G2Sd Grain-size statistics and description of sediment

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Package 'G2Sd'

February 14, 2012

Type Package

Title Grain-size Statistics and Description of Sediment

Version 1.2

Date 2012-01-04

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Description G2Sd package gives full descriptive statistics and a physical description of sediment obtained with AFNOR or phi sieves according to the grain size distribution.

Depends R (>=2.10.0)

License GPL (>= 2.0)

URL http://cran.r-project.org/web/packages/G2Sd/index.html

LazyLoad yes

Repository CRAN

Date/Publication 2012-01-11 14:35:30

R topics documented:

G2Sd *Grain-size Statistics and Description of Sediment*

Description

G2Sd package gives full descriptive statistics and a physical description of sediment obtained with AFNOR or phi sieves according to the grain size distribution.

Details

The G2Sd package is an evolution of the Gradistat v.4.0 macro for MS Excel initially developped by Blott and Pye (2001) for phi sieves and Laser granulometer. This package is suited to analyse data obtained from AFNOR (micrometer) or phi sieves. The user is required to input the weight of sediment retained on sieves spaced at any AFNOR or phi intervals. Statistics are calculated using arithmetic and geometric Method of Moments (micrometer) and using logarithmic Folk and Ward (1957) Method (phi scale): mean, standard-deviation, skewness, kurtosis. The mode(s) is(are) determined graphically by the user (with a maximum of 4 modes). The determination of the mode is optional (no determination by default). Several percentiles and common index are calculated: D10, D50, D90, D90/D10, D90-D10, D75/D25, D75-D25, Trask(So) Index, Krumbein(Qd) Index. Physical description of texture, sorting, skewness or kurtosis are provided as such as the sediment name after Folk (1954). Are also included the percentage of particules falling into each predefined size fraction, modified from Blott and Pye (2001) scale, Udden (1914) and Wentworth (1922). There are two functions. `granstat` is a function which provides all results organized in two ways: a complete matrix (by default) or by separate items; `granplot` is a function which provides a histogramm with a cumulative percentage curve

Author(s)

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References

Blott, S., Pye, K. 2001. Gradistat: grain size distribution and statistics package for the analysis of unconsolidated sediment. Earth, Surface Processes and Landforms **26**, *1237-1248*

Folk, R.L. 1954. The distinction between grain size and mineral composition in sedimentary-rock nomenclature. Journal of Geology **62**, *344-359*

Folk, R.L., Ward, W.C. 1957. Brazos River bar: a study in the significance of grain size parameters. Journal of Sedimentary Petrology **27**, *3-26*

Krumbein, W.C., Pettijohn, F.J. 1938. Manual of Sedimentary Petrography. *Appleton-Century-Crofts, New-York*

Udden, J.A. 1914. Mechanical composition of clastic sediments. Bulletin of the Geological Society of America **25**, *655-744*

Wentworth, C.K. 1922. A scale of grade and class terms for clastic sediments. Journal of Geology **30**, *377-392*

See Also

granstat, granplot

Examples

```
data(granulo)
result=granstat(granulo)
granplot(granulo,1)
```

---

granplot *Histogram with a cumulative percentage curve*

Description

This function provides a histogram of the grain-size distribution with a cumulative percentage curve

Usage

```
granplot(x, xc = 1, hist = TRUE, cum = TRUE, main = "",
col.cum = "red", col.hist="gray")
```

Arguments

x	A numeric matrix or data frame
xc	Define a column
hist	If TRUE, display a histogram; if FALSE, do not display a histogram
cum	If TRUE, display a cumulative percentage curve; if FALSE do not display a cumulative percentage curve
main	Add a title to the current plot
col.cum	Color in which cumulative percentage curve will be drawn
col.hist	Color in which histogram will be drawn

Details

The obtained graph is the most commonly used by Sedimentologists

Value

A histogram with a cumulative percentage curve

Author(s)

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Examples

```
data(granulo)
granplot(granulo,xc=1,hist=TRUE,cum=TRUE,main="Grain-size Distribution",
col.hist="grey",col.cum="black")
```

`granstat` *Calculates all descriptive statistics*

Description

Statistics are calculated using arithmetic and geometric Method of Moments (micrometer) and using logarithmic Folk and Ward (1957) Method (phi scale): mean, standard-deviation, skewness, kurtosis. The mode(s) is(are) determined graphically by the user (with a maximum of 4 modes). The determination of the mode is optional (no determination by default). Several percentiles and common index are calculated: D10, D50, D90, D90/D10, D90-D10, D75/D25, D75-D25, Trask(So) Index, Krumbein(Qd) Index. Physical description of texture, sorting, skewness or kurtosis are provided as such as the sediment name after Folk (1954). Are also included the percentage of particules falling into each predefined size fraction, modified from Blott and Pye (2001) scale, Udden (1914) and Wentworth (1922). `granstat` is a function which provides all results organized in two ways: a complete matrix (by default) or by separate items.

Usage

```
granstat(x, statistic = "all", aggr = TRUE, modes = FALSE)
```

Arguments

`x`	A numeric matrix or data frame
`statistic`	Statistic used: "arithmetic", "geometric", "folk.ward", "all". If this argument is not used, all statistics are calculated
`aggr`	If TRUE, a complete matrix is provided. If FALSE, the results are organized in separate items: `$stat`, `$index`, `$mode`, `$sedim`. If this argument is not used, a complete matrix is provided
`modes`	If TRUE, the mode must be determinated graphically by the user. If FALSE, the mode is not determinated. If this argument is not used, no determination of the mode is proposed

Details

For the determination of the mode (`modes=TRUE`). All the samples are successively shown with a graph. The user can choose graphically the mode (1 in 4 maximum) by a click on the graph. If 4 modes are chosen, the following graph appears automatically. If 1, 2 or 3 modes are chosen, the user has to use the function stop locator in the graphic window.

If the weight of sediment retained on the broadest sieve exceeds 5 percent of the total mass of the sample, the Folk and Ward statistics cannot be computed.

Value

A matrix containing

mean.arith	the mean of grain-size distribution (arithmetic method of moments)
sd.arith	the standard-deviation of grain-size distribution (arithmetic method of moments)
skewness.arith	the skewness of grain-size distribution (arithmetic method of moments)
kurtosis.arith	the kurtosis of grain-size distribution (arithmetic method of moments)
mean.geom	the mean of grain-size distribution (geometric method of moments
sd.geom	the standard-deviation of grain-size distribution (geometric method of moments)
skewness.geom	the skewness of grain-size distribution (geometric method of moments)
kurtosis.geom	the kurtosis of grain-size distribution (geometric method of moments)
Sediment	physical description of the sediment, the sorting, the skewness and the kurtosis
Mean.fw.mm	the mean of grain-size distribution (logarithmic Folk and Ward method, mm scale)
Sd.fw.mm	the standard-deviation of grain-size distribution (logarithmic Folk and Ward method, mm scale)
Skewness.fw.mm	the skewness of grain-size distribution (logarithmic Folk and Ward method, mm scale)
Kurtosis.fw.mm	the kurtosis of grain-size distribution (logarithmic Folk and Ward method, mm scale)
Mean.fw.phi	the mean of grain-size distribution (logarithmic Folk and Ward method, phi scale)
Sd.fw.phi	the standard-deviation of grain-size distribution (logarithmic Folk and Ward method, phi scale)
Skewness.fw.phi	the skewness of grain-size distribution (logarithmic Folk and Ward method, phi scale)
Kurtosis.fw.phi	the kurtosis of grain-size distribution (logarithmic Folk and Ward method, phi scale)
Mode	the mode (mm scale), graphically defined by the user
D10(mm)	the 10th percentile
D50(mm)	the median
D90(mm)	the 90th percentile
D90/D10	ratio of the 90th percentile and the 10th percentile
D90-D10	difference between the the 90th percentile and the 10th percentile
D75/D25	ratio of the 75th percentile and the 25th percentile
D75-D25	difference between the the 75th percentile and the 25th percentile
Trask(So)	the Trask Index (So) defined as D25/D75 (mm scale)
Krumbein(Qd)	the Krumbein Index (Qd) defined as (D25-D75)/2 (phi scale)

`Texture`	physical description of the texture of the sediment
`Boulder`	percentage of sediment of the grain-size distribution retained in the Boulder class (upper to 63 mm)
`Gravel`	percentage of sediment of the grain-size distribution retained in the Gravel class (between 2 mm and 63 mm)
`Sand`	percentage of sediment of the grain-size distribution retained in the Sand class (between 63 micrometer and 2 mm)
`Mud`	percentage of sediment of the grain-size distribution retained in the Mud class (down to 63 micrometer)
`Boulder`	percentage of sediment of the grain-size distribution retained in the Boulder class (upper to 63 mm)
`vcgravel`	percentage of sediment of the grain-size distribution retained in the Very Coarse Gravel class (between 31.5 mm and 63 mm)
`cgravel`	percentage of sediment of the grain-size distribution retained in the Coarse Gravel class (between 16 mm and 31.5 mm)
`mgravel`	percentage of sediment of the grain-size distribution retained in the Medium Gravel class (between 8 mm and 16 mm)
`fgravel`	percentage of sediment of the grain-size distribution retained in the Fine Gravel class (between 4 mm and 8 mm)
`vfgravel`	percentage of sediment of the grain-size distribution retained in the Very Fine Gravel class (between 2 mm and 4 mm)
`vcsand`	percentage of sediment of the grain-size distribution retained in the Very Coarse Sand class (between 1 mm and 2 mm)
`csand`	percentage of sediment of the grain-size distribution retained in the Coarse Sand class (between 500 micrometer and 1 mm)
`msand`	percentage of sediment of the grain-size distribution retained in the Medium Sand class (between 250 micrometer and 500 micrometer)
`fsand`	percentage of sediment of the grain-size distribution retained in the Fine Sand class (between 125 micrometer and 250 micrometer)
`vfsand`	percentage of sediment of the grain-size distribution retained in the Very Fine Sand class (between 63 micrometer and 125 micrometer)
`vcsilt`	percentage of sediment of the grain-size distribution retained in the Very Coarse Silt class (between 40 micrometer and 63 micrometer)
`silt`	percentage of sediment of the grain-size distribution retained in the Silt class (lower than 40 micrometer)

Author(s)

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References

Blott, S., Pye, K. 2001. Gradistat: grain size distribution and statistics package for the analysis of unconsolidated sediment. Earth, Surface Processes and Landforms **26**, *1237-1248*

Folk, R.L. 1954. The distinction between grain size and mineral composition in sedimentary-rock nomenclature. Journal of Geology **62**, *344-359*

Folk, R.L., Ward, W.C. 1957. Brazos River bar: a study in the significance of grain size parameters. Journal of Sedimentary Petrology **27**, *3-26*

Krumbein, W.C., Pettijohn, F.J. 1938. Manual of Sedimentary Petrography. *Appleton-Century-Crofts, New-York*

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Wentworth, C.K. 1922. A scale of grade and class terms for clastic sediments. Journal of Geology **30**, *377-392*

Examples

```
#granulo is the data set
data(granulo)
granstat(granulo)
granstat(granulo,statistic="all",aggr=TRUE,modes=FALSE)
granstat(granulo,statistic="folk.ward",aggr=FALSE,modes=TRUE)
```

---

granulo *Data frame for G2Sd package*

Description

granulo is a data frame of 29 observations and 16 variables (samples K1 to K16). The first column corresponds to the apertures sizes of AFNOR sieves, in micrometer (25000, 20000, 16000, 12500, 10000, 8000, 6300, 5000, 4000, 2500, 2000, 1600, 1250, 1000, 800, 630, 500, 400, 315, 250, 200, 160, 125, 100, 80, 63, 50, 40, 0). Warning ! the last sieve 0 corresponds to the material retained in the < 40 micrometer pan after sieving. The others columns corresponds to the weight of samples beside each size class

Usage

```
data(granulo)
```

Format

A data frame with 29 observations on the following 16 variables

K1 a numeric vector

K2 a numeric vector

K3 a numeric vector

`K4` a numeric vector

`K5` a numeric vector

`K6` a numeric vector

`K7` a numeric vector

`K8` a numeric vector

`K9` a numeric vector

`K10` a numeric vector

`K11` a numeric vector

`K12` a numeric vector

`K13` a numeric vector

`K14` a numeric vector

`K15` a numeric vector

`K16` a numeric vector

Details

This example provide a data frame of sedimentary data obtained with AFNOR sieves (in micrometer)

Source

Godet, L., Fournier, J., Toupoint, N., Olivier, F. 2009. Mapping and monitoring intertidal benthic habitats: a review of techniques and proposal of a new visual methodology for the European coasts. Progress in Physical Geography **33**, *378-402*

References

Fournier, J., Godet, L., Bonnot-Courtois, C., Baltzer, A., Caline, B. 2009. Distribution des formations superficielles de l archipel de Chausey (Manche). Geologie de la France **1**, *5-17*

Examples

```
data(granulo)
```

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