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Overview of the structure and dynamics of cometary plasmas after the Rosetta Mission *(invited)*

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Cometary ionospheres and induced magnetospheres are archetypes of mass-loaded, partially collisional and partially ionized plasmas. They are characterized by a wide range of varying plasma parameters, where the interplay between collisionless and collisional processes are essential to understand the complex cometary plasma dynamics.

Complementing past cometary fly-by missions that paved the way towards our understanding of cometary environments, the ESA Rosetta mission was the first and only space mission that has escorted a comet along its orbit around the Sun. During more than two years of in situ measurement (2014-2016), Rosetta provided the first extensive, long-term, in situ survey of a cometary plasmas, by monitoring the ionized environment of comet 67P/CG at heliocentric distances ranging from 1.2 to 3.8 AU, to witness for a variety of cometary outgassing activity conditions, and at distances from the comet nucleus ranging from 1500 km down to the comet nucleus surface itself. This was the first extensive, long-term, in situ survey of an expanding cometary ionosphere which interaction with the solar wind forms an induced magnetosphere. It has now made comet 67P/Churyumov-Gerasimenko an archetype of comets, targeted to both strengthen our understanding of cometary plasmas and prepare for future cometary missions, such as the ESA Comet Interceptor mission.

In this context, I will review our understanding of the structure and dynamics of the plasma surrounding comet 67P/Churyumov-Gerasimenko as well as the wave processes observed in such a plasma environment, obtained from the combination of *in situ* observations, provided by the different instruments of the Rosetta Plasma Consortium (RPC), with state-of-art numerical modeling of cometary plasma environments.