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Prepared by WMO  
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## OUTCOME OF THE BIENNIAL QUESTIONNAIRE ON SATELLITE DATA AVAILABILITY AND USE

This paper provides a top-level summary of the outcome of a questionnaire that WMO distributed in 2010 among its 189 Members on the availability and use of satellite data and products for the period 2008-2009. WMO has been using biennial questionnaires to establish evidence on the capabilities and possible existing deficiencies on the part of users. This analysis of the outcome was based on 100 responses from 86 countries.

A key motivation for users to respond to the questionnaire lies in the expectation that remedial action will be taken by satellite operators, processing centres and training facilities, helping to mitigate some of the reported deficiencies and unmet requirements in the following areas: access to satellite data; use of satellite data and products; applications of satellite data and products; training in satellite meteorology; other requirements.

CGMS as a coordination forum of satellite operators is a key recipient of these results.

The full report with an analysis of the biennial questionnaire is available at:

[http://www.wmo.int/pages/prog/sat/documents/SAT-PUB\\_SP-8-TD-1567-Questionnaire-Outcome-2010.pdf](http://www.wmo.int/pages/prog/sat/documents/SAT-PUB_SP-8-TD-1567-Questionnaire-Outcome-2010.pdf).

Action/Recommendation proposed:

CGMS members are invited to take note of the outcome of the 2010 WMO questionnaire on availability and use of satellite data and products, covering the period 2008-2009.

## **Outcome of the Biennial Questionnaire on Satellite Data Availability and Use**

### **1 Introduction**

In line with the WMO strategic plan, one of the goals of the WMO Space Programme is to improve the status of availability and use of satellite data and products from both operational and R&D satellites within WMO Members (currently 189 States and Territories). One means to monitor and stimulate progress towards this goal is by means of information obtained from surveys conducted among Members. Such surveys have been based on biennial questionnaires circulated within Member countries (online and in hardcopy), providing evidence on the capabilities and possible existing deficiencies on the part of users. The latest survey of this kind was carried out in 2010 for the period 2008-2009 and received 100 responses from 86 countries, a summary of which is given in the present working paper (the full report is available at: [http://www.wmo.int/pages/prog/sat/documents/SAT-PUB\\_SP-8-TD-1567-questionnaire-outcome-2010.pdf](http://www.wmo.int/pages/prog/sat/documents/SAT-PUB_SP-8-TD-1567-questionnaire-outcome-2010.pdf)).

A key motivation for users to respond to the questionnaire lies in the expectation that remedial action will be taken by satellite operators, processing centres and training facilities, helping to mitigate some of the reported deficiencies and unmet requirements. CGMS as a coordination forum of satellite operators is a key addressee of these results; the WMO Space Programme with its strategy to improve satellite data availability and utilization is another one.

The findings established over the past 15 years based on biennial questionnaires have provided valuable insight into the needs of Members related to satellite data and products. Discussions are currently ongoing within the CBS OPAG-IOE Expert Team on Satellite Utilization and Products (ET-SUP) on more effective and more representative gathering of evidence on these needs, through modified questionnaires and/or other means (e.g., interviews, surveying of focus groups).

### **2 Summary Findings**

The response rate (46%), while still relatively low, was higher than any previous edition of the questionnaire, reflecting the efforts of ET-SUP and the WMO Space Programme to increase participation.

A large majority of responding Members (73%) indicated an increase in access to, and use of, satellite data, once again reflecting the efforts of all concerned with maximizing this aspect.

The trends of data reception mechanisms continue to reflect changes from analogue to digital data and the growing importance of data services utilizing DVB-S broadcast technology.

There is a clear signal from Members that data from R&D and other environmental satellites (e.g., QuikScat, TRMM, Terra/Aqua, Jason-1) are of growing importance and that access to these data is widely requested.

In common with the previous two editions of the survey, Members indicated that data describing precipitation are still the most needed data currently not readily available from satellites.

Members reported a very impressive number of staff trained in satellite meteorology over the two-year period of the questionnaire. This is a very healthy sign for the future exploitation of satellite data and services

### **3 Questionnaire Categories**

The questionnaire resulted in feedback by users in the following areas:

**Access to Satellite Data**

- Data Access Trends
- Data Reception Mechanisms
- Data Access by Satellite Name
- Satellites which Members do not access but would like to receive

**Use of Satellite Data and Products**

- Data Processing and Usage
- Distribution to other Users
- Limiting Factors
- Change in Usage by WMO Region

**Applications of Satellite Data and Products**

- Most Important Parameters
- Required but not Available Parameters

**Training in Satellite Meteorology**

- Training in each WMO Region
- Training Methods
- Virtual Laboratory Usage Reported from each Region
- Limiting Factors in Education and Training in each Region
- Changes in Education and Training in each Region

**General Comments**

- Suggested Additional Satellites
- Other Limiting Factors
- Suggested Additional Parameters

For detailed results, please consult the full report at:

[http://www.wmo.int/pages/prog/sat/documents/SAT-PUB\\_SP-8-TD-1567-questionnaire-outcome-2009.pdf](http://www.wmo.int/pages/prog/sat/documents/SAT-PUB_SP-8-TD-1567-questionnaire-outcome-2009.pdf)

## **4 Other Key Findings**

**Access to Satellite Data**

For GEO satellites, there was a high increase in the data access for FY-2D. For LEO satellites, a small increase in data access. For R&D satellites, the highest increase in data access for QuikScat, TRMM, Terra/Aqua and JASON-1.

Data from Terra/Aqua satellites were the most requested among the satellite data that are not readily accessed. JASON satellite series, not in top 10 previously ranked four among the most requested satellites.

**Use of Satellite Data and Products**

The increased use of locally generated products reveals a stronger product processing capability, especially as concerns quantitative imagery, sounder data, cloud, precipitation and sea surface products.

Technical difficulties were again the most important limiting factor of data usage in most regions, and the financial limitations in other cases.

### **Applications of Satellite Data and Products**

One question in the questionnaire sought to establish which geophysical parameters, derived from satellite data, are the most important for Members. The results below are based on a cumulative ranking of all application areas (e.g., Nowcasting, Regional NWP, Hydrology):

Parameters that have shown a consistent increase in importance over the past three editions of the survey include:

- Fires
- Land surface temperature

Parameters that show a marked increase in importance since the previous survey edition include:

- Soil moisture
- Specific humidity profile
- Ozone total column
- Vegetation type
- Sea ice cover

Further details are given in the full report referenced above.

### **Training in Satellite Meteorology**

There was a strong increase in reported training via the WMO Regional Training Centre in RA IV (North America, Central America and the Caribbean). A decrease in the number of staff trained via internal training is recorded, although it is in RA VI (Europe) by far the main method of training.

Satellite image interpretation (vs. equipment, operation, maintenance; software development; physical basis for remote sensing) remains by far the most reported skill accounting for more than 50% of the responses and showing little change from the last edition of the survey.

Classroom based presentation was still the most popular method of training with little change from previous editions of the survey.

Awareness and usage of the VLab have remained almost unchanged compared with previous years although usage figures, both regular and occasional, are a little lower. The wish of more promotion of the VLab was expressed. Regular updates on satellite derived products are appreciated.

Financial difficulties continue to be the most common factor limiting education and training.

### **Other Limiting Factors**

Data latency of several hours for the use of some low-Earth orbit satellites (reduced latency is needed).

Bandwidth limitations in the communications with major data providing centres; need to increase ability to get satellite products into the forecasters' workstations in timely fashion.

Need for additional polar-orbiting resources providing consistent data from AM, mid-AM, and PM orbits, with increased access to international data in near-real-time.

## **5 Conclusions**

CGMS members are invited to take note of the outcome of the 2010 WMO questionnaire on availability and use of satellite data and products, covering the period 2008-2009. The WMO ET-SUP is working on addressing the issues identified in the survey, in collaboration and coordination with relevant stakeholders (in the areas of satellite product generation, data dissemination and access, web-based information, training, etc).