5 -

10 μm and 10 - 62.5 μm in diameter, respectively. In addition, we will show several lines of observational evidence that indicate coarse and super-coarse dust particles are transported much farther than previously expected and that the abundance of these particles is substantially underestimated in current global models. Despite the limitations of representing coarse and super-coarse dust aerosols in models, we will highlight their unique impacts on several aspects of the Earth's climate system.