3D EVOLUTION OF A CORONAL SHOCK AND ITS LINK TO THE LONGITUDINAL DISTRIBUTION OF SEP PROPERTIES

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We follow the 3D evolution of a coronal shock from its birth in the AIA field of view (FOV) to its propagation in interplanetary space till Mars. The shock structure is identified using the center-median filtering method which is applied to EUV observations including SDO/AIA and Proba2/SWAP. Then 3D shock morphology is reconstructed with the updated and validated mask-fitting method from the triple-view observations at Earth, STEREO A and B in the FOV from EUV through coronagraph to heliospheric images. The mask-fitting method allows us to obtain a better shape of the 3D shock and calculate the anisotropy of shock evolution. The shock signals were later recorded in in-situ data by Messenger (0.39 AU), Venus Express (0.72 AU), WIND/ACE (1AU), STEREO B (1.03AU), Mars Science Laboratory (1.20AU), and Mars Express(1.52AU). These spacecraft were located at different distances and different longitudes relative to the Sun. Therefore, the corresponding in-situ data can provide further constraint on the shock dynamics along different directions on one hand, on the other hand reveal longitudinal distributions of SEPs in a wide angle of about 120 degrees. We also run MHD simulations based on the derived 3D shock morphology and dynamics. The magnetic field connectivity to aforementioned spacecraft and the obtained shock characteristics (e.g., shock geometry, speed, Alfvén Mach number, etc.) at cobpoint can help with the understanding of the SEP properties (e.g., energy spectra) measured at different longitudes.