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Forecast of Relativistic Electron Flux at Geosynchronous Orbit With and Without Solar Wind Input

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To a large extent, the solar wind controls magnetospheric dynamics. Therefore measurements of the solar wind upstream of the Earth can be used to forecast the characteristic variations of the magnetosphere. We have developed models to forecast the variations of radiation belt electron fluxes and the Dst index based on available solar wind measurements. We have also developed a model to forecast the MeV electrons at geosynchronous orbit without solar wind input. The model is based on the strong correlation between the behavior of low-energy (tens to hundreds of keV) and high-energy (>1 MeV) electron fluxes measured at geosynchronous orbit. The time delay between similar features in low- and high-energy electron fluxes makes it possible to forecast the high-energy electron flux days in advance, based on the current and previous days' fluxes of low- and high-energy electrons. Parameters in the model are set by optimizing prediction efficiency (PE) for the years 1995-1996, and the optimized PE for these 2 years is 0.81. The model is run for more than one full solar cycle (1995-2006). Model results are comparable to our previous model results where solar wind input is needed. When the two models are combined, the resulting model performs better overall than each does individually.