

Effects of the same CIR on the plasma environment of Venus, Earth and Mars

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Abstract

During the recent solar activity minimum the solar wind streams were very persistent, even after a few solar rotations the global solar wind properties were unchanged. The compression regions due to the fast stream - slow stream interaction were sweeping through the ecliptic plane without large longitudinal alterations, these are named corotating interaction regions (CIR). Their persistence allows the comparison of the effects of the same CIR on the different terrestrial planets. We investigated the time period in January and February 2007, when the twin solar spacecraft STEREO were still nearby Earth observing simultaneously the solar wind and the terrestrial magnetotail. When considering the solar rotation and the corotating solar wind structures, Venus was ~10 days ahead Earth, while Mars ~10 days behind. For this reason, the Venus Express in-situ plasma and magnetic field measurements were shifted by such a timelag to Earth orbit, and respectively the Mars Express observations in order to find the corresponding CIRs. Since the investigated three planets have different magnetic characteristics, their response to the CIR passage is expected to be different. We find energetic particle bursts escaping from the magnetized Earth and the unmagnetized planets Venus and Mars have increased ion escape rates.