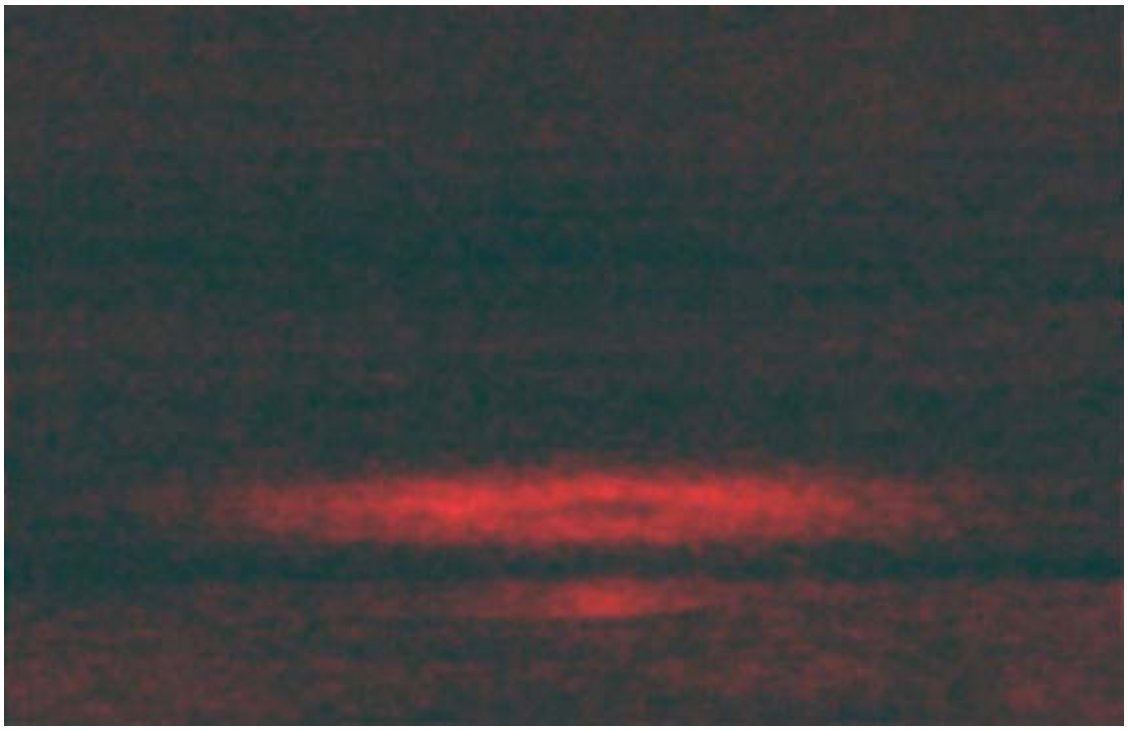
How to Catch an Elf

STS-107 Astronaut Dave Brown captured this image with the MEIDEX Xybion camera at MET 02/17:26:23.94 while over the South Pacific Ocean. The storm was located near the Earth's limb to the north of the ground track, some 1800 km away, approximately at 22 S, 155 E. MEIDEX used the 665nm filter (Red) and captured the image in a single frame. The lower bright spot is likely the cloud illuminated by the lightning preceding the Elf. This is the first image of an ELF in space from a calibrated instrument in the 665 nm filter.

Uncalibrated (Raw) ELF Image (MET 02/17:26.23.94)



Extremely Low Frequency (ELF) emanations (in the 30 Hz to 3 kHz range), familiarly referred to as Elves (in singular, usually pronounced "Elf"), are rapid lateral expansions of luminosity which take the shape of a donut in the altitude range of 85-95 km above the ground. They occur due to the Electromagnetic Pulse that emanates upward from cloud tops toward the ionosphere, usually after a powerful cloud-to-ground flash (as determined by Stanford's Professor Umran Inan and his team). They usually last for 0.1 milliseconds and have a horizontal scale of 100-300 km.

Forecast for MEIDEX

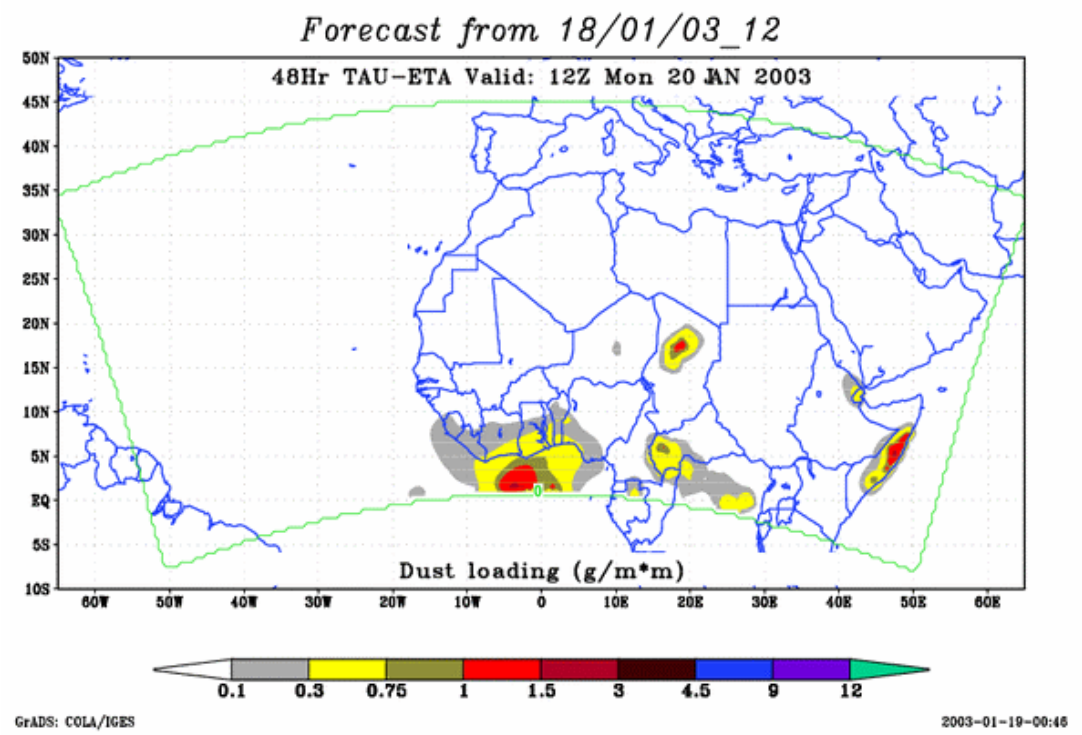
Date: 19 Jan 2003

General:

Over the next 3 days, i.e., MET 003 to 004, the "Tunisian" cyclone will move more or less around Greece (the cyclone to its west, Sicily will merge with it). This implies that no dust will be expected in the vicinity of Crete and that the weather there will be cloudy with occasional rains.

The dust maps from both Tel Aviv and Skiron models show no significant dust plumes over the Mediterranean or over the Atlantic ROIs.

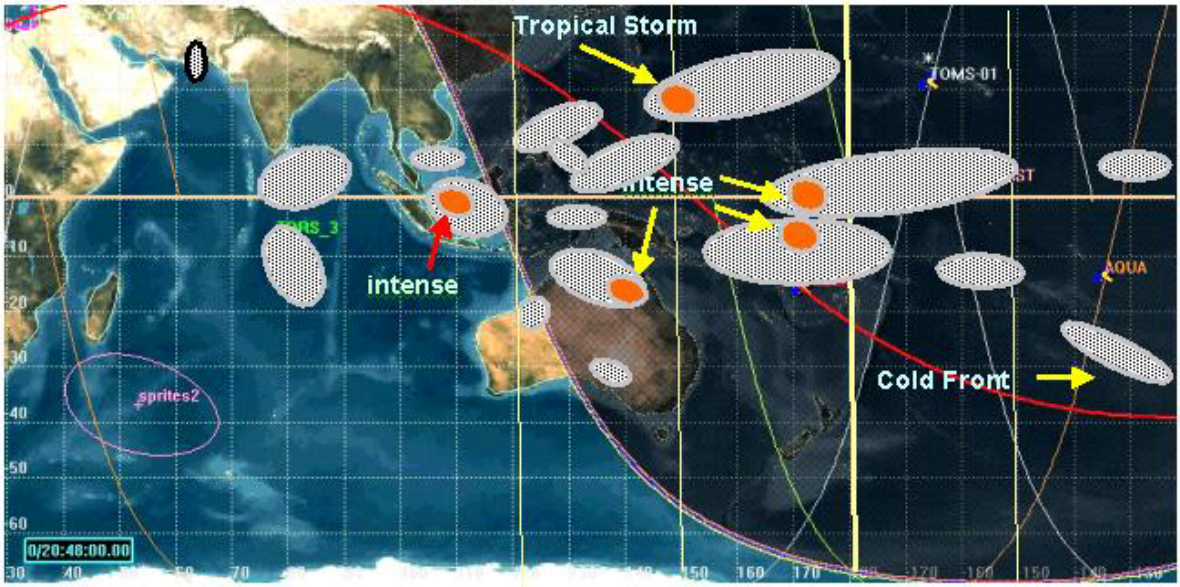
Dust Map for 20 Jan 2003 12 UTC, MET 003/20:21:00



Sprite forecast for 20 Jan 2003 12 UTC

Major storm activity continues over northern Australia, Indonesia, the Philippines and in the equatorial Pacific. We will be able to advise the exact location of those storms approximately 3 hours prior to the respective observation orbits. These storms are long persisting with a moderate to high lightning flash rate.

Sprite forecast for 19 Jan 2003 12 UTC



MSG 043A - BLUE FD05 MEIDEX OPS

MX Playback: 03/22:30 – 03/23:00
MX XFERS: 03/21:50, 04/04:40
MX PGSC SETUP (Step 5): 03/22:00, 04/04:50
Standalone Door Ops: None
Digital TV Instructions: None

Special Instructions: Crew will maintain control of payload between operations on close consecutive orbits or when extended gaps of TDRS are expected.

Orbit # 60
Observation type: Moon Cal
Video: Live Analog downlink; Recorded on VTR and V10
Special Instructions: Center Moon in Xybion FOV at start of observation. Do not start PLD VCRs until moon in Xybion FOV. Once started, record for 6 minutes.
Violations: RAM until 03/17:37

Start	Procedure	Instructions	R/NR	CMD	Notes
03/17:00	MEIDEX SETUP	Step 4 (TLM Config)	REQ	POCC	
		Step 5 (Event Log Config)	REQ	POCC	
		Step 6 (PLD VCR Act.)	REQ	POCC	VCR = 3
		Step 7 (Sekai Activation)	REQ	POCC	
03/17:15	XYBION ACTIVATION	Step 1 (Xybion Powerup)	REQ	POCC	
		Step 2 (Time/Date Config)	REQ	POCC	
03/17:20	MEIDEX SCIENCE	Step 4 (Xyb Cam Config)	REQ	POCC	Setup = Moon
		Step 6 (Truss Pntg Config)	REQ	POCC	Truss = 0
03/17:05	**MEIDEX SETUP**	**Step 1 (Timer Setup)**	**REQ**	**Crew**	
		Step 2 (PTV Check)	**REQ**	**Crew**	
		Step 3 (Tape Verification)	**REQ**	**Crew**	
03/17:25	**MEIDEX SCIENCE**	**Step 1 (Xyb Pwr Check)**	**REQ**	**Crew**	
		Step 2 (Xyb T/D Check)	**REQ**	**Crew**	
		Step 3 (Door Open)	**REQ**	**Crew**	**NET 03/17:37**
		Step 4 (Xyb Cam Config)	NR	--	Already cmded
		Step 5 (Mon 2 Checks)	**REQ**	**Crew**	**Setup = Moon**
		Step 6 (Truss Pntg Config)	NR	--	Already cmded
		Step 7 (In Cabin Record)	**REQ**	**Crew**	**Analog Dnlk**
		Step 8 (PLD VCR act)	**REQ**	**Crew**	**Do not record until moon in Xyb FOV.**
03/17:38	**T Time**	**Step 9 (Observation)**	**REQ**	**Crew**	**Proceed to step 10 after 6 minutes of PLD VCR recording or NLT 03/17:50**
NLT 03/17:50	**MEIDEX SCIENCE**	**Step 10 (PLD VCR Stop)**	**REQ**	**Crew**	
		Step 11 (In Cabin Stop)	**REQ**	**Crew**	
		Step 12 (PTV PWRDN)	NR	--	
		Step 13 (Door Close)	NR	--	
		Step 14 (PLD VCR Swap)	NR	--	
		Step 15 (Status Check)	**REQ**	**Crew**	
		Step 16 (Truss Reconfig)	**REQ**	**Crew**	

MSG 043A - BLUE FD05 MEIDEX OPS

Orbit # 61

Observation type: Sea Surface (Mediterranean)
Dust plume width: No dust is expected
Airplane Support: Yes, south of Crete
Video: Live SSV; Recorded on VTR and V10
Special Instructions: if cloud coverage is over 25%, do NOT record in PLD VCR. Continue recording in crew cabin only

Violations: None

Start	Procedure	Instructions	R/NR	CMD	Notes
NLT 03/17:55	**MEIDEX SCIENCE**	**Step 1 (Xyb Pwr Check)**	**REQ**	**Crew**	
		Step 2 (Xyb T/D Check)	**REQ**	**Crew**	
		Step 3 (Door Open)	NR	--	
		Step 4 (Xyb Cam Config)	**REQ**	**Crew**	**Setup = ROI**
		Step 5 (Mon 2 Checks)	**REQ**	**Crew**	**Setup = ROI**
		Step 6 (Truss Pntg Config)	NR	--	Already cmded
		Step 7 (In Cabin Record)	**REQ**	**Crew**	**No downlink**
		Step 8 (PLD VCR act)	**REQ**	**Crew**	**VCR = 3**
03/18:09	**T Time**	**Step 9 (Observation)**	**REQ**	**Crew**	
03/18:16	**MEIDEX SCIENCE**	**Step 10 (PLD VCR Stop)**	**REQ**	**Crew**	**NLT 03/18:17**
		Step 11 (In Cabin Stop)	**REQ**	**Crew**	
		Step 12 (PTV PWRDN)	NR	--	
		Step 13 (Door Close)	NR	--	
		Step 14 (PLD VCR Swap)	NR	--	
		Step 15 (Status Check)	**REQ**	**Crew**	
		Step 16 (Truss Reconfig)	**REQ**	**Crew**	

MSG 043A - BLUE FD05 MEIDEX OPS

Orbit # 61

Observation type: Sprite

Storm Center: Northern Australia and Indonesia. Exact location will be defined 3 hours prior to operation according to real time satellite data.

Video: Live SSV; Recorded on VTR and V10

Special Instructions: Direct Xybion FOV towards lightning activity.

Violations: None

Start	Procedure	Instructions	R/NR	CMD	Notes
NET 03/18:35	**MEIDEX SCIENCE**	**Step 1 (Xyb Pwr Check)**	**REQ**	**Crew**	
		Step 2 (Xyb T/D Check)	**REQ**	**Crew**	
		Step 3 (Door Open)	NR	--	
		Step 4 (Xyb Cam Config)	**REQ**	**Crew**	**Setup = Sprite**
		Step 5 (Mon 2 Checks)	**REQ**	**Crew**	**Setup = Sprite**
		Step 6 (Truss Pntg Config)	**REQ**	**Crew**	**Check MCC**
		Step 7 (In Cabin Record)	**REQ**	**Crew**	**No Downlink**
		Step 8 (PLD VCR act)	NR	--	
03/18:49	**T Time**	**Step 9 (Observation)**	**REQ**	**Crew**	**Maneuver truss as required to track lightning**
03/19:17	**MEIDEX SCIENCE**	Step 10 (PLD VCR Stop)	NR	--	
		Step 11 (In Cabin Stop)	**REQ**	**Crew**	
		Step 12 (PTV PWRDN)	NR	--	
		Step 13 (Door Close)	NR	--	
		Step 14 (PLD VCR Swap)	NR	--	
		Step 15 (Status Check)	**REQ**	**Crew**	
		Step 16 (Truss Reconfig)	**REQ**	**Crew**	

MSG 043A - BLUE FD05 MEIDEX OPS

Orbit # 62

Observation type: Sea Surface (Mediterranean)
Dust plume width: No dust is expected
Airplane Support: Yes, south of Crete
Video: Live SSV; Recorded on VTR and V10
Special Instructions: if cloud coverage is over 25%, do NOT record in PLD VCR. Continue recording in crew cabin only.
Violations: RAM at 19:57

Start	Procedure	Instructions	R/NR	CMD	Notes
03/19:25	**MEIDEX SCIENCE**	**Step 1 (Xyb Pwr Check)**	**REQ**	**Crew**	
		Step 2 (Xyb T/D Check)	**REQ**	**Crew**	
		Step 3 (Door Open)	NR	--	
		Step 4 (Xyb Cam Config)	**REQ**	**Crew**	**Setup = ROI**
		Step 5 (Mon 2 Checks)	**REQ**	**Crew**	**Setup = ROI**
		Step 6 (Truss Pntg Config)	**REQ**	**Crew**	**Truss = 0**
		Step 7 (In Cabin Record)	**REQ**	**Crew**	**No Downlink**
		Step 8 (PLD VCR act)	**REQ**	**Crew**	**VCR = 3**
03/19:44	**T Time**	**Step 9 (Observation)**	**REQ**	**Crew**	
03/19:51	**MEIDEX SCIENCE**	**Step 10 (PLD VCR Stop)**	**REQ**	**Crew**	**NLT 03/19:52 Deselect AUTOTLM; notify MCC, GO for POCC cmd**
		Step 11 (In Cabin Stop)	**REQ**	**Crew**	
		Step 12 (PTV PWRDN)	NR	--	
		Step 13 (Door Close)	**REQ**	**Crew**	**NLT 03/19:55**
		Step 14 (PLD VCR Swap)	NR	--	
		Step 15 (Status Check)	REQ	POCC	
		Step 16 (Truss Reconfig)	REQ	POCC	
03/19:55	MEIDEX Closeout	Step 3 (Xybion Deact)	REQ	POCC	
03/19:57	**RAM Violation**	**Door must be closed**			

MSG 043A - BLUE FD05 MEIDEX OPS

Orbit # 63

Observation type: sea surface (Mediterranean)
Dust plume width: No dust is expected
Dust Plume Location: N/A
Airplane Support: no
Video: Live SSV; Recorded on VTR and V10
Special Instructions: if cloud coverage is over 25%, do NOT record in PLD VCR. Continue recording in crew cabin only
Violations: RAM at 03/21:39

Start	Procedure	Instructions	R/NR	CMD	Notes
03/20:55	XYBION ACTIVATION	Step 1 (Xybion Powerup)	REQ	POCC	
		Step 2 (Time/Date Config)	REQ	POCC	
03/21:00	MEIDEX SCIENCE	Step 4 (Xyb Cam Config)	REQ	POCC	Setup = ROI
		Step 6 (Truss Pntg Config)	REQ	POCC	Truss = 0
03/21:05	**MEIDEX SCIENCE**	**Step 1 (Xyb Pwr Check)**	**REQ**	**Crew**	
		Step 2 (Xyb T/D Check)	**REQ**	**Crew**	
		Step 3 (Door Open)	**REQ**	**Crew**	**NLT 03/21:13**
		Step 4 (Xyb Cam Config)	NR	--	Already cmded
		Step 5 (Mon 2 Checks)	**REQ**	**Crew**	**Setup = ROI**
		Step 6 (Truss Pntg Config)	NR	--	Already cmded
		Step 7 (In Cabin Record)	**REQ**	**Crew**	**No downlink**
		Step 8 (PLD VCR act)	**REQ**	**Crew**	**VCR = 3**
03/21:18	**MEIDEX SCIENCE**	**Step 9 (Observation)**	**REQ**	**Crew**	
03/21:23	**MEIDEX SCIENCE**	**Step 10 (PLD VCR Stop)**	**REQ**	**Crew**	**NLT 03/21:24. Deselect AUTOTLM; notify MCC, GO for POCC cmd**
		Step 11 (In Cabin Stop)	**REQ**	**Crew**	
		Step 12 (PTV PWRDN)	**REQ**	**Crew**	
		Step 13 (Door Close)	**REQ**	**Crew**	**NLT 03/21:37**
		Step 14 (PLD VCR Swap)	NR	--	
		Step 15 (Status Check)	REQ	POCC	
		Step 16 (Truss Reconfig)	REQ	POCC	
03/21:25	MX CLOSEOUT	Steps 1-4	REQ	POCC	
03/21:39	**RAM Violation**	**Door must be closed**			
03/21:50	**MX CLOSEOUT**	**Step 5 (File Transfer)**	**REQ**	**Crew**	**Do not enable autotlm after transfer**
03/22:00	**MX PGSC SETUP**	**Step 5 (MX TLM Config)**	**REQ**	**Crew**	

MSG 043A - BLUE FD05 MEIDEX OPS

Orbit #66

Observation type: Sprite

Storm Center: Northern Australia and Indonesia. Exact location will be defined 3 hours prior to operation according to real time satellite data

Video: Live SSV; Recorded on VTR and V10

Special Instructions: Direct the Xybion FOV towards lightning activity.

Violations: None

Start	Procedure	Instructions	R/NR	CMD	Notes
04/01:25	MEIDEX SETUP	Step 4 (TLM Config)	REQ	POCC	
		Step 5 (Event Log Config)	REQ	POCC	
		Step 6 (PLD VCR Act.)	REQ	POCC	VCR = 3
		Step 7 (Sekai Activation)	REQ	POCC	
04/01:45	XYBION ACT	Step 1 (Xybion Powerup)	REQ	POCC	
		Step 2 (Time/Date Config)	REQ	POCC	
04/01:50	**MEIDEX SETUP**	**Step 1 (Timer Setup)**	**REQ**	**Crew**	
		Step 2 (PTV Check)	**REQ**	**Crew**	
		Step 3 (Tape Verification)	**REQ**	**Crew**	
04/01:55	MEIDEX SCIENCE	Step 4 (Xyb Cam Config)	REQ	POCC	Setup = Sprite
04/02:05	**MEIDEX SCIENCE**	**Step 1 (Xyb Pwr Check)**	**REQ**	**Crew**	
		Step 2 (Xyb T/D Check)	**REQ**	**Crew**	
		Step 3 (Door Open)	**REQ**	**Crew**	**NLT 04/02:15**
		Step 4 (Xyb Cam Config)	NR	--	Already cmded
		Step 5 (Mon 2 Checks)	**REQ**	**Crew**	**Setup = Sprite**
		Step 6 (Truss Pntg Config)	**REQ**	**Crew**	**Check MCC**
		Step 7 (In Cabin Record)	**REQ**	**Crew**	**No downlink**
		Step 8 (PLD VCR act)	NR	--	
04/02:20	**T Time**	**Step 9 (Observation)**	**REQ**	**Crew**	**Maneuver truss as required to track lightning**
04/02:40	**MEIDEX SCIENCE**	Step 10 (PLD VCR Stop)	NR	--	
		Step 11 (In Cabin Stop)	**REQ**	**Crew**	**Deselect AUTOTLM; notify MCC, GO for POCC cmd**
		Step 12 (PTV PWRDN)	NR	--	
		Step 13 (Door Close)	**REQ**	**Crew**	**NLT 04/02:48**
		Step 14 (PLD VCR Swap)	NR	--	
		Step 15 (Status Check)	REQ	POCC	
		Step 16 (Truss Reconfig)	REQ	POCC	
04/02:45	MEIDEX Closeout	Step 3 (Xybion Deact)	REQ	POCC	

MSG 043A - BLUE FD05 MEIDEX OPS

Orbit #67

Observation type: Sprite

Storm Center: northern Australia and Indonesia. Exact location will be defined 3 hours prior to operation according to real time satellite data

Video: Live Analog Downlink; Recorded on VTR and V10

Special Instructions: Direct the Xybion FOV towards lightning activity.

Violations: None

Start	Procedure	Instructions	R/NR	CMD	Notes
04/03:20	XYBION ACTIVATION	Step 1 (Xybion Powerup)	REQ	POCC	
		Step 2 (Time/Date Config)	REQ	POCC	
04/03:25	MEIDEX SCIENCE	Step 4 (Xyb Cam Config)	REQ	POCC	Setup = Sprite
04/03:35	**MEIDEX SCIENCE**	**Step 1 (Xyb Pwr Check)**	**REQ**	**Crew**	
		Step 2 (Xyb T/D Check)	**REQ**	**Crew**	
		Step 3 (Door Open)	**REQ**	**Crew**	**NLT 04/03:45**
		Step 4 (Xyb Cam Config)	NR	--	Already cmded
		Step 5 (Mon 2 Checks)	**REQ**	**Crew**	**Setup = Sprite**
		Step 6 (Truss Pntg Config)	**REQ**	**Crew**	**Check MCC**
		Step 7 (In Cabin Record)	**REQ**	**Crew**	**Analog Dnlk**
		Step 8 (PLD VCR act)	NR	--	
04/03:50	**T Time**	**Step 9 (Observation)**	**REQ**	**Crew**	**Maneuver truss as required to track lightning**
04/04:15	**MEIDEX SCIENCE**	Step 10 (PLD VCR Stop)	NR	--	
		Step 11 (In Cabin Stop)	**REQ**	**Crew**	**Deselect AUTOTLM; notify MCC, GO for POCC cmd**
		Step 12 (PTV PWRDN)	**REQ**	**Crew**	
		Step 13 (Door Close)	**REQ**	**Crew**	**NLT 04/04:20**
		Step 14 (PLD VCR Swap)	NR	--	
		Step 15 (Status Check)	REQ	POCC	
		Step 16 (Truss Reconfig)	REQ	POCC	
04/04:20	MX CLOSEOUT	Steps 1-4	REQ	POCC	
04/04:40	**MX CLOSEOUT**	**Step 5 (File Transfer)**	**REQ**	**Crew**	
04/04:50	**MX PGSC SETUP**	**Step 5 (MX TLM Config)**	**REQ**	**Crew**	