5th GOES Users' Conference, New Orleans, 23-24 January 2008

Geostationary satellites in a WMO perspective

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Outline

- **The WMO Global Observing System (GOS)**
- **Geostationary satellites in the GOS**
- **Key role of current and future GOES**
- **Conclusions**

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Global Observing System (GOS)

- **Globally Coordinated**
- **Space and Surface-based**
- **Increasing role of space observation**

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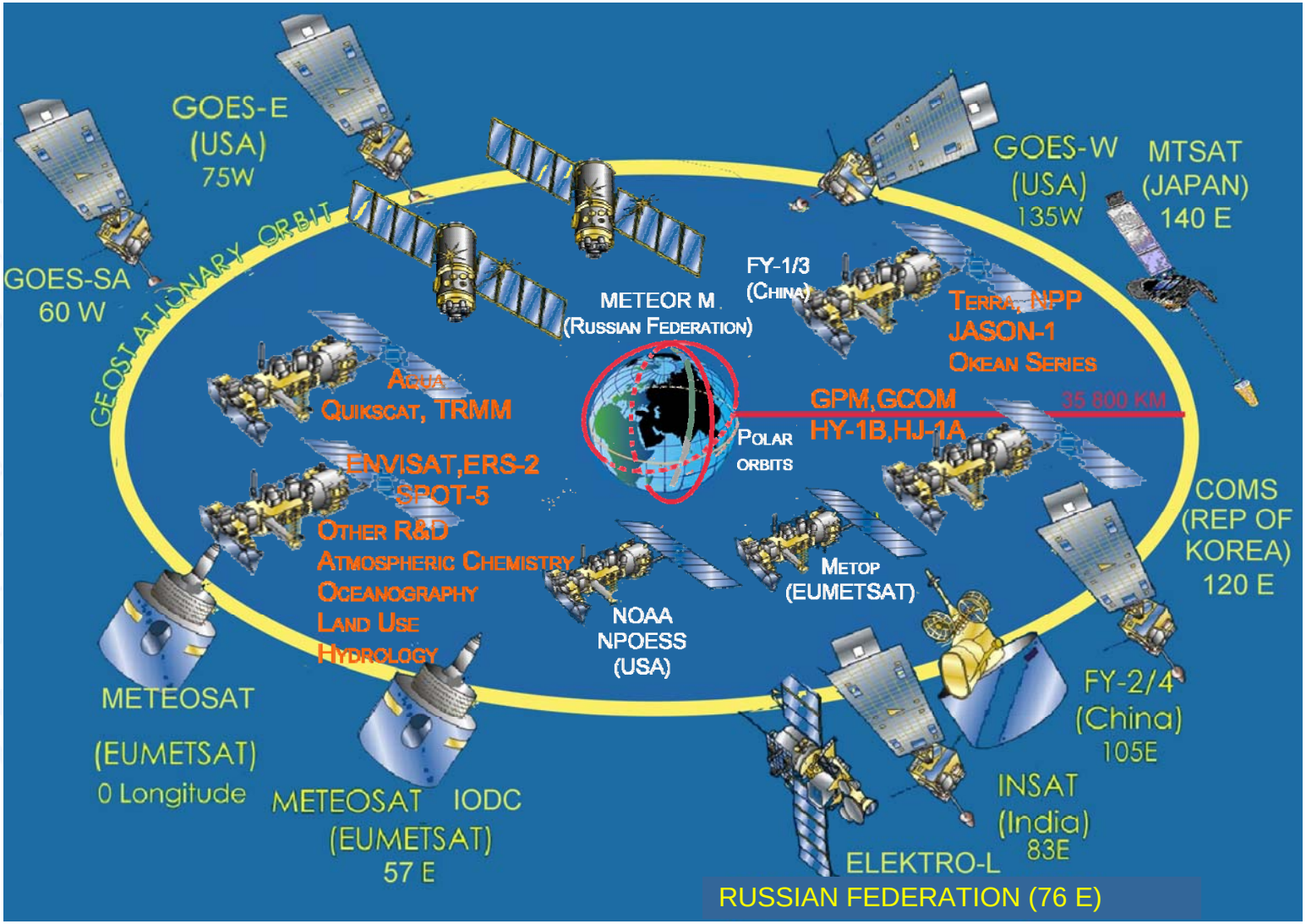
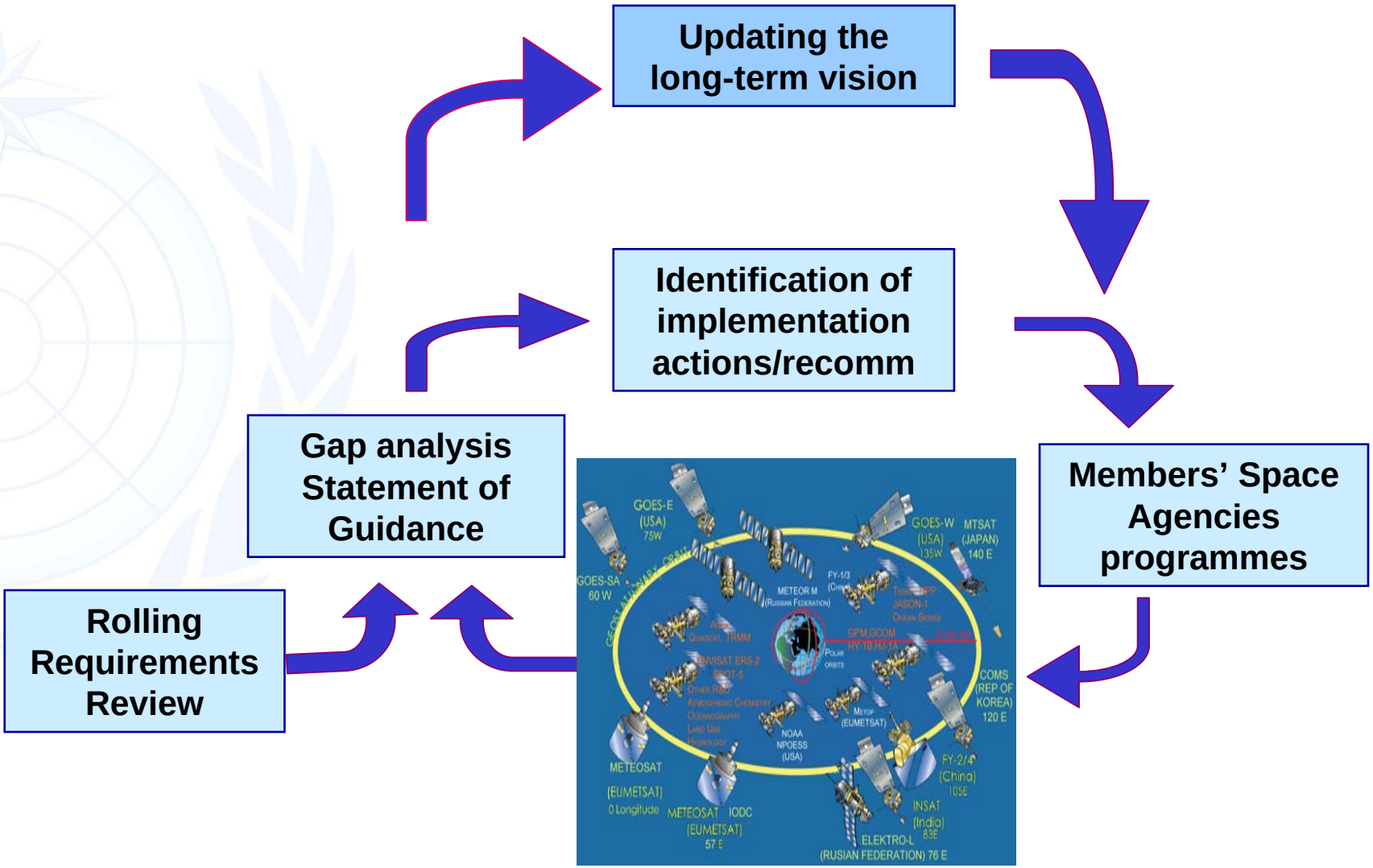
Space-Based component of the Global Observing System (GOS)



Evolution of the GOS



Towards WMO Integrated Global Observing Systems (WIGOS)

- Initial focus on weather forecasting (WWW)
- In 2006, WMO initiated a Re-design of the GOS baseline
  - To update the vision to 2025
  - To respond to weather **and climate** requirements
- In 2007, 15th WMO Congress agreed the principle of WMO Integrated Global Observing Systems (WIGOS)
  - For Weather forecasting *and* Climate monitoring *and* Atmospheric Composition *and* Hydrology…

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GOS as a component of GEOSS

WMO: Weather-Water-Climate and applications

9 SBAs

- Weather
- Climate
- Water
- Disasters
- Agriculture
- Health
- Energy
- Biodiversity
- Ecosystems

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New Vision of the GOS to 2025
(1) General aspects

- Operational observations from various orbit types:

  geo, polar, + other inclinations/altitude when relevant
- Transition of advanced observations from R&D to operations
- Improved calibration
- Improved data access and data timeliness
- Consider the possibility of targeted observations
- Increased cooperation among satellite operators

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New Vision of the GOS to 2025
(2) *overview*

- **Optimized/enhanced geostationary constellation**
- **Sounding missions on 3 sun-synchronous orbital planes**
- **Operational Radio-Occultation Sounding constellation**
- **Updated strategy for altimetry and sea surface wind**
- **Continuity of other Essential Climate Variables**
  - **Global Precipitation Measurement**
  - **Earth Radiation Budget**
  - **Atmospheric Chemistry**
  - **Special Imagery for ocean colour, vegetation**
- **Lightning detection (encouraged)**
- **Possible Highly Elliptical Orbit missions for polar regions**

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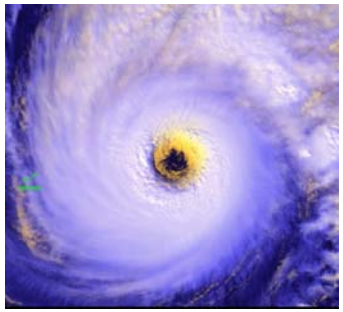
Unique role of geostationary satellites

- **Monitoring rapidly evolving weather patterns**
  - Severe storms and hurricanes
  - Convection
  - Targeted observation



- **Tracking wind or pollutant transfer**
  - Clouds and water vapour patterns
  - Volcanic ash clouds
- **Event detection**
  - Lightning
  - Wild fires

- **Continuous monitoring**
  - Capturing diurnal cycle (LST, SST, Radiation fluxes)
  - Picking up cloud-free spots

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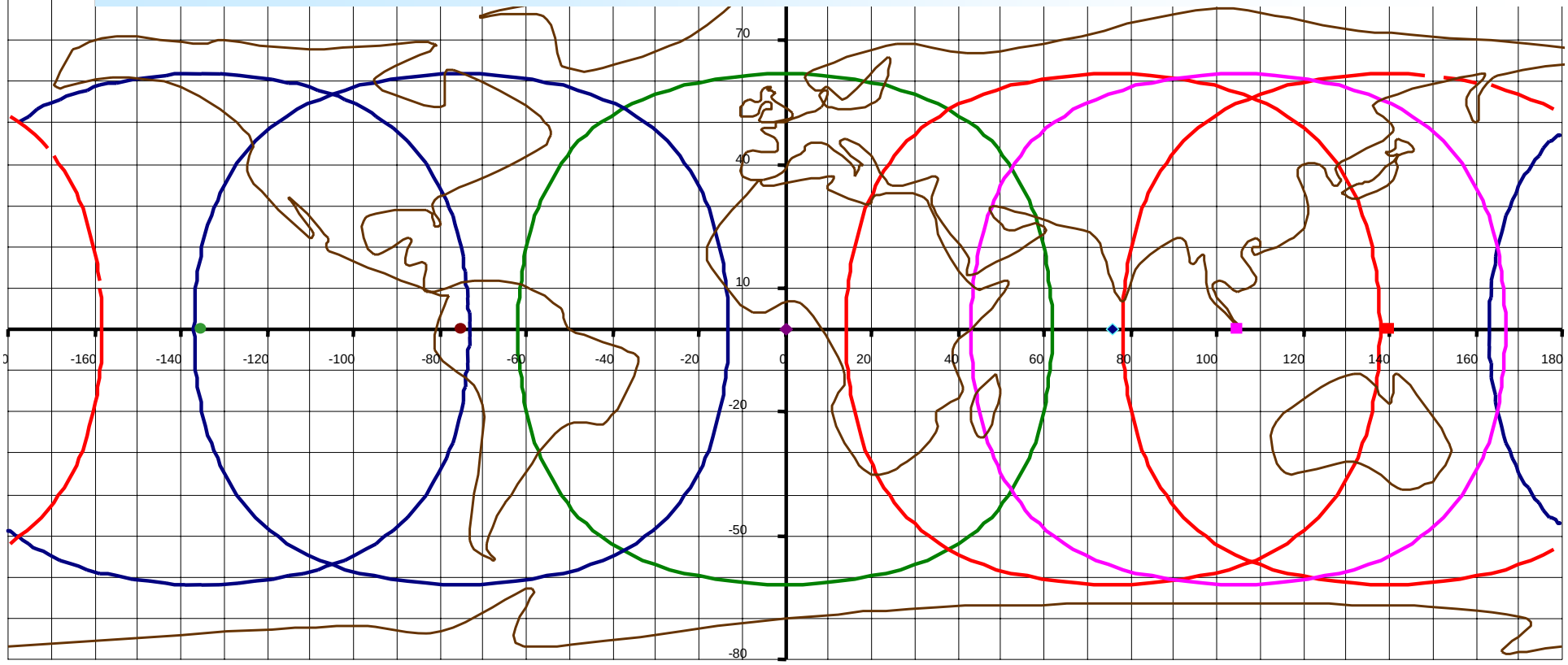
The operational geostationary constellation

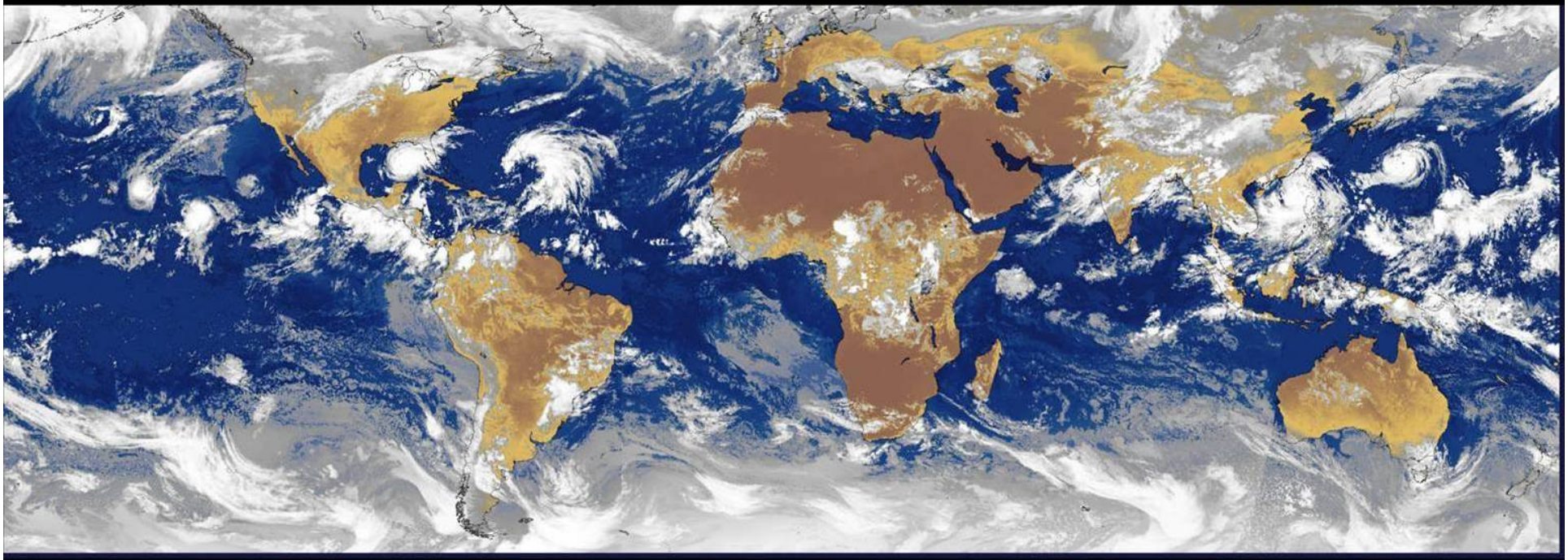
Current nominal locations : 135 W, 75W, 0, 76 E, 105 E, 140 E

Footprints for a maximum zenith angle < 70 deg



The operational geostationary constellation

A permanent near-global coverage



Courtesy of METEO-FRANCE

Five-sat composite IR image 22/09/2005 12h00 UTC

New Vision of the GOS to 2025
Operational geostationary component

- Near-global coverage with at least 6 spacecraft separated by $\leq$ 60 deg longitude
- Multipurpose VIS/IR imagery
  - Revisit time < 15 min for full disc
  - Shorter on limited areas
- IR Hyperspectral sounding

- Contribution to Earth Radiation Budget
  - (TBD, complement to LEO)
- Contribution to Atmospheric Chemistry
  - (TBD, complement to LEO)
- Lightning detection complementing ground systems

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GOES' key role in the global constellation

- 33 years of continuous service
- Covering 2 WMO Regions out of 6
  - Nominal locations GOES-East and -West
  - GOES-10 at 60 W
- Two oceans
  - Hurricane watch over Caribbean and Pacific
- Pioneering geostationary sounding

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Looking forward to GOES-R series

- **ABI an excellent response to imagery requirement**
  - Will allow breakthrough in NWC, NWP (wind)
  - Will lead the new generation of imagers (MTG, FY-4, MTSAT-FO)
- **Lightning detection**
  - Serving Nowcasting and climate
- **SEISS**
  - Space Weather now being considered by WMO
- **Hyperspectral IR sounder ?**
  - Considered essential in New Vision of the GOS to 2015
  - Wind, Moisture, Temp profiles with high temporal/horizontal/vertical resolution for regional and convective scale NWP, NWC
  - Major benefit for global NWP when available globally: FY-4-O, MTG/IRS, MTSAT-FO/Sounder
  - **Strongly encouraged for GOES-S and beyond**

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Conclusions

- As the new GOS is expanded and diversified, geostationary satellites remain the backbone of meteorological observation for which operational continuity is mandatory
- GOES system a major component of WMO GOS since its origin
- Improved spatial, temporal and spectral resolution allows major improvements on products and benefits in applications
- Looking forward to GOES-R series that should allow unprecedented geostationary imaging performance
- Encouraging NOAA to consider hyperspectral sounding on future spacecraft when possible

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Thank you !