An International Study of the Marine Biogeochemical
Cycles of Trace Elements and their Isotopes

GEOTRACES Quality Flag Policy

When submitting data, researchers should assign a quality flag to each data value. Researchers can use **any quality flag scheme** provided that the scheme is defined in the metadata submitted along with the data.

However, GEOTRACES recommends the **SeaDataNet** Scheme (https://www.seadatanet.org/) which is described in the table below, as it includes a flag for values below detection limits.

Key	Entry Term	Abbreviated term	Term definition
0	no quality control	none	No quality control procedures have been applied to the data value. This is the initial status for all data values entering the working archive.
1	good value	good	Good quality data value that is not part of any identified malfunction and has been verified as consistent with real phenomena during the quality control process.
2	probably good value	probably_good	Data value that is probably consistent with real phenomena but this is unconfirmed or data value forming part of a malfunction that is considered too small to affect the overall quality of the data object of which it is a part.
3	probably bad value	probably_bad	Data value recognised as unusual during quality control that forms part of a feature that is probably inconsistent with real phenomena.
4	bad value	bad	An obviously erroneous data value.
5	changed value	changed	Data value adjusted during quality control. Best practice strongly recommends that the value before the change be preserved in the data or its accompanying metadata.
6	value below detection	BD	The level of the measured phenomenon was too small to be quantified by the technique employed to measure it. The accompanying value is the detection limit for the technique or zero if that value is unknown.
7	value in excess	excess	The level of the measured phenomenon was too large to be quantified by the technique employed to measure it. The accompanying value is the measurement limit for the technique.
8	interpolated value	interpolated	This value has been derived by interpolation from other values in the data object.
9	missing value	missing	The data value is missing. Any accompanying value will be a magic number representing absent data.
A	value phenomenon uncertain	ID_uncertain	There is uncertainty in the description of the measured phenomenon associated with the value such as chemical species or biological entity.

We anticipate that most data sets would use flag 2 (rather than flag 1) to identify data the analyst believes is accurate. We recommend using flag 6 for values below the detection limit. The method detection limit (MDL) is defined as the concentration of a substance that can be reported to be greater than zero with some specified degree of confidence (usually 95% or 99%). In practice, this is usually calculated using two or three times the standard deviation from multiple

analyses (usually at least 7) of a low sample or matrix blank spiked with a low concentration of the analyte of interest. In any case, the method used to determine the detection limit must be defined in the associated metadata. Flag 9 (for missing data) would be used when a sample was simply not collected, or when a sample might have been lost. Once again, the metadata should explain why those data are missing.

The SeaDataNet QC manual is also available to download (https://www.seadatanet.org/Standards/Data-Quality-Control)