The

WMO Space Programme

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Outline

- WMO Structure
- Status of the WWW’s space-based sub-system GOS
- WMO Space Programme
- WMO Space Programme Implementation
- Towards an integrated WMO global observing system (WMO – IOS)
Purposes of WMO

To promote and foster meteorology, hydrology, and related geophysical sciences and to facilitate world-wide cooperation for the benefit of humankind:

• Networks for meteorological / hydrological and other geophysical observations;
• Standardization of observations and publications;
• Development of operational hydrology;
• Systems for processing and rapid exchange of data;
• Applications for socio-economic development (transportation, water, agriculture, oceans, pollution control, etc), environment protection, and policy formation;
• Disaster prevention and mitigation;
• Research and training.
Organizational Structure

- **Congress**, supreme body, determines the future policy (meets every 4 years)
- **Executive Council**, 37 directors of meteorological or hydrometeorological services. They act in their individual capacities (meets annually)
- **Regional Associations** (6) - address regional concerns
- **Technical commissions** (8) - technical experts make recommendations on scientific or technical issues within the purposes of WMO
- **Secretariat** with regional (3) and subregional (4) offices
WMO Programme Structure

- World Climate Programme
- Atmospheric Research and Environment Programme
- Applications of Meteorology Programme
- Hydrology and Water Resources Programme

WMO Space Programme

- Natural Disaster Prevention and Mitigation Programme

- World Weather Watch Programme
- Education and Training Programme
- Technical Cooperation Programme
- Regional Programme
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## Space-based sub-system of GOS (2004)

### Geostationary
- **EUMETSAT**
  - Meteosat-8 at 10.5°W
  - Meteosat-7 at 0°
  - Meteosat-6 at 10°E
  - Meteosat-5 at 63°E
- **Japan**
  - GMS-5 at 140°E
- **People's Republic of China**
  - FY-2B at 105°E
- **Russian Federation**
  - GOMS-N1 at 76°E
- **United States of America**
  - GOES-12 at 75°W
  - GOES-11 at 103°W
  - GOES-10 at 135°W
  - GOES-9 at 155°E
  - GOES-8 at 165°E

### Polar Orbiting
- **People's Republic of China**
  - FY-1C, 1D series
- **Russian Federation**
  - METEOR series
- **United States of America**
  - NOAA series

### R&D
- CNES
- ESA
- JAXA
- NASA
- Roskosmos
- …
Unparalleled international cooperation has been achieved in satellite activities.
Space-based component of GOS (2000)
Status of the WWW’s space-based component GOS

Standing members

• operational satellite operators

Newest members

• NASA – Aqua, Terra, NPP, TRMM, QuickScat
• JAXA – GCOM series
• ESA – ERS 1 and 2, ENVISAT
• Roskosmos – METEOR 3M N1 (R&D inst), OKEAN series
• CNES – Jason-1, SPOT-5
• IMD – INSAT series
• Republic of Korea – COMSAT-1
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WMO Space Programme

Fourteenth WMO Congress (May 2003):

• Recognized *critical and fast growing importance of data, products and services provided by WWW’s expanding space-based component of the GOS* to WMO Programmes and supported Programmes

• Decided to initiate a *new major WMO Space Programme as a cross-cutting programme* to increase the effectiveness and contributions from satellite systems

• CBS lead Technical Commission
International coordination

- CGMS (Coordination Group for Meteorological Satellites)
- CEOS (Committee on Earth Observation Satellites)
- IGOS (Integrated Global Observing Strategy) Partnership
- COPUOS (UNISPACE III)
- GEO and its GEOSS (WWW’s space-based GOS, a major GEOSS component)
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WMO Space Programme Implementation

- Coordination with space agencies within CGMS and CEOS
- Organization for new WMO Expert Team on Satellite Systems
- Development WMO portions 10-Year Implementation Plan for GEOSS
- Interaction with the WMO Expert Team on Evolution of the GOS
- Preparation for symposia to identify R&D satellite data and products for transition to operational satellites
- Continuation & Expansion of Virtual Laboratory for Education and Training in Satellite Meteorology
Increased real time access to satellite data

- EUMETSAT ATOVS Retransmission Service (EARS) has increased ATOVS real time access in Northern Hemisphere
- Access to near real time ATOVS data important for WMO activities such as implementation planning for the redesign (evolution) of the GOS and THORPEX
- EARS extremely effective example of ADM
- Need to extend coverage into Southern Hemisphere
- WMO Space Programme to act as catalyst to form local consortia (Regional ATOVS Retransmission Services) similar to EARS
- WMO SG written to CGMS and WMO Members
- IGDDS to link regional ADMs into a global data dissemination service
- First WMO RARS/IGDDS planning meeting 16-17 December 2004 hosted by EUMETSAT with key global participation
Secondary user community

Additional products

Regional consolidation

Local processing

Central processing

Global data (Recorded/dumped)

Polar orbiting satellites in the region

Geostationary satellites

Polar orbiting satellites locally received data

Regional network of HRPT stations

Other data available from within the region (non-satellite)

Data circulation and exchange within a region

Data Sources

Advanced Dissemination Methods

An ADM in a Region

User community #1

User community #2

User community #3

ADM #1

ADM #2

ADM #3

ADM # 3

User community #3

User community #2

User community #1

Secondary user community

Polar orbiting satellites

Global data

Local received data

Polar orbiting satellites

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Other data available from within the region (non-satellite)
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Polar orbiting satellites
Locally received data
Regional network of HRPT stations

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Data circulation and exchange within a region

IGDDS

ADM #1

User community #1

Secondary user community

ADM #2

User community #2

ADM #3

User community #3

Advanced Dissemination Methods

ADMs in an Integrated Global Data Dissemination Service (IGDDS)
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Towards an integrated WMO global observing system (WMO – IOS)

- CM-4 recommendation for EC-XLVI (June 2004) consideration

- Space-based sub-system of an integrated WMO global observing system
  - operational meteorological polar orbiting satellites
  - operational meteorological geostationary satellites
  - environmental Research and Development satellite constellations

- Three Earth-system domains and two cross-cutting sets of requirements for atmosphere, ocean, land, climate and natural disaster reduction
Towards an integrated WMO global observing system (WMO – IOS) (continued)

Three Earth-system domains

**Atmosphere** meeting the needs of

- operational WWW, aviation meteorology (CAeM) and agricultural meteorology (CAgM)
- weather research WWRP (CAS)
- atmospheric chemistry, GAW – CAS

**Ocean** meeting the needs of

- Global Ocean Observing System (GOOS)
- JCOMM
Towards an integrated WMO global observing system (WMO – IOS) (continued)

Three Earth-system domains (continued)

Land surface and fresh water meeting the needs of

- World Hydrological Cycle Observing System (WHyCOS)
- Hydrology and Water Resource Programme (HWR) as articulated through CHy
- WMO-co-sponsored Global terrestrial Observing System (GTOS)
- CAgM
Towards an integrated WMO global observing system (WMO – IOS) (continued)

Two cross-cutting sets of requirements

**Climate**, incremental to, and integrating across, the domain-based observing systems meeting the needs of

- climate research, (WCRP)
- climate policy, articulated through SBSTA, COP, based on information from IPCC etc.
- climate monitoring and services, articulated through CCl, CAgM, CHy

**Natural disaster reduction**, incremental to, and integrating across, the domain-based observing systems to support WMO Natural Disaster Prevention and Mitigation Programme
Exciting times for WMO Members

- Space-based component of the GOS continues to expand
- Provides valuable satellite data, products and services more so than ever before in the history of the World Weather Watch
- WMO established a new *WMO Space Programme*
- Efforts towards an integrated WMO global observing system
- WMO Space Programme Implementation Activities
Thank you