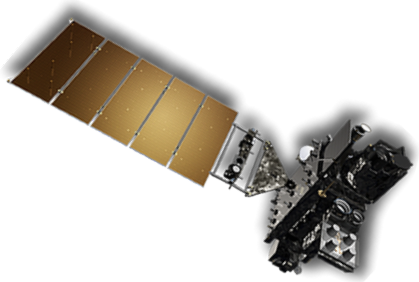
NOAA Wallops CDA Station
GOES Data Collection System

NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

GOES Spacecraft Constellation

- GOES-16: Prime East S/C @ 75.2° W Longitude
  - ➢ Replaced G13, 18 Dec, 2017
- GOES-15: Prime West S/C @ 135° W Longitude
- GOES-14: Storage @ 105° W Longitude
  - ➢ Currently supporting EMWIN & LRIT
- GOES-13: Storage @ 60° W Longitude
  - ➢ Arrived 31 Jan, 2018
- GOES-17: Parked @ 89.5° W Longitude for testing
  - ➢ Scheduled to replace G15 late 2018 @ 137° W

GOES 16



- NOAA's newest geostationary satellite series replaced GOES 13 at 75° West,18 Dec, 2017.

- **Reminder:** The GOES R satellite series frequency plan is different from the plan currently in use by the GOES 14 and 15 satellites. GOES DRGSs supported the GOES East (GOES 13) DCS downlink in the frequency range of 1694.30 to 1694.70 MHz. The GOES R series satellites uses 1679.70 to 1680.10 MHz to support the DCS downlink.

- Note that the GOES 16 frequency plan changes do NOT affect the Data Collection Platform (DCP) UHF-Band uplink transmissions, only the L-Band downlink to NOAA and the DRGSs.
- There are NO frequency changes in the DCS DOMSAT Ku-Band service.

- **http://www.goes-r.gov**

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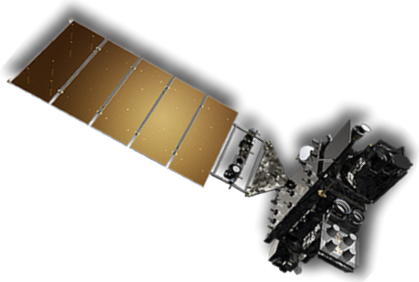
GOES 17



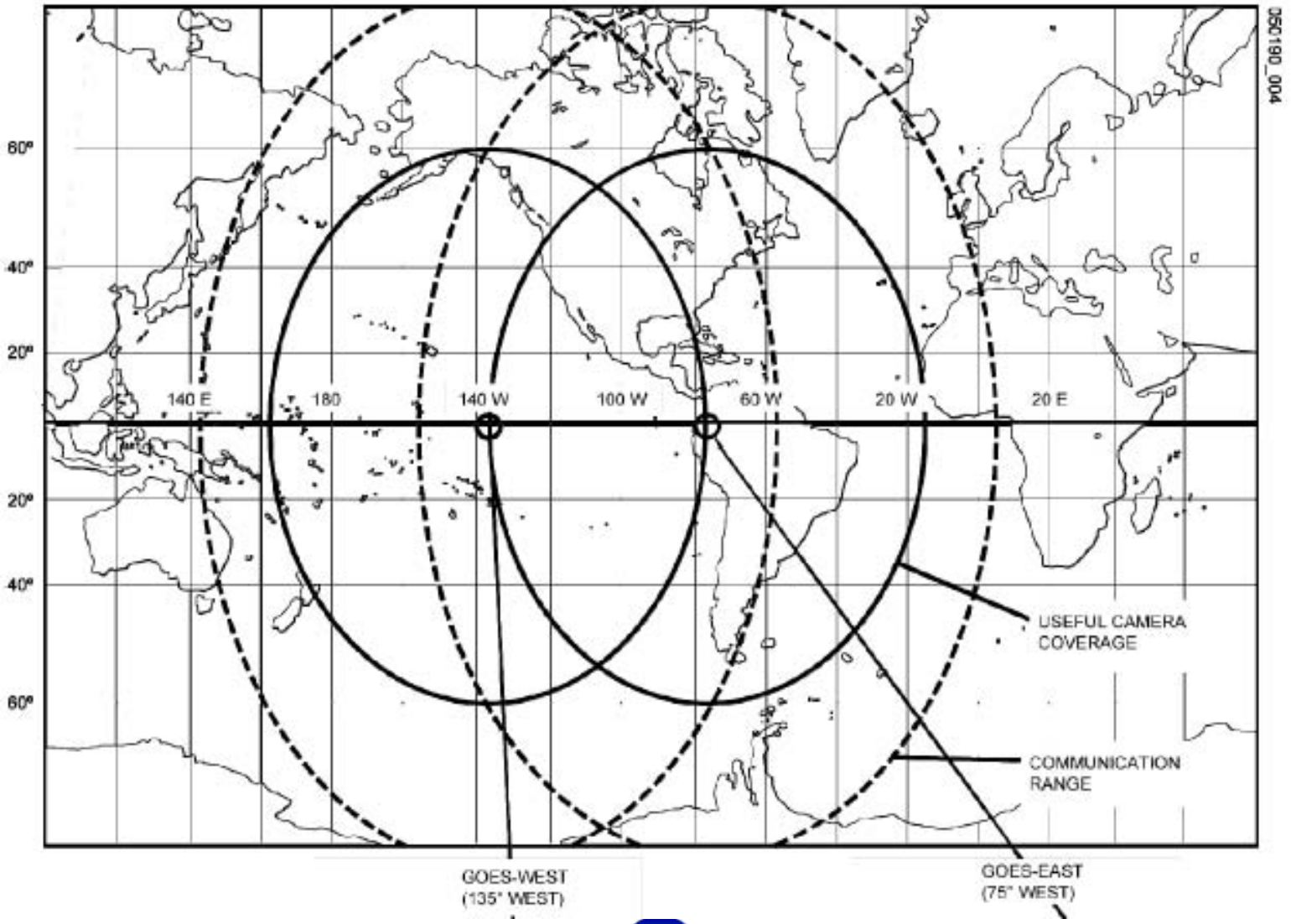
- NOAA's newest geostationary satellite, GOES S, was successfully launched 1 March. Orbit raising maneuvers are scheduled to bring the satellite into geostationary orbit at 89.5° West, around 18 March. Once in geostationary orbit, GOES 17 will undergo a period of checkout and validation, moving to the GOES West operational position in late 2018. (NOAA press release, 1 March: https://www.nesdis.noaa.gov/GOES-R-Series-Satellites).

- **Reminder:** The GOES R satellite series frequency plan is different from the plan currently in use by the GOES 14 and 15 satellites. GOES DRGSs currently support the GOES West (GOES 15) DCS downlink in the frequency range of 1694.30 to 1694.70 MHz. The GOES R series satellites will use 1679.70 to 1680.10 MHz to support the DCS downlink. GOES DCS users will need to modify their DRGSs to accommodate this change in downlink frequency, to be able to support GOES 17, later this year.

- Note that the GOES 17 frequency plan changes do NOT affect the Data Collection Platform (DCP) UHF-Band uplink transmissions, only the L-Band downlink to NOAA and the DRGSs.

- **http://www.goes-r.gov**

GOES Footprints



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DCPR Changes for GOES-R

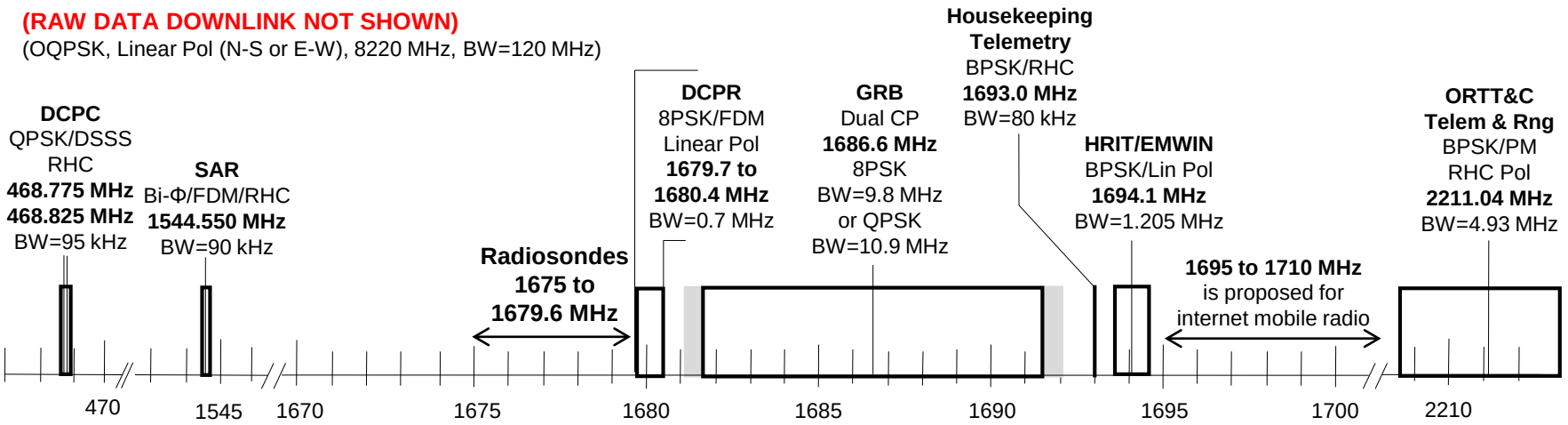
- On the GOES-N/O/P satellites the DCPR downlink band is 1694.3 – 1694.7 MHz
  - The uplink Pilot at 401.85 MHz is translated to 1694.45 MHz in the existing downlink
- For the GOES-R series satellites the DCPR downlink band will be 1679.7 – 1680.1 MHz
  - The uplink Pilot at 401.85 MHz will be translated to 1679.85 MHz in the new downlink
- No DCP uplink frequencies will change from the GOES-N to GOES-R satellites – only the downlinks

GOES R Frequency Plan

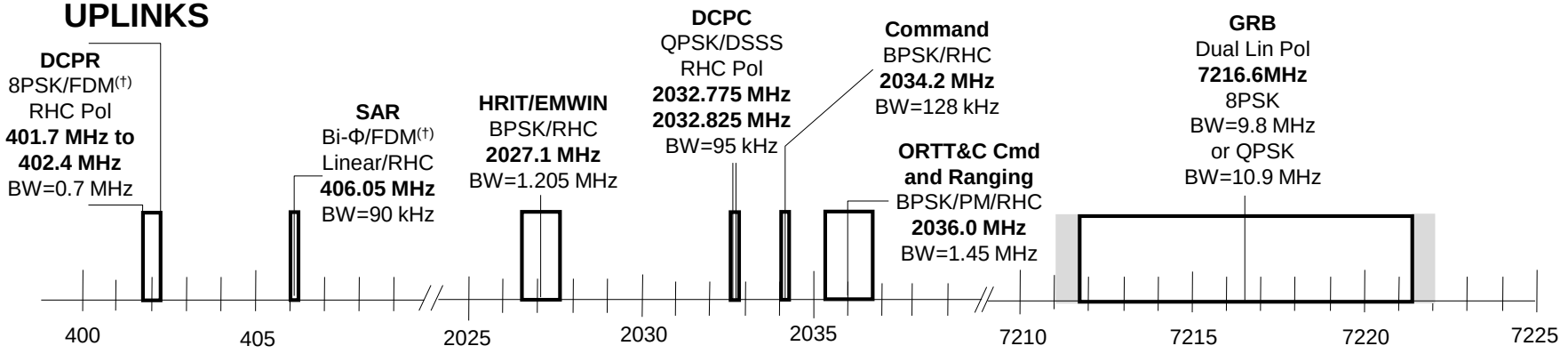
DOWNLINKS

(RAW DATA DOWNLINK NOT SHOWN)

(OQPSK, Linear Pol (N-S or E-W), 8220 MHz, BW=120 MHz)



UPLINKS



NOTES †: DCPR (8PSK) and SAR (Bi-Φ) are individual uplinks FDM'ed in the spacecraft transponder.

: Indicates possible extra GRB bandwidth for QPSK modulation

noblis

Wallops CDAS Backups

- WBU, Goddard Space Flight Center, MD
  - GOES 13-15 series backup for GOES East
  - Secondary DCS Pilot 401.7MHz transmits 24/7
- Fairbanks CDAS
  - GOES 13-15 series backup for GOES West
- Backup DADDS at NSOF Suitland, MD
- CBU, Fairmont, WV
  - GOES R series backup for GOES East & West

NOAA GOES DCS Data Services

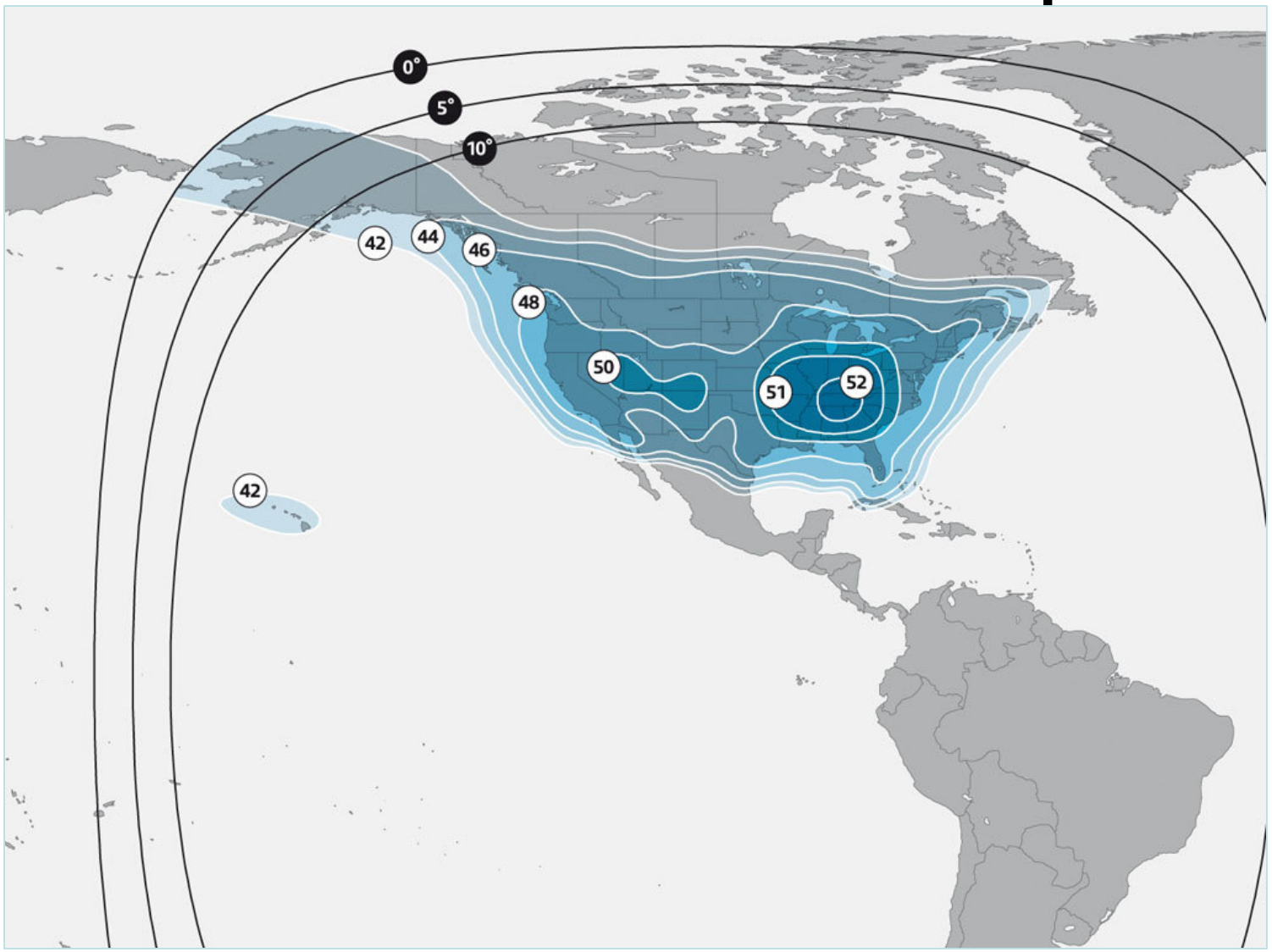
The OSPO provides GOES DCS ground system support at two facilities; the prime system is at the Wallops CDAS while the backup is at the NSOF. Wallops Operations monitors and controls both systems. The DCS supports the following dissemination services:

- **DOMSAT**
  - CONUS rebroadcast from Wallops or NSOF
- **NWSTG**
  - WMO Header service from Wallops or NSOF DADDS
- **LRGS**
  - File sharing service from/with Wallops, EDDN & NSOF DAMS-NT
- **LRIT**
  - GOES 13-15 link, DCS data from NSOF DADDS or Wallops LRGS
- **HRIT**
  - GOES R Series link, DCS data from Wallops or NSOF DADDS

NOAA DCS DOMSAT

- Wallops CDAS, VA is Prime and NSOF Suitland, MD is Backup
- Conus Coverage
- Annual cost for Wallops and NSOF backup site ≈ $15k
  - Funded by the OSPO
- Current Period of Performance: May 16, 2017 to May 15, 2018
- Current Satellite, SES-1
  - Circuit# 8819
  - Located at 101° W
  - Ku Transponder 16K
  - 12033.80 MHz (effective 11 April, 2017)
  - Horizontal Linear Polarization

SES-1 Ku-Band Footprint



NOAA Satellite and Information Service
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DCS National Weather Service Telecommunication Gateway (NWSTG)

- Approximately 86% of the DCS messages processed are embedded with a WMO header and then sent to the NWSTG for distribution

- Wallops and NSOF systems are both providing DCS data to the Gateway. This, in theory, enables the Gateway to select which stream to disseminate, with the default being Wallops is Prime.

- Recent changes to the Gateway have introduced delays in Wallops requests to have them select the desired data stream. NOAA is revisiting the original configuration that enabled Wallops to direct the desired site stream to the Gateway as opposed to requesting that they make configuration changes.

- Data customers using the NWSTG are largely unknown.

NOAA LRGS Configuration

- NOAA Wallops CDAS hosts 3 LRGS,
  - CDADATA:
    - LRGS Address ; cdadata.wcda.noaa.gov
    - DRGS input from Wallops East & West DAMS NT demodulator applications, Primary & Backup
    - DDS Primary is CDABACKUP, DDS Backup is EDDN1 then NLRGS1
  - CDABACKUP:
    - LRGS Address ; cdabackup.wcda.noaa.gov
    - DRGS input from Wallops East & West DAMS NT demodulator applications, Primary & Backup
    - DDS Primary is EDDN2, DDS Backup is EDDN 1 then NSOF LRGS 2
  - DROT:
    - LRGS Address ; cdadrot.wcda.noaa.gov
    - DOMSAT receive input from the 1.8m antenna system, useful for DOMSAT troubleshooting
    - No Backup ingests so that DOMSAT data outages can be monitored

- NOAA Suitland NSOF hosts 2 LRGS,
  - NLRGS1:
    - LRGS Address ; nlrgs1.noaa.gov
    - DRGS input from NSOF East & West DAMS NT demodulator applications, Primary & Backup
    - DDS Receive Primary is EDDN1, DDS Receive Backup is CDADATA
  - NLRGS2:
    - LRGS Address ; nlrgs2.noaa.gov
    - DRGS input from NSOF East & West DAMS NT demodulator applications, Primary & Backup
    - DDS Receive Primary is CDABACKUP, DDS Receive Backup is EDDN2

NOAA LRGS Support

- The Wallops CDAS monitors and maintains NOAA LRGS Network
- The LRGSs can be monitored through "**LRGS Summary Status"** web page, available through the DADDS webservers 1-4:
  - https://dcsX.noaa.gov ►"LRGS Status" ► https://dcsX.noaa.gov/lrgs/LrgsSummaryStatus.html
- The Emergency Data Distribution Network's (EDDN) 3 LRGSs can also be monitored through the **LRGS Summary Status:**
  - https://eddn.usgs.gov/lrgs/LrgsSummaryStatus.html
- CDADATA and CDABACKUP LRGSs provide GOES LRIT backup source.

LRGS Summary Status

LRGS Summary Status

UTC: August 30, 2017 12:31:41 (Day 242)

Host Name	*Status Time*	*LRGS Status*	*Primary Downlink Status*	*Primary Quality Last Hour*	*Aggregate Quality Last Hour*	*Msgs This Hour*	*Num DDS Clients*	*ILEX LRGS Version*
cdadata.wcda.noaa.gov	08/30 12:31:25	OK	DRGS:Active	99.39%	99.39%	18933	76	9.1
cdabackup.wcda.noaa.gov	08/30 12:31:12	OK	DRGS:Active	99.4%	99.4%	18798	40	9.1
cdadrot.wcda.noaa.gov	08/30 12:31:15	OK	DOMSAT:Active	99.53%	99.53%	18725	12	9.1
nlrgs1.noaa.gov	08/30 12:28:39	OK	DRGS:Active	99.33%	99.33%	17404	5	9.1
nlrgs2.noaa.gov	08/30 12:29:53	OK	DRGS:Active	99.33%	99.33%	18177	5	9.1
lrgseddn1.cr.usgs.gov	08/30 12:31:19	OK	DDS:Active	99.4%	99.4%	18866	97	9.1
lrgseddn2.cr.usgs.gov	08/30 12:31:20	OK	DDS:Active	99.4%	99.4%	18922	31	9.1
lrgseddn3.cr.usgs.gov	08/30 12:31:15	OK	DDS:Active	99.41%	99.41%	18810	72	9.1

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LRGS Monitor Page

LRGS: cdadata.wcda.noaa.gov

UTC: August 30, 2017 12:33:27 (Day 242)
(Time reported by LRGS)
System Status: Running
LRGS Version: 9.1.OpenDCS-6.3w RC12 (May 22, 2017)

Archive Statistics

Messages In Storage: 25223923 | Oldest Msg Time: 07/30 23:59:56 | Next Idx #: 435464

Hourly Data Collection Statistics

Hour:	*5-6*	*6-7*	*7-8*	*8-9*	*9-10*	*10-11*	*11-12*	*12-13*
GOES DRGS (Good/ParErr):	74039 / 396	73749 / 374	73254 / 368	73429 / 440	73624 / 362	73011 / 372	72778 / 400	43020 / 214
DDS Recv (Good/ParErr):	34596 / 227	34437 / 205	34272 / 203	34308 / 244	34426 / 193	34089 / 191	33921 / 230	20254 / 131
Archived (Good/ParErr):	34587 / 217	34473 / 197	34237 / 195	34314 / 239	34417 / 183	34126 / 181	34008 / 220	20203 / 121

Downlink Statistics

Downlink Name	*Last Msg Rcv Time*	*Last Seq Num*	*Link Status*	*Link Params*
DRGS:Microcom-DRGS-BE	08/30 12:33:27	27796	Connected	
DRGS:Microcom-DRGS-PE	08/30 12:33:27	27586	Connected	
DRGS:Microcom-DRGS-BW	08/30 12:33:27	20293	Connected	
DRGS:Microcom-DRGS-PW	08/30 12:33:27	20218	Connected	
DDS:EDDN	08/30 12:33:26	-1	Real-Time	Primary
DDS:CDA-BACKUP	08/29 06:06:33	-1	Ready	Primary
DDS:NLRGS1	(none)	-1	Disconnected	Primary

Client Statistics

Slot	*Host Name*	*User*	*Msg Count*	*Last Activity Time*	*Last Msg Time*	*Status*
0	-	onthyd	3	08/30 12:33:27	08/30 12:27:31	running
1	-	mtwatr	1	08/30 12:33:14	08/30 12:27:49	running
2	-	cened1	0	08/30 12:33:04	08/30 12:29:22	running
3	-	ftsinc1	60	08/30 12:33:26	08/30 12:33:25	running
4	-	onthyd	13747	08/30 12:33:27	08/30 12:33:22	running
5	-	yukoaa	49	08/30 12:33:27	08/30 07:19:11	running

NOAA Satellite and Information Service
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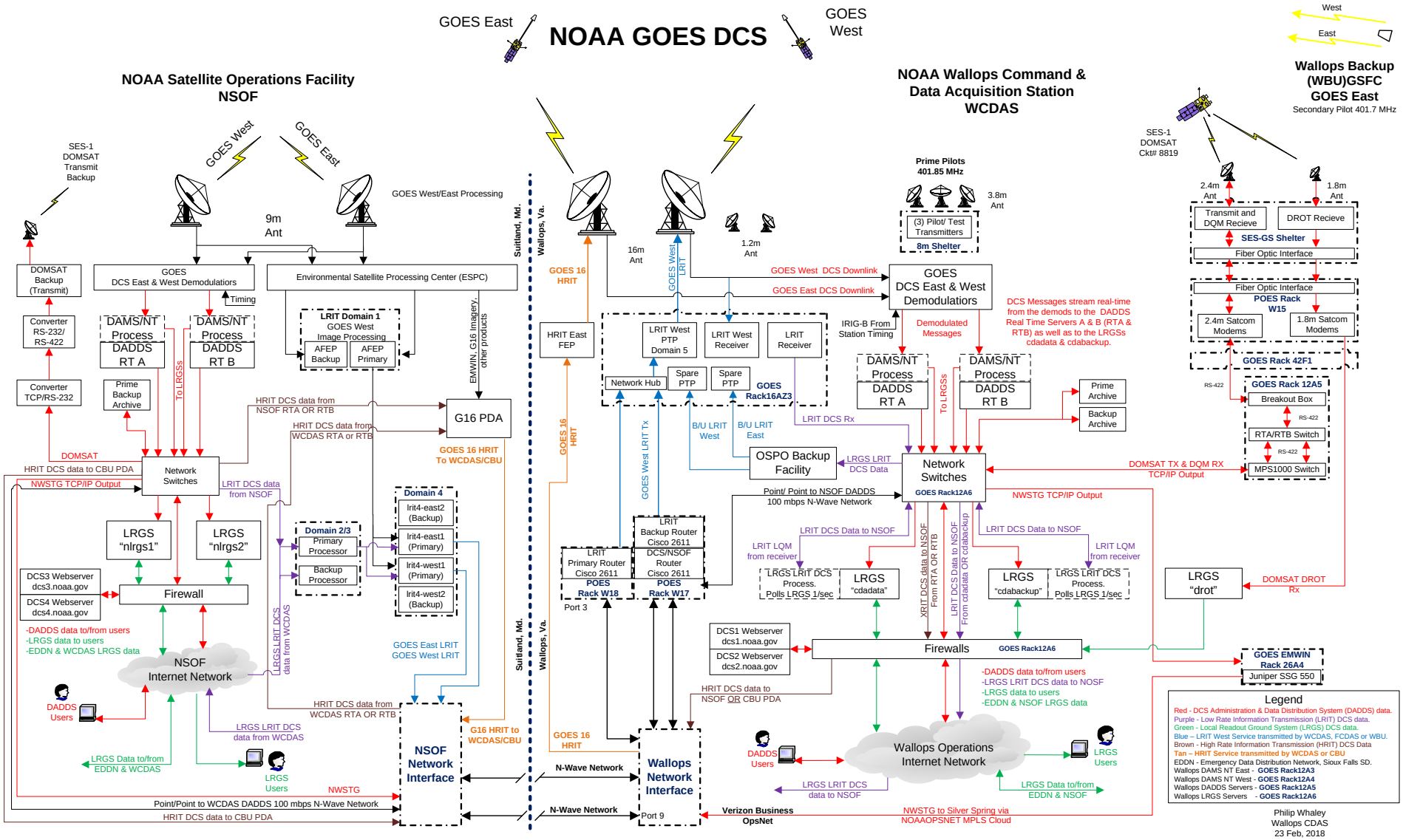
Low Rate Information Transmission (LRIT)
&
High Rate Information Transmission (HRIT)

- GOES East & West DCS data is provided by the DADDS for inclusion in the GOES West LRIT broadcast; Wallops LRGSs provide backup data sources.

- GOES East & West DCS data is provided by the DADDS for inclusion in the GOES East HRIT broadcast.

- GOES LRIT & HRIT coverage extends well beyond the CONUS coverage offered by DOMSAT.

- GOES LRIT and HRIT services can be supported by a 1m to 1.2m receive antenna system.

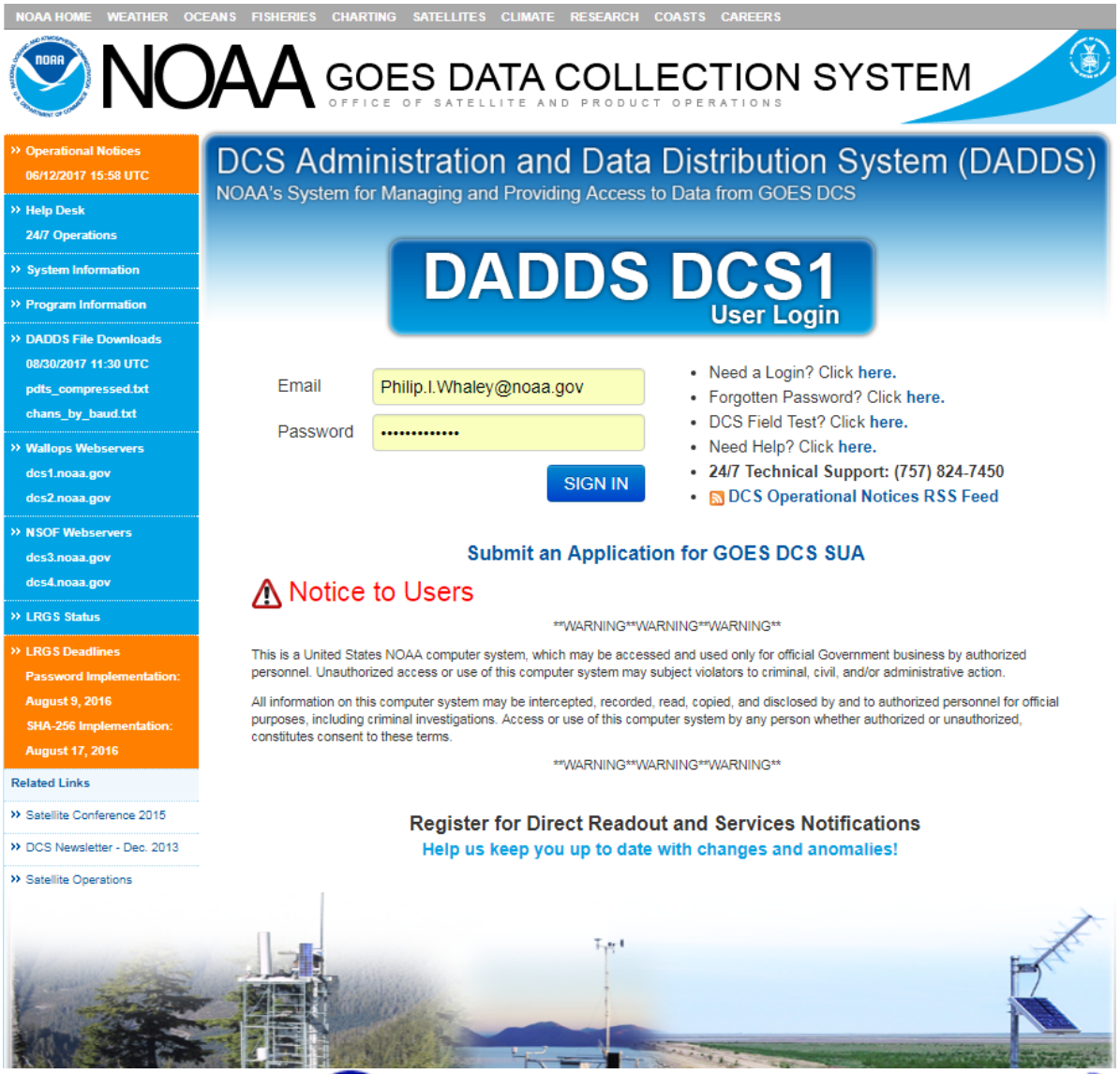


Philip Whaley
Wallops CDAS
23 Feb, 2018

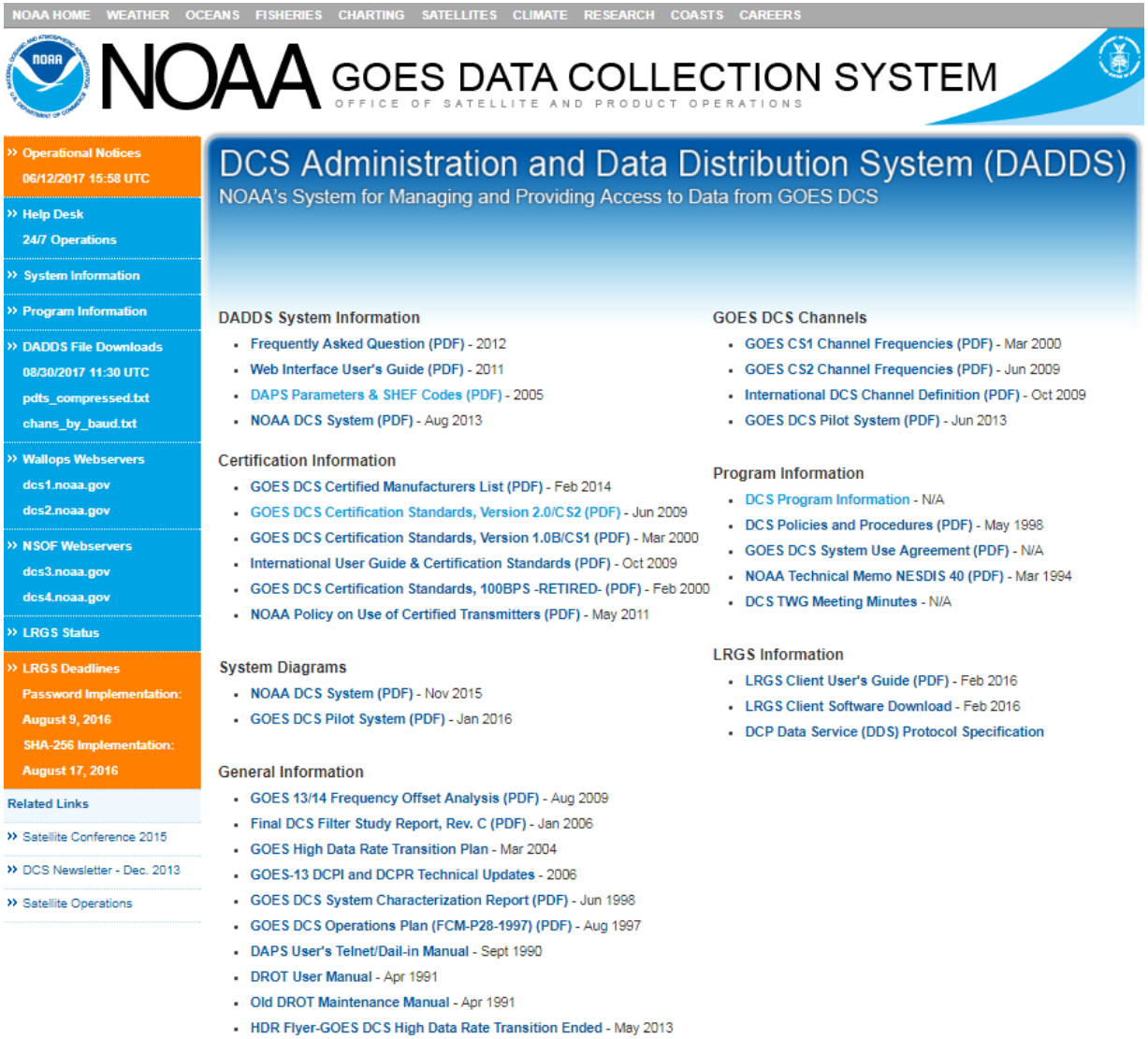
NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

DADDS Webservers 1 - 4

- Operational Notices
  - 06/12/2017 15:58 UTC
- Help Desk
  - 24/7 Operations
- System Information
- Program Information
- DADDS File Downloads
  - 08/30/2017 11:30 UTC
  - pdts_compressed.txt
  - chans_by_baud.txt
- Wallops Webservers
  - dcs1.noaa.gov
  - dcs2.noaa.gov
- NSOF Webservers
  - dcs3.noaa.gov
  - dcs4.noaa.gov
- LRGS Status
- LRGS Deadlines
  - Password Implementation: August 9, 2016
  - SHA-256 Implementation: August 17, 2016



DADDS Webservers System Information



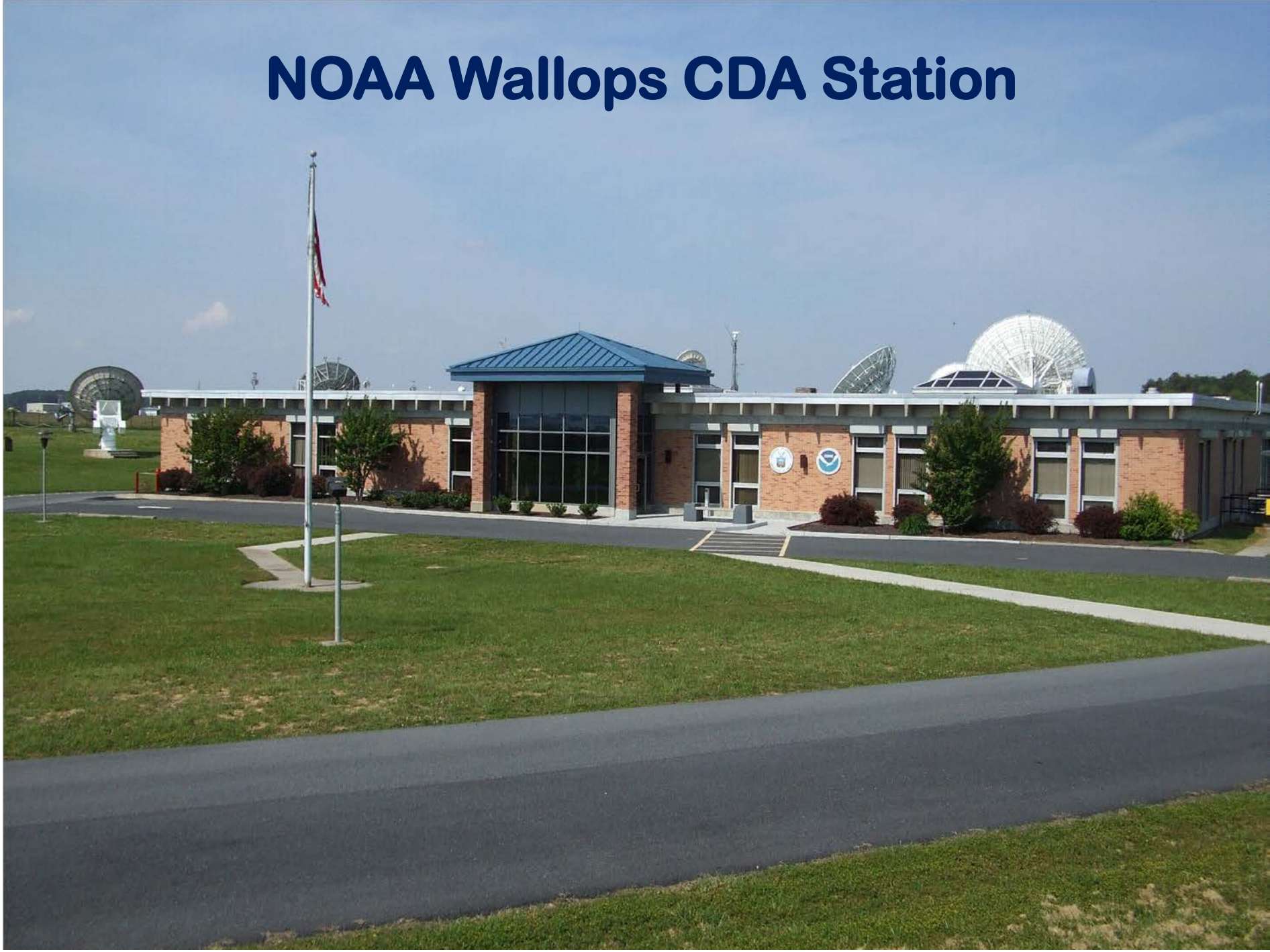
NOAA Wallops CDAS Support Phone Numbers

- Wallops Help Desk: 757-824-7450 or 757-824-7451
  - 24/7 Technical Support for DCS, LRGS, LRIT, HRIT
- Travis Thornton: 757-824-7304
  - Operations Shift Supervisor and DCS Operations Lead
- Albert McMath: 757-824-7316
  - Wallops CDAS Operations Branch Chief
- Philip Whaley: 757-824-7316
  - Systems Engineering Branch support for GOES Systems
  - NOAA DCPRS Certification Official

Acronyms

- **NOAA**: National Oceanic and Atmospheric Administration
  - Office/Agency of the Department of Commerce.
- **NESDIS**: National Environmental Satellite, Data, and Information Service
  - Line office of NOAA
- **OSPO**: Office of Satellite and Product Operations
  - Suitland MD, Wallops VA, Fairbanks AK, College Park MD
- **NSOF**: NOAA Satellite Operations Facility, Suitland, MD
- **WCDAS**: Wallops Command and Data Acquisition Station, VA
- **FCDAS**: Fairbanks Command and Data Acquisition Station, AK
- **WBU**: Wallops Backup, Goddard Space Flight Center, MD
- **CBU**: Consolidated Backup Facility, Fairmont, WV
- **DADDS**: Data Collection System (DCS) Administration & Data Distribution System
- **DRGS:** Direct Readout Ground System
- **LRGS**: Local Readout Ground System
- **LRIT:** Low Rate Information Transmission, GOES 13, 14 & 15 broadcast
- **HRIT:** High Rate Information Transmission, GOES R Series (G16)
- **NWSTG**: National Weather Service Telecommunications Gateway

NOAA Wallops CDA Station



DCP Test Channels

- GOES East
  - 300bps
    - 195E for CS1 & CS2 (401.99200 MHz)
  - 1200bps
    - A99 for CS1, 497 for CS2 (401.99575 MHz)
      - Incompatible with CS2-needs to move

- GOES West
  - 300bps
    - 196W for CS1 & CS2 (401.99350 MHz)
  - 1200bps
    - A100 for CS1, 499 for CS2 (401.99875 MHz)

Abnormal Response Messages (ARM)
Or
Information Messages (IM)

- 'G' : Good Message - also transmitted with all messages except '?' and 'M'.
- '?' : Parity Error(s).
- 'A' : Correctable address
- 'N' : PDT Incomplete
- 'T' : Overlapping time error. A message was outside of, but overlapping its window.
- 'U' : Non-overlapping time error. Message completely out of its defined window.
- 'W' : Wrong channel
- 'M' : A self-timed message was not received at all, received on wrong channel, not completely inside a window or an overlapping window.
- 'B' : Non-correctable : Available on the DADDS Website message data. Messages with bad addresses are not disseminated.
- 'I' : Invalid address. Available on the DADDS Website message data. Messages invalid addresses are not disseminated.

DCS Message Statistics

11083215414G48+2NN167EFF

- **YYDDDHHMMSS Time: YYDDDHHMMSS (Frame Sync)**
- **T Type: G = Good ? = Parity Errors (ARM)**
- **SS Signal Strength: dBm EIRP (assumes 47 dBmi Pilot)**
  - **25 to 56 dBm nominal demod reception thresholds**
- **±X Frequency: Sign & Digit (±F times 50 Hz)**
- **M Modulation Index (Phase): Normal, High, Low**
- **D Data Quality (Phase): Normal, Fair, Poor**