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International Earth Science Constellation Mission Operations Working Group June 12 – 14, 2018

Constellation Coordination System (CCS) Status

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Agenda

- CCS Purpose and Goals
- CCS 2018.1
- CCS 2018.1 Demo
- CCS for Coordinated Science
- CCS Future
 - Release 2018.2
- Feedback
 - Feedback and Discussion

CCS Purpose and Goals

- System for coordinating and monitoring Constellation safety of the Earth Sciences Constellation (ESC) missions and is a central source of data sharing and operational planning.
 - Primary tool for monitoring the Constellation configurations
 - Enables information exchange among/between domestic and international partner ESC missions, including access to nominal predicted mission ephemerides.
 - Transfer critical product data between the Mission Operation Centers (MOCs), Conjunction Assessment Risk Analysis (CARA), and other authorized mission users.
 - Mission Analysis tools and automated health and safety monitoring.
 - Automated constellation safety warning notifications.
 - Graphical visualization of orbital data.
- The latest release, CCS 2018.1, was deployed to operations on April 11, 2018.

CCS 2018.1

Released: 11-April-2018

- Addition of an ephemeris comparison utility for comparing ephemeris files and reporting of over 15 user selected, comparison parameters including beta angle, argument of perigee, and ground track error rate.
- Automated ephemeris selection for pre-defined, mission-specific definitive and predicted product rules, based on the user selected mission and analysis span.
- Added default predictive and definitive rule selectors to the mission definitions.
- VCMs to CCSDS OEM ephemerides are now 10 weeks long.
- Provided the RIC components at the TCA to the header.
- Modified the custom mission entry field in tools to provide instant feedback of invalid entries to the user.
- When a user is locked out after three unsuccessful login attempts they will now receive a notification email.
- CCSDS OEM ephemerides correctly span a leap second.

Coordinated Science

Below is a current list of CCS tools. Some of these tools will be demoed to demonstrate how they may be used for coordinated science.

- **Ad Hoc Analysis**
 - Text report of a variety of orbit parameters
- **Argument of Latitude**
 - Visualize the latitude of one or more missions at a specific epoch
- **Close Approach Analysis Tool**
 - Close approach situation is encountered across any pair of missions
- **Control Box and Phasing Analysis**
 - Visualize a mission relative to its mission-defined Control Box over a specific time period
- **Mean Local Time at the Nodes**
 - Visualize the mean local time of the Ascending and/or Descending Node for a mission
- **Phase Margin Analysis**
 - Time separation between two spacecraft at their orbit intersections based on their descending node crossing times
- **Phasing at the Poles**
 - Analyze the phasing and radial separation between two missions at their orbit intersections

Coordinated Science

- Satellite Situational Awareness
 - Visualize the orbits of one or more missions
- Single Orbit Altitude Versus Latitude
 - Analyze the altitude versus latitude relationship between any two spacecraft over a single orbit

CCS 2018.2

CCS 2018.2 is currently in development, and is scheduled for deployment in mid August 2018.

- Add plot images to the Control Box violation and Close Approach email notifications
- Update Control Box analysis to include
 - Add header information to display the number of maneuvers contained in an ephemeris file
 - Account for trend arc discontinuities when determining violations
 - Implement “once around” violation detection to better predict when a spacecraft will re-enter from the other side
- Modify tools to run asynchronously to allow the user the ability to start an analysis and return to it later without having to wait on the page.
- General updates and fixes to improve user experience

Feedback

- What ideas or suggestions do you have?
- What are the capabilities you find most useful currently?
- What would make CCS more useful to you?
- Would additional training and/or outreach be beneficial to you?

Feedback

- Thank you for your continued support!
- For all CCS communications please contact:

ccs-support@lists.hq.nasa.gov