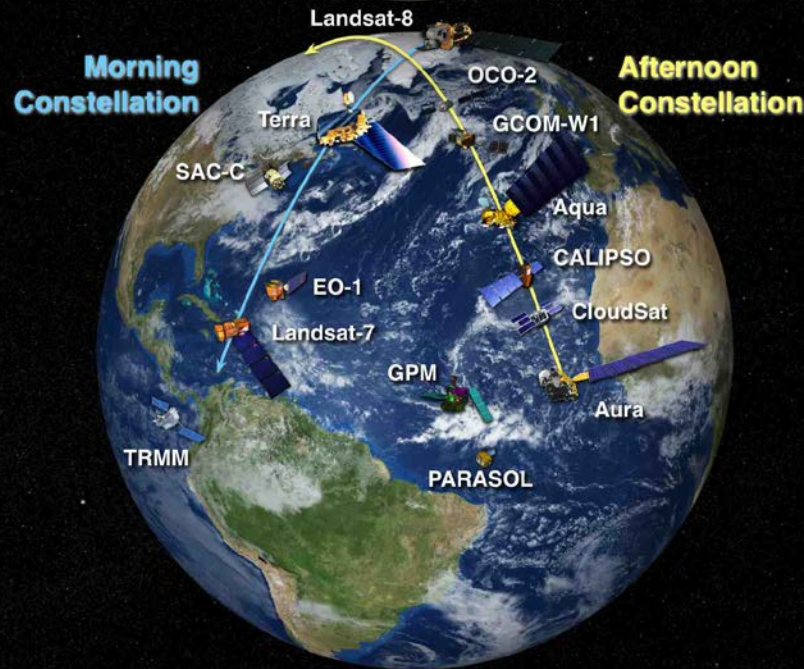




International Earth Science Constellation Mission Operations Working Group June 12 – 14, 2018

Constellation Visualization Tool and Constellation Coordination System Status

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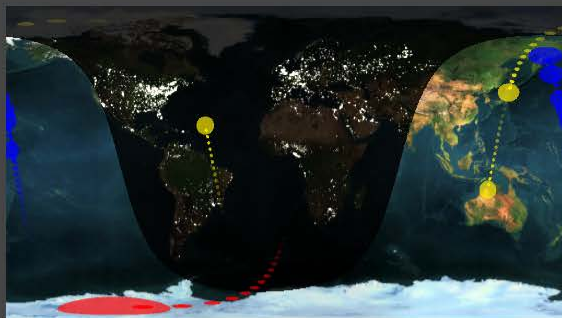
Agenda

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

Constellation Visualization Tool

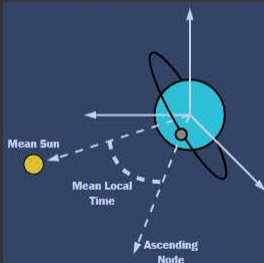
- The Constellation Visualization Tool (CVT) has completed the authorization process and is now available to request from the NASA software catalog!
 - <https://software.nasa.gov/software/GSC-17917-1>
- Available to US persons and foreign national partners.
- Supports remote, local, and demo modes.
- To display morning constellation, afternoon constellation, and partner satellites, contact the Constellation Coordination System (CCS) support team to be provided with directory details.
 - To display a subset, CCS subscriptions to a non-CCS secure file transfer protocol (SFTP) server will be required.

Constellation Visualization Tool



Mean Local Time (MLT)

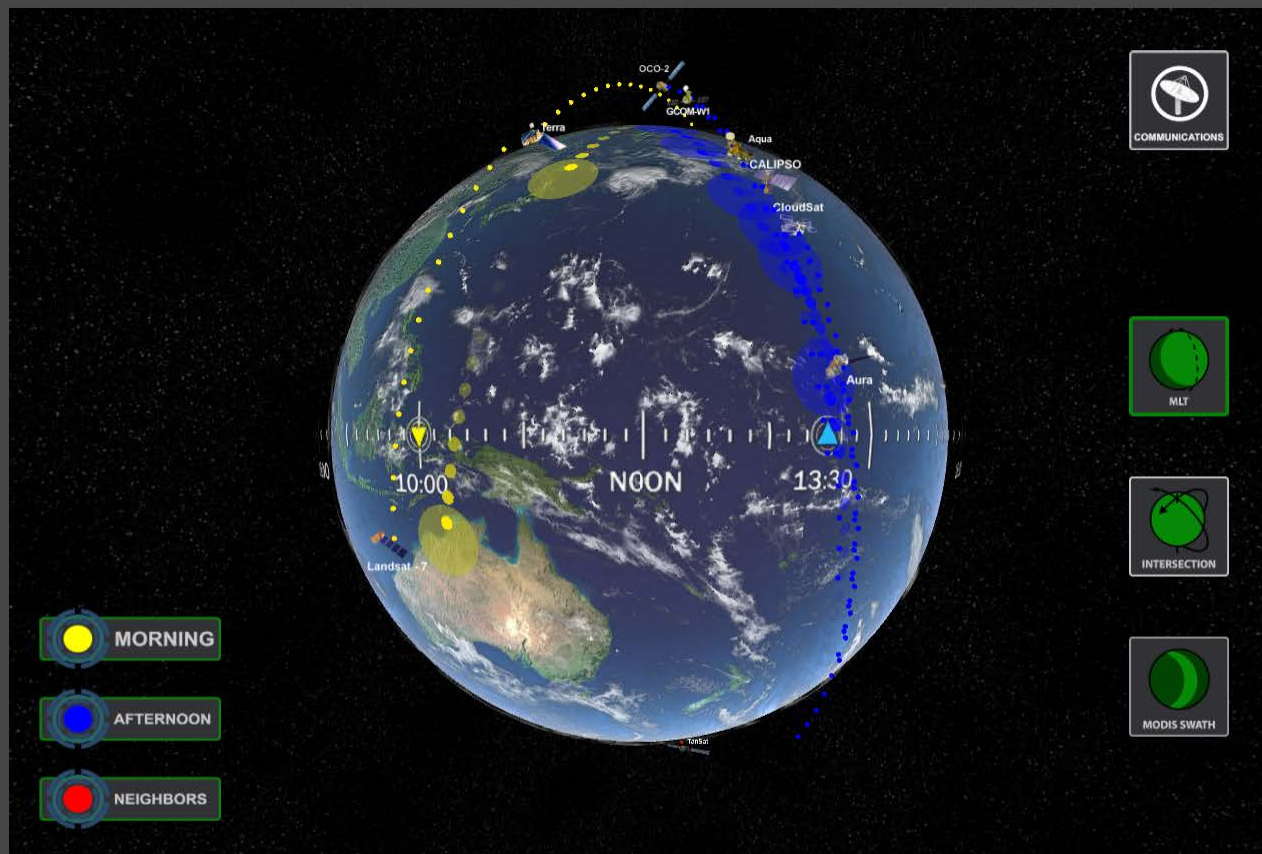
The Morning and Afternoon Constellations fly in frozen, sun-synchronous orbits.



The Afternoon Constellation ascends across the equator at roughly 13:30 local time on each orbit.

Sun-synchronous orbits are designed so that each crossing of the equator occurs at the same mean local time (MLT).

Flying constellations in sun-synchronous orbits minimizes the global variations in altitude and allows the science instruments on the spacecraft to observe the same points on the earth at regular intervals and at a consistent sun angle.



2017-02-01
01:25:45 UTC
Paused



700X



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 11 April 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.
- Space-Track provided states to Consultative Committee for Space Data Systems (CCSDS) orbit ephemeris message (OEM) ephemerides are now 10 weeks long.

CCS 2018.1

Released: 11 April 2018

- Provided the radial, in-track and cross-track (RIC) components at the time of closest approach (TCA) to the header of the Close Approach results file.
- 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 manual analyses. Some of these analyses will be demonstrated on 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
 - 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.

Coordinated Science

- 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.
- 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.

Demo

Demo Time!

CCS 2018.2

- CCS 2018.2 is currently in development, and is scheduled for deployment in 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