A Novel Probe for Insitu Measurements of Upper Atmospheric Parameters

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A novel Electron Density and Neutral Wind Probe (ENWi) has been designed and developed for undertaking rocket borne upper atmospheric studies. This probe consists of a first of its kind neutral wind/electron density probe and a Langmuir probe. The neutral wind probe is designed for making measurement of ionospheric E region (~ 90-120 km) neutral winds and F-region (~ 120-500 km) ion drift. The ionic motion is controlled by the neutrals due to frequent collisions between the two species, in the E region. Hence the neutral wind velocity is equal to the ionic velocity in this altitude region. This principle is used to derive the neutral winds in the E region. The field of view of the instrument is 10º. The instrument is capable of making wind measurements in the range of 10-400 m/s. The Langmuir probe will be operated in fixed bias mode for measurement of ionospheric electron density and irregularity strength. The electron density measurements can be made in the range 0f 10^3-(5×10^5)/cm^3. This probe was used for insitu measurements during the annular solar eclipse campaign of January 14-17, 2010. The major scientific results to be presented are a) Investigations on the effects of the eclipse on the neutral winds and electron density in the E and F regions and their implications for occurrence/non occurrence of the ionospheric irregularities/Counter Electrojet from rocket flights made at Trivandrum (magnetic equatorial location) and SHAR. b) Investigations on the modulations in the electron density and neutral wind/ion drift in the post eclipse period derived from the rocket flight at Trivandrum after the eclipse. These results are the first ever, simultaneous in-situ neutral wind and electron density measurements, during an eclipse at the magnetic equator.