Package 'shinyNORRRM'

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Type Package

Title The Ultimate Igneous Norm

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Imports shiny,shinythemes,shinyWidgets,pracma,Ternary,grDevices,graphics,utils

Description The computer program is an efficient igneous norm algorithm and rock classification system written in R but run as shiny app.

URL https://github.com/TheRFrog/shinyNORRRM

BugReports https://github.com/TheRFrog/shinyNORRRM/issues/

License GPL-3

Depends R (>= 4.2.0)

Encoding UTF-8

LazyData true

RoxygenNote 7.1.2

NeedsCompilation no

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R topics documented:

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adjRock | *Recalculate the compositions of the rocks in an anhydrous basis (volatile-free; 100% adjusted)*

Description

The oxide data, from SiO2 to P2O5 (or CO2) are first recalculated to 100 percent on an anhydrous basis, and then Fe oxidation ratio adjustment is done according to the recommendations of Middlemost (1989), or Le Maitre (1976), or else the measured Fe2O3/FeO ratios are maintained. Finally, the oxide data is recalculated to 100 percent on an anhydrous basis from Fe2O3/FeO ratios calculated.

Usage

```
adjRock(data, Type, Fe.adjustment, Cancrinite, Calcite)
```

Arguments

data	a whole rock major and trace element chemical data (as percent %). It is important to note that Fe2O3 or FeO could be Fe2O3T or FeOT if any of this values are NA or 0.
Type	rock type, if the argument is "Volcanic" is shown the volcanic rock type after (Le Bas et al., 1986), iron oxidation ratio is calculated following the equation of Le Maitre (1976) for Volcanic rocks, if the argument is "Plutonic", then Plutonic adjusts are done.
Fe.adjustment	if the argument is "Middlemost", iron oxidation ratio is calculated depending on rock type at Middlemost (1989). if the argument is "Le Maitre", iron oxidation ratio is calculated depending on rock type at Le Maitre (1976). if the argument is "Fe+3/Fe+2", iron oxidation ratio is calculated depending on their own concentration).
Cancrinite	if the argument is TRUE, CO2 will be used in whole rock adjust.
Calcite	if the argument is TRUE, CO2 will be used in whole rock adjust.

Value

Returns a dataset of adjust oxide data (.adj) on an anhydrous basis.

Author(s)

Maintainer: Reneé González-Guzmán <rguzman@geociencias.unam.mx> ([ORCID](#))

References

Le Maitre, R.W. 1976. Some problems of the projection of chemical data into mineralogical classifications. Contribution Mineralogical Petrology. v. 56, pp. 181–189. Middlemost, E.A.K. 1989. Iron oxidation ratios, norms and the classification of volcanic rocks. Chemical Geology. v. 77, pp. 19–26.

See Also

[ultimateCIPW Indices](#)

Examples

```
#create a dataframe with major elements indicating the appropriate parameters of rocks
#example of dataframes: EAP.csv, IUGS.csv, and TephraKam.csv
data(IUGS)
adjRock(IUGS, Type= "Volcanic", Fe.adjustment = "Middlemost", Cancrinite = FALSE, Calcite = FALSE)
rm(IUGS)#cleanup
```

AtomWeight *The standard atomic weights*

Description

Data frame with symbols, element names, and standard atomic weights.

Usage

```
data(AtomWeight)
```

Format

The format is a data frame with 92 rows and 3 columns, including the row names.

Details

This table is based on the 2011 table after the IUPAC (International Union of Pure and Applied Chemistry), Commission on Isotopic Abundances and Atomic Weights. Note that row names are the symbol of the elements.

Source

https://iupac.org/

References

Wieser, M.E., and others. 2013. Pure and Applied Chemistry. International Union of Pure and Applied Chemistry (IUPAC). v. 78, no. 11, pp. 2051–2066.

See Also

MinWeight,OxiWeight

Examples

```
data(AtomWeight)
AtomWeight['H','AWeight']
rm(AtomWeight)#cleanup
##
```

Deccan	*Data collection of igneous rocks from the Deccan region (India)*

Description

Compilation of major and trace element analysis of 7019 igneous rocks from the Deccan region, India.

Usage

```
data(Deccan)
```

Format

The format is a data frame with 7019 rows and 30 columns.

Details

The database is part of a global whole-rock geochemical database, sourced from various existing databases and supplemented with an extensive list of individual publications.

Source

The database is part of the compiled data in Gard et al. (2019). For full details see doi:10.5194/essd1115532019.

References

Gard, M., Hasterok, D. and Halpin, J.A., 2019. Global whole-rock geochemical database compilation. Earth System Science Data, 11(4), pp.1553-1566.

See Also

EAP IUGS TephraKam

Examples

```
data(Deccan)
rm(Deccan)#cleanup
##
```

EAP   *Data collection of igneous rocks from Eastern Mexican Alkaline Province*

Description

Compilation of major and trace element analysis of 46 igneous rocks from San Carlos-Cruillas, Tamaulipas, Mexico.

Usage

```
data(EAP)
```

Format

The format is a data frame with 46 rows and 28 columns.

Details

The origin of the Eastern Mexican Alkaline Province has been explained by landward arc migration and subsequent asthenospheric upwelling after slab roll-back of the Farallon Plate. Detailed geochemical analysis suggests the participation of two types of metasomatized mantle regions: a lithospheric source modified by past subduction processes and an asthenospheric source slightly affected by carbonatite-related metasomatism. Variations in the partial melting degrees controlled the extent of magma enrichment in the latter. Major and trace element geochemistry, together with geochronological data and field relations, evinced an older post-orogenic setting related to the arc-like rocks (Eocene) and a younger intraplate extensional environment associated with all enriched igneous rocks (Oligocene-Miocene). Bivariate diagrams of SiO2 vs. trace element ratios and multi-element patterns indicate that magmas from the SSCC complex dominantly evolved through fractional crystallization with a limited crustal contribution.

Source

The database is also available in Elizondo-Pacheco et al. (2022). For full details see https://academic.oup.com/petrology/article/63/5/egac027/6553218 .

References

Elizondo-Pacheco, L. A., Ramírez-Fernández, J. A., De Ignacio, C., González-Guzmán, R., Rodríguez-Saavedra, P., Leal-Cuellar, V. A. & Montalvo-Arrieta, J. C. (2022). Generation of Arc-Like and OIB-Like Magmas Triggered by Slab Detachment in the Eastern Mexican Alkaline Province: Petrological Evidence from the Cenozoic Sierra de San Carlos-Cruillas Complex, Tamaulipas. Journal of Petrology, 63(5), egac027.

See Also

[Deccan IUGS TephraKam](#)

Examples

```
data(EAP)
rm(EAP)#cleanup
##
```

Indices	*Indices*

Description

The adjusted oxide data,

Usage

```
Indices(data, Calcite)
```

Arguments

data	a whole rock major adjusted oxide chemical data.
Calcite	if it is TRUE, CaO will be used in the computation.

Value

Returns a dataset with several petrological parameters.

Author(s)

Renee Gonzalez Guzman <rguzman@geociencias.unam.mx>

References

Elizondo-Pacheco, L. A., Ramírez-Fernández, J. A., De Ignacio, C., González-Guzmán, R., Rodríguez-Saavedra, P., Leal-Cuellar, V. A. & Montalvo-Arrieta, J. C. (2022). Generation of Arc-Like and OIB-Like Magmas Triggered by Slab Detachment in the Eastern Mexican Alkaline Province: Petrological Evidence from the Cenozoic Sierra de San Carlos-Cruillas Complex, Tamaulipas. Journal of Petrology, 63(5), egac027.

See Also

[ultimateCIPW adjRock](#)

Examples

```
#create a dataframe with major elements indicating the appropriate parameters of rocks
#example of dataframes: EAP.csv, IUGS.csv, and TephraKam.csv
data(IUGS)
data <- adjRock(IUGS, Type= "Volcanic", Fe.adjustment = "Middlemost",
Cancrinite = FALSE, Calcite = FALSE)
Indices(data, Calcite = FALSE)
rm(IUGS,data)#cleanup
##
```

IUGS *Data collection of igneous rocks used in IUGSTAS software*

Description

Compilation of major elements data for 37 representative samples of volcanic rocks.

Usage

```
data(IUGS)
```

Format

The format is a data frame with 37 rows and 28 columns.

Details

This data is available from the Cambridge University Press, as a part of IUGSTAS software.

References

Le Maitre, R.W et al. 2002. Igneous Rocks: A Classification and Glossary of Terms: Recommendations of the International Union of Geological Sciences, Subcommission on the Systematics of Igneous Rocks. Cambridge University Press, 2002, 252 pp.

See Also

Deccan EAP TephraKam

Examples

```
data(IUGS)
rm(IUGS)#cleanup
##
```

MinWeight   *The oxides molecular weights of normative minerals*

Description

Data frame with normative mineral names, chemical nomenclature, oxides molecular weights and theoretical density of minerals used in the Norm computations.

Usage

```
data(MinWeight)
```

Format

The format is a data frame with 36 rows and 6 columns, including the row names.

Details

This table is calculated from the 2011 table values after the IUPAC (International Union of Pure and Applied Chemistry), Commission on Isotopic Abundances and Atomic Weights. Note that row names are the name of the normative minerals.

References

Wieser, M.E., and others. 2013. Pure and Applied Chemistry. International Union of Pure and Applied Chemistry (IUPAC). v. 78, no. 11, pp. 2051–2066.

See Also

AtomWeight,OxiWeight

Examples

```
data(MinWeight)
MinWeight['Quartz','ConsWeight']
##

MinWeight['Quartz','Density']
##
rm(MinWeight)#cleanup
```

OxiWeight	*The molecular weights*

Description

Data frame with chemical nomenclature and molecular weights used in the ultimate Norm computation.

Usage

```
data(OxiWeight)
```

Format

The format is a data frame with 26 rows and 3 columns, including the row names.

Details

This table is calculated from the 2011 table values after the IUPAC (International Union of Pure and Applied Chemistry), Commission on Isotopic Abundances and Atomic Weights. Note that row names are the chemical nomenclature of the oxides and the third column is the oxide weight rounded.

References

Wieser, M.E., and others. 2013. Pure and Applied Chemistry. International Union of Pure and Applied Chemistry (IUPAC). v. 78, no. 11, pp. 2051–2066.

See Also

AtomWeight, MinWeight

Examples

```
data(OxiWeight)
OxiWeight ['SiO2','OWeight']
##
rm(OxiWeight)#cleanup
```

shinyNORRRM   *shinyNORRRM - launches the shinyNORRRM app*

Description

Starts the shinyNORRRM app in the client's browser.

Usage

```
shinyNORRRM(host = "127.0.0.1", port = NULL, browser = NULL)
```

Arguments

host   host link (defaults to the local machine "127.0.0.1")

port   port number (randomly chosen unless specified as a certain number)

browser   path to browser exe (defaults to standard browser)

Details

shinyNORRRM is the interface of NORRRM

Value

A shiny app

Examples

```
## Not run:
## Launch application on localhost (127.0.0.1)
## ----------------------------------------
## By default shinyNORRRM starts the application on localhost
## and a randomly selected port (e.g. 9876), in which case you can connect
## to the running application by navigating your browser to
## http://localhost:9876.
shinyNORRRM()

## Launch application on a different host
## -----------------------------------
## You can also run the application on a different host
## by specifying a hostname and port. Just make sure to
## use an open port on your machine. Here "open" means
## that the port should not be used by another service
## and the port is opened by your firewall.
shinyNORRRM(host="your-hostname", port=8888)

## Launch application on a different browser
## --------------------------------------
## To run the shinyNORRRM app on a different browser than your standard browser
## use the "browser" argument to set the path to the respective .exe file (e.g., Windows system)
```

```
launch_interim(browser = "C:/Program Files/Mozilla Firefox/firefox.exe")

## End(Not run)
```

| TephraKam | *Data collection of igneous rocks from the Kamchatka volcanic arc (northwestern Pacific)* |

Description

Compilation of major and minor element analysis of 7596 igneous rocks from Kamchatka, Rusia.

Usage

```
data(TephraKam)
```

Format

The format is a data frame with 7596 rows and 30 columns.

Details

The database contains 7596 single-shard major and minor element analyses obtained by electron microprobe. The samples characterize about 300 explosive eruptions, which occurred in Kamchatka from the Miocene up to recent times.

Source

The database is also available in Portnyagin et al. (2019). For full details see doi:10.5194/essd12-4692020.

References

Portnyagin, M.V., Ponomareva, V.V., Zelenin, E.A., Bazanova, L.I., Pevzner, M.M., Plechova, A.A., Rogozin, A.N. and Garbe-Schönberg, D., 2020. TephraKam: geochemical database of glass compositions in tephra and welded tuffs from the Kamchatka volcanic arc (northwestern Pacific). Earth System Science Data, 12(1), pp.469-486.

See Also

Deccan EAP IUGS

Examples

```
data(TephraKam)
##
rm(TephraKam)#cleanup
```

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ultimateCIPW   *The Igneous Norm (major and trace elements)*

Description

Computed from the chemical composition, the normative mineralogy is an alternative approach for mineralogical classification and useful for set up the naming of igneous rocks (e.g., as parts of the TAS classification). The CIPW Norm (acronym from the surnames of the authors: Cross, Iddings, Pirrson and Washington, Cross et al., 1902) is the most commonly used calculation algorithm to estimate the standard mineral assemblages for igneous rocks, generated over more than a hundred years ago and thereafter modified by some authors to the passage of the years (e.g., Verma et al., 2002). It is based upon assumptions about the order of mineral formation and known phase relationships of rocks and minerals, using simplified mineral formulas.

In this option, the trace elements that can be used are Ba, Co, Cr Cs, Li, Ni, Rb, S, Sr, V and Zr. Additionally, minor element concentrations of F, S, and SO3 (expressed as wt. percent) are handled like trace elements as well. Sulfur concentration when available is reported as either SO3 or S, in which case their separate identity should be maintained.

Usage

```
ultimateCIPW(data, Type, Fe.adjustment, Cancrinite, Calcite)
```

Arguments

data	a whole rock major and trace element chemical data. It is important to note that Fe2O3 or FeO could be Fe2O3T or FeOT if any of this values are NA or 0. On the other hands, the format of CO2 and F column must be 'CO2.' and 'F.', respectively.
Type	rock type, if is TRUE is shown the volcanic rock type after Middlemost in output, if it is FALSE, then Plutonic rock classification is done.
Fe.adjustment	if is TRUE, iron oxidation ratio is calculated depending on rock type.
Cancrinite	if is TRUE, CO2 will be used in whole rock adjust. If the concentration of CO2 is more than 0, and the modal cancrinite is present then Sodium carbonate is calculated.
Calcite	if is TRUE, CO2 will be used in whole rock adjust. If the concentration of CO2 is more than 0, and the modal calcite is present then Calcite is calculated.

Value

Calculate the igneous Norm and others geochemical parameters.

Author(s)

Renee Gonzalez Guzman <rguzman@geociencias.unam.mx>

References

Cross, W., Iddings, J.P., Pirsson, L. V., Washington, Henry S. 1902, A quantitative chemico-mineralogical classification and nomenclature of igneous rocks: The Journal of Geology, v. 10, no. 6, pp. 555–690.

Verma, S.P., Torres-Alvarado, I.S., and Velasco-Tapia, F., 2003, A revised CIPW norm: Schweizerische Mineralogische und Petrographische Mitteilungen, v. 83, no. 2, pp. 197–216.

See Also

Indices adjRock

Examples

```
#create a dataframe with major elements indicating the appropriate parameters of rocks
#example of dataframes: EAP.csv, IUGS.csv, and TephraKam.csv
data(EAP)
ultimateCIPW(EAP, Type= "Volcanic", Fe.adjustment = "Middlemost",
Cancrinite = FALSE, Calcite = FALSE)
##
rm(EAP)#cleanup
```

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