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Mass lost from the atmosphere through ion-outflow

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In the polar regions, there is a continuous outward flow of ions along the open geomagnetic field lines. The purpose of this study is to determine the fate of these ions. What amount will disappear out on the Earth's night side, instead of returning to the magnetosphere?
ESA's Cluster spacecrafts move in an elliptical, polar orbit and make measurements of the ion density (n), the particle velocity ($\mathbf{v}_{pm}$) along the magnetic field lines, the electric ($\mathbf{E}_m$) and magnetic field components ($\mathbf{B}_m$) in the magnetosphere. When we combine these data, and use several assumptions, it is also possible to calculate the convection velocity ($\mathbf{v}_{cm}$) in the magnetosphere and in the ionosphere ($\mathbf{v}_i$).
From these calculations we can determine where the ions are when they reach the plasma sheet, and compare it to the location of the reconnection point on the Earth's night side. Based on this, we can decide whether they will return to Earth's magnetosphere, or escape beyond the distant neutral line, and get lost into the solar wind, and estimate the total mass loss rate.
Finally, we will explore how different solar wind parameters and geomagnetic indices affect the loss of ions.