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Solar-cycle dependent relationship between cosmic-ray intensity and the heliospheric current sheet tilt angle

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We investigate cosmic-ray intensities as measured by neutron monitors as function of the corresponding heliospheric current sheet tilt angle. Three solar cycles with three changes in solar magnetic polarity are examined. The results are compared to predictions of cosmic-ray modulation models that include drift effects. The intensity-tilt plots produce open loops with clockwise rotations for solar cycles 21 and 23 and with anti-clockwise rotation for solar cycle 22, as predicted by drift models. However, the observed intensity-tilt loops for cycles 21 and 23 are larger than the loop for cycle 22 contrary to the drift model predictions. To explain this difference we use the time dependence of the tilt angle and show that the loops then become very similar. We show that from this renormalization, the approximate time it takes for particles to travel from the termination shock to Earth can be estimated, and that the time is consistent with model predictions.

**Level (Hons, MSc,
 PhD, other)?**

Hons

**Consider for a student
 award (Yes / No)?**

Yes

**Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?**

Yes

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