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Comets in the Young Solar System: Hybrid Plasma Model Results

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The observations of the Rosetta mission and, in particular, of the Rosetta Plasma Consortium (RPC) have provided lengthy in-situ observations of a cometary plasma environment. Building on results of the Rosetta mission, we have taken recent astronomical findings on the evolution of the Sun and the solar wind and employed them to provide the first iteration of an early solar system cometary plasma model.

We investigate a 67P-like comet at three heliocentric distances (corresponding to the orbital distances of Venus, Earth and Mars) and at solar system age of approximately 100 My, using EK Draconis as a solar proxy. The strong inferred EUV flux, along with strong solar wind and low solar constant provide harsh conditions for the coma, creating plasma environments considerably smaller than with contemporary conditions. We discuss the differences between modern and young solar system cometary plasma environments, present the first results of the modelling and provide discussion on the planned developments to modelling the young solar system comets.