



Adaptive-physics simulations of the Halloween storms with the Space Weather Modeling Framework (SWMF)

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The Space Weather Modeling Framework (SWMF) provides a flexible framework for space physics applications. The SWMF uses "adaptive physics," by coupling a number of modules, each of which is based on physics and numerics that are optimized for the relevant portion of the global calculation. In the simulations presented here, the modules that are coupled are those for the Solar Corona (including an Eruptive Event Generator), the Inner Heliosphere, Solar Energetic Particles, the Global Magnetosphere, the Inner Magnetosphere, the Radiation Belt, Ionosphere Electrodynamics and the Upper Atmosphere. These are coupled so as to provide a global simulation method that represents the physics of the various regions as optimally as possible, providing high-performance runs on parallel machines. All the modules can be replaced with alternatives, and it is possible to use only a subset of the components. In the simulations presented here, all the modules mentioned above are coupled, to give as full as presently possible a representation of the physical processes.

The SWMF enables us to do simulations that were not possible with the individual components. We highlight some numerical simulations obtained with the SWMF. In particular we present simulations of the Halloween Storms and compare the results with observations.