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

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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.