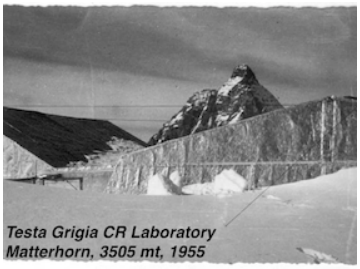

Contribution ID: **38** Type: **poster**

Computation of ion production rate and short, mid and long term ionization effect by cosmic rays during Bastille day event (GLE 59)

Tuesday, 6 September 2016 16:30 (1h 45m)

The galactic cosmic rays are the main source of ionization in the Earth stratosphere and troposphere. The induced by primary cosmic ray particles ionization is important in various processes related to atmospheric physics and chemistry, specifically the minor constituents. The ion production in the atmosphere is enhanced compared to the average following major solar energetic particles events, specifically over the polar and sub-polar regions (with geomagnetic cutoff rigidities Rc ≤ 1 GV). During the solar cycle 23 (1996-2008) we observed 16 Ground Level Enhancements (GLE) (http://cosmicrays.oulu.fi/GLE.html). One of the strongest among them was the Bastille Day Event on July 14, 2000 (GLE 59), the national day of France, occurring near the peak of the solar maximum in solar cycle 23. It was the biggest solar radiation event since 1989. The proton event was four times more intense than any previously recorded since the launches of SOHO in 1995 and ACE in 1997. The flare was also followed by a full-halo coronal mass ejection and a geomagnetic super storm on July 15 (the Dst index reached a minimum value of -301 nT and the Kp index run up to Kp,max = 9).
In the work presented here we apply a full Monte Carlo 3-D model in order to compute the cosmic ray induced ionization during GLE 59. The computations is based on atmospheric shower simulation with CORSIKA code using FLUKA and QGSJET II hadron generators and the ion production rate is considered as a superposition of cosmic rays with galactic and solar origin. The ion production rate is computed as a function of the altitude above the sea level and the short, mid and long term ionization effects relative to the average due to galactic cosmic rays is computed. It is determined the planetary distribution in the Earth environment of the enhanced ionization rate due to solar cosmic rays of the considered GLE 59.

Primary author: Prof. VELINOV, Peter (Institute for Space Research and Technology, Bulgarian Academy of Sciences)

Co-author: Dr MISHEV, Alexander (ReSolve Center of Excellence, University of Oulu, Finland)

Presenter: Dr MISHEV, Alexander (ReSolve Center of Excellence, University of Oulu, Finland)

Session Classification: Poster