Operations Coordination Plan Status

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Operations Coordination Plan Update

- At the MOWG meeting in June 2017, we presented a schedule for the *Operations Coordination Plan* document update.
- Subsequently, CloudSat and CALIPSO left the ESC orbit and a few missions experienced anomalies.
- As a result, we decided to delay the document update until the anomalies had worked their full course.

It is now time to restart the update process

Operations Coordination Plan History

YEAR	EVENT
2002	Landsat-7 and Terra publish their *Morning Train Coincident Observations Implementation and Operations Plan*
2003	A-Train Mission Operations Working Group (MOWG) formed. Agreements begin to be developed between MOWG teams.
2005	A-Train MOWG agreements published : • *Afternoon Constellation Operations Coordination Plan* • *Afternoon Constellation Contingency Procedures*
2008	Published Revision #1 of both documents *(A-Train missions only)*
2011	Published Revision #2 of both documents *(A-Train missions only)*
2015	Published the *Operations Coordination Plan For The Morning and Afternoon Constellations* (Document # 428-PLAN-011)

The current 2015 version expires in May 2020

Operations Coordination Plan Change Summary (1 of 2)

- **Envelope size change (Constellation Change Request #17)**
- **Personnel changes**
- **Constellation Coordination System (CCS) screen updates**
- **Constellation evolution**
  - Earth Observing-1 (EO-1) decommissioning
  - CloudSat exit
  - CALIPSO exit
  - C-Train creation

Operations Coordination Plan Change Summary (2 of 2)

- **The C-Train was considered to still be a part of the Afternoon Constellation.**
  - Still crosses the equator in the afternoon
  - Has periodic coincident science opportunity periods with other A-Train satellites
  - Follows precedent set by PARASOL which was not in the A-Train orbit after December 2009 but was considered part of the A-Train through their decommissioning in December 2013.
- **Many of the original requirements for A-Train constellation flying no longer apply to the C-Train, so the C-Train specific information was moved to a newly created Section 3.**

Specific Document Changes

Front Matter

SECTION	CHANGE
Signature page	• Updated to list the current signatories
Preface	• Eliminated reference to pre-2015 versions. Updated contact name and address.

Specific Document Changes
Section 1 – *Constellation Coordination*

SECTION	CHANGE
1.1 (“*Purpose*”):	• Brought history up-to-date (e.g., EO-1 decommissioned, CloudSat’s exits, CALIPSO’s exit, C-Train, etc.)
1.2 (“Scope”)	• Added a reference to the new Section 3 (“C-Train”)
1.3 (“*Definition of Terms*”)	• Added “C-Train”. • Added a note about the C-Train in the “Afternoon Constellation” definition. • Updated the “Constellation Envelope” definition per CR #17 by changing the Margin from 2 km to 0.5 km.
1.4 (“*Documentation*”)	• Updated with the latest Applicable and Reference document versions. Removed some old documents.
1.5 (“*Operations Coordination*”)	• Updated the *MOWG Executive Board* contacts
1.7.1 (“*Launch and Early Orbit Analysis*”)	• Updated text to clarify launch execution errors, per Ted Sweetser comment.
1.8 (“*Anomaly and Conflict Resolution Process*”)	• Updated Figure 1-4 to remove EO-1
1.9 (“*Constellation Exit Planning*”)	• Updated text to require Exit Plans “*at least 18 months*” prior to expected exit, per MOWG action item #1706-01.

Specific Document Changes

Section 2 – *Afternoon Constellation (1 of 2)*

SECTION	CHANGE
2.1 ("*Afternoon Constellation Coordination*")	• Updated the science and operations leads.
2.2. ("*Afternoon Constellation Overview*")	• Updated text due to the C-Train creation • Updated Figure 2-1 to show the current configuration • Removed CS & CP from Table 2-2
2.3.1 ("*Afternoon Constellation Placement Strategy*"):	• Updated Figure 2-2 to show the current control box configuration • Removed CALIPSO and CloudSat info from text and Table 2-3. • Table 2-3 was relocated to be near the start of the section.
2.3.1.4 ("*OCO-2 Placement Strategy*")	• Updated OCO-2 MLTAN value wording, per Mark Vincent.

Specific Document Changes

Section 2 – *Afternoon Constellation (2 of 2)*

SECTION	CHANGE
2.3.2. (“*Afternoon Constellation Drag Makeup Maneuvers*”)	• Removed CALIPSO and CloudSat
2.3.3 (“*Afternoon Constellation Inclination Adjust Maneuvers”*)	• Added list of inclination adjust maneuvers (IAMs) conducted since 2015
2.4.1.2 (“*Constellation-Related Flags*”) and 2.5 (“*Afternoon Constellation Contingency Procedures”*)	• Updated figures 2-6, 2-9, and 2-10 using the latest CCS screen captures

Specific Document Changes

Section 3 – *C-Train*

SECTION	CHANGE
All section	• New section created to capture the C-Train information

Specific Document Changes

Section 4 – *Morning Constellation*

SECTION	CHANGE
4.1 (“*Morning Constellation Coordination*”)	• Updated the science and operations leads in Table 4-1
4.2 (“*Morning Constellation Overview*”)	• Deleted EO-1 from the text, Figure 4-1, and Table 4-2
4.3 (“*Morning Constellation Derived and Operational Requirements*”)	• Updated text for EO-1 to reflect decommissioning. Deleted EO-1 from Table 4-3 and description of its maneuvers.

Document Update Schedule (Proposed)

DATE	EVENT
July 31, 2019	MOWG feedback requested
August 31, 2019	***Final version*** sent to MOWG teams
September 30, 2019	Final comments due from MOWG teams
October 31, 2019	***Signature version*** sent to MOWG teams
November/December 2019	Sign at Fall 2019 MOWG meeting

Questions and suggestions?

Arigatou Gozaimasu

Merci

Thank you

Acronyms and Abbreviations

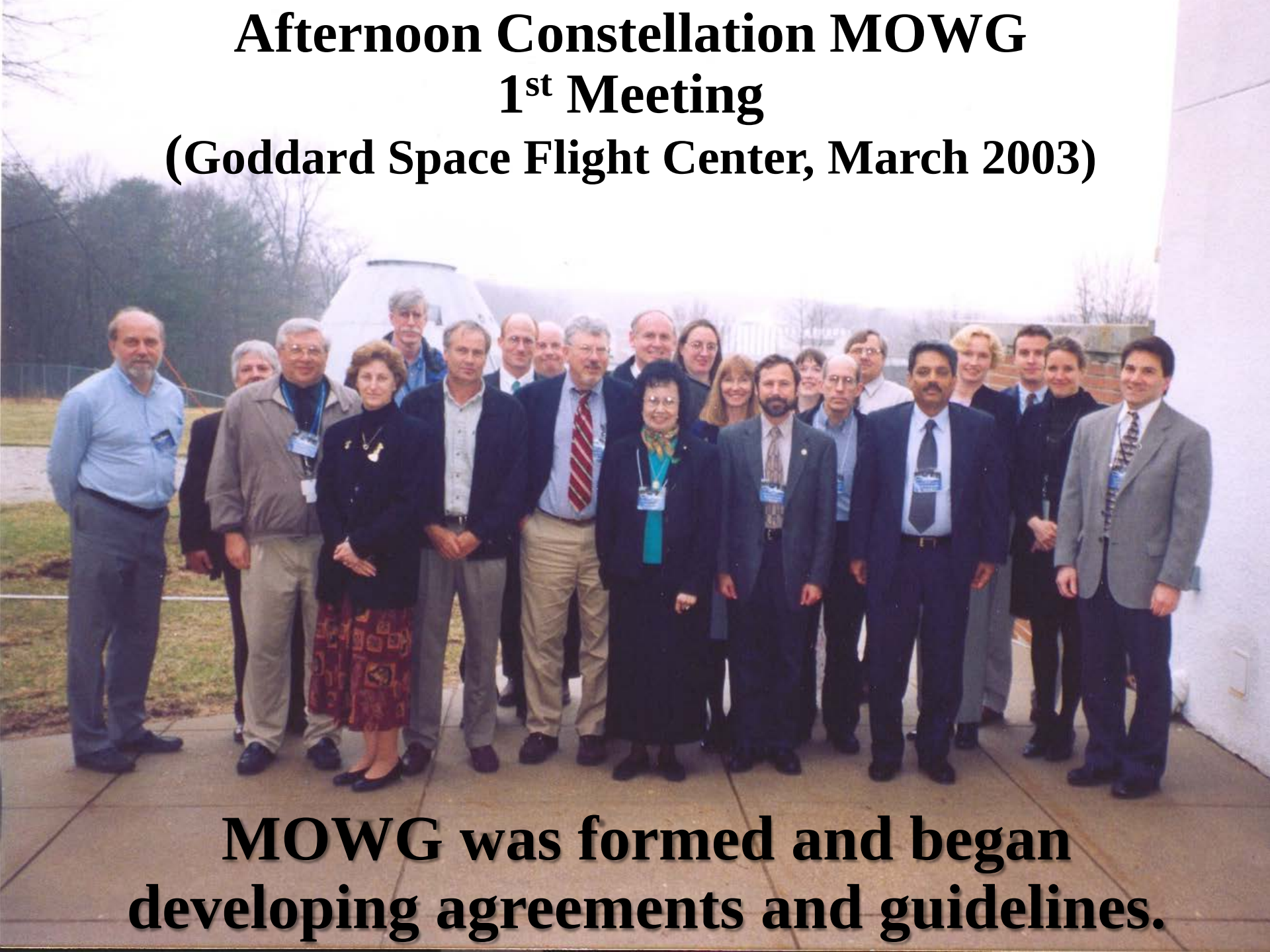
TERM	EXPANSION
AM	ante meridiem
CALIPSO or CP	Cloud Aerosol Lidar and Infrared Pathfinder Satellite Observations
CR	Change request
CCS	Constellation Coordination System
CNES	Centre National D'Etudes Spatiales
CS	CloudSat
EO-1	Earth Observing-1
ESC	Earth Science Constellation
ESMO	Earth Science Mission Operations
IAMs	inclination adjust maneuvers
JAXA	Japan Aerospace Exploration Agency
LaRC	Langley Research Center
MLTAN	mean local time at the ascending node
MOWG	Mission Operations Working Group
NASA	National Aeronautics and Space Administration
OCO-2	Orbiting Carbon Observatory-2
PARASOL	Polarization and Anisotropy of Reflectances for Atmospheric Science coupled with Observations from a Lidar
USGS	United States Geological Survey

Reference Section

History of the Constellation agreements (2003-2015)

(Originally presented June 2015)

Afternoon Constellation MOWG
1st 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 *Morning (AM) Train Coincident Observations Implementation and Operations Plan*
2003 - 2004	A-Train MOWG formed. Agreements developed between MOWG teams.
2005	A-Train MOWG published agreements: • *Afternoon Constellation Operations Coordination Plan* • *Afternoon Constellation Contingency Procedures*
2008	REVISION #1 published (A-Train missions only)
2010	• A-Train / Landsat 5 passings highlighted the need for closer coordination between the 2 constellations. • Subsequent discussions at MOWG meetings reinforced the need for *one* MOWG and one set of agreements.
2011	REVISION #2 published (still A-Train missions only)

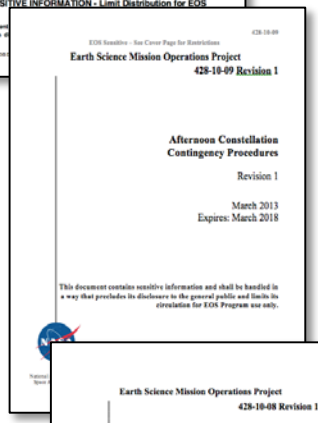
Operations Coordination Plan History (2 of 4)

YEAR	EVENT
2012 - 2013	• Extensive effort spent to standardize Definitions (e.g., *safe exit orbit*, *Constellation Envelope*, etc.). • *Operations Coordination Plan* and the *Contingency Procedures* merged. Document also expanded to encompass both the Morning and Afternoon Constellations. • Drafts issued to teams in July and December 2013.
2014	• April 11 – Updated document presented at MOWG meeting at GSFC. • July 21 – Interim update issued to add Morning Constellation and OCO-2 information • September 19 – Interim update issued to fix some orbital configuration entries in Table 2-3, Figure 2-2, and Section 2.2. • 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).

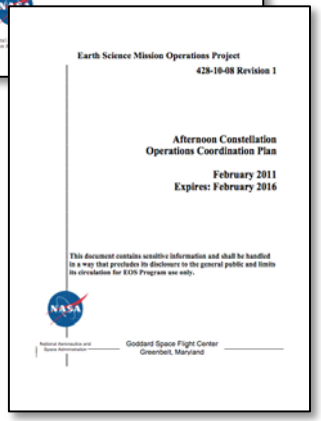
Operations Coordination Plan History (3 of 4)
Merging documents


Earth Science Mission Operations Project
428-10-02
Morning (AM) Train Coincident Observation Implementation and Operations Plan
September 2002
Goddard Space Flight Center
Greenbelt, Maryland
SENSITIVE INFORMATION - Limit Distribution for EOS

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

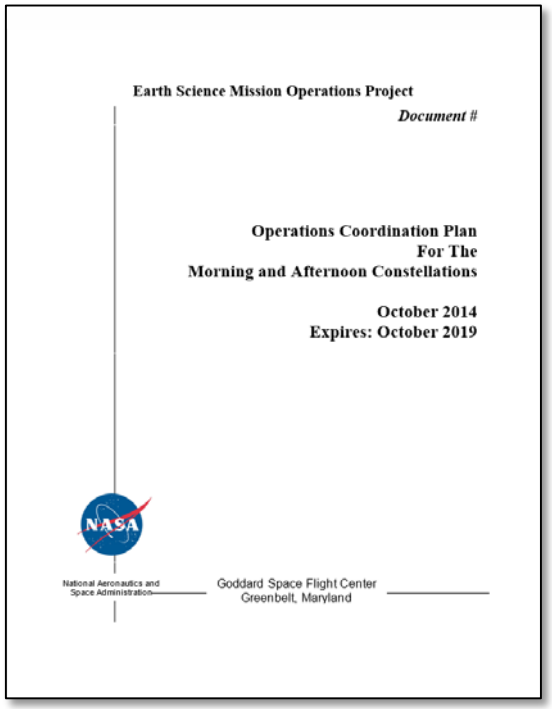

Earth Science Mission Operations Project
428-10-09 Revision 1
Afternoon Constellation Contingency Procedures
Revision 1
March 2013
Expires: March 2018
This document contains sensitive information and shall be handled in a way that precludes its disclosure to the general public and limits its circulation for EOS Program use only.

Afternoon Constellation Operations Coordination Plan (February 2011)


Earth Science Mission Operations Project
428-10-08 Revision 1
Afternoon Constellation Operations Coordination Plan
February 2011
Expires: February 2016
This document contains sensitive information and shall be handled in a way that precludes its disclosure to the general public and limits its circulation for EOS Program use only.
Goddard Space Flight Center
Greenbelt, Maryland

Afternoon Constellation Contingency Procedures (February 2011)

Merged document


Earth Science Mission Operations Project
Document #
Operations Coordination Plan
For The
Morning and Afternoon Constellations
October 2014
Expires: October 2019
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

"New" *Operations Coordination Plan* (May 2015)

Operations Coordination Plan History (4 of 4)

YEAR	EVENT
2015	• March – Final signature received from the mission teams • March 31 – Document submitted to Earth Science Mission Operations (ESMO) Project Configuration Management process • May 13 – Document approved and distributed to all teams