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Cometary dust particle agglomerates analysed in-situ by COSIMA onbaord ROSETTA

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Dust particles in the inner coma were sampled in-situ for the first time 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 microscopy and secondary ion mass spectrometry (SIMS) to in-situ measurements of cometary particles between 1.25 and 3.8 AU. These particles and particle agglomerates were captured on metal targets and imaged in-situ with the COSIMA microscope COSISCOPE. SIMS ion mass spectra revealed a complex mixture representing 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 (< 10 m/s) and the images and SIMS showed single particles as well as agglomerates of various morphologies and compositions. We will present particle composition and image observations and will discuss their current interpretation.