

EUMETNET Observations Programme Management

Quarterly Quality Monitoring Report Q2 2019

Prepared by: *Peter Gault*

For submission to: *EUMETNET Members*

Summary: *The purpose of this document is to give an overview of the performance of the EUMETNET Composite Observing System (EUCOS) for the period 01 04 2019 to 30 06 2019*

Action required: *For information and comment*

Distribution: *Restricted*

Reference	Date	Author(s)	Content
ObsPMT/REP/2019-002_QM	26 11 2019	Pete Gault	Quarterly QM Report Q2 2019

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Introduction

This Quarterly Report uses information from the EUCOS Quality Monitoring Portal <https://eucos.dwd.de>. The Report refers to observations that form the EUCOS Network – this is a subset of European observations, it is not all of them.

Performance statistics are based on monthly targets.

Quarterly statistics are calculated as arithmetic averages of the monthly averaged performances.

Timeliness is calculated as the time delay between nominal observation time and the storage date and time in DWDs' database.

There may be differences between monitoring statistics in this report and other monitoring statistics. This is because calculations for this report do not remove 'outliers'.

For example, monitoring statistics in this report may indicate that O-B results of VAD wind data from weather radars (E-PROFILE) are worse than those indicated by other sources of monitoring statistics.

The monitoring statistics of all networks and fleets use BUFR data. TAC data is used only for surface station 16597 Luqa (Malta) that does not yet provide BUFR data.

E-SURFMAR VOS and drifting buoys are monitored only in the EUCOS area; 10°N-90°N and 70°W-40°E

A note from the Obs Programme Management Team

The Obs Programme Management Team:

Bruce Truscott (Met Office) – EUMETNET Obs Capability Area Manager
Jacqueline Sugier (Met Office) – EUCOS Science & Projects Manager
Pete Gault (Met Office) – EUCOS Network Manager
Tanja Kleinert (DWD) – Quality Monitoring Systems Manager

The quarterly reports for 2019 have been delayed due to work required as part of the handover process between DWD and the Met Office. Most of the statistics given in these reports are processed manually from downloaded .CSV files generated by the EUCOS QMP.

Work has begun to automate all these processes, and to enhance them with graphics - this effort has also contributed to the delay.

If you have comments or suggestions to help us improve the quarterly reports please email us at eucos@metoffice.gov.uk

A note about the ‘GPS Epoch Event’ on 6 April 2019.

An *Epoch Event* happens every 7168 days, (about once every 20 years). The GPS satellite navigation system’s clock/counter reaches the limit of its 10-bit “week number” and it flips back to 0000000000. An Epoch Event happened on 6th April 2019. There was an impact upon some parts of the EUCOS Network.

Land Radiosonde

About 20% of radiosonde stations globally were affected, including a significant proportion of European stations, and all Australian stations. Within a couple of days, Vaisala produced a software update to be installed at each affected station and sent out new GPS circuit cards .

It appeared to a problem only for Vaisala equipment - depending upon which MGR (a GPS circuit card) was installed. Where older MGR111/112/113 cards were installed in the systems, Vaisala shipped out replacement MGR114 cards. Most stations were working again by around 10th April. Where replacement cards were sent to remote or offshore locations it inevitably took longer to restore equipment.

The Radiosonde Working Group met at Sodankylä in May 2019 and from there had a video conference call with Vaisala. Vaisala gave a comprehensive account to the group of their response to the Epoch Event.

It is understood that other radiosonde manufacturers were not affected by the Epoch Event problem..

ASAP

The Event affected 6 ASAP stations fitted with Vaisala equipment – not all of these were in the EUCOS area on 6th April.

Restoring service to a ship depended upon the ship either having capable satcom facilities to download updated software, or making a scheduled stop an available port for repair.

Graw radiosonde systems (fitted on board five ACL container ships) were not affected by the Epoch Event.

Drifting buoys

Around 6 April, some drifting buoys began reporting incorrect dates (wrong by several years). It depended upon which exact GPS receiver and which exact firmware was integrated in the buoy. The problem did not threaten the viability of the entire network. Less than 5% of the buoys were affected - and it was found possible to do a 'fix' in the data processing.

Colour Keys used in tables in this report

Network Data Availability and Timeliness summaries

Target achieved
<10% below target
=>10% below target
No data in the QMP

Performance
compared to
previous
quarter

↑	Improved
⇐	<1% change
↓	Deteriorated

Network NWP comparison summaries

EUCOS target achieved
EUCOS target missed, WMO target met
EUCOS and WMO target missed
No data in the QMP

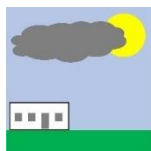
Performance
compared to
previous
quarter

↑	Improved
⇐	< 0.1 range
↓	Deteriorated

Member tables - Performance is compared to the targets agreed in the EUCOS Performance Standards, (see EUMETNET Portal, group *OBS Programme – OBS Programme Management - Procedures and technical regulations*).

Target achieved
Performance below target

EUCOS Surface Land Stations Network



2019 Q2 whole network summary

Data availability and timeliness

Data availability	<i>Target</i>	95.0%	➡
	<i>Actual</i>	95.6%	
Timeliness HH+50	<i>Target</i>	90.0%	➡
	<i>Actual</i>	99.6%	
Timeliness HH+100	<i>Target</i>	95.0%	➡
	<i>Actual</i>	99.8%	

Comparison to NWP model output of ECMWF

Temperature RMSE	<i>Target</i>	1.00 K	⬆
	<i>Actual</i>	1.81 K	
Wind mean vector difference RMSE	<i>Target</i>	5.00 m/s	⬆
	<i>Actual</i>	2.44 m/s	
Specific humidity error dq/q	<i>Target</i>	10.00 %	⬆
	<i>Actual</i>	7.44 %	
Pressure RMSE	<i>Target</i>	1.00 hPa	⬆
	<i>Actual</i>	0.54 hPa	

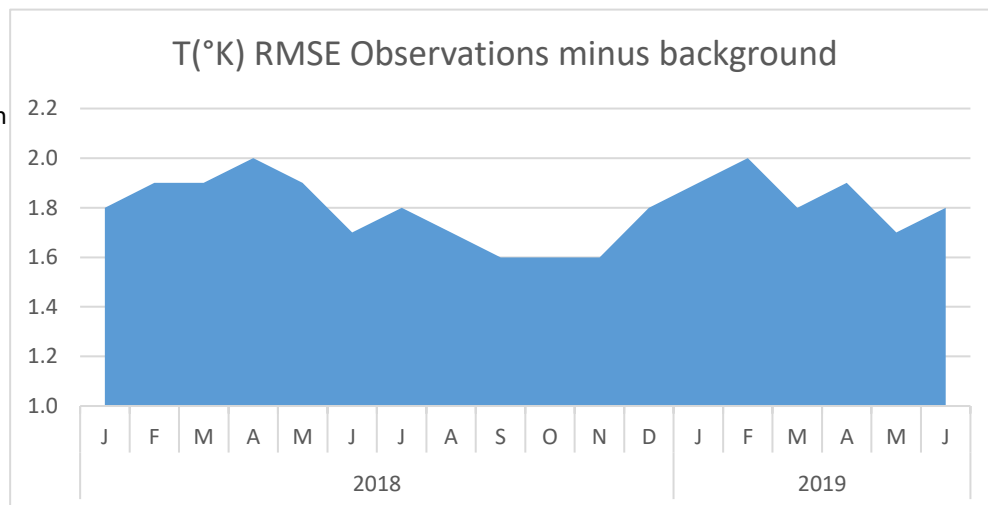
Requirement: data availability hourly or 3-hourly observations (according to notification by NMHS), timeliness HH+50 or HH+100 the latest – delay of decoding date in DWD's database compared to nominated observation time.

2019 Q2

	Obs. totals	Data availability	Timeliness HH+50	Timeliness HH+100	T RMSE* <i>See below</i>	WIND RMSVD	HUM dq/q*	P RMSE
Austria	4,904	99.1%	99.3%	99.4%	3.2	3.3	11.7	0.5
Belgium	6,357	97.0%	100.0%	100.0%	1.2	2.4	6.5	0.6
Croatia	8,701	97.2%	99.9%	100.0%	2.0	2.4	6.9	0.5
Cyprus	3,611	98.7%	98.5%	99.2%	2.3	2.3	7.8	0.8
Czech Republic	8,680	99.4%	99.9%	100.0%	1.7	2.4	5.8	0.4
Denmark	39,113	90.5%	99.6%	100.0%	2.3	3.1	11.9	0.5
Estonia	6,552	100.0%	100.0%	100.0%	1.7	2.2	5.9	0.6
Finland	39,251	99.9%	99.7%	99.8%	1.8	1.8	6.3	0.3
France	50,134	99.8%	99.9%	99.9%	1.5	2.2	6.5	0.5
Germany	32,750	100.0%	99.8%	99.8%	1.7	2.3	5.8	0.4
Greece	6,341	96.8%	99.9%	100.0%	1.8	2.6	7.3	0.7
Hungary	6,419	73.5%	99.7%	99.7%	1.5	2.0	6.2	0.5
Iceland	4,324	78.8%	99.6%	99.8%	2.0	2.4	7.9	0.4
Ireland	13,064	99.7%	100.0%	100.0%	1.0	2.0	5.5	0.3
Italy	42,290	90.2%	98.5%	99.9%	2.4	3.2	11.3	0.9
Latvia	4,391	63.3%	99.5%	99.6%	1.7	2.1	5.4	1.0
Luxembourg	2,121	97.1%	100.0%	100.0%	1.8	2.4	5.2	0.6
Malta	726	99.7%	100.0%	100.0%	1.8	2.6	6.2	0.6
Montenegro	3,365	77.0%	99.5%	100.0%	3.2	2.3	13.7	1.6
The Netherlands	15,288	100.0%	99.9%	99.9%	1.1	2.0	4.7	0.6
North Macedonia	463	63.2%	99.6	99.6	1.8	2.9	8.9	1.8
Norway	42,659	94.6%	99.0%	99.4%	1.4	2.8	6.3	0.4
Poland	32,743	100.0%	100.0%	100.0%	1.4	2.1	5.2	0.6
Portugal	21,569	98.9%	99.8%	99.9%	1.5	3.0	7.5	0.6
Serbia	10,875	99.6%	99.9%	99.9%	2.0	1.9	9.1	0.7
Slovak Republic	8,720	99.8%	100.0%	100.0%	1.4	2.8	5.8	0.5
Slovenia	2,184	100.0%	100.0%	100.0%	2.9	4.3	8.4	0.4
Spain	42,730	99.5%	99.8%	99.9%	1.7	2.5	6.8	0.5
Sweden	31,512	96.2%	100.0%	100.0%	2.0	2.0	6.4	0.5
Switzerland	15,288	100.0%	99.8%	99.9%	4.8	2.6	16.5	0.7
United Kingdom	26,135	99.7%	98.7%	99.0%	1.1	2.1	5.1	0.4

*Surface air temperature T RMSE is routinely calculated by ECMWF for EUCOS and is a measure of the difference between the observation and the model background field. The resulting RMSE shown in this report is an *Observation minus Background* analysis and therefore can represent a combination of model error and observation error.

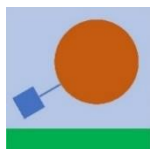
There is an apparent seasonal variation in the T RMSE O-B.



Surface land stations that often miss standard EUCOS data availability targets, or have a known irregular reporting pattern.

Country	Stations	notes
Austria	11146	11146 Sonnblick only provides 3-hourly SYNOPS from 06 to 18 UTC. These messages are sometimes significantly delayed because the data is routed via ZAMG subsidiary in Salzburg and manually transmitted to ZAMG HQ to be put into GTS.
Croatia	14307 14474	Provide SYNOP data on a 3-hourly interval only. SYNOPS and BUFRs at these locations are produced by observers and missing reports are from periods when DHMZ do not have observers on locations.
	14240, 14330 14370, 14445	Only provide SYNOP data at 00 UTC and then hourly between 03 and 21 UTC.
Greece	16723	Usually only provides SYNOP data at main and intermediate synoptic hours from 03 to 18 UTC.
Italy	16470	The station stopped reporting on 28 March when it came under the control of Enav (Civil Organization) and stopped its membership of the Italian Air Force Met Service. Enav will at first only provide METARs and SPECIs. SYNOPS and SYREPs will be provided when their new reporting system is upgraded.
	16480	Only provides hourly SYNOP data from 06 to 18 UTC.
Latvia	All	During most of Q2, Latvian surface land stations usually only provided SYNOP data at main and intermediate hours. Hourly reporting began on 17 June. 26422 Riga was only providing occasional SYNOPS. The station was being modernised and there had been a problem with SYNOP message generation. Hourly reporting began again on 17 June – at the same time as the other Latvian stations began full reporting.
Malta	16597	Provides FM12 SYNOP data - at main and intermediate hours only. Malta is the only land station in the EUCOS network that does not report in BUFR.
Montenegro	13363, 13459	No SYNOP data provided at 01,02, 22 and 23 UTC.
North Macedonia	13591	Stip provides 3-hourly obs but has long periods of drop-out of BUFR data. FM12 data is usually available during these drop-outs.

EUCOS Radiosonde Stations Network



2019 Q2 whole network summary

Comparison to NWP model output of ECMWF

Temperature RMSE	<i>Target</i>	1.00 K	↑
	<i>Actual</i>	0.73 K	
Wind mean vector difference RMSE	<i>Target</i>	5.00 m/s	↑
	<i>Actual</i>	2.78 m/s	
Specific humidity error dq/q	<i>Target</i>	10.0 %	→
	<i>Actual</i>	5.58 %	

Data availability and timeliness

Data availability	<i>Target</i>	95.0%	↑
	<i>Actual</i>	82.5%	
Timeliness (Temp A&B) HH+50	<i>Target</i>	75.0%	→
	<i>Actual</i>	97.1%	
Timeliness (Temp A&B) HH+100	<i>Target</i>	95.0%	↓
	<i>Actual</i>	97.9%	
Achieving 100 hPa	<i>Target</i>	97.0%	→
	<i>Actual</i>	98.8%	
Achieving 50 hPa	<i>Target</i>	95.0%	↑
	<i>Actual</i>	94.8%	

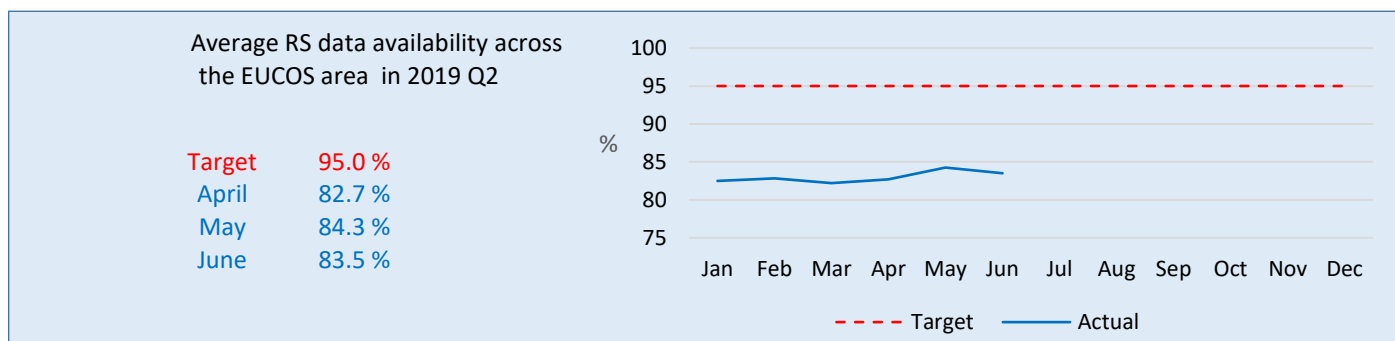
Requirement: data availability 2 ascents per day, timeliness of BUFR data up to 100 hPa (IUK messages) within HH+50 and of BUFR data containing the entire sounding (IUS messages) within HH+100 – delay of decoding date in DWDs database compared to nominated observation time (00, 12 UTC)

T RMSE, Wind RMSVD and Hum dq/q are routinely calculated by ECMWF for EUCOS and are a measure of the distance between the observation and the model background field.

2019 Q2	Obs. totals	Data availability	Timeliness HH+50	Timeliness HH+100	Achieving 100 hPa	Achieving 50 hPa	T RMSE	WIND RMSVD	HUM dq/q*
Austria	417	57.1%	97.4%	97.8%	95.2%	91.1%	0.8	3.0	6.5
Belgium	81	44.6%	50.6%	58.0%	98.8%	96.3%	0.8	2.7	12.9
Croatia	347	95.3%	98.8%	98.8%	100.0%	98.3%	1.0	3.4	5.7
Cyprus	182	100.0%	100.0%	100.0%	97.3%	95.6%	0.8	4.8	5.3
Czech Republic	461	100.0%	97.6%	98.3%	100.0%	99.8%	0.7	2.8	5.0
Denmark	1,076	98.5%	99.8%	99.7%	98.8%	97.6%	0.8	2.7	5.6
Estonia	91	50.0%	92.8%	94.5%	93.3%	87.8%	0.9	2.9	7.0
Finland	538	99.2%	99.4%	99.6%	99.8%	99.1%	0.7	2.7	4.1
France	933	98.9%	99.2%	99.2%	99.2%	96.2%	0.8	2.8	6.9
Germany	2,223	79.2%	91.4%	91.5%	99.6%	98.6%	0.7	2.8	4.7
Greece	335	61.3%	79.7%	84.2%	97.9%	83.3%	0.8	3.2	5.3
Hungary	364	99.7%	97.0%	95.3%	97.8%	96.7%	0.9	3.1	8.7
Iceland	191	52.6%	96.9%	96.9%	99.5%	94.8%	0.5	1.9	3.6
Ireland	182	100.0%	98.9%	98.9%	97.8%	96.7%	0.9	2.7	6.7
Italy	1,355	92.9%	99.5%	98.2%	99.2%	97.7%	0.7	3.0	5.5
Latvia	45	24.7%	100.0%	100.0%	100.0%	97.8%	0.7	2.4	4.1
The Netherlands	105	57.7%	95.2%	96.2%	97.1%	97.1%	0.7	2.5	2.8
Norway	1,039	86.1%	94.7%	95.9%	98.7%	97.1%	0.7	2.5	4.9
Poland	543	99.4%	100.0%	100.0%	100.0%	98.9%	0.6	2.5	5.7
Portugal	264	48.4%	97.7%	99.6%	99.6%	98.9%	0.7	2.8	5.4
Serbia	356	97.8%	97.8%	99.7%	98.0%	94.7%	0.9	2.9	7.0
Slovak Republic	182	100.0%	99.5%	98.4%	100.0%	100.0%	0.7	3.1	6.2
Slovenia	89	48.9%	100.0%	100.0%	92.1%	51.7%	0.9	3.2	8.8
Spain	1,244	97.4%	98.8%	99.1%	97.9%	92.2%	0.8	2.8	5.8
Sweden	451	62.0%	98.0%	99.3%	96.2%	86.0%	0.6	2.4	5.2
Switzerland	182	100.0%	100.0%	98.9%	100.0%	98.9%	0.7	3.0	5.7
United Kingdom	790	71.6%	97.0%	98.0%	99.2%	94.8%	0.6	2.6	5.5

Radiosonde data availability

The requirement for 95% data availability is based on 2 ascents each day for each station in the EUCOS area. This target is not being achieved primarily because a number of stations follow an observing schedule of just 1 sounding a day, a subset of which undertake additional soundings on demand. Further details are provided in the table below.



Stations that usually miss the EUCOS target of 2 daily ascents; or have a known irregular reporting pattern are shown below.

Country	Stations	Usual Daily ascents	More available on demand?	Notes
Austria	11010 11120 11240	1		Airfields 11010 Linz, 11120 Innsbruck and 11240 Graz usually provide only one sounding each day. Further soundings may be launched after 03 UTC for a nominal observation time of 06 UTC. This can cause poor timeliness statistics.
Belgium	06458	1		06458 Beauvechain usually only provides one sounding each day
Estonia	26038	1		
Greece	16622 16716	1		Both airfields often only provide one ascent per day because of financial restrictions.
Iceland	04089	(1)		Egilsstadir only does soundings from October to April. The station is excluded from EUCOS statistics for Q2 and Q3.
Italy	16144	1		
Latvia	26435	0.5		Skriveri usually does one sounding every other day. These are done on even calendar dates.
The Netherlands	06260	1	Yes	Ascent is done at 00 UTC
Norway	01004	1	Yes	Ny-Alesund usually only provides one ascent per day
	01400	(1)		An oil rig platform. No ascents if there are high winds, or if there are moderate winds from some directions. Maximum annual data availability is about 75%. The station uses 200g helium balloons – may cause low burst height.
	01241	1		An airport, where launch restrictions sometimes apply.
Portugal	All	1		Ascents are done at 12 UTC.
Slovenia	14015	1		
Sweden	02185	1		Military station – doing 1 ascent each day
	02527	1		Out of service in Q2 - 26 April to 21 May – technical problems
United Kingdom	03238 03354 03882 03918	1	Yes	The Met Office routinely provides 1-sounding per day from these stations with additional soundings being made on demand.

Radiosonde burst heights

Burst height targets

The Obs-SET meeting at ECMWF in April, and the RS Working Group meeting in Sodankylä in May discussed radiosonde burst heights and targets.

100hPa and 50hPa targets – these are currently monitored on the QMP, and summarised in this Quarterly Report.

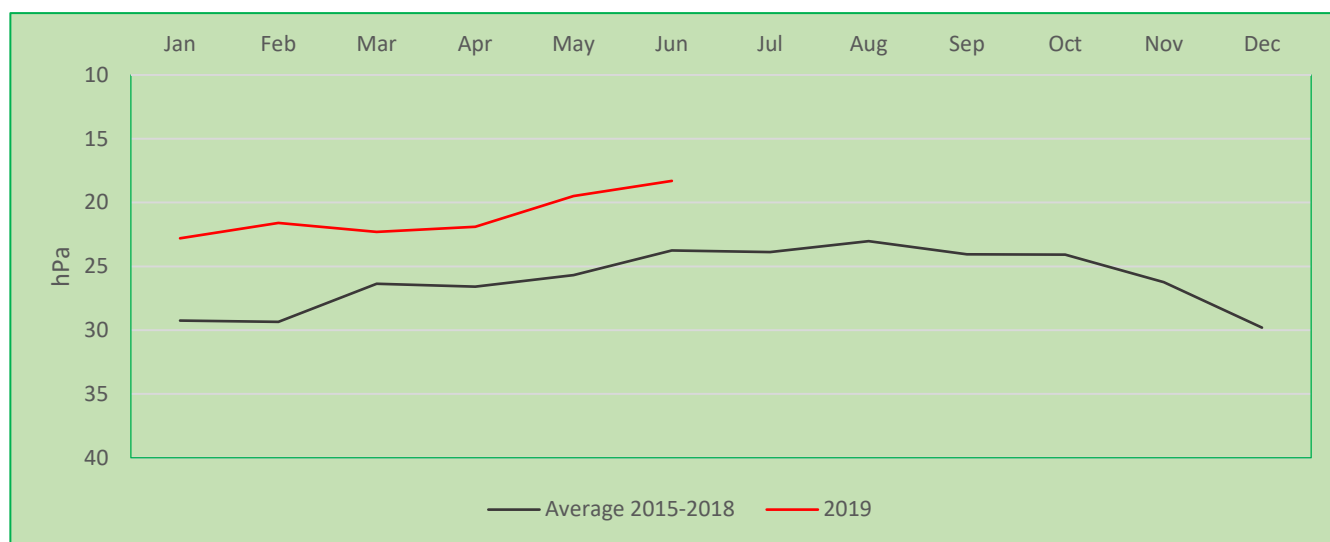
30hPa target - Ongoing discussions may lead to revising the burst height target from 50 hPa to 30 hPa, (a GCOS target).

10hPa target - In the GCOS proposal for discussion at WMO Congress, there is also a request that Members 'should' operate a subset of stations to reach 10hPa.

Actual burst heights

Monthly averaged actual burst heights in the EUCOS area for 2019 Q1 and Q2 are shown below in red.

For comparison, averaged burst heights over the previous 4 years are shown in black.



The graph shows that there is a seasonal trend; and that average burst heights across the network are improving.

High resolution BUFR IUK messages

Spain - all Spanish Vaisala stations have been upgraded and are now sending high resolution IUK messages.

Radiosonde descent data

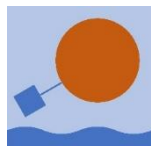
WG-RS recommends that radiosonde descent data formatted using BUFR sequence 3 09 056 (radiosonde descent) can be shared on the GTS using header IUX /// (other upper-air data). If data is formatted using BUFR sequence 3 09 053 (dropsonde), this should not be shared on the GTS due to the possibility of confusion with genuine dropsonde data. Data formatted using BUFR sequence 3 09 053 can be shared directly between interested parties for test purposes using file transfer protocols and should also use the header using header IUX ///.

Obs-SET is currently actively carrying out and coordinating the evaluation of the descent data. Update will be issued in 2020 Q2 following the next annual face-to-face Obs-SET meeting.

Other notes

Portugal – a new radiosonde system became operational on the 24th of April, Vaisala MW41, using RS41-SGP radiosondes.

EUCOS E-ASAP Units



2019 Q2 E-ASAP summary of all units

Comparison to NWP model output of ECMWF

Temperature RMSE	Target	1.00 K	↓
	Actual	0.66 K	
Wind mean vector	Target	5.00 m/s	↓
difference RMSE	Actual	2.15 m/s	
Specific humidity	Target	10.0 %	↓
error dq/q	Actual	5.40 %	

Data availability and timeliness

Data availability (past 12 months)	Target	3900 obs	↓
	Actual	3341 (85.6%)	
Timeliness (Temp A&B) HH+50	Target	75.0%	↑
	Actual	92.0%	
Timeliness (Temp A&B) HH+100	Target	95.0%	→
	Actual	93.7%	
Achieving 100 hPa	Target	90.0%	↑
	Actual	80.9%	
Achieving 50 hPa	Target	75.0%	↑
	Actual	71.6%	

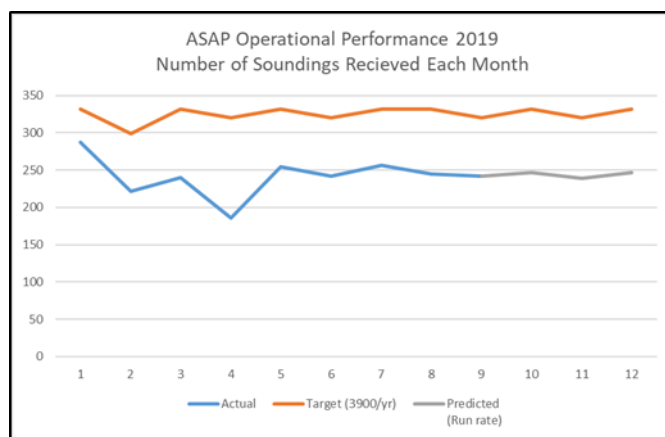
Requirement: data availability 2 ascents per day, timeliness of BUFR data up to 100 hPa (IUK messages) within HH+50 and of BUFR data containing the entire sounding (IUS messages) within HH+100 – delay of decoding date in DWD's database compared to nominated observation time.

T RMSE, Wind RMSVD and Hum dq/q are routinely calculated by ECMWF for EUCOS and are a measure of the distance between the observation and the model background field.

E-ASAP 2019 Q2	Obs. totals	Timeliness HH+50	Timeliness HH+100	Achieving 100 hPa	Achieving 50 hPa	T RMSE	WIND RMSVD	HUM dq/q*
Denmark	230	66.5%	67.0%	90.9%	81.3%	0.7K	2.4m/s	3.8%
France	308	76.9%	89.6%	55.5%	41.9%	0.3K	0.7m/s	1.7%
Germany	206	99.0%	97.1%	94.7%	90.8%	0.8K	2.9m/s	5.7%
Spain	52	100.0%	100.0%	96.2%	96.2%	0.8K	2.8m/s	4.4%
EUMETNET	258	91.9%	92.2%	80.2%	64.3%	0.7K	2.1m/s	8.0%

Fewer ASAP soundings have been generated in 2019 than expected for the following reasons:

- The four French ASAP stations were removed from their host ships, only one to date has been transferred to a new host ship. The other three stations are inactive. Météo-France expects that the transition from the old to the new ships will be completed by early 2020;
- Two additional ASAP vessels have been laid up for extended periods (6-months & 3-months);
- Two ASAP research vessels operated in the Southern Hemisphere for a prolonged period. According to E-ASAP policy the number of soundings were limited, further impacted by equipment losses and failures;
- Six ASAP stations were affected by the Vaisala GPS epoch event of 07-April-2019 as noted earlier in this report;



Based on current predictions approximately 3,000 soundings are likely to be provided this year compared to an operational target of 3,900.

ASAP data missing from the GTS.

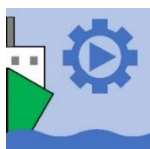
During Q2, colleagues at ECMWF and DWD noticed that soundings from the three E-ASAP stations JNKN7JF, KMPLHPW, and LRYQE3U were available on the EUCOS Quality Monitoring Portal (QMP), but not on the GTS. Further investigation traced the problem back to a software update in spring 2018 where the headers were incorrectly set.

Soundings from the 3 ships were transmitted to DWD's database (and thus to the QMP) but not to the GTS. As the statistics were visible on the portal the failure on GTS was not noticed until May 2019.

When the source of the problem was identified, it was quickly corrected and data was restored on 4 May.

E-SURFMAR

Automated VOS ships in the EUCOS area



2019 Q2 automated VOS ship observations

Data availability and timeliness

Data availability – daily average	Target Actual	2000 obs 1760 (88%) ↑
Timeliness HH+50	Target Actual	90.0 % 95.5% →
Timeliness HH+100	Target Actual	95.0% 96.0% →

Comparison to NWP model output of ECMWF

Temperature RMSE	Target Actual	2.00 K 1.36 K ↓
Wind mean vector difference RMSE	Target Actual	5.00 m/s 1.36 m/s ↑
Specific humidity error dq/q	Target Actual	15.00% 4.75% →
Pressure RMSE	Target Actual	1.00 hPa 0.63 hPa ↑

In these results, T RMSE, Wind RMSVD, Hum dq/q and P RMSE are routinely calculated by ECMWF for EUCOS and are a measure of the difference between the observation and the model background field.

Requirement: timeliness HH+50 or HH+100 the latest – delay of decoding date in DWDs database compared to nominated observation time.

AutoVos ships 2019 Q2	Obs. totals	Timeliness HH+50	Timeliness HH+100	T RMSE	WIND RMSVD	HUM dq/q*	P RMSE
France	21660	97.9%	98.6%	1.4	2.8	5.1	0.6
Germany	53877	88.6%	89.3%	1.3	2.4	3.3	0.7
Norway	2166	98.9%	99.4%	1.6	3.1	4.7	0.6
Spain	2180	98.3%	98.7%				
Sweden	5293	83.3	98.5	1.3	3.1	13.3	0.7
United Kingdom	80353	99.3%	99.7%	1.4		5.1	0.6

* Grey boxes indicate that no data was available in the QMP

Conventional VOS ships in the EUCOS area



2019 Q2 Conventional VOS ship observations

Comparison to NWP model output of ECMWF

Data availability and timeliness

Data availability – daily average	Target Actual	250 obs 161 (64%)	↑	Temperature RMSE	Target Actual	2.00 K 1.79K	↓
Timeliness HH+50	Target Actual	90.0 % 84.3%	↑	Wind mean vector difference RMSE	Target Actual	5.00 m/s 3.95 m/s	↑
Timeliness HH+100	Target Actual	95.0% 94.9%	↑	Specific humidity error dq/q	Target Actual	15.00% 9.34%	↑
				Pressure RMSE	Target Actual	1.00 hPa 1.01hPa	→

ConVOS ships 2019 Q2

	Obs. totals	Timeliness HH+50	Timeliness HH+100	T RMSE	WIND RMSVD	HUM dq/q*	P RMSE
Germany	4760	83.7%	94.7%	2.0	3.9	9.3	1.0
Ireland				2.3	5.6	8.9	0.5
The Netherlands	2372	98.8%	99.4%	1.8	3.5	9.3	1.1
Sweden	156	50.0%	59.6%	4.9	5.7		1.1
United Kingdom	7405	80.7%	94.3%	1.4	4.0	9.6	1.0

In these results, T RMSE, Wind RMSVD, Hum dq/q and P RMSE are routinely calculated by ECMWF for EUCOS and are a measure of the distance between the observation and the model background field.

* Grey boxes indicate that no data was available in the QMP

No data was available from Greece within the EUCOS area in the period Q2 2019

VOS Performance Targets: it is proposed to revisit the conventional and automated VOS data availability targets as these were set some years ago, are not being met and no longer appear to reflect the surface marine network design and more specifically the balance between the VOS types. New proposed targets will be prepared for STAC20.

Moored buoys



2019 Q2 Moored buoys

Comparison to NWP model output of ECMWF

Data availability and timeliness

Data availability – daily average	Target Actual	90.0% 98.3%	→	Temperature RMSE	Target Actual	1.0 K 0.4 K	→
Timeliness HH+50	Target Actual	90.0% 92.9%	↓	Wind mean vector difference RMSE	Target Actual	5.0 m/s 2.1 m/s	→
Timeliness HH+100	Target Actual	95.0% 99.7%	→	Specific humidity error dq/q	Target Actual	10.0 % 2.6 %	→
				Pressure RMSE	Target Actual	1.0hPa 0.5hPa	→

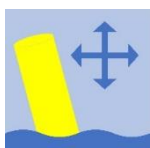
In these results, T RMSE, Wind RMSVD, Hum dq/q and P RMSE are routinely calculated by ECMWF for EUCOS and are a measure of the distance between the observation and the model background field.

Moored buoys - Requirement: data availability hourly observations encoded in BUFR, timeliness HH+50 or HH+100 the latest – delay of decoding date in DWDs database compared to nominated observation time.

Moored buoys 2019 Q2

	Obs. totals	Data availability	Timeliness HH+50	Timeliness HH+100	T RMSE	WIND RMSVD	HUM dq/q*	P RMSE
France	2128	97.5%	97.6%	99.2%	0.6	2.1		0.4
Ireland	2113	96.8%	99.6%	99.8%	0.4	2.3	4.3	0.4
Spain	2179	99.8%	99.8%	100.0%	0.4	1.8		0.4
United Kingdom	2166	99.2%	74.8%	99.7%	0.4	2.1	6.1	0.7

Drifting buoys



2019 Q2 Drifting buoys

Timeliness

Timeliness HH+50	Target	90.0%	↓
	Actual	97.2%	
Timeliness HH+100	Target	95.0%	↓
	Actual	98.7%	

Data availability and

Comparison to NWP model output of ECMWF

Data availability – daily average	Target	88.0%	→
	Actual	95.5%	
Pressure RMSE	Target	1.0hPa	↑
	Actual	0.45hPa	

Drifting buoys - Requirement: data availability hourly observations encoded in BUFR, timeliness HH+50 or HH+100 the latest – delay of decoding date in DWDs database compared to nominated observation time.

Total drifting buoy observations in 2019 Q2 – 137206.

E-ABO

EUMETNET funded observations including humidity observations



2019 Q2 E-ABO

Data availability and timeliness

Data availability - past 12 months	Target	11.0 m obs
	Actual	14.7 m obs
Timeliness HH+50	Target	90.0%
	Actual	94.2%
Timeliness HH+100	Target	95.0%
	Actual	98.5%

Comparison to NWP model output of ECMWF

Temperature RMSE	Target	1.50K
	Actual	0.90K
Wind mean vector difference RMSE	Target	5.00m/s
	Actual	3.21m/s
Av Hum RH RMSE	Target	10.0%
	Actual	13.2%

Profile distribution

Daily profiles	Target	718
	Actual	1259

Daily airports	Target	129
	Actual	129

Requirement:

Timeliness HH+50 or HH+100 the latest – delay of decoding date in DWDs database compared to nominated report time.

T RMSE and Wind RMSVD are routinely calculated by ECMWF for EUCOS and are a measure of the distance between the observation and the model background field.

Some data for these E-ABO tables was kindly prepared by Stewart Taylor and Steve Stringer, Met Office.

A-ABO 2019 Q2

Airline

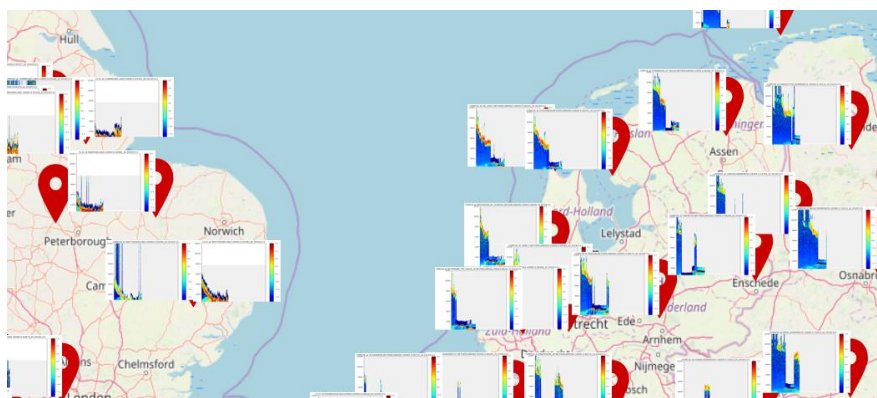
	Obs. totals	Timeliness HH+50	Timeliness HH+100	T RMSE	WIND RMSVD
AFR	429381	78.0%	87.9%	1.0	3.4
AUA	11471	99.1	99.5	0.8	3.4
BAW	110760	95.7%	99.2%	0.9	3.1
CLH	231248	96.2%	99.6%	0.9	3.1
DLH	1368153	91.5%	99.2%	1.0	3.3
EIN	137986	99.0%	99.7%	0.8	3.1
EWE	68643	97.4%	99.1%	0.8	3.4
EWG	110560	98.6%	99.8%	0.8	3.1
EZY	1512961	99.5%	99.9%	0.8	3.1
FIN	97117	99.4%	99.8%	0.8	3.0
GEC	47186	85.8%	99.8%	1.1	4.0
GWI	183439	98.1%	99.5%	0.9	3.1
SAS	264793	94.8%	99.8%	0.8	3.1
TCG	91349	92.4%	99.9%	0.9	3.2

E-PROFILE

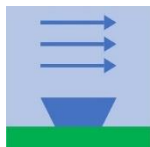
New website










During May, a new E-PROFILE website went online at <https://e-profile.eu/>

For the first time, the horizontal and vertical wind profile information from the 41 operational wind profilers and 113 weather radars - as well as the backscatter measurements and cloud products from the 282 active automatic lidars and ceilometers are visualised on one fully interactive page.



Wind Profilers (WP)



2019 Q2	Data availability	Timeliness HH+60	Wind mean vector difference RMSE
Target	85.0%	85.0%	5.00m/s
Total WP Network	66.0% 	98.8% 	4.24 
Operational WP	70.5% 	98.7% 	4.12 
Non-operational WP	44.8% 	99.1% 	4.85 

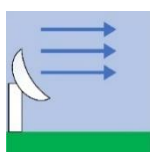
For E-PROFILE, Wind RMSVD is routinely calculated by ECMWF for EUCOS and is a measure of the distance between the observation and the model background field.










Wind profilers (WP) Requirement: data availability at least hourly/half hourly observation cycles, timeliness HH+60 – delay of decoding date in DWDs database compared to nominated observation time.

Wind Profilers 2019 Q2	Obs. totals	Data availability	Timeliness HH+60	WIND RMSVD
Austria	34930	100.0%	99.5%	4.7
Czech Republic	34862	99.8%	98.5%	4.0
France	7421		98.1%	4.7
Germany	30358	99.3%	99.7%	2.7
Hungary	16601	95.0%	98.9%	10.4
Norway	8274	94.7%	98.2%	3.5m/s
Switzerland	23447	89.5%	99.5%	4.0m/s
United Kingdom	8714	99.7%	93.8%	3.0m/s

No data was available within the EUCOS area in the period Q2 2019 for The Netherlands, Spain, Italy and Sweden. In the United Kingdom, only South Uist and Aberystwyth have been operating since October 2018.

Weather Radar Wind Profilers (WRWP)



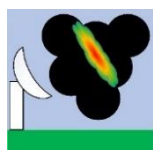
2019 Q2	Data availability	Timeliness HH+60	Wind mean vector difference RMSE
Target	No target	85.0%	5.00m/s
Total WRWP Network	78.9% 	99.9% 	5.10m/s 
Operational WRWP	89.6% 	99.9% 	4.09m/s 
Non-operational WRWP	67.8% 	99.9% 	6.31m/s 

Wind profiler weather radars (WRWP) Requirement: there is no data availability target agreed due to inconsistent reporting of NIL messages by the Members; timeliness HH+60 – delay of decoding date in DWDs database compared to nominated observation time.

Weather radar wind profilers 2019 Q2	Obs. totals	Timeliness HH+60	WIND RMSVD
Austria	104032	100.00	14.1
Croatia	16462	99.7%	6.0
Czech Republic	35052	99.6%	4.7
Finland	87251	99.7%	3.7
France	28469	100.0%	5.6
Germany	431697	100.0%	4.9
Hungary	33439	100.0%	3.5
Ireland	8660	99.6%	3.0
Italy	24956	99.5%	6.2
The Netherlands	52192	100.0%	3.2
Norway	83789	100.0%	4.3
Poland	69848	100.0%	4.1
Portugal	6617	99.7%	5.8
Slovenia	19848	100.0%	7.2
Spain	184423	100.0%	5.3
Switzerland	43084	99.8%	8.7
United Kingdom	201212	99.7%	3.7

No data was available within the EUCOS area in the period Q2 2019 for Belgium and Sweden - VAD wind radar data were switched off a few years ago.

OPERA



2019 Q2

	Data availability	Timeliness		
		HH+08	HH+10	HH+20
Target	95.0%	90.0%	95.0%	95.0%
ICD (incoming data)	92.5% ➡	96.7% ⬆	99.2% ⬆	
PPD (pre-processed data)	94.8% ⬇			
Composite products	99.9% ➡			99.4% ➡

Requirement: data availability of incoming radar data (ICD) according to notification by Odyssey as well as of pre-processed radar data used for OPERA composite production, timeliness HH+08 or HH+10 the latest – delay of decoding date in Odyssey's database compared to nominal observation time.

OPERA 2019 Q2	Obs. Totals ICD	Data availability ICD	Timeliness ICD HH+08	Timeliness ICD HH+10	Obs totals PPD	Data availability PPD
Belgium	50420	71.6%	100.0%	100.0%	16858	96.5%
Croatia	15111	86.5%	99.5%	99.6%	15028	86.0%
Czech Republic	17139	98.1%	99.9%	99.9%	17085	97.8%
Denmark	130351	100.0%	99.8%	99.9%	43429	99.4%
Estonia	16852	96.4%	96.6%	99.3%	16657	95.3%
Finland	85938	98.4%	99.2%	99.9%	86229	98.7%
France	570392	94.6%	100.0%	100.0%	190052	90.6%
Germany	448423	99.1%	99.9%	99.9%	146305	88.1%
Hungary	34190	61.3%	99.6%	99.7%	27231	77.9%
Iceland	51200	97.7%	0.1%	93.8%	17079	97.8%
Ireland	17431	99.8%	99.7%	99.8%	8663	49.6%
Latvia	9969	76.3%	96.9%	97.2%	6448	73.8%
Malta	29064	100.0%	99.9%	99.9%	8649	99.0%
The Netherlands	52177	99.6%	96.1%	98.7%	17365	99.4%
Norway	120500	65.6%	97.5%	99.1%	84286	96.5%
Poland	103231	49.2%	95.5%	97.6%	68256	97.7%
Portugal	107092	100.0%	99.7%	99.7%	22781	86.9%
Romania	86662	91.8%	33.7%	75.2%	18430	79.7%
Serbia	19042	72.6%	82.2%	98.6%	6471	74.1%
Slovakia	104363	99.6%	100.0%	100.0%	34760	99.5%
Slovenia	51292	100.0%	100.0%	100.0%	17183	98.3%
Spain	135276	36.9%	99.8%	99.9%	119063	97.4%
Sweden	91177	87.0%	99.4%	99.7%	86154	75.9%
Switzerland	76960	98.2%	99.6%	99.7%	25652	97.9%
United Kingdom	402492	96.0%	99.9%	99.9%	134008	95.9%

Austria - Austrocontrol own Austrian radars, (ZAMG is a member). Data from these radars is sent to E-PROFILE, but not to OPERA.
Greece - Greek radar data is not used by OPERA, some datasets are received, but not in the correct format.

Some OPERA notes

OPERA is currently working towards:

- 5-minute frequency (but some countries may not be able to achieve this)
- Developing new SLAs
- Possibly developing adaptive scan angles (Met Office)

OPERA - Odyssey will be replaced by Cumulus 2020-2022 with 3 output streams/production lines		
Cirrus	Stratus	Nimbus
Reflectivity composites every 5 minutes	Data hub	Advanced products: rain rate, WRWP.
Rapid updates for nowcasting	Assimilation to SR-NWP Input to Regional composites	Best quality for verification, rainfall accumulation
2020 Météo France	Early 2020 DWD	2022 ZAMG

E-GVAP



2019 Q2

GNSS sites-AC

	Accuracy
Target NRT ZTD accuracy RMS OmB	15.0 mm
Actual super sites only	15.2 ↓
Actual sites	11.4 ↑

At least one ZTD timely	Data availability	Timeliness HH+90
Target	85.0%	85.0%
13 Supersites	55.9% ↓	97.4% ↑
All sites/ACs	82.4% ↑	57.5% ↓
Operational ACs	81.8% ↑	63.0% ↓
Test ACs	83.2% ↑	51.7% ↓

Requirement: data availability of Zenith Total Delay (ZTD) measurements according to expected number of ZTDs per day (24-288 ZTDs depending on site-ACs as indicated in E-GVAP station list), at least one ZTD timely with a timeliness of maximum HH+90 – delay of decoding date in DWDs database compared to nominated observation time. NWP comparison results of GNSS ZTD estimates against UK Met Office global NWP model on a daily averaged basis are shown as near real time (NRT) ZTD accuracies ‘avg RMS OmB’ in mm.

Please note: The percentage regarding ‘Data availability’ reflects the comparison of total number of ZTDs received against total number of ZTDs expected. The statistics on ‘Timeliness HH+90 (one ZTD timely)’ reflect the percentage of ‘one ZTD timely’ received within HH+90 per hour in relation to the total number of maximum 24 hourly ZTDs expected to be timely per day. The performance statistics are provided for the 13 supersites as well as per Processing centre (ACs) in operational or test mode.

Data in E-GVAP summary data for the tables below was kindly provided by Tanja Kleinert, DWD.

Overview E-GVAP

Supersites 2019 Q2

	Obs. totals	Data availability	Timeliness HH+90 (one ZTD timely)	ZTD accuracy (mm)
BRST	79,342	94.3%	96.5%	14.3
CABW	11,047	45.1%	98.6%	7.0
CAMO	14,499	35.7%	99.5%	8.9
GOPE	26,160	68.0%	98.7%	8.4
IZAN	19,024	88.1%	98.7%	56.7
LDB2	27,569	89.1%	98.7%	8.2
MOSE	22,441	69.9%	98.5%	25.7
MEDI	34,330	88.3%	96.8%	22.4
ONSA	31,373	56.4%	98.6%	12.6
PAYE	34,700	67.0%	98.7%	8.3
SMNE	35,285	90.2%	98.5%	8.3
YEBE	34,553	71.8%	97.2%	8.6
ZIMM	36,450	74.5%	95.7%	8.7

Overview E-GVAP

Operational ACs 2019 Q2

	Obs. totals	Data availability	Timeliness HH+90 (one ZTD timely)	ZTD accuracy
ASI_	2572384	82.9%	53.9%	12.3
BKG_	190617	90.3%	99.3%	8.9
GF1G	4266609	80.2%	30.9%	8.0
GF1R	3166469	59.7%	84.8%	7.7
GFZ_	1692607	80.9%	93.4%	10.2
GOP1	303164	88.8%	43.1%	8.9
GOPG	271754	88.8%	42.7%	10.3
LPT_	845844	98.5%	49.8%	10.2
METO	2055224	83.9%	80.0%	8.2
ROBH	5725294	90.9%	79.2%	11.2
SGN_	4003150	94.4%	52.4%	10.1
SGN1	2501951	72.0%	51.5%	10.4

**Overview E-GVAP
Non-operational
ACs 2019 Q2**

	Obs. totals	Data availability	Timeliness HH+90 (one ZTD timely)	ZTD accuracy
ASIC	0	0.0%		9.2
IGE2	486136	67.6%	99.5%	15.2
LPTX	91252	97.2%	99.3%	13.5
METG	193299	79.7%	100.0%	9.9
NGA1	1279196	91.3%	98.9%	8.5
ROBG	465370	78.7%	99.3%	10.9
ROBQ	371687	78.1%	99.3%	9.2
SGN2	485318	60.8%	97.4%	10.9
SGN3	374933	70.4%	99.0%	11.8
SGN4	375151	70.4%	99.0%	11.6
SGNC	45914	71.6%	93.5%	28.6
SGNR	37269	54.5%	83.3%	27.3
WLIT	13797	90.2%	96.5%	10.8
WUEL	237980	50.9%	97.7%	9.5

2019 Q3 Report

The 2019 Q3 Report will be delayed because of ongoing difficulties in manual processing of data; and because of effort being invested in automating these processes.