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Impact of solar coronal mass ejections (CME) on formation of Earth climate and weather pattern

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Abstract— Earth Observation System (EOS) program is designed to examine the role of Earth-Sun connection in wide-scale global processes in order to determine the function of the Earth as a single system. One of global climate change reason is caused due to emissions of greenhouse gases like carbon dioxide into the atmosphere. The real drivers of climate are the Sun's insulation (light and heat), its magnetic flux, and the relative position and orientation of the Earth to the Sun.

The variations in the Sun's magnetic flux control the amount of cosmic rays enter the atmosphere. Cosmic rays produce ionizations and the ions form nuclei for cloud formation. Cloud cover has a great effect on global temperature, but this area is still poorly understood and not addressed in climate models. Meteorological effects resulting from fluctuations in the solar wind are presently poorly represented in weather and climate models. Geomagnetic storm is a major disturbance of Earth's magnetosphere that occurs when there is a very efficient exchange of energy from the solar wind into the space environment surrounding Earth. These storms result from variations in the solar wind that produces major changes in the currents, plasmas, and fields in Earth's magnetosphere. The largest storms that result from these conditions are associated with solar coronal mass ejections (CME) where a billion tons of plasma from the sun, with its embedded magnetic field, arrives at Earth. CME typically take several days to arrive at Earth,

Geomagnetic indices are important parameter in weather forecasting methods. The development of the global circulation processes are depending on their capacity in, and then the emergence of the local weather. Applying Earth's magnetosphere model is conducted the continuous observation on the magnetic field and the expected geomagnetic storms have to be predicted what is important in weather formation on the earth

The correlation between geomagnetic storms and meteorological elements (temperature, precipitation, wind) have been determined for Georgian region using meteorological observation and NASA's Solar Dynamics Observatory and NOAA Space Weather Prediction Center data. The results show that there exist dependence between weather parameters and income radiation. New approaches have been suggested to explain observation results.

Key words: Coronal mass ejection, Earth magnetic field, Geomagnetic storm, geomagnetic indices.