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Preliminary Results of Explorer XVII

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Preliminary Results of Explorer XVII

THE EXPLORER XVII satellite has discovered that the Earth is surrounded by a belt of neutral helium atoms and has sent back more than 8 hours of scientific information on the physics and chemistry of the tenuous gases that make up the Earth's atmosphere.

NASA Goddard Space Flight Center scientists said the data being sent back to Earth is giving scientists the first actual measurements on neutral gases in the satellite's particular orbital path and their pressures, densities, and temperatures.

The reports were based on preliminary data received at NASA's Blossom Point, Md., tracking station.

At the satellite perigee of 150 miles, independent instruments showed that there are about 60 million neutral helium molecules per cubic centimeter, an area roughly the size of a sugar cube. At the satellite apogee of 575 miles there are not more than about one million helium molecules for the same volume.

The experimenters noted that the neutral helium layer begins about 60 miles below the altitude where space researchers first measured an electrically charged belt of helium some two years ago with daytime and nighttime probes, P-21 and P-21A.

Satellite pressure gauges showed that at perigee pressure is about one-hundredth of one billionth that of the Earth's atmosphere at sea level. Data on pressure at apogee has not been analyzed, but experimenters expect it to show readings of only one trillionth of the Earth's atmosphere at sea level. The atmospheric density measured by the satellite at perigee was determined to be 2.7×10^{-8} grams per cubic centimeter.

Several measurements of electron temperature confirmed other satellite data which showed that these temperatures vary from day to night and that electron temperature at apogee and perigee remained near the same level during the night. The nighttime electron temperature is about 850° Kelvin (1070° F) and the daytime temperature is about 2200° Kelvin (3500° F).

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