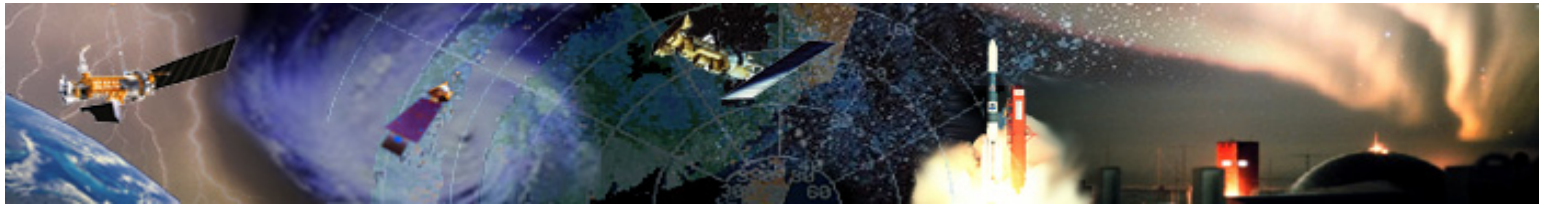

NOAA-NASA Cooperative Supports for Aqua and Aura Missions

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GSAW 2005

Working Group Session

“Teaming Early, Teaming Often”

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What's the Big Picture?

- **In late 2003, NOAA and NASA signed an MOU…**

  "…to establish mission support status in order to provide contingency back-up support in the event of planned and unplanned resource or system outages or spacecraft emergency."

- **Applicable resources**
  - **NASA: Poker Flat, Alaska; Wallops Flight Facility (WFF), Virginia; Merritt Island/Ponce de Leon (MILA/PDL), Florida; Santiago, Chile; and McMurdo, Antarctica.**
  - **NOAA: Fairbanks and Wallops CDA Stations; GOES Backup Station (Greenbelt, MD).**
- **Conditions**
  - **Funding reimbursement unnecessary in most cases.**
  - **Supports carried out on a basis of non-interference...but flexible!**

FYI: Historical Precedents

- ***Basic Agreement Between the National Aeronautics and Space Administration and the U. S. Department of Commerce Concerning Collaborative Programs*, dated June 17, 1998.**
- ***Memorandum Of Agreement Between the National Aeronautics and Space Administration and the National Oceanic And Atmospheric Administration of the U. S. Department of Commerce for Cooperation in the Geostationary-Orbiting Operational Environmental Satellite Program (GOES)*, dated April 17, 1998.**
- ***Memorandum Of Agreement Between the National Aeronautics and Space Administration and the National Oceanic And Atmospheric Administration of the U. S. Department of Commerce for Cooperation in the Polar-Orbiting Operational Environmental Satellite Program (POES)*, dated April 17, 1998.**

What's the Problem?

Two key issues addressed

- **Primary purpose of the cooperative agreement is RISK REDUCTION to environmental spacecraft operations.**
  - **Supported services include communications, tracking, and data acquisition.**
- **Result is increased reliability of data provision to meet key NOAA and NASA responsibilities**
  - **E.g., Maritime and aviation safety, environmental research data**

Why Collaborate?

"The sum of the parts is greater than the whole."

- **Knowledge that there is more than one method for conducting spacecraft tracking and data acquisition expands the experience base of both agencies.**
  - **Both NASA and NOAA have extensive environmental satellite operations experience.**
- **Both agencies have "global" missions.**
  - **Interagency cooperation serves national and international interests.**
- **Technical capabilities similar.**
- **Overlap of some station geographic coverage, especially at northern polar ground stations.**

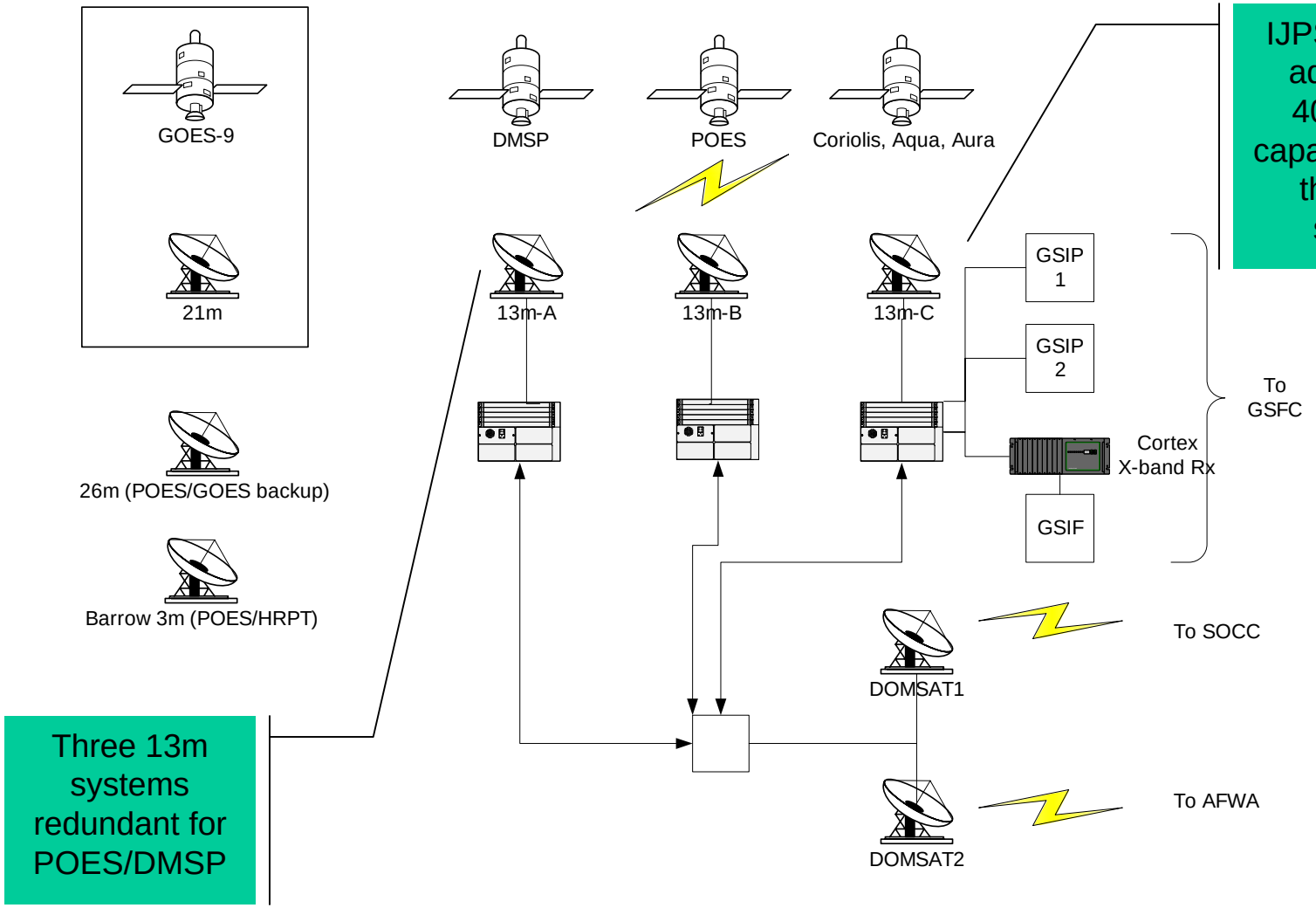
Who's Involved?

- **NOAA/NESDIS**
  - **Office of Satellite Operations**
    - **Fairbanks CDA Station (Gilmore Creek)**
    - **SOCC (Suitland)**
- **NASA GSFC/WFF**
  - **Ground Network**
    - **Poker Flat Ground Station**
    - **Honeywell-TSI**
  - **Earth Observation Systems**
    - **Aqua & Aura Flight Operations**
    - **EOS Data Operations System (EDOS)**
  - **Data Services Management Center (DSMC)**
  - **NASA Communications (NASCOM)**
  - **Flight Dynamics Facility**

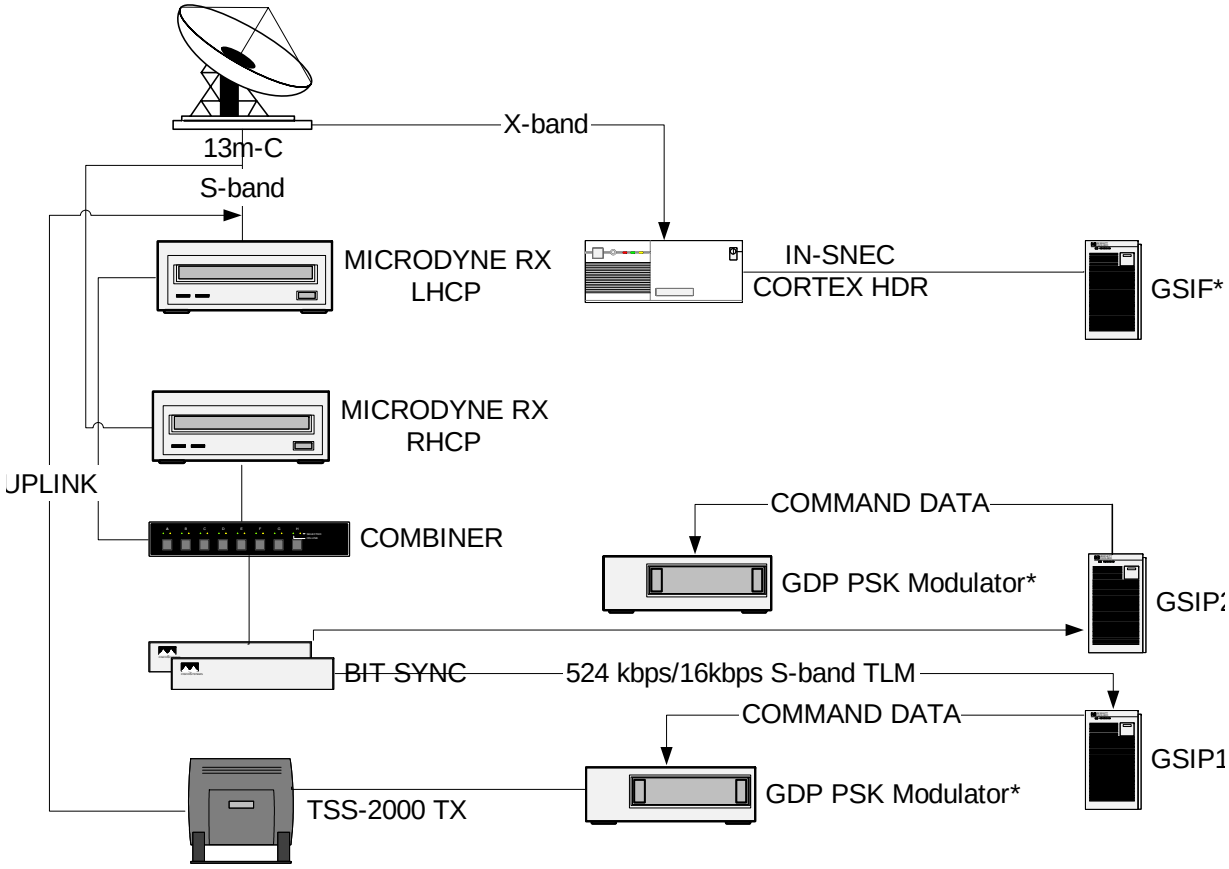
How Did You Do It?

- **First instance of support under the MOU was to certify Fairbanks CDA Station for Aqua.**
  - **Certify at least one antenna for Aqua TT&C and X-band playback**
  - **Mid-term objective to certify all three 13-meter FCDAS antennas for Aqua and Aura**
- **Main tasks**
  - **Modify FCDAS interfaces to GSFC (GSIP and GSIF)**
  - **Upgrade station hardware for X-band high-data-rate downlink**
  - **Develop test plan and scheduling protocol**
  - **Engineering tests**
  - **Formal certification tests and discrepancy reporting/resolution**

FCDAS Overview



FCDAS EOS Configuration



* NASA equipment

Did it Work?

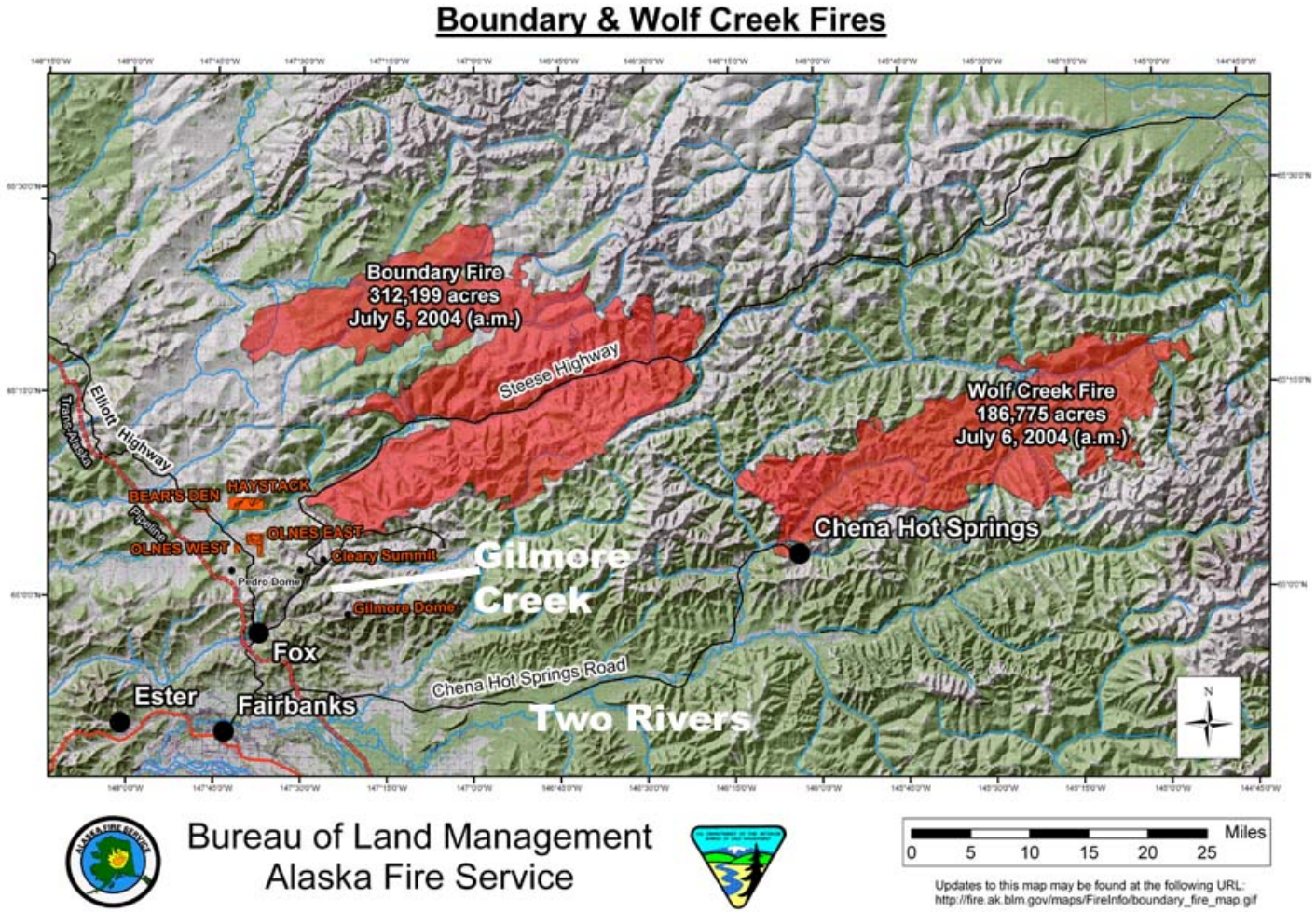
YES!

- **13m-3/C certified for Aqua first, then Aura.**
- **Successful effort proved crucial when Poker Flat had to be evacuated due to wildfires in late June 2004.**

Boundary Fire 2004

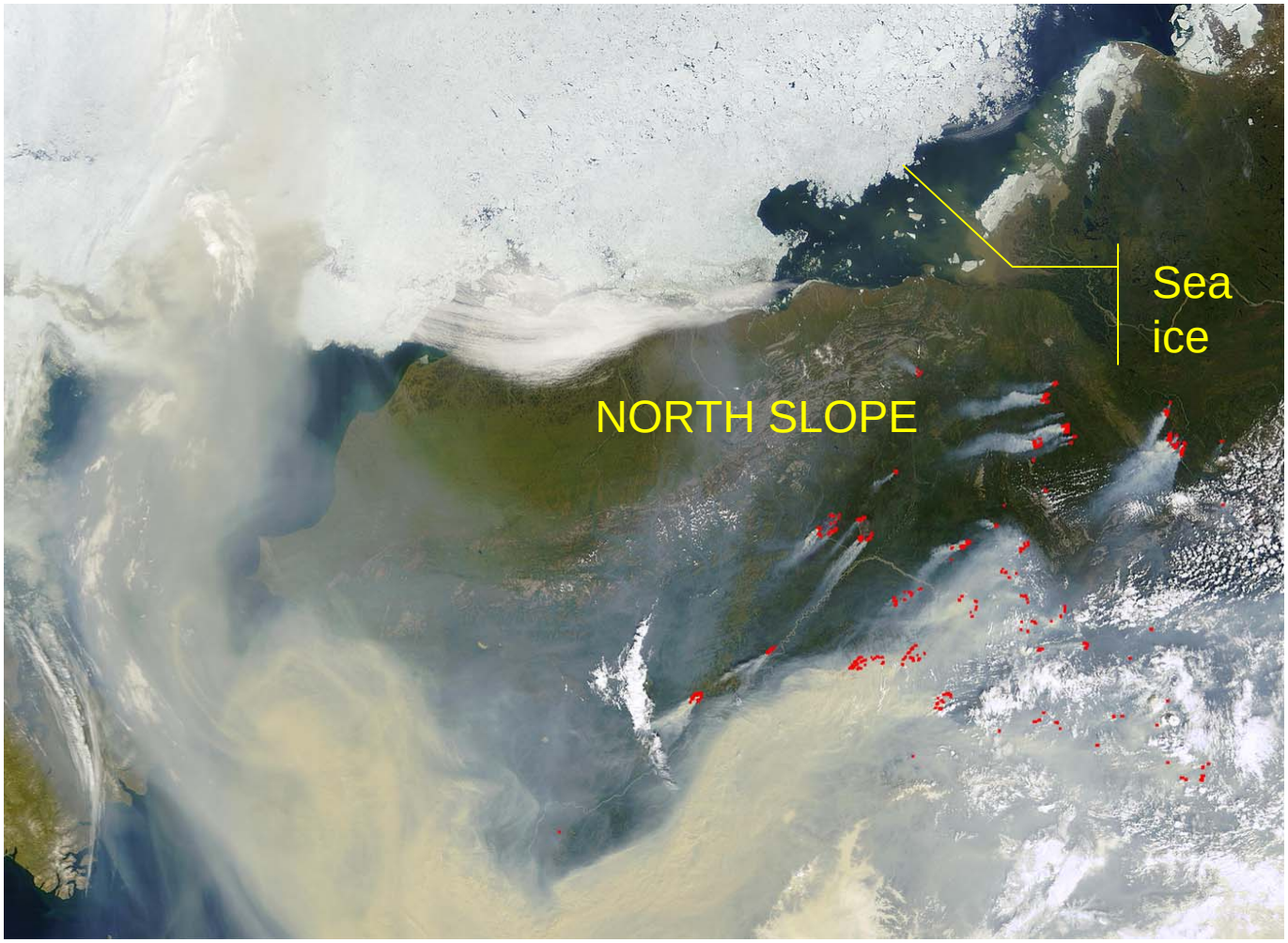
July 2nd

Early July Fire Extent



NASA Site at Poker Flat

MODIS from Aqua Satellite



What Helped? (1/2)

- **Senior management buy-in**
- **Technology**
  - **New programmable Cortex HDR receiver configurable by software**
- **Detailed written test plan**
  - **Enabled agreement on test steps, progress, and procedures to be achieved across all elements participating in the integration effort.**
- **Incremental testing**

What Helped (2/2)

- **FCDAS permits flexible resource allocation on 13-meter systems.**
  - **Added daytime scheduler to FCDAS staff to better handle real-time support requests.**
- **Effective low-level technical and operations staff communications**
  - **Responsiveness rapidly improved with familiarity and frequency of emails, phone calls, scheduled contacts, etc.**
  - **“Do what it takes” attitude.**

What Didn't? (1/2)

General Communications & Procedural Differences

- **Both agencies' sat ops staff have different paradigms and terminologies.**
- **Resolved through experience and frequent, open communications. We are now able to work through the unanticipated disconnects quickly as they are discovered.**
- **The exchange of technical information is not sufficient to establish interoperation between two established entities.**
- **Failed initially to identify all participating elements and support personnel to be involved, and provide clear definitions of roles and responsibilities.**
- **Clearly defined central management authorities on both sides would have helped assure smoother execution (at first).**
- **These problems rectified for follow-on certification tests.**

What Didn't? (2/2)

- **NOAA-NASA MOU does not accommodate more than casual support to maintain proficiency.**
  - **More frequent practice is needed to maintain the ability to support another mode of operations effectively.**
  - **FCDAS can shadow AGS supports. Prior arrangements needed with EDOS for data quality checks.**
  - **Not all shifts (FCDAS and Flight Ops) have had equal experience with joint supports. More regular contacts will help.**
- **Technical incompatibility for tracking information exchange.**
  - **Antenna angle and Doppler tracking data for FDF was not successful; interfaces not plug-'n'-play.**

What's Next?

- **Aqua/Aura certifications for 13-1/A and 13-2/B underway**
  - **Goal is to have at least one other 13-meter system (and preferably both) at FCDAS certified by 1st of June.**
  - **Test plans in review.**
  - **Remaining IJPS and GSIP/GSIF hardware modifications to be completed before certification begins.**
  - **Command uplink PSK modulator to be added to backup GSIP, thus having redundant paths.**
- **More collaborative efforts!**

Questions?

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