**Supporting information**

**Comparative features of BINP AMS and MICADAS facilities, working at AMS Golden Valley, Russia**

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It can be seen (Table 1S) that, in most cases, the discrepancy between the repeated measurements of graphites by MICADAS is less than 1 sigma uncertainty for a single measurement. In this regard, when averaging the results obtained for 2-4 graphites for one sample, the measurement uncertainty was also considered:

$\overbar{F\left(age\right)}=\frac{\sum\_{i=1}^{N}F\_{i}(age\_{i})/σ\_{i}^{2}}{\sum\_{i=1}^{N}1/σ\_{i}^{2}}$ (1)

$stdev=\sqrt{\frac{1}{\sum\_{i=1}^{N}1/σ\_{i}^{2}}}$ (2)

When *stdev* was less than the mean measurement uncertainty, it was taken equal to the latter:

$stdev=\sqrt{\frac{\left(F\left(age\right)-\overbar{F\left(age\right)}\right)^{2}}{N-1}}$ (3)

The formula (2) was used for most of the samples from MICADAS, except of samples G, I, K, L when formula (3) was used. Oppositely, the formula (3) was used for samples from BINP AMS, except of J, O, Q.

The calculation of the one-sample t-test was the following:

$t=\frac{\left|\overbar{F\left(age\right)\_{1}}-\overbar{true}\right|}{stdev/\sqrt{N}}$, (4)

For the independent two-sample t-test to assess the statistical significance (p-value) between AGE-3 and ACS, the following values were calculated:

$t=\frac{\left|\overbar{F\left(age\right)\_{1}}-\overbar{F\left(age\right)\_{2}}\right|}{s}$, (5)

$s=\sqrt{\frac{stdev\_{1}^{2}}{N\_{1}}-\frac{stdev\_{2}^{2}}{N\_{2}}}$, (6)

$n=N\_{1}+N\_{2}-2$ (7)

where “1” and “2” refer to MICADAS and BINP AMS series.

The results of these manipulations are shown in Table 2. The statistical significance is below 0.05 for samples O and Q in BINP AMS series, with the rest of the samples having no or minor differences.

Table 1S. Student’s t-test comparing mean values (F or radiocarbon age) of GIRI samples, graphitized by AGE-3, and then measured on MICADAS-28 and BINP AMS, with preliminary consensus mean values (Scott et al. 2023) as specified ones (true), and t-test of the values from MICADAS-28 and BINP AMS.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Preliminary consensus values**  | **MICADAS ⋛ true** | **BINP AMS ⋛ true** | **MICADAS ⋛ BINP AMS** |
|  | **True** | **One-sample t-test** | **One-sample t-test** | **Two-sample t-test** |
|  | **Mean F** | **stdev** | **N** | **Mean F** | **stdev** | **N** | **t** | **p-value** | **Mean F** | **stdev** | **N** | **t** | **p-value** | **n** | **s** | **t** | **p-value** |
| **A** | 1.1643 | 0.0075 | 99 | 1.1638 | 0.0030 | 2 | 0.22 | 0.86 | 1.1835 | 0.0134 | 2 | 2.02 | 0.29 | 2 | 0.010 | 2.02 | 0.18 |
| **C** | 1.0227 | 0.0072 | 98 | 1.0075 | 0.0041 | 1 | 3.76 |  | 1.0460 | 0.0410 | 2 | 0.80 | 0.57 | 1 | 0.029 | 1.32 | 0.41 |
| **F** | 1.0162 | 0.0117 | 96 | 1.0174 | 0.0026 | 2 | 0.63 | 0.64 | 1.0290 | 0.0495 | 2 | 0.37 | 0.78 | 2 | 0.035 | 0.33 | 0.77 |
| **N** | 0.002146 | 0.00181 | 104 | 0.0021 | 0.0004 | 2 | 0.17 | 0.89 | 0.0009 | 0.0015 | 2 | 1.17 | 0.45 | 2 | 0.001 | 1.09 | 0.39 |
| **M** | n.d. | n.d. |  | 0.982 | 0.003 | 2 |  |  | 1.001 | 0.021 | 2 |  |  | 2 | 0.015 | 1.25 | 0.34 |
| **Q** | n.d. | n.d. |  | 0.959 | 0.003 | 2 |  |  | 1.015 | 0.005 | 2 |  |  | 2 | 0.004 | 13.32 | **0.01** |
|  | **Mean age** |  |  | **Mean age** |  |  |  |  | **Mean age** |  |  |  |  |  |  |  |  |
| **B** | 11813 | 110 | 98 | 11832 | 29 | 2 | 0.92 | 0.53 | 12278 | 247 | 2 | 2.65 | 0.23 | 2 | 176 | 2.53 | 0.13 |
| **D** | 3826 | 70.5 | 98 | 3806 | 22 | 2 | 1.28 | 0.42 | 4073 | 273 | 2 | 1.28 | 0.42 | 2 | 194 | 1.38 | 0.30 |
| **E** | 378 | 48.56 | 113 | 359 | 21 | 2 | 1.30 | 0.42 | 363 | 434 | 2 | 0.05 | 0.97 | 2 | 307 | 0.01 | 0.99 |
| **G** | 4523 | 48.5 | 112 | 4529 | 41 | 2 | 0.22 | 0.86 | 4565 | 273 | 2 | 0.22 | 0.86 | 2 | 195 | 0.18 | 0.87 |
| **H** | 2208 | 44 | 50 | 2213 | 21 | 2 | 0.31 | 0.81 |  |  |  |  |  |  |  |  |  |
| **I** | 23644 | 168 | 95 | 23517 | 89 | 4 | 2.86 | 0.07 |  |  |  |  |  |  |  |  |  |
| **J** | 38571 | 886 | 99 | 38243 | 314 | 3 | 1.81 | 0.21 | 37867 | 404 | 2 | 2.46 | 0.25 | 3 | 338 | 1.11 | 0.35 |
| **K** | 12780 | 114 | 94 | 12809 | 47 | 4 | 1.24 | 0.30 | 12505 | 277 | 4 | 1.98 | 0.14 | 6 | 141 | 2.16 | 0.07 |
| **L** | 2241 | 58 | 48 | 2416 | 78 | 2 | 3.15 | 0.20 |  |  |  |  |  |  |  |  |  |
| **M** | 132 | 32 | 91 | 146 | 22 | 2 | 0.87 | 0.54 |  |  |  |  |  |  |  |  |  |
| **O** | 11826 | 153 | 106 | 11783 | 29 | 2 | 2.08 | 0.29 | 12780 | 84 | 2 | 15.97 | **0.04** | 2 | 63 | 15.78 | **0.004** |
| **P** | 2227 | 62 | 112 | 2222 | 23 | 2 | 0.31 | 0.81 | 1950 | 322 | 2 | 1.22 | 0.44 | 2 | 228 | 1.19 | 0.36 |
| **Q** | 336 | 46 | 83 | 332 | 22 | 2 | 0.24 | 0.85 |  |  |  |  |  |  |  |  |  |