POLAR-ORBITING OPERATIONAL ENVIRONMENTAL SATELLITE (POES) OVERVIEW

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POES Mission

• **TO PROVIDE** *UNINTERRUPTED FLOW OF GLOBAL ENVIRONMENTAL INFORMATION IN SUPPORT OF OPERATIONAL REQUIREMENTS FOR:**
  – Global Soundings
  – Global Imagery
  – Global and Regional Surface & Hydrological Obs
  – Direct Readout, Data Collection, Search and Rescue
  – Space Environment and Ozone Observations

• **TO ESTABLISH LONG-TERM CONTINUOUS DATA SETS FOR:**
  – Climate monitoring and change predictions

• **This requires two satellites for continuous coverage placed in orbits selected to optimize support for both weather services and climate requirements**
NOAA Polar-orbiting Satellite System – 2004

- Fairbanks, AK
- Suitland, MD and Camp Springs, MD
- Wallops Is, VA

Polar Orbits

10:00 A.M.

Sun-Synchronous
Incl. 98.74
Period 101 min.
Apogee 530/518 miles

Scan width 2700 km
Circle Earth 14 times per day

2:00 P.M.
Major Customers

• Direct Readout Users
  – High-resolution Picture Transmission (HRPT) Users
  – Automatic Picture Transmission (APT) Users
  – Search and Rescue
  – Data Collection System

• Numerical Weather Prediction Centers
• National Weather Service Field Offices
• NOAA Coast Watch and Ocean Watch
• Hazard community (US Forest Service)
• Other U.S. Federal Agencies
  – Dept of Defense
  – Dept. of Agriculture
  – Federal Aviation Administration (FAA) (Volcanic Ash)

• International community
• Global climate community
International Partners

• EUMETSAT
  – MetOp - (Initial Joint Polar System)

• United Kingdom - UK Met Office
  – Advanced Microwave Sounding Unit-B (Moisture) for NOAA-15, -16, -17

• Canada - DND
  – Search and Rescue - (SARR)

• France - CNES
  – Search and Rescue - (SARP)
  – Service ARGOS - (DCS & A-DCS)
Initial Joint Polar-orbiting System (IJPS)

- IJPS consists of two independent, but fully coordinated, polar satellite systems to provide for the continuous and timely collection and exchange of environmental data from space.
- Satellite systems are provided by:
  - NOAA - National Oceanic and Atmospheric Administration for the afternoon orbit
    - NOAA-N launch Mar 2005
    - NOAA-N’ launch Dec 2007
  - EUMETSAT - European Organization for the Exploitation of Meteorological Satellites for the mid morning orbit
    - Metop 1 launch Dec 2005
    - Metop 2 launch 2010
Integrated Joint Polar-orbiting System (IJPS) - 2006

**Polar Orbits**
- Fairbanks, AK
- Metop

**Sun-Synchronous**
- Incl. 98.7/98.9
- Period 101 min.
- Apogee 530/518 miles
- Scan width 2700 km
- Circle Earth 14 times per day

**Locations**
- Suitland, MD and Camp Springs, MD
- Wallops Is, VA
- Darmstadt, Germany

**Time**
- 9:30 A.M.
- 2:00 P.M.
NOAA N & N’

- 1400 Orbit - Ascending Node
- Direct broadcast with existing HRPT and analog APT links
- **Instruments**
  - NOAA Provided
    - AVHRR/3
    - HIRS/4
    - AMSU-A
    - SEM
    - SARSAT
  - EUMETSAT Provided
    - MHS
  - Argos (Data Collection Sys)
  - NOAA Unique
    - SBUV/2

METOP 1 & 2

- 0930 Orbit - Descending Node
- Direct broadcast with M-HRPT and digital LRPT links
- **Instruments**
  - NOAA Provided
    - AVHRR/3
    - HIRS/4
    - AMSU-A
    - SEM
    - SARSAT
  - EUMETSAT Provided
    - MHS
  - Argos (Data Collection Sys)
  - EUMETSAT Unique
    - IASI
    - ASCAT
    - GOME-2
    - GRAS
Low Data Rate DRO Users

• POES Automatic Picture Transmission (APT)
  – Analog signal
  – 2 imagery channels at 4km
  – Frequency change for NOAA-N & N’ -- reduce interference
    • 137.1 and 137.9125 MHz
  – On afternoon NOAA satellites until ~ 2012
  – On NOAA 15 and 17 until no longer optional

• Metop Low Rate Picture Transmission (LRPT)
  – Digital signal
  – 3 imagery channels at 1km & all other instrument data
    • Date compressed and can be encrypted
  – Flown on Metop morning orbits starting in 2006 and through ~ 2012
High Data Rate DRO Users

• POES High-resolution Picture Transmission (HRPT)
  – Realtime data at 667kbs rate
  – NOAA-N/N’ instrument changes: MHS & HIRS/4
  – On afternoon NOAA satellite until ~ 2012
  – On morning NOAA satellite until ~ 2006

• Metop Advanced High-resolution Picture Transmission (A-HRPT)
  – Realtime data at 3.5mbs rate
  – Flown on Metop morning orbits from 2006-2012
  – All instrument data including European sensors (IASI, ASCAT, etc.)
  – Can be encrypted
Search & Rescue Satellite-Aided Tracking

S A R S A T
COSPAS-SARSAT System Overview

1. DISTRESS CALL UTILIZING EMERGENCY BEACON
2. SEARCH & RESCUE SATELLITES
3. LOCAL USER TERMINAL
4. MISSION CONTROL CENTER
5. RESCUE COORDINATION CENTER
Mission Control Centers (MCC) – 25 Locations
Argos Data Collection System

- NOAA and CNES cooperative program since the early 1970’s
- Developed to fill technological need for scientific data retrieval
- Oversight by Argos Operations Committee (OPSCOM) co-chaired by NOAA and French Space Agency (CNES)

- NOAA responsible for:
  - Spacecraft integration, launch and operation
  - Providing access to global pre-processed data stream

- CNES responsible for:
  - Providing Argos instrument
  - Operation of Argos data processing system
All Argos Platforms in 24 Hours
GROUND RECEIVING STATIONS

GLOBAL

FAIRBANKS

WALLOPS IS.
REGIONAL STATION COVERAGE

ARGOS ground stations coverage
ARGOS PROCESSING CENTERS

LARGO

TOULOUSE

TOKYO

LIMA

JAKARTA

MELBOURNE
POES Planned System Coverage

PM Orbit

APT & HRPT
Available

NOAA-16

NOAA-N

NOAA-N'

AM Orbit

APT & HRPT
Available

NOAA-17

LRPT & A-HRPT
Available

Metop 1

Metop 2

DRO user decision point—cost effective to go digital LRPT and/or A-HRPT?