Managed and Supported Missions in the Joint Polar Satellite System (JPSS) Common Ground System (CGS)

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NOAA and NASA are jointly acquiring the next-generation civilian operational weather and environmental satellite system: the Joint Polar Satellite System (JPSS). JPSS will contribute the afternoon orbit component and ground processing system to replace the current Polar-orbiting Operational Environmental Satellites (POES) managed by NOAA and the ground processing component of the POES. The JPSS satellites will carry a suite of sensors designed to monitor global environmental conditions in addition to collecting and disseminating data related to the weather, atmosphere, oceans and land. The ground processing system for JPSS, known as the Common Ground System (JPSS CGS), provides command, control, communications, data processing and product delivery. The CGS currently flies the Suomi National Polar-orbiting Partnership (S-NPP) satellite and acquires, routes and processes S-NPP mission data to provide Environmental Data Records (EDRs) to NOAA and partner agency's processing centers, generating multiple terabytes per day across more than two dozen environmental data products. Beyond mission management and data processing for the Suomi NPP and JPSS missions, the CGS also provides global data routing support to six additional missions and data acquisition to three of those missions. The CGS's flexible architecture allows for multimission capabilities that offer significant opportunities for cost reduction and improved information integration across missions.

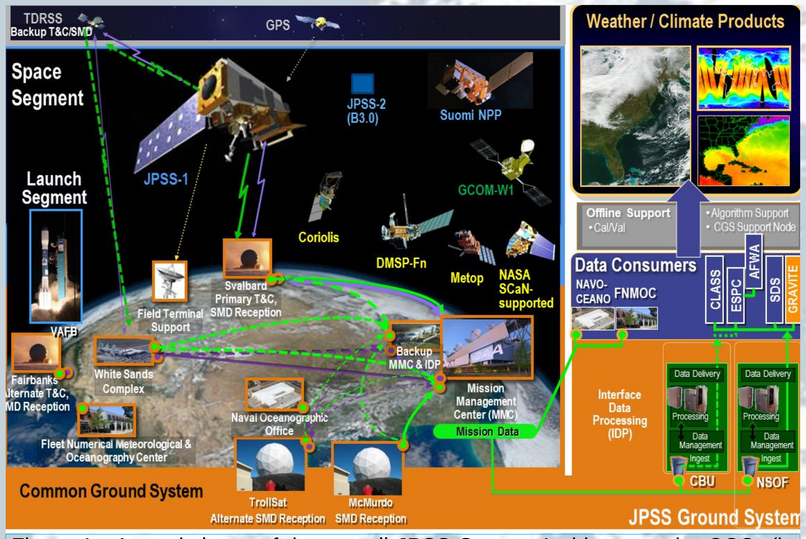

Figure 1. As a vital part of the overall JPSS System Architecture, the CGS (in orange) provides: (1) command, control, and data routing via a ground network of antennae, fiber-based WAN and Mission Management Centers, and (2) data processing at NSOF and CBU.

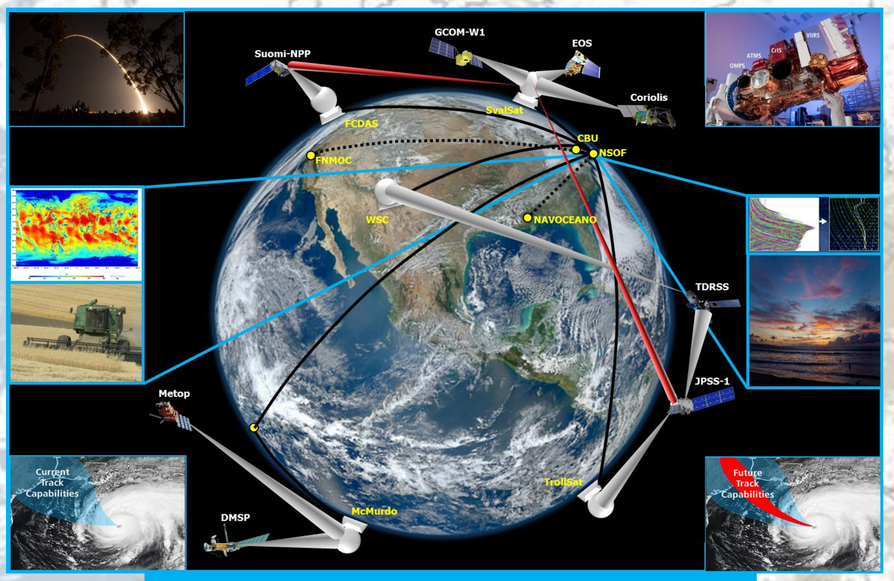

Figure 2: The CGS Multi-Mission Operations Concept

JPSS Service and Mission Information		JPSS-Supported Missions (Managed and operated by other agencies and supported by one or more JPSS CGS services)						JPSS-Managed Missions (Managed and operated by JPSS Program)		
		NSF	Coriolis/ WindSat	SCaN	DMSP	MetOp	GCOM-W1	S-NPP	JPSS-1	JPSS-2
Mission/Payload Type		Comm	MW	IR-Vis-O_3-UV-Chem	MW-IR-UV-Vis-SEM	MW-IR-Vis-SEM	MW	MW-IR-UV-Vis-O_3-ER	MW-IR-UV-Vis-O_3-ER	MW-IR-UV-Vis-O_3-ER
# of Payloads Supported		N/A	1	15	6	7	1	5	5	5
Number of Spacecraft Supported	Now (10)	N/A	1	3	2	2	1	1	0	0
	Future (12+)	N/A	1	4	2	3	1	1	1	1
Launch Date		N/A	Current - Operational						J1: 2017	J2: 2021
Mission Planning		No	No	No	No	No	No	Yes	Yes	Yes
Spacecraft Control		No	No	No	No	No	No	Yes	Yes	Yes
Satellite TLM		No	No	No	No	No	No	Yes	Yes	Yes
Data Acquisition		No	Yes	No	Yes	No	Yes	Yes	Yes	Yes
Data Routing		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data Processing/ Distribution		No	No	No	No	No	RDR-level	XDR-level	XDR-level	XDR-level
Data Product Calibration/Validation		No	No	No	No	No	No	Yes	Yes	Yes
Field Terminal Support		No	No	No	No	No	No	Yes	Yes	Yes

*Data Acquisition for JPSS-Supported Missions, Cal/Val, and Field Terminal Support (FTS) Provided by JPSS GS (not part of CGS)
[1]: DMSP Acquisitions at McMurdo Station Antarctica are scheduled by CGS, [2]: GCOM-W1 Acquisitions use CGS equipment at Svalbard,
[3]: POES services are removed starting in Block 2.0, [4]: The CGS interfaces with the FTS in Block 2.0 (e.g. ANC, SA, etc.)

Figure 3. The CGS supports and/or manages 10 satellites now and 12 or more in the future. CGS's services include Mission Planning; Spacecraft Command & Control; Data Acquisition, Routing, Processing and Distribution; and Cal/Val.

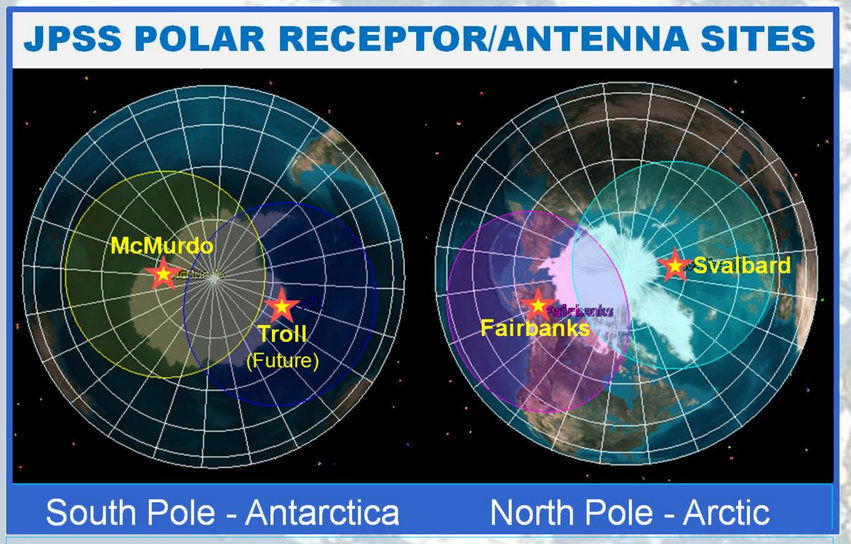

Figure 4. CGS supports four global ground stations, and TDRSS White Sands ground station, that can receive Suomi NPP and/or JPSS-1 mission data.

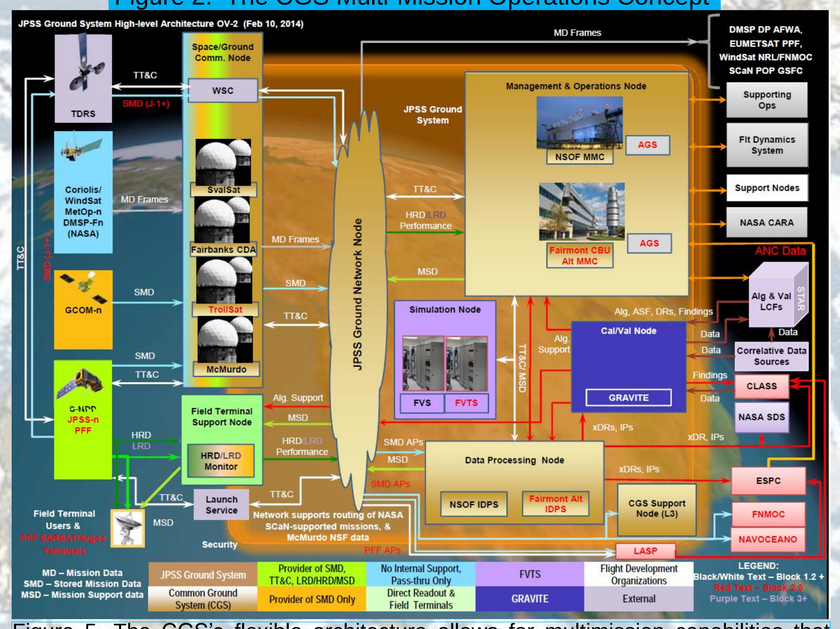

Figure 5. The CGS's flexible architecture allows for multimission capabilities that offer significant opportunities for cost reduction and improved information integration across missions.

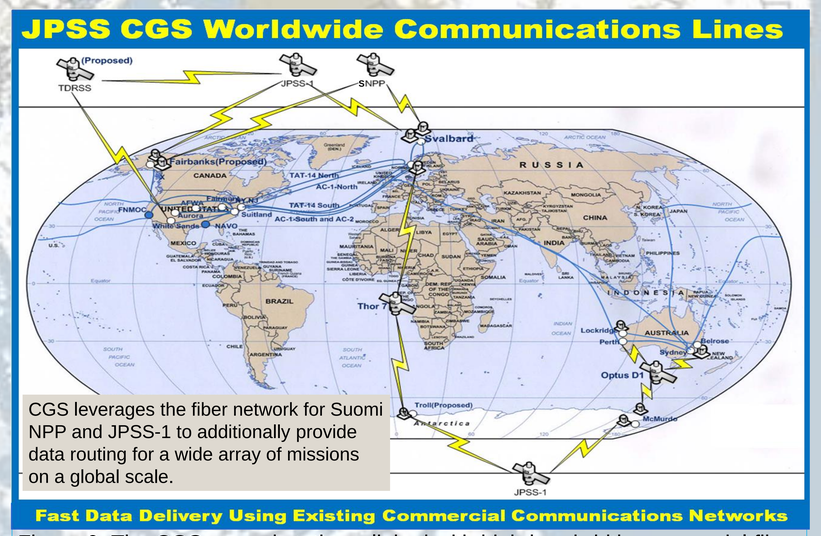

Figure 6. The CGS ground stations, linked with high-bandwidth commercial fiber, can quickly transport the data to the processing centers for environmental product generation and delivery.

Figure 7. The multimission capabilities of the CGS facilitate support to an array of missions beside S-NPP and JPSS.