

Exploring the Compositional Heterogeneity of Dust Particles of 67P/Churyumov-Gerasimenko

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Abstract

Dust particles in the inner coma were collected in-situ by dust instruments onboard ROSETTA, the ESA mission orbiting and traveling along comet 67P/Churyumov-Gerasimenko from August 2014 to September 2016. One in-situ dust instrument, the COmetary Secondary Ion Mass Analyser (COSIMA), had applied the laboratory techniques of optical microscopy and secondary ion mass spectrometry (SIMS) to in-situ measurements of cometary particles collected between 1.25 and 3.8 AU. These particle agglomerates were captured on metal targets and imaged and identified in-situ with the COSIMA microscope COSISCOPE. Collected secondary ions reflect the composition of the elements and molecules on the surface particle area bombarded by the primary ion beam. The interpretation of the spectra requires knowledge of the stable molecular ions as well as statistical methods analyzing and comparing mass spectra. Within the inner coma, particles were captured at low velocities and the optical images and SIMS revealed particle agglomerates of various morphologies and compositions. We will present particle compositions in view of the particle population heterogeneity and will discuss their impact on selected comet evolution models.

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