SOLAR CYCLE VARIATIONS OF THE ANOMALOUS COSMIC RAY COMPONENT

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The intensity of the "anomalous" cosmic ray component, consisting of He, N, O, and Ne, has long been known to be especially sensitive to the effects of solar modulation. Following its discovery in 1972, this component dominated the quiet-time flux of cosmic ray nuclei below ~30 MeV/nucleon during the 1972-1978 solar minimum, but then became essentially unobservable at 1 AU with the approach of solar maximum conditions. One recent theoretical model predicts substantial differences in the intensity of the anomalous fluxes from one solar minimum period to the next because of the reversal of the solar magnetic field. Using data from the Caltech experiments on IMP-8 and ICE (ISEE-3), we report on the intensity of anomalous O and He at 1 AU during the years 1972 to 1985. In particular, we hope to determine whether the anomalous fluxes will return to their 1972-1978 levels, as predicted by spherically symmetric modulation models, or whether they will fail to return to 1 AU, as suggested by modulation models in which gradient and curvature drifts dominate.

Our preliminary analysis of data from 1984 shows that the intensity of 8 to 27 MeV/nucleon O is still more than an order of magnitude below its 1972 to 1978 levels, while the intensity of 25 to 43 MeV/nucleon He is a factor of ~8 below its maximum level in 1977. Data from 1985 is now being analyzed.

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