

REPORT ON THE KCDB TO THE 47TH MEETING OF THE JCRB

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www.bipm.org/

KCDB Report to the JCRB¹

March to September 2023

Executive Summary

The KCDB is a platform providing publicly available, peer reviewed, free and, searchable information on CMCs of NMIs and DIs participating in the CIPM MRA, as well as information on the supporting scientific comparisons. The platform also provides behind the scenes tools for the registration, review and publication processes used by the NMI and DI community, and additionally provides a tool for user-generated statistics. The KCDB provides an Application Programming Interface for search on CMCs. Early-stage work is being undertaken with regard to the database so as to understand what further developments might be needed in light of the digital transformation agenda.

The number of CMCs is approximately stable, with increasing information offset by the adoption of wider scope CMCs. The time for review has decreased significantly since the implementation of KCDB 2.0 in late 2019. Compared to the old system, the JCRB review durations have seen a reduction from 140 to 81 median days.

The comparisons record is cumulative, so increases over time, but the rate of increase is also approximately stable, the majority of comparisons launched being repeats of outdated comparisons plus new supplementary comparisons within the RMOs.

Introduction

This report summarizes the major progress and evolution of the BIPM Key Comparison Database (KCDB) over the last six months.

The key comparison database - KCDB – is a supporting database for the implementation of the Mutual Recognition Arrangement of the International Committee for Weights and Measures (CIPM MRA) that was implemented in 1999. It contains data on Calibration and Measurement Capabilities (CMCs) and comparison results of measurements in physics, ionizing radiation, chemistry and biology. The KCDB is an evidence-based database: all data included have been reviewed by international groups of experts and approved for mutual recognition.

The KCDB website www.bipm.org/kcdb gives access to the following services with open access:

- searching on published CMCs in the KCDB
- searching on published comparison information, reports and results
- information on statistics and recent news on issues linked to CMCs and comparisons

¹ The KCDB Office provides the KCDB report, addressed to the Joint Committee of the Regional Metrology Institutes and the Bureau International des Poids et Mesures (JCRB), every 6 months. Those reports are made publicly available via the BIPM website: <https://www.bipm.org/en/cipm-mra/kcdb-reports>

supported by a set of guidance documents.

The status of the database concerning **Calibration and Measurement Capabilities** are given in Section 1. In Section 2, recent information concerning **Comparisons** carried out within the frame of the CIPM MRA is summarized, and Section 3 highlights the status of **Associates** of the BIPM. The **performance of the system** is discussed in Section 4, and a short view on the software **status** is presented in Section 5. The **BIPM KCDB and digitalization** is brought to notice in Section 6.

This report reflects the status as of 1 September 2023.

1. CIPM MRA Appendix C: Calibration and Measurement Capabilities

1.1. CMC statistics

There were² 25 809 (25 829) CMCs published in the KCDB on 1 September 2023 of which 19 669 (19 645) are in Physics and 6140 (6184) in Chemistry and Biology, see Figure 1. The total number of published CMCs remains almost the same over the previous year which confirms the observed steady-state trend over the last 5 years period.

The repartition of CMCs on metrology areas, expertise and state or economy is available in real-time from the KCDB home page in “CMC statistics”

<https://www.bipm.org/kcdb/cmc/statistics/public> .

The distribution of published CMCs along the RMOs is listed in Table 1.

The status of not yet published CMCs that are placed on the platform is listed in Table 2; 2723 compared to 2364 half a year earlier. This number can vary considerably, depending on the status of the review campaigns applied by some of the Consultative Committees.

² The numbers given within parenthesis represents the number of CMC reported one year earlier.

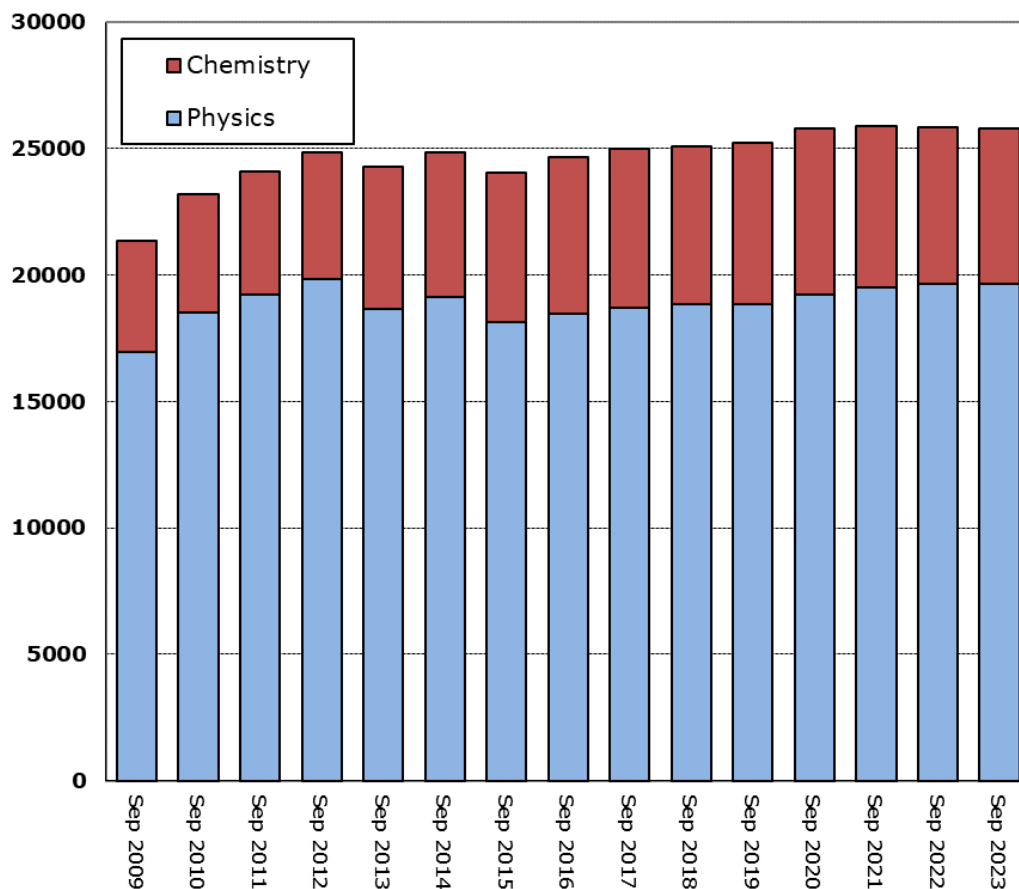


Figure 1 Number of CMCs registered in the KCDB since September 2009.

Table 1 Number of published CMCs in KCDB per RMO on 1 September 2023 (follow-up of Action 17/1 of JCRB 2006).

RMO	Number of CMCs	
	2023-09-01	2022-09-01
AFRIMETS	753	730
APMP	6763	6756
COOMET	2197	2580
EURAMET	11564	11325
GULFMET	74	46
SIM	4458	4392
Total	25809	25829

Table 2 Status of not yet published CMCs in KCDB on 1 September 2023

Status	number of CMCs	number of CMCs
	2023-09-01	2023-02-23
Draft	352	355
RMO: Submitted	462	241
RMO: Under Review	118	70
RMO: Review Completed	105	69
RMO: Accepted	24	344
RMO: Revision Requested	199	204
RMO: Revision Completed	18	6
Submitted to the JCRB	6	2
JCRB: Under Review	278	398
JCRB: Revision Requested	335	153
JCRB: Revision Completed	25	15
JCRB: Approved	329	28
JCRB: Waiting for VOTE	22	25
Greyed out	450	454
TOTAL	2723	2364

The total number of published CMCs during the last 6 months for each metrology area is listed in Table 3. The total number of published CMCs has increased in comparison to the previous 6-month period, noting that 60% of the published CMCs were not subject to JCRB review.

Table 3 Number of published CMCs per metrology area during the last 6 months.



Metrology area	Published CMCs	Published CMCs
	2023-09-01	2023-02-23
AUV	2	3
EM	63	95
L	10	23
M	143	30
PR	63	34
T	4	6
TF	27	1
QM	6	110
RI	55	6
TOTAL	373	308

1.2. Greyed out CMCs and reinstatements

There are presently 450 greyed out CMCs, compared to 454 CMCs 6 months earlier. Table 4 displays all greyed out CMCs where the most recent events are highlighted in yellow and green for increased and decreased number of greyed-out CMCs, respectively.

Table 4 Status of greyed out CMCs on 1 September 2023

RMO	COUNTRY	AUV	EM	L	M	PR	QM	RI	T	TF	TOTAL
AFRIMETS	ZA				0			11			11
APMP	AU							5			5
APMP	CN							1			1
APMP	KR		8				80				88
APMP	NZ		1			8				2	11
APMP	SG			4							4
COOMET	KZ									0	0
COOMET	RU						40				40
EURAMET	DE		0				56	3	1		60
EURAMET	ES							2			2
EURAMET	FR						7				7
EURAMET	GB		5		6						11
EURAMET	IT		3					98			101
EURAMET	LT			9	12						21
EURAMET	LV		4								4
EURAMET	NO			1	4						5
EURAMET	PL			1							1
EURAMET	PT			1				1			2
EURAMET	SK						10				10
EURAMET	UA				6			1			7
EURAMET	JRC						0	0			0
SIM	AR			1			6				7
SIM	BR				3						3
SIM	CA		7		1						8
SIM	MX					4	17				21
SIM	US					20					20
TOTAL:		0	28	17	32	32	216	122	1	2	450

 Increased in number
 Decreased in number

As of 1 September, Table 5 lists the number of greyed-out CMCs in the KCDB that reach its maximum possible 5 years as greyed-out within the next six months.

Table 5 CMCs reaching the limit of 5 years of stayed greyed-out within the next six months.

RMO	Metrology area	number	date limit greyed-out
APMP	Electricity and Magnetism	1	3/2024
EURAMET	Ionizing Radiation	5	11/2023
SIM	Mass	3	10/2023

The dynamically updated full list of CMCs greyed-out is available for registered users from the KCDB 2.0 platform under the statistics menu (<https://www.bipm.org/kcdb/cmc/statistics/greyed-out>).

2. CIPM MRA Appendix B: Key and supplementary comparisons

2.1. Comparison statistics

On 1 September 2023 the KCDB listed 1834 comparisons distributed as listed in Table 6; 1157 of them are key comparisons and 677 supplementary comparisons. This represents a total increase of 21 comparisons since 23 February 2023.

Table 6 Key and Supplementary Comparisons on 1 September 2023.

Entity	KC	SC
BIPM	99	1
CC	573	34
AFRIMETS	8	32
APMP	151	123
COOMET	49	121
EURAMET	192	219
GULFMET	7	26
SIM	78	121
TOTAL	1157	677

Figure 2 shows the evolution of the total number of key (dark blue) and of supplementary (light blue) comparisons registered in the KCDB since September 2003. The annual increase of key comparisons seems to have stabilized to around 30, corresponding to an increase of 3%. The ratio of supplementary comparisons, 20% in 2006, has continuously progressed to constitute 37% of all comparisons, see Figure 3. The graphs include repeats of key comparisons.

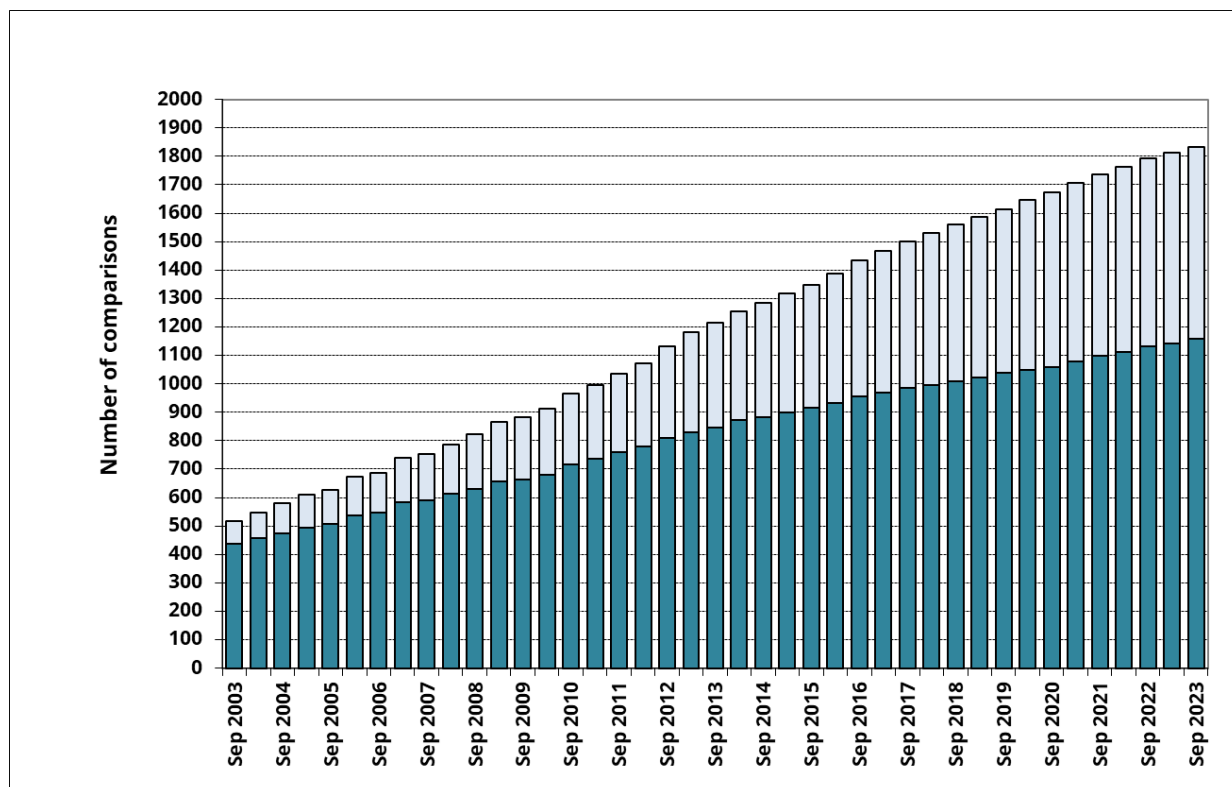


Figure 2 Total number of key comparisons (dark blue) and supplementary comparisons (light blue).

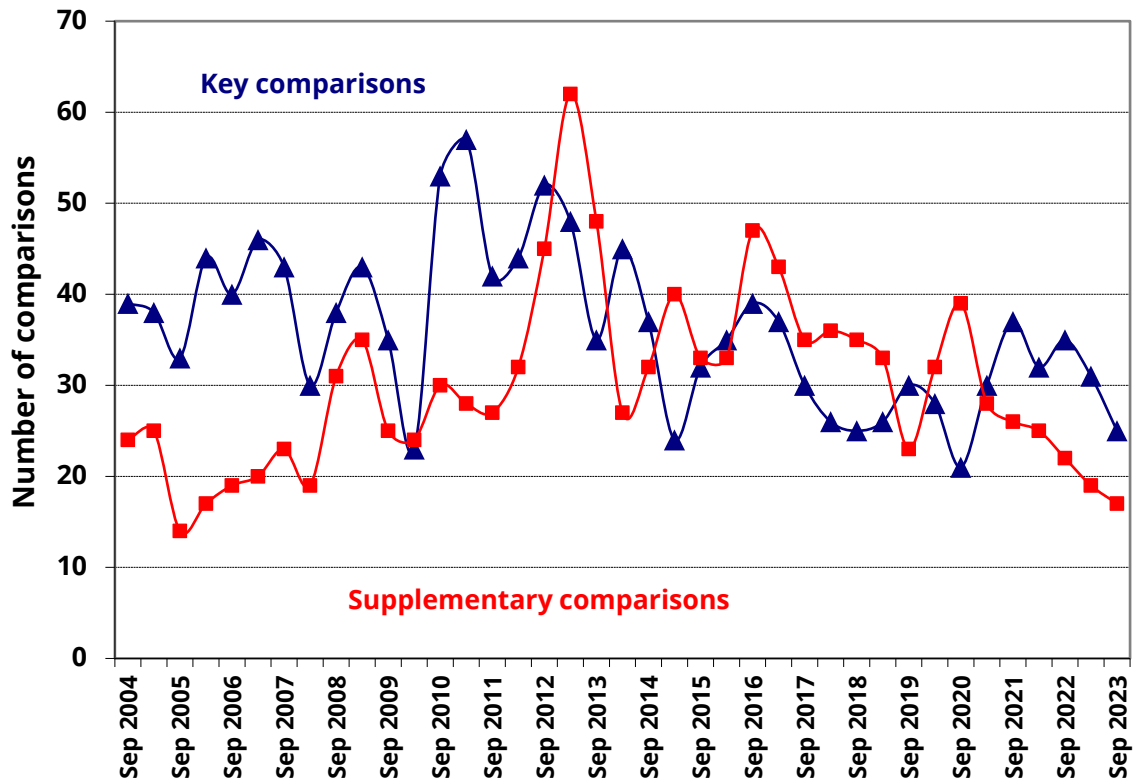
The number of new key and supplementary comparisons registered in the KCDB over the one-year period ending at the date indicated on the the abscissa is illustrated in Figure 3.

Graphs generated in real-time illustrating the participation in key and supplementary comparisons are available under the Statistics menu on the KCDB home page:

<https://www.bipm.org/kcdb/comparison/statistics/key>

<https://www.bipm.org/kcdb/comparison/statistics/supplementary>.

Figure 3 Number of new comparisons registered in the KCDB over the one-year period.



The following 21 comparisons were registered as new during the last 6 months:

- | | |
|-----------------------|--------------------------------|
| AFRIMETS.L-S6 | COOMET.M.FF-S11 |
| AFRIMETS.M.D-S2 | EURAMET.L-K3.n01.1 |
| APMP.SIM.M.P-K1c.2023 | EURAMET.M.D-K5 |
| CCM.V-K4.A | EURAMET.M.P-K15.2 |
| CCM.V-K4.B | EURAMET.RI(II)-K2.Ho-166m.2024 |
| CCQM-K10.2018.1 | GULFMET.RI(I)-S2 |
| CCQM-K154.b.1 | SIM.AUV.A-K6 |
| CCQM-K157 | SIM.M.F-K3.a |
| CCQM-K73.2018.2 | SIM.M.F-S12 |
| CCQM-K96.2023 | SIM.QM-S17 |
| CCT-K9.3 | |

The following 38 reports were published during the last 6 months:

AFRIMETS.AUV.A-S2	BIPM.RI(I)-K2 (BFHK 2023)	CCT-K9
AFRIMETS.EM-S3	BIPM.RI(I)-K4 (BFHK 2021)	COOMET.EM-S26
APMP.EM-S8	BIPM.RI(I)-K6 (ARPANSA 2022)	COOMET.EM-S6
APMP.M.D-K4	BIPM.RI(I)-K8 (NPL 2022)	COOMET.L-S28
APMP.T-K3.6	BIPM.RI(II)-K1.Co-60 (update 2023)	COOMET.M.H-S3
BIPM.EM-K11 (DEFNAT 2022)	BIPM.RI(II)-K4 (ANSTO 2023)	COOMET.T-S4
BIPM.EM-K11 (NPLI 2023)	BIPM-QM-K1 (NIST 2022)	EURAMET.AUV.V-K5
BIPM.EM-K13 (CEM 2022)	CCPR-K1.a.2017	EURAMET.EM-S43
BIPM.EM-K13 (INRIM 2023)	CCQM-K150	EURAMET.L-S26.1
BIPM.EM-K14.a and b	CCQM-K157	EURAMET.RI(I)-S18
BIPM.QM-K1 (DHMZ 2022)	CCQM-K3.2019	SIM.L-K7.2016
BIPM.QM-K1 (LNE 2023)	CCQM-K68.2019	SIM.QM-S5
BIPM.RI(I)-K1 (BFHK 2021)	CCT-K7.2021	

On 1 September, the number of abandoned or superseded key and supplementary comparisons, stored in the KCDB archives is 102, compared to 86 on 1 September 2022.

2.2. Comparisons older than 5 years (Follow-up Action 33/3 of JCRB 2015)

Action 33/3: *The BIPM KCDB office, as part of the KCDB report to the JCRB, to identify Key and Supplementary Comparisons which were started 5 or more years ago and have not reached a conclusion.*

While uncompleted Key Comparisons, connected to the Consultative Committees, keep reducing in number since the follow-up action was triggered by the JCRB eight years ago, the number of lasting supplementary RMO comparisons is roughly on the same level as in 2015 when this issue was pointed out by the JCRB.

The total number is illustrated in Figure 4. A list of the comparisons concerned is available in Appendix I.

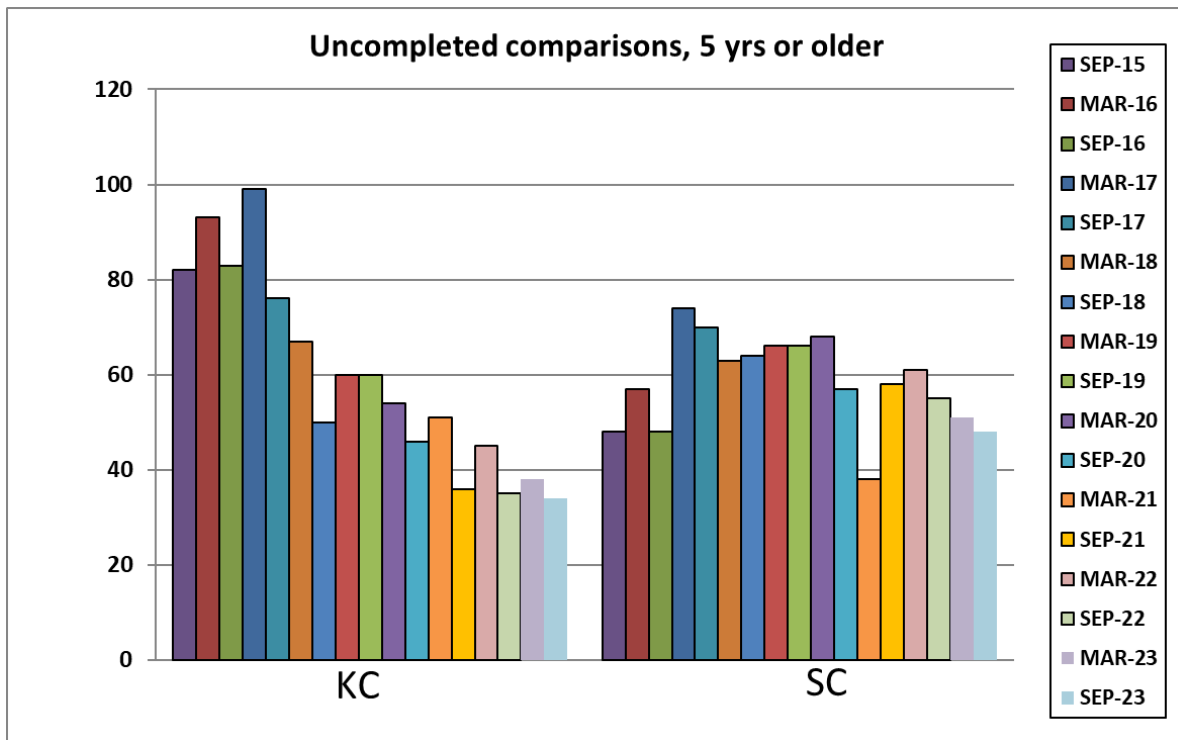


Figure 4 Histogram showing the number of incomplete comparisons that started more than 5 years ago.

3. Participation of Associates of the CGPM in CIPM MRA activities

Table 7 summarizes the participation of the [36 Associates of the CGPM](#) in CIPM MRA activities as of 1 September 2023.³

³ These numbers take into account all comparisons registered in the KCDB, disregarding status, for which at least one laboratory of the Associate is listed in the participants list.

Table 7 CIPM MRA activity of the Associates of the CGPM: number of published CMCs and participation in key and supplementary comparisons.

Country	Published CMCs	Greyed out CMCs	Key Comparisons	Supplementary Comparisons
Albania	10		7	5
Azerbaijan	32		1	8
Bangladesh			3	3
Bolivia	22		11	32
Bosnia and Herzegovina	84		16	21
Botswana	3		1	5
Cambodia				0
CARICOM (Caribbean Community)	1		1	11
Chinese Taipei	397		111	50
Ethiopia	2			4
Georgia	65		7	18
Ghana			2	7
Hong Kong, China	298		111	31
Jamaica	22		6	11
Kuwait			3	5
Latvia	15		15	11
Luxembourg	10	4	5	3
Malta			3	3
Mauritius			2	3
Moldova, Republic of	76		6	19
Mongolia	23		5	4
Namibia	7			3
North Macedonia	21		10	12
Oman				1
Panama	38		8	22
Paraguay	8		2	19
Peru	113		31	42
Philippines	33		17	11
Qatar			3	2
Sri Lanka	2		9	2
Syrian Arab Republic			11	3
Tanzania				1
Uzbekistan			5	8
Viet Nam	31		39	10
Zambia	11		2	7
Zimbabwe	19		1	3
TOTAL	1343	4	454	400

The repartition of CMCs and comparisons among Associates is illustrated in Figure 5 and Figure 6, respectively.

Figure 5 Graph on the number of CMCs declared by Associates of the CGPM.

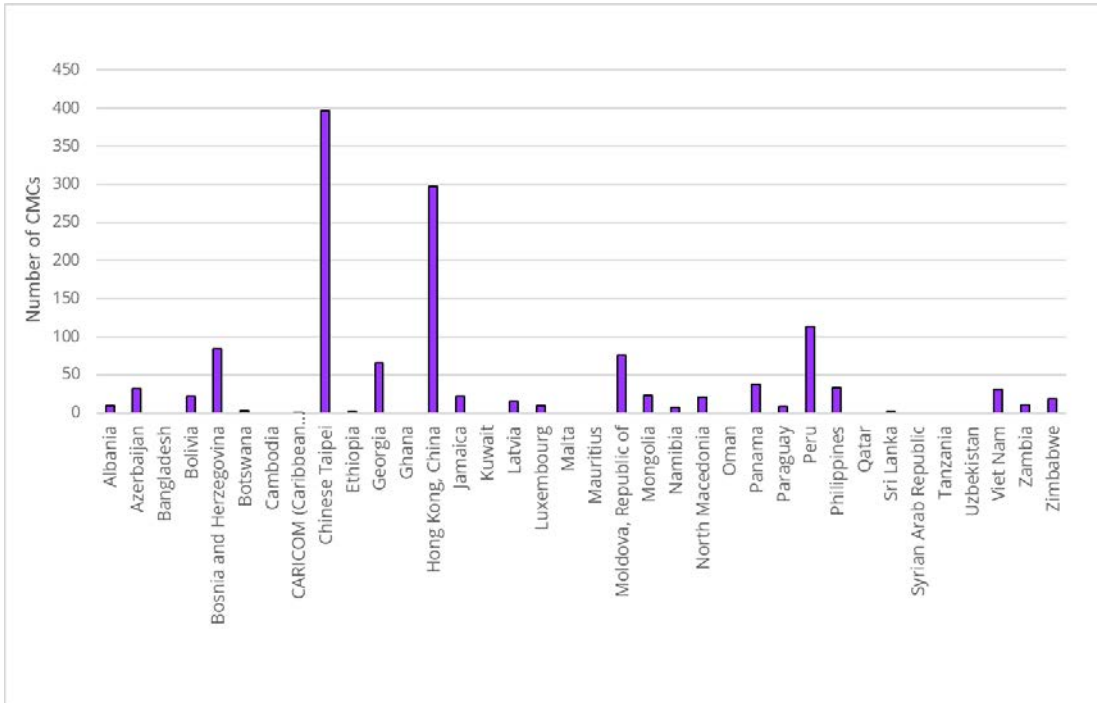
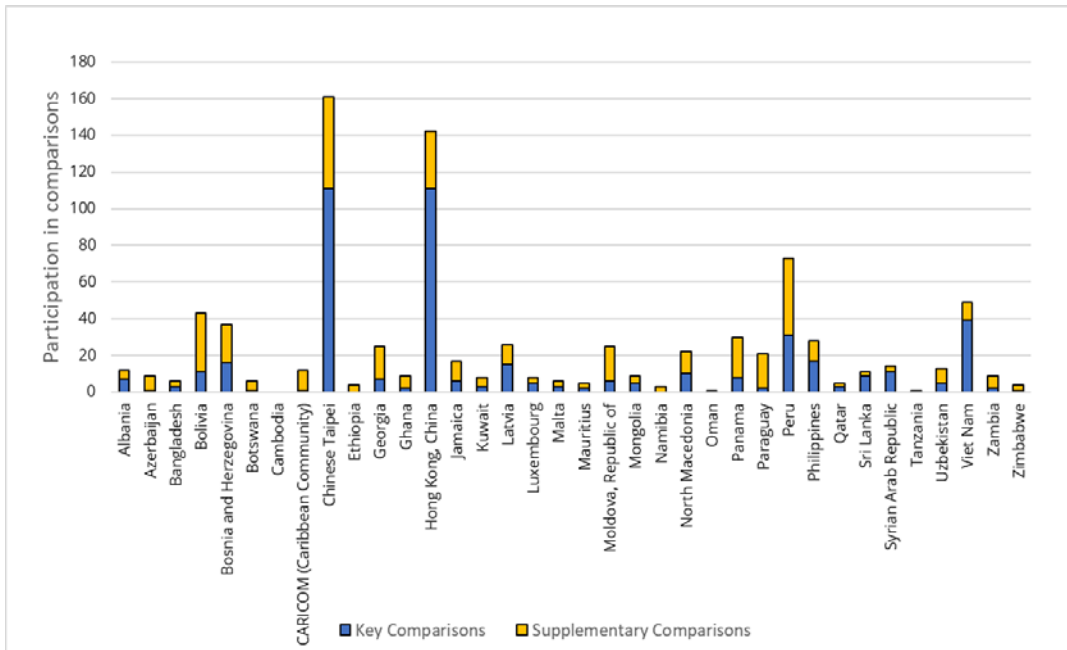


Figure 6 Graph on the participation of Associates of the CGPM in key and supplementary comparisons.



4. System’s Performance

An evaluation of the performance of the CIPM MRA activities as documented by the KCDB has been undertaken for the September 2023 Report on the KCDB to the JCRB as follows.

An analysis was started in March 2021 comparing the review duration of CMCs that had been completely processed using the KCDB 2.0. This evaluation is ongoing, and an update is provided in this current report.

Statistical data on JCRB review durations for CMCs are also available from the Statistics Menu of the KCDB 2.0 platform and are illustrated in Fig 7, which shows the average, maximum, and minimum time it took for the CMCs to pass the JCRB review.

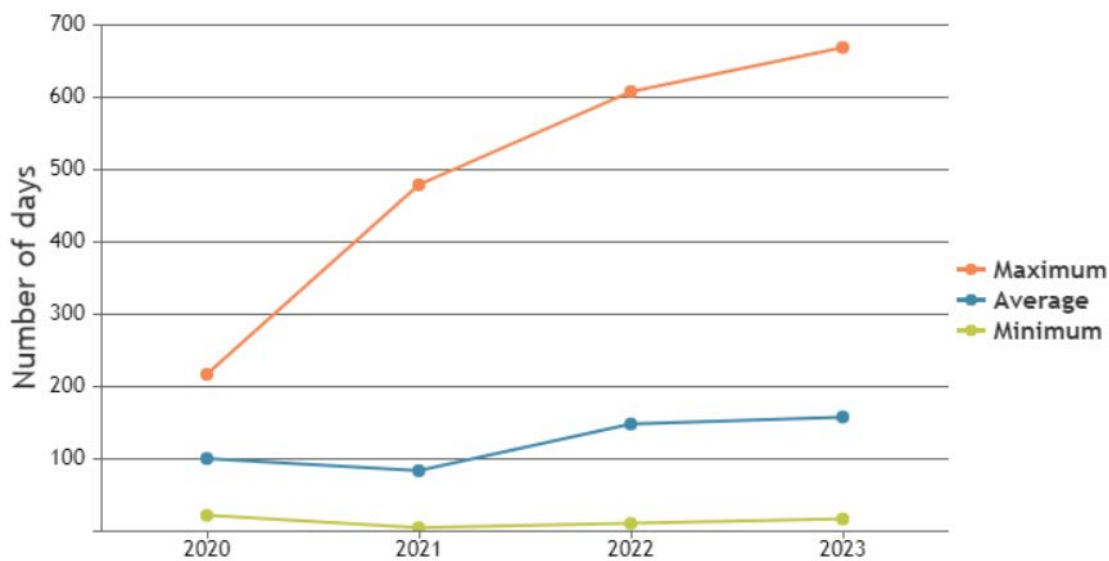


Figure 7 : A graph giving a snapshot on 1 September 2023 of the duration of the CMC approval for JCRB review as directly retrieved from the statistics on the CMCs menu of the KCDB. The KCDB 2.0 was launched in 2020.

A more detailed picture is given in Fig. 8 for the last six months (March 2023 to September 2023). Here, the CMC approval time from initial submission to the KCDB, to intra-regional RMO and subsequent JCRB review is depicted for CMCs submitted by the respective RMOs. The JCRB review duration is relatively low, medians of <100 days for all RMOs except one.

As the picture indicated by Fig. 8 shows only the last six months it is interesting to also look at the long-term data. Intra-RMO and JCRB review durations for those CMCs processed fully on the KCDB 2.0 platform since 2020 are displayed in Fig. 9 with a column showing the median value across all RMOs on the right-hand side of the graph.

Based on this, the overall picture is summarized in Table 8 where JCRB review durations are compared to the more recent data of CMCs processed on the KCDB 2.0 platform. The numbers for the current reporting period, column Sep. 2023 in Table 8, have drastically reduced than the March reporting period (from 43 to 22 days minimum and 147 to 71 median days) except for the mean and maximum numbers affected by some CMCs that had very long review durations. There is a slight rise to the KCRB 2.0 figure, from 67 days in March2023 to now 81 days (status 2023-08-24). However, the overall picture as compared to the old system is still quite positive, a reduction from 140 days to 81. The increase of JCRB review durations in the current reporting period is pretty much depending on the metrology area and specific settings at the RMOs.

Since intra-RMO review data was not recorded in the KCDB of the previous system, Table 8 does not contain data for the intra-RMO review. With increasing time working on the new KCDB 2.0 platform, future reports will also comprise the temporal evolution for this review stage.

Table 8 JCRB review durations in days for CMCs at different times.

	45 th JCRB	Sep. 2022	Mar. 2023	Sep. 2023'	KCDB 2.0*
minimum	24	6	43	22	0
median	75	61	147	71	81
mean	85	95	126	131	108
maximum	327	412	214	665	665

'Computed for CMCs published from 3/2023 to 9/2023

*Computed from the KCDB 2.0 menu 'Statistics on review performance' for the whole period since 2020-01-01

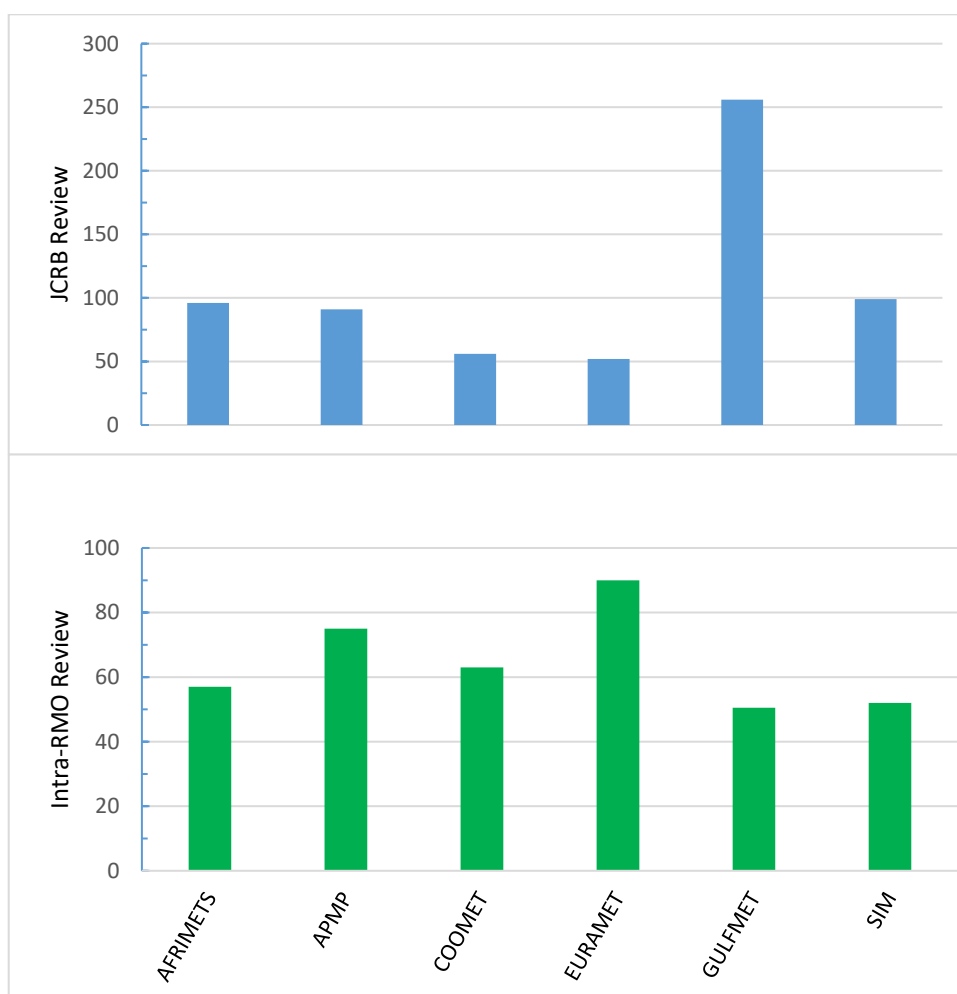


Figure 8 : Review durations for CMCs published in the KCDB 2.0 from March 2023 to September 2023. The bars reflect median intra-regional review in the bottom panel and median JCRB review durations in the upper panel for CMCs submitted by the RMOs indicated on the x axis.

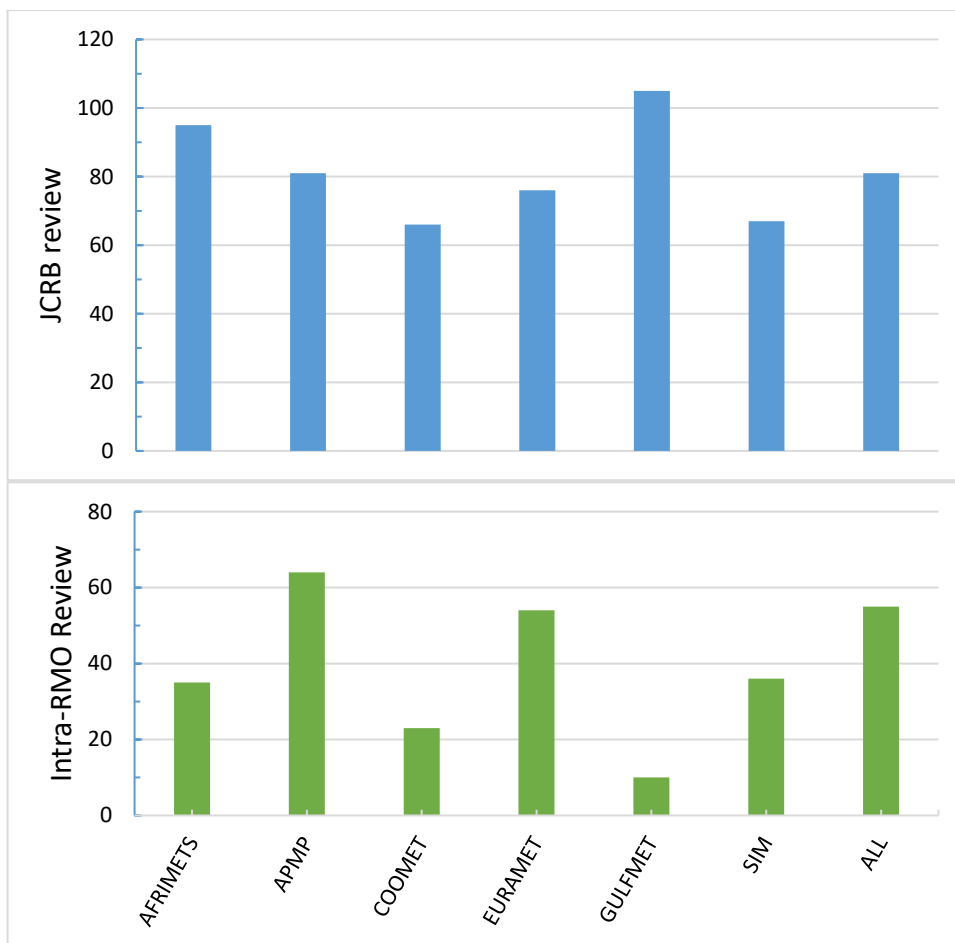


Figure 9 : Median review durations computed on CMCs fully processed in the KCDB 2.0 platform since 2020. Bottom, the intra-RMO review for all RMOs that submitted CMCs. Top, JCRB review on the same CMCs. Median data on both review stages averaged across all RMO submissions in the right column.

Review durations are different for different metrology areas as can be seen from Fig. 10. Extremes, in this reporting period (light blue bars), are seen in the JCRB review durations in the areas L and QM. For QM this long JCRB duration was mainly caused by the special arrangement of JCRB review of CMCs. However, the long-term trend from 2020 to September 2023 does reveal a great improvement in JCRB review durations for all areas, as indicated by the dark blue bars in Fig. 10, as compared to the old system.

Due to the special approval process of the CCQM KCWG in the JCRB review, the average duration depends on when the 6-month time window is applied for statistics, and therefore, when the 6-month window is studied. The review duration for the QM area in the longer-term perspective has been computed and displayed in Table 9. March 2023 showed lower JCRB review durations followed by a comparably large median JCRB duration in September 2023. The median JCRB review duration in QM has now increased again to 384 days within this reporting period but with reduced median duration of 119 days computed for CMCs since April 2021.

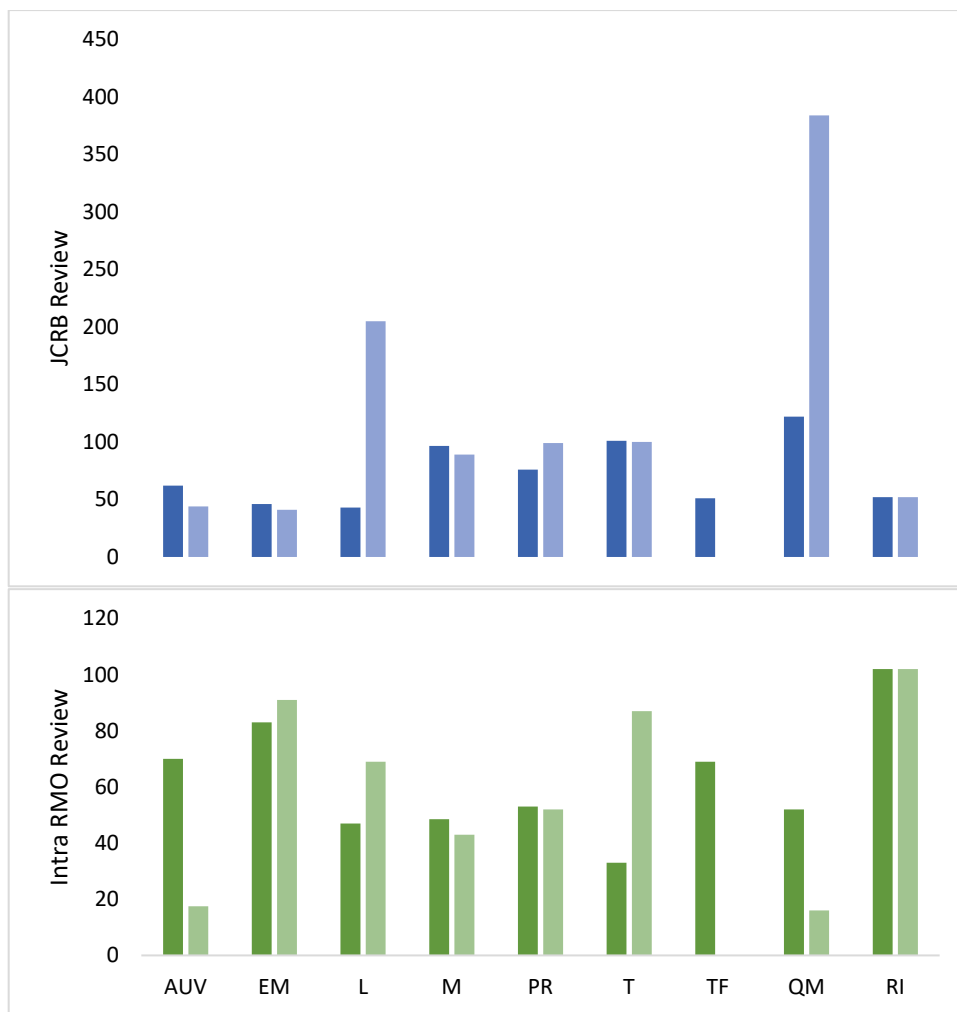


Figure 10 : Median review durations of CMCs published during the last six months (light green and blue bars) and since 2020 (dark blue and green bars) related to metrology areas.

Table 9 Duration of CMCs published in the QM area for JCRB review.

Year	September 2022 – March 2023	March 2023 – September 2023	April 2021 – September 2023
JCRB duration / days	172	384	119

5. Present Status of the BIPM KCDB 2.0

The KCDB facility is accompanied by providing a variety of guidance material, cf. <https://www.bipm.org/en/about-us/kcdb-help.html>. Several online demonstrations to users within the frame of the CBKT <https://www.bipm.org/en/cbkt/> have been organized during the last 6 months, focused on different user profiles or requested needs.

The KCDB 2.0 software is supported by an Application Management contract, presently giving the opportunity to make smaller adjustments of the software. Anomalies and suggestions for improvements may be communicated by the users by completing the form https://www.bipm.org/utis/common/pdf/KCDB_2.0/Form_for_declaring_an_anomaly_or_request.docx.

The Quality System underpinning the previous version of the KCDB has been updated. An internal audit was held in June 2023.

6. BIPM KCDB and digitalization

The metrology community is progressively noting the importance of FAIR⁴ machine-readable data for calibration issues but also for future emerging applications. Industrial sectors request urgently possibilities to use Digital Calibration Certificates which will contribute to versatile technical advantages, cost effectiveness and improvements from a quality perspective.

The BIPM implemented an Application and Programming Interface for the KCDB (API KCDB) in 2021 as a first step in this direction. This interface allows external users to make CMC queries from a support other than the KCDB web and to collect machine readable data: <https://www.bipm.org/en/cipm-mra/kcdb-api>.

An extension of the service of the KCDB API which provide access to all CMC versions has been launched. In addition of published CMCs, CMCs that are no longer valid can be accessed and traced back when linked to the calibration certificate.

Within the framework of the Digital SI reference system, work is presently progressing towards interoperability of the CMC data.

Acknowledgement

Many thanks to the BIPM IT team Laurent Le Mée and Thierry N’Guyen for their continued support.

⁴ Findable Accessible Interoperable Reusable

APPENDIX I List of uncompleted comparisons older than 5 years**a) Key Comparisons**

KC identifier	Indicated measurement date		Status as of 1 September 2023
	Start year	End year	
APMP.EM.BIPM-K11.2	2004	2004	Report in progress, draft B
APMP.EM.RF-K8.CL	2012	2013	Measurements completed
APMP.EM-K12	2014	2015	Waiting for approval
APMP.EM-K2	2010	2011	Waiting for approval
APMP.EM-K5.1	2010	2013	Waiting for approval
APMP.M.F-K3.a	2013	2017	Measurements in progress
APMP.M.P-K15	2013	2014	Report in progress, draft A
APMP.M.P-K4	2015	2016	Measurements completed
APMP.M.P-K7.2	2015	2016	Report in progress, draft B
APMP.M.T-K1	2015	2016	Planned
APMP.PR-K3.a	2012	2014	Report in progress, draft A
APMP.PR-K3.a.1	2006	2006	Measurements completed
APMP.T-K4.1	2013	2014	Report in progress, draft B
CCEM.RF-K26	2014	2016	Report in progress, draft B
CCEM.RF-K5.c.CL	2012	2015	Measurements in progress
CCL-K4.2015	2015	2017	Report in progress, draft B
CCM.FF-K2.2011	2013	2015	Report in progress, draft B
CCPR-K2.b.2016	2016	2017	Measurements completed
CCQM-K110	2012	2012	Postponed
CCQM-K133	2017	2017	Planned
CCRI(II)-K2.Pa-231	2017	2017	Report in progress, draft B
CCRI(II)-K2.Tc-99	2012	2013	Measurements in progress
CCT-K1.1	2006	2014	Report in progress, draft A
CCT-K10	2014	2016	Report in progress, draft B
CCT-K4.1	2012	2014	Report in progress, draft B
CCT-K6.1	2008	2010	Report in progress, draft A
CCT-K8	2016	2017	Measurements completed
COOMET.AUV.V-K1	2007	2008	Report in progress, draft B
COOMET.L-K3	2011	2012	Report in progress, draft A
EURAMET.T-K6.2	2017	2017	Planned
EURAMET.T-K8	2008	2012	Report in progress, draft B
EURAMET.T-K8.1	2017	2017	Planned
GULFMET.T-K9	2017	2017	Measurements in progress
SIM.M.M-K6	2015	2017	Report in progress, draft B

b) Supplementary Comparisons

SC identifier	Indicated measurement date		Status as of 1 September 2023
	Start year	End year	
APMP.EM.RF-S5.CL	2013	2015	Protocol complete
APMP.M.FF-S2.2016	2016	2017	Report in progress, draft B
APMP.M.G-S1	2012	2012	Report in progress, draft A
APMP.M.H-S4	2011	2011	Report in progress, draft A
APMP.M.MM-S1	2012	2013	Measurements in progress
APMP.M.P-S1	2003	2005	Measurements completed
APMP.M.P-S7	2015	2015	Report in progress, draft B
APMP.PR-S5	2008	2009	Measurements in progress
APMP.PR-S8	2015	2017	Measurements in progress
APMP.T-S10	2013	2013	Planned
APMP.T-S11	2013	2016	Report in progress, draft A
APMP.T-S13	2014	2016	Measurements in progress
APMP.T-S14	2017	2017	Measurements in progress
APMP.T-S8	2011	2015	Measurements in progress
APMP.T-S9	2013	2013	Measurements in progress
CCRI(II)-S9	2011	2011	Report in progress, draft A
CCT-S3	2007	2008	Report in progress, draft B
COOMET.EM-S10	2010	2012	Waiting for approval
COOMET.EM-S18	2013	2016	Waiting for approval
COOMET.EM-S19	2015	2017	Report in progress, draft A
COOMET.EM-S21	2016	2017	Waiting for approval
COOMET.EM-S7	2009	2011	Waiting for approval
COOMET.L-S20	2016	2016	Report in progress, draft A
COOMET.M.FF-S4	2009	2010	Report in progress, draft B
COOMET.M.F-S1	2008	2010	Report in progress, draft B
COOMET.M.H-S2	2014	2016	Report in progress, draft A
COOMET.M.M-S2	2015	2017	Report in progress, draft A
COOMET.M.M-S3	2016	2017	Measurements in progress
COOMET.M.P-S1	2014	2015	Report in progress, draft B
COOMET.PR-S10	2016	2017	Protocol complete
COOMET.PR-S5	2008	2011	Measurements completed
COOMET.RI(I)-S3	2016	2017	Waiting for approval

(continued...)

SC identifier	Indicated measurement date		Status as of 1 September 2023
	Start year	End year	
EURAMET.M.F-S2	2012	2013	Measurements in progress
EURAMET.M.P-S16	2016	2016	Protocol complete
EURAMET.M.T-S4	2015	2015	Report in progress, draft A
EURAMET.PR-S4	2012	2013	Measurements completed
SIM.M.FF-S4	2006	2006	Report in progress, draft B
SIM.M.FF-S9	2016	2016	Report in progress, draft A
SIM.M.F-S2	2012	2012	Report in progress, draft A
SIM.M.F-S6	2017	2017	Report in progress, draft A
SIM.M.M-S17	2017	2017	Measurements completed
SIM.QM-S3	2012	2012	Report in progress, draft A
SIM.QM-S4	2012	2012	Report in progress, draft A
SIM.QM-S6	2016	2016	Protocol complete
SIM.T-S4	2008	2008	Report in progress, draft B
SIM.T-S6	2012	2014	Report in progress, draft A
SIM.T-S8	2014	2014	Report in progress, draft A
SIM.T-S9	2017	2017	Planned

