

A CASE STUDY: CUSTOMIZING THE STK INTERFACE FOR ENHANCED PRODUCTIVITY

NASA JPL PLUGIN PROVIDES INTERFACE TO JUPITER ENVIRONMENTAL MODELS

Solution | Space

Challenge:

Needed geometric analysis and visualization of Jupiter magnetic field models for the Europa Jupiter System Mission.

Solution:

NASA JPL built a custom user interface plugin to STK – the Jupiter Environment Tool (JET).

Results:

Users can visualize the different magnetic field models of Jupiter through various rendering methods, which are fully integrated within STK's 3D Window. The plugin serves as a proof-of-concept for further environment model integration.

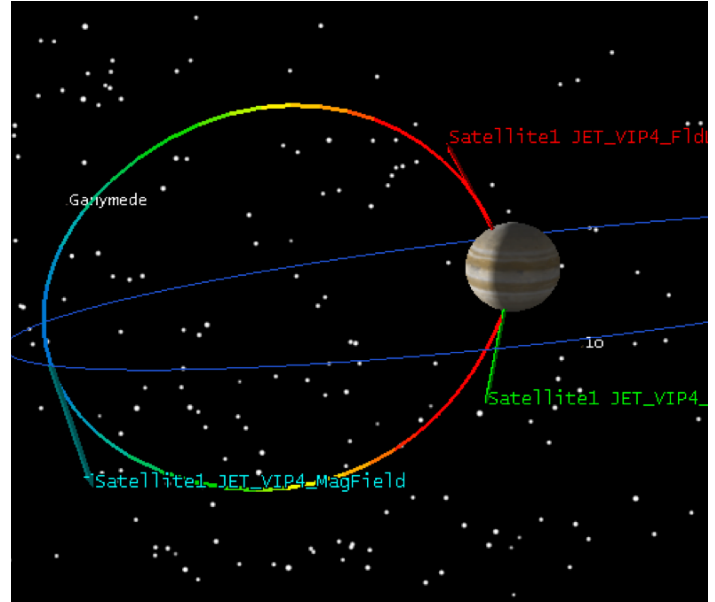
The Europa Jupiter System Mission (EJSM) is a joint international mission between NASA and ESA which consists of two primary flight elements that will explore the Jupiter (Jovian) system to find out how gas giants and their planets form and evolve. When the EJSM team determined a need for geometric analysis and visualization of different magnetic field models of Jupiter, NASA Jet Propulsion Laboratory (JPL) engineer Erick Sturm, who was already performing STK work for the mission, gathered a team for in-house development of an STK user interface plugin. The result: the Jupiter Environment Tool, or JET. JET users can visualize the different magnetic field models of Jupiter through various rendering methods, which are fully integrated within STK's 3D Window.

Specifically, the EJSM team needed geometric analysis and visualization with respect to:

- Magnetosphere
- Rings/dust/small bodies
- Radiation field
- Satellite atmospheres
- Plasma and neutral tori

They also needed fast-turnaround Jovian tour radiation dose estimation. JPL in-house development commenced in July 2010 with the primary goal of integrating Jovian magnetic field models into STK as a proof-of-concept for further environment model integration.

"I knew that with STK 9, we could easily develop custom user interface plugins through an API," said Sturm. STK allowed the team to take advantage of the software's accurate rendering of celestial bodies, as well as its' object management and graphics primitives,



all within a standard toolset that is easily integrated with other products. As a result, STK brought JET additional capabilities including:

- Area and line target generation from footprint oval primitives
- Addition of three custom vectors in STK's Vector Geometry Tool
 - Magnetic field vector
 - Field-line/central-body intersection vectors (North & South)
- Custom report and graph templates

JPL developers began by integrating three magnetic field models into the plugin: a simple dipole model, VIP4 model (original FORTRAN code) and a VIP4 model (translated into C#). They then created an integrated user interface window, toolbar and context menu. The plugin provides four visualization types accessible through STK's 3D Window:

- Field lines
- Plane contours
- Flux-tube footprint ovals
- Spherical-sector contours

JET can show various visualizations at one time, and comes with numerous customization options to make the interface exactly how you need it. "Beyond just Jupiter, we've shown that the plugin can be extended to other planets and satellites. Basically any central body that is within STK, if you have a magnetic field model for it, the plugin can be adapted to render that magnetic field," Sturm said. For additional information on JET, write to stk.jet@jpl.nasa.gov.



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