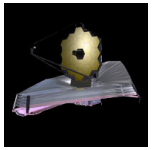

1251 - Titan Climate, Composition and Clouds

Cycle: 1, Proposal Category: GTO

INVESTIGATORS

Name	*Institution*
Dr. Conor Nixon (PI)	**NASA Goddard Space Flight Center**
Sebastien Rodriguez (CoI) (ESA Member)	Institut de Physique du Globe - Universite Paris Diderot
Dr. Robert A. West (CoI)	Jet Propulsion Laboratory
Nick Teanby (CoI) (ESA Member)	University of Bristol
Emmanuel Lellouch (CoI) (ESA Member)	Observatoire de Paris - Section de Meudon
Bruno Bezard (CoI) (ESA Member)	Observatoire de Paris
Manuel Lopez-Puertas (CoI) (ESA Member)	Instituto de Astrofisica de Andalucia (IAA)
Dr. Thomas Cornet (CoI) (ESA Member)	Aurora Technology BV for ESA
Elizabeth Turtle (CoI)	The Johns Hopkins University Applied Physics Laboratory
Christophe Sotin (CoI)	Jet Propulsion Laboratory
Dr. Richard Achterberg (CoI)	University of Maryland
Dr. Stefanie N. Milam (CoI)	NASA Goddard Space Flight Center
Dr. Heidi B. Hammel (CoI)	Space Science Institute
Prof. Alex Hayes (CoI)	Cornell University

OBSERVATIONS

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
Leading hemisphere observations of Titan				
	1	MIRI Leading Hemisphere	MIRI Medium Resolution Spectroscopy	(4) TITAN-LEADING-MIRI
	6	BG FOR MIRI Leading Hemisphere	MIRI Medium Resolution Spectroscopy	(3) BG-TITAN-LEADING
	2	NIRSpec Leading Hemisphere	NIRSpec IFU Spectroscopy	(1) TITAN-LEADING

Folder	*Observation*	*Label*	*Observing Template*	*Science Target*
	3	NIRCam Leading Hemisphere	NIRCam Imaging	(1) TITAN-LEADING
Trailing hemisphere observations				
	4	NIRSpec Trailing Hemisphere	NIRSpec IFU Spectroscopy	(2) TITAN-TRAILING
	5	NIRCam Trailing Hemisphere	NIRCam Imaging	(2) TITAN-TRAILING

ABSTRACT

ID GTO 1251: We focus the extremely broad capability of the combined JWST instrument suite to advance our understanding of Titan's gases, hazes, condensates (clouds) and surface composition. NIRSpec's high-resolution spectral imaging (R~2700) at near-IR wavelengths (0.6-5.0 micron) in IFU mode will yield information on all of these scientific areas. The spatial resolution and multiple filter capability of JWST NIRCam will reveal the distribution of haze and clouds in the atmosphere occurring during southern winter/northern summer. MIRI will be used to measure Titan's stratosphere to attempt new gas detections, and to measure isotopic ratios with unprecedented sensitivity. We will obtain a full-range (4.9-28.8 micron), high resolution spectral-image with MIRI in MRS mode to measure temperatures, abundances of trace gases, isotopic ratios and haze signatures. This combined suite of observations in the 2019-2020 timeframe will follow directly after Cassini (end of mission in 2017) and expand on Cassini's science return. These observations will provide a valuable input to dynamical models, and also serve as a baseline JWST measurement that may be repeated later in the mission as Titan's south pole emerges into summer (Titan is known to be highly variable with season).

OBSERVING DESCRIPTION

Visit 1: Titan leading hemisphere: MIRI, NIRSpec, NIRCam. Anugular separation of Titan from Saturn > 1.8'.
Titan longitude 90 +/- 5.

Visit 2 (8 days after visit 1): NIRSpec, NIRCam. Anugular separation of Titan from Saturn > 1.8'.
Titan longitude 270 +/- 5.

MIRI: MRS mode, full spectrum, high resolution. FAST mode to avoid saturation. 4-pt dither.

MIRI Background Observation: mirror image point to Titan on imaginary Titan torsu around Saturn, but other side of Saturn.

NIRSpec:

Acquire data in all filters. 4 point dither. Observe twice, leading and trailing hemisphere.

Need Titan from Saturn > 1.7' to remove Saturn from MSA FOV; hence leakcal turned OFF.

Need two sides of Titan at +/- 90 longitude.

NIRCam:

Sub-array mode to avoid saturation (160^2). 4 sub-pixel positions. Observe twice, leading and trailing hemisphere.

Proposal 1251 - Targets - Titan Climate, Composition and Clouds

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	TITAN-LEADING	STD=SATURN	STD=TITAN	
Comments: Extended=YES				
(2)	TITAN-TRAILING	STD=SATURN	STD=TITAN	
Comments: Extended=YES				
(3)	BG-TITAN-LEADING	STD=SATURN	TYPE=TORUS,LONG=90,LAT=0,RAD=1221870,POLE_LONG=0,POLE_LAT=90,O_LONG=0,O_LAT=0,O_RAD=0	
Comments: Extended=YES				
(4)	TITAN-LEADING-MIRI	STD=SATURN	STD=TITAN	
Comments: Extended=YES				

Observation

Proposal 1251, Observation 1: MIRI Leading Hemisphere Sat Jul 01 23:00:34 GMT 2023

Diagnostic Status: Error

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observations:[BG FOR MIRI Leading Hemisphere (Obs 6)]

Comments: Central meridian longitude constraint is required to ensure that Titan leading (or trailing) hemisphere is fully, not partially observed. Without the CMT constraint, the center of the leading hemisphere (trailing hemisphere) could be substantially displaced towards the edge of the visible disk area (the limb) and therefore the leading/trailing hemisphere observations that are planned would not achieve full coverage of Titan's surface.

The special requirements for non-interruptible sequences (1,2,3, 6) and (4,5) are required to ensure that MIRI, NIRSpec and NIRCam observations of Titan are contemporaneous. Solar system bodies with atmospheres can exhibit significant variability of a period of weeks or months, and to maximize the ability to interpret the data across multiple instruments, these observations must be made as closely as possible in time.

See ticket INC0165672, approved by Dean Hines 2021-02-23 10:57 for approval of NGROUPS=2 for the MIRI MRS observations of Titan.

MRSSHORT integrations increased from 10 to 13 to better match MRSLONG total duration.

9/18/22 - resubmited after adding background observation for MIRI. Background is on Titan torus at mirror image of Titan, but other side of Saturn, to get stary light.

Diagnostics

(MIRI Leading Hemisphere (Obs 1)) Error (Form): Groups/Int cannot be 1, Groups/Int = 2 requires permission and Groups/Int of 3-4 is allowed but not recommended.

(MIRI Leading Hemisphere (Obs 1)) Error (Form): Groups/Int cannot be 1, Groups/Int = 2 requires permission and Groups/Int of 3-4 is allowed but not recommended.

(MIRI Leading Hemisphere (Obs 1)) Error (Form): Groups/Int cannot be 1, Groups/Int = 2 requires permission and Groups/Int of 3-4 is allowed but not recommended.

(Visit 1:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(MIRI Leading Hemisphere (Obs 1)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(4)	TITAN-LEADING-MIRI	STD=SATURN	STD=TITAN	

Comments: Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F1000W	ALL	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	2	25	1	Dither 1	4	100	821.412	
1	SHORT(A)	MRSSHORT		FASTR1	5	13	1	Dither 1	4	52	854.712	
2	MEDIUM(B)	MRSLONG		FASTR1	2	25	1	Dither 1	4	100	821.412	
2	MEDIUM(B)	MRSSHORT		FASTR1	5	13	1	Dither 1	4	52	854.712	
3	LONG(C)	MRSLONG		FASTR1	2	25	1	Dither 1	4	100	821.412	
3	LONG(C)	MRSSHORT		FASTR1	5	13	1	Dither 1	4	52	854.712	

Special Requirements

Sequence Observations 1, 2, 3, 6, Non-interruptible

SEPARATION OF TITAN SATURN FROM JWST GREATER THAN 1.8'
CENTRAL MERIDIAN LONGITUDE OF TITAN FROM JWST BETWEEN 77.5 102.5
DEFAULT WINDOW: NOT OCCULTATION OF TITAN-LEADING-MIRI BY SATURN FROM JWST
DEFAULT WINDOW: SEPARATION OF TITAN-LEADING-MIRI RHEA FROM JWST GREATER THAN 10"
DEFAULT WINDOW: ANGULAR RATE TITAN-LEADING-MIRI FROM JWST LESS THAN 0.03

Observation

Proposal 1251, Observation 6: BG FOR MIRI Leading Hemisphere Sat Jul 01 23:00:34 GMT 2023

Diagnostic Status: Error

Observing Template: MIRI Medium Resolution Spectroscopy

Background Observation For: [MIRI Leading Hemisphere (Obs 1)]

Comments: Central meridian longitude constraint is required to ensure that Titan leading (or trailing) hemisphere is fully, not partially observed. Without the CMT constraint, the center of the leading hemisphere (trailing hemisphere) could be substantially displaced towards the edge of the visible disk area (the limb) and therefore the leading/trailing hemisphere observations that are planned would not achieve full coverage of Titan's surface.

The special requirements for non-interruptible sequences (1,2,3) and (4,5) are required to ensure that MIRI, NIRSpec and NIRCam observations of Titan are contemporaneous. Solar system bodies with atmospheres can exhibit significant variability of a period of weeks or months, and to maximize the ability to interpret the data across multiple instruments, these observations must be made as closely as possible in time.

See ticket INC0165672, approved by Dean Hines 2021-02-23 10:57 for approval of NGROUPS=2 for the MIRI MRS observations of Titan.

MRSSHORT integrations increased from 10 to 13 to better match MRSLONG total duration.

9/18/22 - resubmited after adding background observation for MIRI. Background is on Titan torus at mirror image of Titan, but other side of Saturn, to get stary light.

Diagnostics

(BG FOR MIRI Leading Hemisphere (Obs 6)) Error (Form): Groups/Int cannot be 1, Groups/Int = 2 requires permission and Groups/Int of 3-4 is allowed but not recommended.

(BG FOR MIRI Leading Hemisphere (Obs 6)) Error (Form): Groups/Int cannot be 1, Groups/Int = 2 requires permission and Groups/Int of 3-4 is allowed but not recommended.

(BG FOR MIRI Leading Hemisphere (Obs 6)) Error (Form): Groups/Int cannot be 1, Groups/Int = 2 requires permission and Groups/Int of 3-4 is allowed but not recommended.

(Visit 6:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(BG FOR MIRI Leading Hemisphere (Obs 6)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(3)	BG-TITAN-LEADING	STD=SATURN	TYPE=TORUS,LONG=90,LAT=0,RAD=1221870,POLE_LONG=0,POLE_LAT=90,O_LONG=0,O_LAT=0,O_RAD=0	

Comments: Extended=YES

Acquisition

#	Target
1	NONE

Template

AcqFilter	Primary Channel	Simultaneous Imaging	Imager Subarray	Grating Wheel Direction
F1000W	ALL	NO	FULL	NEUTRAL

Dithers

#	Dither Type	Optimized For	Direction
1	4-Point	EXTENDED SOURCE	NEGATIVE

Spectral Elements

#	Wavelength Range	Detector	Filter	Readout Pattern	Groups/Int	Integrations/Exp	Exposures/Dith	Dither	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	SHORT(A)	MRSLONG		FASTR1	2	25	1	Dither 1	4	100	821.412	
1	SHORT(A)	MRSSHORT		FASTR1	5	13	1	Dither 1	4	52	854.712	
2	MEDIUM(B)	MRSLONG		FASTR1	2	25	1	Dither 1	4	100	821.412	
2	MEDIUM(B)	MRSSHORT		FASTR1	5	13	1	Dither 1	4	52	854.712	
3	LONG(C)	MRSLONG		FASTR1	2	25	1	Dither 1	4	100	821.412	
3	LONG(C)	MRSSHORT		FASTR1	5	13	1	Dither 1	4	52	854.712	

Special Requirements

Sequence Observations 1, 2, 3, 6, Non-interruptible

SEPARATION OF TITAN SATURN FROM JWST GREATER THAN 1.8'
CENTRAL MERIDIAN LONGITUDE OF TITAN FROM JWST BETWEEN 77.5 102.5
DEFAULT WINDOW: NOT OCCULTATION OF BG-TITAN-LEADING BY SATURN FROM JWST
DEFAULT WINDOW: SEPARATION OF BG-TITAN-LEADING RHEA FROM JWST GREATER THAN 10"
DEFAULT WINDOW: SEPARATION OF BG-TITAN-LEADING TITAN FROM JWST GREATER THAN 10"
DEFAULT WINDOW: ANGULAR RATE BG-TITAN-LEADING FROM JWST LESS THAN 0.03

Observation

Proposal 1251, Observation 2: NIRSpec Leading Hemisphere Sat Jul 01 23:00:34 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Comments: Need Titan from Saturn > 1.8' to remove Saturn from MSA FOV; hence leakcal turned OFF.

Central meridian longitude constraint is required to ensure that Titan leading (or trailing) hemisphere is fully, not partially observed. Without the CMT constraint, the center of the leading hemisphere (trailing hemisphere) could be substantially displaced towards the edge of the visible disk area (the limb) and therefore the leading/trailing hemisphere observations that are planned would not achieve full coverage of Titan's surface.

The special requirements for non-interruptible sequences (1,2,3) and (4,5) are required to ensure that MIRI, NIRSpec and NIRCam observations of Titan are contemporaneous. Solar system bodies with atmospheres can exhibit significant variability of a period of weeks or months, and to maximize the ability to interpret the data across multiple instruments, these observations must be made as closely as possible in time

Diagnostics

(Visit 2:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(NIRSpec Leading Hemisphere (Obs 2)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	TITAN-LEADING	STD=SATURN	STD=TITAN	

Comments: Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	4	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G140H/F070LP	NRSRAPID	5	1	false	true	NONE	4	4	257.682	
2	G140H/F100LP	NRSRAPID	5	1	false	true	NONE	4	4	257.682	
3	G235H/F170LP	NRSRAPID	5	1	false	true	NONE	4	4	257.682	
4	G395H/F290LP	NRSRAPID	20	1	false	true	NONE	4	4	901.889	

Special Requirements	
	Sequence Observations 1, 2, 3, 6, Non-interruptible SEPARATION OF TITAN SATURN FROM JWST GREATER THAN 1.8' CENTRAL MERIDIAN LONGITUDE OF TITAN FROM JWST BETWEEN 85 95 DEFAULT WINDOW: NOT OCCULTATION OF TITAN-LEADING BY SATURN FROM JWST DEFAULT WINDOW: SEPARATION OF TITAN-LEADING RHEA FROM JWST GREATER THAN 10" DEFAULT WINDOW: ANGULAR RATE TITAN-LEADING FROM JWST LESS THAN 0.03

Observation

Proposal 1251, Observation 3: NIRCam Leading Hemisphere Sat Jul 01 23:00:34 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Comments: Central meridian longitude constraint is required to ensure that Titan leading (or trailing) hemisphere is fully, not partially observed. Without the CMT constraint, the center of the leading hemisphere (trailing hemisphere) could be substantially displaced towards the edge of the visible disk area (the limb) and therefore the leading/trailing hemisphere observations that are planned would not achieve full coverage of Titan's surface.

The special requirements for non-interruptible sequences (1,2,3) and (4,5) are required to ensure that MIRI, NIRSpec and NIRCam observations of Titan are contemporaneous. Solar system bodies with atmospheres can exhibit significant variability of a period of weeks or months, and to maximize the ability to interpret the data across multiple instruments, these observations must be made as closely as possible in time

Diagnostics

(Visit 3:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(NIRCam Leading Hemisphere (Obs 3)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(1)	TITAN-LEADING	STD=SATURN	STD=TITAN	

Comments: Extended=YES

Template

Module	Subarray	Target Placement
B	SUB160P	Module Gap

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	SUBARRAY_DITHER	3	STANDARD		1

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F164N+F150W2	F323N+F322W2	BRIGHT2	10	16	48	3	281.115	
2	F187N	F460M	RAPID	10	20	60	3	184.21	
3	F187N	F480M	RAPID	10	20	60	3	184.21	
4	F212N	F466N+F444W	BRIGHT2	10	16	48	3	281.115	
5	F140M	F250M	RAPID	10	10	30	3	92.105	
6	F162M+F150W2	F300M	RAPID	10	12	36	3	110.526	
7	F182M	F335M	RAPID	10	12	36	3	110.526	
8	F210M	F360M	RAPID	10	12	36	3	110.526	
9	F070W	F277W	RAPID	5	10	30	3	50.309	
10	F090W	F356W	RAPID	5	10	30	3	50.309	
11	F115W	F444W	RAPID	5	10	30	3	50.309	
12	F150W	F410M	RAPID	10	12	36	3	110.526	
13	F200W	F430M	RAPID	10	12	36	3	110.526	

Special Requirements	
	Sequence Observations 1, 2, 3, 6, Non-interruptible SEPARATION OF TITAN SATURN FROM JWST GREATER THAN 1.8' CENTRAL MERIDIAN LONGITUDE OF TITAN FROM JWST BETWEEN 85 95 DEFAULT WINDOW: NOT OCCULTATION OF TITAN-LEADING BY SATURN FROM JWST DEFAULT WINDOW: SEPARATION OF TITAN-LEADING RHEA FROM JWST GREATER THAN 10" DEFAULT WINDOW: ANGULAR RATE TITAN-LEADING FROM JWST LESS THAN 0.03

Observation

Proposal 1251, Observation 4: NIRSpec Trailing Hemisphere Sat Jul 01 23:00:34 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRSpec IFU Spectroscopy

Comments: Need Titan from Saturn > 1.8' to remove Saturn from MSA FOV; hence leakcal turned OFF.

Central meridian longitude constraint is required to ensure that Titan leading (or trailing) hemisphere is fully, not partially observed. Without the CMT constraint, the center of the leading hemisphere (trailing hemisphere) could be substantially displaced towards the edge of the visible disk area (the limb) and therefore the leading/trailing hemisphere observations that are planned would not achieve full coverage of Titan's surface.

The special requirements for non-interruptible sequences (1,2,3) and (4,5) are required to ensure that MIRI, NIRSpec and NIRCam observations of Titan are contemporaneous. Solar system bodies with atmospheres can exhibit significant variability of a period of weeks or months, and to maximize the ability to interpret the data across multiple instruments, these observations must be made as closely as possible in time

Diagnostics

(Visit 4:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(NIRSpec Trailing Hemisphere (Obs 4)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(2)	TITAN-TRAILING	STD=SATURN	STD=TITAN	

Comments: Extended=YES

Template

TA Method
NONE

Dithers

#	Dither Type	Size	Starting Point	Number of Points	Points
1	CYCLING	SMALL	1	4	

Spectral Elements

#	Grating/Filter	Readout Pattern	Groups/Int	Integrations/Exp	Leakcal	Dither	Autocal	Total Dithers	Total Integrations	Total Exposure Time	ETC Wkbk.Calc ID
1	G140H/F070LP	NRSRAPID	5	1	false	true	NONE	4	4	257.682	
2	G140H/F100LP	NRSRAPID	5	1	false	true	NONE	4	4	257.682	
3	G235H/F170LP	NRSRAPID	5	1	false	true	NONE	4	4	257.682	
4	G395H/F290LP	NRSRAPID	20	1	false	true	NONE	4	4	901.889	

Special Requirements	
	Sequence Observations 4, 5, Non-interruptible SEPARATION OF TITAN SATURN FROM JWST GREATER THAN 1.8' CENTRAL MERIDIAN LONGITUDE OF TITAN FROM JWST BETWEEN 258.5 282.5 DEFAULT WINDOW: NOT OCCULTATION OF TITAN-TRAILING BY SATURN FROM JWST DEFAULT WINDOW: SEPARATION OF TITAN-TRAILING RHEA FROM JWST GREATER THAN 10" DEFAULT WINDOW: ANGULAR RATE TITAN-TRAILING FROM JWST LESS THAN 0.03

Observation

Proposal 1251, Observation 5: NIRCam Trailing Hemisphere Sat Jul 01 23:00:34 GMT 2023

Diagnostic Status: Warning

Observing Template: NIRCam Imaging

Comments: Central meridian longitude constraint is required to ensure that Titan leading (or trailing) hemisphere is fully, not partially observed. Without the CMT constraint, the center of the leading hemisphere (trailing hemisphere) could be substantially displaced towards the edge of the visible disk area (the limb) and therefore the leading/trailing hemisphere observations that are planned would not achieve full coverage of Titan's surface.

The special requirements for non-interruptible sequences (1,2,3) and (4,5) are required to ensure that MIRI, NIRSpec and NIRCam observations of Titan are contemporaneous. Solar system bodies with atmospheres can exhibit significant variability of a period of weeks or months, and to maximize the ability to interpret the data across multiple instruments, these observations must be made as closely as possible in time

Diagnostics

(Visit 5:1) Warning (Form): Overheads are provisional until the Visit Planner has been run.

(NIRCam Trailing Hemisphere (Obs 5)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Solar System Targets

#	Name	Level 1	Level 2	Level 3
(2)	TITAN-TRAILING	STD=SATURN	STD=TITAN	

Comments: Extended=YES

Template

Module	Subarray	Target Placement
B	SUB160P	Module Gap

Dithers

#	Primary Dither Type	Primary Dithers	Subpixel Dither Type	Dither Size	Subpixel Positions
1	SUBARRAY_DITHER	3	STANDARD		1

Spectral Elements

#	Short Filter	Long Filter	Readout Pattern	Groups/Int	Integrations/Exp	Total Integrations	Total Dithers	Total Exposure Time	ETC Wkbk.Calc ID
1	F187N	F460M	RAPID	10	20	60	3	184.21	
2	F187N	F480M	RAPID	10	20	60	3	184.21	
3	F164N+F150W2	F323N+F322W2	BRIGHT2	10	16	48	3	281.115	
4	F212N	F466N+F444W	BRIGHT2	10	16	48	3	281.115	
5	F140M	F250M	RAPID	10	10	30	3	92.105	
6	F162M+F150W2	F300M	RAPID	10	12	36	3	110.526	
7	F182M	F335M	RAPID	10	12	36	3	110.526	
8	F210M	F360M	RAPID	10	12	36	3	110.526	
9	F070W	F277W	RAPID	5	10	30	3	50.309	
10	F090W	F356W	RAPID	5	10	30	3	50.309	
11	F115W	F444W	RAPID	5	10	30	3	50.309	
12	F150W	F410M	RAPID	10	12	36	3	110.526	
13	F200W	F430M	RAPID	10	12	36	3	110.526	

Special Requirements	
	Sequence Observations 4, 5, Non-interruptible SEPARATION OF TITAN SATURN FROM JWST GREATER THAN 1.8' CENTRAL MERIDIAN LONGITUDE OF TITAN FROM JWST BETWEEN 258.5 282.5 DEFAULT WINDOW: NOT OCCULTATION OF TITAN-TRAILING BY SATURN FROM JWST DEFAULT WINDOW: SEPARATION OF TITAN-TRAILING RHEA FROM JWST GREATER THAN 10" DEFAULT WINDOW: ANGULAR RATE TITAN-TRAILING FROM JWST LESS THAN 0.03