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Title: Operational Advances in Ring Current Modeling Using RAM-SCB

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Operational Advances in Ring Current Modeling Using RAM-SCB

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The Ring current Atmosphere interaction Model with Self-Consistently calculated 3D Magnetic field (RAM-SCB) combines a kinetic model of the ring current with a force-balanced model of the magnetospheric magnetic field to create an inner magnetospheric model that is magnetically self consistent. RAM-SCB produces a wealth of outputs that are valuable to space weather applications. For example, the anisotropic particle distribution of the KeV-energy population calculated by the code is key for predicting surface charging on spacecraft. Furthermore, radiation belt codes stand to benefit substantially from RAM-SCB calculated magnetic field values and plasma wave growth rates – both important for determining the evolution of relativistic electron populations.

RAM-SCB is undergoing development to bring these benefits to the space weather community. Data-model validation efforts are underway to assess the performance of the system. “Virtual Satellite” capability has been added to yield satellite-specific particle distribution and magnetic field output. The code’s outer boundary is being expanded to 10 Earth Radii to encompass previously neglected geosynchronous orbits and allow the code to be driven completely by either empirical or first-principles based inputs. These advances are culminating towards a new, real-time version of the code, rtRAM-SCB, that can monitor the inner magnetosphere conditions on both a global and spacecraft-specific level. This paper summarizes these new features as well as the benefits they provide the space weather community.