GOES Data Collection System (DCS)

Overview and Updates

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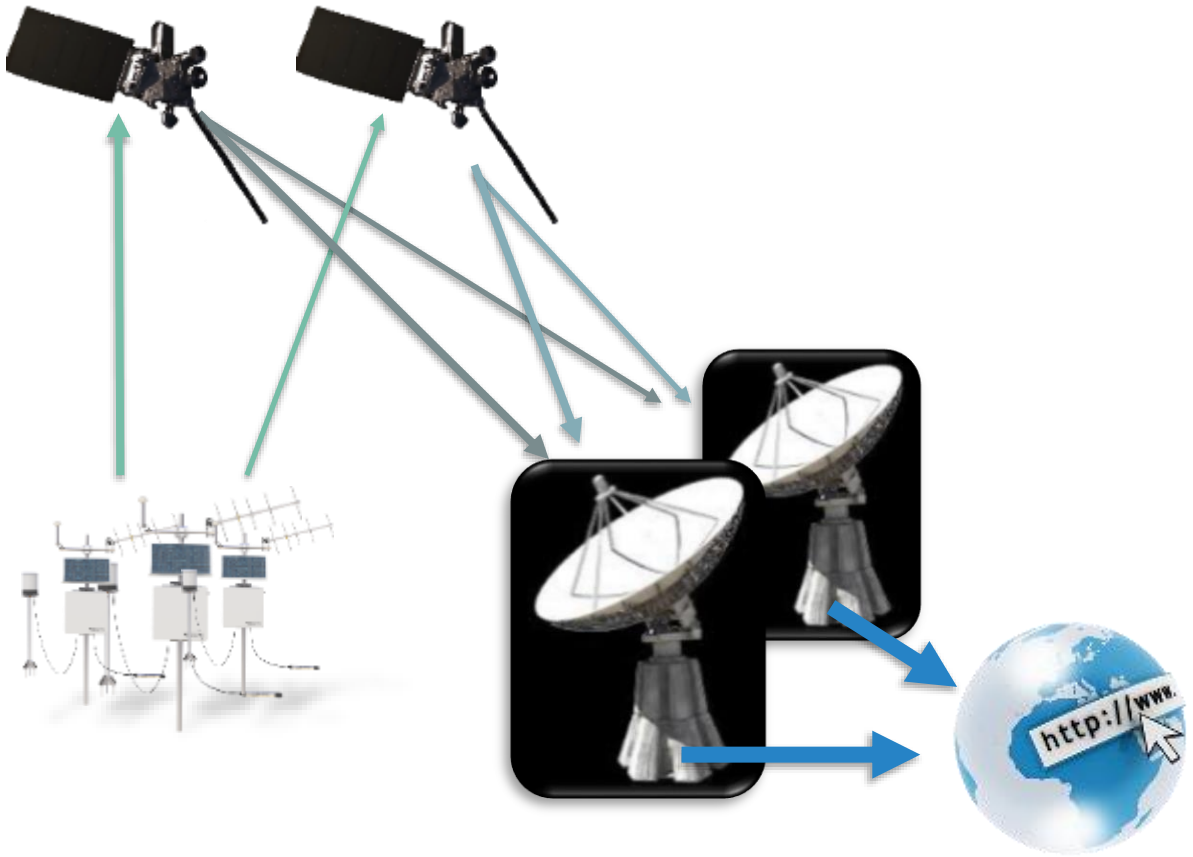
GOES DCS Update - Agenda

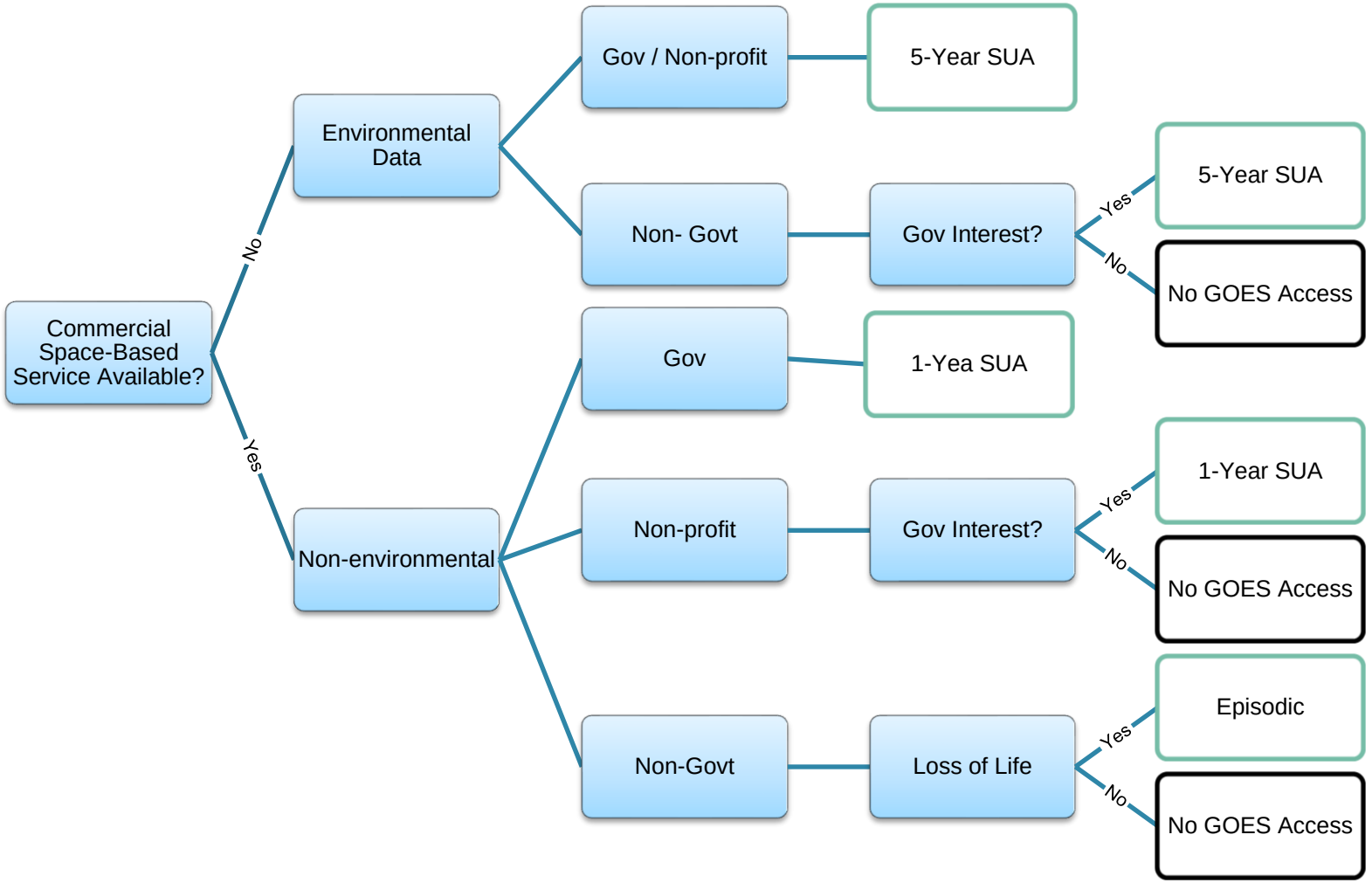
- GOES DCS Overview
- GOES DCS Issues
  - CS1 to CS2 Transition
  - Radio Frequency Interference
  - GOES Inclination
  - GeoXO
  - Current Events
- GOES DCS Updates and Projects
  - Replacement DADDS
  - Latitude/Longitude and more
  - Communication Protocols
  - DCP Commanding (DCPC) –aka Two-way Comms

GOES DCS Overview



Satellites:	GOES East – 89.5ºW GOES West – 137ºW GOES 16 – In Transit to Storage*
Data Collection Platforms:	33,592 active 43,000+ registered
DCS DCP Uplink:	401-402 MHz
DCS DCP Downlink:	468 MHz
GOES Downlink:	1679.7 - 1680.1 MHz
Agency Agreements:	728
Countries Participating:	42
***DCS will request use of GOES-16 Auxiliary Comms for DCS for continued RFI mitigation testing.**	

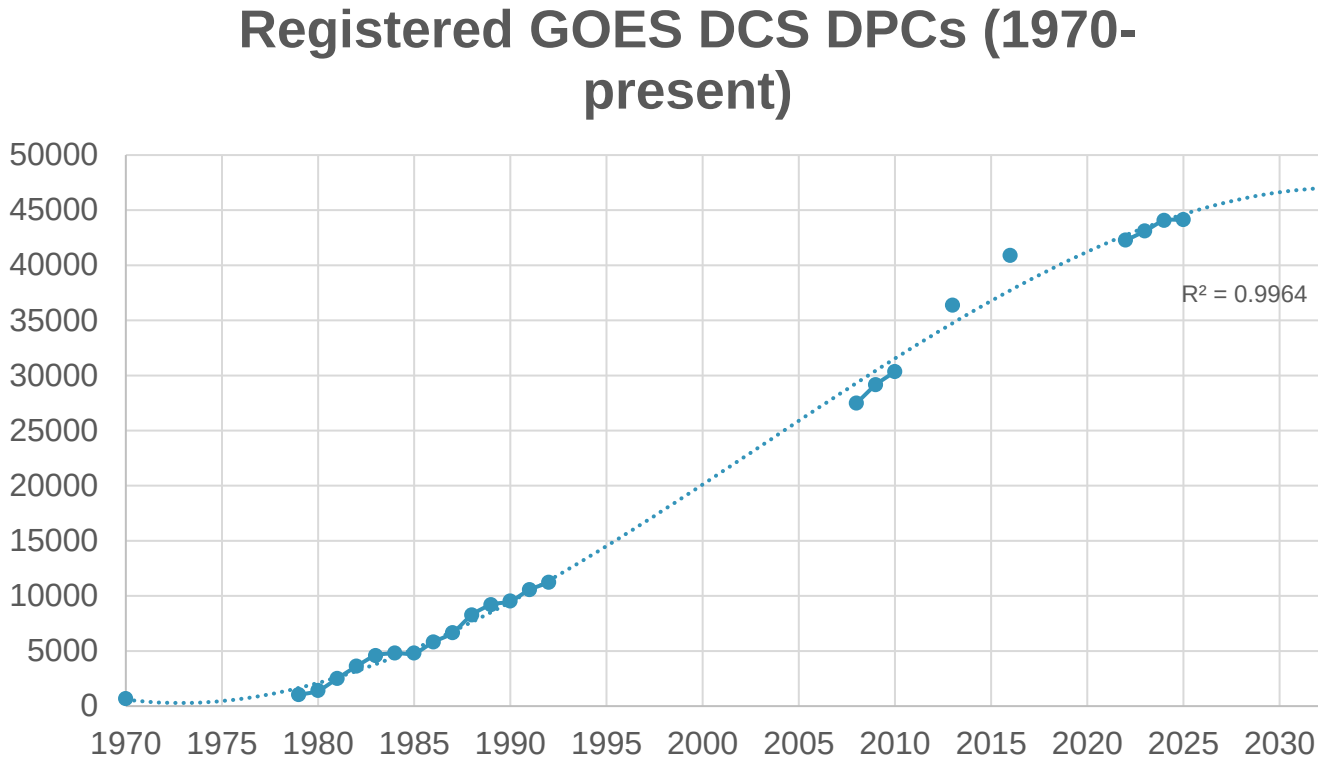
GOES DCS - Access



General summary of US 15 CFR 911, not authoritative.

GOES DCS Overview - DCS Growth

- System Growth remains ~2% year



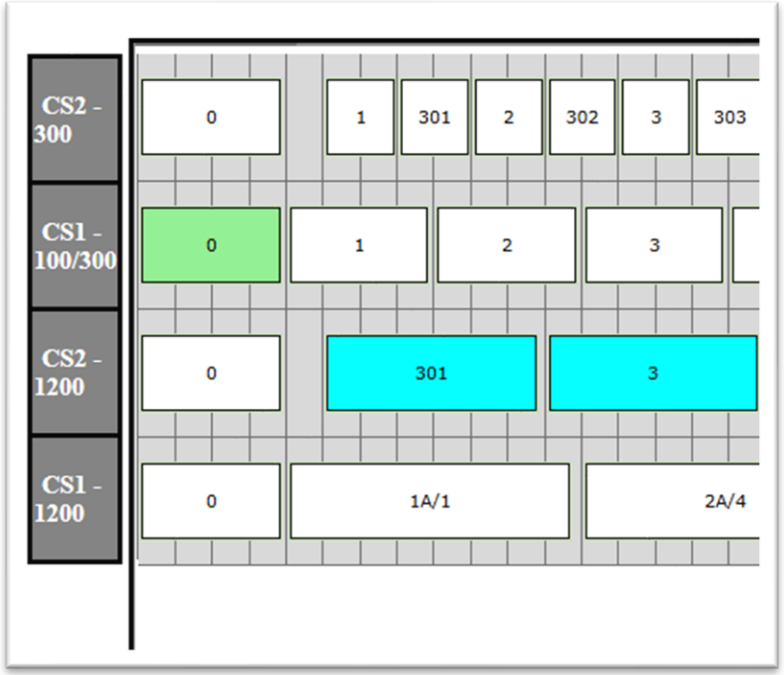
GOES DCS Overview – DCS Users and Users

- Water Level Monitoring and Flood Alerting
- Navigable Waterway Management (River, Canals and Locks)
- Water Retention & Allocation
- Fire Prediction and Firefighting
- Seismic Alerting and Tsunami Warning
- Avalanche Warning
- Weather
- Climate Research
- System Technology and Testing
- …and more!

Country	# DCPs
United States	>22,000
Canada	>4500
Brazil	>1500
Chile, Mexico, Colombia	>700
Peru	>400
Puerto Rico, Panama, Venezuela	>100
Nicaragua, Honduras, Argentina	>50
Ecuador, Dominica, Suriname, Belize, Grenada, El Salvador, Bolivia	>20
St. Lucia, French Polynesia, Dominican Republic, Uruguay, Guyana	>10
25 Additional Countries	One or more

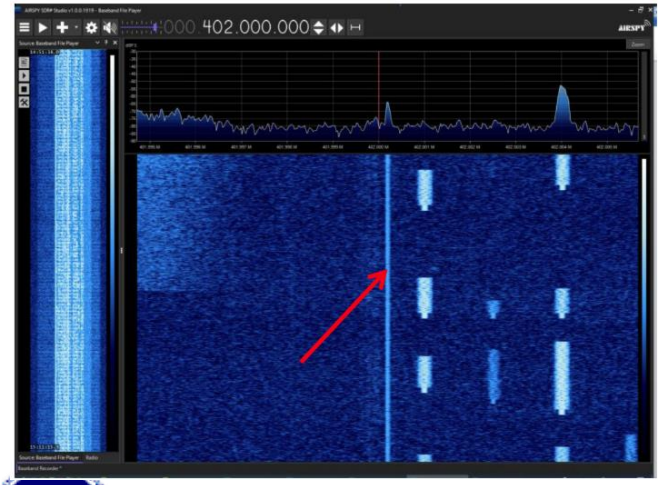
GOES DCS Issues – CS1 to CS2

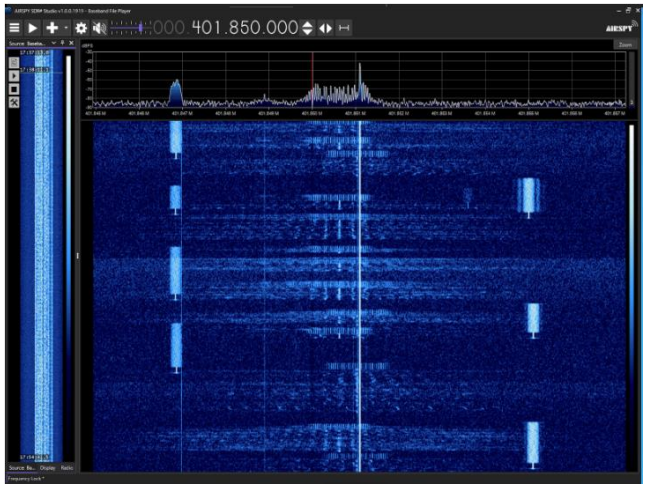
- NOAA published Communication Standard 2 in June 2009, Transition period ends May 31, 2026
- 33,542 Active Platforms
  - 1018893 messages in a given day, CS1: 120682, CS2: 897755. CS1: 13% CS2: 87%
  - 366 Organizations are <50% CS2, 215 Organizations are at 0% compliance
- User Engagement Effort:
  - DCS staff sent 260 messages to users still operating CS1
  - Many, many organizations responded with a status and their plan – **THANK YOU!!!**
  - User engagement will continue…
- GOES DCS Program is trying to consolidate all post-C2 deadlines to dedicated channels. *Optimal but not always possible.*
- Operators that utilize CS1 after May 31 **and have not** pre-coordinated with the GOES DCS Program may be reported to Regulatory Agencies

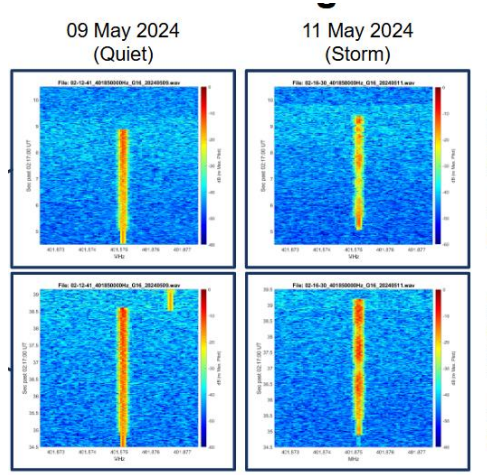


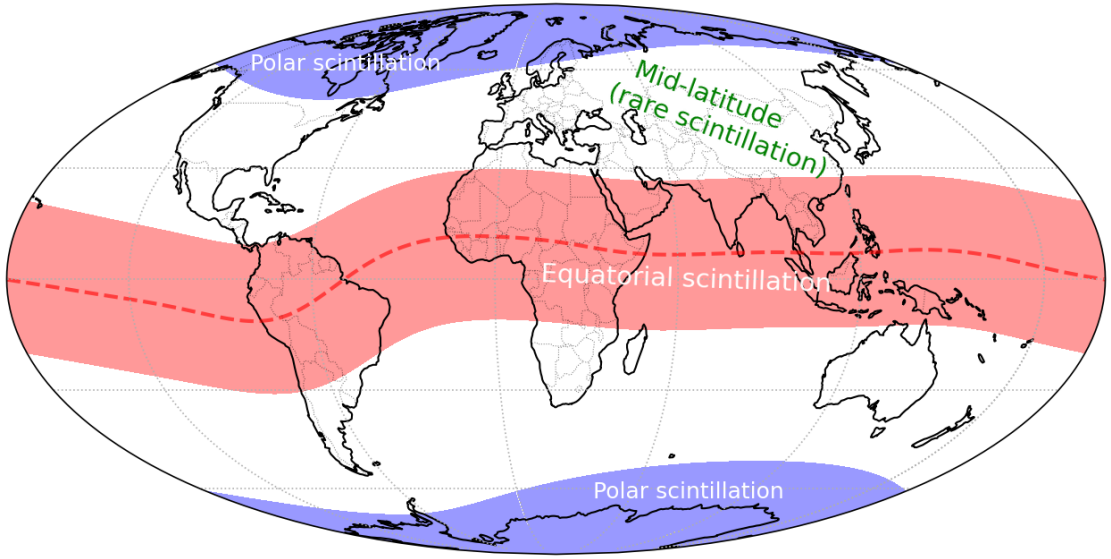
GOES DCS Issues - Radiofrequency Interference (RFI)

- GOES DCS is impacted by a number of interfering RF effects in the UHF Uplink
  - Constant Carriers
  - Voice
  - Space Weather (Ionospheric Scintillation)









Ionospheric Scintillation Graphics courtesy of Boston College, 2025

GOES DCS Issues – What do to about RFI?

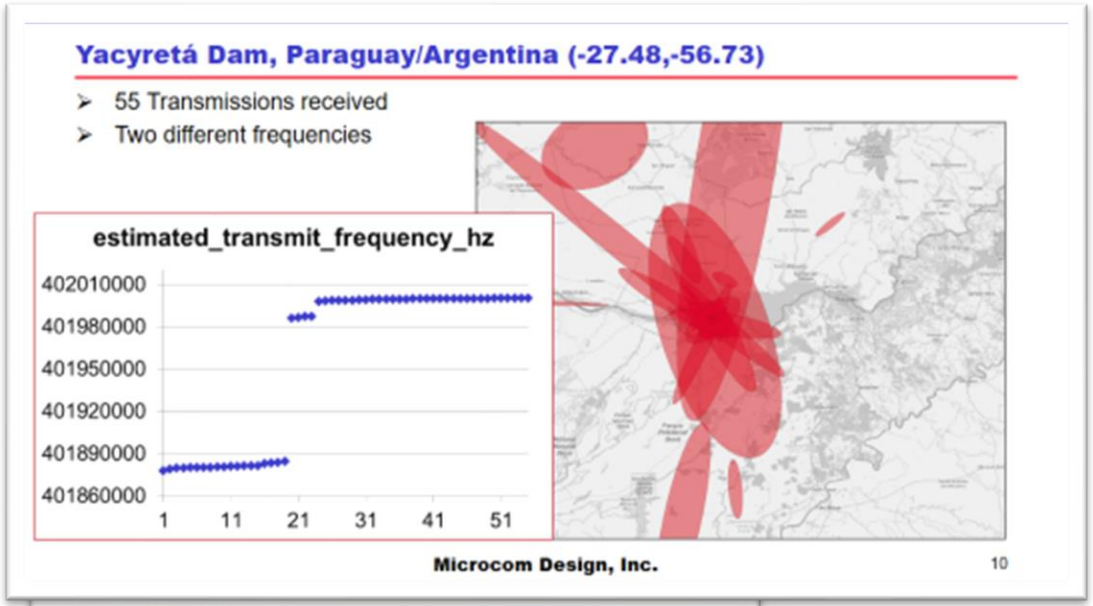
- Identify a Persistent Problem
  - ~1500-2000 Parity Errors Per Day
  - User input
  - System Monitoring (primarily increases in Parity Errors)
  - Space Weather Prediction Center - https://www.swpc.noaa.gov/
- Mitigate
  - Use of Spare Demodulators
  - Voluntary channel/time slot assignment changes
  - **Cross Ingest from both NOAA downlink sites for "best message" in DADDS**
  - Alternate Satellite Data Paths – GOES-17 transition GOES-16 in Storage
  - Explore more robust DCP communication protocols – To Be Discussed on Day 2
- *Predict – emerging possibility*
  - Use of DCS as a Space Weather Sensor to improve modeling
  - DCS DADDS Statistics for "S_{DCS}" or S_4

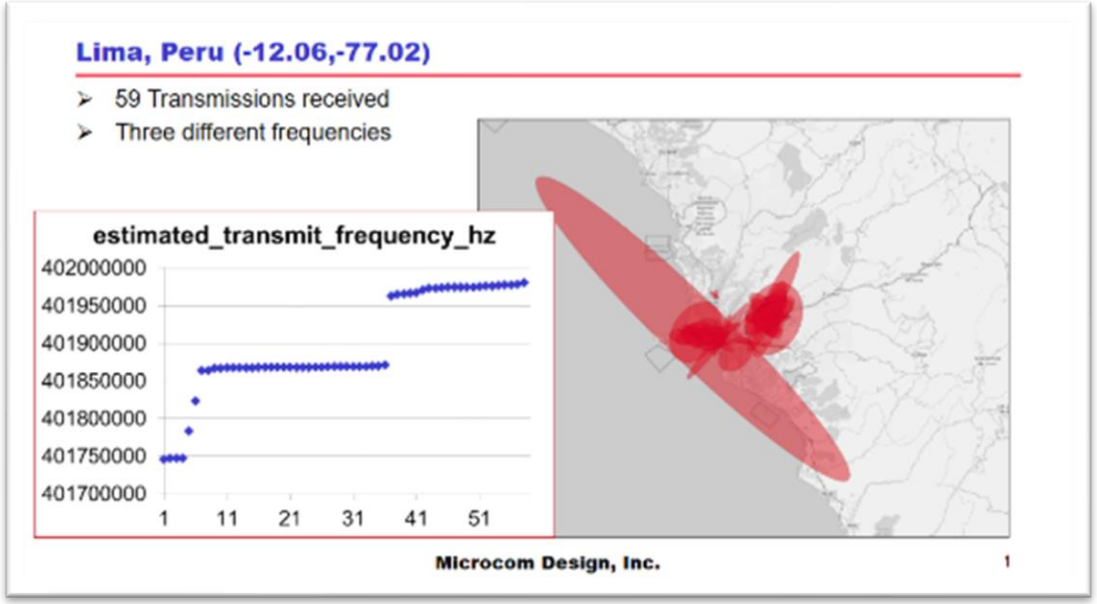
GOES DCS Issues – What do to about RFI?

- Remove
  - Locate
    - NOAA does not have formal geolocation capability – reliant on interagency support
    - If a DCP is a source we can typically find out who and where
  - Remove
    - Coordinate with DCS User(s)
    - Coordinate with NOAA international affairs and the Department of State
    - Work with regional DCS stakeholders that might have better contact information
    - Submit RFI Reports to the NTIA, FCC, or ITU

Hope that creativity, innovation, partnerships, persistence, and a little luck payoff!

GOES DCS Issues – Signals Removed in 2025!





GOES and GeoXO

- GOES Inclination Drift
  - **What**: Effort to extend GEO satellite life in the even of GeoXO issues
  - **Why**: fuel saving measure to prolong GOES service lives
  - **How**: allow satellite to drift +/- 5 degree
  - **When**: GOES-16 in storage (June 2025)
  - **Who**: may affects DCS users at the extreme edges of the GOES footprint
- GeoXO – No **Official** Changes, DCS w/ DCPC is still in the Baseline

No impact for years
Limited impact

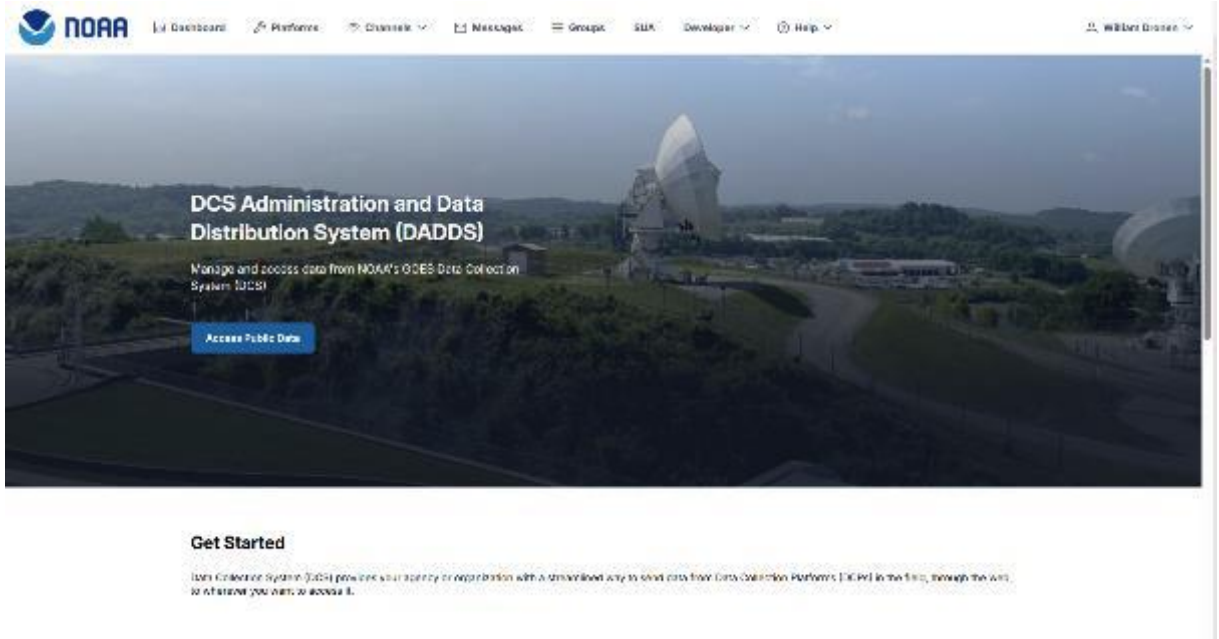
Case of marginal impact vs no satellite

GOES DCS – Impacts or Implications Based on Current Events

- No official communication regarding a stance on the DCS Program and Capability
- New administrative processes, contract procedures *may* have echoing impacts on DCS Program Management
  - All expenditures above a certain level must be approved at the Department level.
    - DCS Operations and Sustainment Support has made it through this process.
    - Replacement DADDS is not affected
    - Direct Service Branch (DSB) Data Support Team (DST) contract option is pending approval
- Loss of positions has required redirect of resources (time) to address issues in other program areas.
- Spectrum Reallocation or Spectrum Sharing
  - Users should monitor public announcements or notices related to bands they need

GOES DCS Updates & Projects – Replacement DADDS

- DCS DADDS IT Modernization – Replacement DADDS (RDADDS) Project
  - Development Environment is in NOAA's Common Cloud Framework (NCCF)
  - User Acceptance Testing (UAT) environment is on request.
  - Production Environment to follow
- **Demo of tomorrow**!

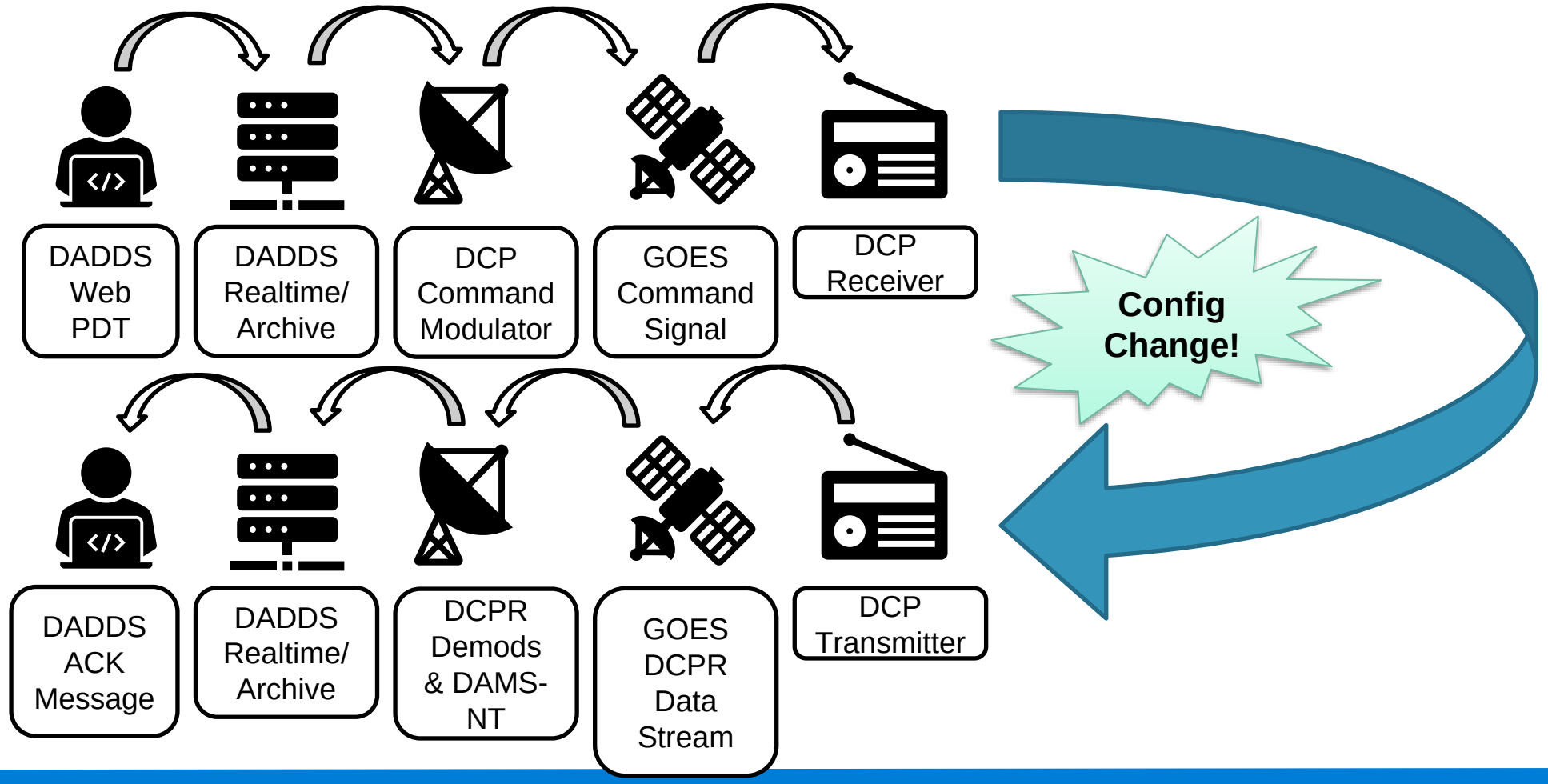


GOES DCS Projects – Lat/Long & More

- Demodulation Capability for Development
- Latitude/Longitude - pending DADDS Realtime & Demod Dev System
- Communication Protocols – **firmware/software only**

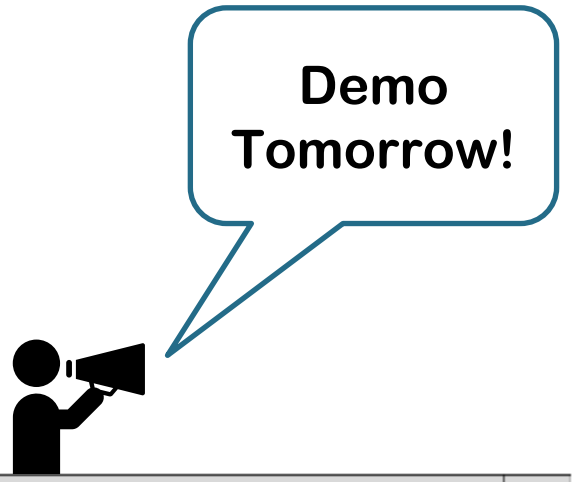
DCS Communication Protocol Matrix	Data Rates					
	300	400		800		1200
ASCII	X					X
Compacted ASCII	X					X
Pseudobinary	X					X
Compacted Pseudobinary	X					X
Binary	X	X	RS	X	RS	X
Enhanced DCP Protocol		X	RS	X	RS	

GOES DCS Updates & Projects – DCPC



GOES DCS Projects - DCPC

- NOAA has committed to restoring DCP Commanding on GOES
  - Successful End-to-End Demonstration in 2023
  - DCS DADDS was used to sent remote commands to lab DCP via GOES
    - “Ping” with acknowledge, Disable transmitter Enable Transmitter, Change DCP Channel
  - Notional Concept of Operations
    - DCPs are programmed to “listen” following scheduled or unscheduled broadcasts.
    - 255 Possible Commands
    - Industry will be provided with a Reference Design



CMD Code	Short Description	Long Description	R/O
0x00	Fill	Data has no meaning; it is used as a fill between commands	R
0x01	Ping	Requests a response from the platform to check if it is still active.	R
0x02	Software Reset	DCP must execute software reset after acknowledgement.	R
0x03	Hardware Reset	DCP should execute a hard reset after acknowledgement.	O
0x04	Disable Timed	Disable Self-Timed transmissions until specified date/time	R
0x05	Enable Timed	Enable Self-Timed transmissions (use after indefinite disable).	R
0x06	Disable Random	Disable Random transmissions until specified date/time	R
0x07	Enable Random	Enable Random transmissions (use after indefinite disable).	R
0x08	Enb/Dis DCP	Enable/Disable the DCP (if supported).	O
0x09	Failsafe Reset	Reset transmitter failsafe.	R
0x0A	Transmitter Status	Send DCP transmitter status and key performance metrics.	R
0x0B	Receiver Status	Send DCPC receiver status and key performance metrics.	R
0x0C	Set Platform ID	Set 32-Bit DCP Address	R
0x0D	Receiver Listen	Set DCPC receiver listen (aka power up) mode/times.	R
0x0E	Force GPS Sync	Force a GPS Sync and report result.	R
0x0F	Lat/Lon/TxID	Initiate a Lat/Lon/TxID Report Sequence	O
0x10	Resend Timed Tx	Resend a Self-Timed Message on Specified Channel	O
0x11	Future		?
thru	Future	**NOTE: Some of these could be system/manufacturer specific.**	?
0x1F	Future		?

Questions?