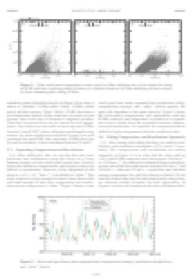


[Back](#)

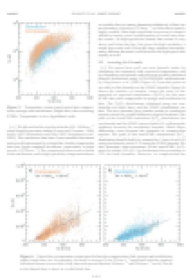
1



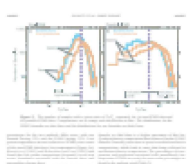
2



3



4



JOURNAL OF GEOPHYSICAL RESEARCH,

An improved expected temperature for interplanetary coronal mass ejections

H. A. Elliott,¹ D. J. McComas,¹ N. A. Schwadron,¹ G. Gloeckler,³ and T. H. Zurbuchen⁴

Received 17 September 2004; revised 25 November 2004; accepted 11 December 2004

[1] In this study we compare nearly 5 years of solar wind measurements from the Solar Wind Electron Proton Advanced Composition Explorer (ACE) to derive an improved formula to identify interplanetary coronal mass ejections (ICMEs). Proton temperatures have long been associated with ICMEs, but not present, the solar wind speed and temperature are used. Previous studies have derived fits to these measurements. Using the expected temperature formula, it is determined from the solar wind speed. Anomalous proton temperatures are identified as times when the ratio of the measured to expected temperature is greater than 1. In this study we remove ICMEs before fitting the remaining solar wind data. The solar wind interact and cause compressions and rarefactions away from the Sun. Since such interaction causes the proton temperatures to change, we separately fit compression and rarefaction regions. The improved expected temperature formula derived in this way produces fewer false ICMEs than previous formulas, particularly in compression regions.

Citation: Elliott, H. A., D. J. McComas, N. A. Schwadron, J. T. Goswami, and T. H. Zurbuchen, 2005: An improved expected temperature formula for identifying interplanetary coronal mass ejections. *J. Geophys. Res.*, 110, A08107, doi:10.1029/2004JA010794.

1. Introduction

[2] Early in situ solar wind measurements showed that solar wind proton temperature and speed are generally well correlated [Neugebauer and Snyder, 1966]. Many studies since then have fit proton temperature (T_p) as a function of speed (V). The “expected temperature” (T_{ex}) is an estimate of the temperature determined from solar wind speed measurements using a formula based on a fit. One of the earliest fits was done by Hundhausen *et al.* [1970], who concluded that Vela 3 data could be fit well with either a linear fit to $\sqrt{T_p}$ or T_p versus V . Burlaga and Ogilvie [1970] fit $\sqrt{T_p}$ versus V in their analysis of Explorer 34 data. Lopez and Freeman [1986] found that the slope of the T_p - V curve changes at speeds ~ 500 km/s and then fit data above the

< Back

