



Detection of a galactic cosmic ray influence on clouds

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Galactic cosmic ray changes have been suggested to affect weather and climate, and new evidence is presented here directly linking galactic cosmic rays with clouds. Clouds increase the diffuse solar radiation, measured continuously at UK surface meteorological sites since 1947. The ratio of diffuse to total solar radiation - the diffuse fraction - is used to infer cloud, and is compared with the daily mean neutron count rate measured at Climax, Colorado from 1951-2000, which provides a globally-representative indicator of cosmic rays. Across the UK, on days of high cosmic ray flux compared with low cosmic ray flux, (1) the chance of an overcast day increases and (2) the diffuse fraction increases. Furthermore, during sudden transient reductions in cosmic rays (e.g. Forbush events), simultaneous decreases occur in the diffuse fraction, showing that the diffuse radiation changes are unambiguously due to cosmic rays. The statistically significant non-linear cosmic ray effect is small, but it will have a considerably larger aggregate effect on longer timescale (e.g. century) climate variations when day-to-day variability averages out.