Bureau International des Poids et Mesures

SEPTEMBER 2022 REPORT ON THE KCDB TO THE JCRB

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www.bipm.org/

KCDB

KCDB Report to the JCRB[1]

March to September 2022

Executive Summary

The KCDB 2.0 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 the KCDB 2.0 in late 2019.

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over time, but the rate of increase is also approximately stable, the majority of comparisons launched being repeats of outdated comparisons plus new supplementary comparisons within the RMOs.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 from March to September 2022. The report will be discussed and formally approved at the 46th meeting of the JCRB in March 2023 together with the next KCDB Report covering the period September 2022 to March 2023. Due to the CGPM meeting there is no JCRB meeting organized for September 2022.

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 and the JCRB Executive Secretary provide the KCDB report, addressed to the Joint Committee of the Regional Metrology Organizations and the Bureau International des Poids et Mesures (JCRB), every 6 month. 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 2022.

Acknowledgement

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

1. CIPM MRA Appendix C: Calibration and Measurement Capabilities

1.1. CMC statistics

There were[2] 25 829 (25 887) CMCs published in the KCDB on 1 September 2022 of which 19 645 (19 510) are in Physics and 6184 (6377) in Chemistry and Biology, see
Figure 1. The total number of published CMCs remained almost the same over a one-year period. However, a decrease by 3 % of CMCs was observed for Chemistry and Biology since last September, linked to the successive implementation of broad-scope CMCs.

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 throughout the RMOs is listed in Table 1.

GULFMET has progressed to declare 46 CMCs in Electricity and Magnetism, Length metrology, Time and Frequency, and in Mass and related quantities.

The status of not yet published CMCs that are placed on the platform is listed in Table 2; 1862 compared to 2495 six months 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.

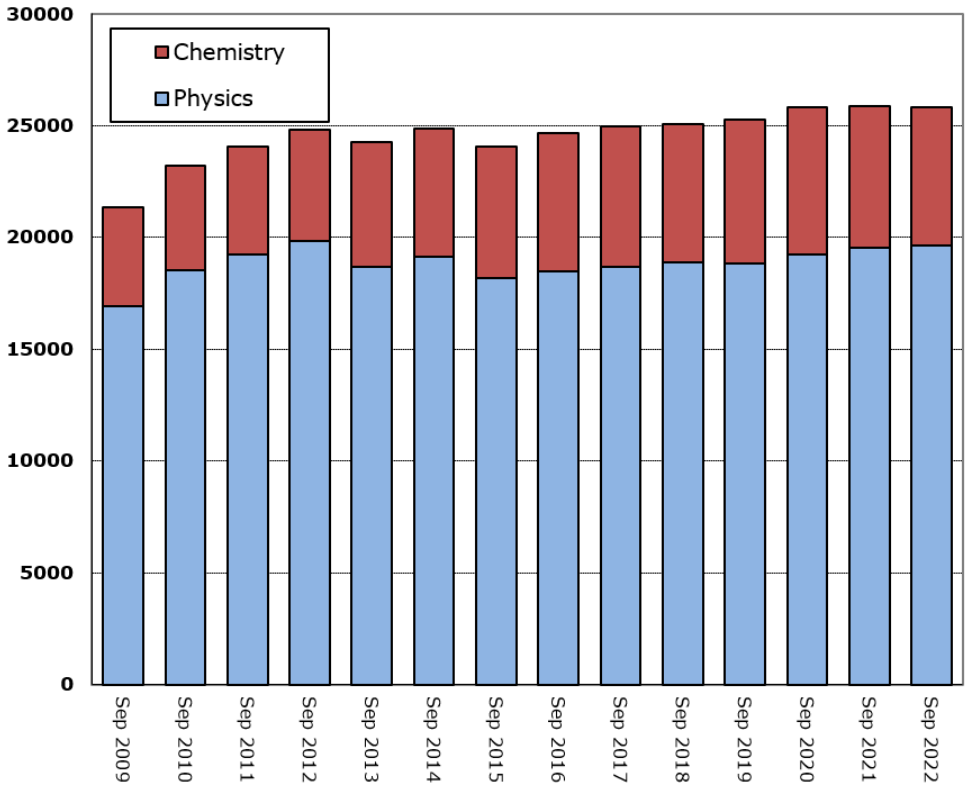

Figure 1 *Number of CMCs registered in the KCDB since September 2009.*

Table 1 Number of published CMCs in KCDB per RMO on 1 September 2022 (follow-up of Action 17/1 of JCRB 2006).

RMO	Number of CMCs	
	2022-09-01	**2021-08-17**
AFRIMETS	730	655
APMP	6756	6545
COOMET	2580	2720
EURAMET	11325	11474
GULFMET	46	0
SIM	4392	4493
TOTAL	25829	25887

Table 2 Status of not yet published CMCs in KCDB on 1 September 2022

Status	number of CMCs 2022-09-01	number of CMCs 2022-02-22
Draft	334	320
RMO: Submitted	279	367
RMO: Under Review	63	61
RMO: Review Completed	0	92
RMO: Accepted	21	35
RMO: Revision Requested	178	191
RMO: Revision Completed	13	0
Submitted to the JCRB	0	3
JCRB: Under Review	89	686
JCRB: Revision Requested	224	136
JCRB: Revision Completed	63	60
JCRB: Approved	141	4
JCRB: Waiting for VOTE	91	2
Greyed out	366	538
TOTAL	1862	2495

The total number of published CMCs during the last 6 months for each metrology area is listed in Table 3. The total number gives the impression that the number of submitted CMCs have suddenly decreased. However, a larger number of CMCs issued from the former JCRB site were published during the previous 6-month period while still compensating for the previous delay (linked to the implementation of the new software).

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

Metrology area	Published CMCs 2022-09-01	Published CMCs 2022-02-22
AUV	10	39
EM	133	394
L	35	18
M	65	124
PR	102	2
T	28	25
TF	18	0
QM	240	398
RI	16	2
TOTAL	647	1002

1.2. Greyed-out CMCs and reinstatements

There are presently 366 greyed-out CMCs, compared to 538 CMCs 6 months earlier. This decrease is associated with the deletion of greyed-out CMCs by the JRC (European Union). 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.

It should be noted here that according to the discussions at the 45th meeting of the JCRB in March 2022, the guidelines CIPM MRA-G13 have been slightly revised in Section 10 that details the greying-out procedure. This revision simplifies the process and makes use of the technical functionalities of the KCDB 2.0 platform. It finally removed actions that had originally been adopted as transition arrangements when the process of greying-out had first been introduced, but which had somehow become part of the process. With the approval of the JCRB, the document CIPM MRA-G13 V1.2 was released in August 2022. Based on the new procedure, greyed-out CMCs are allowed to remain with this status for a maximum period of 5 years. Within this period, the institute holding the CMC, i.e., the CMC writer can decide to reinstate or to delete it. Reinstatement of modified CMCs must adhere to the given, and well-established rules for modifying CMCs. A warning is given to the CMC holder after 4 years through a KCDB-automated alert and by the JCRB Executive Secretary. Once the 5-year period has expired the CMCs will be permanently deleted from the KCDB if the CMC writer has not taken any action to reinstate it.

Since August 2022 this new approach has been applied to all newly greyed-out CMCs and those who have not reached the fifth year of greyed-out status.

Table 4 Status of greyed out CMCs on 1 September 2022

RMO	COUNTRY	AUV	EM	L	M	PR	QM	RI	T	TF	TOTAL
AFRIMETS	ZA				1			11			12
APMP	AU							5			5
APMP	IN			3							3
APMP	KR						37				37
APMP	NZ		1							2	3
APMP	SG			4							4
APMP	TH			1							1
COOMET	KZ									21	21
COOMET	RU						23				23
EURAMET	BG						5				5
EURAMET	DE		1				34	3	1		39
EURAMET	ES							2			2
EURAMET	FI			0							0
EURAMET	FR						1				1
EURAMET	IT		4		1		1	98			104
EURAMET	JRC						1	22			23
EURAMET	LT			9	12						21
EURAMET	LV		4								4
EURAMET	NO			1	4						5
EURAMET	PL			1			1				2
EURAMET	PT			1				1			2
EURAMET	SE		0								0
EURAMET	SK	0					10				10
SIM	AR						6				6
SIM	BR				3						3
SIM	CA		7		1						8
SIM	MX						17				17
SIM	US		5								5
	TOTAL:	0	22	20	22	0	136	142	1	23	366

Increased in number

Decreased in number

Table 5 shows the situation as of 1 September 2022 regarding the number of greyed-out CMCs in the KCDB that will reach the maximum possible 5 years as greyed-out within the next six months.

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

RMO	Metrology area	number	date limit greyed-out
AFRIMETS	Mass	2	4/2023
APMP	Length	4	9 & 12/2022
EURAMET	Mass	1	11/2022

The dynamically updated full list of greyed-out CMCs is available for registered users from the KCDB 2.0 platform under the statistics menu (https://www.bipm.org/kcdb/cmc/statistics/greyed-out). There, a couple of older CMCs are listed as well for which reinstatement has been agreed well ahead of recent CIPM MRA-G13 changes and where a reinstatement plan was agreed.

2. CIPM MRA Appendix B: Key and supplementary comparisons

2.1. Comparison statistics

On 1 September 2022 the KCDB listed 1792 comparisons distributed as shown in Table 6; 1132 are key comparisons and 660 supplementary comparisons. This represents a total increase of 29 comparisons since 22 February 2022.

Table 6 Key and Supplementary Comparisons on 1 September 2022.

Entity	KC	SC
BIPM	98	1
CC	555	34
AFRIMETS	8	30
APMP	151	123
COOMET	49	121
EURAMET	188	210
GULFMET	7	23
SIM	76	118
TOTAL	1132	660

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 6 %. The ratio of supplementary comparisons, 20 % in 2006, keeps progressing and constitutes 37 % of all comparisons, see Figure 3. The graphs include repeats of key comparisons.

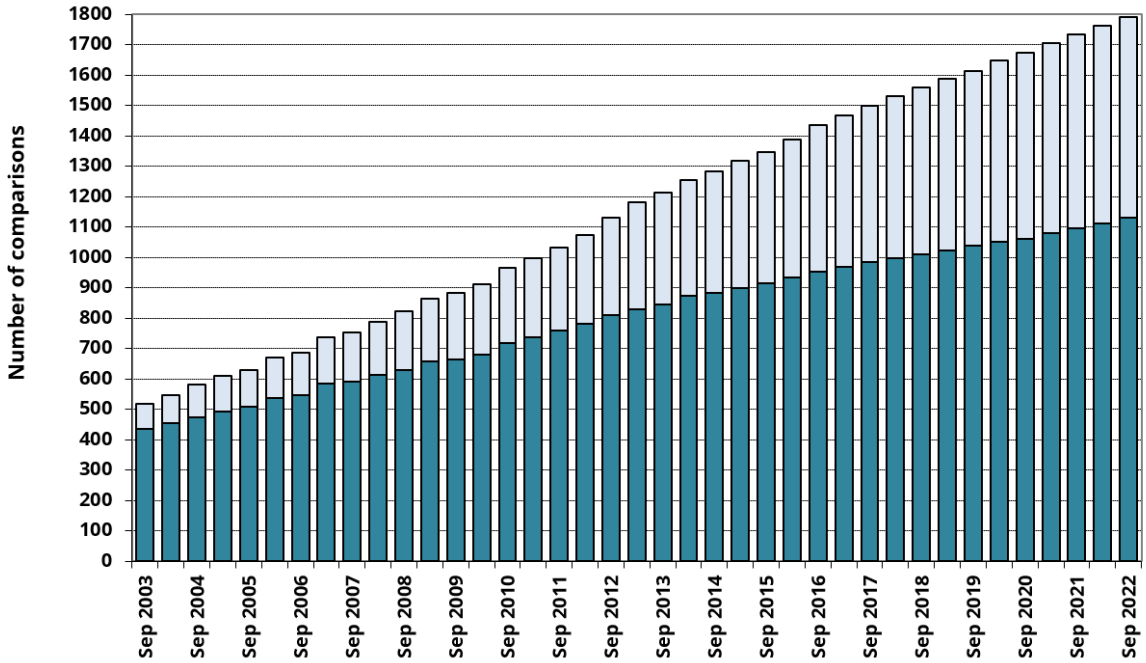

Figure 2 *Total number of key comparisons (dark blue) and supplementary comparisons (light blue).*

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 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.

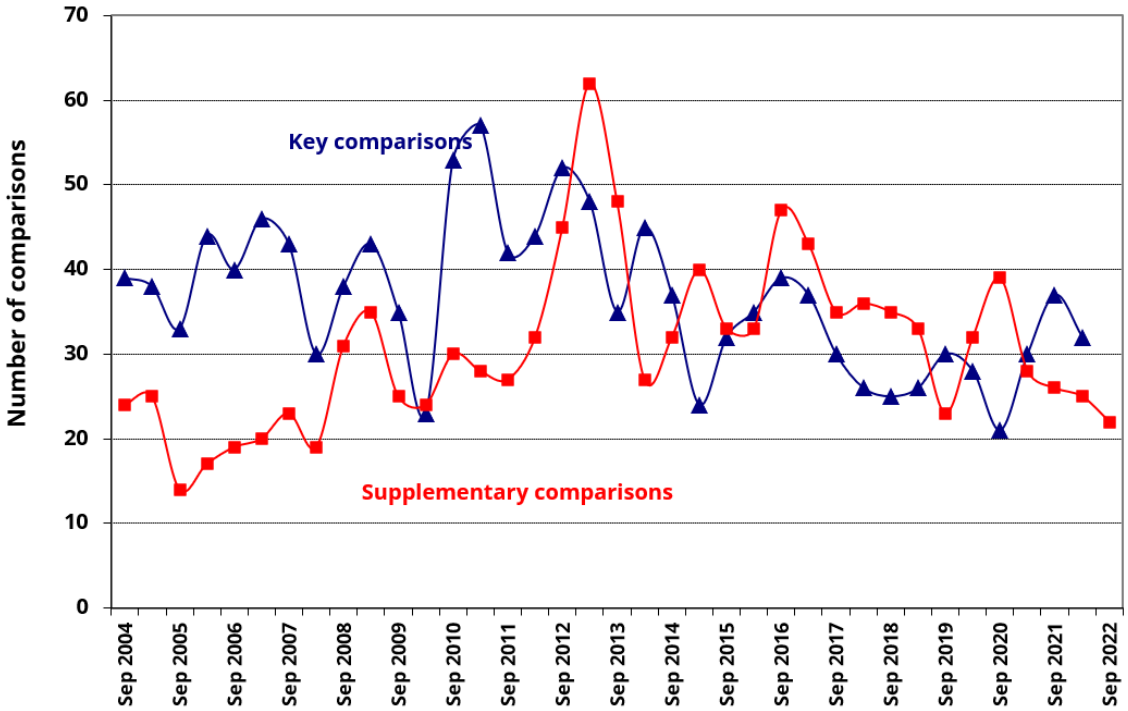

Figure 3 *Number of new comparisons registered in the KCDB over the one-year period.*

The following 29 comparisons were registered as new during the last 6 months:

AFRIMETS.EM-S3
AFRIMETS.M.T-S1
APMP.AUV.V-S1
APMP.L-S11
APMP.M.FF.K1.1.2022
CCEM.RF-K5.d.CL
CCEM-K13
CCEM-K6.a.2018
CCEM-K6.c.2018
CCEM-K9.2018
CCM.D-K1.2023
CCM.G-K2.2023
CCM.P-K13.1
CCQM-78.b
CCQM-K148.b
CCQM-K156.1
CCQM-K179
CCQM-K180
CCRI(III)-K12
CCT-K11
EURAMET.L-K5.n01
EURAMET.M.M-K7
EURAMET.M.M-S11
EURAMET.RI(II)-K1.Cr-51
GULFMET.RI(I)-K5
GULFMET.RI(I)-S1
SIM.M.D-S7
SIM.M.M-K4.1
SIM.M.M-S20

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

AFRIMETS.M.D-S4	BIPM.RI(I)-K2 (KRISS)	CCQM-K165
AFRIMETS.M.M-K7	BIPM.RI(I)-K3 (KRISS)	CCRI(I)-S3
APMP.EM-S15	BIPM.RI(I)-K4 (NIM)	COOMET.EM.RF-S1
APMP.M.H-S5	BIPM.RI(I)-K6 (PTB)	COOMET.PR-S1
APMP.M.H-S6	BIPM.RI(II)-K1.Co-57	EURAMET.AUV.V-S1
APMP.M.P-K7.3	BIPM.RI(II)-K1.Sn-113	EURAMET.AUV.V-S2
APMP.QM-S16	CCL-K11	EURAMET.L-K1.2019
APMP.QM-S17	CCL-K11.2011	EURAMET.L-S30
BIPM.EM-K11 (SMD)	CCM.FF-K1.2015	EURAMET.M.FF-S13
BIPM.EM-K13 (INMETRO)	CCM.FF-K6.2017	SIM.M.P-K6
BIPM.QM-K1 (CHMI)	CCPR-K3.2014	SIM.M.T-S1
BIPM.QM-K1 (INRIM)	CCQM-K115.2018	SIM.EM.RF-S17
BIPM.RI(I)-K2 (GUM)	CCQM-K115.c	

On 1 September, the number of abandoned or superseded key and supplementary comparisons, stored in the KCDB archives, remains the same – 87.

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 “sleeping” Key Comparisons, connected to the Consultative Committees, have reduced in number since the follow-up action was triggered by the JCRB six 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.

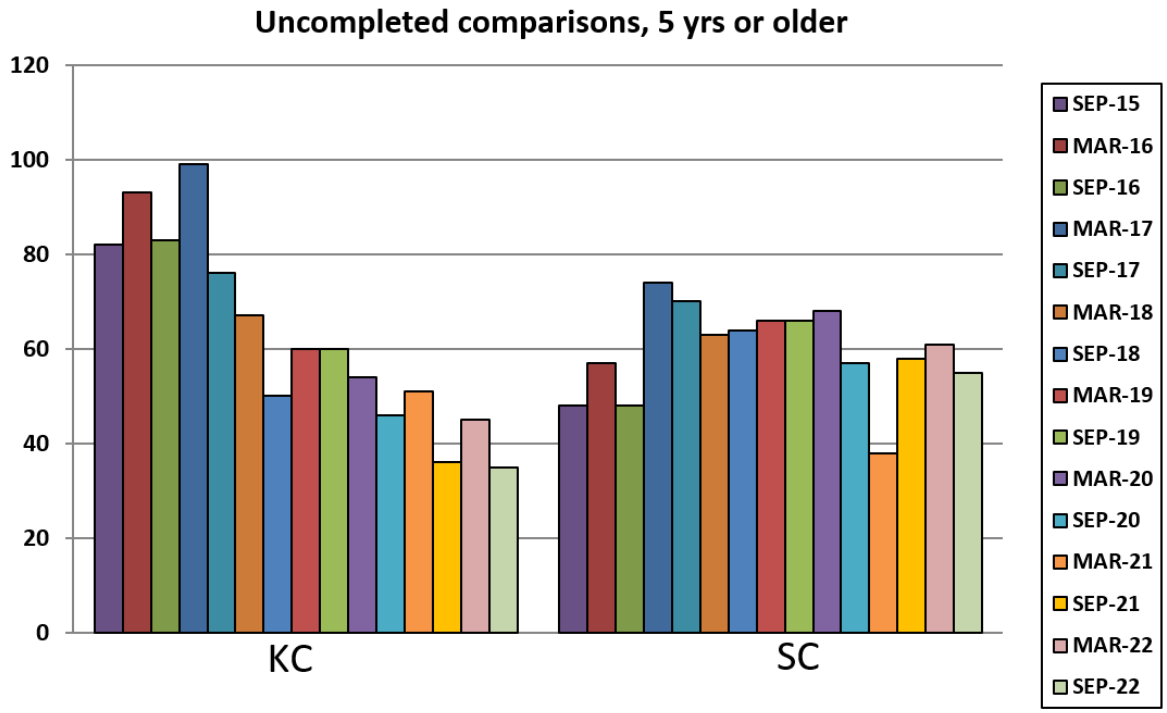

Figure 4 *Histogram showing the number of incomplete comparisons that started more than 5 years ago.*

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

The first CMCs of Sri Lanka were published in the KCDB on 6 July 2022. These covered competences in Pressure.

Table 6 summarizes the participation of the 37 Associates of the CGPM in CIPM MRA activities as of 22 February 2022.[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	4
Azerbaijan	32		1	8
Bangladesh			2	3
Bolivia	21		11	29
Bosnia and Herzegovina	82		15	18
Botswana	3		1	5
Cambodia				
CARICOM (Caribbean Community)	1		1	11
Chinese Taipei	396		108	50
Costa Rica	70		20	34
Ethiopia				4
Georgia	65		6	19
Ghana			2	7
Hong Kong, China	298		103	31
Jamaica	22		6	11
Kuwait			2	3
Latvia	15	4	15	9
Luxembourg	10		5	3
Malta			3	3
Mauritius			2	3
Moldova, Republic of	76		6	19
Mongolia	16		4	4
Namibia	7			3
North Macedonia	21		10	11
Oman				2
Panama	37		8	22
Paraguay	8		2	19
Peru	108		31	39
Philippines	33		15	10
Qatar			3	2
Sri Lanka	2		9	2
Syrian Arab Republic			12	3
Tanzania				1
Uzbekistan			2	5
Viet Nam	31		39	10
Zambia	11		2	7
Zimbabwe	19		1	3
TOTAL	**1394**	**4**	**454**	**417**

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

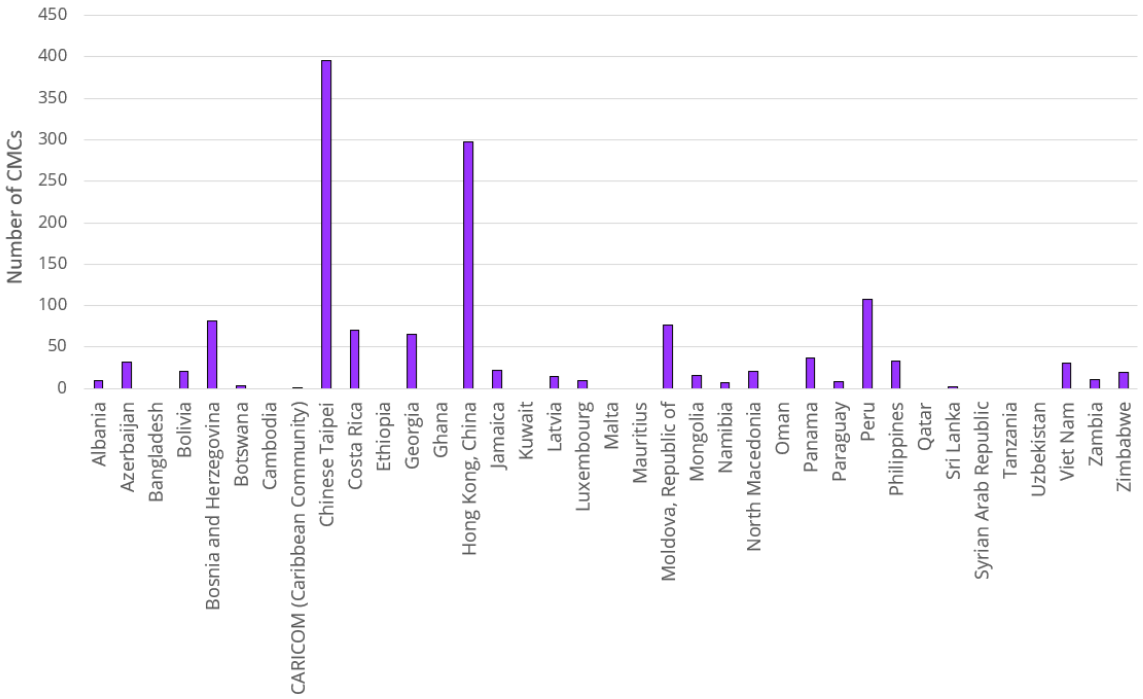

Figure 5 *Graph on the number of CMCs declared by Associates of the CGPM.*

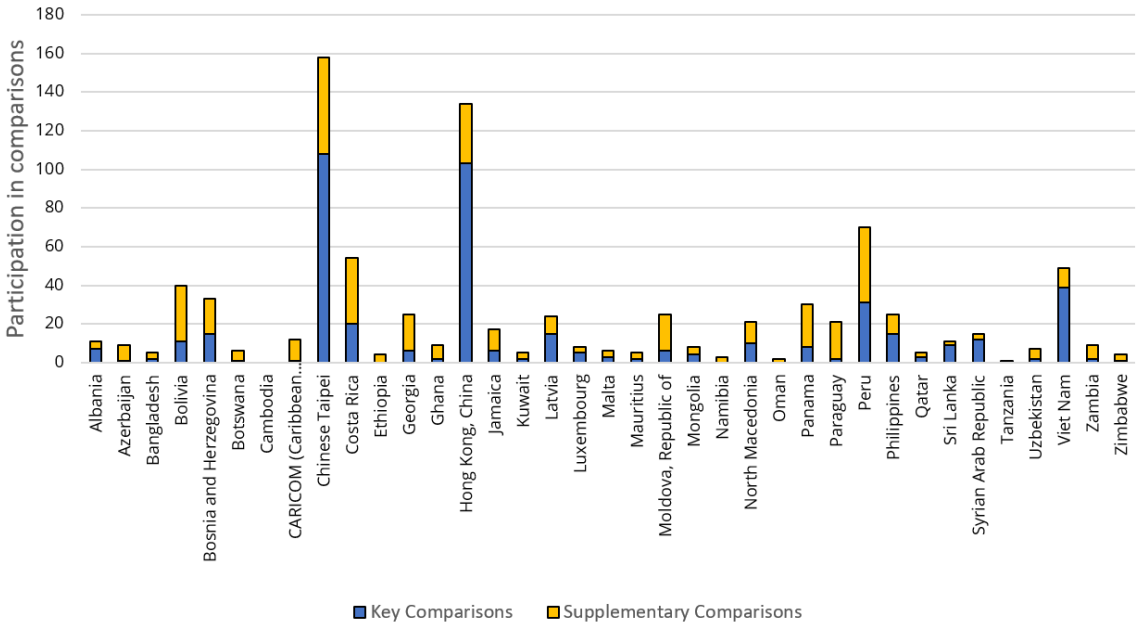

Figure 6 *Graph on the participation of Associates of the CGPM in key and supplementary comparisons.*

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 2022 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 platform to the corresponding numbers regarding CMCs from 2004 to 2019 that were processed in the previous version of the KCDB. This evaluation is ongoing and an update is provided in the present 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.

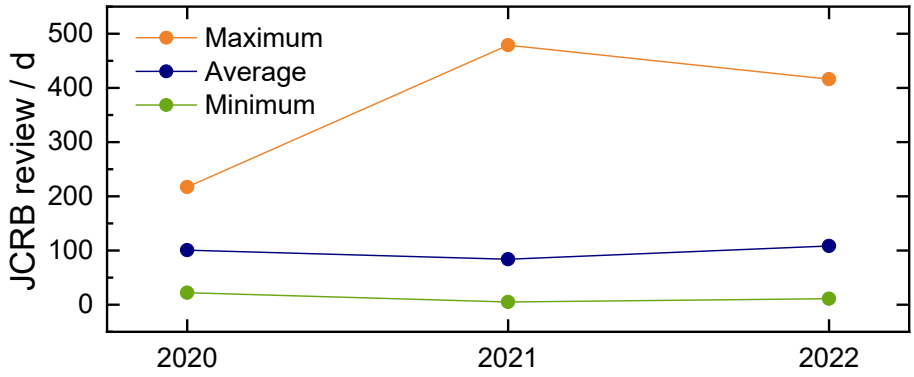

Figure 7 : *A graph giving a snapshot on 1 September 2022 of the duration of the CMC approval for JCRB review as directly retrieved from the statistics on the CMCs menu of the KCDB. The KCDB 2.0 was launched in 2020.*

A more detailed picture is given in Fig. 8 for the last six months (March to September 2022). Here, the CMC approval time from first submission to the KCDB, to intraregional RMO and subsequent JCRB review is depicted for CMCs submitted by the respective RMOs. The table includes metrology areas for which there are outliers with high review times.

As the picture indicated by Fig. 8 shows only the last six months it is interesting to 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. Additionally, a column is provided which shows the median value across all RMOs to the right-hand side of the graph.

Based on this, the overall picture is summarized in Table 8 where JCRB review durations computed in the 'old' system of the previous KCDB are compared to the more recent data of CMCs processed on the KCDB 2.0 platform. Here the picture is that review times have decreased from 140 days (median) in the old system to less than 60 days on the KCDB 2.0.

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.

	2004 – 2019	44th JCRB'	45th JCRB''	Sep. 2022	KCDB 2.0*
minimum	*not computed*	5	24	6	0
median	140	63	75	61	59
mean	188	84	85	95	81
maximum	>365	479	327	412	475

'Computed for CMCs published from 3/2021 to 9/2021
'' Computed for CMCs published from 9/2021 to 3/2022
*Computed from the KCDB 2.0 menu 'Statistics on review performance' for the whole period since 2020-01-01

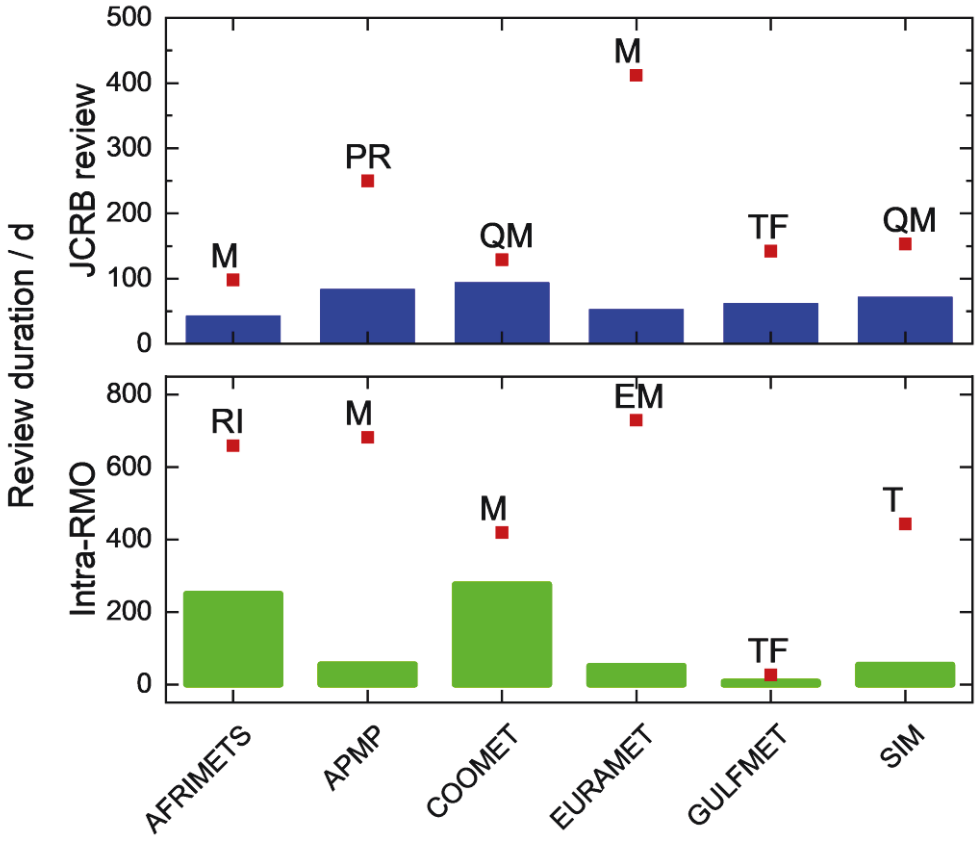

Figure 8 : *Review durations for CMCs published in the KCDB 2.0 from March 2022 to September 2022. The bars reflect median intraregional review in the bottom panel and median JCRB review durations in the upper panel for CMCs submitted by the RMOs indicated in the x axis. Red squares in both panels indicate the longest duration and the metrology area where this occurred.*

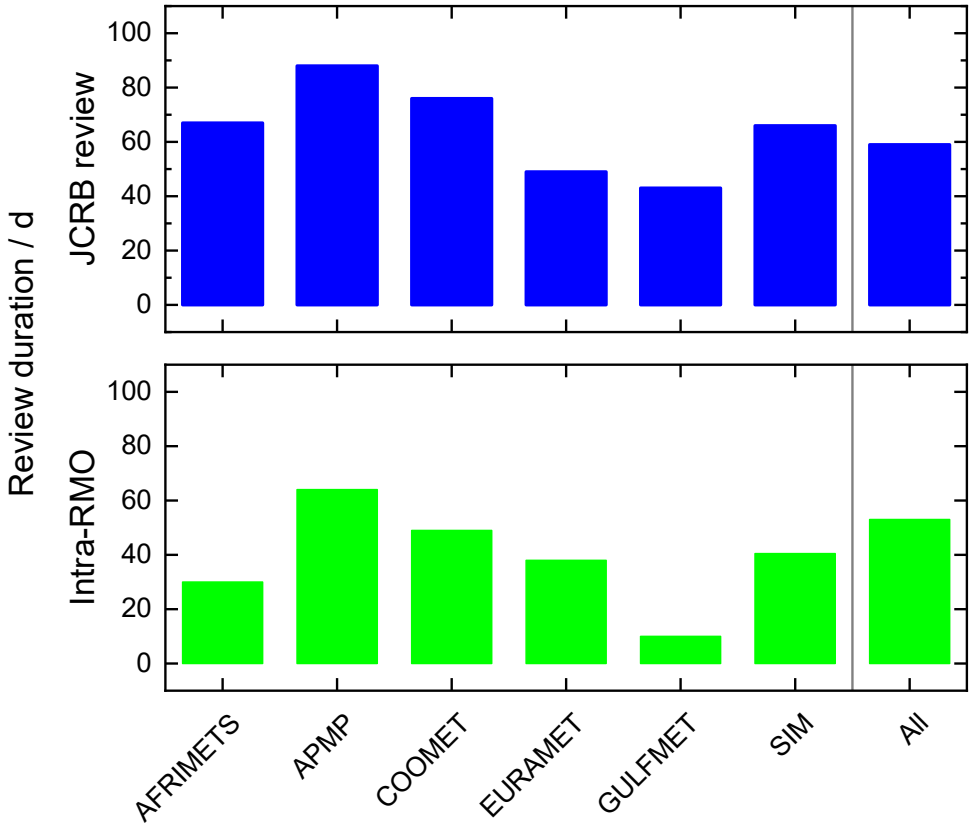

Figure 9 : *Median review durations computed on CMCs fully processed in the KCDB 2.0 platform since 2020. Bottom, the intra-RMO review for all RMOs that submitted CMCs. Top, JCRB review on the same CMCs. Median data on both review stages averaged across all RMO submissions in the right-hand column.*

Review durations are different for different metrology areas as can be seen from Fig. 10. Extremes are seen in the durations for the EM (JCRB review) and RI (intra-RMO review) areas. Such outliers are typically related to some changes in responsibilities within TCs/WGs where, in some cases, a smooth transition has been disturbed.

Faster publication of chemistry and biology CMCs (QM area) with the KCDB 2.0 platform is possible now, as has already been reported in the previous KCDB Report. Due to the special approval process of the CCQM KCWG in the JCRB review, the average duration depends on when the 6month 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. September 2021 showed lower JCRB review durations followed by a comparably large median JCRB duration in March 2022. The median JCRB review duration in QM has decreased to 61 days within this reporting period and to a median duration of 84 days computed for CMCs since April 2021.

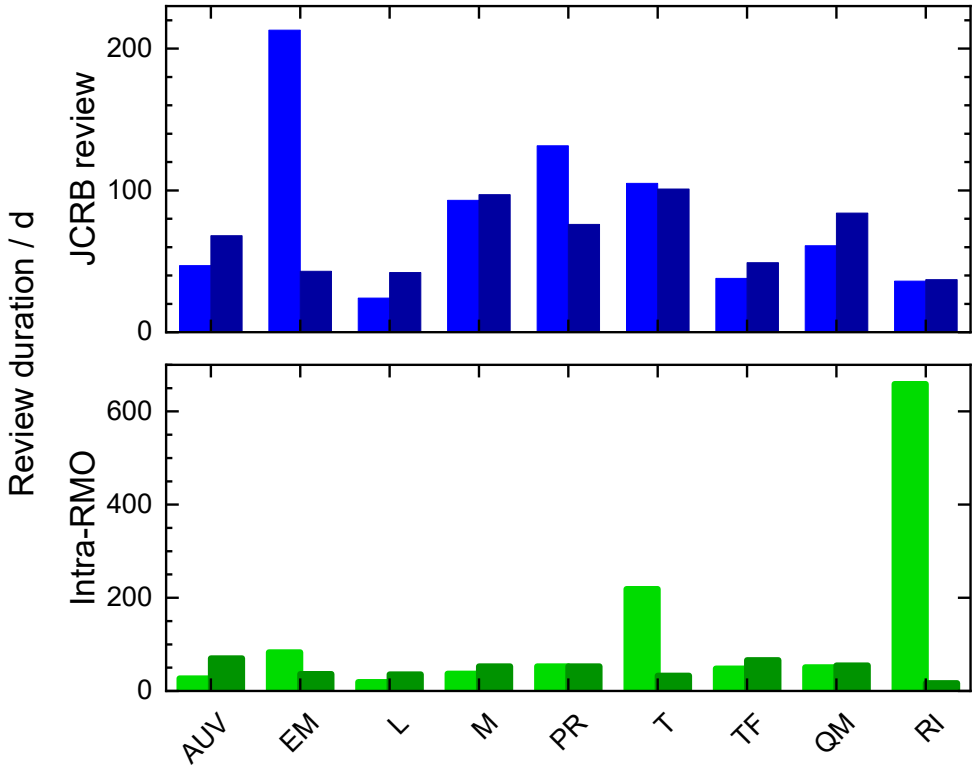

Figure 10 : *Median review durations of CMCs published during the last six months (light geen and blue bars) and since 2020 (dark blue and green bars) related to metrology areas.*

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

Year	Median / d	Mean / d	Maximum / d	Minimum / d
March 2022 - September 2022	61	79	166	53
April 2021 – September 2022	84	99	287	17

Preparatory work, which commenced in the previous reporting periods, supported CIPM MRA activities, the interaction of key actors, and the adoption of the KCDB 2.0 platform by the metrology areas . This preparatory work included the organization of BIPM Capacity Building and Knowledge Transfer Programme (CBKT) training sessions for potential CMC writers, reviewers and regional metrology organization (RMO) technical TC/WG Chairs, as well as mock review exercises. In parallel, guidance documents were prepared for JCRB review using the KCDB 2.0 platform and the CMC review guidelines developed by many of the CC KCWG/WGRMO were reviewed, often supported by the KCDB Office. A suite of CIPM MRA Brochures on all aspects of the CIPM MRA has been released in 2022 (https://www.bipm.org/en/committees/cb/cbkt/cipm-mra-brochures).

5. Present Status of the BIPM KCDB 2.0

The KCDB 2.0 is supported by a variety of guidance materials, 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 small adjustments to the software. Anomalies and suggestions for improvements may be communicated by the users by completing the form https://www.bipm.org/utils/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. The most recent internal audit was held in June 2021.

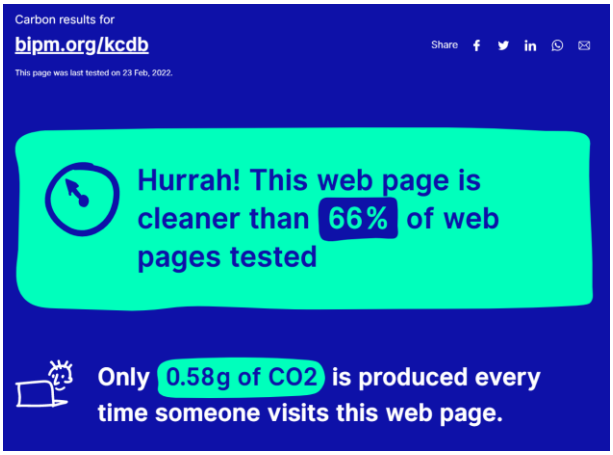

Figure 8 *Estimated CO_2 emissions when using https://www.bipm.org/kcdb/ (ref: https://www.websitecarbon.com/).*

6. BIPM KCDB and digitalization

The metrology community is progressively noting the importance of FAIR[4] machine-readable data for calibration issues but also for future emerging applications. Industrial sectors have made requests indicating their desire for Digital Calibration Certificates, which will contribute to versatile technical advantages, cost effectiveness and improvements from a quality perspective.

The BIPM implemented an Application 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 .

Within the frame of an Expert Group, under the auspices of the CIPM Task Group on the Digital SI, the KCDB has been the object of a case study in relation to a supporting interoperable units and quantity systems, and work on this is in progress.

[4] Findable Accessible Interoperable Reusable

APPENDIX I List of uncompleted comparisons older than 5 years

a) Key Comparisons

KC identifier	Indicated year	Pilot	Status Sep-2022
APMP.EM.BIPM-K11.2	2004	Puslit KIM-LIPI	Planned
APMP.EM.RF-K8.CL	2012 – 2013	NMIJ AIST	Report in progress, draft B
APMP.M.D-K4	2007 – 2008	KRISS	Report in progress, draft B
APMP.M.F-K3.a	2013 – 2017	NIM	Report in progress, draft A
APMP.M.P-K15	2013 – 2014	NMIJ AIST	Measurements completed
APMP.M.P-K4	2015 – 2016	KRISS	Measurements completed
APMP.M.P-K7.2	2015 – 2016	NIMT	Planned
APMP.M.T-K1	2015 – 2016	KRISS	Measurements in progress
APMP.PR-K2.b	2014	KRISS	Measurements in progress
APMP.PR-K3.a	2012 – 2014	NMIJ AIST	Measurements completed
APMP.PR-K3.a.1	2006	NIM	Report in progress, draft A
APMP.RI(I)-K3.2013	2015 – 2016	NRSL/INER	Report in progress, draft B
APMP.T-K3.6	2013 – 2014	NIM	Planned
APMP.T-K4.1	2013 – 2014	NIM	Report in progress, draft B
CCEM.RF-K26	2014 – 2016	NMIJ AIST	Report in progress, draft B
CCEM.RF-K5.c.CL	2012 – 2015	NMIJ AIST	Measurements in progress
CCL-K4.2015	2015 – 2017	NIST	Measurements in progress
CCM.FF-K2.2011	2013 – 2015	VSL	Report in progress, draft B
CCPR-K2.b.2016	2016 – 2017	KRISS	Measurements completed
CCRI(II)-K2.Tc-99	2012 – 2013	NPL	Planned
CCT-K1.1	2006 – 2014	NIST	Report in progress, draft B
CCT-K10	2014 – 2016	NPL	Measurements completed
CCT-K4.1	2012 – 2014	NMIA	Measurements in progress
CCT-K6.1	2008 – 2010	MSL	Report in progress, draft A
CCT-K8	2016 – 2017	INTA	Measurements completed
CCT-K9	2011 – 2012	NIST	Measurements in progress
COOMET.AUV.V-K1	2007 – 2008	VNIIM	Measurements completed
COOMET.L-K3	2011 – 2012	VNIIM	Measurements completed
EURAMET.T-K7.4	2015 – 2017	UME	Report in progress, draft A
EURAMET.T-K8	2008 – 2012	PTB	Report in progress, draft A
SIM.L-K7.2016	2016 – 2017	INRIM	Planned
SIM.M.M-K6	2015 – 2017	CENAM	Report in progress, draft A
SIM.M.P-K6.1	2011 – 2013	LACOMET	Report in progress, draft A
SIM.M.P-K7	2001	CENAM	Report in progress, draft B
SIM.QM-K1	2009	INMETRO	Report in progress, draft B

b) Supplementary Comparisons

SC identifier	Indicated year	Pilot	Status Sep-2022
APMP.EM.RF-S5.CL	2013 – 2015	NMIJ AIST	Protocol complete
APMP.EM-S8	2011 – 2013	NPLI	Protocol complete
APMP.M.FF-S2.2016	2016 – 2017	RCM-LIPI	Report in progress, draft B
APMP.M.G-S1	2012	NIM	Report in progress, draft A
APMP.M.H-S4	2011	KRISS	Report in progress, draft A
APMP.M.MM-S1	2012 – 2013	KRISS	Measurements in progress
APMP.M.P-S1	2003 – 2005	CMS/ITRI	Measurements completed
APMP.M.P-S7	2015	NIMT	Report in progress, draft B
APMP.PR-S5	2008 – 2009	NMIJ AIST	Measurements in progress
APMP.PR-S7	2015 – 2016	NIM	Protocol complete
APMP.PR-S8	2015 – 2017	KRISS	Measurements in progress
APMP.RI(II)-S3.Cs-134.Cs-137	2013	NMIJ AIST	Report in progress, draft B
APMP.T-S10	2013	KRISS	Planned
APMP.T-S11	2013 – 2016	NMIJ AIST	Report in progress, draft A
APMP.T-S13	2014 – 2016	NMC, A*STAR	Measurements in progress
APMP.T-S8	2011 – 2015	NMLPHIL	Measurements in progress
APMP.T-S9	2013	NMIJ AIST	Measurements in progress
CCRI(II)-S9	2011	KRISS	Report in progress, draft A
COOMET.EM-S10	2010 – 2012	VNIIMS	Report in progress, draft B
COOMET.EM-S18	2013 – 2016	VNIIMS	Report in progress, draft A
COOMET.EM-S19	2015 – 2017	GEOSTM	Measurements completed
COOMET.EM-S21	2016 – 2017	VNIIMS	Report in progress, draft B
COOMET.EM-S6	2007 – 2010	VNIIMS	Report in progress, draft B
COOMET.EM-S7	2009 – 2011	VNIIMS	Report in progress, draft B
COOMET.L-S20	2016	NMI (MD)	Report in progress, draft A
COOMET.M.FF-S4	2009 – 2010	NSC IM	Report in progress, draft B
COOMET.M.F-S1	2008 – 2010	VNIIM	Report in progress, draft B
COOMET.M.H-S2	2014 – 2016	VNIIFTRI	Report in progress, draft A
COOMET.M.H-S3	2014 – 2016	NSC IM	Measurements completed
COOMET.M.M-S2	2015 – 2017	NSC IM	Report in progress, draft A
COOMET.M.M-S3	2016 – 2017	NMI (MD)	Measurements in progress
COOMET.M.P-S1	2014 – 2015	NSC IM	Report in progress, draft A
COOMET.PR-S1	2012 – 2013	VNIIOFI	Measurements completed
COOMET.PR-S10	2016 – 2017	BelGIM	Protocol complete
COOMET.PR-S5	2008 – 2011	INIMET	Measurements completed
COOMET.RI(I)-S3	2016 – 2017	BelGIM	Report in progress, draft B

(continued…)

SC identifier	Indicated year	Pilot	Status Sep-2022
EURAMET.M.F-S2	2012 – 2013	BEV	Measurements in progress
EURAMET.M.P-S16	2016	GUM	Protocol complete
EURAMET.M.T-S4	2015	LNE	Measurements completed
EURAMET.PR-S4	2012 – 2013	LNE	Measurements completed
EURAMET.RI(I)-S17	2016	IST-LPSR	Protocol complete
EURAMET.T-S6	2015 – 2016	NPL	Measurements in progress
SIM.M.FF-S4	2006	CENAM	Report in progress, draft B
SIM.M.FF-S8	2014	CENAMEP AIP	Report in progress, draft B
SIM.M.FF-S9	2016	CENAM	Report in progress, draft A
SIM.M.F-S2	2012	IDIC	Report in progress, draft A
SIM.M.P-S2	2009 – 2011	INMETRO	Measurements in progress
SIM.M.T-S1	2016	CENAM	Report in progress, draft B
SIM.QM-S3	2012	NIST	Report in progress, draft A
SIM.QM-S4	2012	NIST	Report in progress, draft A
SIM.QM-S5	2015	CENAM	Report in progress, draft A
SIM.QM-S6	2016	INMETRO	Protocol complete
SIM.T-S4	2008	LATU	Report in progress, draft B
SIM.T-S6	2012 – 2014	NIST	Report in progress, draft A
SIM.T-S8	2014	CESMEC	Report in progress, draft A

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