Reference and Sample Manual

□ Reference

2. Write the first letter **in uppercase.**

○ Reference Variables and Description

Variable	Description
Title	Paper titles in which the dataset was used
Journal	Journal in which the paper was published
Author	Name of the author(s) of the paper(Last, First;)
Year	Year the paper was published
DOI	DOI registered in the paper
URL	URL registered in the paper
Vol	Vol of the journal in which the article was published
Issue	Issue of the journal in which the article was published
Page	Page of the journal in which the article was published

○ Type of journal

Journal
Chemical Geology
Earth and Planetary Science Letters
Earth-Science Reviews
Economic and Environmental Geology
Geochemical Journal
Geological Journal
Geosciences Journal
Gondwana Research
Journal of Asian Earth Sciences
Journal of Coastal Research
Journal of the Geological Society of Korea
Journal of the Korean Association of Regional Geographers
Journal of the Korean Geographical Society
Journal of The Korean Geomorphological Association
Lithos
Lithosphere

Minerals
Open geography journal
Ore Geology Reviews
Precambrian Research
Sedimentary Geology
Terra Nova
The Holocene
The Journal of the Petrological Society of Korea

□ Sample

1. Bold fields are required.
2. Write the first letter **in uppercase.**
3. Write latitude and longitude **in degrees.**

○ Sample Variables and Description

Variable	Description
Sample	Name of the sample that was analyzed
Material	The type of rock on which the analysis was performed
Longitutde	Longitude at which the sample was taken
Latitude	Latitude at which the sample was taken
Taxon	Detailed rock name of the sample (e.g. Granite, Quartzite)

○ Type of material

Material
Igneous Rock
Metamorphic Rock
Sedimentary Rock
Deposit
Clay

□ Age

1. **Bold fields are required.**
2. Write the first letter **in uppercase.**
3. The unit of age is **yr.**

○ Age Variables and Description

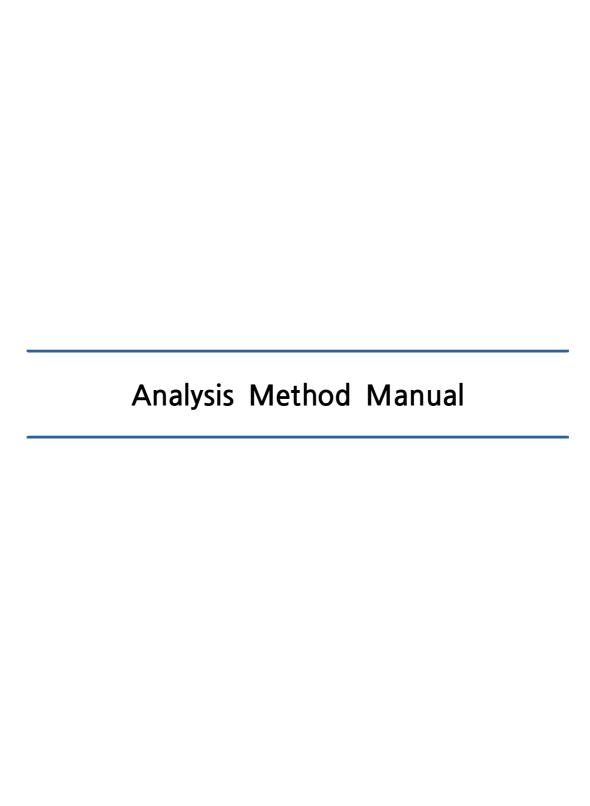| Variable	Description
Sample	Name of the sample that was analyzed
Method_cd	Analysis method code
Age	Age at the time of sample generation
Age_min	Age min at the time of sample generation
Age_max	Age max at the time of sample generation
Era	Era of sample generation
Period	Period of sample generation
Epoch	Epoch of sample generation

○ Method and Method Code

Variable	Description
Ar-Ar	001
Cosmogenic10Be	002
K-Ar	003
Lu-Hf	004
OSL	005
Sm-Nd	006
U-Pb	007

○ Geological Age

Era	Period	Epoch	Age_max (Ma)	Age_min (Ma)
Cenozoic	Quaternary	Holocene	0.0117	0
		Pleistocene	2.588	0.0117
	Neogene	Pliocene	5.333	2.588
		Miocene	23.03	5.333
	Paleogene	Oligocene	33.9	23.03
		Eocene	56	33.9
		Paleocene	66	56
Mesozoic	Cretaceous	Late Cretaceous	100.5	66
		Early Cretaceous	145	100.5
	Jurassic	Late Jurassic	163.5	145
		Middle Jurassic	174.1	163.5
		Early Jurassic	201.3	174.1
	Triassic	Late Triassic	237	201.3
		Middle Triassic	247.2	237
		Early Triassic	251.902	247.2
Paleozoic	Permian	Lopingian	259.1	251.902
		Guadalupian	272.95	259.1
		Cisuralian	298.9	272.95
	Carboniferous	Pennsylvanian	323.2	298.9
		Mississippian	358.9	323.2
	Devonian	Late Devonian	382.7	358.9
		Middle Devonian	393.3	382.7
		Early Devonian	419.2	393.3
	Silurian	Pridoli	423	419.2
		Ludlow	427.4	423
		Wenlock	433.4	427.4
		Llandovery	443.8	433.4
	Ordovician	Late Ordovician	458.4	443.8
		Middle Ordovician	470	458.4
		Early Ordovician	485.4	470
	Cambrian	Furongian	497	485.4
		Miaolingian	509	497
		Series 2	521	509

		Terreneuvian	541	521
Neoproterozoic	Ediacaran		635	541
	Cryogenian		720	635
	Tonian		1000	720
Mesoproterozoic	Stenian		1200	1000
	Ectasian		1400	1200
	Calymmian		1600	1400
Paleoproterozoic	Statherian		1800	1600
	Orosirian		2050	1800
	Rhyacian		2300	2050
	Siderian		2500	2300
Neoarchean			2800	2500
Mesoarchean			3200	2800
Paleoarchean			3600	3200
Eoarchean			4000	3600

Analysis Method Manual

□ Ar-Ar

1. **Bold fields are required.**
2. Do **not** express values as **exponents**(ex: 10^3 → 1000 / 10^{-3} → 0.0001).
3. The unit of age is **yr.**

○ Ar-Ar Method Variables and Description

Variable	Description
Sample	**Name of the sample that was analyzed**
Plateau.Age	Age based on Steps in which apparent age is flattened
Plateau.Age.SD	Age based on Steps in which apparent age is flattened Uncertainty(Standard Deviation)
Plateau.Per	Age based on Steps in which apparent age is flattened Percent
Steps	Number of Steps to derive Plateau Age_ Number of all steps (ex. 10_12, 9_13)
MSWD	Mean Square of the Weighted Deviates
Intergrated.Age	Age based on all apparent age
Intergrated.Age.SD	Age based on all apparent age Uncertainty(Standard Deviation)

□ Cosmogenic Be10

1. Bold fields are required.

2. Do **not** express values as **exponents**(ex: 10^3 → 1000 / 10^{-3} → 0.0001).

3. The unit of age is **yr.**

○ Cosmogenic Be10 Method Variables and Description

Variable	Description
Sample	**Name of the sample that was analyzed**
Concentration.Be10	Be10 Concentration
Concentration.Be10.PM	Be10 Concentration Uncertainty
Concentration.Be10.Unit	Be10 Concentration Uncertainty Unit
Be carrier	Added isotope Be9
Be carrier.Unit	Added isotope Be9 Unit
Be10_Be9	Ratio of beryllium isotopes Be10 to Be9
Be10_Be9.PM	Ratio of beryllium isotopes Be10 to Be9
Age	Age
Age.PM	Age Uncertainty

○ Cosmogenic Be10 Unit

Variable	Description
atoms/g	Atoms per gram
g	Gram

□ K-Ar

1. **Bold fields are required.**
2. Do **not** express values as **exponents**(ex: 10^3 → 1000 / 10^{-3} → 0.0001).
3. The unit of age is **yr.**

○ K-Ar Method Variables and Description

Variable	Description
Sample	**Name of the sample that was analyzed**
K	Potassium
K.PM	Potassium Uncertainty
K.Unit	Potassium Unit
Sample Weight	Sample weight
Sample Weight.Unit	Sample weight Unit
Radiogenic Ar40	Radiogenic argon40
Radiogenic Ar40.Unit	Radiogenic argon40 Unit
Delta Radiogenic Ar40	Radiogenic argon40 Uncertainty
Delta Radiogenic Ar40.Unit	Radiogenic argon40 Uncertainty Unit
Radiogenic Ar36	Radiogenic argon36
Radiogenic Ar36.Unit	Radiogenic argon36 Unit
Delta Radiogenic Ar36	Radiogenic argon36 Uncertainty
Delta Radiogenic Ar36.Unit	Radiogenic argon36 Uncertainty Unit
Age	Age
Age.PM	Age Uncertainty
Airfraction	Atmospheric contamination Ar40
Airfraction.Unit	Atmospheric contamination Ar40 Uncertatinty
Non Radiogenic Ar40	Non Radiogenic argon40
Non Radiogenic Ar40.Unit	Non Radiogenic argon40 Unit

○ K-Ar Method Unit

Variable	Description
wt%	Weigth percent
ccSTP/g	Cubic centimeter gas volume at standard temperature and pressure per gram
%	Percent
g	Gram

□ Lu-Hf

1. **Bold fields are required.**
2. Do **not** express values as **exponents**(ex: $10^3 \rightarrow 1000$ / $10^{-3} \rightarrow 0.0001$).
3. The unit of age is **yr.**

○ Lu-Hf Method Variables and Description

Variable	Description
Sample	**Name of sample obtained**
RunID	**Name of the sample that was analyzed**
Age	Age
Yb176_Hf177	Ratio of ytterbium isotope Yb176 to hafnium isotope Hf177
Yb176_Hf177.2SD	Ratio of ytterbium isotope Yb176 to hafnium isotope Hf177 Uncentainty(Standard Deviation)
Lu176_Hf177	Ratio of lutetium isotope Lu176 to hafnium isotope Hf177
Lu176_Hf177.2SD	Ratio of lutetium isotope Lu176 to hafnium isotope Hf177 Uncentainty(Standard Deviation)
Hf176_Hf177	Ratio of hafnium isotopes Hf176 to Hf177
Hf176_Hf177.2SD	Ratio of hafnium isotopes Hf176 to Hf177 Uncentainty(Standard Deviation)
Hf176_Hf177.2SE	Ratio of hafnium isotopes Hf176 to Hf177 Uncentainty((Standard Error)
Hf176_Hf177_i	Ratio of hafnium isotopes Hf176 to Hf177 at initial time
Hf176_Hf177_t	Ratio of hafnium isotopes Hf176 to Hf177, time corrected
E_Hf_0	Calculated as $[(Hf176/Hf177)_{Sample}/\{(176Hf/177Hf)_{std} - 1\}]*1000$, at initial time
E_Hf_t	Calculated as $[(Hf176/Hf177)_{Sample}/\{(176Hf/177Hf)_{std} - 1\}]*1000$, time corrected
TDM	The depleted mantle model ages
TDMc	The crustal model ages
TDM2	The two-stage depleted mantle model ages
f_Lu_Hf	$[(Lu147/Hf144)_{Sample}/(Lu147/Hf144)_{CHUR}]-1$

□ OSL

1. **Bold fields are required.**

2. Do **not** express values as **exponents**(ex: $10^3 \rightarrow 1000$ / $10^{-3} \rightarrow 0.0001$).

3. The unit of age is **yr.**

○ OSL Method Variables and Description

Variable	Description
Sample	**Name of the sample that was analyzed**
Depth	Depth at which the sample was acquired
Depth.Unit	Depth at which the sample was acquired Unit
Water Content	Average of the current and saturated moisture content of the sample
Water Content.Unit	Average of the current and saturated moisture content of the sample.Unit
Dose Rate	Natural radiation energy absorbed by the mineral per unit time
Dose Rate.PM	Natural radiation energy absorbed by the mineral per unit time Uncertainty
Dose Rate.Unit	Natural radiation energy absorbed by the mineral per unit time Unit
Equivalent dose	Total amount of ionizing radiation absorbed from the surroundings by minerals in sediments or rocks
Equivalent dose.PM	Total amount of ionizing radiation absorbed from the surroundings by minerals in sediments or rocks Uncertainty
Equivalent dose.Unit	Total amount of ionizing radiation absorbed from the surroundings by minerals in sediments or rocks Unit
Age	Age
Age.PM	Age Uncertainty
Age.SE	Age Uncertainty(Standard Error)
Age.SD	Age Uncertainty(Standard Deviation)

○ OSL Method Unit

Variable	Description
Gy/ka	Gamma ray per unit time
Gy	Gamma ray
%	Percent

□ Sm-Nd

1. Bold fields are required.

2. Do **not** express values as **exponents**(ex: $10^3 \rightarrow 1000$ / $10^{-3} \rightarrow 0.0001$).

3. The unit of age is **yr.**

○ Sm-Nd Method Variables and Description

Variable	Description
Sample	**Name of sample obtained**
RunID	**Name of the sample that was analyzed**
Sm	Samarium
Sm.Unit	Samarium Unit
Nd	Neodymium
Nd.Unit	Neodymium Unit
Sm147_Nd144	Ratio of samarium isotope Sm147 to neodymium isotope Nd144
Nd143_Nd144	Ratio of neodymium isotopes Nd143 to Nd144
Nd143_Nd144.2SD	Ratio of neodymium isotopes Nd143 to Nd144 Uncertainty(Standard Deviation)
E_Nd_0	Calculated as $[(Nd143/Nd144)_{Sample}/\{(Nd143/Nd144)_{std} - 1\}]*1000$, at tinitial time
E_Nd_t	Calculated as $[(Nd143/Nd144)_{Sample}/\{(Nd143/Nd144)_{std} - 1\}]*1000$, time corrected
TDM	The depleted mantle model ages
TDM2	The two-stage depleted mantle model ages

□ U-Pb

1. **Bold fields are required.**
2. Do **not** express values as **exponents**(ex: $10^3 \rightarrow 1000$ / $10^{-3} \rightarrow 0.0001$).
3. The unit of age is **yr.**

○ U-Pb Method Variables and Description

Variable	Description
Sample	**Name of sample obtained**
RunID	**Name of the sample that was analyzed**
Pb	Lead
Pb.Unit	Lead Unit
Pb206	Lead isotope 206
Pb206.PM.Per	Lead isotope 206 Uncertainty(%)
Pb206.Unit	Lead isotope 206 Unit
Pbc	Common Lead
Pbc.Unit	Common Lead unit
Pbr	Radiogenic Lead
Pbr.Unit	Radiogenic Lead unit
U	Uranium
U.Unit	Uranium unit
Th	Thorium
Th.Unit	Thorium unit
Th_U	Ratio of thorium to Uranium
Th_U.Per	Ratio of thorium to Uranium Uncertainty(%)
Th_U.PM.Per	Ratio of thorium to Uranium Uncertainty(±%)
Th_U.Unit	Ratio of thorium to Uranium Unit
Pb204_Pb206	Ratio of lead isotope Pb204 to Pb206
Pb204_Pb206.PM	Ratio of lead isotope Pb204 to Pb206 Uncertainty(%)

Pb204_Pb206.PM.Per	Ratio of lead isotope Pb204 to Pb206 Uncertainty(±%)
Pb206_Th232	Ratio of lead isotope Pb206 to Thorium isotope Th235
Pb206_Th232.SD	Ratio of lead isotope Pb206 to Thorium isotope Th232 Uncertainty(Standard Deviation)
Pb206_U238	Ratio of lead isotope Pb206 to uranium isotope U238
Pb206_U238.PM	Ratio of lead isotope Pb206 to uranium isotope U238 Uncertainty(±)
Pb206_U238.PM.Per	Ratio of lead isotope Pb206 to uranium isotope U238 Uncertainty(±%)
Pb206_U238.SD	Ratio of lead isotope Pb206 to uranium isotope U238 Uncertainty(Standard Deviation)
Pb206_U238.2SD	Ratio of lead isotope Pb206 to uranium isotope U238 Uncertainty(2Standard Deviation)
Pb206_U238.2SE	Ratio of lead isotope Pb206 to uranium isotope U238 Uncertainty(2Standard Error)
U238_Pb206	Ratio of uranium isotope U238 to lead isotope Pb206
U238_Pb206.Per	Ratio of uranium isotope U238 to lead isotope Pb206 Uncertainty(%)
U238_Pb206.PM	Ratio of uranium isotope U238 to lead isotope Pb206 Uncertainty(±)
U238_Pb206.PM.Per	Ratio of uranium isotope U238 to lead isotope Pb206 Uncertainty(±%)
U238_Pb206.SD	Ratio of uranium isotope U238 to lead isotope Pb206 Uncertainty(Standard Deviation)
Pbr206_U238	Ratio of radiogenic lead Pb206 to uranium isotope U238
Pbr206_U238.PM	Ratio of radiogenic lead Pb206 to uranium isotope U238 Uncertainty(±)
Pbr206_U238.PM.Per	Ratio of radiogenic lead Pb206 to uranium isotope U238 Uncertainty(±%)
U238_Pbr206	Ratio of uranium isotope U238 to radiogenic Lead Pb206
U238_Pbr206.PM	Ratio of uranium isotope U238 to radiogenic Lead Pb206 Uncertainty(±)
U238_Pbr206.PM.Per	Ratio of uranium isotope U238 to radiogenic Lead Pb206 Uncertainty(±%)
Pb207_Pb206	Ratio of lead isotope Pb207 to Pb206
Pb207_Pb206.Per	Ratio of lead isotope Pb207 to Pb206 Uncertainty(%)
Pb207_Pb206.PM	Ratio of lead isotope Pb207 to Pb206 Uncertainty(±)
Pb207_Pb206.PM.Per	Ratio of lead isotope Pb207 to Pb206 Uncertainty(±%)
Pb207_Pb206.SD	Ratio of lead isotope Pb207 to Pb206 Uncertainty(Standard Deviation)
Pb207_Pb206.2SD	Ratio of lead isotope Pb207 to Pb206 Uncertainty(2Standard Deviation)

Pb207_Pb206.2SE	Ratio of lead isotope Pb207 to Pb206 Uncertainty(2Standard Error)
Pbr207_Pb206	Ratio of radiogenic lead isotope Pb207 to lead isotope Pb206
Pbr207_Pb206.PM	Ratio of radiogenic lead isotope Pb207 to lead isotope Pb206 Uncertainty(±)
Pbr207_Pb206.PM.Per	Ratio of radiogenic lead isotope Pb207 to lead isotope Pb206 Uncertainty(±%)
Pbr207_Pbr206	Ratio of radiogenic lead isotope Pb207 to Pb206
Pbr207_Pbr206.PM.Per	Ratio of radiogenic lead isotope Pb207 to Pb206 Uncertainty(±%)
Pb207_U235	Ratio of lead isotope Pb207 to uranium isotope U235
Pb207_U235.PM.Per	Ratio of lead isotope Pb207 to uranium isotope U235 Uncertainty(±%)
Pb207_U235.SD	Ratio of lead isotope Pb207 to uranium isotope U235 Uncertainty(Standard Deviation)
Pb207_U235.2SD	Ratio of lead isotope Pb207 to uranium isotope U235 Uncertainty(2Standard Deviation)
Pb207_U235.2SE	Ratio of lead isotope Pb207 to uranium isotope U235 Uncertainty(2Standard Error)
Pbr207_U235	Ratio of radiogenic lead Pb207 to uranium isotope U235
Pbr207_U235.PM	Ratio of radiogenic lead Pb207 to uranium isotope U235 Uncertainty(±)
Pbr207_U235.PM.Per	Ratio of radiogenic lead Pb207 to uranium isotope U235 Uncertainty(±%)
Pb208_Pb206	Ratio of lead isotope Pb208 to Pb206
Pb208_Pb206.PM.Per	Ratio of lead isotope Pb208 to Pb206 Uncertainty(±%)
Pb206_U238.Age	Ratio of lead isotope Pb206 to uranium isotope U238 Age
Pb206_U238.Age.PM	Ratio of lead isotope Pb206 to uranium isotope U238 Age Uncertainty(±)
Pb206_U238.Age.PM.Per	Ratio of lead isotope Pb206 to uranium isotope U238 Age Uncertainty(±%)
Pb206_U238.Age.SD	Ratio of lead isotope Pb206 to uranium isotope U238 Age Uncertainty(Standard Deviation)
Pb206_U238.Age.2SD	Ratio of lead isotope Pb206 to uranium isotope U238 Age Uncertainty(2Standard Deviation)
Pb206_U238.Age.2SE	Ratio of lead isotope Pb206 to uranium isotope U238 Age Uncertainty(2Standard Error)
Pbr206_U238.Age	Ratio of radiogenic lead Pb206 to uranium isotope U238 Age
Pbr206_U238.Age.PM	Ratio of radiogenic lead Pb206 to uranium isotope U238 Age Uncertainty(±)
Pbr206_U238.Age.PM.Per	Ratio of radiogenic lead Pb206 to uranium isotope U238 Age Uncertainty(±%)
U238_Pb206.Age	Ratio of uranium isotope U238 to lead isotope Pb206 Age

U238_Pb206.Age.PM.Per	Ratio of uranium isotope U238 to lead isotope Pb206 Age Uncertainty(±%)
Pb207_Pb206.Age	Ratio of lead isotope Pb207 to Pb206 Age
Pb207_Pb206.Age.PM	Ratio of lead isotope Pb207 to Pb206 Age Uncertainty(±)
Pb207_Pb206.Age.PM.Per	Ratio of lead isotope Pb207 to Pb206 Age Uncertainty(±%)
Pb207_Pb206.Age.SD	Ratio of lead isotope Pb207 to Pb206 Age Uncertainty(Standard Deviation)
Pb207_Pb206.Age.2SD	Ratio of lead isotope Pb207 to Pb206 Age Uncertainty(2Standard Deviation)
Pb207_Pb206.Age.2SE	Ratio of lead isotope Pb207 to Pb206 Age Uncertainty(2Standard Error)
Pbr207_Pbr206.Age	Ratio of radiogenic lead Pb207 to Pb206 Age
Pbr207_Pbr206.Age.PM	Ratio of radiogenic lead Pb207 to Pb206 Age Uncertainty(±)
Pbr207_Pbr206.Age.PM.Per	Ratio of radiogenic lead Pb207 to Pb206 Age Uncertainty(±%)
Pb207_U235.Age	Ratio of lead isotope Pb207 to uranium isotope U235 Age
Pb207_U235.Age.PM	Ratio of lead isotope Pb207 to uranium isotope U235 Age Uncertainty(±)
Pb207_U235.Age.SD	Ratio of lead isotope Pb207 to uranium isotope U235 Age Uncertainty(Standard Deviation)
Pb207_U235.Age.2SD	Ratio of lead isotope Pb207 to uranium isotope U235 Age Uncertainty(2Standard Deviation)
Pb207_U235.Age.2SE	Ratio of lead isotope Pb207 to uranium isotope U235 Age Uncertainty(2Standard Error)
Pb208_Th232.Age	Ratio of lead isotope Pb208 to thorium isotope Th232 Age
Pb208_Th232.Age.PM	Ratio of lead isotope Pb208 to thorium isotope Th232 Age Uncertainty(±)
Age	Apparent age
Age.PM	Apparent age Uncertainty(±)
Disc	Discordant
Disc.Unit	Discordant Unit(%)

○ U-Pb Method Unit

Variable	Description
ppm	Parts per million
%	Percent