



Contribution ID: 56

Type: oral

Analysis of Superflare “Isotopic Imprints” in Lunar and Terrestrial Samples

Thursday, 8 September 2016 17:30 (15 minutes)

Extreme cosmic ray event around AD775, revealed by ^{14}C annual tree-ring analysis, is believed to be the greatest solar proton event (SPE) on a multi-millennial time scale. We aim to study the effect of extreme SPEs on the production of different cosmogenic radionuclides and to compare the predictions with measured isotopic imprints in terrestrial and lunar samples. Simulations of isotope production for some solar flares (23.02.56, 04.08.72, 20.01.05 etc.) show that to produce imprints similar to AD775 its power has to be tens and hundreds times greater. Observed radionuclide ratios set the range of parameters for superpowerful SPEs spectra. Data obtained from lunar sample analysis give a limitation on frequency for these events as one per several thousand years.

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Session Classification: Parallel