Operational DCS status report + status of implementation of best practices (EUMETSAT)

Presented to CGMS-51 Working Group I session, agenda item 8.2

Executive summary of the WP

This presentation supports the status of the EUMETSAT Data Collection Services (DCS) paper CGMS-51-EUMETSAT-WP-02. These are currently supported by Meteosat-10 at 0° and Meteosat-9 at 45.5°E IODC (Indian Ocean Data Coverage). Meteosat-9 took over from Meteosat-8 as the prime IODC satellite 1 July 2022. Meteosat-10 took over from Meteosat-11 as the prime 0° satellite on 21 March 2023.

The paper includes details of channel utilisation, DCP allocation, geographical distribution and DCP data dissemination mechanisms. It covers also details on expected changes to the EUMETSAT DCS service in 2023. The DCS is one of the core services operated by EUMETSAT in support of meteorology and weather prediction. Noting that the EUMETSAT DCS is also embarked on the Meteosat Third Generation (MTG).

The EUMETSAT DCS currently supports both standard-rate (100bps) and high-rate (1200bps) DCPs. The prime IODC application is for the Indian Ocean Tsunami Warning Network (IOTWS). As of 31 March 2023, there are 147 DCP operators located in 78 countries (Europe, Africa, Asia). There are a total of 1691 DCPs allocated, with 455 actively transmitting. Out of those DCPs allocated, 386 are HRDCPs transmitting at 1200 bps (359 supported by Meteosat-10 at 0° and 27 by Meteosat-9 at 45.5°E). The remaining 1305 are Standard Rate DCPs (1158 supported by Meteosat-10 at 0° and 147 by Meteosat-9 at 45.5°E). Since March 2022, 66 new DCPs have been assigned (66 HRDCP and 0 SRDCP). The EUMETSAT DCS has a typical reliability greater than 99%.

Introduction

The paper CGMS-51-EUMETSAT-WP-02 presents the status of the EUMETSAT Data Collection Services (DCS) currently supported by Meteosat-10 at 0° for the prime and Meteosat-9 at 45.5°E for the IODC (Indian Ocean Data Coverage). Included are details of channel utilisation, DCP allocation, geographical distribution and DCP data dissemination mechanisms.

EUMETSAT DCS OVERVIEW

The Data Collection Service (DCS) is one of the core services operated by EUMETSAT in support of meteorology and weather prediction. The DCS serves an important role in enabling data collection platform (DCP) operators to use the Meteosat system to receive environmental data collected from DCP platforms. The DCS is particularly useful for the collection of data from remote and inhospitable locations where it may provide the only possibility for data relay.
The Meteosat DCS, initially established with the first generation of Meteosat satellites (MFG) in 1977, has continued and expanded with Meteosat Second Generation (MSG), and is also embarked on the Meteosat Third Generation (MTG). The Data Collection Service is currently supported by Meteosat-10 at 0° and Meteosat-9 at 45.5°E.
The Meteosat DCS supports the following functions:

The transmission of data from DCPs to the Meteosat satellite;
The immediate relay of the data by the satellite to the EUMETSAT Ground Station;
Processing of the DCP data and quality checks;
Onward transmission of selected data to the user.

MSG Data Collection System (DCP message and Bulletins dissemination)

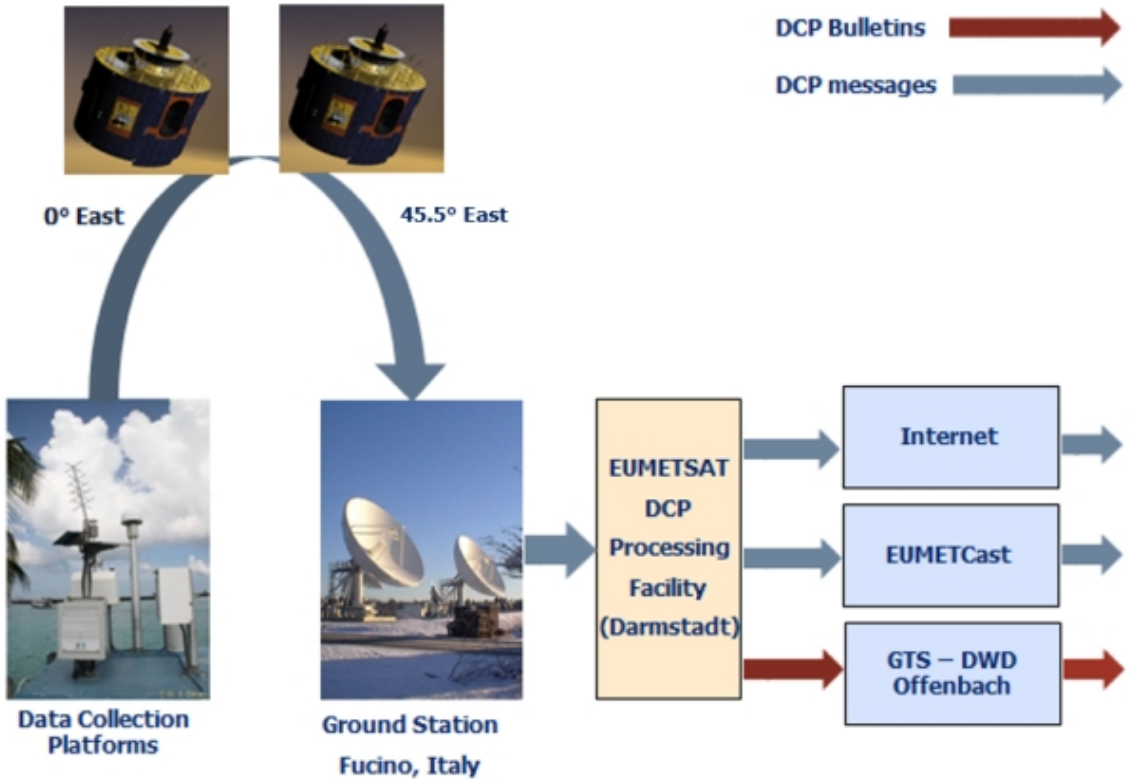

Figure 1

MSG Data Collection System (DCP message and Bulletins dissemination)

As illustrated above, the DCP first transmits its message to the satellite in the UHF radio frequency band. The satellite then transponds the message and transmits the data to the Primary Ground Station (PGS), for MSG this is located at Fucino, Italy, and if needed a backup ground station in Cheia, Romania. Data is then routed immediately to the DCP Processing Facility (MME_DCPF) at the Main Control Centre (MCC) in Darmstadt. The messages are compared with the master list of expected DCPs, processed and distributed to end user through three different dissemination mechanisms:

- EUMETCast - EUMETSAT's multi-service data dissemination system based on multicast technology. It uses commercial telecommunication geostationary satellites using DVB standards and research networks to multi-cast files (data and products) to a wide user community. A small change in the format of these products was made in March 2022;
- Global Telecommunications System (GTS) of WMO - Used to transmit environmental data to meteorological services throughout the world. EUMETSAT disseminates DCP bulletins to the RTH in DWD Offenbach;
- Internet - manual download from the website via secure log in.

The EUMETSAT DCS has a typical availability greater than 99%.

EUMETSATs Geostationary Meteosat Third Generation series (MTG) has begun with the launch of MTG1 in December 2022. The current planning is that MTGI1 will take over the 0° service in early 2024. The MTG series will offer an increased capacity over that of MSG.

Channel Utilisation Status

There are 245 regional channel slots (at 1.5 kHz spacing) available. Of these channel slots, 88 support 'older' 100 bps SRDCPs, and are assigned 3 kHz spacing. The remaining 157 channel slots can support the 1.5 kHz regional SRDCPs and the 3 kHz regional HRDCPs.
Currently there is a spare capacity of 94 channels of unused bandwidth (at 1.5kHz spacing).
The allocation of regional DCP channels is shown in Figure 2. This figure also shows the 11 international (IDCS) channels (with centre frequencies spaced 3 kHz apart), from 402.0355 - 402.0655 MHz. Originally there were 33 International Channels, but they were redistributed following the agreement at CGMS-36, i.e.:

- I01 – I11 (402.0025 – 402.0325 MHz) were allocated to NOAA for regional use;
- I12 – I22 (402.0355 – 402.0655 MHz) remain as International channels.
- I23 – I33 (402.0685 - 402.0985 MHz) allocated to EUMETSAT for regional use.

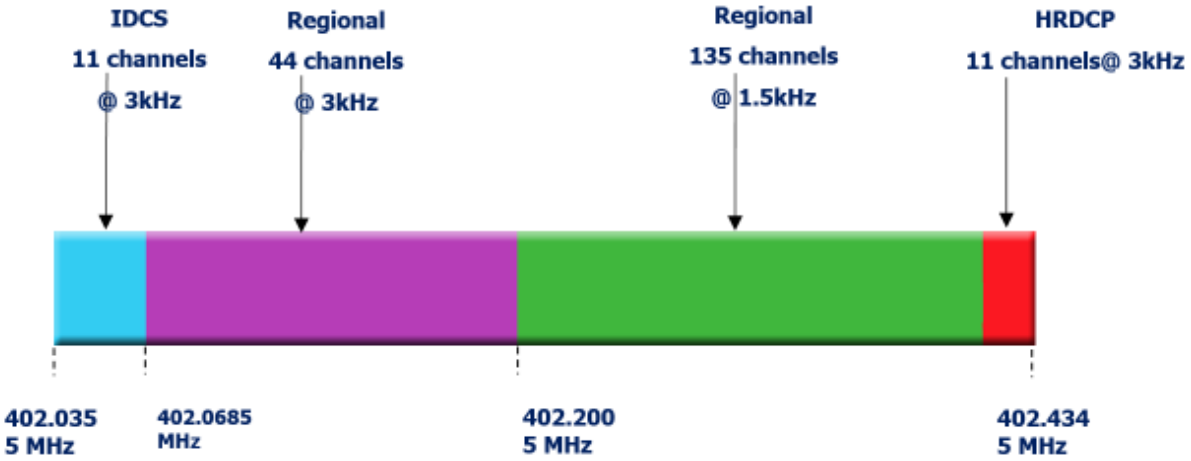

Figure 2

DCP Types

The EUMETSAT DCS currently supports both standard and high-rate DCPs.

Standard rate DCP (SRDCP) - SRDCPs transmit at 100bps and can transmit 649 bytes of platform data in 60 seconds (including 5 seconds unmodulated carrier, preamble, sync code and address) with a timing accuracy better than +/- 15 seconds.

High Rate DCP (HRDCP) – HRDCPs transmit at 1200bps and can transmit 653 bytes of data in 10 seconds. The timing accuracy is also improved to +/- 0.5 seconds. The modulation scheme used is also more robust against interference. More data can also be transmitted in a single message due to a more flexible allocation capability.

The high rate DCPs (HRDCP) therefore allow for improved capabilities and warnings of potentially devastating natural phenomena such as tsunamis.

Figure 2

DCP Allocation

As of 31 March 2023, there are a total of 1691 DCPs allocated, with 455 actively transmitting. Out of those DCPs allocated, 386 are HRDCPs transmitting at 1200 bps (359 supported by Meteosat-10 at 0° and 27 by Meteosat-9 at 45.5°E). The remaining 1305 are Standard Rate DCPs (1158 supported by Meteosat-11 at 0° and 147 by Meteosat-9 at 45.5°E).

Since March 2022, 37 new DCPs have been assigned.

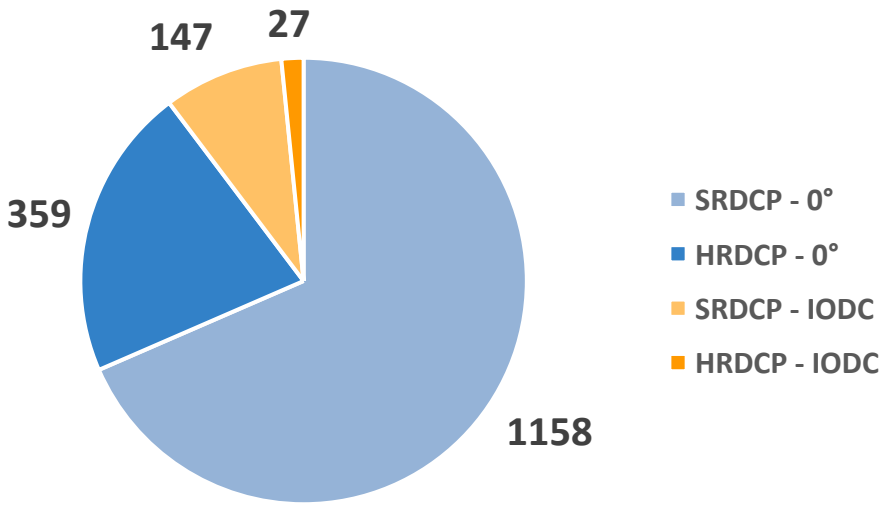

Figure 3

DCP Geographical Distribution

DCPs transmitting via the 0° and IODC satellite are located in Europe, Africa and Asia. The following figure visualises the geographical distribution of DCPs. On 31 December 2022, there were 1696 DCPs deployed in 79 countries (Europe, Africa, Asia).

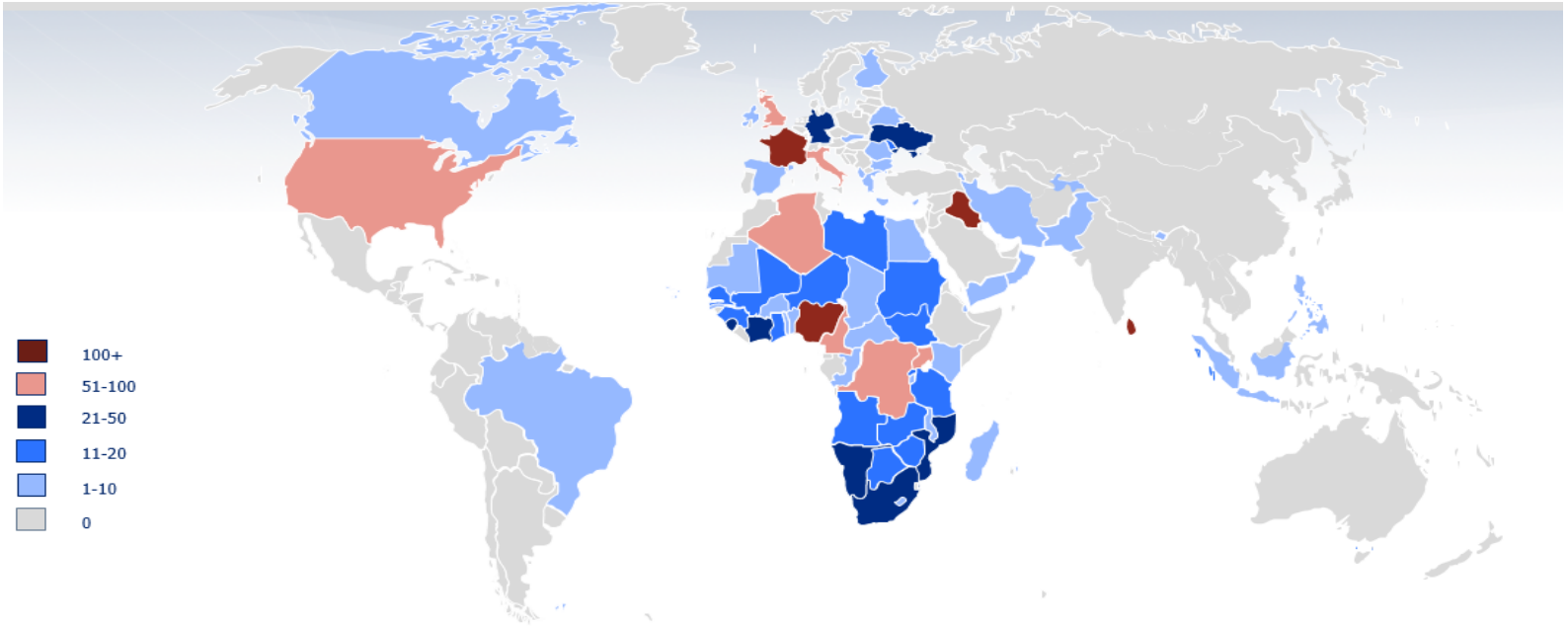

Figure 4

Geographical Distribution of DCPs by Country

The following table shows the breakdown of number of DCPs per country, as of 31 December 2022. It also shows changes in geographical distribution for the period 1 July 2022 to 31 December 2022.

DCPs	Country	DCPs	Country	DCPs	Country	DCPs	Country
6	Albania	1	Finland	4	Mauritania	18	Tanzania
51	Algeria	104	France	4	Mauritius	2	Togo
13	Angola	1	Gambia	23	Mozambique	85	Uganda
2	Armenia	25	Germany	29	Namibia	70	UK
6	Belarus	13	Ghana	17	Niger	24	Ukraine
2	Benin	1	Gibraltar	124	Nigeria	1	Union des Comores
5	Bhutan	1	Greece	10	Oman	67	USA
14	Botswana	11	Guinea	4	Pakistan	1	Yemen
1	Brazil	2	Guinea-Bissau	3	Philippines	16	Zambia
1	Bulgaria	9	Indonesia	11	Republic of Moldova	13	Zimbabwe
7	Burkina Faso	2	Iran	9	Republic of Seychelles		
2	Burundi	208	Iraq	7	Romania		
97	Cameroon	9	Ireland	14	Rwanda		
2	Canada	76 ↑	Italy	1 ↑	St-Pierre and Miquelon		
4	Cap Verde	38 ↑	Ivory Coast	11	Senegal		
2	Central African Republic	9	Kenya	30	Sierra Leone		
4	Chad	6	Lesotho	1	Slovakia		
3	Congo	11	Libya	42	South Africa		
1	Cyprus	6	Madagascar	1	Spain		
69	Dem. Rep. of the Congo	9	Malawi	148	Sri Lanka		
8	Djibouti	3	Maldives	16	Sudan		
1	Egypt	19	Mali	12	Southern Sudan		
2 ↑	Falklands	1	Malta	10	Tajikistan (TZ)		

Larger numbers of DCPs are highlighted with darker colours.

Table entries in green = new; Country name in red = DCPs no longer registered.

↑↓ = indicates an increase /decrease in DCPs registered, compared with previous report.

Table 1

Coordination Group for Meteorological Satellites

EUMETSAT CGMS

Transition to Meteosat-9 IODC

The following tMeteosat-9 took over from Meteosat-8 as the prime IODC (Indian Ocean Data Coverage) satellite, at the target longitude of 45.5° E, from 1 July 2022. After 10 years of IODC service Meteosat-8 reached its end of life and has been placed in a graveyard orbit.

EUMETSAT DCS is therefore now supported by Meteosat-9 at 45.5°.

able shows the breakdown of number of DCPs per country, as of 31 December 2022. It also shows changes in geographical distribution for the period 1 July 2022 to 31 December 2022.

Transition to Meteosat-10 0°

Until March 2023, Meteosat-11 was providing the Full Earth Scan (FES) and Data collection Service (DCS) from a position at 0°, while Meteosat-10 was providing the Rapid Scanning Service (RSS) from a position at 9.5° E.
In order to ensure the safe continuation of RSS, Meteosat-10 and Meteosat-11 roles and orbital positions were swapped on 21 March 2023.
EUMETSAT DCS is therefore now supported by Meteosat-10 at 0°.

STATUS OF THE BEST PRACTICES FOR CERTIFICATION

The following table provides a EUMETSAT status of implementation of the CGMS Agency Best Practices in support to DCP Transmitter (TX) Certification Process (EUM/CGMS/DOC/21/1252912).

Best Practice		Compliance	Comment
1	BP.01 MINIMISE THE COSTS FOR THE CERTIFICATION PROCESS	Yes	EUMETSAT has performed the certification process at one of their ground stations
2	BP.02 PROVIDE AN ONLINE REGISTRATION PROCESS FOR AN MANUFACTURER CERTIFICATION	No	EUMETSAT does not have an online registration process. The PDF form are available online but no interactive process exists.
3	BP.03 THE MANUFACTURER SHOULD PERFORM INITIAL TESTING AND SUPPLY RESULTS TO THE SATELLITE OPERATEOR	Yes	This has been applied during the previous certifications
4	BP.04 FAVOURABLE ASSESSMENT OF THE INITIAL REPORT SHOULD LEAD TO PRELIMINARY OVER THE AIR TESTING	Yes	We did find it difficult and it was done on a case by case basis
5	BP.05 PROVIDE TEST DCP ENCODING MESSAGE AND EXAMPLES OF THE CODING PROCESS AT THE DIFFERENT STEPS	Yes	EUMETSAT has supplied these
6	6 BP.06 CONTINGENCY TIME SHOULD BE BUILT INTO ANY CERTIFICATION PLAN	Yes	We considered this when planning certification

STATUS OF THE BEST PRACTICES FOR DATA ACCESS

The following table provides a EUMETSAT status of implementation of the CGMS Agency Best Practices in support to DCP Data Access (EUM/CGMS/DOC/21/1252911).

Best Practice		Compliance	Comment
1	BP.01 DCS DATA AVAILABILITY VIA THE INTERNET	Yes	
2	BP.02 DCS DATA AVAILABILITY ON THE WMO GTS	Yes	
3	BP.03 CONTIDIONS OF DCS DATA ACCESS VIA THE INTERNET	No	EUMETSAT's data access policy is deemed not to allow this.
4	BP.04 HIGH DCS DATA AVAILABILITY	Yes	
5	BP.05 DATA LATENCY	Yes	All DCP data is available to the end user within 3 minutes
6	BP.06 DCS DATA ARCHIVE	Yes	Currently a 30 day archive
7	BP.07 TAILORED DCS DATA ACCESS	Partial	EUMETSAT does not offer much tailoring. This will be addressed in the new version of the web service which is planned to be introduced in 2025.
8	BP.08 USER NOTIFICATIONS	Yes	The EUMETSAT User Notification System is used (https://uns.eumetsat.int/)
9	BP.09 UP-TO-DATE RECORD OF DCP OPERATOR CONTACT INFORMATION	No	This is a manual task performed by the engineers internally at EUMETSAT. It is a requirement on the planned web service replacement, planned for 2025, that will allow the update of this data directly by the users.
10	BP.10 DCS DATA ACCESS DOCUMENTATION	Partial	Documentation is available but not directly from the DCS web service. It will be included with the new web service planned for 2025.

ACTIONS AND/OR RECOMMENDATIONS FOR CONSIDERATION BY CGMS WORKING GROUP I

CGMS WG-I is invited to take note of the status of the EUMETSAT Data Collection Services. No actions or recommendations are proposed; this paper is for information only.

CONCLUSION

EUMETSAT is committed to providing a high level of service to its DCS users. CGMS WG-I is invited to take note of the status of the EUMETSAT Data Collection Services.