



EISCAT D-region spectral widths during a solar proton event as a diagnostic of atomic oxygen

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The lambda parameter, being the ratio of negative ion density to electron density, is known to affect the spectral width of the ion-line spectra. An increased lambda is found to widen the spectrum. We here use an ion-chemistry model for the mesosphere to deduce the time-dependent ratio of modelled spectral widths to spectral widths measured with the EISCAT VHF radar during the solar proton event on 30 October, 2003.

Atomic oxygen exhibits a strong diurnal variation and is the most important factor for controlling the diurnal variation of negative ions and thus affecting the lambda parameter. In the night, the atomic oxygen decreases drastically, causing an increase in the negative ion density, which in turn means a higher lambda-value and a higher estimated spectral width. However, during a solar proton event the diurnal variation of atomic oxygen is restrained leading to a less pronounced decrease during night time. We compare modelled and measured spectral widths to examine the build-up of atomic oxygen due to a solar proton event.