



Relation between cosmic rays and climate: What do we know?

I.G. Usoskin (1)

(1) Sodankylä Geophysical Observatory (Oulu unit), University of Oulu, Finland
(Ilya.Usoskin@oulu.fi)

A link between the cosmic ray flux and cloudiness is considered as a possible mechanism of solar variability influence upon Earth's climate. Here we review evidence relating terrestrial climate variability to changes of cosmic ray flux in Earth's vicinity on different time scales. On daily scales, there are hints on instantaneous relations between short term variations of cosmic rays (Forbush decreases and solar energetic particle events) and atmospheric vorticity indices at high latitudes during cold periods. At inter-annual scales, impressing correlation between low clouds and cosmic ray induced ionization has been found but it appears significant only in some geographical areas. Although a link between solar activity and climate seems plausible on millennial time scale, only a marginal correlation between palaeoclimatic data and geomagnetic field variations supports the idea of cosmic ray influence. On very long time scales, a close relation was reported between the global climate and variations of cosmic ray flux expected from changes in the local galactic environment. However, large uncertainties make this result only indicative. Although none of these facts alone is conclusive, in the aggregate they support the link between cosmic rays and climate on Earth. These results are based on phenomenological relations, and theoretical development and experimental investigation of this hypothesis is ongoing.