

Space Weather: Geomagnetic Quiet, HILDCAAs, Magnetic Storms and Extreme Storms

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Various aspects of space weather will be discussed. The types of space weather naturally divide themselves into those that occur during solar maximum and those that occur during solar minimum. During solar maximum, Coronal Mass Ejections (CMEs) and their interplanetary counterparts (ICMEs) dominate geomagnetic activity at Earth. The various phases of magnetic storms (initial, main and recovery) will be explained in terms of a simple picture of an ICME interaction with the magnetosphere. It will also be shown that ICME shocks can cause major changes to the dayside equatorial ionosphere. During solar minimum, coronal holes dominate solar activity. High speed corotating streams emanating from coronal holes cause recurring magnetic storms. Following these storms, High Intensity Long Duration Continuous AE Activity (HILDCAAs) can last for days to weeks. HILDCAAs will be shown to be caused by interplanetary Alfvén waves. Finally, the largest magnetic storm on record (September 1-2, 1859) will be discussed. During this storm, auroras were sighted from Hawaii and Santiago, Chile (23° magnetic latitude). We will discuss the possibility/probability of such an event happening again and what some of the consequences may be.