



Superposed epoch analysis of the Dst index and interplanetary shocks observed at 1 au

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We have identified 1,068 interplanetary (IP) shocks in data obtained by the Wind spacecraft between 1995 and 2015. We have analyzed four types of shocks: 540 fast forward (FF), 110 fast reverse (FR), 229 slow forward (SF), and 189 slow reverse (SR). While FF shocks occur at the leading edges of CMEs and slow-fast stream interaction regions (SIRs), FR shocks can occur at the trailing edge of the CME ejecta and bounding the rear edge of the SIR. We performed a superposed epoch analysis of the disturbance storm time (Dst) geomagnetic index and 1,068 IP shocks. The Dst index gives information about the strength of the ring current around Earth caused by solar protons and electrons. We found that the Dst minimum for FF shocks is after the shock while for FR shocks it is before the shock. However, we have not observed any correlation between SF/SR shocks and the Dst index. We discuss possible links between IP shock parameters and geomagnetic storms.