The Cosmic Ray Ground Level Enhancement and the Forbush Decrease in January 2005 - Analysis of the Swiss Cosmic Ray Observations

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After major solar activity in January 2005 the IGY and NM64 neutron monitors at Jungfraujoch, Switzerland (geogr. latitude: 46.55N, geogr. longitude: 7.98E; altitude: 3570/3475 m asl; effective vertical cutoff rigiditiy Rc = 4.5 GV), the special neutron monitor in Bern (46.95N, 7.45E; 570 m asl; Rc = 4.4 GV), and the solar neutron telescope SONTEL at Gornergrat (45.98N, 7.78E; 3135 m asl; Rc = 4.7 GV) recorded several pronounced variations in the ground-level cosmic ray intensity. The IGY neutron monitor at Jungfraujoch first observed a Forbush decrease (Fd) with onset around noon GMT on January 17, 2005, and with maximum amplitude of about -15%. The Fd was associated with enhanced geomagnetic activity. On January 20, with onset at 06:54 UT, i.e. still during the main phase of the Fd, a solar cosmic ray ground level enhancement (GLE) was observed. This GLE reached a maximum amplitude of 11.4% in the 1-minute recordings. Based on the data of the Swiss cosmic ray detectors as well as of the worldwide network of neutron monitors, including solar wind data, and using simulations with the Geant4 codes MAGNETOCOSMICS and ATMOSCOSMICS [1, 2, 3], we evaluated the modulation of the spectrum of galactic cosmic rays during the Fd and determined the characteristics of the solar particle flux near Earth. Special emphasis will be given to the peculiarities in the intensity-time profiles (e.g. pre-increase and double maximum of GLE). In the paper we discuss the method of analysis and present first results.

References

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[2] Desorgher, L., *http://reat.space.qinetiq.com/septimess/atmcos/* (2004).
[3] Desorgher, L., *http://reat.space.qinetiq.com/septimess/magcos/* (2004).