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On the global polarity reversal of the induced magnetosphere of Venus: a statistical study

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In this study we present the first statistical analysis on the effects of Interplanetary Magnetic Field (IMF) sector boundary crossings on the induced magnetosphere of Venus. These events are of particular interest because they lead to the reconfiguration of the induced magnetosphere with opposite polarity. IMF sector boundary crossings can occur after Heliospheric Current Sheet (HCS) crossings and often after the passages of Interplanetary Coronal Mass Ejections (ICME) and Corotating Interaction Regions (CIR). The results show that the HCS crossings cause significant erosion of the dayside ionosphere and in this region the average heavy ion flux was reduced by a factor of 0.63 compared to the undisturbed cases. The heavy ion flux on the nightside changed by a factor of 0.81. On the nightside ion heating was observed and the average heavy ion temperature increased by the factor of 1.63 compared to the undisturbed cases. The ICME/CIR events were sorted into two groups depending on the polarity reversal of the induced magnetosphere. We found significant differences between them: the cases with polarity reversal showed significant ion heating and increased heavy ion flux upon arrival of the ICME/CIR event. We conclude that the observations are similar to the previous comet studies and the polarity reversal of the induced magnetosphere might be accompanied with dayside reconnection.