



Measurement of Pickup Ions in the Vicinity of Comet 67P/Churyumov-Gerasimenko

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The Ion and Electron Sensor (IES), as well as other members of the Rosetta Plasma Consortium (RPC) on board the Rosetta spacecraft measured the characteristics of the plasma surrounding the comet 67P/Churyumov-Gerasimenko almost continuously since arrival at the comet in August 2014 and until the end of the mission on 30 September 2016. Rosetta is the first (and as yet only) spacecraft to have rendezvoused with and remained close by the nucleus during the mission and thus allowed the study of the development and characteristics of the plasma coma at a higher spatial and temporal resolution than has been possible during previous fast flybys. As the comet approached the Sun and the nucleus increased its activity, both the increased neutral gas density as well as the increased solar ultra-violet (UV) resulted in an increase in the plasma density. Within a month after comet arrival, while Rosetta was <100 km from CG and ~ 3 AU from the Sun, in addition to solar wind, we began to observe low-energy ($\sim < 20$ eV) positive ions. We believe that these are newly formed by photo-ionization of cometary neutrals near Rosetta and attracted to the negative spacecraft potential. During the following 2 years IES observed pickup ions of energies up to the upper limit of the instrument's capability, 17 keV, flowing in the anti-sunward direction. For such a high energy, these must be heavy ions, such as H_2O^+ . These ions appear to be in a shell-like configuration, as would be expected for ions picked up far upstream and having had sufficient time to be energized and form such a distribution. We describe in this paper the results of analysis of selected observations of these pickup ions.