

# The Joint Polar Satellite System's (JPSS) Common Ground System (CGS) in Antarctica - An International and Inter-Agency Partnership Success



AMS 2013: Poster #900

William G. Munley, Jr., The Aerospace Corporation

James M. Valenti, National Oceanic and Atmospheric Administration

Craig C. Weikel, National Aeronautics and Space Administration

## Overview

International and inter-agency partnerships can powerfully leverage the strengths of the participants to the benefit of all. But when both types of partnerships are realized by one system, the benefits reach worldwide. This presentation highlights the successful implementation of the Joint Polar Satellite System (JPSS) Common Ground System (CGS) fielded at McMurdo Station, Antarctica.

## Partner Organizations:



Joint Polar Satellite System (JPSS)  
NASA and NOAA



The European Organisation for the Exploitation of Meteorological Satellites

EUMETSAT



NASA Near Earth Network (NEN)  
National Aeronautics and Space Administration



National Environmental Satellite, Data, and Information Service (NESDIS) &  
National Geophysical Data Center (NGDC)  
National Oceanic and Atmospheric Administration



United States Antarctica Program (USAP)  
National Science Foundation



Defense Meteorological Satellite Program (DMSP)  
United States Air Force

## Roles & Responsibilities

- Ka/S Band Receptor Antennas, McMurdo Multi-mission Communications System, JPSS Wide Area Network
- Metop-n spacecraft, Data Processing Facility, Darmstadt Germany
- McMurdo Ground Station (MG-1), Joint Spacecraft Operations Center, NASA OPS
- DMSP Operations (NESDIS), Public Access Data Website (NGDC)
- McMurdo Station Communications Network, Black Island Telecommunications Facility, Civil Works, Station Infrastructure & Logistics Support
- DMSP Satellites, Data Processing (Air Force Weather Agency), Public Data Release, Joint Spacecraft Operations Center

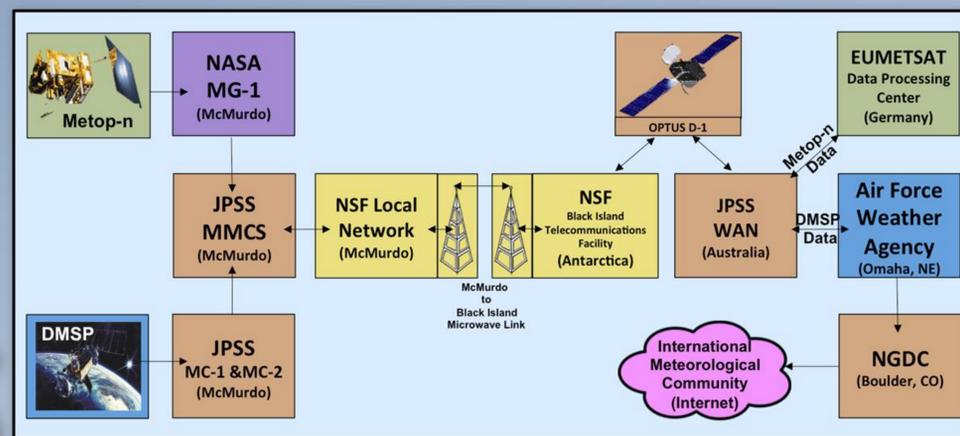
## Results

Decreased latency for the Metop satellites (115 to 65 minutes) and the DMSP satellites (110 to 55 minutes). Faster data processing improved real-time mesoscale and mid/long range global weather forecasts. High speed communications improved data transfer and health & safety on/off Antarctica. Free and open access to DMSP data for the worldwide meteorological community. JPSS CGS At McMurdo is an absolute international and inter-agency success.

## Legend

Metop-n – Series of EUMETSAT satellites  
JPSS WAN – JPSS Wide Area Network  
OPTUS D-1 – Australian Telecommunications Satellite  
MC-1/2 – JPSS 4m Receptors on McMurdo Station  
MG-1 – NASA 10m Antenna on McMurdo Station

## JPSS CGS Nominal Data Flow by Responsible Agency



## Reasons for Success

Dedicated Personnel	Effective Communication	Unwavering Commitment	Efficient Management
<ul style="list-style-type: none"> <li>• Technically competent</li> <li>• Effective intrapersonal skills</li> <li>• Results oriented</li> <li>• Can-do Attitude</li> </ul>	<ul style="list-style-type: none"> <li>• Open communications, vertically and laterally</li> <li>• Frequent communication, both formal and informal (e-mails, phone calls, face to face meetings, technical information exchange telecons, etc.)</li> <li>• Honest and direct – no politics or holding back</li> </ul>	<ul style="list-style-type: none"> <li>• Each agency had a vested interest that motivated engagement and involvement</li> <li>• Commitment of personal participants, irrespective of organizational affiliation</li> <li>• “Can-do” spirit – Agencies and individuals displayed the willingness to work around problems and create solutions – “Do whatever it takes to make things work” was the motto</li> </ul>	<ul style="list-style-type: none"> <li>• Use of multiple bilateral agreements instead of one 5-party agreement allowed for simpler, more flexible partnerships</li> <li>• Use the right amount of process e.g. mission phase reviews, requirements management, formal testing, etc.</li> <li>• Continuous Task Management – constant forward looking; regular what-if scenario assessments – results dynamically incorporated as the projects evolved</li> </ul>

## Agency Benefits of JPSS CGS at McMurdo

<p><b>Unique Benefits</b></p> <ul style="list-style-type: none"> <li>• Strengthened JPSS partnership with NOAA</li> <li>• Minimal changes to Metop system</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthened JPSS partnership with EUMETSAT</li> <li>• Meets commitment via strategic partnerships with NSF and NASA</li> <li>• Gained cost-sharing partner for McMurdo Multi-mission Communications System (MMCS)</li> <li>• Proved design for MMCS worked with real world data</li> </ul>	<ul style="list-style-type: none"> <li>• International recognition for McMurdo Station's role for high latitude space data acquisition as a conjugate to Svalbard in the Northern Hemisphere</li> <li>• Leveraging the NSF mission in Antarctica with NOAA, DoD and NASA missions to provide greater return on the U.S. national investment</li> <li>• Low overhead/simplified management for NSF (only 1 bilateral agreement needed NSF-NASA for MGS hosting and logistical support)</li> <li>• Infrastructure upgrades at McMurdo (MGS road access, local area network improvements, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Gained Long-term customer for MGS</li> <li>• Refurbished aging antenna system and upgraded ground station electronics for MGS with remote operability and increased capability to support future NASA missions</li> <li>• Cost-sharing partner for MGS, upgrades, operations and maintenance</li> <li>• Infrastructure upgrades at McMurdo (MGS road access, local area network improvements, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthened partnership with NOAA and NASA</li> <li>• Established strong working relationship for potential future DoD use of JPSS CGS</li> </ul>
<p><b>Common Benefits</b></p> <ul style="list-style-type: none"> <li>• Low cost solution for improving Metop data latency from 115 minutes to 65 minutes on average</li> <li>• Access to NOAA's McMurdo Multi-mission Communications System (MMCS)</li> </ul>	<ul style="list-style-type: none"> <li>• Low cost solution for improving Metop data latency from 115 minutes to 65 minutes on average</li> <li>• Early deployment of JPSS capability to reduce DMSP latency from 110 minutes to 55 minutes and allowed USAF to provide free and open access to the data for the worldwide meteorological community</li> </ul>	<ul style="list-style-type: none"> <li>• Improved forecasting and weather predictions for flight and search/rescue operations in Antarctica as a result of improved latency and local access to data</li> <li>• Affordable communications enhancements for NSF's science program via access to the MMCS</li> </ul>	<ul style="list-style-type: none"> <li>• Affordable communications enhancements for NASA's space data ground network via access to the McMurdo Multi-mission Communications System (MMCS)</li> </ul>	<ul style="list-style-type: none"> <li>• Low cost solution for improving DMSP data latency from 110 minutes to 55 minutes</li> <li>• Increased cloud data coverage from 35% to 100% per orbit</li> <li>• Free and open access to DMSP data for the worldwide meteorological community</li> </ul>



Photo Credits: 1-5,7,8,10,11,13-24 William Munley, The Aerospace Corporation/ 9 Craig Weikel, NASA/ 6,12 The National Science Foundation