Space Weather, global simulations of solar wind interaction with the Earth's magnetosphere

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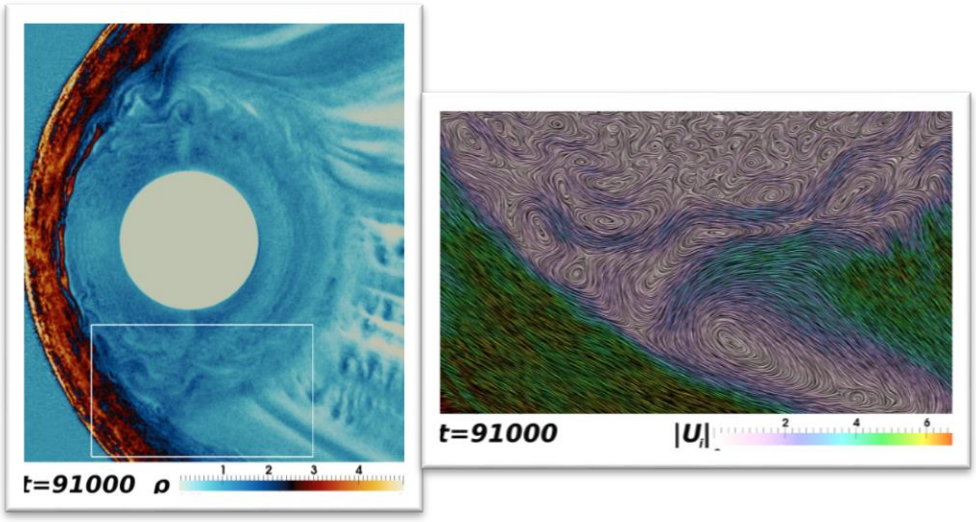
Objectives

- **Enable *in situ* visualization for global hybrid (electron fluid, kinetic ions) simulations used to study the interaction of the solar wind with planetary magnetospheres such as the Earth and Mercury**
- **Directly embed ParaView Catalyst in a tightly coupled manner with UH3D code to perform scalable in-situ analysis at run time**

Impact (Already made and/or Expected)

- **Reduce I/O bottleneck by drastically decreasing storage demands**
- **Lessen time-to-insight in longer running, more complex global hybrid simulations**
- **Eliminate the need to migrate data to a visualization cluster**
- **Exclude the I/O bottleneck in traditional post-processing visualization software**
- **Do away with the need to adapt the output format from global hybrid simulations to input readable for traditional post-processing visualization software**



Line integral convolution (LIC) visualization of magnetic field.

Progress (and/or Accomplishments)

- **Delivered UH3D/ParaView Catalyst integration with:**
  - **Low impact on simulation code**
  - **Adaptable to different simulations and visualization scenarios**
  - **Low impact on simulation run time**
  - **Good resource utilization**

Publication

H. Karimabadi, P. O'Leary, B. Loring, A. Majumdar, M. Tatineni, and B. Geveci, "In-situ visualization for global hybrid simulations," In Proceedings of the Conference on Extreme Science and Engineering Discovery Environment: Gateway to Discovery (XSEDE '13). ACM, New York, NY, USA, Article 57, 8 pages, 2013