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Solar cycle dependence of magnetospheric currents

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Satellite measurements from high-resolution magnetic field mapping missions over almost a complete solar cycle have been used to investigate the variability of major magnetospheric currents. As judged from near-Earth magnetic field observations, the tail current exhibits no long-term trend. Activity dependent enhancements decay within hours. A suitable index to parameterize the temporal variation is the merging electric field, delayed by 60 minutes with respect to its value at the bow shock. Conversely, the ring current strength shows pronounced solar cycle dependences. We show for the first time that a solar cycle dependent bias has to be added to Dst. It ranges from about -15 nT at solar maximum to zero at solar minimum. The scaled solar flux index, F10.7, delayed by 20 months, is found to be a suitable quantity for describing the quiet-time ring current strength. A spherical harmonic model is presented reflecting all magnetospheric field contributions.