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COMMISSION FOR BASIC SYSTEMS  
OPEN PROGRAMME AREA GROUP ON INTEGRATED OBSERVING SYSTEMS

INTER-PROGRAMME EXPERT TEAM ON SATELLITE UTILIZATION AND  
PRODUCTS

ITEM: 5.5

FIRST SESSION

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## WHAT ARE ESSENTIAL SATELLITE DATA?

*(Submitted by A. Rea and Secretariat)*

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### Summary and Purpose of Document

To outline the key issues and policy documents framing the issue of essential satellite data.

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### ACTION PROPOSED

The session is invited to:

- (a) Note the information provided; and
- (b) Consider framing a recommendation to CGMS-43 on what constitutes essential satellite data.

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**Appendix A:** Generic dissemination requirements for satellite data (developed in context of IGDDS)

## DISCUSSION

### Introduction and Context

1. In the context of observational data for weather and climate applications, there are different perceptions of the word “essential”:
  - (i) users often perceive it as the data most critical for their application (e.g., the ten data streams with the highest impact on forecast skill of a NWP model);
  - (ii) data providers often denote data “essential” if they are being distributed in an open manner, with no limitations on use, free of charge; in contrast, “additional” data are subject to some limitations or charges
  - (iii) WIS centres (such as Global Information System Centres, GISC) perceive “essential” data that require caching; hitherto only few satellite datasets are registered in the WIS catalogues
  
2. WMO Resolution 40 (Cg-XII, 1995) states:
 

“(1) Members shall provide on a free and unrestricted basis essential data and products which are necessary for the provision of services in support of the protection of life and property and the well-being of all nations, particularly those basic data and products, as, at a minimum, described in Annex 1 to this resolution, required to describe and forecast accurately weather and climate, and support WMO Programmes.”
  
3. Annex 1 is broad regarding “essential” satellite data, saying that
  - (i) “Those data and products from operational meteorological satellites that are agreed between WMO and satellite operators. (These should include data and products necessary for operations regarding severe weather warnings and tropical cyclone warnings). “
  - (ii) “Free and unrestricted” means non-discriminatory and without charge.
  
4. The distinction of “essential” and “additional” data in the sense of Res. 40 has helped that different data access and distribution policies could coexist among WMO Members: while those Members with a data policy favouring open and free access declared all their data “essential” (from a provider’s perspective), for others with more restricted data policies, the Resolution enabled commercial distribution of some data while protecting “essential” data from commercial interests.
  
5. Satellite data exchange and use has dramatically changed since 1995, due to:
  - (i) A transformed ICT landscape, allowing for a range of data access and exchange mechanisms beyond managed, point-to-point lines (e.g., internet, DVB-S), and data reproduction at virtually no cost to providers;
  - (ii) Dramatic improvements in temporal and spatial resolution from satellites; and
  - (iii) The NWP community being the single largest satellite data user today, whereas Res. 40 is formulated against the backdrop of using (geostationary) satellite imagery for nowcasting and severe weather warnings
  
6. The prospect of private-sector operators of basic satellite systems has triggered renewed attention to the issue of data access for global WMO applications. Actors such as PlanetIQ, GeoMetWatch, and others propose models of data commercialization and utilization whereby they will sell data under a restricted use licence to multiple users.
  
7. A key issue is that, where commercial satellite data streams are used to substitute for traditional in situ measurements, the replacement data streams may not be available to WMO members. An example could be the substitution of GPS-RO data for upper air balloon soundings. This could have the effect, over time, of reducing overall availability of data to WMO members.

## WMO Context

7. This issue was considered at the most recent meeting of ET-SAT. At this meeting, ET-SAT recognised:
- (i) Private information sources were traditionally outside the scope of meteorological activity, however, as **we move towards a more integrated Earth system monitoring, a more open approach may be needed.**
  - (ii) **There are however related risks. It** raises questions to be addressed by the WIGOS task team in charge of these issues. In particular:
    - a. Loss of total transparency of the observation and processing chain, and control over integrity and reliability of the data. This may happen if some information cannot be disclosed because they involve proprietary knowledge, or in case of conflict of interests. This risk has to be fully controlled through contracts.
    - b. Limitations to data access. Maintaining and expanding international data sharing is a fundamental goal of WMO. Resol.40 defines “essential data” and “additional data”. Essential data must be exchanged openly without any restrictive condition, but the exchange of additional data may be subject to conditions and possibly charged. Therefore, **Resolution 40 enables a commercial activity** without hampering the free and open exchange of essential data.
    - c. Preserve international mission **coordination** for the smooth implementation of the WMO agreed vision, with priority effort to fill the gaps, and interoperability.
8. At the recent 4<sup>th</sup> Session of ICG-WIGOS, this issue was also addressed in a discussion paper (available from: [http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/ICG-WIGOS-4/Doc-6.4\\_Data-Management\\_Data-Policy-v02.doc](http://www.wmo.int/pages/prog/www/WIGOS-WIS/meetings/ICG-WIGOS-4/Doc-6.4_Data-Management_Data-Policy-v02.doc))
9. The key points made at ICG-WIGOS were as follows:
- **Data Policy:** The policies of some external data providers place constraints on the use and redistribution of contributed data. These constraints vary by organization and data type, and any constraints are generally seen to challenge the WMO principle of free and unrestricted exchange. WIGOS will require practical policy guidelines and technical implementations to enable constrained data to be usefully contributed to NMHSs and WMO while protecting the operational and intellectual property interests of the data provider. At the same time, it should also be noted that there are many policy drivers toward increasing access to publicly funded data and information (e.g. INSPIRE within Europe, Open Data directives elsewhere) and that in many cases NMHSs and other public institutions are required to respond.
  - **Commercial Data:** There is significant growth in private sector-operated observing networks which may offer useful data to support NMHS and WMO programmes. Further, in some jurisdictions there is direction to explore greater use of the private sector to meet national needs for both surface and space-based observations. As a significant shift from traditional NMHS practice, there is not a broad body of experience nor well established practices regarding licencing arrangements to best support WMO objectives. In the absence of this experience, Members would benefit from an examination of emerging business models and the establishment of WMO principles on private sector data policies and licensing.
10. In light of these developments, it is timely and warranted that IPET-SUP discusses what constitute “essential satellite data”, with the understanding that a designation of “essential” should promote the removal of any limitations on access and use.

## Possible next steps

11. Satellite users within WMO communities should be polled regarding their view on what constitute “essential satellite data”, in particular:
- Global and regional NWP and those associated with the Global Data Processing and Forecasting System (GDPFS)
  - Nowcasting
  - Aeronautical meteorology
  - Tropical cyclone programme
  - Disaster risk reduction
  - Climate
  - Atmospheric composition

## Reference material

12. In the IGDDS context, generic user requirements for satellite data (e.g., “MW soundings”, “SST fields”) were formulated which could serve as a basis for recommending “essential satellite data” ([WMO IGDDS Implementation Group, First Meeting, 2007](#); see Annex).
13. EUMETSAT Data Policy  
(<http://www.eumetsat.int/website/home/AboutUs/LegalInformation/DataPolicy/index.html>)
14. NOAA advocates for a full and open data policy that allows for sharing of data.  
(<http://www.nesdisia.noaa.gov/policy.html>)
15. In the GFCS context, a Draft Resolution on “Exchange of Data and Products to Support the Implementation of the GFCS” is being submitted to Congress-17 for adoption. Its Annex says “in addition to the climate data and products provided under Annex I to Res. 40, the following data and products, including those relating to the GCOS Essential Climate Variables (Atmospheric, Oceanic, and Terrestrial): [...]
- (3) all available climate relevant upper ocean data (0-700m), in particular sea ice, temperature, and salinity,
  - (4) all available climate relevant coastal interface data, in particular sea level, waves and storm surges,
  - (5) all available data on radiative forcing greenhouse gases and aerosols,
  - (6) all available climate relevant satellite data and products,
  - (7) all available stream flow and lake level data, including stage and discharge,
  - (8) all available climate relevant cryospheric data, in particular snow cover, snow depth, glacial monitoring, permafrost, and lake and river ice,
  - [...]
  - (10) all available climate relevant data and products required for the current and future priority areas of the GFCS...”

**Appendix: Generic dissemination requirements for satellite data (developed in context of IGDDS)**

Table 1: Generic requirements for satellite data (up to level 1)

Type of data and source	Baseline requirement	
	Type of data	Repeat cycle; Timeliness
GEO imagery over Region		
GEO sounding channels over Region		
GEO lightning data over Region, when available		
GEO other instruments when available		
GEO imagery elsewhere		
Operational LEO VIS-IR imagery		
Local operational LEO sounding data		
Regional operational LEO sounding		
Global operational LEO sounding		
LEO MW Imagery		
Other LEO data from operational or preoperational instruments (such as Earth radiation, UV)		
Scatterometer		

<b>Type of data and source</b>	<b>Baseline requirement</b>	
	<b>Type of data</b>	<b>Repeat cycle; Timeliness</b>
Radio-occultation sounding		
R&D instrument data		
Other (please specify)		

Table 2: Generic requirements for derived satellite-based products (up to level 2)

Product Categories	Baseline requirement	
	Type of data	Repeat cycle; Timeliness
Wind vectors (from GEO)		
Wind vectors (polar)		
Sea surface winds		
Sounding T,U (radiometric)		
Sounding T,U (radio occultation)		
Cloud analysis		
Stability index		
Total Precipitable Water		
Precipitation		
SST		
Wind-waves		
Sea level		
Solar and Earth radiation products		
Albedo		
Fire detection		
Ice and snow extent		
Vegetation index		
Oceanic chlorophyll		
Volcanic ash		
Others (please specify)		