1 The effect of heliospheric current sheet on the propagation of shock and its geoeffectiveness

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Using 180 flare associated interplanetary shock events observed by WIND/ACE during 1997-2005, we analyse the influence of heliospheric current sheet (HCS) upon the propagation of the shocks and its geomagnetic effects. Our preliminary results are: (1) Frequency numbers of the flare present a Gaussian distribution with the maximum near the HCS. (2) When the Earth and the flare are located in the same side of the HCS, the frequency numbers of shock events and geomagnetic disturbance events, f_{SS} and f_{SG}, are obviously higher than those in the opposite side, f_{OS} and f_{OG}, with f_{SS}/f_{OS}=122/58, f_{SG}/f_{OG}=86/33. (3) Parametric jumps across the shock wave surfaces are also higher in the same side than that in the opposite side, and the stronger shocks (speed jump V≧200km/s), are mainly observed in the same side, with f_{SS1}/f_{OS1}=25/11, where f_{SS1} and $f_{OS1}$are frequency numbers of stronger shocks in the same-side and opposite-side, respectively. (4) Level of the geomagnetic disturbances is higher in the same side than that in the opposite side, the ratio of frequency of intense magnetic storm (Dst≦-100) in the same side to that in the opposite side is 23/6. (5) We suggest two kinds of empiricial models used for predicting the arrival time of the shock events from the same and opposite side, respectively. These results show that the HCS is an important physical reference plane for the propagation of interplanetary shock and its geoeffectiveness.