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Solar origins of Interplanetary Coronal Mass Ejections in Cycle 24

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Interplanetary coronal mass ejections (ICMEs) are the most geoeffective solar wind flows associated with spontaneous solar activity. Investigation of relationship between parameters of ICMEs and properties of their solar origins, such as coronal mass ejections (CMEs) and solar flares, is important for modeling of ICMEs and prediction their geoefficiency. Commonly, identification of solar origins of ICMEs is based on kinematic properties of transients, but due to evolution of these parameters in the heliosphere, the result sometimes is ambiguous. To establish a link between parameters of ICMEs and their solar origins for further modeling, it is promising to explore the measured in-situ ion composition of ICMEs and ionization state of the erupting plasma in solar corona. In the report, we present the ICME list for 24th solar cycle supplemented with the ion composition data and parameters of the identified solar sources. To select the solar sources (CMEs and flares) of the ICMEs we used a combination of the data from the coronagraphs at the STEREO-A, -B, LASCO and GOES data. Analysis of statistics of ICME and the solar activity events in Cycle 24 has shown that the total number of ICMEs during Cycle 24 is 25% less than in Cycle 23. However, the total number of CMEs is 80% higher, but the number of X-ray flares is 15% lower in Cycle 24 than in Cycle 23. Correlations of the ICMEs year frequencies with that of CMEs and flares in Cycle 24 decreased. For Cycle 24 the peak (for each ICME) values of the temperature-dependent ion charge ratios and iron charge in ICMEs varied in wider ranges than in the similar period of Cycle 23 due to extremely weak solar minimum between Cycles 23 and 24. We discuss relations between parameters of the ICMEs and their identified solar sources. This investigation should help to select optimal parameters of solar sources for the ICME prediction models.