Report on CIPM key comparison of the second phase of multiples and submultiples of the kilogram (CCM.M-K5)

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Abstract

In order to show equivalence of mass standard determination among NMIs of CIPM member countries, key comparisons of mass standards have been carried out under the auspices of the Comité Consultatif pour la Masse et les Grandeurs Apparantées (CCM). At each NMI, mass standards are derived from one kilogram by means of the multiples and submultiples methods. The pilot laboratory, NMIJ, prepared five sets of transfer standards. Any set of transfer standard consists of five pairs of mass standards with nominal values of 200 mg, 1 g, 50 g, 200 g and 2 kg. The nominated twenty participants have been divided into four groups and the corresponding four sets of transfer standards have been circulated within the groups simultaneously while remaining one set has been kept at the pilot laboratory for the stability evaluation. The pilot laboratory measured the volumes, the centres of gravity and the magnetic properties, susceptibilities or magnetism, of the standards before the circulation and has reported these values to the participants. The pilot laboratory has also verified the stability of all travelling standards in advance. Nineteen laboratories have reported final results to the pilot. Nine participants belong to EURAMET, three belong to COOMET but two of them also belong to EURAMET, four belong to SIM, and five belong to APMP. Table 2 shows all the results associated with their uncertainties reported by the participants. As shown in the table 3 the majority of the instabilities of the transfer standards during their circulation were less than claimed uncertainties of the participants except for few standards of small mass, 1 g and 200 mg. These instabilities are considered for uncertainty evaluation within the group. All reported results among different groups have been linked based on the average values of transfer standards before and after the circulation. Figure 3 to 7 show the comparison results of all the participants for five nominal mass values respectively. The plotted results are expressed in relation to the median as reference values. Tables 10 to 19 show the differences

and associated expanded uncertainties referred to a confidence level of 95% between any combination of the laboratories in the form of matrices. They show few outliers, one at 2 kg and 200 g, three at 50 g, and two at 200mg.

1. Introduction

This inter-laboratory comparison is based on the decision of the 6th CCM meeting held during 29-30 May 1996 at BIPM (see also document CCM 96-18 [1]). There were proposed three phases for the multiple and sub-multiple mass standards comparison. For each phase, the CCM has agreed to perform a key comparison with weights of five nominal values according to the CCM decision [2]. The first phase was conducted during 1998 and 1999 with mass of nominal values 100 mg, 2 g, 20 g, 500 g, 10 kg and reported in 2003 [3]. This key comparison is the second phase that has been carried out with mass values of 200 mg, 1 g, 50 g, 200 g, 2 kg from June 2002 to April 2003. The future third phase would be done with mass values of 500 mg, 5g, 10 g, 100g, 5 kg. As in the case of the first phase, these nominal values have been chosen, because they cover the range of mass standards mostly used in practice, and because a box containing these standards can be transported by hand-carrying. The CCM agreed during the 7th meeting 12-14 May 1999 at BIPM that NRLM , the former organization of NMIJ/AIST, would organize this second inter-comparison as a pilot laboratory. Later, PTB and BIPM accepted to be helping laboratories.
The CCM key cmparison CCM.M-K5 was performed according to the agreement at the 7th meeting of May 2002 CCM with mass standards of the five nominal values: 2 kg, 200 g, 50 g, 1 g, 200 mg. Two weights should be prepared for each mass value for each set of transfer standard. Therefore each set contains ten weights.

2. Participants

There were twenty NMIs that have been nominated to participate in this comparison in measuring and transporting the transfer standards. One of the initial participants withdrew its participation after its measurement. Therefore this report consists of the results from nineteen participants listed in the table below. Besides India, Brazil, and Netherland, others are member countries of CCM on the occasion of the comparison.

Institute of participating laboratory	Acronym	Country
Korea Research Institute of Standards and Science	KRISS	Republic of Korea
National Measurement Institute, Australia	NMIA	Australia
National Metrology Institute of Japan (Pilot institute)	NMIJ	Japan
National Physical Laboratory, India	NPL-I	India
National Institute of Metrology, China	NIM	P.R. China
Centro Nacional de Metrologia	CENAM	Mexico
Institute Nacional de Metrologia	INMETRO	Brazil
Institute for National Measurment Standards, National Research Council Canada	NRC -INMS	Canada
National Institute of Standards and Technology	NIST	United States of America
Van Swinden Laboratorium	VSL	Netherlands
D.I.Mendeleyev Institute for Metrology	VNIIM	Russia
Central Office of Measures	GUM	Poland
National Institute of Metrological Research	INRIM	Italy
Federal Office of Metrology	METAS	Switzerland
National Physical Laboratory, U,K,	NPL	United Kingdom
Physikalisch-Technische Bundesanstalt	PTB	Germany

Centro Español de Metrología	CEM	Spain
Laboratoire National de Métrologie et d'Essais	LNE	France
Slovak Institute of Metrology	SMU	Slovakia

3. Transfer standards

3.1 Mass standards

By November 1999, NMIJ purchased five sets of transfer mass standards. Each set contains five pairs of weights for five nominal values of 2 kg, 200 g, 50 g, 1 g, 200 mg. These weights are made of non-magnetic stainless steel and have the forms and characteristics that are recommended by OIML [4] for the accuracy class E_1 (figure 1). Four of the five sets have been delivered to four divided petal groups of participants which were chosen in consideration of transportation efficiency. The fifth set has remained at NMIJ as the stability reference.

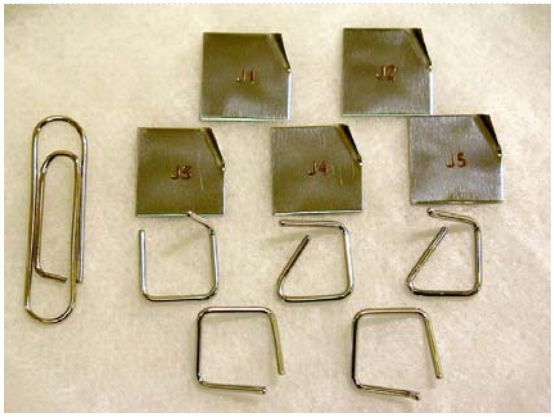
The density, the magnetic susceptibility, the center positions, and the mass of all standards except the density of the 200 mg standards were determined at NMIJ (table 1). The stability of the standards has been observed at NMIJ for about two and a half years before the comparison started and found to be small enough for the purpose of this comparison (table 3).

The pilot laboratory, NMIJ, characterized the weights and revealed the following characteristics.

Table 1. Characteristics of the transfer mass standards used for the comparison.

Nominal value of mass	Marking or box code	Shape	Density $\rho \pm \boldsymbol{u}_\rho$[kg/m^3]	Center of gravity from the bottom $z \pm u_z$ [mm]	Susceptibility χ or Magnetization
2 kg-Jx	J1, J2,J3,J4,J5	OIML	7886.7 ± 0.31	46.2 ± 0.5	< 0.006
2 kg-Jy	J6, J7,J8,J9,J0	OIML	8006.7 ± 0.31	46.2 ± 0.5	< 0.006
200 g-Jx	J1, J2,J3,J4,J5	OIML	7864.5 ± 0.30	22.0 ± 0.5	< 0.006
200 g-Jy	J6, J7,J8,J9,J0	OIML	8004.5 ± 0.30	22.0 ± 0.5	< 0.006
50 g-Jx	J1, J2,J3,J4,J5	OIML	7904.7 ± 0.47	13.3 ± 0.5	< 3 μT
50 g-Jy	J6, J7,J8,J9,J0	OIML	8006.5 ± 0.47	13.3 ± 0.5	< 3 μT
1 g-Jx	J1, J2,J3,J4,J5	OIML	7856 ± 2.6	2.7 ± 0.5	< 3 μT
1 g-Jy	J6, J7,J8,J9,J0	OIML	8000 ± 2.6	2.7 ± 0.5	< 3 μT
200mg-Jx	J1, J2,J3,J4,J5	OIML(Sheet)	7950 ± 50*	-----	< 3 μT
200mg-Jy	J6, J7,J8,J9,J0	OIML(Wire)	7950 ± 50*	-----	< 3 μT

* Density values of the weights are expected from the material specification.
The cubic thermal expansion coefficient is supposed to be 4.8 x 10^{-5}.



200 mg weights

1 g, 50 g, 200 g, and 2 kg weights

Figure 1. Transfer standards prepared for the CCM.M-K5 key comparison.

3.2 Carrying case

The carrying case can be hermetically sealed and has separate holes to hold the weights tightly. The weights are wrapped in clean optical paper and fixed at their positions by such paper stuffed into the holes. The dimensions of the case are 380 mm width, 360 mm depth, and 160 mm height, the total weight including transfer mass standards are summed up to around 12 kg. The pictures of the carrying cases are shown in the figure 2.

Figure 2. Carrying case of mass traveling standards used for the CCM.M-K5 key comparison.

4. Summary of the results reported by the participants

4.1 Reported values of mass and combined uncertainty

There were four sets of transfer standards for circulation each of them has been circulated simultaneously within four participant groups, A, B, C, and D. Group A consists of KRISS, NMIA, NMIJ, and NIM. Group B consists of CENAM, INMETRO, NRC, and NIST. Group C consists of VSL, VNIIM, GUM, INRIM, and METAS. Group D consists of NPL. PTB, CEM, LNE, and SMU. Table 2 shows the results of reported mass values and their associated combined uncertainties as given by the participants and the pilot laboratory. Results under names of NMIJ_X1 and NMIJ_X2 of any group X are measured values by NMIJ in the same periods before and after the circulation respectively. These results should be used only to make linkage among the four sets of transfer standards. The pilot, NMIJ, also reported its results as one of the laboratory. For each nominal mass value, there are two series of separate group of transfer mass set Jx and Jy. The results for Jx and Jy should be independent but their deviations should show the similar characteristics because both should be calibrated with the same standard at each participant laboratory.

4.2 Changes and corrections accepted by the participants

One participant withdrew its participation. Three participants applied for changes to their results. One was accepted as follows, and the other two were declined by the participants.

1) The second participant of group D made its measurements but the result was not reported to the pilot, and the participant withdrew its participation status.
2) The participant from VNIIM asked to change one of the reported values of 200 mg from +0.0049 mg to -0.0049 mg because of simple mistake. This change was accepted.

Table 2. Results of transfer standards, reported from the participants and the pilot. The $\boldsymbol{m}_A$ represents residual value from the nominal mass value, and $\boldsymbol{u}_c$ represents combined standard uncertainty ($k = 1$) claimed by each laboratory.

Institute	2 kg				200 g				50 g			
	Jx		Jy		Jx		Jy		Jx		Jy	
	m_A mg	u_c mg	m_A mg	u_c mg	m_A mg	u_c mg	m_A mg	u_c mg	m_A mg	u_c mg	m_A mg	u_c mg
NMIJ_A1	3.611	0.057	-0.821	0.057	0.4352	0.0066	0.0381	0.0066	0.1066	0.0026	-0.0021	0.0026
KRISS	3.640	0.038	-0.930	0.033	0.4230	0.0040	0.0230	0.0040	0.1010	0.0020	-0.0050	0.0020
NMIA	3.920	0.147	-0.660	0.147	0.4430	0.0090	0.0440	0.0090	0.1030	0.0035	-0.0030	0.0035
NMIJ	3.646	0.057	-0.805	0.057	0.4346	0.0066	0.0429	0.0066	0.1085	0.0026	0.0003	0.0026
NPL-I	3.780	0.040	-0.700	0.050	0.4270	0.0160	0.0340	0.0160	0.1130	0.0070	-0.0010	0.0070
NIM	3.885	0.037	-0.685	0.037	0.4500	0.0050	0.0560	0.0050	0.1060	0.0040	0.0020	0.0040
MNIJ_A2	3.648	0.057	-0.836	0.057	0.4306	0.0066	0.0466	0.0066	0.1028	0.0026	-0.0001	0.0026
NMIJ_B1	4.166	0.057	0.369	0.057	0.4481	0.0066	-0.0411	0.0066	0.1338	0.0026	-0.0182	0.0026
CENAM	4.251	0.062	0.431	0.062	0.4600	0.0040	-0.0270	0.0040	0.1321	0.0028	-0.0160	0.0028
INMETRO	4.200	0.600	0.500	0.600	0.4610	0.0600	-0.0220	0.0600	0.1340	0.0150	-0.0150	0.0150
NRC	4.143	0.031	0.334	0.029	0.4548	0.0041	-0.0228	0.0035	0.1420	0.0053	-0.0126	0.0055
NIST	4.139	0.032	0.336	0.032	0.4593	0.0055	-0.0235	0.0055	0.1299	0.0039	-0.0202	0.0039
MNIJ_B2	4.157	0.057	0.356	0.057	0.4488	0.0066	-0.0405	0.0066	0.1334	0.0026	-0.0186	0.0026
NMIJ_C1	3.873	0.057	0.513	0.057	0.4178	0.0066	0.0220	0.0066	0.1183	0.0026	-0.0013	0.0026
VSL	3.890	0.070	0.620	0.070	0.4280	0.0120	0.0200	0.0120	0.1290	0.0030	0.0100	0.0030
VNIIM	3.950	0.020	0.670	0.020	0.4550	0.0040	0.0420	0.0040	0.0710	0.0070	-0.0470	0.0070
GUM	5.040	0.180	1.410	0.180	0.4700	0.0200	0.0600	0.0200	0.1190	0.0110	-0.0010	0.0110
INRIM	3.896	0.030	0.550	0.030	0.4387	0.0037	0.0329	0.0037	0.1164	0.0020	0.0013	0.0020
METAS	3.917	0.067	0.600	0.067	0.4454	0.0065	0.0427	0.0065	0.1276	0.0017	0.0137	0.0017
MNIJ_C2	3.916	0.057	0.525	0.057	0.4194	0.0066	0.0296	0.0066	0.1199	0.0026	0.0030	0.0026
NMIJ_D1	3.882	0.057	0.144	0.057	0.4320	0.0066	0.0187	0.0066	0.1330	0.0026	-0.0004	0.0026
NPL	3.920	0.039	0.180	0.039	0.4520	0.0037	0.0340	0.0037	0.1300	0.0017	0.0000	0.0017
PTB	3.936	0.028	0.201	0.028	0.4433	0.0028	0.0309	0.0028	0.1326	0.0008	-0.0002	0.0008
CEM	3.937	0.035	0.186	0.036	0.4454	0.0056	0.0334	0.0055	0.1320	0.0019	0.0010	0.0018
LNE	3.950	0.100	0.230	0.100	0.4435	0.0070	0.0371	0.0070	0.1337	0.0045	0.0023	0.0045
SMU	3.990	0.050	0.260	0.050	0.4670	0.0065	0.0410	0.0065	0.1390	0.0028	0.0050	0.0028
MNIJ_D2	3.888	0.057	0.186	0.057	0.4346	0.0066	0.0247	0.0066	0.1362	0.0026	0.0026	0.0026

Table 2. (continued)

Institute	1 g				200 mg			
	Jx		Jy		Jx		Jy	
	m_A µg	u_c µg	m_A µg	u_c µg	m_A µg	u_c µg	m_A µg	u_c µg
NMIJ_A1	-7.67	0.50	-1.68	0.50	-1.55	0.30	6.20	0.30
KRISS	-6.90	0.30	-0.60	0.30	-1.10	0.15	6.90	0.15
NMIA	-7.10	0.40	-0.70	0.40	-3.30	0.30	4.80	0.30
NMIJ	-7.09	0.50	0.01	0.50	-1.29	0.30	6.84	0.30
NPL-I	-6.00	1.00	1.00	1.00	0.00	1.00	7.00	1.00
NIM	-7.10	0.70	-0.60	0.70	-3.20	0.50	4.80	0.50
MNIJ_A2	-7.02	0.50	-0.40	0.50	-1.63	0.30	6.67	0.30
NMIJ_B1	-2.64	0.50	-2.79	0.50	-1.96	0.30	-5.08	0.30
CENAM	-3.00	0.70	-3.00	0.70	-4.00	0.20	-6.80	0.20
INMETRO	-1.60	0.60	-1.80	0.60	-3.20	0.60	-6.40	0.60
NRC	-1.40	0.75	-1.82	0.70	-3.50	0.90	-5.80	1.00
NIST	-3.17	0.72	-2.91	0.72	-4.20	0.19	-6.31	0.19
MNIJ_B2	-2.75	0.50	-2.53	0.50	-2.75	0.30	-4.82	0.30
NMIJ_C1	-1.42	0.50	-7.21	0.50	-2.24	0.30	8.25	0.30
VSL	-2.00	1.00	-7.00	1.00	-2.80	0.40	7.50	0.40
VNIIM	-3.40	0.80	-8.00	0.80	-4.90	0.50	6.20	0.50
GUM	-1.00	1.00	-7.00	1.00	-3.30	0.60	7.60	0.60
INRIM	-2.60	0.50	-8.00	0.50	-4.40	0.40	5.50	0.40
METAS	-1.51	0.73	-6.70	0.73	-3.85	0.32	6.52	0.32
MNIJ_C2	-1.30	0.50	-6.56	0.50	-2.43	0.30	8.22	0.30
NMIJ_D1	0.45	0.50	-1.15	0.50	-0.97	0.30	-3.19	0.30
NPL	0.80	0.20	-1.10	0.20	-2.00	0.20	-4.40	0.20
PTB	2.20	0.20	0.20	0.20	-0.10	0.20	-3.20	0.20
CEM	1.40	0.51	0.15	0.52	-0.97	0.23	-4.05	0.23
LNE	3.10	1.00	0.10	0.80	-0.50	0.60	-3.50	0.45
SMU	2.90	0.80	0.90	0.80	0.00	0.70	-7.00	0.70
MNIJ_D2	1.95	0.50	0.20	0.50	2.34	0.30	-2.06	0.30

5 Estimation of the comparison

5.1 Stability of the travelling standards

The mass change of the transfer standards were measured at NMIJ against the NMIJ working standards before and after the circulation. The results are shown in table 3. In most of the cases the changes are small or comparable to the uncertainty. For 200 mg and 1 g standards there are a couple of bigger changes than claimed uncertainties. Changes of other mass values are small enough compared to the claimed uncertainties.

Table 3. Mass changes of the transfer and reference standards during the comparison. Mass values were measured against the NMIJ working standards before and after the circulation.

m_0	Mass change Δm_N in micro grams during the comparison from June 2002 to April 2003									
	Group A		Group B		Group C		Group D		Reference kept in NMIJ	
	Jx	**Jy**	**Jx**	**Jy**	**Jx**	**Jy**	**Jx**	**Jy**	**Jx**	**Jy**
2 kg	37	-15	-9	-13	43	13	6	42	-14	-36
200 g	-4.6	8.5	0.7	0.6	1.6	7.6	2.6	6.0	-1.3	-2.9
50 g	-3.8	1.9	-0.4	-0.5	1.6	4.3	3.2	3.0	-0.4	-1.2
1 g	0.65	1.28	-0.10	0.26	0.12	0.65	1.49	1.35	0.04	0.43
200 mg	-0.08	0.48	-0.80	0.26	-0.18	-0.03	3.31	1.13	-0.24	0.24

5.2 Mass comparison capability of the transfer standards at NMIJ

Repeatability estimation of mass measurements of the transfer standards have been performed at NMIJ. The results are shown in table 4. The reference standards that are of the same lot of the transfer standards have been measured four times before and after the comparison circulation. Standard deviations of measurement are estimated using these results. We only use these values of standards deviation of the measurements for the uncertainty estimation of measurements of the transfer standards. We do not use the mass values themselves.

Table 4. Mass measurement repeatability data for the transfer standards measured at NMIJ.

Date	2 kg		200 g		50 g		1 g		200 mg	
	Jx (J5) m-m_0 mg	Jy (J0) m-m_0 mg	Jx (J5) m-m_0 mg	Jy (J0) m-m_0 mg	Jx (J5) m-m_0 mg	Jy (J0) m-m_0 mg	Jx (J5) m-m_0 mg	Jy (J0) m-m_0 mg	Jx (J5) m-m_0 mg	Jy (J0) m-m_0 mg
Nov. 2000	3.638	-0.776	0.4345	0.0736	0.0978	-0.0062	-0.00482	0.00399	-0.00321	0.00601
July 2001	3.630	-0.795	0.4371	0.0747	0.0983	-0.0058	-0.00465	0.00416	-0.00303	0.00608
June 2002	3.630	-0.769	0.4360	0.0763	0.0987	-0.0053	-0.00511	0.00312	-0.00307	0.00620
Apr. 2003	3.616	-0.805	0.4347	0.0734	0.0983	-0.0065	-0.00507	0.00355	-0.00331	0.00644
Average	3.628	-0.786	0.4356	0.0745	0.0983	-0.0060	-0.00491	0.00370	-0.00316	0.00618
Std.Dev.	0.009	0.016	0.0013	0.0013	0.0004	0.0005	0.00022	0.00047	0.00013	0.00019

5.3 Linkage among transfer standards of different petals

During the circulation each transfer standard might have some change in mass that could mainly be estimated with the data in table 3 taken by comparing the transfer standard against the NMIJ standard. This mass change value would not be perfectly determined because the NMIJ standard also might have some change to some extent as well. But it is supposed that the relative mass differences among transfer standards could be evaluated with uncertainties according to the NMIJ capability of mass comparison at each moment before and after the circulation. The uncertainties of defference values are supposed to be comparable with the standard deviation of the mass values in table 4 that shows reproducibility of the set of transfer standards kept in NMIJ without transportation. Therefore it is supposed that mass changes of the transported transfer standards in table 3 could have the uncertainties shown in table 4.

Even though it is not clear when and how much the mass change would happen in each transfer mass standard, we can see relations among reported values of participants in the same petal by using the average of the mass values with uncertainties estimated by mass change amount of taransfer standard before and after the circulation as the representing point.

Each reported mass value given by each participant A is $m_{\text{A-reported}}$ are appeared in residual value m_{A} as expressed in equation (1).

$$m_{\text{A}} = m_{\text{A-reported}} - m_0 \tag{1}$$

Here m_0 is a nominal mass value.
The mass values of the transfer standard before and after the circulation are expressed by m_{NMIJ1} and m_{NMIJ2}, then the average of them m_{N} and the corrected mass value m_{CA} of participant A can be calculated with subtraction of this average m_{N} as follows.

$$m_{\text{N}} = \frac{m_{\text{NMIJ1}} + m_{\text{NMIJ2}}}{2} - m_0 \tag{2}$$

$$m_{\text{CA}} = m_{\text{A}} - m_{\text{N}} \tag{3}$$

Also we can see relations of reported values among different petals because linkages are made through m_{N} value as the representing point of each petal in order to make linkage among four petals. The uncertainty of this linkage $u_{\text{c}}(m_{\text{N}})$ could be estimated by the data of table 4.
On the other hand, the mass change during the circulation should be estimated separately for each petal group. Because there are a couple of transfer mass standards show certain amount of changes, mass values of such set might have exceeding uncertainties in relation with a mass change of each transfer standard Δm_{N} to be added in order to estimate their degree of equivalence.

$$\Delta m_{\text{N}} = m_{\text{NMIJ2}} - m_{\text{NMIJ1}} \tag{4}$$

As mentioned previously, the NMIJ standard mass values should be used only for linking the participant's values among different petals, the NMIJ participated as one of the participants within the circulation and has a laboratory number as well. Therefore there are not strict reference values unless the average or the median values should be adopted.
We adopt the median as the reference in this estimation.

$$m_{\text{Cref}} = \text{median}\{m_{\text{CA}}\text{; all reported values for each type of transfer, Jx or Jy}\} \tag{5}$$

The deviation of each reported mass value of participant A is expressed in the next equation.

$$m_{\mathrm{eq\,A}} = m_{\mathrm{C\,A}} - m_{\mathrm{C\,ref}} \tag{6}$$

In this expression, there is no influence from the NMIJ mass standard except for the repeatability of comparison among same type of weight set in short period that is usually small enough.

5.4 Uncertainty estimation of the comparison

Uncertainty of the estimated median can be calculated by the following equations according to the concept explained by Müller [5]

$$u\ (m_{\mathrm{C\,ref}}) = C \times \mathrm{median}\{\mathrm{abs}(m_{\mathrm{eq\,A}}); \mathrm{all\ data}\} \tag{7}$$

$$C = \frac{1.9}{\sqrt{n-1}} \tag{8}$$

The equivalence of each reported mass value should be estimated by comparing the deviation from the median $m_{\mathrm{eq\,A}}$ and its uncertainty that could be calculated as follows.

$$u\ (m_{\mathrm{eq\,A}}) = \sqrt{u_{\mathrm{c}}^2(m_{\mathrm{A}}) + u_{\mathrm{c}}^2(m_{\mathrm{N}}) + \frac{\Delta d_{\mathrm{N}}{}^2}{12} + u^2(m_{\mathrm{C\,ref}})} \tag{9}$$

$$U_{95}(m_{\mathrm{eq\,A}}) = 2 \times u(m_{\mathrm{eq\,A}}) \tag{10}$$

Results of all the participants estimated based on the concept mentioned above are shown in table 5 to table 9. Also the results can be easily reviewed in figure 1 to figure 5, where circles and squares representing values of $m_{\mathrm{eq\,A}}$ for Jx mass set and Jy mass set respectively with error bars representing $U_{95}(m_{\mathrm{eq\,A}})$.

5.5 Equivalence between any combination of two laboratories

In order to compare results between any combination of two patrticipants the difference between any two participant laboratories A and B should be sought by the next equation.

$$\Delta m_{\mathrm{A,B}} = m_{\mathrm{eq\,A}} - m_{\mathrm{eq\,B}} \tag{11}$$

Uncertainty of this value can be calculated as follows. Participant A and participant B are in the same group;

$$u_{\mathrm{a}}(\Delta m_{\mathrm{A,B}}) = \sqrt{u_{\mathrm{c}}^2(m_{\mathrm{A}}) + u_{\mathrm{c}}^2(m_{\mathrm{B}}) + u_{\mathrm{c}}^2(m_{\mathrm{N}}) + \frac{\Delta m_{\mathrm{N}}{}^2}{12}} \tag{12}$$

Participant A and participant B are in the different groups;

$$u_{\mathrm{a}}(\Delta m_{\mathrm{A,B}}) = \sqrt{u_{\mathrm{c}}^2(m_{\mathrm{A}}) + u_{\mathrm{c}}^2(m_{\mathrm{B}}) + 2u_{\mathrm{c}}^2(m_{\mathrm{N}}) + \frac{\Delta m_{\mathrm{NA}}{}^2}{12} + \frac{\Delta m_{\mathrm{NB}}{}^2}{12}} \tag{13}$$

Results concerning equivalence between every pair combination among the participants are shown in tables from table 10 to table 19.

6. Conclusions

Equivalence among participants are as follows.
2 kg; Figure 3 shows that, except for one participant, all the participants values with uncertainty bars are crossing the reference line.
200 g; Figure 4 shows that, except for one pariticipant, all the participants values with uncertainty bars are crossing the reference line.
50 g; Figure 5 shows that values of three participants deviate more than their expanded uncertainties and other participants values with uncertainty bars are crossing the reference line.
1 g; Figure 6 shows that all the participants values with uncertainty bars are crossing the reference line except for one participant results deviate arond its expanded uncertainty.
200 mg; Figure 7 shows that most of the participants values with uncertainty bars are crossing the reference line except for two participants data that deviate around double of their uncertainties to the same directon and in the same petal.
It can be generally mentioned that all the comparisons have been done successfully.

Acknowledgement
Authors would appreciate the contributions of following persons involved in the comparison measurement at each laboratory. Woo Gab Lee and Kwang Pyo Kim of KRISS, X. Jiang of NMIA, Masaaki Ueki of NMIJ, AK. Bandyopadhyay of NPL-I, Jorge Nava and Leticia Luján of CENAM, Fábio A. Ludolf Cacais of INMETRO, George Matthews of NRC, Angelo Torino of INRIM, Simon Thies of METAS, Martin Firlus of PTB, Ángel Lumbreras and Manuel Bautista of CEM.

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Table 5. Estimated results of 2 kg transfer mass standards for each participant in relation with the median. (Refer to the section 5.4 and 5.5 to clarify variable symbols.)

Institute	2 kg Jx								2 kg Jy							
	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$
	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
KRISS	3.640	0.038	3.630	0.009	0.037	0.010	-0.041	0.089	-0.930	0.033	-0.828	0.016	-0.015	-0.102	-0.170	0.088
NMIA	3.920	0.147	3.630	0.009	0.037	0.290	0.239	0.298	-0.660	0.147	-0.828	0.016	-0.015	0.168	0.100	0.300
NMIJ	3.646	0.057	3.630	0.009	0.037	0.017	-0.035	0.123	-0.805	0.057	-0.828	0.016	-0.015	0.024	-0.045	0.128
NPL−I	3.780	0.040	3.630	0.009	0.037	0.150	0.099	0.093	-0.700	0.050	-0.828	0.016	-0.015	0.128	0.060	0.116
NIM	3.885	0.037	3.630	0.009	0.037	0.255	0.204	0.087	-0.685	0.037	-0.828	0.016	-0.015	0.143	0.075	0.095
CENAM	4.251	0.062	4.161	0.009	-0.009	0.090	0.038	0.131	0.431	0.062	0.362	0.016	-0.013	0.069	0.000	0.137
INMETRO	4.200	0.600	4.161	0.009	-0.009	0.039	-0.013	1.201	0.500	0.600	0.362	0.016	-0.013	0.138	0.069	1.201
NRC	4.143	0.031	4.161	0.009	-0.009	-0.018	-0.070	0.075	0.334	0.029	0.362	0.016	-0.013	-0.028	-0.097	0.082
NIST	4.139	0.032	4.161	0.009	-0.009	-0.022	-0.074	0.076	0.336	0.032	0.362	0.016	-0.013	-0.026	-0.095	0.087
VSL	3.890	0.070	3.894	0.009	0.043	-0.004	-0.056	0.148	0.620	0.070	0.519	0.016	0.013	0.101	0.033	0.152
VNIIM	3.950	0.020	3.894	0.009	0.043	0.056	0.004	0.062	0.670	0.020	0.519	0.016	0.013	0.151	0.083	0.071
GUM	5.040	0.180	3.894	0.009	0.043	1.146	1.094	0.363	1.410	0.180	0.519	0.016	0.013	0.891	0.823	0.365
INRIM	3.896	0.030	3.894	0.009	0.043	0.002	-0.050	0.077	0.550	0.030	0.519	0.016	0.013	0.031	-0.037	0.084
METAS	3.917	0.067	3.894	0.009	0.043	0.023	-0.028	0.142	0.600	0.067	0.519	0.016	0.013	0.081	0.013	0.146
NPL	3.920	0.039	3.885	0.009	0.006	0.035	-0.016	0.089	0.180	0.067	0.165	0.016	0.042	0.015	-0.053	0.101
PTB	3.936	0.028	3.885	0.009	0.006	0.051	0.000	0.070	0.201	0.028	0.165	0.016	0.042	0.036	-0.032	0.084
CEM	3.937	0.035	3.885	0.009	0.006	0.052	0.001	0.081	0.186	0.036	0.165	0.016	0.042	0.021	-0.047	0.096
LNE	3.950	0.100	3.885	0.009	0.006	0.065	0.014	0.204	0.230	0.100	0.165	0.016	0.042	0.065	-0.003	0.210
SMU	3.990	0.050	3.885	0.009	0.006	0.105	0.054	0.108	0.260	0.050	0.165	0.016	0.042	0.095	0.027	0.118

Table 6. Estimated results of 200 g transfer mass standards for each participant in relation with the median. (Refer to the section 5.4 and 5.5 to clarify variable symbols.)

Institute	200 g Jx								200 g Jy							
	m_A mg	u_c mg	m_N mg	$u(m_N)$ mg	Δm_N mg	m_{CA} mg	m_{eqA} mg	$U_{95}(m_{eqA})$ mg	m_A mg	u_c mg	m_N mg	$u(m_N)$ mg	Δm_N mg	m_{CA} mg	m_{eqA} mg	$U_{95}(m_{eqA})$ mg
KRISS	0.4230	0.0040	0.4329	0.0013	-0.0046	-0.0099	-0.0214	0.0101	0.0230	0.0040	0.0424	0.0013	0.0085	-0.0194	-0.0330	0.0105
NMIA	0.4430	0.0090	0.4329	0.0013	-0.0046	0.0101	-0.0014	0.0190	0.0440	0.0090	0.0424	0.0013	0.0085	0.0016	-0.0120	0.0193
NMIJ	0.4346	0.0066	0.4329	0.0013	-0.0046	0.0018	-0.0098	0.0146	0.0429	0.0066	0.0424	0.0013	0.0085	0.0005	-0.0131	0.0149
NPL−I	0.4270	0.0160	0.4329	0.0013	-0.0046	-0.0059	-0.0174	0.0326	0.0340	0.0160	0.0424	0.0013	0.0085	-0.0084	-0.0220	0.0327
NIM	0.4500	0.0050	0.4329	0.0013	-0.0046	0.0171	0.0056	0.0118	0.0560	0.0050	0.0424	0.0013	0.0085	0.0136	0.0000	0.0121
CENAM	0.4600	0.0040	0.4485	0.0013	0.0007	0.0115	0.0000	0.0098	-0.0270	0.0040	-0.0408	0.0013	0.0006	0.0138	0.0002	0.0093
INMETRO	0.4610	0.0600	0.4485	0.0013	0.0007	0.0125	0.0010	0.1201	-0.0220	0.0600	-0.0408	0.0013	0.0006	0.0188	0.0052	0.1201
NRC	0.4548	0.0041	0.4485	0.0013	0.0007	0.0063	-0.0052	0.0099	-0.0228	0.0035	-0.0408	0.0013	0.0006	0.0180	0.0044	0.0085
NIST	0.4593	0.0055	0.4485	0.0013	0.0007	0.0108	-0.0007	0.0123	-0.0235	0.0055	-0.0408	0.0013	0.0006	0.0173	0.0037	0.0120
VSL	0.4280	0.0120	0.4186	0.0013	0.0016	0.0094	-0.0021	0.0247	0.0200	0.0120	0.0258	0.0013	0.0076	-0.0058	-0.0194	0.0249
VNIIM	0.4550	0.0040	0.4186	0.0013	0.0016	0.0364	0.0249	0.0098	0.0420	0.0040	0.0258	0.0013	0.0076	0.0162	0.0026	0.0103
GUM	0.4700	0.0200	0.4186	0.0013	0.0016	0.0514	0.0399	0.0404	0.0600	0.0200	0.0258	0.0013	0.0076	0.0342	0.0206	0.0405
INRIM	0.4387	0.0037	0.4186	0.0013	0.0016	0.0201	0.0086	0.0093	0.0329	0.0037	0.0258	0.0013	0.0076	0.0071	-0.0065	0.0098
METAS	0.4454	0.0065	0.4186	0.0013	0.0016	0.0268	0.0153	0.0142	0.0427	0.0065	0.0258	0.0013	0.0076	0.0169	0.0033	0.0145
NPL	0.4520	0.0037	0.4333	0.0013	0.0026	0.0187	0.0072	0.0094	0.0340	0.0037	0.0217	0.0013	0.0060	0.0123	-0.0013	0.0095
PTB	0.4433	0.0028	0.4333	0.0013	0.0026	0.0100	-0.0015	0.0081	0.0309	0.0028	0.0217	0.0013	0.0060	0.0092	-0.0044	0.0081
CEM	0.4454	0.0056	0.4333	0.0013	0.0026	0.0121	0.0006	0.0126	0.0334	0.0055	0.0217	0.0013	0.0060	0.0117	-0.0019	0.0125
LNE	0.4435	0.0070	0.4333	0.0013	0.0026	0.0102	-0.0013	0.0152	0.0371	0.0070	0.0217	0.0013	0.0060	0.0154	0.0018	0.0152
SMU	0.4670	0.0065	0.4333	0.0013	0.0026	0.0337	0.0222	0.0142	0.0410	0.0065	0.0217	0.0013	0.0060	0.0193	0.0057	0.0143

Table 7. Estimated results of 50 g transfer mass standards for each participant in relation with the median. (Refer to the section 5.4 and 5.5 to clarify variable symbols.)

Institute	50 g Jx								50 g Jy							
	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$
	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
KRISS	0.1010	0.0020	0.1047	0.0004	-0.0038	-0.0037	-0.0028	0.0053	-0.0050	0.0020	-0.0011	0.0005	0.0019	-0.0039	-0.0043	0.0047
NMIA	0.1030	0.0035	0.1047	0.0004	-0.0038	-0.0017	-0.0008	0.0078	-0.0030	0.0035	-0.0011	0.0005	0.0019	-0.0019	-0.0023	0.0074
NMIJ	0.1085	0.0026	0.1047	0.0004	-0.0038	0.0038	0.0046	0.0062	0.0003	0.0026	-0.0011	0.0005	0.0019	0.0014	0.0010	0.0058
NPL−I	0.1130	0.0070	0.1047	0.0004	-0.0038	0.0083	0.0092	0.0144	-0.0010	0.0070	-0.0011	0.0005	0.0019	0.0001	-0.0003	0.0142
NIM	0.1060	0.0040	0.1047	0.0004	-0.0038	0.0013	0.0022	0.0087	0.0020	0.0040	-0.0011	0.0005	0.0019	0.0031	0.0027	0.0084
CENAM	0.1321	0.0028	0.1336	0.0004	-0.0004	-0.0015	-0.0006	0.0062	-0.0160	0.0028	-0.0184	0.0005	-0.0005	0.0024	0.0019	0.0061
INMETRO	0.1340	0.0150	0.1336	0.0004	-0.0004	0.0004	0.0013	0.0301	-0.0150	0.0150	-0.0184	0.0005	-0.0005	0.0034	0.0029	0.0301
NRC	0.1420	0.0053	0.1336	0.0004	-0.0004	0.0084	0.0093	0.0109	-0.0126	0.0055	-0.0184	0.0005	-0.0005	0.0058	0.0053	0.0112
NIST	0.1299	0.0039	0.1336	0.0004	-0.0004	-0.0037	-0.0028	0.0082	-0.0202	0.0039	-0.0184	0.0005	-0.0005	-0.0018	-0.0023	0.0081
VSL	0.1290	0.0030	0.1191	0.0004	0.0016	0.0099	0.0108	0.0066	0.0100	0.0030	0.0009	0.0005	0.0043	0.0091	0.0087	0.0069
VNIIM	0.0710	0.0070	0.1191	0.0004	0.0016	-0.0481	-0.0472	0.0143	-0.0470	0.0070	0.0009	0.0005	0.0043	-0.0479	-0.0483	0.0144
GUM	0.1190	0.0110	0.1191	0.0004	0.0016	-0.0001	0.0008	0.0222	-0.0010	0.0110	0.0009	0.0005	0.0043	-0.0019	-0.0023	0.0223
INRIM	0.1164	0.0020	0.1191	0.0004	0.0016	-0.0027	-0.0018	0.0049	0.0013	0.0020	0.0009	0.0005	0.0043	0.0004	0.0000	0.0052
METAS	0.1276	0.0017	0.1191	0.0004	0.0016	0.0085	0.0094	0.0044	0.0137	0.0017	0.0009	0.0005	0.0043	0.0128	0.0124	0.0048
NPL	0.1300	0.0017	0.1346	0.0004	0.0032	-0.0046	-0.0037	0.0047	0.0000	0.0017	0.0011	0.0005	0.0030	-0.0011	-0.0015	0.0045
PTB	0.1326	0.0008	0.1346	0.0004	0.0032	-0.0020	-0.0011	0.0036	-0.0002	0.0008	0.0011	0.0005	0.0030	-0.0013	-0.0017	0.0033
CEM	0.1320	0.0019	0.1346	0.0004	0.0032	-0.0026	-0.0017	0.0050	0.0010	0.0018	0.0011	0.0005	0.0030	-0.0001	-0.0005	0.0046
LNE	0.1337	0.0045	0.1346	0.0004	0.0032	-0.0009	0.0000	0.0096	0.0023	0.0045	0.0011	0.0005	0.0030	0.0012	0.0008	0.0094
SMU	0.1390	0.0028	0.1346	0.0004	0.0032	0.0044	0.0053	0.0064	0.0050	0.0028	0.0011	0.0005	0.0030	0.0039	0.0035	0.0063

Table 8. Estimated results of 1 g transfer mass standards for each participant in relation with the median. (Refer to the section 5.4 and 5.5 to clarify variable symbols.)

Institute	1 g Jx								1 g Jy							
	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$
	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg
KRISS	-6.90	0.30	-7.35	0.22	0.65	0.45	0.20	1.05	-0.60	0.30	-1.04	0.47	1.28	0.44	0.00	1.42
NMIA	-7.10	0.40	-7.35	0.22	0.65	0.25	0.00	1.18	-0.70	0.40	-1.04	0.47	1.28	0.34	-0.10	1.52
NMIJ	-7.09	0.50	-7.35	0.22	0.65	0.26	0.01	1.32	0.01	0.50	-1.04	0.47	1.28	1.05	0.61	1.63
NPL−I	-6.00	1.00	-7.35	0.22	0.65	1.35	1.10	2.18	1.00	1.00	-1.04	0.47	1.28	2.04	1.60	2.38
NIM	-7.10	0.70	-7.35	0.22	0.65	0.25	0.00	1.65	-0.60	0.70	-1.04	0.47	1.28	0.44	0.00	1.90
CENAM	-3.00	0.70	-2.70	0.22	-0.10	-0.30	-0.55	1.60	-3.00	0.70	-2.66	0.47	0.26	-0.34	-0.78	1.76
INMETRO	-1.60	0.60	-2.70	0.22	-0.10	1.10	0.85	1.43	-1.80	0.60	-2.66	0.47	0.26	0.86	0.42	1.61
NRC	-1.40	0.75	-2.70	0.22	-0.10	1.30	1.05	1.69	-1.82	0.70	-2.66	0.47	0.26	0.84	0.40	1.76
NIST	-3.17	0.72	-2.70	0.22	-0.10	-0.47	-0.72	1.64	-2.91	0.72	-2.66	0.47	0.26	-0.25	-0.69	1.79
VSL	-2.00	1.00	-1.36	0.22	0.12	-0.64	-0.89	2.15	-7.00	1.00	-6.88	0.47	0.65	-0.12	-0.56	2.29
VNIIM	-3.40	0.80	-1.36	0.22	0.12	-2.04	-2.29	1.78	-8.00	0.80	-6.88	0.47	0.65	-1.12	-1.56	1.95
GUM	-1.00	1.00	-1.36	0.22	0.12	0.36	0.11	2.15	-7.00	1.00	-6.88	0.47	0.65	-0.12	-0.56	2.29
INRIM	-2.60	0.50	-1.36	0.22	0.12	-1.24	-1.49	1.27	-8.00	0.50	-6.88	0.47	0.65	-1.12	-1.56	1.50
METAS	-1.51	0.73	-1.36	0.22	0.12	-0.15	-0.40	1.66	-6.70	0.73	-6.88	0.47	0.65	0.18	-0.26	1.84
NPL	0.80	0.20	1.20	0.22	1.49	-0.40	-0.65	1.23	-1.10	0.20	-0.48	0.47	1.35	-0.62	-1.06	1.37
PTB	2.20	0.20	1.20	0.22	1.49	1.00	0.75	1.23	0.20	0.20	-0.48	0.47	1.35	0.68	0.24	1.37
CEM	1.40	0.51	1.20	0.22	1.49	0.20	-0.05	1.55	0.15	0.52	-0.48	0.47	1.35	0.63	0.19	1.68
LNE	3.10	1.00	1.20	0.22	1.49	1.90	1.65	2.31	0.10	0.80	-0.48	0.47	1.35	0.58	0.14	2.07
SMU	2.90	0.80	1.20	0.22	1.49	1.70	1.45	1.98	0.90	0.80	-0.48	0.47	1.35	1.38	0.94	2.07

Table 9. Estimated results of 200 mg transfer mass standards for each participant in relation with the median. (Refer to the section 5.4 and 5.5 to clarify variable symbols.)

Institute	200 mg Jx								200 mg Jy							
	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$	m_A	u_c	m_N	$u(m_N)$	Δm_N	m_{CA}	m_{eqA}	$U_{95}(m_{eqA})$
	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg	µg
KRISS	-1.10	0.15	-1.59	0.13	-0.08	0.49	1.68	0.60	6.90	0.15	6.43	0.19	0.48	0.47	1.89	0.76
NMIA	-3.30	0.30	-1.59	0.13	-0.08	-1.71	-0.52	0.79	4.80	0.30	6.43	0.19	0.48	-1.63	-0.21	0.92
NMIJ	-1.29	0.30	-1.59	0.13	-0.08	0.30	1.48	0.79	6.84	0.30	6.43	0.19	0.48	0.41	1.83	0.92
NPL−I	0.00	1.00	-1.59	0.13	-0.08	1.59	2.78	2.07	7.00	1.00	6.43	0.19	0.48	0.57	1.99	2.12
NIM	-3.20	0.50	-1.59	0.13	-0.08	-1.61	-0.42	1.13	4.80	0.50	6.43	0.19	0.48	-1.63	-0.21	1.22
CENAM	-4.00	0.20	-2.35	0.13	-0.80	-1.65	-0.46	0.80	-6.80	0.20	-4.95	0.19	0.26	-1.85	-0.43	0.77
INMETRO	-3.20	0.60	-2.35	0.13	-0.80	-0.85	0.34	1.38	-6.40	0.60	-4.95	0.19	0.26	-1.45	-0.03	1.37
NRC	-3.50	0.90	-2.35	0.13	-0.80	-1.15	0.04	1.93	-5.80	1.00	-4.95	0.19	0.26	-0.85	0.57	2.10
NIST	-4.20	0.19	-2.35	0.13	-0.80	-1.85	-0.66	0.79	-6.31	0.19	-4.95	0.19	0.26	-1.36	0.06	0.76
VSL	-2.80	0.40	-2.34	0.13	-0.18	-0.46	0.72	0.96	7.50	0.40	8.24	0.19	-0.03	-0.74	0.69	1.02
VNIIM	-4.90	0.50	-2.34	0.13	-0.18	-2.56	-1.38	1.13	6.20	0.50	8.24	0.19	-0.03	-2.04	-0.61	1.19
GUM	-3.30	0.60	-2.34	0.13	-0.18	-0.96	0.22	1.31	7.60	0.60	8.24	0.19	-0.03	-0.64	0.79	1.36
INRIM	-4.40	0.40	-2.34	0.13	-0.18	-2.06	-0.88	0.96	5.50	0.40	8.24	0.19	-0.03	-2.74	-1.31	1.02
METAS	-3.85	0.32	-2.34	0.13	-0.18	-1.51	-0.33	0.83	6.52	0.32	8.24	0.19	-0.03	-1.72	-0.30	0.91
NPL	-2.00	0.20	0.69	0.13	3.31	-2.69	-1.50	2.02	-4.40	0.20	-2.63	0.19	1.13	-1.77	-0.35	1.00
PTB	-0.10	0.20	0.69	0.13	3.31	-0.79	0.40	2.02	-3.20	0.20	-2.63	0.19	1.13	-0.57	0.85	1.00
CEM	-0.97	0.23	0.69	0.13	3.31	-1.66	-0.47	2.03	-4.05	0.23	-2.63	0.19	1.13	-1.42	0.00	1.02
LNE	-0.50	0.60	0.69	0.13	3.31	-1.19	0.00	2.32	-3.50	0.45	-2.63	0.19	1.13	-0.87	0.55	1.28
SMU	0.00	0.70	0.69	0.13	3.31	-0.69	0.50	2.43	-7.00	0.70	-2.63	0.19	1.13	-4.37	-2.95	1.67

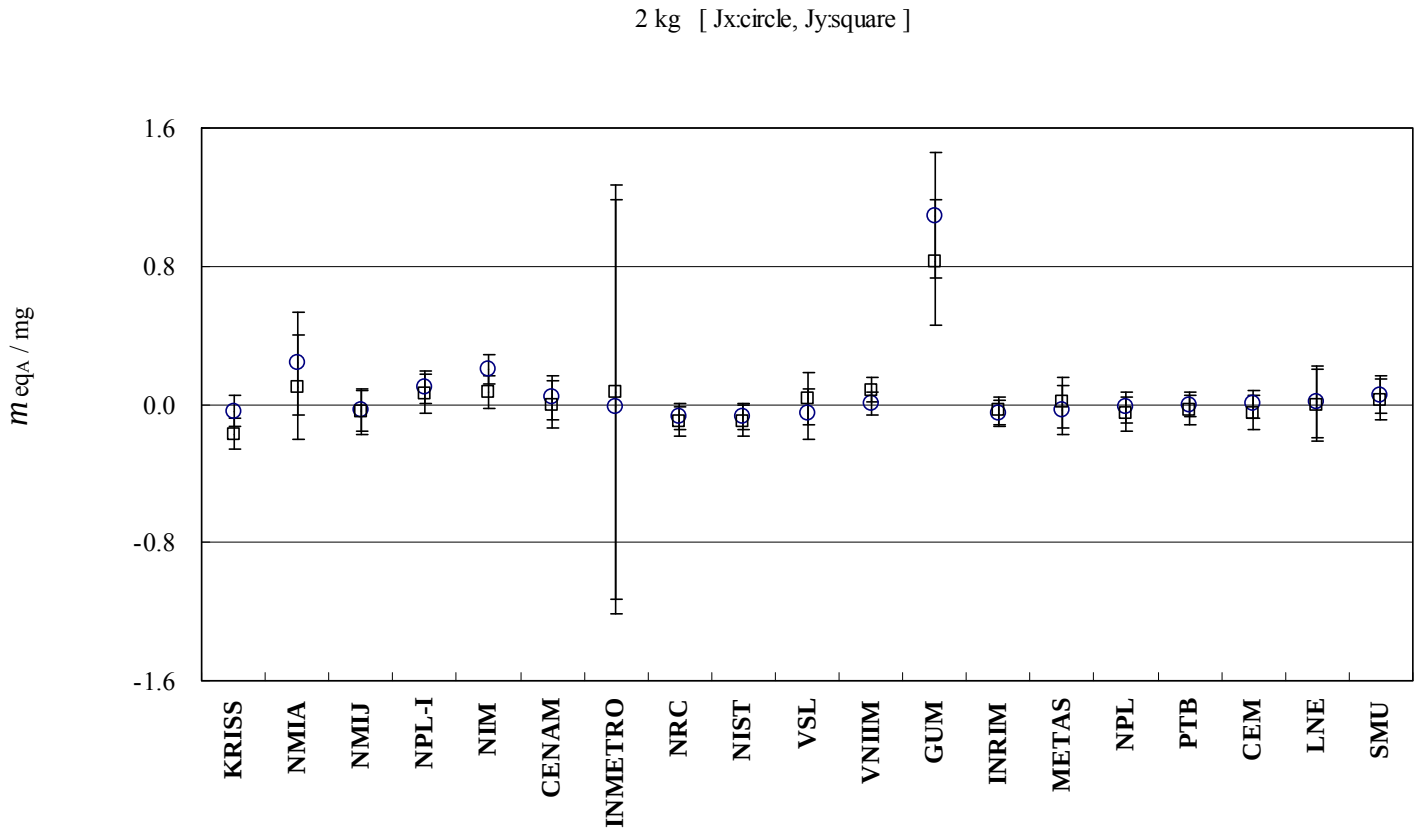

Figure 3. Results of 2 kg mass standard for all participants. The zero line represents the median.
Circle and solid square points represent Jx and Jy standard mass respectively.
Error bars show the expanded uncertainty $U_{95}(m_{\mathrm{eq_A}})$ of each point.
Uncertainties of the median are 0.037 mg for Jx, 0.048 mg for Jy.

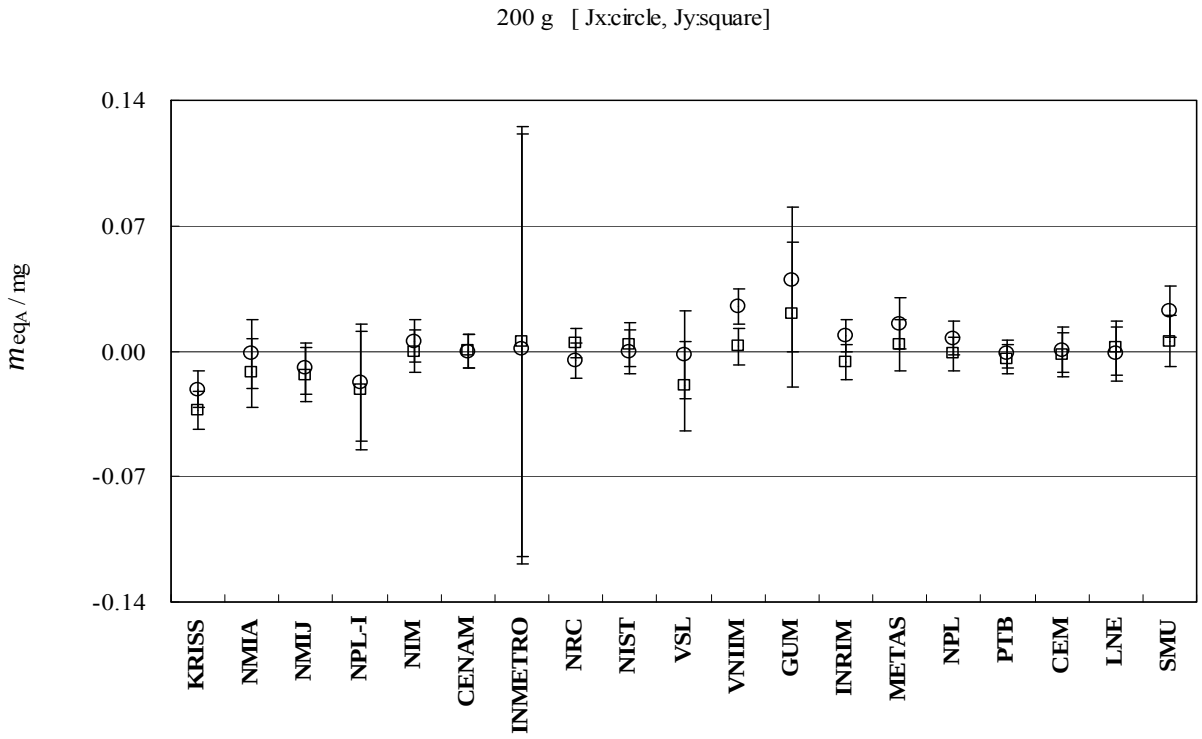

Figure 4. Results of 200 g mass standard for all participants. The zero line represents the median.
Circle and solid square points represent Jx and Jy standard mass respectively.
Error bars show the expanded uncertainty $U_{95}(m_{eq_A})$ of each point.
Uncertainties of the median are 0.0050 mg for Jx, 0.0039 mg for Jy.

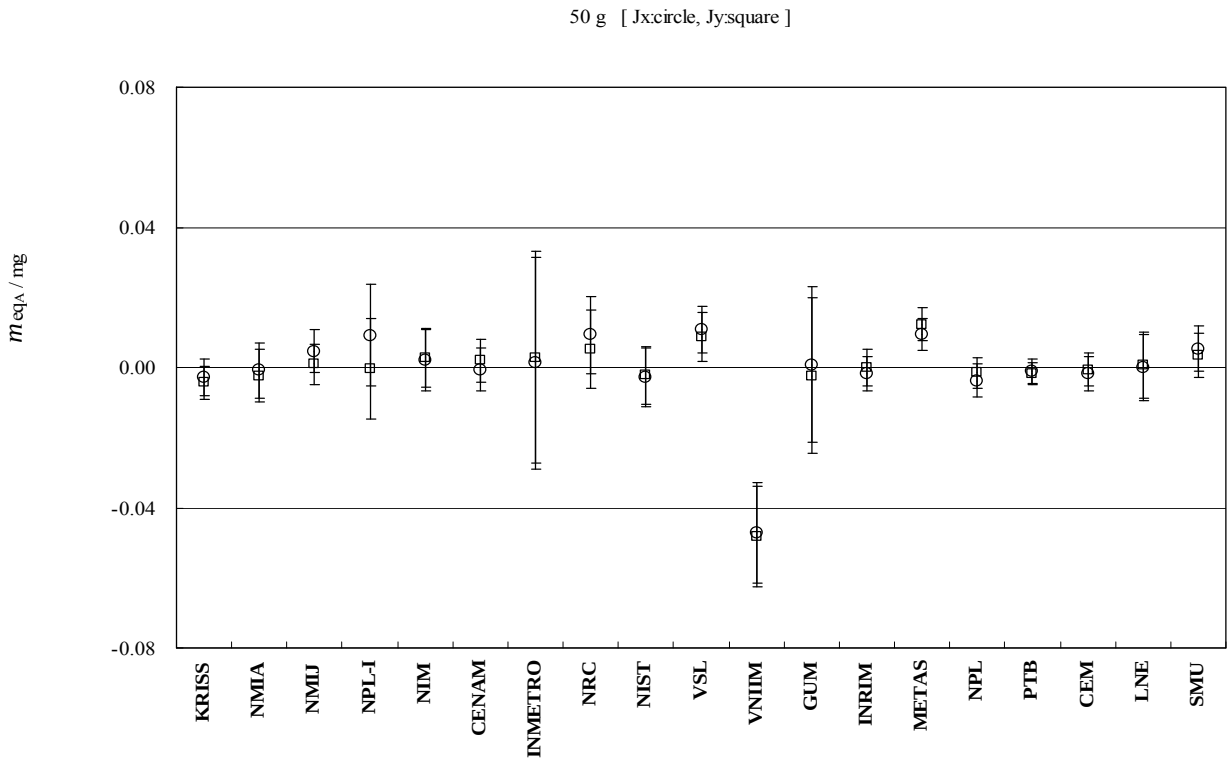

Figure 5. Results of 50 g mass standard for all participants. The zero line represents the median.
Circle and solid square points represent Jx and Jy standard mass respectively.
Error bars show the expanded uncertainty $U_{95}(m_{eq_A})$ of each point.
Uncertainties of the median are 0.0025 mg for Jx, 0.0021 mg for Jy.

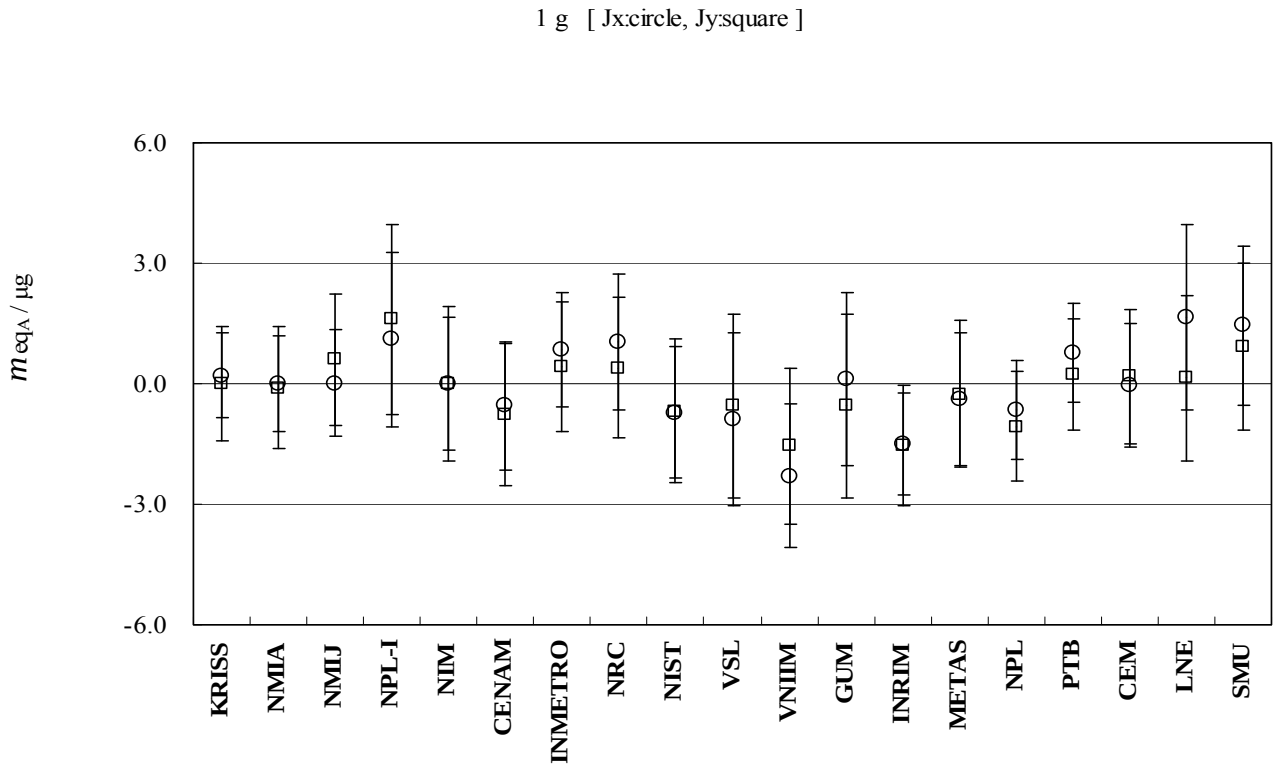

Figure 6. Results of 1 g mass standard for all participants. The zero line represents the median.
Circle and solid square points represent Jx and Jy standard mass respectively.
Error bars show the expanded uncertainty $U_{95}(m_{eq_A})$ of each point.
Uncertainties of the median are 0.00065 mg for Jx, 0.00050 mg for Jy.

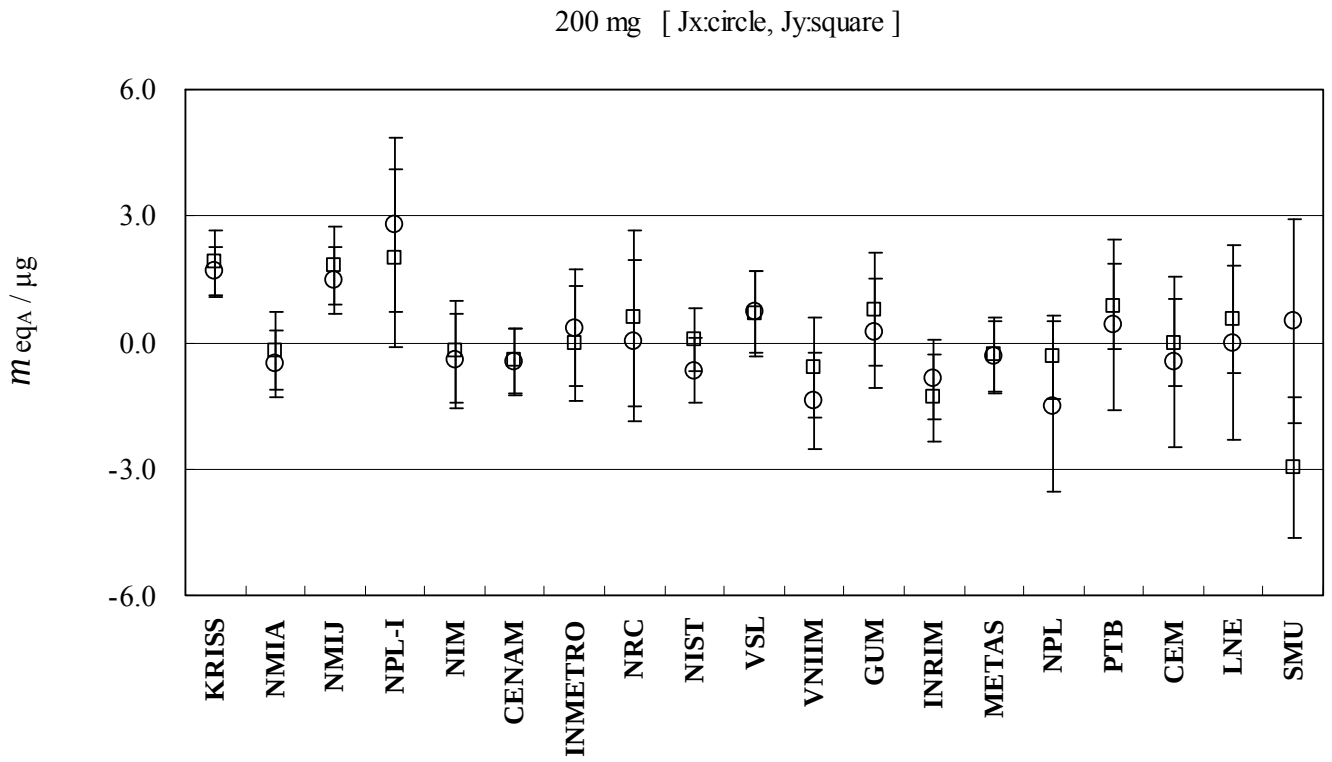

Figure 7. Results of 200 mg mass standard for all participants. The zero line represents the median. Circle and solid square points represent Jx and Jy standard mass respectively. Error bars show the expanded uncertainty $U_{95}(m_{eq_A})$ of each point. Uncertainties of the median are 0.00045 mg for Jx, 0.00051 mg for Jy.

Table 10. (a) Differences of 2 kg-Jx transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 2kg-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		-280	-6	-140	-245	-79	-28	29	33	15	-45	-1135	9	-12	-25	-41	-42	-55	-95
NMIA	280		274	140	35	201	252	309	313	295	235	-855	289	268	255	239	238	225	185
NMIJ	6	-274		-134	-239	-73	-22	35	39	21	-39	-1129	15	-6	-19	-35	-36	-49	-89
NPL−I	140	-140	134		-105	61	112	169	173	155	95	-995	149	128	115	99	98	85	45
NIM	245	-35	239	105		166	217	274	278	260	200	-890	254	233	220	204	203	190	150
CENAM	79	-201	73	-61	-166		51	108	112	94	34	-1056	88	67	54	38	37	24	-16
INMETRO	28	-252	22	-112	-217	-51		57	61	43	-17	-1107	37	16	3	-13	-14	-27	-67
NRC	-29	-309	-35	-169	-274	-108	-57		4	-14	-74	-1164	-20	-41	-54	-70	-71	-84	-124
NIST	-33	-313	-39	-173	-278	-112	-61	-4		-18	-78	-1168	-24	-45	-58	-74	-75	-88	-128
VSL	-15	-295	-21	-155	-260	-94	-43	14	18		-60	-1150	-6	-27	-40	-56	-57	-70	-110
VNIIM	45	-235	39	-95	-200	-34	17	74	78	60		-1090	54	33	20	4	3	-10	-50
GUM	1135	855	1129	995	890	1056	1107	1164	1168	1150	1090		1144	1123	1110	1094	1093	1080	1040
INRIM	-9	-289	-15	-149	-254	-88	-37	20	24	6	-54	-1144		-21	-34	-50	-51	-64	-104
METAS	12	-268	6	-128	-233	-67	-16	41	45	27	-33	-1123	21		-12	-28	-29	-42	-82
NPL	25	-255	19	-115	-220	-54	-3	54	58	40	-20	-1110	34	12		-16	-17	-30	-70
PTB	41	-239	35	-99	-204	-38	13	70	74	56	-4	-1094	50	28	16		-1	-14	-54
CEM	42	-238	36	-98	-203	-37	14	71	75	57	-3	-1093	51	29	17	1		-13	-53
LNE	55	-225	49	-85	-190	-24	27	84	88	70	10	-1080	64	42	30	14	13		-40
SMU	95	-185	89	-45	-150	16	67	124	128	110	50	-1040	104	82	70	54	53	40	

Table 10. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in μg of 2 kg-Jx transfer mass standard values between laboratory A (left column) and laboratory B (top row).

$\boldsymbol{U}$/μg, 2kg-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		305	139	114	110	150	1203	104	105	165	96	370	106	159	115	100	109	217	130
NMIA	305		316	306	305	321	1236	302	303	328	300	467	303	326	306	301	304	357	312
NMIJ	139	316		142	138	172	1206	134	135	185	127	380	135	180	142	131	138	232	155
NPL-I	114	306	142		113	152	1203	107	108	167	99	371	109	161	117	104	112	218	133
NIM	110	305	138	113		148	1203	103	104	164	94	370	104	158	113	99	108	216	129
CENAM	150	321	172	152	148		1207	140	141	191	135	383	143	186	149	139	145	237	162
INMETRO	1203	1236	1206	1203	1203	1207		1202	1202	1209	1201	1253	1202	1208	1203	1202	1202	1217	1204
NRC	104	302	134	107	103	140	1202		91	157	82	367	94	151	104	88	97	211	121
NIST	105	303	135	108	104	141	1202	91		158	84	367	95	152	105	89	99	212	122
VSL	165	328	185	167	164	191	1209	157	158		149	388	155	196	165	155	161	247	176
VNIIM	96	300	127	99	94	135	1201	82	84	149		364	78	142	95	78	88	207	114
GUM	370	467	380	371	370	383	1253	367	367	388	364		366	385	370	366	369	413	375
INRIM	106	303	135	109	104	143	1202	94	95	155	78	366		149	105	90	99	212	122
METAS	159	326	180	161	158	186	1208	151	152	196	142	385	149		159	149	155	243	170
NPL	115	306	142	117	113	149	1203	104	105	165	95	370	105	159		98	107	216	129
PTB	100	301	131	104	99	139	1202	88	89	155	78	366	90	149	98		92	209	116
CEM	109	304	138	112	108	145	1202	97	99	161	88	369	99	155	107	92		213	124
LNE	217	357	232	218	216	237	1217	211	212	247	207	413	212	243	216	209	213		224
SMU	130	312	155	133	129	162	1204	121	122	176	114	375	122	170	129	116	124	224	

Table 11. (a) Differences of 2 kg-Jy transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 2kg-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		-270	-125	-230	-245	-170	-239	-73	-75	-203	-253	-993	-133	-183	-117	-138	-123	-167	-197
NMIA	270		145	40	25	100	31	197	195	67	17	-723	137	87	153	132	147	103	73
NMIJ	125	-145		-105	-120	-45	-114	52	50	-77	-127	-867	-7	-58	9	-12	3	-41	-71
NPL-I	230	-40	105		-15	60	-9	157	155	27	-23	-763	97	47	113	92	107	63	33
NIM	245	-25	120	15		75	6	172	170	42	-8	-748	112	62	128	107	122	78	48
CENAM	170	-100	45	-60	-75		-69	97	95	-33	-83	-823	37	-13	53	32	47	3	-27
INMETRO	239	-31	114	9	-6	69		166	164	36	-14	-754	106	56	122	101	116	72	42
NRC	73	-197	-52	-157	-172	-97	-166		-2	-130	-180	-920	-60	-110	-44	-65	-50	-94	-124
NIST	75	-195	-50	-155	-170	-95	-164	2		-128	-178	-918	-58	-108	-42	-63	-48	-92	-122
VSL	203	-67	77	-27	-42	33	-36	130	128		-50	-790	70	20	86	65	80	36	6
VNIIM	253	-17	127	23	8	83	14	180	178	50		-740	120	70	136	115	130	86	56
GUM	993	723	867	763	748	823	754	920	918	790	740		860	810	876	855	870	826	796
INRIM	133	-137	7	-97	-112	-37	-106	60	58	-70	-120	-860		-50	16	-5	10	-34	-64
METAS	183	-87	58	-47	-62	13	-56	110	108	-20	-70	-810	50		66	45	60	16	-14
NPL	117	-153	-9	-113	-128	-53	-122	44	42	-86	-136	-876	-16	-66		-21	-6	-50	-80
PTB	138	-132	12	-92	-107	-32	-101	65	63	-65	-115	-855	5	-45	21		15	-29	-59
CEM	123	-147	-3	-107	-122	-47	-116	50	48	-80	-130	-870	-10	-60	6	-15		-44	-74
LNE	167	-103	41	-63	-78	-3	-72	94	92	-36	-86	-826	34	-16	50	29	44		-30
SMU	197	-73	71	-33	-48	27	-42	124	122	-6	-56	-796	64	14	80	59	74	30	

Table 11. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in μg of 2 kg-Jy transfer mass standard values between laboratory A (left column) and laboratory B (top row).

$\boldsymbol{U}$/μg, 2kg-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		303	136	125	105	148	1203	100	104	162	91	369	101	156	115	102	111	217	131
NMIA	303		317	312	305	323	1236	303	305	329	301	467	304	326	309	304	307	360	315
NMIJ	136	317		155	140	175	1206	136	139	186	129	380	137	181	148	137	144	236	160
NPL-I	125	312	155		129	166	1205	125	128	179	118	377	126	173	138	126	134	230	151
NIM	105	305	140	129		152	1203	106	109	165	97	371	107	160	120	107	116	220	135
CENAM	148	323	175	166	152		1207	141	144	193	139	384	146	188	156	146	153	241	168
INMETRO	1203	1236	1206	1205	1203	1207		1202	1202	1209	1202	1254	1202	1208	1204	1202	1203	1218	1205
NRC	100	303	136	125	106	141	1202		93	159	85	368	96	153	111	96	107	215	127
NIST	104	305	139	128	109	144	1202	93		161	89	369	100	155	114	100	110	217	130
VSL	162	329	186	179	165	193	1209	159	161		149	388	156	196	169	160	166	250	180
VNIIM	91	301	129	118	97	139	1202	85	89	149		364	80	143	103	87	98	211	120
GUM	369	467	380	377	371	384	1254	368	369	388	364		367	385	372	368	371	415	377
INRIM	101	304	137	126	107	146	1202	96	100	156	80	367		150	112	98	108	215	128
METAS	156	326	181	173	160	188	1208	153	155	196	143	385	150		163	154	160	246	175
NPL	115	309	148	138	120	156	1204	111	114	169	103	372	112	163		105	114	219	133
PTB	102	304	137	126	107	146	1202	96	100	160	87	368	98	154	105		100	212	122
CEM	111	307	144	134	116	153	1203	107	110	166	98	371	108	160	114	100		216	130
LNE	217	360	236	230	220	241	1218	215	217	250	211	415	215	246	219	212	216		227
SMU	131	315	160	151	135	168	1205	127	130	180	120	377	128	175	133	122	130	227	

Table 12. (a) Differences of 200 g-Jx transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 200g-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		-20.0	-11.6	-4.0	-27.0	-21.4	-22.4	-16.2	-20.7	-19.3	-46.3	-61.3	-30.0	-36.7	-28.6	-19.9	-22.0	-20.1	-43.6
NMIA	20.0		8.4	16.0	-7.0	-1.4	-2.4	3.8	-0.7	0.7	-26.3	-41.3	-10.0	-16.7	-8.6	0.1	-2.0	-0.1	-23.6
NMIJ	11.6	-8.4		7.6	-15.4	-9.8	-10.8	-4.6	-9.1	-7.6	-34.6	-49.6	-18.3	-25.0	-16.9	-8.2	-10.3	-8.4	-31.9
NPL-I	4.0	-16.0	-7.6		-23.0	-17.4	-18.4	-12.2	-16.7	-15.3	-42.3	-57.3	-26.0	-32.7	-24.6	-15.9	-18.0	-16.1	-39.6
NIM	27.0	7.0	15.4	23.0		5.6	4.6	10.8	6.3	7.7	-19.3	-34.3	-3.0	-9.7	-1.6	7.1	5.0	6.9	-16.6
CENAM	21.4	1.4	9.8	17.4	-5.6		-1.0	5.2	0.7	2.1	-24.9	-39.9	-8.6	-15.3	-7.2	1.5	-0.6	1.3	-22.2
INMETRO	22.4	2.4	10.8	18.4	-4.6	1.0		6.2	1.7	3.1	-23.9	-38.9	-7.6	-14.3	-6.2	2.5	0.4	2.3	-21.2
NRC	16.2	-3.8	4.6	12.2	-10.8	-5.2	-6.2		-4.5	-3.1	-30.1	-45.1	-13.8	-20.5	-12.4	-3.7	-5.8	-3.9	-27.4
NIST	20.7	0.7	9.1	16.7	-6.3	-0.7	-1.7	4.5		1.4	-25.6	-40.6	-9.3	-16.0	-7.9	0.8	-1.3	0.6	-22.9
VSL	19.3	-0.7	7.6	15.3	-7.7	-2.1	-3.1	3.1	-1.4		-27.0	-42.0	-10.7	-17.4	-9.3	-0.6	-2.7	-0.8	-24.3
VNIIM	46.3	26.3	34.6	42.3	19.3	24.9	23.9	30.1	25.6	27.0		-15.0	16.3	9.6	17.7	26.4	24.3	26.2	2.7
GUM	61.3	41.3	49.6	57.3	34.3	39.9	38.9	45.1	40.6	42.0	15.0		31.3	24.6	32.7	41.4	39.3	41.2	17.7
INRIM	30.0	10.0	18.3	26.0	3.0	8.6	7.6	13.8	9.3	10.7	-16.3	-31.3		-6.7	1.4	10.1	8.0	9.9	-13.6
METAS	36.7	16.7	25.0	32.7	9.7	15.3	14.3	20.5	16.0	17.4	-9.6	-24.6	6.7		8.1	16.8	14.7	16.6	-6.9
NPL	28.6	8.6	16.9	24.6	1.6	7.2	6.2	12.4	7.9	9.3	-17.7	-32.7	-1.4	-8.1		8.7	6.6	8.5	-15.0
PTB	19.9	-0.1	8.2	15.9	-7.1	-1.5	-2.5	3.7	-0.8	0.6	-26.4	-41.4	-10.1	-16.8	-8.7		-2.1	-0.2	-23.7
CEM	22.0	2.0	10.3	18.0	-5.0	0.6	-0.4	5.8	1.3	2.7	-24.3	-39.3	-8.0	-14.7	-6.6	2.1		1.9	-21.6
LNE	20.1	0.1	8.4	16.1	-6.9	-1.3	-2.3	3.9	-0.6	0.8	-26.2	-41.2	-9.9	-16.6	-8.5	0.2	-1.9		-23.5
SMU	43.6	23.6	31.9	39.6	16.6	22.2	21.2	27.4	22.9	24.3	-2.7	-17.7	13.6	6.9	15.0	23.7	21.6	23.5	

Table 12. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in µg of 200 g-Jx transfer mass standard values between laboratory A (left column) and laboratory B (top row).

U/µg, 200g-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		20.0	15.9	33.2	13.3	12.2	120	12.3	14.3	25.7	12.2	41.0	11.8	15.9	11.9	10.8	14.5	16.8	16.0
NMIA	20.0		22.7	36.9	20.9	20.2	121	20.3	21.6	30.3	20.2	44.1	20.0	22.7	20.0	19.4	21.7	23.3	22.7
NMIJ	15.9	22.7		34.8	17.0	16.1	121	16.2	17.8	27.8	16.1	42.4	15.8	19.1	15.9	15.1	18.0	19.8	19.1
NPL-I	33.2	36.9	34.8		33.7	33.3	124	33.3	34.1	40.3	33.3	51.4	33.2	34.8	33.2	32.8	34.2	35.2	34.9
NIM	13.3	20.9	17.0	33.7		13.6	120	13.7	15.5	26.4	13.6	41.5	13.2	17.0	13.3	12.4	15.7	17.8	17.1
CENAM	12.2	20.2	16.1	33.3	13.6		120	11.7	13.8	25.6	11.9	41.0	11.5	15.7	11.6	10.5	14.3	16.6	15.7
INMETRO	120	121	121	124	120	120		120	121	122	120	127	120	121	120	120	121	121	121
NRC	12.3	20.3	16.2	33.3	13.7	11.7	120		14.0	25.6	12.0	41.0	11.6	15.8	11.7	10.7	14.4	16.7	15.8
NIST	14.3	21.6	17.8	34.1	15.5	13.8	121	14.0		26.7	14.1	41.6	13.8	17.4	13.8	12.9	16.2	18.2	17.5
VSL	25.7	30.3	27.8	40.3	26.4	25.6	122	25.6	26.7		25.4	46.7	25.3	27.4	25.4	25.0	26.8	28.1	27.6
VNIIM	12.2	20.2	16.1	33.3	13.6	11.9	120	12.0	14.1	25.4		40.9	11.2	15.5	11.6	10.5	14.3	16.6	15.8
GUM	41.0	44.1	42.4	51.4	41.5	41.0	127	41.0	41.6	46.7	40.9		40.8	42.1	40.9	40.6	41.7	42.6	42.2
INRIM	11.8	20.0	15.8	33.2	13.2	11.5	120	11.6	13.8	25.3	11.2	40.8		15.2	11.2	10.1	14.0	16.3	15.5
METAS	15.9	22.7	19.1	34.8	17.0	15.7	121	15.8	17.4	27.4	15.5	42.1	15.2		15.5	14.7	17.6	19.5	18.8
NPL	11.9	20.0	15.9	33.2	13.3	11.6	120	11.7	13.8	25.4	11.6	40.9	11.2	15.5		9.7	13.7	16.1	15.2
PTB	10.8	19.4	15.1	32.8	12.4	10.5	120	10.7	12.9	25.0	10.5	40.6	10.1	14.7	9.7		12.9	15.4	14.5
CEM	14.5	21.7	18.0	34.2	15.7	14.3	121	14.4	16.2	26.8	14.3	41.7	14.0	17.6	13.7	12.9		18.2	17.4
LNE	16.8	23.3	19.8	35.2	17.8	16.6	121	16.7	18.2	28.1	16.6	42.6	16.3	19.5	16.1	15.4	18.2		19.3
SMU	16.0	22.7	19.1	34.9	17.1	15.7	121	15.8	17.5	27.6	15.8	42.2	15.5	18.8	15.2	14.5	17.4	19.3	

Table 13. (a) Differences of 200 g-Jy transfer mass standard values $\Delta m_{A,B}$ in µg between laboratory A (left column) and laboratory B (top row).

Δm/µg, 200g-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		-21.0	-19.9	-11.0	-33.0	-33.2	-38.2	-37.4	-36.7	-13.6	-35.6	-53.6	-26.5	-36.3	-31.7	-28.6	-31.1	-34.8	-38.7
NMIA	21.0		1.1	10.0	-12.0	-12.2	-17.2	-16.4	-15.7	7.4	-14.6	-32.6	-5.5	-15.3	-10.7	-7.6	-10.1	-13.8	-17.7
NMIJ	19.9	-1.1		8.9	-13.1	-13.3	-18.3	-17.5	-16.8	6.3	-15.7	-33.7	-6.6	-16.4	-11.8	-8.7	-11.2	-14.9	-18.8
NPL-I	11.0	-10.0	-8.9		-22.0	-22.2	-27.2	-26.4	-25.7	-2.6	-24.6	-42.6	-15.5	-25.3	-20.7	-17.6	-20.1	-23.8	-27.7
NIM	33.0	12.0	13.1	22.0		-0.2	-5.2	-4.4	-3.7	19.4	-2.6	-20.6	6.5	-3.3	1.3	4.4	1.9	-1.8	-5.7
CENAM	33.2	12.2	13.3	22.2	0.2		-5.0	-4.2	-3.5	19.6	-2.4	-20.4	6.7	-3.1	1.5	4.6	2.1	-1.6	-5.5
INMETRO	38.2	17.2	18.3	27.2	5.2	5.0		0.8	1.5	24.6	2.6	-15.4	11.7	1.9	6.5	9.6	7.1	3.4	-0.5
NRC	37.4	16.4	17.5	26.4	4.4	4.2	-0.8		0.7	23.8	1.8	-16.2	10.9	1.1	5.7	8.8	6.3	2.6	-1.3
NIST	36.7	15.7	16.8	25.7	3.7	3.5	-1.5	-0.7		23.1	1.1	-16.9	10.2	0.4	5.0	8.1	5.6	1.9	-2.0
VSL	13.6	-7.4	-6.3	2.6	-19.4	-19.6	-24.6	-23.8	-23.1		-22.0	-40.0	-12.9	-22.7	-18.1	-15.0	-17.5	-21.2	-25.1
VNIIM	35.6	14.6	15.7	24.6	2.6	2.4	-2.6	-1.8	-1.1	22.0		-18.0	9.1	-0.7	3.9	7.0	4.5	0.8	-3.1
GUM	53.6	32.6	33.7	42.6	20.6	20.4	15.4	16.2	16.9	40.0	18.0		27.1	17.3	21.9	25.0	22.5	18.8	14.9
INRIM	26.5	5.5	6.6	15.5	-6.5	-6.7	-11.7	-10.9	-10.2	12.9	-9.1	-27.1		-9.8	-5.2	-2.1	-4.6	-8.3	-12.2
METAS	36.3	15.3	16.4	25.3	3.3	3.1	-1.9	-1.1	-0.4	22.7	0.7	-17.3	9.8		4.6	7.7	5.2	1.5	-2.4
NPL	31.7	10.7	11.8	20.7	-1.3	-1.5	-6.5	-5.7	-5.0	18.1	-3.9	-21.9	5.2	-4.6		3.1	0.6	-3.1	-7.0
PTB	28.6	7.6	8.7	17.6	-4.4	-4.6	-9.6	-8.8	-8.1	15.0	-7.0	-25.0	2.1	-7.7	-3.1		-2.5	-6.2	-10.1
CEM	31.1	10.1	11.2	20.1	-1.9	-2.1	-7.1	-6.3	-5.6	17.5	-4.5	-22.5	4.6	-5.2	-0.6	2.5		-3.7	-7.6
LNE	34.8	13.8	14.9	23.8	1.8	1.6	-3.4	-2.6	-1.9	21.2	-0.8	-18.8	8.3	-1.5	3.1	6.2	3.7		-3.9
SMU	38.7	17.7	18.8	27.7	5.7	5.5	0.5	1.3	2.0	25.1	3.1	-14.9	12.2	2.4	7.0	10.1	7.6	3.9	

Table 13. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in μg of 200 g-Jy transfer mass standard values between laboratory A (left column) and laboratory B (top row).

U/μg, 200g-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		20.5	16.5	33.5	14.0	12.9	120	12.3	14.9	26.4	13.6	41.5	13.3	17.0	13.0	12.1	15.3	17.6	16.8
NMIA	20.5		23.0	37.1	21.3	20.6	122	20.3	22.0	30.9	21.1	44.5	20.9	23.5	20.7	20.1	22.3	23.9	23.3
NMIJ	16.5	23.0		35.1	17.5	16.7	121	16.2	18.3	28.4	17.2	42.8	17.0	20.1	16.8	16.0	18.6	20.5	19.9
NPL-I	33.5	37.1	35.1		34.0	33.6	124	33.3	34.4	40.7	33.8	51.8	33.7	35.4	33.6	33.3	34.6	35.6	35.3
NIM	14.0	21.3	17.5	34.0		14.2	121	13.7	16.1	27.1	14.9	41.9	14.6	18.1	14.3	13.5	16.5	18.6	17.9
CENAM	12.9	20.6	16.7	33.6	14.2		120	11.0	13.9	26.0	12.7	41.2	12.3	16.3	12.0	11.0	14.5	16.9	16.1
INMETRO	120	122	121	124	121	120		120	121	123	120	127	120	121	120	120	121	121	121
NRC	12.3	20.3	16.2	33.3	13.7	11.0	120		13.3	25.7	12.1	41.0	11.7	15.9	11.4	10.3	14.0	16.5	15.6
NIST	14.9	22.0	18.3	34.4	16.1	13.9	121	13.3		27.0	14.8	41.9	14.5	18.0	14.2	13.4	16.4	18.5	17.8
VSL	26.4	30.9	28.4	40.7	27.1	26.0	123	25.7	27.0		25.8	46.9	25.6	27.8	26.0	25.6	27.2	28.6	28.1
VNIIM	13.6	21.1	17.2	33.8	14.9	12.7	120	12.1	14.8	25.8		41.1	12.0	16.1	12.8	11.9	15.2	17.5	16.7
GUM	41.5	44.5	42.8	51.8	41.9	41.2	127	41.0	41.9	46.9	41.1		41.0	42.4	41.2	41.0	42.0	42.9	42.6
INRIM	13.3	20.9	17.0	33.7	14.6	12.3	120	11.7	14.5	25.6	12.0	41.0		15.8	12.5	11.5	14.9	17.2	16.4
METAS	17.0	23.5	20.1	35.4	18.1	16.3	121	15.9	18.0	27.8	16.1	42.4	15.8		16.4	15.7	18.3	20.3	19.6
NPL	13.0	20.7	16.8	33.6	14.3	12.0	120	11.4	14.2	26.0	12.8	41.2	12.5	16.4		10.3	14.0	16.4	15.6
PTB	12.1	20.1	16.0	33.3	13.5	11.0	120	10.3	13.4	25.6	11.9	41.0	11.5	15.7	10.3		13.1	15.7	14.8
CEM	15.3	22.3	18.6	34.6	16.5	14.5	121	14.0	16.4	27.2	15.2	42.0	14.9	18.3	14.0	13.1		18.3	17.6
LNE	17.6	23.9	20.5	35.6	18.6	16.9	121	16.5	18.5	28.6	17.5	42.9	17.2	20.3	16.4	15.7	18.3		19.6
SMU	16.8	23.3	19.9	35.3	17.9	16.1	121	15.6	17.8	28.1	16.7	42.6	16.4	19.6	15.6	14.8	17.6	19.6	

Table 14. (a) Differences of 50 g-Jx transfer mass standard values $\Delta m_{A,B}$ in µg between laboratory A (left column) and laboratory B (top row).

Δm/µg, 50g-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		-2.0	-7.5	-12.0	-5.0	-2.2	-4.1	-12.1	0.0	-13.6	44.4	-3.6	-1.0	-12.2	0.9	-1.7	-1.1	-2.8	-8.1
NMIA	2.0		-5.5	-10.0	-3.0	-0.2	-2.1	-10.1	2.0	-11.6	46.4	-1.6	1.0	-10.2	2.9	0.3	0.9	-0.8	-6.1
NMIJ	7.5	5.5		-4.5	2.5	5.3	3.4	-4.6	7.5	-6.2	51.8	3.8	6.4	-4.8	8.3	5.7	6.3	4.6	-0.7
NPL-I	12.0	10.0	4.5		7.0	9.8	7.9	-0.1	12.0	-1.6	56.4	8.4	11.0	-0.2	12.9	10.3	10.9	9.2	3.9
NIM	5.0	3.0	-2.5	-7.0		2.8	0.9	-7.1	5.0	-8.6	49.4	1.4	4.0	-7.2	5.9	3.3	3.9	2.2	-3.1
CENAM	2.2	0.2	-5.3	-9.8	-2.8		-1.9	-9.9	2.2	-11.4	46.6	-1.4	1.2	-10.0	3.1	0.5	1.1	-0.6	-5.9
INMETRO	4.1	2.1	-3.4	-7.9	-0.9	1.9		-8.0	4.1	-9.5	48.5	0.5	3.1	-8.1	5.0	2.4	3.0	1.3	-4.0
NRC	12.1	10.1	4.6	0.1	7.1	9.9	8.0		12.1	-1.5	56.5	8.5	11.1	-0.1	13.0	10.4	11.0	9.3	4.0
NIST	0.0	-2.0	-7.5	-12.0	-5.0	-2.2	-4.1	-12.1		-13.6	44.4	-3.6	-1.0	-12.2	0.9	-1.7	-1.1	-2.8	-8.1
VSL	13.6	11.6	6.2	1.6	8.6	11.4	9.5	1.5	13.6		58.0	10.0	12.6	1.4	14.5	11.9	12.5	10.8	5.5
VNIIM	-44.4	-46.4	-51.8	-56.4	-49.4	-46.6	-48.5	-56.5	-44.4	-58.0		-48.0	-45.4	-56.6	-43.5	-46.1	-45.5	-47.2	-52.5
GUM	3.6	1.6	-3.8	-8.4	-1.4	1.4	-0.5	-8.5	3.6	-10.0	48.0		2.6	-8.6	4.5	1.9	2.5	0.8	-4.5
INRIM	1.0	-1.0	-6.4	-11.0	-4.0	-1.2	-3.1	-11.1	1.0	-12.6	45.4	-2.6		-11.2	1.9	-0.7	-0.1	-1.8	-7.1
METAS	12.2	10.2	4.8	0.2	7.2	10.0	8.1	0.1	12.2	-1.4	56.6	8.6	11.2		13.1	10.5	11.1	9.4	4.1
NPL	-0.9	-2.9	-8.3	-12.9	-5.9	-3.1	-5.0	-13.0	-0.9	-14.5	43.5	-4.5	-1.9	-13.1		-2.6	-2.0	-3.7	-9.0
PTB	1.7	-0.3	-5.7	-10.3	-3.3	-0.5	-2.4	-10.4	1.7	-11.9	46.1	-1.9	0.7	-10.5	2.6		0.6	-1.1	-6.4
CEM	1.1	-0.9	-6.3	-10.9	-3.9	-1.1	-3.0	-11.0	1.1	-12.5	45.5	-2.5	0.1	-11.1	2.0	-0.6		-1.7	-7.0
LNE	2.8	0.8	-4.6	-9.2	-2.2	0.6	-1.3	-9.3	2.8	-10.8	47.2	-0.8	1.8	-9.4	3.7	1.1	1.7		-5.3
SMU	8.1	6.1	0.7	-3.9	3.1	5.9	4.0	-4.0	8.1	-5.5	52.5	4.5	7.1	-4.1	9.0	6.4	7.0	5.3	

Table 14. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in µg of 50 g-Jx transfer mass standard values between laboratory A (left column) and laboratory B (top row).

U/µg, 50g-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		8.4	6.9	14.7	9.2	7.3	30	11.6	9.1	7.7	14.8	22.5	6.2	5.8	6.1	5.3	6.3	10.3	7.5
NMIA	8.4		9.0	15.8	10.9	9.3	31	12.9	10.8	9.6	15.9	23.2	8.5	8.2	8.3	7.8	8.5	11.8	9.5
NMIJ	6.9	9.0		15.1	9.8	8.0	31	12.0	9.7	8.3	15.1	22.7	7.0	6.7	6.9	6.2	7.1	10.8	8.2
NPL-I	14.7	15.8	15.1		16.3	15.3	33	17.7	16.2	15.4	20.0	26.2	14.8	14.6	14.7	14.4	14.8	16.9	15.4
NIM	9.2	10.9	9.8	16.3		10.1	31	13.5	11.4	10.3	16.3	23.5	9.3	9.1	9.2	8.7	9.4	12.4	10.2
CENAM	7.3	9.3	8.0	15.3	10.1		31	12.0	9.6	8.3	15.1	22.7	7.0	6.7	6.9	6.2	7.1	10.8	8.2
INMETRO	30	31	31	33	31	31		32	31	31	33	37	30	30	30	30	30	31	31
NRC	11.6	12.9	12.0	17.7	13.5	12.0	32		13.2	12.3	17.6	24.5	11.4	11.2	11.3	10.9	11.5	14.1	12.2
NIST	9.1	10.8	9.7	16.2	11.4	9.6	31	13.2		9.9	16.1	23.4	8.9	8.6	8.8	8.2	8.9	12.1	9.8
VSL	7.7	9.6	8.3	15.4	10.3	8.3	31	12.3	9.9		15.3	22.8	7.3	7.0	7.3	6.6	7.5	11.1	8.5
VNIIM	14.8	15.9	15.1	20.0	16.3	15.1	33	17.6	16.1	15.3		26.1	14.6	14.5	14.6	14.3	14.7	16.8	15.3
GUM	22.5	23.2	22.7	26.2	23.5	22.7	37	24.5	23.4	22.8	26.1		22.4	22.3	22.4	22.2	22.4	23.9	22.8
INRIM	6.2	8.5	7.0	14.8	9.3	7.0	30	11.4	8.9	7.3	14.6	22.4		5.4	5.7	4.9	6.0	10.1	7.3
METAS	5.8	8.2	6.7	14.6	9.1	6.7	30	11.2	8.6	7.0	14.5	22.3	5.4		5.3	4.4	5.6	9.9	6.9
NPL	6.1	8.3	6.9	14.7	9.2	6.9	30	11.3	8.8	7.3	14.6	22.4	5.7	5.3		4.2	5.5	9.8	6.8
PTB	5.3	7.8	6.2	14.4	8.7	6.2	30	10.9	8.2	6.6	14.3	22.2	4.9	4.4	4.2		4.6	9.4	6.1
CEM	6.3	8.5	7.1	14.8	9.4	7.1	30	11.5	8.9	7.5	14.7	22.4	6.0	5.6	5.5	4.6		10.0	7.0
LNE	10.3	11.8	10.8	16.9	12.4	10.8	31	14.1	12.1	11.1	16.8	23.9	10.1	9.9	9.8	9.4	10.0		10.8
SMU	7.5	9.5	8.2	15.4	10.2	8.2	31	12.2	9.8	8.5	15.3	22.8	7.3	6.9	6.8	6.1	7.0	10.8	

Table 15. (a) Differences of 50 g-Jy transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 50g-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		-2.0	-5.3	-4.0	-7.0	-6.3	-7.3	-9.7	-2.1	-13.0	44.0	-2.0	-4.3	-16.7	-2.8	-2.6	-3.8	-5.1	-7.8
NMIA	2.0		-3.3	-2.0	-5.0	-4.3	-5.3	-7.7	-0.1	-11.0	46.0	0.0	-2.3	-14.7	-0.8	-0.6	-1.8	-3.1	-5.8
NMIJ	5.3	3.3		1.3	-1.7	-1.0	-2.0	-4.4	3.2	-7.7	49.3	3.3	1.0	-11.4	2.5	2.7	1.5	0.2	-2.5
NPL-I	4.0	2.0	-1.3		-3.0	-2.3	-3.3	-5.7	1.9	-9.0	48.0	2.0	-0.3	-12.7	1.2	1.4	0.2	-1.1	-3.8
NIM	7.0	5.0	1.7	3.0		0.7	-0.3	-2.7	4.9	-6.0	51.0	5.0	2.7	-9.7	4.2	4.4	3.2	1.9	-0.8
CENAM	6.3	4.3	1.0	2.3	-0.7		-1.0	-3.4	4.2	-6.8	50.2	4.2	1.9	-10.5	3.5	3.7	2.5	1.2	-1.5
INMETRO	7.3	5.3	2.0	3.3	0.3	1.0		-2.4	5.2	-5.8	51.2	5.2	2.9	-9.5	4.5	4.7	3.5	2.2	-0.5
NRC	9.7	7.7	4.4	5.7	2.7	3.4	2.4		7.6	-3.4	53.6	7.6	5.3	-7.1	6.9	7.1	5.9	4.6	1.9
NIST	2.1	0.1	-3.2	-1.9	-4.9	-4.2	-5.2	-7.6		-11.0	46.0	0.0	-2.3	-14.7	-0.7	-0.5	-1.7	-3.0	-5.7
VSL	13.0	11.0	7.7	9.0	6.0	6.8	5.8	3.4	11.0		57.0	11.0	8.7	-3.7	10.2	10.4	9.2	7.9	5.2
VNIIM	-44.0	-46.0	-49.3	-48.0	-51.0	-50.2	-51.2	-53.6	-46.0	-57.0		-46.0	-48.3	-60.7	-46.8	-46.6	-47.8	-49.1	-51.8
GUM	2.0	0.0	-3.3	-2.0	-5.0	-4.2	-5.2	-7.6	0.0	-11.0	46.0		-2.3	-14.7	-0.8	-0.6	-1.8	-3.1	-5.8
INRIM	4.3	2.3	-1.0	0.3	-2.7	-1.9	-2.9	-5.3	2.3	-8.7	48.3	2.3		-12.4	1.5	1.7	0.5	-0.8	-3.5
METAS	16.7	14.7	11.4	12.7	9.7	10.5	9.5	7.1	14.7	3.7	60.7	14.7	12.4		13.9	14.1	12.9	11.6	8.9
NPL	2.8	0.8	-2.5	-1.2	-4.2	-3.5	-4.5	-6.9	0.7	-10.2	46.8	0.8	-1.5	-13.9		0.2	-1.0	-2.3	-5.0
PTB	2.6	0.6	-2.7	-1.4	-4.4	-3.7	-4.7	-7.1	0.5	-10.4	46.6	0.6	-1.7	-14.1	-0.2		-1.2	-2.5	-5.2
CEM	3.8	1.8	-1.5	-0.2	-3.2	-2.5	-3.5	-5.9	1.7	-9.2	47.8	1.8	-0.5	-12.9	1.0	1.2		-1.3	-4.0
LNE	5.1	3.1	-0.2	1.1	-1.9	-1.2	-2.2	-4.6	3.0	-7.9	49.1	3.1	0.8	-11.6	2.3	2.5	1.3		-2.7
SMU	7.8	5.8	2.5	3.8	0.8	1.5	0.5	-1.9	5.7	-5.2	51.8	5.8	3.5	-8.9	5.0	5.2	4.0	2.7	

Table 15. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in µg of 50 g-Jy transfer mass standard values between laboratory A (left column) and laboratory B (top row).

$\boldsymbol{U}$/µg, 50g-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		8.2	6.7	14.6	9.1	7.1	30	11.8	9.0	7.8	14.9	22.6	6.4	6.1	5.8	5.0	5.9	10.2	7.3
NMIA	8.2		8.8	15.7	10.7	9.1	31	13.2	10.6	9.7	16.0	23.3	8.6	8.4	8.2	7.6	8.3	11.7	9.3
NMIJ	6.7	8.8		15.0	9.6	7.8	30	12.3	9.5	8.5	15.2	22.8	7.2	6.9	6.7	6.0	6.8	10.7	8.0
NPL-I	14.6	15.7	15.0		16.2	15.2	33	17.9	16.1	15.5	20.0	26.3	14.9	14.7	14.6	14.3	14.7	16.8	15.3
NIM	9.1	10.7	9.6	16.2		9.9	31	13.7	11.3	10.5	16.4	23.6	9.5	9.2	9.0	8.5	9.1	12.3	10.1
CENAM	7.1	9.1	7.8	15.2	9.9		31	12.4	9.7	8.7	15.4	22.9	7.5	7.2	6.9	6.2	7.0	10.8	8.2
INMETRO	30	31	30	33	31	31		32	31	31	33	37	30	30	30	30	30	31	31
NRC	11.8	13.2	12.3	17.9	13.7	12.4	32		13.5	12.9	18.0	24.8	12.1	11.9	11.7	11.3	11.8	14.4	12.5
NIST	9.0	10.6	9.5	16.1	11.3	9.7	31	13.5		10.3	16.3	23.5	9.2	9.0	8.8	8.3	8.9	12.1	9.9
VSL	7.8	9.7	8.5	15.5	10.5	8.7	31	12.9	10.3		15.5	23.0	7.7	7.4	7.7	7.1	7.8	11.3	8.9
VNIIM	14.9	16.0	15.2	20.0	16.4	15.4	33	18.0	16.3	15.5		26.2	14.8	14.7	14.8	14.5	14.8	17.0	15.4
GUM	22.6	23.3	22.8	26.3	23.6	22.9	37	24.8	23.5	23.0	26.2		22.5	22.4	22.5	22.3	22.5	24.0	22.9
INRIM	6.4	8.6	7.2	14.9	9.5	7.5	30	12.1	9.2	7.7	14.8	22.5		5.9	6.2	5.5	6.3	10.4	7.7
METAS	6.1	8.4	6.9	14.7	9.2	7.2	30	11.9	9.0	7.4	14.7	22.4	5.9		5.9	5.0	6.0	10.2	7.4
NPL	5.8	8.2	6.7	14.6	9.0	6.9	30	11.7	8.8	7.7	14.8	22.5	6.2	5.9		4.3	5.3	9.8	6.8
PTB	5.0	7.6	6.0	14.3	8.5	6.2	30	11.3	8.3	7.1	14.5	22.3	5.5	5.0	4.3		4.4	9.4	6.2
CEM	5.9	8.3	6.8	14.7	9.1	7.0	30	11.8	8.9	7.8	14.8	22.5	6.3	6.0	5.3	4.4		9.9	7.0
LNE	10.2	11.7	10.7	16.8	12.3	10.8	31	14.4	12.1	11.3	17.0	24.0	10.4	10.2	9.8	9.4	9.9		10.8
SMU	7.3	9.3	8.0	15.3	10.1	8.2	31	12.5	9.9	8.9	15.4	22.9	7.7	7.4	6.8	6.2	7.0	10.8	

Table 16. (a) Differences of 1 g-Jx transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 1g-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		0.20	0.19	-0.90	0.20	0.75	-0.65	-0.85	0.92	1.09	2.49	0.09	1.69	0.60	0.85	-0.55	0.25	-1.45	-1.25
NMIA	-0.20		-0.01	-1.10	0.00	0.55	-0.85	-1.05	0.72	0.89	2.29	-0.11	1.49	0.40	0.65	-0.75	0.05	-1.65	-1.45
NMIJ	-0.19	0.01		-1.09	0.01	0.57	-0.83	-1.03	0.74	0.91	2.31	-0.09	1.51	0.42	0.66	-0.74	0.06	-1.64	-1.44
NPL-I	0.90	1.10	1.09		1.10	1.65	0.25	0.05	1.82	1.99	3.39	0.99	2.59	1.50	1.75	0.35	1.15	-0.55	-0.35
NIM	-0.20	0.00	-0.01	-1.10		0.55	-0.85	-1.05	0.72	0.89	2.29	-0.11	1.49	0.40	0.65	-0.75	0.05	-1.65	-1.45
CENAM	-0.75	-0.55	-0.57	-1.65	-0.55		-1.40	-1.60	0.17	0.34	1.74	-0.66	0.94	-0.15	0.10	-1.30	-0.50	-2.20	-2.00
INMETRO	0.65	0.85	0.83	-0.25	0.85	1.40		-0.20	1.57	1.74	3.14	0.74	2.34	1.25	1.50	0.10	0.90	-0.80	-0.60
NRC	0.85	1.05	1.03	-0.05	1.05	1.60	0.20		1.77	1.94	3.34	0.94	2.54	1.45	1.70	0.30	1.10	-0.60	-0.40
NIST	-0.92	-0.72	-0.74	-1.82	-0.72	-0.17	-1.57	-1.77		0.17	1.57	-0.83	0.77	-0.32	-0.07	-1.47	-0.67	-2.37	-2.17
VSL	-1.09	-0.89	-0.91	-1.99	-0.89	-0.34	-1.74	-1.94	-0.17		1.40	-1.00	0.60	-0.49	-0.24	-1.64	-0.84	-2.54	-2.34
VNIIM	-2.49	-2.29	-2.31	-3.39	-2.29	-1.74	-3.14	-3.34	-1.57	-1.40		-2.40	-0.80	-1.89	-1.64	-3.04	-2.24	-3.94	-3.74
GUM	-0.09	0.11	0.09	-0.99	0.11	0.66	-0.74	-0.94	0.83	1.00	2.40		1.60	0.51	0.76	-0.64	0.16	-1.54	-1.34
INRIM	-1.69	-1.49	-1.51	-2.59	-1.49	-0.94	-2.34	-2.54	-0.77	-0.60	0.80	-1.60		-1.09	-0.84	-2.24	-1.44	-3.14	-2.94
METAS	-0.60	-0.40	-0.42	-1.50	-0.40	0.15	-1.25	-1.45	0.32	0.49	1.89	-0.51	1.09		0.25	-1.15	-0.35	-2.05	-1.85
NPL	-0.85	-0.65	-0.66	-1.75	-0.65	-0.10	-1.50	-1.70	0.07	0.24	1.64	-0.76	0.84	-0.25		-1.40	-0.60	-2.30	-2.10
PTB	0.55	0.75	0.74	-0.35	0.75	1.30	-0.10	-0.30	1.47	1.64	3.04	0.64	2.24	1.15	1.40		0.80	-0.90	-0.70
CEM	-0.25	-0.05	-0.06	-1.15	-0.05	0.50	-0.90	-1.10	0.67	0.84	2.24	-0.16	1.44	0.35	0.60	-0.80		-1.70	-1.50
LNE	1.45	1.65	1.64	0.55	1.65	2.20	0.80	0.60	2.37	2.54	3.94	1.54	3.14	2.05	2.30	0.90	1.70		0.20
SMU	1.25	1.45	1.44	0.35	1.45	2.00	0.60	0.40	2.17	2.34	3.74	1.34	2.94	1.85	2.10	0.70	1.50	-0.20	

Table 16. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in μg of 1 g-Jx transfer mass standard values between laboratory A (left column) and laboratory B (top row).

$\boldsymbol{U}$/μg, 1g-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		1.15	1.30	2.17	1.63	1.69	1.52	1.77	1.72	2.21	1.86	2.21	1.37	1.74	1.34	1.34	1.63	2.37	2.05
NMIA	1.15		1.40	2.23	1.71	1.77	1.61	1.85	1.80	2.27	1.93	2.27	1.47	1.82	1.44	1.44	1.72	2.43	2.11
NMIJ	1.30	1.40		2.31	1.81	1.87	1.72	1.94	1.90	2.35	2.02	2.35	1.59	1.91	1.56	1.56	1.82	2.50	2.20
NPL-I	2.17	2.23	2.31		2.51	2.55	2.44	2.60	2.57	2.92	2.66	2.92	2.35	2.58	2.33	2.33	2.51	3.04	2.80
NIM	1.63	1.71	1.81	2.51		2.11	1.98	2.18	2.13	2.55	2.25	2.55	1.87	2.15	1.84	1.84	2.06	2.69	2.40
CENAM	1.69	1.77	1.87	2.55	2.11		1.90	2.10	2.06	2.52	2.22	2.52	1.83	2.12	1.80	1.80	2.03	2.66	2.38
INMETRO	1.52	1.61	1.72	2.44	1.98	1.90		1.97	1.93	2.41	2.09	2.41	1.68	1.99	1.65	1.65	1.90	2.56	2.26
NRC	1.77	1.85	1.94	2.60	2.18	2.10	1.97		2.13	2.58	2.28	2.58	1.91	2.18	1.88	1.88	2.10	2.72	2.44
NIST	1.72	1.80	1.90	2.57	2.13	2.06	1.93	2.13		2.54	2.24	2.54	1.86	2.14	1.83	1.83	2.06	2.68	2.40
VSL	2.21	2.27	2.35	2.92	2.55	2.52	2.41	2.58	2.54		2.60	2.86	2.28	2.52	2.30	2.30	2.48	3.02	2.77
VNIIM	1.86	1.93	2.02	2.66	2.25	2.22	2.09	2.28	2.24	2.60		2.60	1.94	2.21	1.96	1.96	2.17	2.77	2.50
GUM	2.21	2.27	2.35	2.92	2.55	2.52	2.41	2.58	2.54	2.86	2.60		2.28	2.52	2.30	2.30	2.48	3.02	2.77
INRIM	1.37	1.47	1.59	2.35	1.87	1.83	1.68	1.91	1.86	2.28	1.94	2.28		1.82	1.51	1.51	1.78	2.48	2.16
METAS	1.74	1.82	1.91	2.58	2.15	2.12	1.99	2.18	2.14	2.52	2.21	2.52	1.82		1.85	1.85	2.07	2.69	2.41
NPL	1.34	1.44	1.56	2.33	1.84	1.80	1.65	1.88	1.83	2.30	1.96	2.30	1.51	1.85		1.12	1.46	2.26	1.91
PTB	1.34	1.44	1.56	2.33	1.84	1.80	1.65	1.88	1.83	2.30	1.96	2.30	1.51	1.85	1.12		1.46	2.26	1.91
CEM	1.63	1.72	1.82	2.51	2.06	2.03	1.90	2.10	2.06	2.48	2.17	2.48	1.78	2.07	1.46	1.46		2.44	2.13
LNE	2.37	2.43	2.50	3.04	2.69	2.66	2.56	2.72	2.68	3.02	2.77	3.02	2.48	2.69	2.26	2.26	2.44		2.74
SMU	2.05	2.11	2.20	2.80	2.40	2.38	2.26	2.44	2.40	2.77	2.50	2.77	2.16	2.41	1.91	1.91	2.13	2.74	

Table 17. (a) Differences of 1 g-Jy transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 1g-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		0.10	-0.61	-1.60	0.00	0.78	-0.42	-0.40	0.69	0.56	1.56	0.56	1.56	0.26	1.06	-0.24	-0.19	-0.14	-0.94
NMIA	-0.10		-0.71	-1.70	-0.10	0.68	-0.52	-0.50	0.59	0.46	1.46	0.46	1.46	0.16	0.96	-0.34	-0.29	-0.24	-1.04
NMIJ	0.61	0.71		-0.99	0.61	1.38	0.18	0.20	1.29	1.16	2.16	1.16	2.16	0.86	1.67	0.37	0.42	0.47	-0.33
NPL-I	1.60	1.70	0.99		1.60	2.38	1.18	1.20	2.29	2.16	3.16	2.16	3.16	1.86	2.66	1.36	1.41	1.46	0.66
NIM	0.00	0.10	-0.61	-1.60		0.78	-0.42	-0.40	0.69	0.56	1.56	0.56	1.56	0.26	1.06	-0.24	-0.19	-0.14	-0.94
CENAM	-0.78	-0.68	-1.38	-2.38	-0.78		-1.20	-1.18	-0.09	-0.22	0.78	-0.22	0.78	-0.52	0.29	-1.01	-0.96	-0.91	-1.71
INMETRO	0.42	0.52	-0.18	-1.18	0.42	1.20		0.02	1.11	0.98	1.98	0.98	1.98	0.68	1.49	0.19	0.24	0.29	-0.51
NRC	0.40	0.50	-0.20	-1.20	0.40	1.18	-0.02		1.09	0.96	1.96	0.96	1.96	0.66	1.47	0.17	0.22	0.27	-0.53
NIST	-0.69	-0.59	-1.29	-2.29	-0.69	0.09	-1.11	-1.09		-0.13	0.87	-0.13	0.87	-0.43	0.38	-0.92	-0.87	-0.82	-1.62
VSL	-0.56	-0.46	-1.16	-2.16	-0.56	0.22	-0.98	-0.96	0.13		1.00	0.00	1.00	-0.30	0.51	-0.79	-0.74	-0.69	-1.49
VNIIM	-1.56	-1.46	-2.16	-3.16	-1.56	-0.78	-1.98	-1.96	-0.87	-1.00		-1.00	0.00	-1.30	-0.49	-1.79	-1.74	-1.69	-2.49
GUM	-0.56	-0.46	-1.16	-2.16	-0.56	0.22	-0.98	-0.96	0.13	0.00	1.00		1.00	-0.30	0.51	-0.79	-0.74	-0.69	-1.49
INRIM	-1.56	-1.46	-2.16	-3.16	-1.56	-0.78	-1.98	-1.96	-0.87	-1.00	0.00	-1.00		-1.30	-0.49	-1.79	-1.74	-1.69	-2.49
METAS	-0.26	-0.16	-0.86	-1.86	-0.26	0.52	-0.68	-0.66	0.43	0.30	1.30	0.30	1.30		0.81	-0.49	-0.44	-0.39	-1.19
NPL	-1.06	-0.96	-1.67	-2.66	-1.06	-0.29	-1.49	-1.47	-0.38	-0.51	0.49	-0.51	0.49	-0.81		-1.30	-1.25	-1.20	-2.00
PTB	0.24	0.34	-0.37	-1.36	0.24	1.01	-0.19	-0.17	0.92	0.79	1.79	0.79	1.79	0.49	1.30		0.05	0.10	-0.70
CEM	0.19	0.29	-0.42	-1.41	0.19	0.96	-0.24	-0.22	0.87	0.74	1.74	0.74	1.74	0.44	1.25	-0.05		0.05	-0.75
LNE	0.14	0.24	-0.47	-1.46	0.14	0.91	-0.29	-0.27	0.82	0.69	1.69	0.69	1.69	0.39	1.20	-0.10	-0.05		-0.80
SMU	0.94	1.04	0.33	-0.66	0.94	1.71	0.51	0.53	1.62	1.49	2.49	1.49	2.49	1.19	2.00	0.70	0.75	0.80	

Table 17. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in µg of 1 g-Jy transfer mass standard values between laboratory A (left column) and laboratory B (top row).

U/µg, 1g-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		1.56	1.67	2.40	1.93	2.15	2.03	2.15	2.18	2.61	2.31	2.61	1.95	2.22	1.85	1.85	2.08	2.41	2.41
NMIA	1.56		1.75	2.46	2.00	2.22	2.10	2.22	2.24	2.66	2.37	2.66	2.02	2.28	1.92	1.92	2.15	2.47	2.47
NMIJ	1.67	1.75		2.53	2.09	2.30	2.18	2.30	2.32	2.73	2.45	2.73	2.10	2.36	2.02	2.02	2.23	2.54	2.54
NPL-I	2.40	2.46	2.53		2.72	2.88	2.78	2.88	2.90	3.23	3.00	3.23	2.73	2.93	2.66	2.66	2.83	3.08	3.08
NIM	1.93	2.00	2.09	2.72		2.50	2.39	2.50	2.52	2.90	2.64	2.90	2.32	2.55	2.24	2.24	2.44	2.72	2.72
CENAM	2.15	2.22	2.30	2.88	2.50		2.07	2.19	2.22	2.80	2.53	2.80	2.21	2.45	2.12	2.12	2.33	2.63	2.63
INMETRO	2.03	2.10	2.18	2.78	2.39	2.07		2.07	2.10	2.71	2.43	2.71	2.08	2.34	1.99	1.99	2.21	2.53	2.53
NRC	2.15	2.22	2.30	2.88	2.50	2.19	2.07		2.22	2.80	2.53	2.80	2.21	2.45	2.12	2.12	2.33	2.63	2.63
NIST	2.18	2.24	2.32	2.90	2.52	2.22	2.10	2.22		2.82	2.56	2.82	2.23	2.47	2.15	2.15	2.35	2.65	2.65
VSL	2.61	2.66	2.73	3.23	2.90	2.80	2.71	2.80	2.82		2.75	3.00	2.45	2.67	2.58	2.58	2.75	3.01	3.01
VNIIM	2.31	2.37	2.45	3.00	2.64	2.53	2.43	2.53	2.56	2.75		2.75	2.14	2.39	2.28	2.28	2.48	2.76	2.76
GUM	2.61	2.66	2.73	3.23	2.90	2.80	2.71	2.80	2.82	3.00	2.75		2.45	2.67	2.58	2.58	2.75	3.01	3.01
INRIM	1.95	2.02	2.10	2.73	2.32	2.21	2.08	2.21	2.23	2.45	2.14	2.45		2.04	1.91	1.91	2.14	2.46	2.46
METAS	2.22	2.28	2.36	2.93	2.55	2.45	2.34	2.45	2.47	2.67	2.39	2.67	2.04		2.19	2.19	2.39	2.68	2.68
NPL	1.85	1.92	2.02	2.66	2.24	2.12	1.99	2.12	2.15	2.58	2.28	2.58	1.91	2.19		1.34	1.65	2.05	2.05
PTB	1.85	1.92	2.02	2.66	2.24	2.12	1.99	2.12	2.15	2.58	2.28	2.58	1.91	2.19	1.34		1.65	2.05	2.05
CEM	2.08	2.15	2.23	2.83	2.44	2.33	2.21	2.33	2.35	2.75	2.48	2.75	2.14	2.39	1.65	1.65		2.26	2.26
LNE	2.41	2.47	2.54	3.08	2.72	2.63	2.53	2.63	2.65	3.01	2.76	3.01	2.46	2.68	2.05	2.05	2.26		2.57
SMU	2.41	2.47	2.54	3.08	2.72	2.63	2.53	2.63	2.65	3.01	2.76	3.01	2.46	2.68	2.05	2.05	2.26	2.57	

Table 18. (a) Differences of 200 mg-Jx transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 200mg-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		2.20	0.19	-1.10	2.10	2.14	1.34	1.64	2.34	0.95	3.05	1.45	2.55	2.00	3.18	1.28	2.15	1.68	1.18
NMIA	-2.20		-2.01	-3.30	-0.10	-0.06	-0.86	-0.56	0.14	-1.25	0.85	-0.75	0.35	-0.20	0.98	-0.92	-0.05	-0.52	-1.02
NMIJ	-0.19	2.01		-1.29	1.91	1.94	1.14	1.44	2.14	0.76	2.86	1.26	2.36	1.81	2.98	1.08	1.95	1.48	0.98
NPL-I	1.10	3.30	1.29		3.20	3.24	2.44	2.74	3.44	2.05	4.15	2.55	3.65	3.10	4.28	2.38	3.25	2.78	2.28
NIM	-2.10	0.10	-1.91	-3.20		0.04	-0.76	-0.46	0.24	-1.15	0.95	-0.65	0.45	-0.10	1.08	-0.82	0.05	-0.42	-0.92
CENAM	-2.14	0.06	-1.94	-3.24	-0.04		-0.80	-0.50	0.20	-1.18	0.92	-0.68	0.42	-0.13	1.04	-0.86	0.01	-0.46	-0.96
INMETRO	-1.34	0.86	-1.14	-2.44	0.76	0.80		0.30	1.00	-0.38	1.72	0.12	1.22	0.67	1.84	-0.06	0.81	0.34	-0.16
NRC	-1.64	0.56	-1.44	-2.74	0.46	0.50	-0.30		0.70	-0.68	1.42	-0.18	0.92	0.37	1.54	-0.36	0.51	0.04	-0.46
NIST	-2.34	-0.14	-2.14	-3.44	-0.24	-0.20	-1.00	-0.70		-1.38	0.72	-0.88	0.22	-0.33	0.84	-1.06	-0.19	-0.66	-1.16
VSL	-0.95	1.25	-0.76	-2.05	1.15	1.18	0.38	0.68	1.38		2.10	0.50	1.60	1.05	2.22	0.32	1.19	0.72	0.22
VNIIM	-3.05	-0.85	-2.86	-4.15	-0.95	-0.92	-1.72	-1.42	-0.72	-2.10		-1.60	-0.50	-1.05	0.12	-1.78	-0.91	-1.38	-1.88
GUM	-1.45	0.75	-1.26	-2.55	0.65	0.68	-0.12	0.18	0.88	-0.50	1.60		1.10	0.55	1.72	-0.18	0.69	0.22	-0.28
INRIM	-2.55	-0.35	-2.36	-3.65	-0.45	-0.42	-1.22	-0.92	-0.22	-1.60	0.50	-1.10		-0.55	0.62	-1.28	-0.41	-0.88	-1.38
METAS	-2.00	0.20	-1.81	-3.10	0.10	0.13	-0.67	-0.37	0.33	-1.05	1.05	-0.55	0.55		1.17	-0.73	0.14	-0.33	-0.83
NPL	-3.18	-0.98	-2.98	-4.28	-1.08	-1.04	-1.84	-1.54	-0.84	-2.22	-0.12	-1.72	-0.62	-1.17		-1.90	-1.03	-1.50	-2.00
PTB	-1.28	0.92	-1.08	-2.38	0.82	0.86	0.06	0.36	1.06	-0.32	1.78	0.18	1.28	0.73	1.90		0.87	0.40	-0.10
CEM	-2.15	0.05	-1.95	-3.25	-0.05	-0.01	-0.81	-0.51	0.19	-1.19	0.91	-0.69	0.41	-0.14	1.03	-0.87		-0.47	-0.97
LNE	-1.68	0.52	-1.48	-2.78	0.42	0.46	-0.34	-0.04	0.66	-0.72	1.38	-0.22	0.88	0.33	1.50	-0.40	0.47		-0.50
SMU	-1.18	1.02	-0.98	-2.28	0.92	0.96	0.16	0.46	1.16	-0.22	1.88	0.28	1.38	0.83	2.00	0.10	0.97	0.50	

Table 18. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in µg of 200 mg-Jx transfer mass standard values between laboratory A (left column) and laboratory B (top row).

U/µg, 200mg-Jx	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		0.72	0.72	2.04	1.08	0.77	1.37	1.92	0.76	0.93	1.11	1.29	0.93	0.80	2.01	2.01	2.02	2.31	2.42
NMIA	0.72		0.89	2.10	1.19	0.93	1.46	1.99	0.92	1.07	1.23	1.39	1.07	0.96	2.08	2.08	2.09	2.36	2.47
NMIJ	0.72	0.89		2.10	1.19	0.93	1.46	1.99	0.92	1.07	1.23	1.39	1.07	0.96	2.08	2.08	2.09	2.36	2.47
NPL-I	2.04	2.10	2.10		2.25	2.12	2.40	2.75	2.12	2.19	2.27	2.36	2.19	2.13	2.82	2.82	2.83	3.04	3.12
NIM	1.08	1.19	1.19	2.25		1.23	1.67	2.14	1.22	1.33	1.46	1.61	1.33	1.25	2.23	2.23	2.24	2.50	2.60
CENAM	0.77	0.93	0.93	2.12	1.23		1.37	1.92	0.76	1.07	1.23	1.40	1.07	0.96	2.08	2.08	2.09	2.37	2.47
INMETRO	1.37	1.46	1.46	2.40	1.67	1.37		2.23	1.36	1.56	1.67	1.80	1.56	1.48	2.37	2.37	2.38	2.62	2.72
NRC	1.92	1.99	1.99	2.75	2.14	1.92	2.23		1.91	2.06	2.14	2.24	2.06	2.00	2.72	2.72	2.73	2.95	3.03
NIST	0.76	0.92	0.92	2.12	1.22	0.76	1.36	1.91		1.07	1.22	1.39	1.07	0.95	2.07	2.07	2.09	2.36	2.47
VSL	0.93	1.07	1.07	2.19	1.33	1.07	1.56	2.06	1.07		1.31	1.47	1.16	1.06	2.15	2.15	2.16	2.43	2.53
VNIIM	1.11	1.23	1.23	2.27	1.46	1.23	1.67	2.14	1.22	1.31		1.59	1.31	1.22	2.23	2.23	2.24	2.50	2.60
GUM	1.29	1.39	1.39	2.36	1.61	1.40	1.80	2.24	1.39	1.47	1.59		1.47	1.39	2.32	2.32	2.34	2.58	2.68
INRIM	0.93	1.07	1.07	2.19	1.33	1.07	1.56	2.06	1.07	1.16	1.31	1.47		1.06	2.15	2.15	2.16	2.43	2.53
METAS	0.80	0.96	0.96	2.13	1.25	0.96	1.48	2.00	0.95	1.06	1.22	1.39	1.06		2.09	2.09	2.10	2.38	2.49
NPL	2.01	2.08	2.08	2.82	2.23	2.08	2.37	2.72	2.07	2.15	2.23	2.32	2.15	2.09		2.01	2.02	2.31	2.42
PTB	2.01	2.08	2.08	2.82	2.23	2.08	2.37	2.72	2.07	2.15	2.23	2.32	2.15	2.09	2.01		2.02	2.31	2.42
CEM	2.02	2.09	2.09	2.83	2.24	2.09	2.38	2.73	2.09	2.16	2.24	2.34	2.16	2.10	2.02	2.02		2.32	2.43
LNE	2.31	2.36	2.36	3.04	2.50	2.37	2.62	2.95	2.36	2.43	2.50	2.58	2.43	2.38	2.31	2.31	2.32		2.67
SMU	2.42	2.47	2.47	3.12	2.60	2.47	2.72	3.03	2.47	2.53	2.60	2.68	2.53	2.49	2.42	2.42	2.43	2.67	

Table 19. (a) Differences of 200 mg-Jy transfer mass standard values $\Delta m_{A,B}$ in μg between laboratory A (left column) and laboratory B (top row).

Δm/μg, 200mg-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		2.10	0.06	-0.10	2.10	2.32	1.92	1.32	1.83	1.20	2.50	1.10	3.20	2.19	2.24	1.04	1.89	1.34	4.84
NMIA	-2.10		-2.04	-2.20	0.00	0.22	-0.18	-0.78	-0.27	-0.90	0.40	-1.00	1.10	0.09	0.14	-1.06	-0.21	-0.76	2.74
NMIJ	-0.06	2.04		-0.16	2.04	2.26	1.86	1.26	1.77	1.14	2.44	1.04	3.14	2.13	2.18	0.98	1.83	1.28	4.78
NPL-I	0.10	2.20	0.16		2.20	2.42	2.02	1.42	1.93	1.30	2.60	1.20	3.30	2.29	2.34	1.14	1.99	1.44	4.94
NIM	-2.10	0.00	-2.04	-2.20		0.22	-0.18	-0.78	-0.27	-0.90	0.40	-1.00	1.10	0.09	0.14	-1.06	-0.21	-0.76	2.74
CENAM	-2.32	-0.22	-2.26	-2.42	-0.22		-0.40	-1.00	-0.49	-1.11	0.19	-1.21	0.89	-0.13	-0.08	-1.28	-0.43	-0.98	2.52
INMETRO	-1.92	0.18	-1.86	-2.02	0.18	0.40		-0.60	-0.09	-0.71	0.59	-0.81	1.29	0.27	0.32	-0.88	-0.03	-0.58	2.92
NRC	-1.32	0.78	-1.26	-1.42	0.78	1.00	0.60		0.51	-0.11	1.19	-0.21	1.89	0.87	0.92	-0.28	0.57	0.02	3.52
NIST	-1.83	0.27	-1.77	-1.93	0.27	0.49	0.09	-0.51		-0.62	0.68	-0.72	1.38	0.36	0.41	-0.79	0.06	-0.49	3.01
VSL	-1.20	0.90	-1.14	-1.30	0.90	1.11	0.71	0.11	0.62		1.30	-0.10	2.00	0.98	1.04	-0.16	0.69	0.14	3.64
VNIIM	-2.50	-0.40	-2.44	-2.60	-0.40	-0.19	-0.59	-1.19	-0.68	-1.30		-1.40	0.70	-0.32	-0.26	-1.46	-0.61	-1.16	2.34
GUM	-1.10	1.00	-1.04	-1.20	1.00	1.21	0.81	0.21	0.72	0.10	1.40		2.10	1.08	1.14	-0.06	0.79	0.24	3.74
INRIM	-3.20	-1.10	-3.14	-3.30	-1.10	-0.89	-1.29	-1.89	-1.38	-2.00	-0.70	-2.10		-1.02	-0.96	-2.16	-1.31	-1.86	1.64
METAS	-2.19	-0.09	-2.13	-2.29	-0.09	0.13	-0.27	-0.87	-0.36	-0.98	0.32	-1.08	1.02		0.05	-1.15	-0.30	-0.85	2.65
NPL	-2.24	-0.14	-2.18	-2.34	-0.14	0.08	-0.32	-0.92	-0.41	-1.04	0.26	-1.14	0.96	-0.05		-1.20	-0.35	-0.90	2.60
PTB	-1.04	1.06	-0.98	-1.14	1.06	1.28	0.88	0.28	0.79	0.16	1.46	0.06	2.16	1.15	1.20		0.85	0.30	3.80
CEM	-1.89	0.21	-1.83	-1.99	0.21	0.43	0.03	-0.57	-0.06	-0.69	0.61	-0.79	1.31	0.30	0.35	-0.85		-0.55	2.95
LNE	-1.34	0.76	-1.28	-1.44	0.76	0.98	0.58	-0.02	0.49	-0.14	1.16	-0.24	1.86	0.85	0.90	-0.30	0.55		3.50
SMU	-4.84	-2.74	-4.78	-4.94	-2.74	-2.52	-2.92	-3.52	-3.01	-3.64	-2.34	-3.74	-1.64	-2.65	-2.60	-3.80	-2.95	-3.50	

Table 19. (b) Expanded uncertainty $\boldsymbol{U}_{95}(\Delta m_{A,B})$ in µg of 200 mg-Jy transfer mass standard values between laboratory A (left column) and laboratory B (top row).

$\boldsymbol{U}$/µg, 200mg-Jy	KRISS	NMIA	NMIJ	NPL-I	NIM	CENAM	INMETRO	NRC	NIST	VSL	VNIIM	GUM	INRIM	METAS	NPL	PTB	CEM	LNE	SMU
KRISS		0.82	0.82	2.08	1.14	0.80	1.38	2.12	0.79	1.04	1.20	1.38	1.04	0.93	1.02	1.02	1.04	1.30	1.68
NMIA	0.82		0.97	2.14	1.26	0.95	1.48	2.18	0.94	1.17	1.31	1.47	1.17	1.07	1.14	1.14	1.17	1.40	1.76
NMIJ	0.82	0.97		2.14	1.26	0.95	1.48	2.18	0.94	1.17	1.31	1.47	1.17	1.07	1.14	1.14	1.17	1.40	1.76
NPL-I	2.08	2.14	2.14		2.28	2.13	2.41	2.90	2.13	2.24	2.32	2.41	2.24	2.19	2.22	2.22	2.24	2.37	2.60
NIM	1.14	1.26	1.26	2.28		1.24	1.68	2.32	1.24	1.41	1.54	1.67	1.41	1.33	1.40	1.40	1.41	1.61	1.94
CENAM	0.80	0.95	0.95	2.13	1.24		1.33	2.08	0.69	1.05	1.21	1.38	1.05	0.94	1.03	1.03	1.05	1.31	1.69
INMETRO	1.38	1.48	1.48	2.41	1.68	1.33		2.37	1.32	1.55	1.66	1.79	1.55	1.47	1.53	1.53	1.54	1.73	2.03
NRC	2.12	2.18	2.18	2.90	2.32	2.08	2.37		2.08	2.22	2.30	2.40	2.22	2.17	2.21	2.21	2.22	2.35	2.59
NIST	0.79	0.94	0.94	2.13	1.24	0.69	1.32	2.08		1.05	1.21	1.38	1.05	0.93	1.02	1.02	1.04	1.30	1.69
VSL	1.04	1.17	1.17	2.24	1.41	1.05	1.55	2.22	1.05		1.34	1.49	1.19	1.09	1.23	1.23	1.25	1.47	1.82
VNIIM	1.20	1.31	1.31	2.32	1.54	1.21	1.66	2.30	1.21	1.34		1.61	1.34	1.25	1.37	1.37	1.39	1.59	1.92
GUM	1.38	1.47	1.47	2.41	1.67	1.38	1.79	2.40	1.38	1.49	1.61		1.49	1.41	1.52	1.52	1.54	1.72	2.03
INRIM	1.04	1.17	1.17	2.24	1.41	1.05	1.55	2.22	1.05	1.19	1.34	1.49		1.09	1.23	1.23	1.25	1.47	1.82
METAS	0.93	1.07	1.07	2.19	1.33	0.94	1.47	2.17	0.93	1.09	1.25	1.41	1.09		1.13	1.13	1.16	1.39	1.76
NPL	1.02	1.14	1.14	2.22	1.40	1.03	1.53	2.21	1.02	1.23	1.37	1.52	1.23	1.13		0.94	0.97	1.24	1.64
PTB	1.02	1.14	1.14	2.22	1.40	1.03	1.53	2.21	1.02	1.23	1.37	1.52	1.23	1.13	0.94		0.97	1.24	1.64
CEM	1.04	1.17	1.17	2.24	1.41	1.05	1.54	2.22	1.04	1.25	1.39	1.54	1.25	1.16	0.97	0.97		1.26	1.66
LNE	1.30	1.40	1.40	2.37	1.61	1.31	1.73	2.35	1.30	1.47	1.59	1.72	1.47	1.39	1.24	1.24	1.26		1.83
SMU	1.68	1.76	1.76	2.60	1.94	1.69	2.03	2.59	1.69	1.82	1.92	2.03	1.82	1.76	1.64	1.64	1.66	1.83	