Magnetospheric ULF Activity as a Function of Solar Wind Conditions: Implications for Particle Energization in the Radiation Belts

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Magnetospheric ULF waves, with frequencies in the mHz range, are known to efficiently energize and transport relativistic electrons in the radiation belts through resonant interactions leading to enhanced rates of radial diffusion. However, the global occurrence and physical characteristics of the waves driving the transport, and the resulting rates of radial diffusion, are not well-characterized in terms of the solar wind conditions responsible for the ULF activity. In this effort we use global MHD simulations of the magnetosphere driven by idealized sets of solar wind conditions and analyze the resulting ULF wave distributions as a function of radial position and global mode structure within the magnetosphere. We examine the effects of both constant solar wind velocity, which will drive shear waves along the flanks of the magnetopause, as well as the effects of solar wind pressure variations using solar wind drivers based on statistical characterizations of the solar wind pressure as a function of solar wind velocity. The characteristics of the resulting ULF wave distribution are discussed in the context of effectiveness in heating and transporting trapped radiation belt electrons.