

## Can the SuperDARN radar make estimates of thermospheric neutral density?

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Using the ion-momentum equation in the F-region ionosphere, simplified for field-perpendicular ion motion only, we derive an expression for the ion-neutral collision frequency that depends primarily on the temporal and spatial variability of the ion velocity. The ion-neutral collision frequency is primarily a function of neutral density in the thermosphere. SuperDARN radars are very suited to this type of observation because of their large coverage of the F-region ionosphere, mesoscale range resolution and frequency agility. Trial observations have been performed on some SuperDARN radars using a special mode. These show that realistic estimates of thermospheric neutral density, compared to the MSIS model, can be obtained. Since HF radio wave propagation refracts in the F-region ionosphere, a functional comparison is only possible with reliable and accurate ray tracing. Problems with ray tracing and assumptions made are discussed.