

Abstract Submitted  
for the DPP10 Meeting of  
The American Physical Society

**Global Hybrid and Fully Kinetic Simulations of the Magnetosphere** H. KARIMABADI, H.X. VU, B. LORING, Y.A. OMELCHENKO, SciberQuest/UCSD, M. TATINENI, A. MAJUMDAR, SDSC, V. ROYTER-SHTEYN, W. DAUGHTON, LANL — Currently global magnetospheric simulations are predominantly based on MHD. MHD simulations have proven useful in studies of the global dynamics of the magnetosphere with the goal of predicting eminent features of substorms and other global events. But it is well known that the magnetosphere is dominated by ion and electron kinetic effects, which are ignored in MHD simulations, and many key aspects of the magnetosphere relating to transport and structure of boundaries await global kinetic simulations. Taking full advantage of petascale computing and a number of innovations, we have been able to conduct 3D global hybrid (electron fluid, kinetic ions) and 2D global full PIC simulations. Our full PIC simulations are used to develop a better understanding of reconnection under realistic conditions in the magnetosphere and to develop better models of resistivity to be used in the global hybrid simulations. Here we show several specific science issues that we have been able to address for the first time. This includes formation of flux transfer events at the dayside magnetopause and associated flows, plasma depletion layer, and flux ropes in the magnetotail.

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Date submitted: 16 Jul 2010

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