The Spacecraft Simulator

David S. Davis, GSSC

The Mostly Harmless Simulator

Simulation of GLAST attitude and orbit dynamics

Tailored version of "42: The Mostly Harmless Simulation"

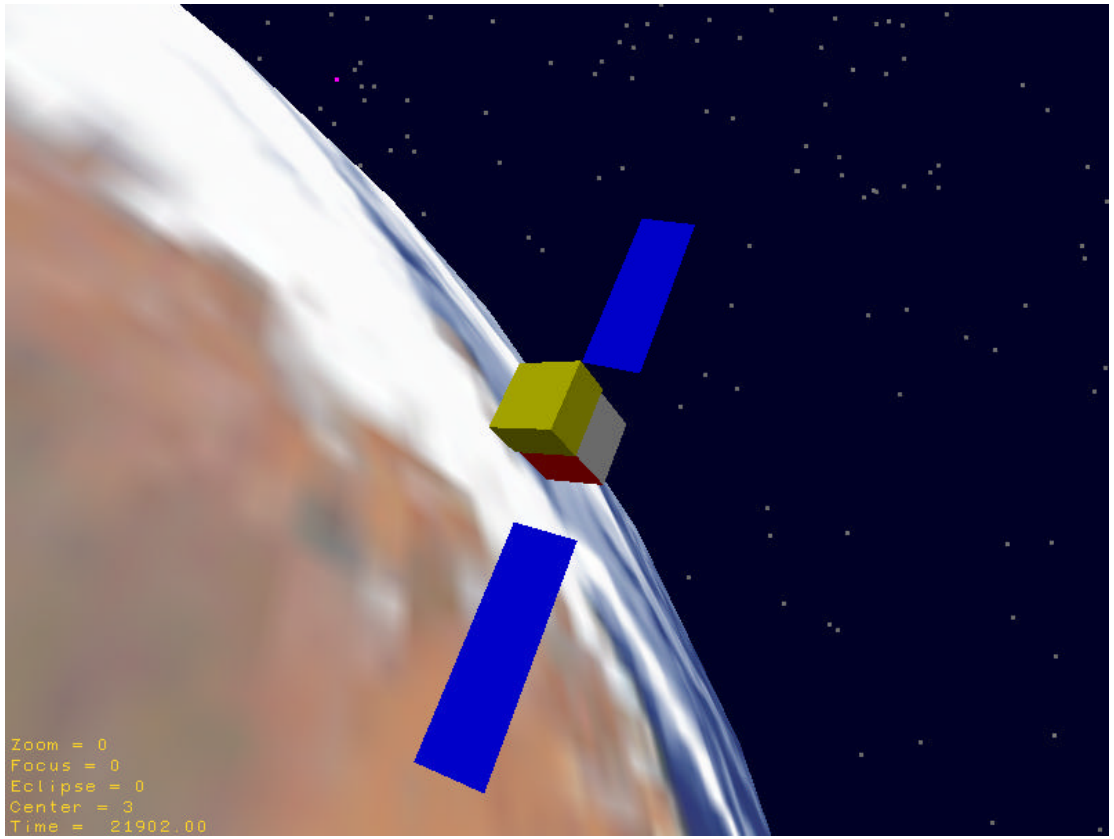
- *Environmental models*
  - *Earth Magnetic Field Model*
  - *Earth Atmospheric Density Model*
  - *Non-spherical geoid, third body (e.g. Sun, Moon) Gravity*
- *Attitude Control Torques*
- *Visualization using OpenGL graphical libraries*

Written by Eric Stoneking, beginning August 6, 2001

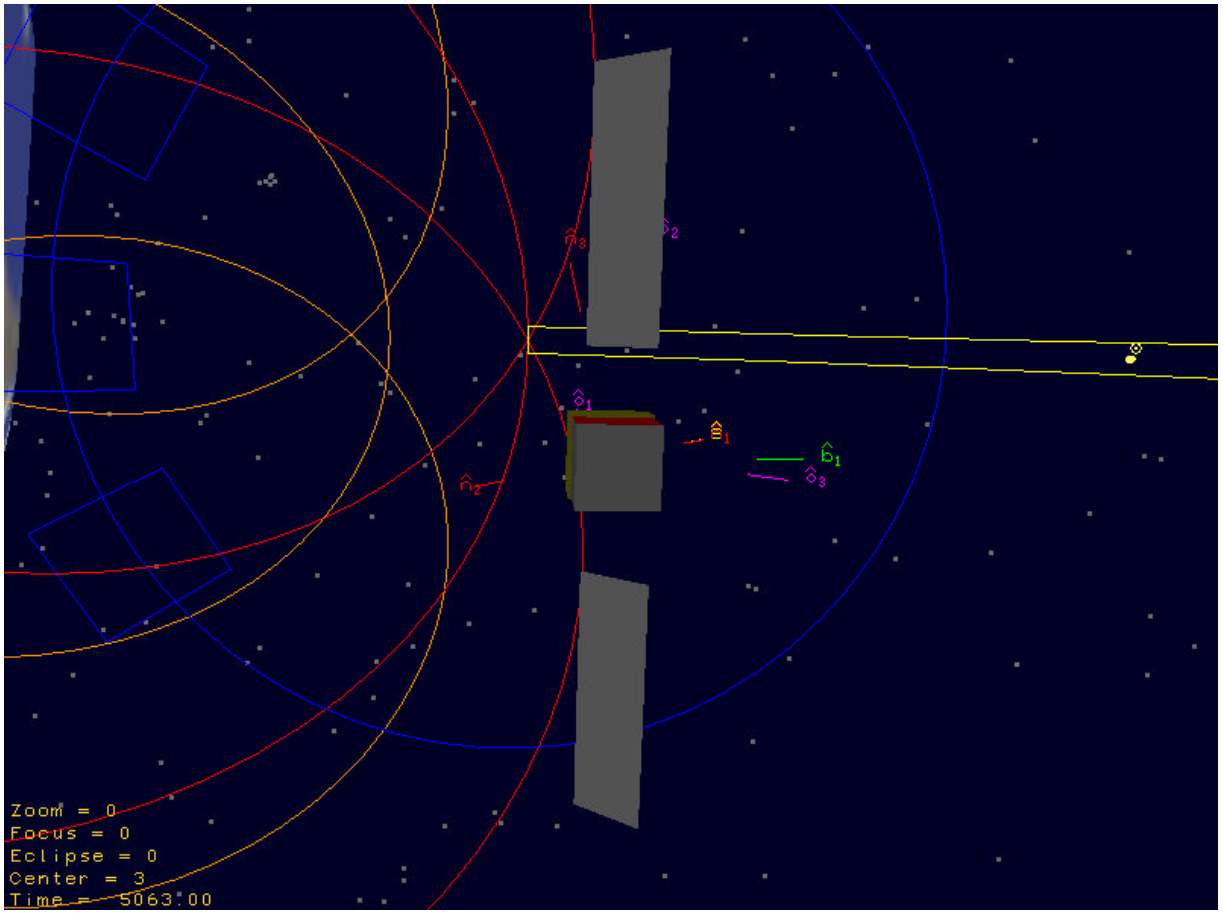
GNC Software Disclaimer

- Attitude Control in "GLAST 42" *approximately* models GLAST Guidance Navigation & Control (GNC) flight software
- Performance requirements, Sun avoidance, Earth avoidance, solar [illegible] software will be expected to meet performance

GLAST 42 Visualization



Visualizing Fields of View, Keep-Out Zones



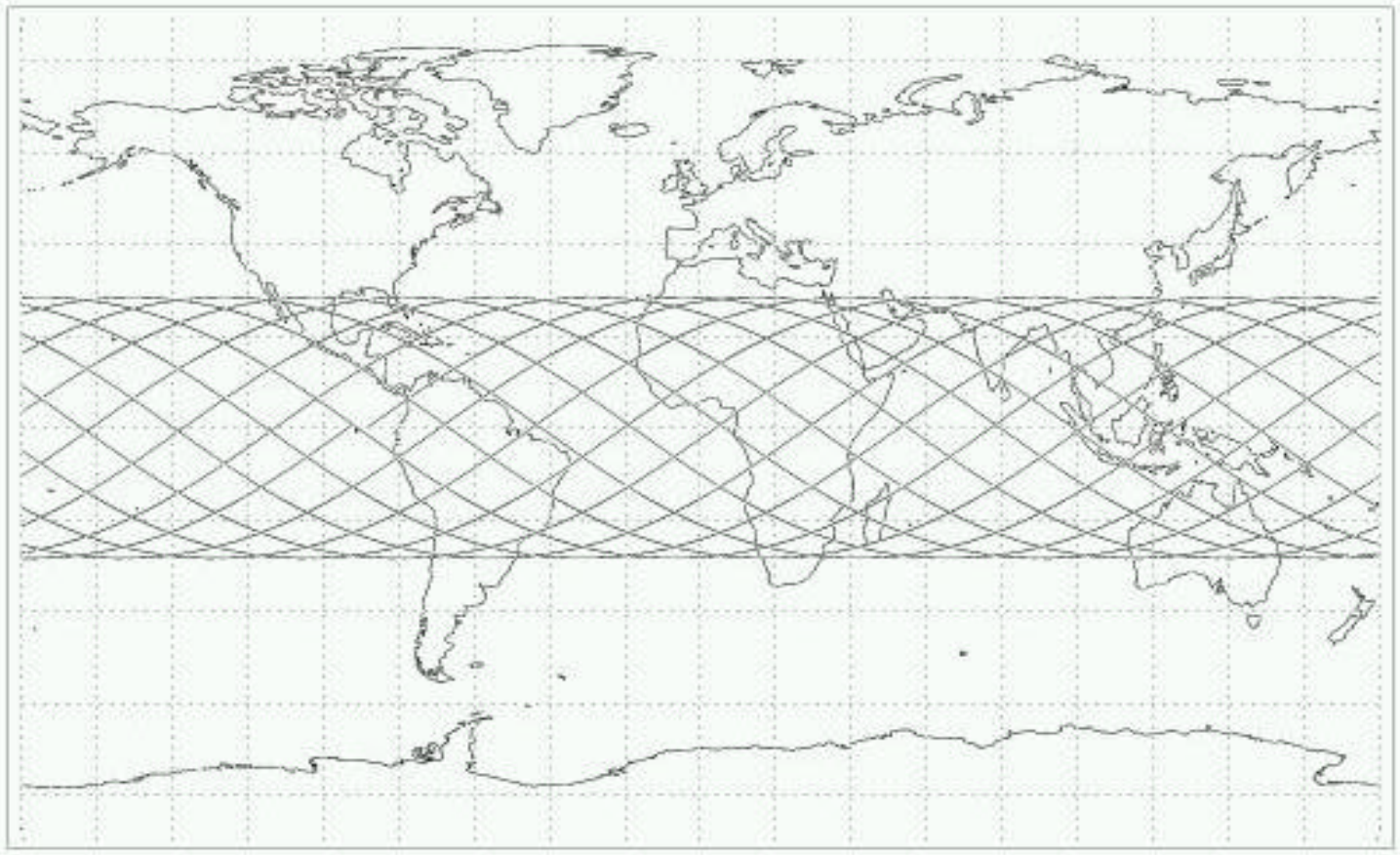
Spacecraft Commands

- *Master Input File defines sim parameters, environment*
- *Spacecraft File defines spacecraft parameters, initial*
- *Used for disturbance force/torque calculation and visualization*

Simulator Outputs

- ***Desired quantities written to files at specified intervals***
  - Position, attitude (RA, Dec)
  - [illegible] satellite point
  - [illegible] actuators
  - [illegible] momenta
  - [illegible] dipole commands
  - Easily customizable

Simulator Outputs



Spacecraft Simulator Uses at the GSSC

- Exploring Observing Strategies
  - Pointed mode
  - Slewing mode
  - Scanning mode
  - Auto re-pointing
- Data Analysis

Conclusions

- Simulator provides a flexible method of determining S/C pointing parameters
- Can provide tables of position and pointing data
- Can take a long time to run