

SOLAR MODULATION OF THE GALACTIC COSMIC RAY SPECTRA SINCE THE MAUNDER MINIMUM

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Knowledge of the galactic cosmic ray modulation in the past centuries is important for understanding the century scale heliospheric behaviour and in particular for the investigation of the solar modulation during prolonged solar quiet periods like the Gleissberg minima and the Maunder minimum of solar activity. We inferred the galactic cosmic ray annual mean spectra on the basis of the following data: primary spectra of cosmic rays obtained from balloon and spacecraft measurements during different phases of the solar cycles # 20-23; Climax neutron monitor time series available since 1953; variation of the annual means of the coronal source magnetic flux as derived from the aa index⁽¹⁾ available since 1868; the sunspot number time series from 1700. The relations among these data sets were extrapolated back to 1700. The differential flux of the galactic cosmic ray $J(T,\Phi)$ (particles/m² s sr MeV) has been characterized by the parameter Φ (MeV) which describes the modulation by the solar magnetic field or the energy lost by particles in traversing the heliosphere⁽²⁾. The obtained results have been validated by means of the comparison between the calculated production rate as a function of time of the cosmogenic Ti-44 ($T_{1/2} = 59.2$ y) in meteorites with our measurements in different chondrites which fell in the last 160 years⁽³⁾.

⁽¹⁾ M. Lockwood, R. Stamper and M.N. Wild, *Nature*, 399, 437-439, 1999. ⁽²⁾ G. Cini Castagnoli and D. Lal, *Radiocarbon*, 22, 133-158, 1980. ⁽³⁾ G. Bonino, G. Cini Castagnoli, N. Bhandari and C. Taricco, *Science*, 270, 1648-1650, 1995 and *Adv. Space Res.*, 23, 607-610, 1999.