Geophysical Research Abstracts
Vol. 12, EGU2010-13124, 2010
EGU General Assembly 2010

Structure of the solar wind discontinuities at the different spatial scales: STEREO measurements

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We present the case study of the solar wind disturbances at the different spatial scales. The results of the solar wind discontinuities geometry analysis based on the solar wind monitoring onboard Wind, ACE, STEREO A, and STEREO B during 2007-2008 are proposed. A case study of the solar wind discontinuities based on STEREO A, STEREO B, ACE and Wind measurements is presented. The normal direction obtained by different spacecraft has been analyzed in depends on the cross spacecraft distance. The radius of curvature of the interplanetary discontinuities is estimated to be in the range from 600 Re to 2000 Re for different cases. The curvature estimation is robust for the spacecraft remoteness less then units of thousands Re. This characteristic size is in a good agreement with the estimated size of the large-scale solar wind structure on the Earth orbit.
The complex correlation analysis in dependence on the spacecraft remoteness based on correlation function estimation time is carried out. The space scale of correlation dependence and amplitude of small scale perturbation are estimated. The correlation function is approximated with the Gauss distribution function with half-width about 1000 Re. The good agreement to the scale of the curvature of the interplanetary discontinuities is obtained.