



Variations of cold ion outflow from the polar caps due to solar illumination and North-South asymmetries.

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In Cluster data of outflowing ions above polar cap arcs we find a dependence of the flux density on solar illumination: above a sunlit polar cap the outflow is higher than above a dark polar cap. The effect is strongest for O^+ ions but is also observed for H^+ , thus also the composition changes. In the data evidence is found that these ions originate in the local polar ionosphere, rather than being cusp outflow convected above the polar cap. The presence of the polar cap arcs does not seem to alter the upflow significantly. Therefore, with these assumptions, we can extrapolate the results to the whole polar cap.

With a very simple model, we explore the implications of this sunlit/dark effect on the total flux of upflowing ions from the polar ionosphere. It will lead to diurnal and seasonal variations of the upflowing ion flux from the whole polar cap. Because the offset of the magnetic pole is different in the Southern hemisphere than in the Northern hemisphere, the flux from the total polar cap and its variations will be different in both hemispheres. Based on this geometric argument, it may also lead to a UT and seasonal dependence of the total flux from both hemispheres combined, and thus of the supply of ionospheric ions to the plasmashet.