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Interplanetary propagation behavior of the fast coronal mass ejection from 23 July 2012

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The fast coronal mass ejection (CME) from July 23, 2012 raised special attention due to its extremely short propagation time of less than 21hrs from Sun to 1 AU. In-situ data from STEREO-A revealed the arrival of a fast forward shock having a velocity of more than 2200 km/s followed by a magnetic structure with a speed of almost 1900 km/s. We present a study about the evolution of the CME in interplanetary (IP) space, separately for the shock and magnetic structure, using the drag based model to reproduce the short propagation time and high impact speed as derived from in-situ data.

We find that due to an efficient magnetic reconnection process in the long-duration flare associated to the CME, the event reached a very high speed. Furthermore, the ambient density must have been exceptionally low which reduced the drag force, such that the massive CME experienced almost no deceleration. The solar wind density is found to be rather low due to the weak solar activity and might have been additionally lowered by a previous CME event.