Use of the NetBeans Platform for NASA Robotic Conjunction Assessment Risk Analysis

Nick Sabey

a.i. solutions, Inc.

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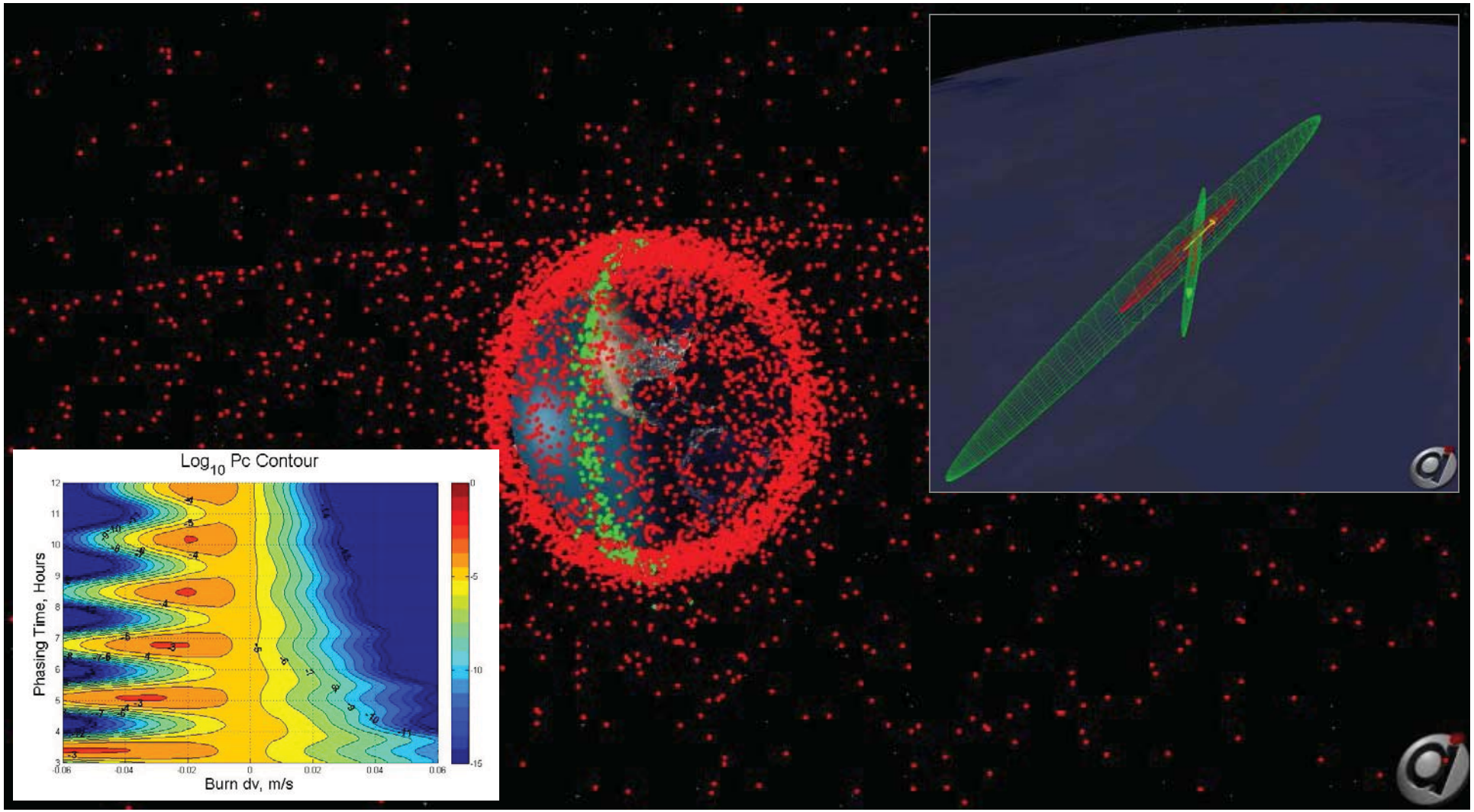
Note: These slides will be moved into the JavaOne template prior to presentation

NASA Robotic Conjunction Assessment Risk Analysis (CARA)

- CARA is the process and team for:
  - Determining the ***risk of collision*** between two orbiting objects
  - Assisting with ***risk mitigation*** (typically, via an orbital maneuver)
- The NASA Robotic CARA group at NASA GSFC provides this support to ***all operational*** NASA robotic (unmanned) missions
  - Started in January 2005
  - Over ***65 missions*** in total
  - Over 1,000 close approach messages received per day
  - Maneuver recommendations result in as many as 30 realized maneuvers each year

NASA Robotic Conjunction Assessment Risk Analysis (CARA)



NASA Robotic Conjunction Assessment Risk Analysis (CARA)

- The Joint Space Operations Center (JSpOC) is a USAF operational unit that is responsible for maintaining the locations of all objects in space
  - For NASA, the JSpOC ***identifies close approaches*** between those objects and ***provides data*** to CARA to enable the collision risk assessment
  - The JSpOC operates in a ***secure environment***
    - *i.e. only accredited or in-house software; accreditation can take more than 6 months*
- CARA has an analyst/developer resident at the JSpOC to access data which cannot be sent to NASA
  - Able to ***develop NASA-specific products and services***
    - i.e. development of space weather risk trade space, orbit quality data product
  - ***Symbiotic relationship*** between NASA and USAF/JSpOC
    - i.e. developed automation and improvements to legacy software components

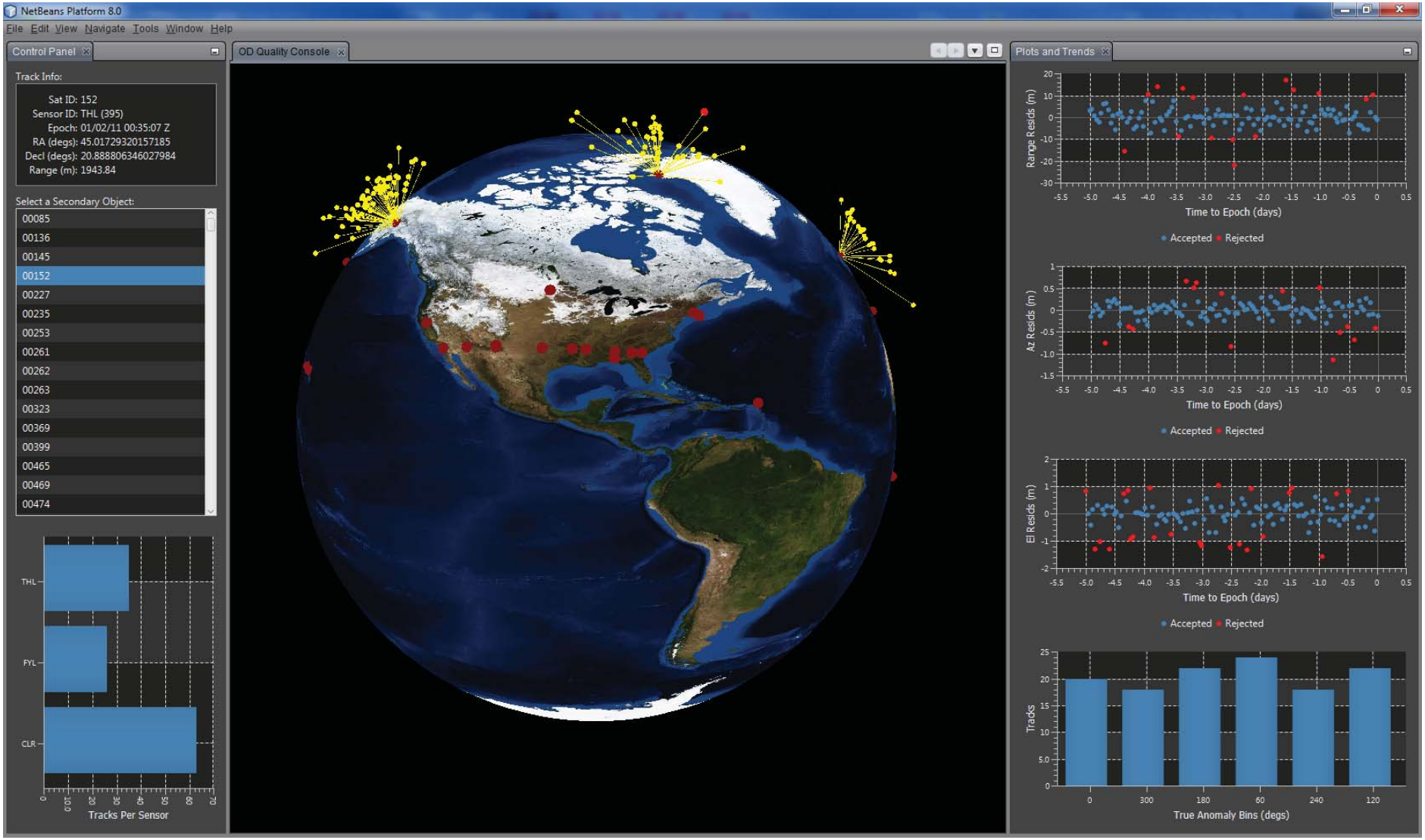
NetBeans for CARA JSpOC Support

- JSpOC development & support provided by a single developer
  - Scope of project would not have been possible without the use of a Rich Client Platform (RCP)
  - NetBeans was intuitive, and provided excellent support
- Initially developed using NetBeans 7.3.1
  - Provided significant UI features with little to no code
  - Scalability from plugin architecture
  - Platform API reduced coding time substantially
    - Nodes, Module, Lookup, and FileSystems APIs used extensively
  - Reused existing platform modules developed for other a.i. solutions projects
  - Interfacing with legacy and supporting software very easy

Upgrading to Java 8 / JavaFX 8

- No software changes required to update to JDK8
  - i.e. nothing broke
- We are adding some of the new JDK 8 features to our application as part of the upgrade:
  - Stream API and Lambdas
    - Reduction in code / simplified syntax
    - Simplifies our use of collections
    - In the process of adding substantially more parallelism
  - JavaFX 8
    - No prior access to JavaFX on our system
    - JavaFX has been approved along with JDK 8
    - Experimenting with both 3D and 2D visualizations

JFX 8 OD Quality Visualization Demo*



*Note: This will be an interactive demo, with all data being simulated