

# ENHANCED $N_2^+$ IN THE SHUTTLE ENVIRONMENT

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## Abstract

Observations were made of the  $N_2^+$  first negative and Meinel emission bands with the Imaging Spectrometric Observatory (ISO) on Spacelab 1. These observations have revealed the presence of  $N_2^+$  emissions which exceed those expected on the basis of current ionospheric models by up to a factor of 10. If the emission is of terrestrial origin, large unidentified ionospheric sources of  $N_2^+$  ions must exist. On the other hand, if the source is local to the shuttle environment, a mechanism must be found which is capable of generating emissions of such unexpectedly large intensity. We suggest charge exchange of ambient ionospheric  $O^+$  ions with shuttle environmental  $N_2$ , followed by resonance scattering of sunlight, as a candidate. However, this model implies that a cloud of  $N_2$  gases must surround the vehicle in concentrations in excess of  $10^{11} \text{ cm}^{-3}$  with a scale length of tens of meters. In addition, the  $N_2^+$  residence time must be of the order of 10 sec.