

EGU2020-22506

<https://doi.org/10.5194/egusphere-egu2020-22506>

EGU General Assembly 2020

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## Consistent data compilation and error propagation for stable isotope data to compile meaningful reference values and uncertainties

**Manfred Groening**

IAEA, Terrestrial Environment Laboratory, Vienna, Austria (m.groening@iaea.org)

Nowadays stable isotope data need to be accompanied by meaningful uncertainty statements for their full utilisation, whether to evaluate their isotopic composition as evidence for origin of samples, for observation and proper evaluation of small isotopic trends due to transient effects, or to their use as laboratory standards. The Guide of Expression of Uncertainty in Measurements (GUM) provides a general framework to perform the task to calculate data with combined standard uncertainties. However, combining several such measurement data in a proper way is not straightforward without consideration of the correlation matrix and mathematical complicated elaborations. An Excel based tool provides means for any laboratory to calculate individual data with their associated combined standard uncertainties, including all major sources of uncertainty like the repeatability and long-term reproducibility of measurements, the possible bias of quality controls, the assigned uncertainty of used reference materials and their measurement data scatter. The tool further allows to calculate and correct memory effects and drifts as occurring in measurements. Standardised correction means allow the merging of data from different instruments with varying performance. This provides ultimately the means to combine such data without compromising the validity of the calculated combined standard uncertainty of the average value. This constitutes the possibility to produce a meaningful reference value with associated combined standard uncertainty from heterogeneous data, e.g. for the purpose to characterize a laboratory reference material by use of independent methods. The tool (SICalib) is available free of charge, is based on Excel macros as a standalone tool for measured rawdata files without the requirement of any particular database or other tool, and is still under further development. Its intention is complementary to available data management systems with a focus of proper uncertainty propagation.