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Mass loading of the solar wind near comet 67P at low activity

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The Rosetta mission reached comet 67P/Churyumov-Gerasimenko early August 2014, at a distance of $\sim$3.65AU (5.47e8 km) to the Sun as 67P was heading to its perihelion. Data presented here are collected between 3.65 to 2 AU, and at the time of submission the comet still presents a low activity case. The atmosphere of 67P at low activity is permeated by the solar wind, the plasma boundaries (bow shock, ionopause) of larger objects such as planet ionosphere are not yet observed. As long as such structures are not formed, mass loading remains the main mechanism through which the comet atmosphere affects the solar wind. We show some clear examples of the effect of mass loading on the solar wind. Due to conservation of momentum, the solar wind is deflected in the opposite direction of the accelerated comet ions. As the solar wind electric field changes direction, the direction of both the accelerated comet water ions and the solar wind ions change in a correlated manner. We examine the mass loading process in detail, and discuss whether the observations of solar wind mass loading made by the Rosetta Plasma Consortium Ion Composition Analyser (RPC-ICA) are consistent with basic theories of solar wind mass loading.