37th COSPAR Scientific Assembly 2008

Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System (B)
Mars Exploration (B02)

A PROTRUSION FROM THE TERMINATOR OF THE MARS OBSERVED ON NOVEMBER 4, 2003

Dr. Tomoko Nakagawa, nakagawa@tohtech.ac.jp
Tohoku Institute of Technology, Sendai, Japan
Masatsugu Minami, vzv03210@nifty.com
Oriental Astronomical Association, Japan

A protrusion phenomenon was observed on the morning terminator of the southern hemisphere of the Mars, around the latitude of 40 - 50°S, during the period from November 4 to 8, 2003, in the summer of the southern hemisphere of the Mars (Ls=290-295). It was about 70 days after the closest approach to Earth, and 5-10 days after the fastest solar wind (1850km/s at Earth's orbit) observed on October 29, 2003.

The protrusion was observed on November 4, 6, 7, 8 from Fukui, Yokohama, Okinawa, and Nagoya. There was another report of observation on November 17 from Italy. The central meridian at the detection of the protrusion, 170-220°W, corresponds to the longitude of the terminator 240-300°W. That is, the projection event was observed when the area from Hellas to Ausonia crosses the terminator. The blue image does not show any prominent cloud. No dust storm was observed, either.

The protrusion phenomenon is not likely to be the aurora, because it persisted for several hours, differently from the characteristic nature of the Martian aurora. Furthermore, an aurora would be clearer on the nightside, rather than on the terminator.

The altitude of the light material is estimated to be in the range from 60 to 300 km. At the altitude of 90 km, an ice cloud of CO2 was reported by Montmessin (2006) on the basis of Mars Express UV observation, although it was in the winter hemisphere.

It should be noted that the projection event was preceded by extremely fast solar wind. The speed was over 1850km/s at Earth on October 29, 2003 (Skoug et al., 2004). The solar wind whose speed was larger than 500km/s persisted for more than a week. The heliocentric longitude between the two planets was about 24 degrees. Such a fast wind must have reached Mars, too. It is believed that the solar wind interacts with the Mars' neutral atmosphere due to the lack of the global dipole magnetic field. Although there are strong crustal magnetic fields mainly in the southern hemisphere, the large impact basins of Hellas and Argyre are largely devoid of enhanced magnetic fields. The Mars' atmosphere, bombarded by the fast solar wind, might be heated through charge exchange process, production of energetic neutral atoms, or sputtering process.

http://homepage2.nifty.com/~cmomn2/2830AA/index.htm