

Dust cloud mass from OSIRIS-REx sample collection event at Bennu

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The high-pressure gas released during the OSIRIS-REx sampling event, on 20 October 2020, lofted a cloud of sub-millimeter and smaller particles from the surface of asteroid Bennu. We attempted to determine the mass of this sub-millimeter dust cloud, and its initial layer thickness. The analysis relied on two images acquired before and after the event agitated Bennu's regolith at Nightingale, the sampling site. We measured the optical depth of the expanding cloud as a function of distance from the center of the expansion during the moment of sample acquisition. Specific values of mass and thickness relied on simplifying assumptions and varied with particle size. We integrated the imaged profile of radially varying optical depth to significantly narrow, or even collapse, the range of average optical depth. We recruited observations from other instruments and analyses to do the same for particle size. With our result, we hope to constrain the nature of the microphysical environment at and near the surface of Bennu's regolith by establishing the presence, or confirming the absence, of a population of sub-millimeter particles and measuring its magnitude.

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