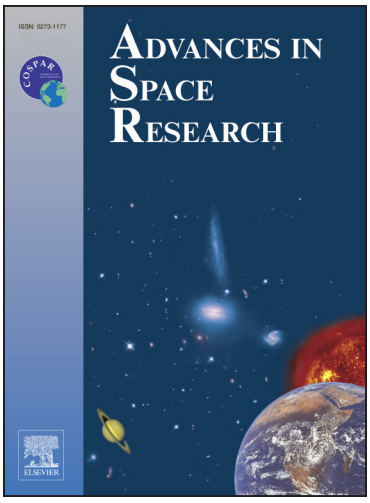

Measurement of secondary cosmic ray intensity at Regener-Pfotzer height using low-cost weather balloons and its correlation with solar activity

Ritabrata Sarkar, Sandip K. Chakrabarti, Partha Sarathi Pal, Debashis Bhowmick, Arnab Bhattacharya

PII: S0273-1177(17)30343-5
DOI: http://dx.doi.org/10.1016/j.asr.2017.05.014
Reference: JASR 13222

To appear in: *Advances in Space Research*

Received Date: 12 January 2017
Revised Date: 9 May 2017
Accepted Date: 10 May 2017

Please cite this article as: Sarkar, R., Chakrabarti, S.K., Pal, P.S., Bhowmick, D., Bhattacharya, A., Measurement of secondary cosmic ray intensity at Regener-Pfotzer height using low-cost weather balloons and its correlation with solar activity, *Advances in Space Research* (2017), doi: http://dx.doi.org/10.1016/j.asr.2017.05.014

Measurement of secondary cosmic ray intensity at Regener-Pfotzer height using low-cost weather balloons and its correlation with solar activity

Ritabrata Sarkar[a,*], Sandip K. Chakrabarti[b,a], Partha Sarathi Pal[a], Debashis Bhowmick[a], Arnab Bhattacharya[a]

[a] *Indian Centre for Space Physics, 43 Chalantika, Garia Station Rd., Kolkata 700084, West Bengal, India*
[b] *S.N. Bose National Centre for Basic Sciences, JD Block, Salt Lake, Kolkata 700097, West Bengal, India*

Abstract

Cosmic ray flux in our planetary system is primarily modulated by solar activity. Radiation effects of cosmic rays on the Earth strongly depend on latitude due to the variation of the geomagnetic field strength. To study these effects we carried out a series of measurements of the radiation characteristics in the atmosphere due to cosmic rays from various places (geomagnetic latitude: $\sim 14.50^\circ$ N) in West Bengal, India, located near the Tropic of Cancer, for several years (2012-2016) particularly covering the solar maximum in the 24th solar cycle. We present low energy ($15 - 140$ keV) secondary radiation measurement results extending from the ground till the near space (~ 40 km) using a scintillator detector on board rubber weather balloons. We also concentrate on the cosmic ray intensity at the Regener-Pfotzer maxima and find a strong anti-correlation between this intensity and the solar activity even at low geomagnetic latitudes.

Keywords: Cosmic ray, Regener-Pfotzer height, Solar activity, X-ray detector, Weather balloon-borne mission
PACS: 94.20.wq, 94.05.Sd, 95.55.-n, 95.55.Ka, 96.60.Q

*Corresponding author
Email addresses: ritabrata.s@gmail.com (Ritabrata Sarkar), sandipchakrabarti9@gmail.com (Sandip K. Chakrabarti), parthasarathi.pal@gmail.com (Partha Sarathi Pal), debashisbhowmick@gmail.com (Debashis Bhowmick), arnabseacom@yahoo.com (Arnab Bhattacharya)