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On the effectiveness of relativistic electron Acceleration at geosynchronous orbit during high-intensity, long-duration, continuous AE activity (HILDCAA) during 2015 - 2017

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This study investigates the enhancements of relativistic electron flux (MeV) in the outer radiation belt that can cause anomalies of geosynchronous satellite systems. The enhancements occurred during High Intensity, Long Duration, Continuous AE Activity (HILDCAA) of 12 events during 2015 - 2017. The relativistic electron (0.8 - 2.0 MeV) flux measured by GOES-13 satellite and low-energy electron (40-130 keV) flux measured by POES satellite are examined. Results reveal that, in the long recovery phase, the relativistic electron flux increases, while the low-energy electron flux decreases. Typically, the enhancements of E > 0.8 and > 2.0 MeV electrons occurred promptly and ~1.0 day after the HILDCAA onset, respectively. Case studies show that the peak flux of > 2.0 MeV occurred about 2 days after the onset of short-period HILDCAA, while it occurred 4 days after the onset of long-period HILDCAA. The HILDCAA events with high amplitude and long-lasting Alfven waves with low solar wind dynamic pressure are associated with the long-lasting of sporadic injection of low energy electrons into the nighttime magnetosphere during the period of prolonged substorm (AE) activity.

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