

I. PHYSICS

Astrophysics (Mesospheric Structure)

STUDY OF VARIATIONS IN MESOSPHERIC STRUCTURE DURING THE TOTAL SOLAR ECLIPSE 16 FEBRUARY 1980

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THE aim of the experiment was to determine the variations of any, in the atmospheric structure (number density and temperature) in 60–90 km altitude region, produced by the decreased solar ultraviolet incidence on the earth's atmosphere during the eclipse. Results from experiments conducted during previous solar eclipses have yielded negative result namely no significant effect due to the eclipse could be found, while measurements of changes in the ionospheric D-region parameters during the same eclipses required, for their explanation (on the basis of present ionospheric theories) a significant decrease in the atmospheric temperatures during the eclipse in this altitude region.

It would also be possible to determine the Solar Lyman alpha emission fluxes during the maximum phase of the eclipse and hence evaluate relative contribution of the disc and the corona.

Keywords : Mesospheric Structure; Solar Ultraviolet Incidence; Solar Lyman-Alpha Emission Flux.

EXPERIMENT

Equipment

The instrument consists of a rocket borne Lyman-alpha photometer which measures the attenuation of hydrogen Lyman-alpha emission (1216Å) from the Sun in the Earth's atmosphere. The attenuation profile can be used to derive the concentration of the main absorbing species in the earth's atmosphere which is molecular oxygen. Over an altitude range of 60–90 km, the measured oxygen concentrations can be used to derive the atmospheric scale height and hence the ambient temperatures.

RESULTS

Three measurements were made from Thumba on Centaur rockets two on February 16, 1980, at 1454hr IST (solar obscuration 40%) respectively and one on February 17, 1980, at 1522hr (control experiment). The experiments of February 16, 1980, were successful and gave good quality data while the February 17, 1980, did not yield any data due to an instrument malfunction. The data are still under analysis.