Global muon detector network observing geomagnetoc storm's precursor since march 2001

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We use complementary observations from the prototype Global Muon Detector Network (GMDN) and the Advanced Composition Explorer satellite to identify precursors of geomagnetic storm events. The GMDN was completed in March 2006 with the installation of the Kuwait detector, in addition to detectors at Nagoya, Hobart and São Martinho da Serra. In this work, we ana-a lyze geomagnetic storms sorted by their intensity as measured by the Disturbance storm-time (Dst) index. Between March 2001 and December 2007, 89 Moderate Storms (MS), 38 Intense Storms (IS) and 7 Super Storms (SS) were monitored by the muon detector network. We find that the percentage of the events accompanied by the precursors prior to the Sudden Storm Commencement (SSC) increases with increasing peak Dst. We also find that 15% of MSs, 30% of ISs and 86% of SSs are accompanied by cosmic ray precursors observed on average 7.2 hours in advance of the SSC. We discuss the interplanetary structure responsible for these storms and examine the possibility of forecasting them using cosmic ray precursors.