

Rosetta/Alice Measurements of Atomic and Molecular Abundances and Dust in the Coma of 67P/Churyumov-Gerasimenko

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During the Rosetta escort phase from August 2014 through September 2016, the Alice far-ultraviolet (FUV) imaging spectrograph routinely monitored the FUV emission (700-2050 Å) from the coma of 67P/Churyumov-Gerasimenko (67P). We have developed a pipeline for the extraction of a variety of atomic emissions most commonly observed in these data, including hydrogen (Lyman β at 1025 Å), oxygen (1304 Å triplet, 1356 Å), sulfur (1429 Å and 1479 Å multiplets, 1814 Å triplet), and carbon (1561 Å, 1657 Å), as well as molecular emission from the CO Fourth Positive and Cameron bands. The pipeline also self-consistently fits the solar continuum reflected from dust in the coma and total H₂O absorption along the two paths from the Sun to the comet and from the comet to Rosetta/Alice. The resulting database is rich with information on the short-term (diurnal, outbursts) and long-term (seasonal) temporal variations of these species as well as on their spatial distribution about the comet nucleus. We present an analysis of these atomic and molecular species with a focus on the abundances in the coma and a mapping of the temporal and spatial variations. We also present ratios among various species with the goal of identifying the dominant processes at work in the coma as a function of time during the escort phase. Finally, we present measurements of the dust as represented by the reflected solar continuum. Our resulting abundances will be placed into context with measurements from other Rosetta instruments where possible.