

Parameter Naming Conventions

All of the GEOTRACES parameter names that are used in the Intermediate Data Products are sorted into Domains; these are used to separate different types of datasets and to cluster different sets of parameters:

1. **Aerosols** - all measurements associated with aerosols, with different collection and analytical methods.
2. **BioGEOTRACES** - Biological measurements (including pigments, DNA parameters, cell quotas and proteins)
3. **Dissolved TEIs** - dissolved trace metals, ligands, radionuclides, rare earth elements and their isotopes,
4. **Hydrography and Biogeochemistry** - Including temperature, salinity, oxygen, major nutrients and their isotopes and noble gases
5. **Particulate TEIs** - particulate trace metals, ligands, radionuclides and major phases, and their isotopes
6. **Precipitation** - all measurements associated with rain and with freshly falling snow, with different collection and analytical methods.
7. **Polar** - unique samples from polar expeditions, also cross listed with “Dissolved TEIs,” “Precipitation,” “Particulate TEIs,” “Hydrography and Nutrients,” “Ligands” and, with “BioGEOTRACES” to facilitate locating this information.
8. **Ligands** - dissolved and particulate ligands also cross listed with “Dissolved TEIs”, “Particulate TEIs” and with “Polar” to facilitate locating this information.

GEOTRACES Intermediate Data Products employ the following parameter naming scheme. Standard hydrographic parameters, such as temperature, salinity and oxygen use names as defined in the WOCE/CLIVAR naming convention (CTDTMP, CTDSAL and CTDOXY for temperature, salinity and oxygen from CTD sensors; <https://exchange-format.readthedocs.io/en/latest/parameters.html>). Other hydrographic and biogeochemistry parameters use names defined intuitively. Examples are PRESSURE for the CTD pressure at the bottle sample depth, SALINITY, PHOSPHATE, NITRATE, and SILICATE for salinity, phosphate, nitrate and silicate measured on bottle samples. Note that NO₃ and NO₂ are used in the Precipitation Domain parameter names. Biogeochemistry parameters use names defined by SCOR naming conventions (e.g., HPLC pigments; Roy et al., 2011) or names that intuitively define the parameters (e.g., nifH_UCYN-A_DNA_P_CONC_BOTTLE; concentration of nifH genes from uncultured unicellular cyanobacteria (UCYN-A) particles (P) in a bottle sample).

All other trace elements and isotope names are composed of up to six separate tokens as shown below. Tokens 2 and 3 are optional, while all other tokens are mandatory for trace elements and isotopes, nutrients and biogeochemistry parameters. A few physical parameters that do not align with the convention of 4 to 6 tokens are exempt from the requirement to include Phase, Data Type and Sampling system (see examples below). This is indicated by “_NONE” in the examples list.

1	2	3	4	5	6
Element/ Compound	[_Oxidation State]	[_Atomic Mass]	_Phase	_DataType	_Sampling System

Explanations

#	Explanation	Example
1	Element or compound (mandatory); information about TEI speciation (e.g., methylation of TEIs, such as Me_MM, Me_DM and free inorganic elements (Me')) is incorporated into the first token.	Fe, Th, DIC, NITRATE, L1Fe
2	Oxidation state as roman number (optional)	_II, _IV, _III_V_ where III and V are combined
3	Atomic mass (optional); two entries for isotope ratios	_228, _208_204
4	Phase on which element or compound was measured (mandatory); may include two components (e.g., _R_TD_ refers to the Total Dissolvable concentration of a constituent in Rain). The default is "seawater" when the medium (e.g., R (rain), A (aerosol), SNOW, ICE is not given. Note that "CELL" is considered a phase where cell quotas are presented.	_A (aerosol) _C (colloidal) _D (dissolved) _DL (dissolved labile) _LPT (large particulate, total (unleached)) _R (rain) _S (soluble) _SMLH2O (soluble mild leach with ultrapure water) _SMLSW (soluble mild leach with seawater) _SSLNH4AC (soluble strong leach with ammonium acetate) _SSLHAC (soluble strong leach with acetic acid) _SP (small particulate) _SPL (small particulate, labile fraction) _SPR (small particulate, refractory fraction) _SPT (small particulate, total (unleached)) _T (total: dissolved plus particulate) _TD (total dissolvable) _TP (total particulate) _TPL (total particulate, labile fraction) _TPR (total particulate, refractory fraction) _CELL (specific individual cell) _ICE (ice) _ICE_D (dissolved on melted ice) _ICE_TD (total dissolvable on melted ice) _ICE_T (total dissolved plus particulate on melted ice) _ICE_TP (total particulate on melted ice) _SNOW (snow) _SNOW_D (dissolved on melted snow) _SNOW_TD (total dissolvable on melted snow) _SNOW_T (total dissolved plus particulate on melted snow) _SNOW_TP (total particulate on melted snow)
5	DataType (mandatory)	_CONC (concentration) _DELTA (isotope ratio in delta notation) _EPSILON (isotope ratio in epsilon notation) _LogK (log of binding constant of ligand)

		_RATIO (atomic abundance ratio of isotopes or molecular ratio of gases)
6	Sampling system (mandatory)	_BOTTLE (Niskin or similar water sampling bottle) _FISH (trace-metal clean towed surface sampler) _PUMP (either in-situ pump or on-deck pump) _UWAY (ship's underway surface seawater) _HIVOL (high-volume aerosol sampler) _LOWVOL (low-volume aerosol sampler) _FINE_IMPACTOR (size-fractionated aerosols, small fraction) _COARSE_IMPACTOR (size-fractionated aerosols, large fraction) _AUTO (automated rain or snow sampler) _MAN (rain or snow sampler with manual on-off controls) _CORER (ICE cores) _GRAB (ICE or SNOW grab samples) _SUBICE_PUMP (seawater collected from an ice floe using a pump) _BOAT_PUMP (seawater collected from a small boat using a pump) _MELTPOND_PUMP (collected from a meltpond using a pump)

Examples

Parameter Name	Parameter description
Fe_D_CONC_BOTTLE	Concentration of dissolved Fe
Fe_II_D_CONC_BOTTLE	Concentration of dissolved Fe(II)
Fe_II_TP_CONC_BOTTLE	Concentration of total particulate Fe(II) determined by filtration from a water sampling bottle
Fe_TPL_CONC_BOTTLE	Concentration of labile particulate iron determined by filtration from a water sampling bottle
Nd_143_144_D_RATIO_BOTTLE	Atom ratio of given isotopes for dissolved Nd
Nd_143_144_D_EPSILON_BOTTLE	Atom ratio of dissolved Nd isotopes expressed in conventional EPSILON notation
Cd_114_110_D_DELTA_BOTTLE	Atom ratio of dissolved Cd isotopes expressed in conventional DELTA notation
Cu_Cu'_D_CONC_BOTTLE	Concentration of dissolved inorganic Cu
Pb_206_204_D_RATIO_BOTTLE	Atom ratio of given isotopes for dissolved Pb
DIC_13_12_D_DELTA_BOTTLE	Atom ratio of given isotopes for dissolved C as DIC in delta notation
DIC_14_12_D_DELTA_BOTTLE	Atom ratio of radiocarbon as dissolved C in DIC in DELTA notation
NITRATE_15_14_D_DELTA_BOTTLE	Atom ratio of given isotopes for dissolved N as nitrate in delta notation
L1_Fe_D_CONC_BOTTLE	Concentration of dissolved L1 Fe-binding ligand
L1_Fe_D_LogK_BOTTLE	Log of the stability constant of L1 Fe
HOMOCYS_D_CONC_BOTTLE	Concentration of dissolved homocysteine

Chl a_HPLC_TP_CONC_BOTTLE	Concentration of particulate Chlorophyll a measured using HPLC method
nifH_UCYN-A_DNA_TP_CONC_BOTTLE	Abundance nifH Uncultured unicellular cyanobacteria (UCYN-A)
AI_A_T_CONC_HIVOL	Total aerosol Al concentration, high-volume sampler
AI_A_SMLH2O_CONC_HIVOL	Soluble aerosol Al concentration, mild leach with ultrapure water, high-volume sampler
AI_A_SMLSW_CONC_HIVOL	Soluble aerosol Al concentration, mild leach with seawater, high-volume sampler
AI_A_SMLH2O_CONC_COARSE_IMPACTOR	Soluble aerosol Al concentration, mild leach with ultrapure water, coarse fraction, impactor sampler
AI_A_SMLH2O_CONC_FINE_IMPACTOR	Soluble aerosol Al concentration, mild leach with ultrapure water, fine fraction, impactor sampler
AI_A_SSLNH4AC_CONC_HIVOL	Soluble aerosol Al concentration, strong leach with ammonium acetate, high-volume sampler
AI_A_SSLNH4AC_CONC_COARSE_IMPACTOR	Soluble aerosol Al concentration, strong leach with ammonium acetate, coarse fraction, impactor sampler
AI_A_SSLNH4AC_CONC_FINE_IMPACTOR	Soluble aerosol Al concentration, strong leach with ammonium acetate, fine fraction, impactor sampler
CTDTMP	Example of a parameter that is exempt from the requirement to include Phase, Data Type and Sampling System: Temperature measured by a CTD profiler.
PH_SWS_BOTTLE	Example of a parameter that is exempt from the requirement to include Phase, Data Type and Sampling System: pH measured on the seawater scale that is measured on a water sample collected with a bottle.
TMP_ICE_CORER	Example of a parameter that is exempt from the requirement to include Phase, Data Type and Sampling System: Temperature measured by inserting a probe into a hole drilled into ice.