

# **Operations Coordination Plan Status**

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**NASA/Goddard Space Flight Center**

## Operations Coordination Plan Key Dates

YEAR	EVENT
2002	Landsat-7 and Terra publish their <i>Morning Train Coincident Observations Implementation and Operations Plan</i>
2003	A-Train Mission Operations Working Group (MOWG) formed. Agreements begin to be developed between MOWG teams.
2005	A-Train MOWG agreements published : <ul style="list-style-type: none"><li>• <i>Afternoon Constellation Operations Coordination Plan</i></li><li>• <i>Afternoon Constellation Contingency Procedures</i></li></ul>
2008	Published Revision #1 of both documents ( <i>A-Train missions only</i> )
2011	Published Revision #2 of both documents ( <i>A-Train missions only</i> )
2015	Published the <i>Operations Coordination Plan For The Morning and Afternoon Constellations</i> (Document # 428-PLAN-011)

*It is now time to start the update process*

# **Operations Coordination Plan Change Summary**

- **Constellation evolution**
  - **Earth Observing -1 (EO-1) decommissioning**
  - **Landsat-9 plans**
  - **Etc.**
- **TanSat**
- **Envelope size change (Constellation Change Request #17)**
- **Personnel changes**
- **Constellation Coordination System (CCS) screen updates**
- **Other changes?**

# Specific Document Changes

## Front Matter

SECTION	CHANGE
Signature page	<ul style="list-style-type: none"> <li>Update to list the current signatories</li> </ul>
Preface	<ul style="list-style-type: none"> <li>Eliminate reference to pre-2015 versions.</li> </ul>

## Section 1 – *Constellation Coordination*

SECTION	CHANGE
1.1 (“ <i>Purpose</i> ”):	<ul style="list-style-type: none"> <li>Bring history up-to-date (e.g., EO-1 decommissioned, TanSat launched, etc.)</li> </ul>
1.3 (“ <i>Definition of Terms</i> ”)	<ul style="list-style-type: none"> <li>Update Constellation Envelope definition.</li> </ul>
1.4 (“ <i>Documentation</i> ”)	<ul style="list-style-type: none"> <li>Update with the latest Applicable and Reference document versions</li> </ul>
1.5 (“ <i>Operations Coordination</i> ”)	<ul style="list-style-type: none"> <li>Update <i>MOWG Executive Board</i> contacts</li> </ul>
1.6.2 (“ <i>Inter-Agency Coordination</i> ”)	<ul style="list-style-type: none"> <li>Add process used to communicate with TanSat.</li> </ul>
1.8 (“ <i>Anomaly and Conflict Resolution Process</i> ”)	<ul style="list-style-type: none"> <li>Update drawing to remove EO-1</li> </ul>

# Specific Document Changes (cont'd)

## Section 2 – *Afternoon Constellation*

SECTION	CHANGE
<b>2.1</b> (“ <i>Afternoon Constellation Coordination</i> ”)	<ul style="list-style-type: none"> <li>Update the science and operations leads. Add text about TanSat.</li> </ul>
<b>2.3.1</b> (“ <i>Afternoon Constellation Placement Strategy</i> ”):	<ul style="list-style-type: none"> <li>Update the configuration drawing</li> </ul>
<b>2.3.3</b> (“ <i>Afternoon Constellation Inclination Adjust Maneuvers</i> ”)	<ul style="list-style-type: none"> <li>Add list of inclination adjust maneuvers (IAMs) conducted since 2015</li> </ul>
<b>2.4.1.2</b> (“ <i>Constellation-Related Flags</i> ”) and <b>2.5</b> (“ <i>Afternoon Constellation Contingency Procedures</i> ”)	<ul style="list-style-type: none"> <li>Use latest CCS screen captures</li> </ul>

# Specific Document Changes (concluded)

## Section 3 – *Morning Constellation*

SECTION	CHANGE
<b>3.1</b> ( <i>“Morning Constellation Coordination”</i> )	<ul style="list-style-type: none"><li>• Update the science and operations leads</li><li>• Update the constellation drawing to delete EO-1 and possibly add Landsat-9</li></ul>
<b>3.2</b> ( <i>“Morning Constellation Overview”</i> )	<ul style="list-style-type: none"><li>• Update for EO-1 decommissioning</li><li>• Add Landsat-9.</li></ul>
<b>3.3</b> ( <i>“Morning Constellation Derived and Operational Requirements”</i> )	<ul style="list-style-type: none"><li>• Update for EO-1 decommissioning</li></ul>
<b>3.3.3</b> ( <i>“Morning Constellation Inclination Adjust Maneuvers”</i> ):	<ul style="list-style-type: none"><li>• Add the dates for the Morning Constellation IAMs</li></ul>

## Document Update Schedule (Proposed)

DATE	EVENT
June 30, 2017	MOWG initial feedback due
August 31, 2017	List of changes frozen
September 29, 2017	<i>Draft version</i> sent to MOWG teams
October 31, 2017	Feedback due from MOWG teams
November 17, 2017	<i>Signature version</i> distributed
December 5-7, 2017	Document signed at Fall MOWG meeting

**Questions and suggestions?**



*Arigatou Gozaimasu*

*Merci*

*Thank you*

# Reference Section

## History of the Constellation agreements (2003-2015)

*(Originally presented June 2015)*

# **Afternoon Constellation MOWG 1<sup>st</sup> Meeting (Goddard Space Flight Center, March 2003)**



**MOWG was formed and began  
developing agreements and guidelines.**

## Operations Coordination Plan History (1 of 4)

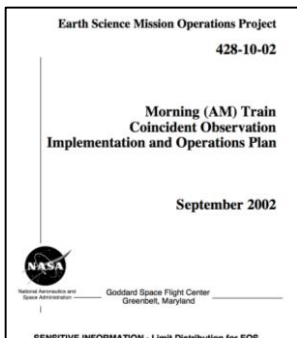
YEAR	EVENT
2002	Landsat-7 and Terra publish their <i>Morning (AM) Train Coincident Observations Implementation and Operations Plan</i>
2003 - 2004	A-Train MOWG formed. Agreements developed between MOWG teams.
2005	A-Train MOWG published agreements: <ul style="list-style-type: none"> <li>• <i>Afternoon Constellation Operations Coordination Plan</i></li> <li>• <i>Afternoon Constellation Contingency Procedures</i></li> </ul>
2008	REVISION #1 published (A-Train missions only)
2010	<ul style="list-style-type: none"> <li>• A-Train / Landsat 5 passings highlighted the need for closer coordination between the 2 constellations.</li> <li>• Subsequent discussions at MOWG meetings reinforced the need for <i>one</i> MOWG and one set of agreements.</li> </ul>
2011	REVISION #2 published (still A-Train missions only)

## Operations Coordination Plan History (2 of 4)

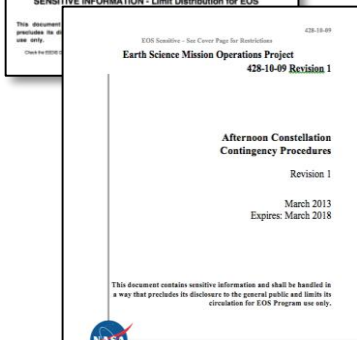
YEAR	EVENT
<b>2012 - 2013</b>	<ul style="list-style-type: none"> <li>• Extensive effort spent to standardize Definitions (e.g., <i>safe exit orbit</i>, <i>Constellation Envelope</i>, etc.).</li> <li>• <i>Operations Coordination Plan</i> and the <i>Contingency Procedures</i> merged. Document also expanded to encompass both the Morning and Afternoon Constellations.</li> <li>• Drafts issued to teams in July and December 2013.</li> </ul>
<b>2014</b>	<ul style="list-style-type: none"> <li>• April 11 – Updated document presented at MOWG meeting at GSFC.</li> <li>• July 21 – Interim update issued to add Morning Constellation and OCO-2 information</li> <li>• September 19 – Interim update issued to fix some orbital configuration entries in Table 2-3, Figure 2-2, and Section 2.2.</li> <li>• October 31 – Final document issued for signature approval. This contained some minor updates based on feedback received at the MOWG meeting in October 2014 at NASA Langley Research Center (LaRC).</li> </ul>

## Operations Coordination Plan History (3 of 4)

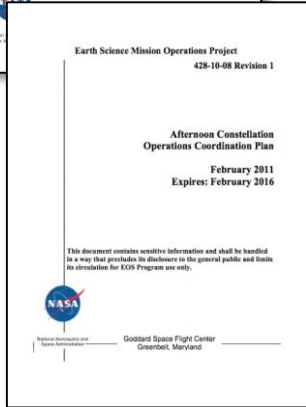
### *Merging documents*



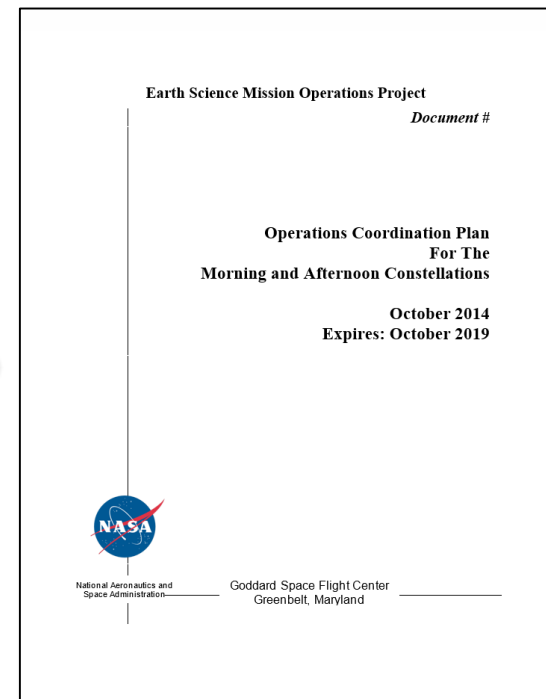
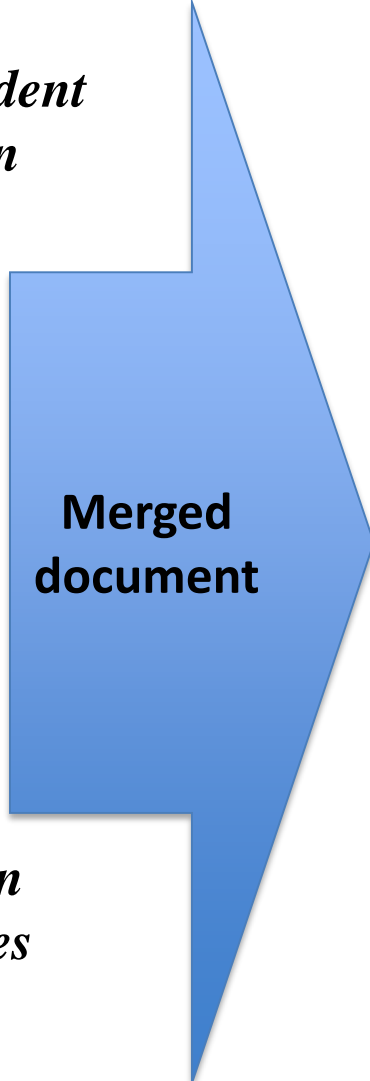
*Morning (AM) Train Coincident  
Observations Implementation  
and Operations Plan  
(September 2002)*



*Afternoon Constellation  
Operations Coordination  
Plan (February 2011)*



*Afternoon Constellation  
Contingency Procedures  
(February 2011)*



*“New” Operations  
Coordination Plan  
(May 2015)*

## Operations Coordination Plan History (4 of 4)

YEAR	EVENT
2015	<ul style="list-style-type: none"><li>• March – Final signature received from the mission teams</li><li>• March 31 – Document submitted to Earth Science Mission Operations (ESMO) Project Configuration Management process</li><li>• May 13 – Document approved and distributed to all teams</li></ul>

***Thank you!***

## Summary of Changes Since 2011

- **Document reorganized:**
  - Sec. 1 – *Constellation Coordination*
  - Sec. 2 – *Afternoon Constellation*
  - Sec. 3 – *Morning Constellation*
- **Sections updated** (*see next 2 slides*)



## Section 1 – *Constellation Coordination*

- Section 1.1 (“*Purpose*”): Rewritten to include both constellations
- Section 1.3 (“*Definition of Terms*”): Replaced with definitions developed during spring/summer 2013 and reviewed at the MOWG meeting in September 2013.
- Section 1.4 (“*Documentation*”): Updated with the latest Applicable and Reference document versions.
- Section 1.5 (“*Operations Coordination*”): Added Conjunction Assessment Risk Analysis (CARA) and Conjunction Analysis and Evaluation Service, Alerts and Recommendations (CAESAR) references .
- Section 1.6 (“*Constellation Coordination Concepts and Guidelines*”): Added CARA to Figure 1-1.
- Section 1.8 (“*Anomaly and Conflict Resolution Process*”): Modified the conflict escalation flow to account for inter-constellation and Morning Constellation conflicts by adding Figures 1-2 and 1-4.
- Section 1.9 (“*Constellation Exit Planning*”): Added paragraphs for trigger events and for the disposition of CCS historical data.
- Section 1.11 (“*Contingency Procedures*”): This section provides the overview previously contained in the *Afternoon Constellation Contingency Procedures* document, plus 3 contingency procedures (in 1.11.2, -.3, and -.4) that affect both constellations. Note that the remaining contingency procedures are found later in the document (in Section 2).

## ***Section 2 – Afternoon Constellation***

- Section 2.1 (“*Afternoon Constellation Coordination*”): The science and operations leads were updated.
- Sections 2.2 – 2.3 were updated to reflect changes to the Afternoon Constellation since 2011
  - PARASOL’s exit
  - Global Change Observation Mission – Water First (GCOM-W1) launch, ascent, and entry into the A-Train
  - CloudSat’s Daylight Only-Operations (DO-Op) mode
  - Aqua/Aura’s no-yaw maneuvers
  - Orbiting Carbon Observatory-2 (OCO-2) launch, ascent, and entry into the A-Train

## ***Section 3 – Morning Constellation***

- All sub-sections: All new text was added with Morning Constellation information

# Summary

- Updating the *Plan* required the support of all Constellation teams.
- It has been well worth the effort. The *Plan* now *reflects our collective understanding* and *documents the agreements* we use to fly safely.

***We appreciate your time and effort.  
Thank you!***