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Sharp boundaries of the solar wind small-scale structures and the conditions of their observations.

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The investigation of large and sharp solar wind ion flux changes is important because of their physical features and possible geoeffectivity. We selected and investigated the huge set (more than 20,000) of ion flux sharp increasing/decreasing observed by Interball-1 and WIND during 1995-2000 with flux changes of greater than 20% and faster than 10 min. Among them there are rather many cases with large ion flux changes during several seconds or tens of seconds that mean that the boundaries of solar wind small-scale structures may be as thin as several or several tens of proton gyroradii. It is necessary to emphasize that in the most of large and sharp ion flux changes the changes of solar wind velocity are small, so they are the pure ion density changes. Statistical distributions of solar wind parameters (density and velocity) using Wind-SWE data during the whole period of Interball-1 stay in solar wind were compared with the same parameters distributions during the intervals when the sharp and large solar wind ion flux changes were observed by Interball-1. It was found out that sharp changes of the ion flux occur mainly in the slow and middle-speed solar wind under the high level of solar wind density. These results allow us to conclude that sharp changes of ion flux are associated with compressed regions, propagated with the velocity of ambient solar wind, mainly not concerned with CMEs (no more than in 0.2% of cases) or CIRs (no more than in 2% of cases). The possible origins of such phenomenon are discussed.