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

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The transterminator ion flow in the Venusian ionosphere is primarily driven by a pressure gradient which is caused by photoionisation [1]. At solar maximum this antisunward flow is the principle source of the nightside ionosphere [2]. Around solar minimum the ionopause is located at a lower altitude and it has been suggested that this would severely inhibit the transport process [3,4]. However, it is only within the last few years that extensive in-situ observations of ionospheric plasma under these solar conditions have been conducted. Observations of ions of ionospheric origin conducted by Venus Express throughout one Venus year sampled all local time sectors twice and flew through these sectors in opposing directions half a Venus year apart. These observations, conducted at high latitudes close to the solar terminator, showed asymmetries in both the dawn-dusk and noon-midnight planes. In the dawn-dusk direction greater numbers of ions were observed on the dusk side than on the dawn side. In the noon-midnight plane greater numbers of ions were observed on the dayside, although significant numbers of ions were seen nightward of the terminator. Collectively these observations suggest a nightward ion flow with the dawn-dusk asymmetry resulting from variations in the plasma density in the dayside ionosphere. Observations of the ion energies suggest that this flow has a velocity of $\sim$4 km s-1.

References

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