



## **Observations of interplanetary shocks with multiple spacecraft**

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Interplanetary (IP) shocks in the heliosphere are often driven by Coronal Mass Ejections and Stream Interaction Regions. They are one of the main accelerators of suprathermal and energetic particles in the interplanetary space. The acceleration mechanisms of these collisionless shocks depend on their Mach numbers and also on the angle between the upstream interplanetary magnetic field and the local normal to the shock. It has been recognized in the past that the latter varies along the shock surface. Observations with multiple spacecraft have shown that the local shock normal is oriented differently at different points in space. However this has been done for spacecraft separations of at least several Earth radii. Here we present observations of IP shocks with multiple spacecraft and missions for much smaller inter-spacecraft separations. In the case of observations with Cluster mission, these separations can be as small as 40 km. Even on these scales we find that the observed shock profiles may be slightly different. We have elaborated a catalog of  $\sim 80$  shocks observed with two or more spacecraft in orbit around Earth. Here we present this catalog as well as some of the most interesting case events.