

KCDB REPORT TO THE 39th JCRB MEETING

1 September 2017 to 1 March 2018

Introduction

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

The EXCEL files used as a basis for the CMC statistics are available on the [access-restricted JCRB CMC website](#) (on “KCDB statistics”). They are updated successively during the year and the CMCs that have been modified are highlighted in pink according to previous JCRB decisions.

Further information on the KCDB may be found on the BIPM KCDB web pages. Notably, the number of key and supplementary comparisons, as well as the number of CMCs by metrology area and by country, are updated successively during the year and may be consulted on the [KCDB Statistics web page](#)¹.

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. Section 3 highlights the status of **Associates** of the BIPM, and a short summary on progress made on the **revision of the KCDB**, in the context of the Review in the CIPM MRA, is presented in Section 4.

During the second half of 2017, data access to the KCDB is now made via <https://> and the number of accessible servers were increased by one unit.

1. CIPM MRA Appendix C : Calibration and Measurement Capabilities

1.1. Status of the KCDB CMC database

End of February 2018, the KCDB included a total of 24 972 CMCs:

- 18 794 in Physics,
- 6 178 in Chemistry.

Although countries published CMCs over the last six months the total number of CMCs is stationary over the same period and increased by only 0.3 % over the last 12 months. While the number of CMCs in physics increased, the number of CMCs in Chemistry decreased, much due to

¹ On request, the KCDB Office may provide an EXCEL file listing information on the present contents of the CIPM MRA Appendix B.

almost 300 CMCs for Sediments, soils, ores and particulates in Chemistry that either were greyed out or deleted.

The evolution of the number of CMCs since 2008 is depicted in Figure 1. The number of CMCs presently published in the KCDB by state/economy and metrology area is continuously available on [KCDB Statistics](#).

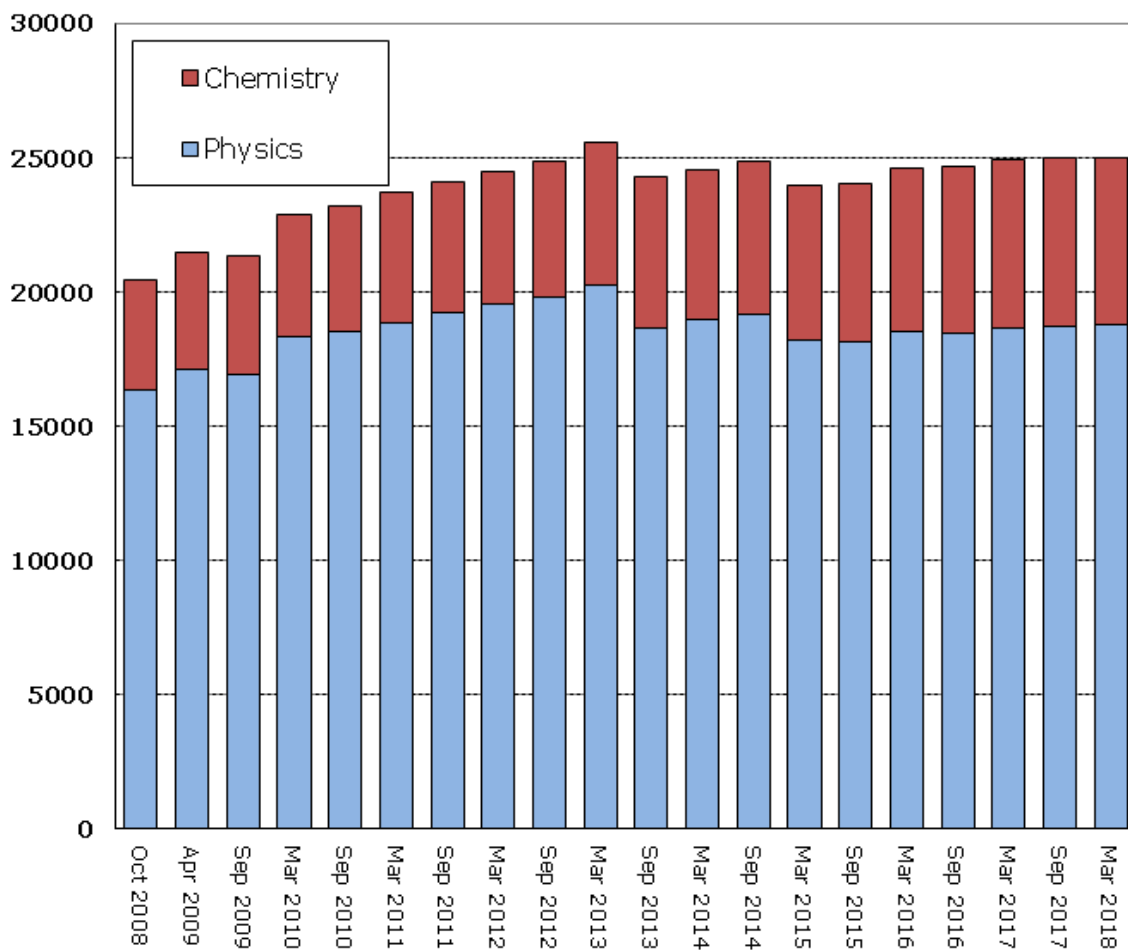


Figure 1. Number of CMCs registered in the KCDB since October 2008.

CMC publications (excluding revisions)

CMCs treated by the BIPM KCDB Office from 1 September 2017 to 1 March 2018 are listed in Table 1².

Table 1. Published CMCs from 1 September 2017 to 1 March 2018 (revised CMCs not included)

	RMO / economy	Field	CMCs
September 2017	CN, JP, TH *	L	-6
	EURAMET: AT, CH, DE, ES, FR, GB, HU, NL, PL, PT, TR	QM / GAS	-38
	SIM: BR, MX, PE, US	QM	-38
	EURAMET: DE, EU, FR GB, GR, NL, RO, SI, TR	QM	-16
	SIM: AR, CA, CO, MX, PE, US, UY	QM	-137
	SIM: BO, CO	M	18
	HR	IR	2
	RU	QM	-1
	EURAMET: BG, CZ, DK, FI	T	16
	UA	AUV / A	1
	UA	PR	6
	MX*	EM	-8
	MX*	T	-15
	October 2017	GR	QM
APMP: AU, CN, HK, JP, KR, SG, TH, TW		QM	117
EG		EM	4
EURAMET: AT, BE, CH, DE, IT, ME, NO, EE		L	19
		M	8
November 2017	MD	L	1
	RU	M	1
	EURAMET: CZ, PL, RO	M	3
	UA	M	2
	IT	M	-7
	CN	TF	6
December 2017	EURAMET: CH, DE, DK, FI, GB, ME, MK, NL, RS	M	6
	APMP:JP, KR	QM	-3
	RS	M	1
	GB	QM	-4

² Published CMCs are announced in "[CMCs News](#)".

Table 1. (Continued)

	RMO / economy	Field	CMCs
January 2018	IN*	L	-3
	BY	AUV	6
February 2018	CA	PR	5
	EU	QM	-14
	COOMET: BY, KZ	EM	3
	DK	AUV	10
	TW	M	3
	CO	L	1
	BR*	QM	-10
	EURAMET: IT, TR	T	6

* : result of greying out

Several countries declared CMC for new Metrology Areas: Colombia, Moldavia and Montenegro in Length metrology; Croatia in Ionizing Radiation; Bolivia, Colombia and Estonia in Mass metrology. Romania, Russia and Ukraine declared new CMCs in additional fields of Mass and related qualities and several members of SIM declared CMCs for additional areas of Chemistry.

1.2. Deleted CMCs, Greying out and Re-instatements

Greying-outs, deletion and reinstatements of CMCs are coordinated by the JCRB Executive Secretary, and carried out by the KCDB Office. Table 2 lists the CMCs concerned during the last six months.

The present situation regarding temporary removal (“greying-out”) of CMCs is available on-line of the [Statistics page of the KCDB](#) at the JCRB restricted web, summarized in Table 3. In total 265 CMCs are presently greyed out.

The dates of the greying-out of CMCs are listed in the spreadsheet “Dates of CMCs greying-out” of the EXCEL file “CMCsNumber_2017, available from the [access-restricted JCRB CMC website](#) (see “KCDB statistics”).

Table 2. Deleted, greyed-out or reinstated CMCs from 1 September 2017 to 1 March 2018

Date	State/ economy	Field	Action
1 September 2017	CN	L	2 CMCs greyed out in Length - Dimensional Metrology
1 September 2017	JP	L	3 CMCs greyed out in Length - Dimensional Metrology
1 September 2017	TH	L	1 CMCs greyed out in Length - Dimensional Metrology
29 September 2017	MX	EM	8 CMCs greyed out in Electricity and Magnetism
29 September 2017	MX	TF	15 CMCs greyed out in thermometry
14 November 2017	IT	M	1 CMC greyed out in Mass - Pressure
19 December 2017	KR	QM	4 CMCs greyed out in Chemistry - Sediments
5 January 2018	IN	L	3 CMCs greyed out in Length - Dimensional Metrology
31 January 2018	AR	L	1 CMCs already greyed out in Length - Dimensional Metrology was deleted
18 February 2018	KZ	QM	Greyed out CRM was reinstated
18 February 2018	BR	QM	10 CMCs greyed out in Chemistry - Sediments

Table 3. Number of CMCs temporary removed (“greyed-out”) from the KCDB, by country and by metrology area, as at 1 March 2018.

Distribution of CMCs that are temporarily removed (“greyed-out”) from the KCDB

	AUY	M	PR	EM	T	RI	L	QM	TF	Total
AFRIMETS										
ZA		2								2
Total AFRIMETS:										2
APMP										
AU				27						27
CN							2			2
IN							3			3
JP							3			3
KR								4		4
TH						3	1			4
Total APMP:										43
COOMET										
KZ								0		0
Total COOMET:										0
EURAMET										
BE				25					6	31
DE								12		12
FR				3						3
IAEA						1				1
IT		31		15			1	3		50
JCR								2		2
LV				30						30
PT							1			1
SK	6						2			8
Total EURAMET:										138
SIM										
MX			22	8	15			2	9	56
AR							0			0
US		3	0	8		1				12
BR								14		14
Total SIM:										82
TOTAL:										265

1.3. CMC statistics of RMOs

(Follow-up of Action 17/1 from the 17th JCRB meeting)

Table 4 summarizes the repartition of CMCs on the different RMOs and international signatories of the CIPM MRA.

Table 4. Information on CMC statistics per RMO

Entity	Total number of CMCs 1 March 2018
AFRIMETS	558
APMP	5929
COOMET	2496
EURAMET	11197
GULFMET ³	0
SIM	4573
ESA	0
IAEA	26
JRC ⁴	190
WMO	3

1.4. CMC Vocabulary

Several Consultative Committees have initiated work on a revised vocabulary on service categories:

- Electro Magnetism services in High Voltage are being revised to be in line with standard bodies;
- Acoustics, Ultrasound and Vibration are revising their vocabulary for Vibration;
- Length is revising parts of their services;
- Thermometry are since a while reorganizing their classification.

Recently limited modifications in vocabulary were carried out in Photometry and Radiometry.

³ The GULFMET was approved as an RMO on a provisional basis by the CIPM in October 2015.

⁴ Earlier IRMM (EC Geel)

The present database does not allow a modification of vocabulary as a global action – the CMCs for each country must be updated one by one and treated as a revised CMC entry which request additional resources from the NMIs and the KCDB Office.

CIPM MRA Appendix B : Key and supplementary comparisons

1.5. Present status

On the 1 March 2018 the KCDB covered **1529 published comparisons** distributed as listed in Table 5; 996 key comparisons and 533 supplementary comparisons. In fact, 70 of the 94 BIPM key comparisons are all part of the BIPM.RI(II)-K1 (SIR equivalent activity). On the other side, 22 continuous BIPM⁵ comparisons cover each tens of completed bi-lateral comparisons carried out between the BIPM and different metrology institutes.

Of the 29 comparisons registered in the KCDB since the last JCRB meeting, 3 comparisons were registered for GULFMET. GULFMET has hence now 17 comparisons registered in the KCDB. GULFMET countries participate in 24 comparisons organized by GULFMET, by other RMOs or Consultative Committees.

Table 5. Key and Supplementary Comparisons on 1 March 2018.

Entity	KC	SC
BIPM	94	1
CC	483	30
AFRIMETS	5	19
APMP	136	105
COOMET	47	91
EURAMET	162	180
GULFMET ⁶	4	13
SIM	65	94

⁵ Of which two

⁶ The GULFMET was approved as an RMO on a provisional basis by the CIPM in October 2015.

Figure 2 shows the evolution of the total number of key (green) and of supplementary (violet) comparisons registered in the KCDB since September 2003. The annual increase of key comparisons seems to have stabilized to around some +40 taking into account the history since 2004. The annual increase of key- and supplementary comparisons is around 6 %. The ratio of Supplementary comparisons, 1 out of 5 in 2006, has progressively increased to 1 out of 3. It should be noted that the graph also include repeats of key comparisons.

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.

Updated graphs illustrating the participation in key and supplementary comparisons were made available on the Statistics page of the KCDB in March 2018.

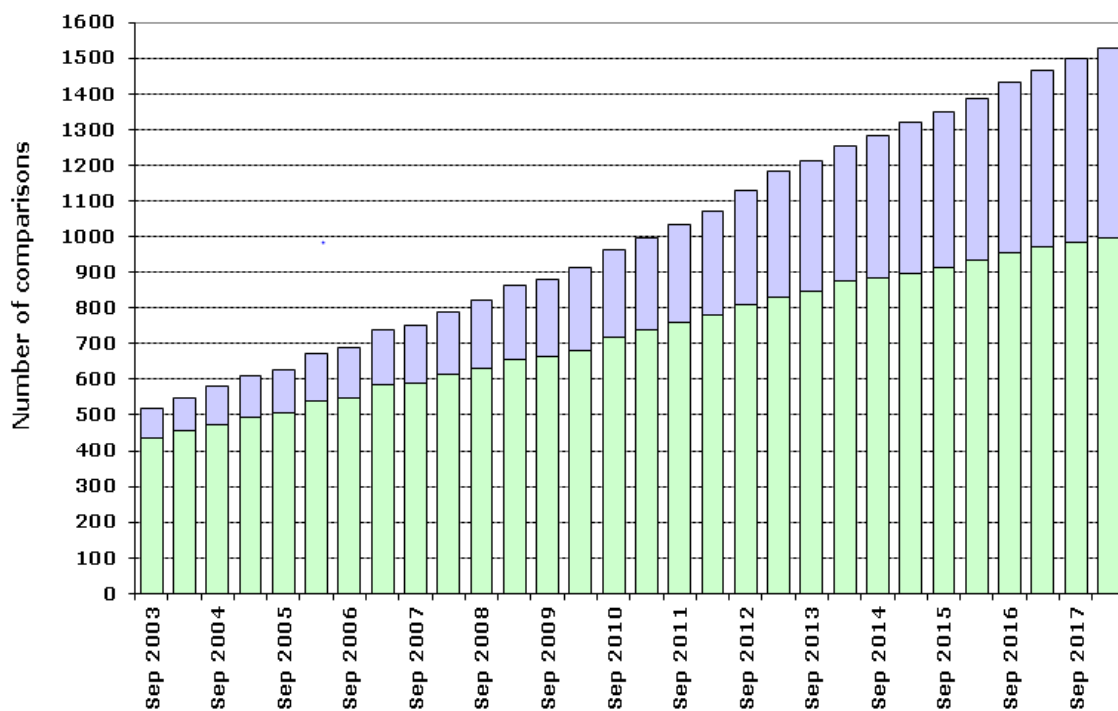


Figure 2. Total number of key comparisons (green) and supplementary comparisons (blue) registered in the KCDB: evolution since September 2003

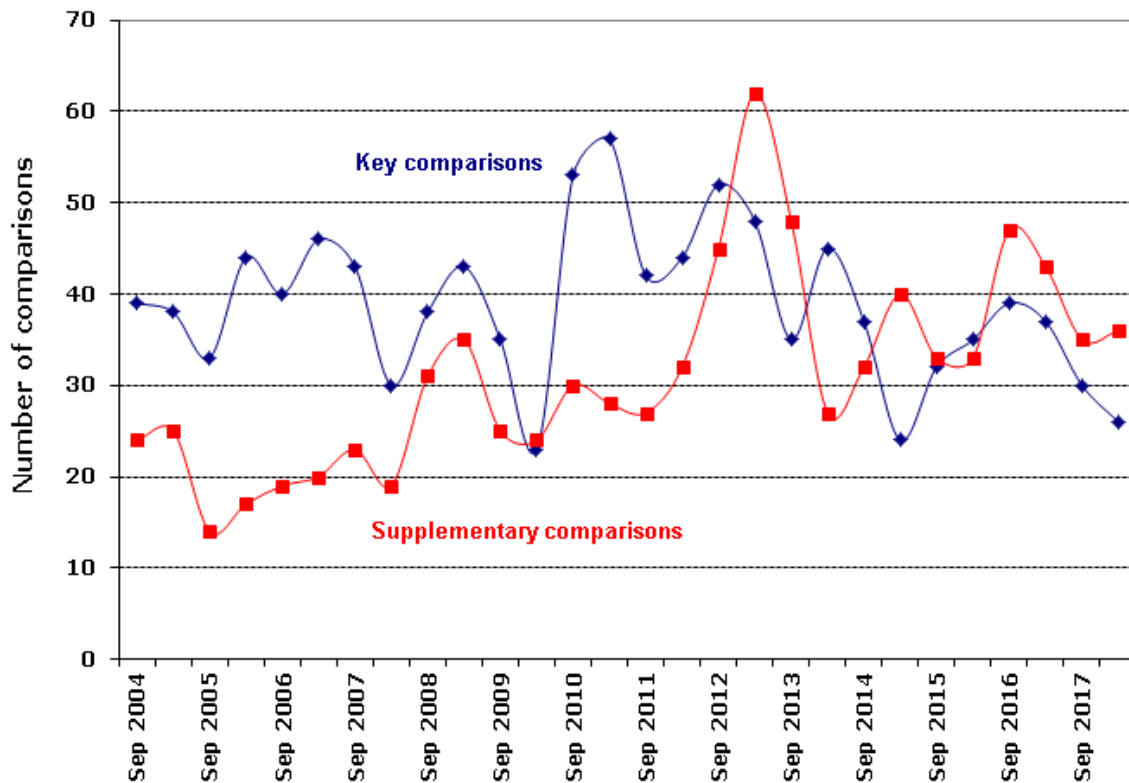


Figure 3. Number of new comparisons registered in the KCDB over the one-year period ending at the date indicated on the abscissa.

1.6. Registrations and modifications of comparisons

From 1 September 2017 the following 29 comparisons were registered as new:

APMP.QM-K90	COOMET.EM-S22	GULFMET.L-S2
APMP.QM-S7.1	COOMET.M.M-S4	GULFMET.M.M-K7
APMP.T-K4.2	COOMET.M.P-S5	SIM.EM-S14
BIPM.RI(II)-K1.Ho-166	EURAMET.L-S27	SIM.M.FF-K6.2017
BIPM.RI(II)-K1.Pa-231	EURAMET.M.FF-S9	SIM.M.FF-S11
CCM.D-K5	EURAMET.M.G-K3	SIM.M.FF-S12
CCM.FF-K6.2017	EURAMET.M.T-S5	SIM.M.F-S6
CCQM-K151	EURAMET.PR-K6.2015	SIM.M.T-S2
CCRI(III)-S1	EURAMET.RI(I)-S17	SIM.QM-S8
CCT-K9.1	GULFMET.EM.RF-S2	

End of February, 55 abandoned or superseded key and supplementary comparisons were kept in the KCDB archives (included in the presented statistics).

1.7. Published results of key and supplementary comparisons

The following 37 reports were published during the last 6 months:

AFRIMETS.M.M-S6	BIPM.RI(I)-K5 (SMU)	EURAMET.L-K8.2009
APMP.L-K5.2006.1	BIPM.RI(I)-K6 (NIM)	EURAMET.M.FF-S8
APMP.PR-K4	BIPM.RI(II)-K1.Am-241	EURAMET.M.FF-S9
APMP.QM-S8	BIPM.RI(II)-K4.Cu-64	EURAMET.M.M-S3
BIPM.EM-K11.a and b (NMISA)	BIPM.RI(II)-K4.F-18	EURAMET.PR-K5
BIPM.EM-K12 (CMU)	CCQM-K90	EURAMET.T-S4
BIPM.EM-K13.a b (SMD)	CCQM-K119	EUROMET.RI(III)-S1
BIPM.QM-K1 (CMS-ITRI)	CCQM-K126	SIM.M.D-S4
BIPM.QM-K1 (NMISA)	CCQM-K139	SIM.M.FF-S12
BIPM.QM-K1 (VSL)	CCQM-K36.2016	SIM.M.M-S13
BIPM.RI(I)-K1 (IST-LPSR)	EURAMET.EM-S31	SIM.QM-S7
BIPM.RI(I)-K1 (SMU)	EURAMET.L-K3.2009	SIM.QM-S8
BIPM.RI(I)-K3 (NIM)		

1.8. Follow-up on JCRB Action 33/3

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.*

The number of comparison older than 5 years seems to slightly decrease. No comparisons have joined this category from 2017 to 2018, and the total number is decreased by 16 as illustrated in Figure 4. A list of the comparisons concerned may be found in Appendix.

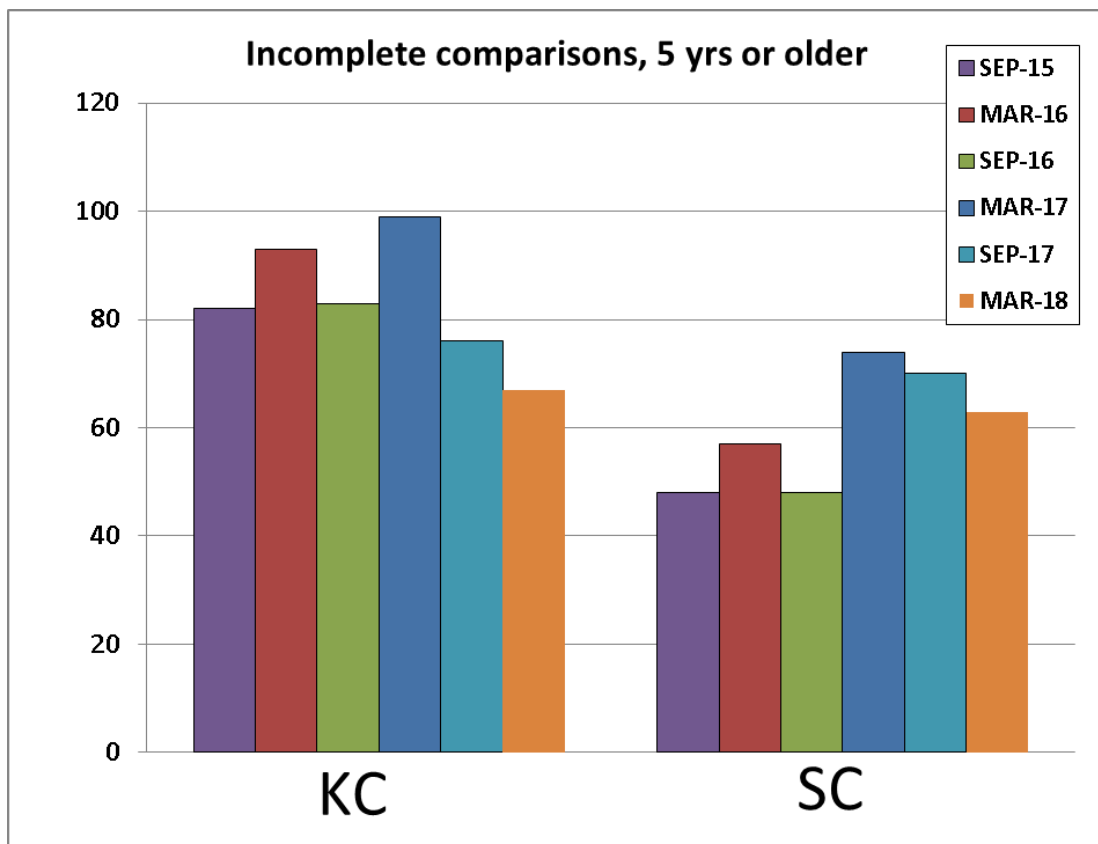


Figure 4. Histogram showing the number of incomplete comparisons that started more than 5 years ago.

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

Table 6 summarizes the participation of the 42 Associates of the CGPM in CIPM MRA activities as at 25 February 2018

The increase of CMCs during the last 12 months is 6 % which indicates a steady increase in short term. CMCs within new areas were published for Bolivia, Estonia, Moldavia, Montenegro, Paraguay and Ukraine but almost half of the Associates have no CMCs published yet in the KCDB. The repartition of CMCs among Associates is illustrated in Figures 5 and 6.

The increase in Associate participation in comparisons increased by 9% since last year, both for key as for supplementary comparisons. The comparison participation by Associates is illustrated in Figure 6.

The relative increase in number of CMCs and comparison participation for Associates is larger that when observing the global community.

Table 6. CIPM MRA activity of the NMIs of Associates of the CGPM: important dates, number of published CMCs and participation in key and supplementary comparisons. ^{7,8}

Associates of the CGPM and the KCDB: CMCs and participation in key and supplementary comparisons



		Associate of the CGPM	Date of becoming an Associate	Date of signature of the CIPM MRA	Published CMCs	Greyed-out CMCs	Date of publication of the first CMC	Area of the first CMC	Key comparisons	Supplementary comparisons
9	4	Albania	10 September 2007	10 October 2007	7	0	05 April 2013	Mass Standards	9	4
1	8	Azerbaijan	01 January 2015	28 January 2015	0	0	-	-	1	8
1	2	Bangladesh	29 March 2010	25 March 2011	0	0	-	-	1	2
38	47	Belarus	05 May 2003	14 October 2003	247	0	07 April 2004	Acoustics, Ultrasound and Vibration	38	47
7	21	Bolivia	04 April 2008	16 May 2008	19	0	19 July 2016	Chemistry	7	21
13	8	Bosnia and Herzegovina	24 May 2011	15 June 2011	59	0	08 June 2012	Mass Standards	13	8
1	3	Botswana	30 May 2012	26 July 2012	0	0	-	-	1	3
0	12	CARICOM	10 October 2005	12 October 2005	0	0	-	-	0	12
104	50	Chinese Taipei	26 April 2002	04 June 2002	375	0	21 October 2003	Mass Standards, Force, Hardness, Pressure	104	50
21	30	Costa Rica	23 January 2004	06 October 2004	67	0	26 November 2008	Mass Standards	21	30
6	21	Cuba	19 December 2000	18 June 2001	113	0	02 May 2005	Ionizing radiation (I and II)	6	21
6	20	Ecuador	20 November 2000	15 April 2001	20	0	16 September 2011	Mass Standards	6	20
10	11	Estonia	27 January 2005	23 March 2005	12	0	05 May 2014	Humidity	10	11
0	0	Ethiopia	01 January 2018	08 January 2018	0	0	-	-	0	0
7	14	Georgia	01 January 2008	17 June 2008	30	0	20 March 2014	Thermometry	7	14
2	4	Ghana	17 September 2009	24 February 2010	0	0	-	-	2	4
88	29	Hong Kong, China	08 April 2000	31 May 2000	251	0	13 December 2000	Length (Laser, Dimensional)	88	29
8	11	Jamaica	15 September 2003	21 July 2004	22	0	24 August 2006	Mass Standards	8	11
13	7	Latvia	11 January 2001	13 March 2001	29	30	23 March 2005	Length (Dimensional)	13	7
3	1	Luxembourg	29 January 2014	01 October 2014	0	0	-	-	3	1
8	8	Macedonia (The Former Yugoslav Republic of)	10 October 2006	14 November 2007	23	0	02 July 2013	Fluid Flow	8	8
5	4	Malta	11 April 2001	20 June 2001	0	0	-	-	5	4
2	2	Mauritius	05 October 2010	09 March 2011	0	0	-	-	2	2
4	17	Moldova, Republic of	01 January 2007	14 November 2007	43	0	26 September 2013	Thermometry	4	17
4	4	Mongolia	07 August 2013	23 October 2013	0	0	-	-	4	4
8	4	Montenegro	01 August 2011	19 October 2011	23	0	20 November 2015	Thermometry	8	4
0	3	Namibia	10 August 2012	16 October 2012	0	0	-	-	0	3
1	2	Oman	08 May 2012	20 November 2014	0	0	-	-	1	2
10	20	Panama	03 August 2003	16 September 2003	37	0	11 September 2006	Mass Standards	10	20
3	17	Paraguay	06 May 2009	27 October 2009	24	0	31 January 2011	Mass Standards	3	17
26	37	Peru	28 May 2009	17 November 2009	109	0	03 August 2010	Mass Standards	26	37
13	8	Philippines	01 June 2002	19 December 2002	31	0	18 December 2013	Mass Standards	13	8
3	1	Qatar	10 March 2016	16 March 2016	0	0	-	-	3	1
0	3	Seychelles	10 September 2010	12 November 2010	0	0	-	-	0	3
5	2	Sri Lanka	14 November 2007	14 November 2007	0	0	-	-	5	2
0	1	Sudan	26 June 2014	26 June 2014	0	0	-	-	0	1
12	3	Syrian Arab Republic	31 May 2012	17 September 2012	0	0	-	-	12	3
0	0	Tanzania	1 January 2018	-	0	0	-	-	0	0
58	79	Ukraine	19 August 2002	14 October 2003	270	0	10 January 2005	Length (Laser, Dimensional)	58	79
32	7	Viet Nam	10 October 2003	16 September 2004	31	0	21 July 2010	Time and Frequency	32	7
2	5	Zambia	10 December 2010	3 February 2011	0	0	-	-	2	5
1	5	Zimbabwe	14 September 2010	14 January 2011	0	0	-	-	1	5

Total: 1842 30

Total: 535 535

⁷ 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.

⁸ As the numbers on participation in key and supplementary comparisons change comparatively slowly with time, the corresponding KCDB statistics are updated every six months (in May and November of each year). However, the numbers of CMCs published in the KCDB varies more rapidly and are updated in "real-time". The numbers given here show the situation as on 25 February 2018.

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

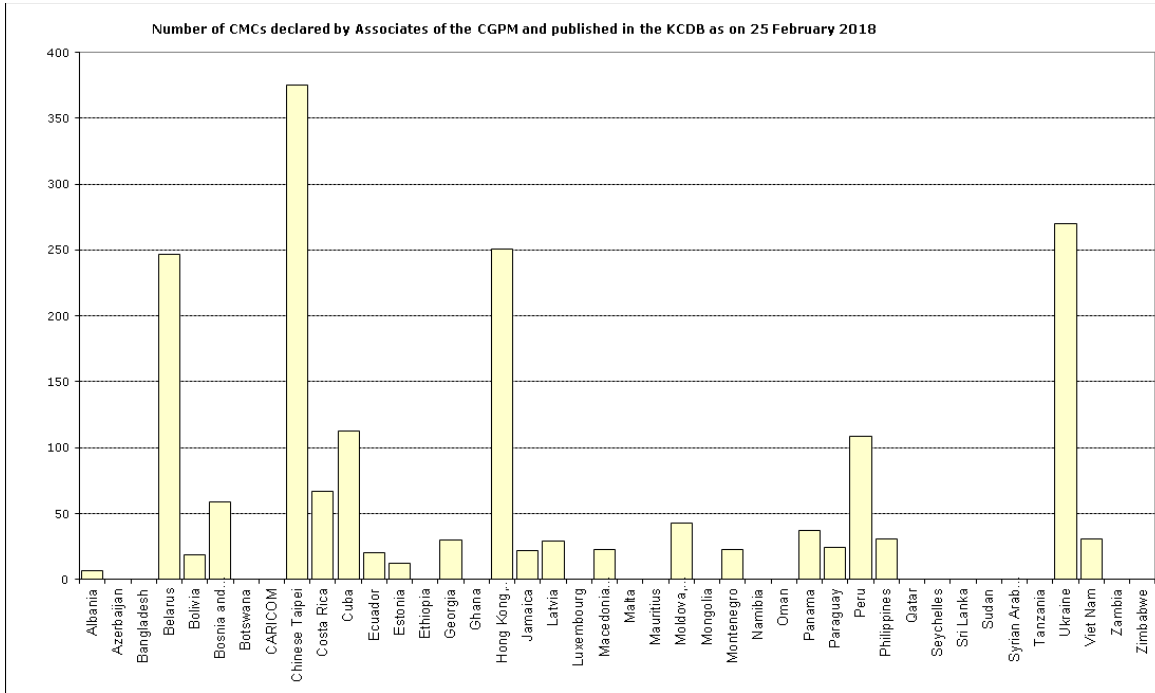
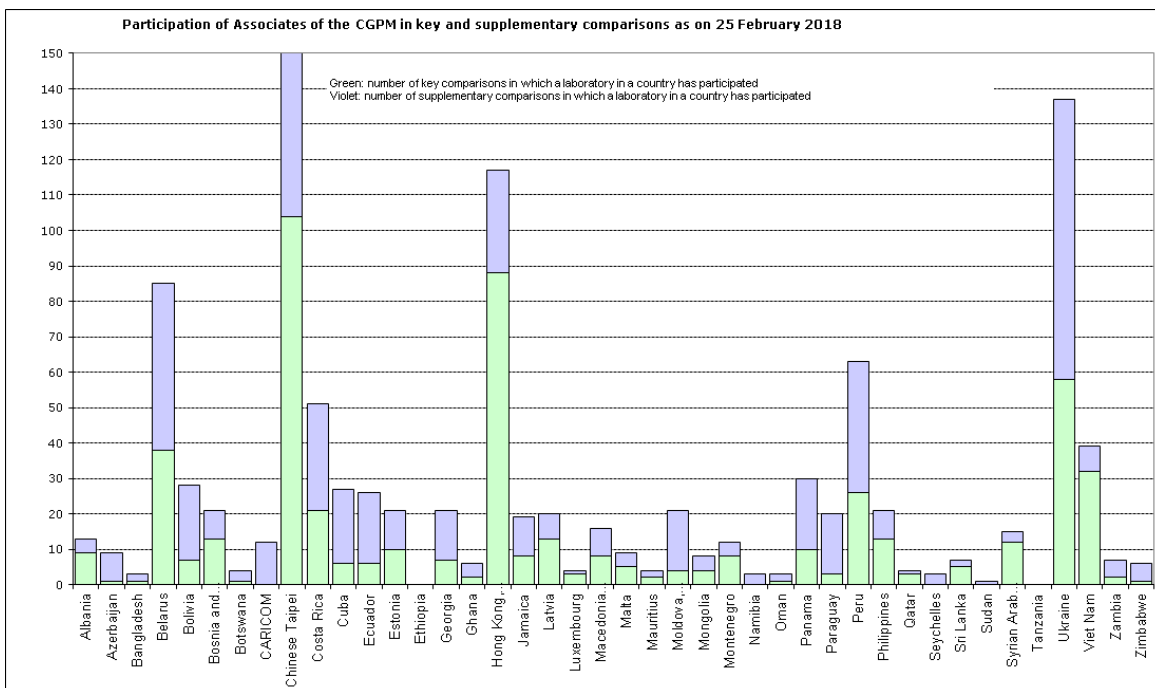


Figure 6. Graph on the participation of Associates of the CGPM in key and supplementary comparisons



3. Revision of the BIPM KCDB

The issued recommendations by the Working Group on the Implementation and Operation of the CIPM MRA [*Report of the Working Group on the Implementation and Operation of the CIPM MRA*](#) were adopted at the 105th meeting of the CIPM in October 2016, where several recommendations concerned a revision of the KCDB.

After a call for tender, work with the selected service provider realizing the KCDB 2.0 started in November 2017. The features of the original specifications have been reviewed and the future KCDB 2.0 UX (User eXperience) design and functionalities have been accomplished interactively.

A few examples of the outcome of this the collaborative work are given below:

- A user platform gives support to write, review and management of CMCs. Access to this platform will be made via user accounts. The profile for access to information and actions depends on the user functions. At start, user accounts will be established for TC-chairs and members of each technical committee. When the TC-chair is renewed the accounts will be passed on to the successor. TC-chairs may manage their pool of writers and reviewers – other user accounts will be supervised by the BIPM.
- Search facilities are accomplished by several tools; free key word search with suggested vocabulary and thesaurus is combined with a faceted search allowing a progressive narrowing of choices. There will also be access to quick links, favourite links and an advanced search. The search results will be presented in a table format with sort facilities.
- A statistical menu proposes pre-programmed graphic representations on a selected combination of search results on CMCs and comparisons. Users with user accounts have also access to performance statistics.
- A standard template for comparison data will allow access to dynamic graphic representation.

The work has now reached the phase where the BIPM shall comment or validate parts of the specifications as interpreted by the service provider. This latter document will serve as the basis for the realization of the computer software.

Additional advice from some of the Consultative Committees on specific KCDB 2.0 questions is presently needed, but the Consultative Committees and NMIs will be solicited for additional work as least possible.

Nevertheless, once the software has been created (initially planned for August/September 2018) there will be a phase lasting 2 - 3 months where the software will extensively tested. At a certain stage it will be of value to get support from some NMI members already acquainted with generating CMCs to test the software (we have presently one volunteer).

The transfer of data from KCDB 1.0 to 2.0 could be made during one working day where the KCDB 1.0 will exceptionally be unavailable. The possibility for a successive introduction to the user community, area by area, will be examined. An important part of work will also be to inform the user community and prepare comprehensive guidance before launching the KCDB 2.0.

Acknowledgement

The development work on the KCDB 2.0 involves also Chingis Kuanbayev, Nikita Zviagin (JCRB Executive Secretary) and the BIPM IT-team - Laurent Le Mée and Thierry/ Many thanks for their contribution. The support to the KCDB Office by Nikita is also acknowledged.

APPENDIX List of uncompleted comparisons older than 5 years

a) Key Comparisons

KC identifier	Status MAR- 2018	Indicated year	Pilot
AFRIMETS.M.P-K2	In progress	2012 - 2013	NMISA
APMP.EM.BIPM-K11.2	Report in progress, Draft B	2004	Puslit KIM-LIPI
APMP.EM.RF-K8.CL	Measurements completed	2012 - 2013	KRISS
APMP.EM-K2	In progress	2010 - 2011	KRISS
APMP.EM-K5.1	Report in progress, Draft A	2010 - 2013	NIM
APMP.M.D-K4	Report in progress, Draft A	2007 - 2008	KRISS
APMP.M.F-K2	Report in progress, Draft A	2007 - 2013	KRISS
APMP.M.F-K3.a	In progress	2011 -	NIM
APMP.M.F-K3.b	In progress	2011 -	NIM
APMP.M.H-K1.b	Report in progress, Draft A	2003 - 2005	NMIJ AIST
APMP.M.H-K1.c	Report in progress, Draft A	2003 - 2005	NMIJ AIST
APMP.M.M-K2.2	In progress	2010	KRISS
APMP.M.M-K5	Planned		NIM
APMP.M.P-K1.c.2	Report in progress, Draft B	2012	KRISS
APMP.M.P-K9	Report in progress, Draft A	2009 -	KRISS, NMIA
APMP.PR-K2.a.1	Measurements completed	2010 - 2012	NMIA
APMP.PR-K2.b.1	In progress	2010 - 2012	NMIA
APMP.PR-K3.a	In progress	2012 - 2014	NMIJ AIST
APMP.PR-K3.a.1	Measurements completed	2006	NIM
APMP.RI(I)-K2.B	Report in progress, Draft A	2007	NMIJ AIST
APMP.RI(I)-K4	Report in progress, Draft A	2009 - 2010	NMIJ AIST
APMP.T-K7.1	Protocol complete	2011 - 2012	NMIJ-AIST
APMP.T-K8	In progress	2011 - 2013	NMIJ-AIST
CCEM.RF-K5.c.CL	In progress	2012 - 2015	NMIJ AIST
CCEM-K2.2012	In progress	2012 - 2015	NRC
CCL-K1.2011	In progress	2011 - 2014	CENAM, NRC
CCM.F-K3.a	Report in progress, Draft A	2005 - 2007	PTB
CCM.F-K3.b	Report in progress, Draft A	2005 -	PTB
CCM.V-K3.A	Report in progress, Draft A	2012 - 2013	NMIJ AIST
CCM.V-K3.B	Report in progress, Draft A	2012 - 2013	NMIJ AIST
CCM.V-K3.C	Report in progress, Draft A	2012 - 2013	NMIJ AIST
CCQM-K11.2	Report in progress, Draft B	2012	NIST
CCQM-K12.2	Report in progress, Draft A	2012	NIST
CCQM-K6.2	Report in progress, Draft B	2012	NIST
CCRI(II)-K2.Fe-55	Report in progress, Draft B	2005 - 2006	BIPM
CCRI(II)-K2.H-3	Report in progress, Draft B	2008 - 2009	BIPM
CCRI(II)-K2.I-125(2)	Report in progress, Draft B	2004 - 2005	BIPM
CCRI(II)-K2.Kr-85	Report in progress, Draft B	2008	BIPM

(continued...)

KC identifier	Status MAR-2018	Indicated year	Pilot
CCRI(II)-K2.Mn-54	Report in progress, Draft B	2003	BIPM
CCRI(II)-K2.P-32	Report in progress, Draft B	2002 - 2003	BIPM
CCRI(II)-K2.P-32.2	Report in progress, Draft A	2005	BIPM
CCRI(II)-K2.Sr-89	Report in progress, Draft B	2000 - 2001	BIPM
CCRI(II)-K2.Sr-90	Report in progress, Draft A	1997 - 1998	BIPM
CCRI(II)-K2.Tc-99	In progress	2012 - 2013	NPL
CCRI(II)-K2.Tl-204	Report in progress, Draft B	2002 - 2003	BIPM
CCRI(III)-K9.AmBe.1	Report in progress, Draft A	2012 - 2013	NPL
CCT-K1.1	Report in progress, Draft A	2006 - 2014	NIST
CCT-K4.1	In progress	2012 - 2014	NMIA
CCT-K6.1	Report in progress, Draft A	2008 - 2010	NPL
CCT-K9	Measurements completed	2011 - 2012	NIST
COOMET.AUV.V-K1	Report in progress, Draft B	2007 - 2008	VNIIM
COOMET.L-K3	Report in progress, Draft A	2011 - 2012	VNIIM
COOMET.M.M-K8	In progress	2012 - 2018	NSC
COOMET.PR-K3.a	Report in progress, Draft A	2009 - 2011	BelGIM
EURAMET.M.D-K1.1	Report in progress, Draft A	2008 - 2012	PTB
EURAMET.M.P-K1.c	In progress	2011 - 2014	FORCE
EURAMET.M.P-K7	Report in progress, Draft B	2005 - 2007	MIKES
EURAMET.PR-K2.a	Measurements completed	2010 - 2012	VSL
EURAMET.T-K3.4	Report in progress, Draft A	2010 - 2011	MIRS/UL-FE/LMK
EURAMET.T-K8	Report in progress, Draft A	2008 - 2012	PTB
EUROMET.M.F-K1	Report in progress, Draft B	2002 - 2004	MIKES
EUROMET.M.F-K3	In progress	2005 -	PTB
SIM.M.P-K1	Protocol complete	2008 - 2010	CENAM
SIM.M.P-K6	In progress	2008 - 2011	CENAM
SIM.M.P-K6.1	In progress	2011 - 2013	LACOMET
SIM.M.P-K7	Report in progress, Draft B	2001	CENAM
SIM.QM-K1	Report in progress, Draft B	2009	INMETRO

b) Supplementary Comparisons

SC identifier	Status MAR-2018	Indicated year	Pilot
AFRIMETS.L-S4	In progress	2012	PTB
AFRIMETS.RI(I)-S1	In progress	2011 - 2013	NMISA
AFRIMETS.T-S2	In progress	2012	NMISA
AFRIMETS.T-S3	In progress	2012	NMISA
APMP.EM-S8	Protocol complete	2011 - 2013	NPLI
APMP.L-S5	In progress	2012	NMIJ AIST, CMS
APMP.M.G-S1	Report in progress, Draft A	2012	NIM
APMP.M.H-S4	Report in progress, Draft A	2011	KRISS
APMP.M.MM-S1	In progress	2012 - 2013	KRISS
APMP.M.M-S1	Planned	2007	NPSL Pakistan
APMP.M.P-S1	Measurements completed	2003 - 2005	CMS/ITRI
APMP.PR-S1.2	Protocol complete	2008	NMC, A*STAR
APMP.PR-S5	Measurements completed	2008 - 2009	NMIJ AIST
APMP.PR-S6	In progress	2012 - 2013	KRISS
APMP.RI(I)-S1	Report in progress, Draft B	2010 - 2011	OAP
APMP.T-S8	In progress	2011 - 2015	NMLPHIL
CCRI(II)-S10	Report in progress, Draft A	2011 - 2012	ENEA-INMRI
CCRI(II)-S6.Co-57	Report in progress, Draft B	2008	IAEA
CCRI(II)-S6.I-131	Report in progress, Draft B	2006	IAEA
CCRI(II)-S9	Report in progress, Draft A	2011	KRISS
CCT-S2	Report in progress, Draft B	2007 - 2010	LNE
CCT-S3	Report in progress, Draft A	2007 - 2008	NMIJ AIST
COOMET.EM.RF-S1	Report in progress, Draft B	2009	VNIIFTRI
COOMET.EM-S10	Report in progress, Draft B	2010 - 2012	VNIIIMS
COOMET.EM-S6	Report in progress, Draft B	2007 - 2010	VNIIIMS
COOMET.EM-S7	Report in progress, Draft B	2009 - 2011	VNIIIMS
COOMET.EM-S9	In progress	2009	VNIIFTRI
COOMET.M.D-S1	Protocol complete	2012 - 2015	VNIIIM
COOMET.M.FF-S2	Report in progress, Draft B	2008 - 2009	PTB
COOMET.M.FF-S4	Report in progress, Draft B	2009 - 2010	SMU
COOMET.M.F-S1	Report in progress, Draft B	2008 - 2010	VNIIIM
COOMET.M.H-S4	Report in progress, Draft B	2007 - 2010	VNIIFTRI
COOMET.PR-S1	Measurements completed	2012 - 2013	VNIIOFI
COOMET.PR-S2	Report in progress, Draft B	2011 - 2012	VNIIOFI
COOMET.PR-S5	Measurements completed	2008 - 2011	INIMET (Cuba)
EURAMET.EM-S33	In progress	2010 - 2011	LCOE (Spain)
EURAMET.EM-S34	Protocol complete	2010 - 2011	LCOE (Spain)
EURAMET.EM-S35	Protocol complete	2012 - 2013	INRIM
EURAMET.EM-S36	Planned	2012 - 2014	SP

(continued...)

SC identifier	Status MAR-2018	Indicated year	Pilot
EURAMET.EM-S37	In progress	2011 - 2013	CMI
EURAMET.M.F-S2	In progress	2012 - 2013	BEV
EURAMET.M.M-S5	Planned	2012 - 2013	NSAI NML
EURAMET.PR-S4	Measurements completed	2012 - 2013	LNE
EURAMET.PR-S5	Measurements completed	2012 - 2013	PTB
SIM.M.D-S5	Report in progress, Draft A	2012 - 2013	INM (CO)
SIM.M.FF-S4	Report in progress, Draft B	2006	INIMET (Cuba)
SIM.M.F-S2	Planned	2012	IDIC
SIM.M.F-S3	Report in progress, Draft B	2012 - 2013	NIST
SIM.M.F-S4	Protocol complete	2012 - 2013	IDIC
SIM.M.M-S11	Report in progress, Draft B	2012 - 2013	INM (CO)
SIM.M.M-S12	Report in progress, Draft A	2012 - 2015	CESMEC Ltda.
SIM.M.M-S6	Report in progress, Draft B	2009	CESMEC (Chile)
SIM.M.P-S2	In progress	2009 - 2011	INMETRO
SIM.M.P-S3	Protocol complete	2010	LCPN-P (Chile)
SIM.M.P-S4	Protocol complete	2010	LCPN-P (Chile)
SIM.M.P-S8	Planned	2012	ENAER
SIM.M.P-S9	Planned	2012	ENAER
SIM.PR-S3	Protocol complete	2012	NIST
SIM.QM-S3	Report in progress, Draft A	2012	NIST
SIM.QM-S4	Report in progress, Draft A	2012	NIST
SIM.T-S3	Report in progress, Draft B	2007 - 2008	CESMEC, INEN
SIM.T-S4	Report in progress, Draft B	2008	PTB
SIM.T-S6	Report in progress, Draft A	2012 - 2014	NIST