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Directional alignments, inhomogeneous heating, and non-Gaussian statistics in solar wind turbulence K. OSMAN, M. WAN, Bartol Research Institute, Department of Physics and Astronomy, University of Delaware, DE, USA, A. GRECO, S. SERVIDIO, Dipartimento di Fisica, Universita della Calabria, Rende, Italy, W. MATTHAEUS, Bartol Research Institute, Department of Physics and Astronomy, University of Delaware, DE, USA, B. BREECH, U.S. Army Research Lab, MD, USA — The directional alignment of the magnetic and velocity field fluctuations are studied using 33 intervals of ACE data, each 10 hours in duration. The local distributions vary substantially: most intervals have a dominant anti-sunward propagating component, some have an almost flat angular distribution, and very few have a dominant sunward propagating component. These observations are consistent with the localization of directional alignment found in 2D incompressible MHD simulations. In both the local and global cases, the alignment cannot be explained as a superposition of uncorrelated Gaussian distributions, but could be associated with small scale coherent structures. In an independent study, a novel method that relates to intermittency is used in the solar wind to identify small scale coherent structures. These are shown to be associated with enhancements in the electron heat flux, electron temperature, and ion temperature. This is consistent with the presence of inhomogeneous heating in MHD inertial range turbulence. Since the coherent structures represent current sheets that form between flux tubes, the sites of observed localized heating are also candidates for magnetic reconnection. Both the above features of solar wind turbulence can be related to non-Gaussian statistics and therefore may be associated with intermittency.

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