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The trans-terminator ion flow in the Venusian ionosphere near solar minimum

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Abstract

The Venusian ionosphere is dominated by flow from the subsolar region towards the night sector, driven primarily by the day-to-night pressure gradient. Pioneer Venus Orbiter made extensive in-situ plasma observations close to solar maximum, which showed that this flow was a substantial source of nightside plasma [1]. At solar minimum radio occultation profiles showed that this mechanism was severely inhibited by a lower dayside ionopause [2]. However, prior to Venus Express, data coverage at the lowest part of the solar cycle was extremely limited.

The ASPERA-4 instrument on Venus Express is currently conducting in-situ measurements of plasma in the Venusian ionosphere close to the terminator near solar minimum. These data are used to show the variation in ion counts between observations conducted sunward and nightward of the terminator. PLASLIFE is a computer code that assists in the interpretation of ionospheric observations, which was developed at Aberystwyth University [3]. It is used to predict the change in ion density across the terminator in the absence of plasma transport. This prediction is compared with the ion observations from ASPERA-4 to obtain an estimate of the trans-terminator flux at solar minimum. PLASLIFE is then used to predict the effect of plasma transport on the nightside ionosphere in this part of the solar cycle. Possible implications for ion escape are also discussed.

References

[1] Knudsen et al. (1981) *GRL,* 8, 241-244.

[2] Knudsen et al. (1987) *JGR,* 92, 13391-13398.

[3] Wood and Pryse (2009) *JGR,* submitted.