



## **Modeling MLT-dependent wave-particle interactions with the VERB-4D code**

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In this work, we use the four-dimensional Versatile Electron Radiation Belt (VERB-4D) code to study magnetic local time (MLT) dependent effects of wave-particle interactions on the dynamics of the Van Allen radiation belts. The code solves modified Fokker-Planck equation with additional advection terms. Such an approach allows modeling electron drift around the Earth that redistributes particles in MLT and radial distance, while implementing MLT-dependent wave models driving electron acceleration and loss in the Earth's radiation belts. We incorporate different models of hiss, upper and lower band chorus, and EMIC waves in order to understand the variability associated with MLT-averaged models usually used by three-dimensional codes in radiation belt modeling. We also show how MLT-dependent models can improve simulation results by comparing the results with satellite data (Van Allen Probes, POES, etc.).