Package 'folio'

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Title Datasets for Teaching Archaeology and Paleontology

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Description Datasets for teaching quantitative approaches and modeling in archaeology and paleontology. This package provides several types of data related to broad topics (cultural evolution, radiocarbon dating, paleoenvironments, etc.), which can be used to illustrate statistical methods in the classroom (multivariate data analysis, compositional data analysis, diversity measurement, etc.).

License GPL (>= 3)

URL https://codeberg.org/tesselle/folio, https://packages.tesselle.org/folio/

BugReports https://codeberg.org/tesselle/folio/issues

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Contents

`arnold1949` *Arnold and Libby's Curve of Knowns*

Description

"The agreement between prediction and observation is seen to be satisfactory."

Usage

```
arnold1949
```

Format

A `data.frame` with 6 observations and 8 variables:

sample `character`: sample name.

age_expected `integer`: Expected age (year BP).

age_expected_error `integer`: Error on `age_expected` (year BP).

age_found `integer`: Measured age (year BP).

age_found_error `integer`: Error on `age_found` (year BP).

activity_expected `numeric`: Expected specific activity (cpm/g of carbon).

activity_found `numeric`: Measured specific activity (cpm/g of carbon).

activity_found_error `numeric`: Error on `activity_found` (cpm/g of carbon).

Source

Arnold, J. R. and Libby, W. F. (1949). Age Determinations by Radiocarbon Content: Checks with Samples of Known Age. *Science*, 110(2869), 678-80. doi:10.1126/science.110.2869.678

See Also

Other radiocarbon dating: `intcal09`, `intcal13`, `intcal20`

`birds` *European Birds*

Description

A dataset of birds species abundance in remote European woodlands.

Usage

```
birds
```

Format

A `data.frame` with 35 observations (species) and 3 variables (woodlands).

Source

Magurran, A. E. (1988). *Ecological Diversity and its Measurement*. Princeton, NJ: Princeton University Press. doi:10.1007/9789401573580.

See Also

Other count data: `boves`, `chevelon`, `compiegne`, `loire`, `merzbach`, `mississippi`, `zuni`

boves *Boves Ceramics*

Description

A dataset containing the ceramic counts from the castle site of Boves (Somme, France). The data are grouped into eight periods ranging from the 10th to the 18th century and thirteen ceramic types.

Usage

```
boves
```

Format

A `data.frame` with 8 observations (periods) and 13 variables (ceramic types).

Source

Racinet P. (2002). Le site castral et prioral de Boves du Xe au XVIIe siècle. Bilan des recherches 1996-2000. *Revue archéologique de Picardie*. Numéro spécial 20, 123 p.

See Also

Other count data: `birds`, `chevelon`, `compiegne`, `loire`, `merzbach`, `mississippi`, `zuni`

bronze *Chinese Ritual Bronzes*

Description

Chemical analysis of 369 Chinese ritual bronzes. The major elements (Cu, Sn and Pb) were measured using atomic absorption spectroscopy and the trace elements using neutron activation analysis.

Usage

```
bronze
```

Format

A `data.frame` with 88 observations and 22 variables (chemical elements):

reference `integer`: catalog number.

chronology `integer`: chronology (typology).

dynasty ordered `factor`: dynasty name.

Cu `numeric`: Cu content (ppm).

Sn numeric: Sn content (ppm).

Pb numeric: Pb content (ppm).

Zn numeric: Zn content (ppm).

Au numeric: Au content (ppm).

Ag numeric: Ag content (ppm).

As numeric: As content (ppm).

Sb numeric: Sb content (ppm).

Source

Wood, J. R. & Liu, Y. (2023). A Multivariate Approach to Investigate Metallurgical Technology: The Case of the Chinese Ritual Bronzes. *Journal of Archaeological Method and Theory*, 30: 707-756. doi:10.1007/s10816022095728.

References

Bagley, R. W. (1987). *Shang ritual bronzes in the Arthur M. Sackler collections*. New York: The Arthur M. Sackler Foundation.

Rawson, J. (1990). *Western Zhou ritual bronzes from the Arthur M. Sackler collections*. New York: The Arthur M. Sackler Foundation.

So, J. (1995). *Eastern Zhou ritual bronzes from the Arthur M. Sackler Collections*. New York: The Arthur M. Sackler Foundation.

See Also

Other chemical data: kommos, verre

---

chevelon *Chevelon Ground Stone*

Description

A dataset of ground stone artifact counts from the Cholla project (USA).

Usage

```
chevelon
```

Format

A `data.frame` with 12 observations (sites) and 10 variables (ground stone types):

BMe `integer`: basin metate.

SMe `integer`: slab metate.

TMe `integer`: Trough metate.

IMe `integer`: indeterminate metate.

UMa `integer`: unifacial mano.

BMa `integer`: bifacial mano.

MUHa `integer`: modified unifacial handstone.

MBHa `integer`: modified bifacial handstone.

UUHa `integer`: unmodified unifacial handstone.

UBHa `integer`: unmodified bifacial handstone.

Source

Reid, J. J. (ed.) (1982). *Cholla Project Archaeology*. Vol. 2. Archaeological Series 161. Tucson: University of Arizona. doi:10.6067/XCV8435710

See Also

Other count data: `birds`, `boves`, `compiegne`, `loire`, `merzbach`, `mississippi`, `zuni`

`cities` *Roman cities*

Description

A dataset of population, area, and infrastructural measures for Roman cities of the Imperial period.

Usage

```
cities
```

Format

A `data.frame` with 125 observations (Roman cities) and 8 variables:

name `character`: site Name.

area `integer`: site area, in hectares.

population `integer`: population estimate, following the methodology in Hanson and Ortman (2017).

forum_area `integer`: total area of all fora/agorae in the site, in square meters.

street_area `integer`: total area of streets in the site, in square meters.

street_length `integer`: total length of streets in the site, in meters.

street_width `integer`: average width of streets, in square meters.

block_area `integer`: average area of a block, in square meters.

Source

Hanson, J. & Ortman, S. (2019). Population, area, and infrastructural measures for Roman cities of the Imperial period. *tDAR*. doi:10.6067/XCV8448563.

References

Hanson J. W. & Ortman S. G. (2017). A systematic method for estimating the populations of Greek and Roman settlements. *Journal of Roman Archaeology*, 30: 301-324. doi:10.1017/S1047759400074134.

Hanson J. W., Ortman S. G., Bettencourt L. M. A. & Mazur L. C. (2019). Urban form, infrastructure and spatial organisation in the Roman Empire. *Antiquity*, 93(369): 702-718. doi:10.15184/aqy.2018.192.

See Also

Other geographical data: `inrap`

`compiegne` *Compiègne Ceramics*

Description

A dataset containing the ceramic counts from the Place des Hallettes in Compiègne (Oise, France). The data are grouped into five periods of about a century, ranging from the 9th to the 14th century, and sixteen ceramic types.

Usage

```
compiegne
```

Format

A `data.frame` with 5 observations (periods) and 16 variables (ceramic types):

A `integer`: red to white ceramics with fine sized inclusions.

B `integer`: red to white ceramics with medium sized inclusions.

C `integer`: dark ceramics with fine sized inclusions.

D `integer`: dark ceramics with medium sized inclusions.

E `integer`: ceramics close to those of groups B or D, with similarities to group F.

F `integer`: black, red or beige ceramics with coarse inclusions.

G `integer`: red polished ceramics with fine to medium sized inclusions.

H `integer`: black polished ceramics with fine sized inclusions.

I `integer`: black polished ceramics with medium sized inclusions.

J `integer`: polished and painted ceramics with fine to medium sized inclusions.

K `integer`: painted ceramics, similar to those of group A.

L integer: painted ceramics, similar to those of group B.

M integer: painted ceramics with coarse inclusions.

N integer: glazed ceramics.

O integer: stamped ceramics.

P integer: coated ceramics.

Chronological periods are numbered from the oldest to the most recent (from 1 to 5).

Source

Lacroix, M. C. (1997). La céramique médiévale du site des Hallettes à Compiègne (Oise). *Revue archéologique de Picardie*. Numéro spécial, 13(1), 135-168. doi:10.3406/pica.1997.1945

See Also

Other count data: birds, boves, chevelon, loire, merzbach, mississippi, zuni

---

epica2008 *EPICA Dome C*

Description

EPICA Dome C 800-ka composite CO_2 data.

Usage

```
epica2008
```

Format

A data.frame with 1096 observations and 2 variables:

age integer: year BP.

CO2 numeric: CO_2 (ppmv).

Source

https://www.ncei.noaa.gov/access/paleo-search/study/6091

References

Lüthi, D., Le Floch, M., Bereiter, B., Blunier, T., Barnola, J.-M., Siegenthaler, U., Raynaud, D., Jouzel, J., Fischer, H., Kawamura, K. and Stocker, T. F. (2008). High-resolution carbon dioxide concentration record 650,000-800,000 years before present. *Nature*, 453, 379-382. doi:10.1038/nature06949

Monnin, E., Indermuhle, A., Dallenbach, A., Fluckiger, J., Stauffer, B., Stocker, T. F., Raynaud, D. and Barnola, J.-M. (2001). Atmospheric CO2 concentrations over the last glacial termination. *Science*, 291, 112-114. doi:10.1126/science.291.5501.112

Petit, J. R., Jouzel, J., Raynaud, D., Barkov, N. I., Barnola, J.-M., Basile, I., Benders, M., Chappellaz, J., Davis, M., Delayque, G., Delmotte, M., Kotlyakov, V. M., Legrand, M., Lipenkov, V. Y., Lorius, C., Pepin, L., Ritz, C., Saltzman, E. and Stievenard, M. (1999). Climate and atmospheric history of the past 420,000 years from the Vostok ice core, Antarctica. *Nature*, 399, 429-436. doi:10.1038/20859

Siegenthaler, U., Stocker, T. F., Monnin, E., Luthi, D., Schwander, J., Stauffer, B., Raynaud, D., Barnola, J.-M., Fischer, H., Masson-Delmotte, V., Jouzel, J. (2005). Stable Carbon Cycle-Climate Relationship During the Late Pleistocene. *Science*, 310, 1313-1317. doi:10.1126/science.1120130

See Also

Other palaeoenvironment data: `law2006`, `lisiecki2005`, `ngrip2004`, `ngrip2010`, `spratt2016`

Examples

```
plot(
  x = epica2008$age / 1000,
  y = epica2008$CO2,
  type = "l",
  xlim = c(800, 0),
  xlab = "kilo year BP",
  ylab = expression("CO"[2]~"(ppmv)")
)
```

---

inrap *Location of Inrap Archaeological Sites*

Description

A dataset of geographical locations of archaeological sites in France.

Usage

```
inrap
```

Format

A `data.frame` with 625 observations (archaeological sites) and 11 variables:

X `numeric`: longitude (RGF93 v1 / Lambert-93).

Y `numeric`: latitude (RGF93 v1 / Lambert-93).

region `character`: French region.

departement `character`: French departement.

commune `character`: French city.

site `character`: name of the site.

start `Date`: excavation start date.

end `Date`: excavation end date.

period `list`: chronology periods.

theme `list`: themes.

type `character`.

Details

This dataset presents the geographical locations of a selection of preventive archaeological excavations carried out in France by the Institut national de recherches archéologiques préventives (Inrap).

Source

https://www.data.gouv.fr/fr/datasets/r/b098d16a-ae19-48e4-8c58-e659e0603acd (last update: 2024-06-03)

See Also

Other geographical data: `cities`

Examples

```
# library(sf)
# coord <- st_as_sf(inrap, coords = c("X", "Y"), crs = st_crs(2154))
# plot(coord["region"])
```

`intcal09` *IntCal09*

Description

The IntCal series of radiocarbon calibration curves.

Usage

```
intcal09
```

Format

A `data.frame` with 3522 observations and 5 variables:

calBP `integer`: calendar (calibrated) age (year BP).

age `integer`: radiocarbon age (year BP).

error `integer`: radiocarbon error (year BP).

delta `numeric`: isotopic ratio $\Delta^{14}C$ (per mil).

sigma `numeric`: error on `delta` (per mil).

Source

Reimer, P. J., Baillie, M. G. L., Bard, E., Bayliss, A., Beck, J. W., Blackwell, P. G., Bronk Ramsey, C. *et al.* (2009). IntCal09 and Marine09 Radiocarbon age Calibration Curves, 0-50,000 Years Cal BP. *Radiocarbon*, 51(4): 1111-50. doi:10.1017/S0033822200034202.

See Also

Other radiocarbon dating: `arnold1949`, `intcal13`, `intcal20`

`intcal13` *IntCal13*

Description

The IntCal series of radiocarbon calibration curves.

Usage

```
intcal13
```

Format

A `data.frame` with 5141 observations and 5 variables:

calBP `integer`: calendar (calibrated) age (year BP).

age `integer`: radiocarbon age (year BP).

error `integer`: radiocarbon error (year BP).

delta `numeric`: isotopic ratio $\Delta^{14}C$ (per mil).

sigma `numeric`: error on `delta` (per mil).

Source

Reimer, P. J., Bard, E. Bayliss, A., Beck, J. W., Blackwell, P. G., Bronk Ramsey, C., Buck, C. E. *et al.* (2013). IntCal13 and Marine13 Radiocarbon age Calibration Curves 0-50,000 Years cal BP. *Radiocarbon*, 55(4): 1869-87. doi:10.2458/azu_js_rc.55.16947.

See Also

Other radiocarbon dating: arnold1949, intcal09, intcal20

---

intcal20 *IntCal20*

Description

The IntCal series of radiocarbon calibration curves.

Usage

```
intcal20
```

Format

A data.frame with 9501 observations and 5 variables:

calBP integer: calendar (calibrated) age (year BP).

age integer: radiocarbon age (year BP).

error integer: radiocarbon error (year BP).

delta numeric: isotopic ratio $\Delta^{14}C$ (per mil).

sigma numeric: error on delta (per mil).

Source

Reimer, P. J., Austin, W. E. N., Bard, E., Bayliss, A., Blackwell, P. G., Bronk Ramsey, C., Butzin, M. *et al.* (2020). The IntCal20 Northern Hemisphere Radiocarbon âge Calibration Curve (0-55 Cal KBP). *Radiocarbon*, 62(4), 725-757. doi:10.1017/RDC.2020.41.

See Also

Other radiocarbon dating: arnold1949, intcal09, intcal13

kommos *Transport Jars from Kommos (Crete)*

Description

Chemical analysis (neutron activation analysis) of 88 Late Bronze Age transport jars found in excavations at Kommos, Crete.

Usage

```
kommos
```

Format

A `data.frame` with 88 observations and 22 variables (chemical elements):

type `factor`: `CJ` (Canaanite jar), `EJ` (Egyptian jar); `TSJ` (transport stirrup jar), `SNA` (short-necked amphora).

date `character`: chronology (period).

Sm `numeric`: Sm content (ppm).

Lu `numeric`: Lu content (ppm).

U `numeric`: U content (ppm).

Yb `numeric`: Yb content (ppm).

As `numeric`: As content (ppm).

Sb `numeric`: Sb content (ppm).

Ca `numeric`: Ca content (ppm).

Na `numeric`: Na content (ppm).

La `numeric`: La content (ppm).

Ce `numeric`: Ce content (ppm).

Th `numeric`: Th content (ppm).

Cr `numeric`: Cr content (ppm).

Hf `numeric`: Hf content (ppm).

Cs `numeric`: Cs content (ppm).

Sc `numeric`: Sc content (ppm).

Rb `numeric`: Rb content (ppm).

Fe `numeric`: Fe content (ppm).

Ta `numeric`: Ta content (ppm).

Co `numeric`: Co content (ppm).

Eu `numeric`: Eu content (ppm).

References

Day, P. M., Quinn, P. S., Rutter, J. B. & Kilikoglou, V. (2011). A World of Goods: Transport Jars and Commodity Exchange at the Late Bronze Age Harbor of Kommos, Crete. *Hesperia*, 80, 511-558. doi:10.2972/hesperia.80.4.0511

See Also

Other chemical data: bronze, verre

`law2006` *Law Dome Ice Core*

Description

Law Dome Ice Core 2000-year CH_4, CO_2 and N_2O data.

Usage

```
law2006
```

Format

A `data.frame` with 2004 observations and 8 variables:

year integer: year AD.

NOAA04 numeric: NOAA04 CH_4 scale.

CH4_spl numeric: CH_4 spline (ppb).

CH4_grw numeric: CH_4 growth Rate (ppb/yr).

CO2_spl numeric: CO_2 spline (ppb).

CO2_grw numeric: CO_2 growth Rate (ppb/yr).

N2O_spl numeric: N_2O spline (ppb).

N2O_grw numeric: N_2O growth Rate (ppb/yr).

Source

https://www.ncei.noaa.gov/access/paleo-search/study/9959

References

MacFarling Meure, C., Etheridge, D., Trudinger, C., Steele, P., Langenfelds, R., van Ommen, T., Smith, A. and Elkins, J. (2006). The Law Dome CO2, CH4 and N2O Ice Core Records Extended to 2000 years BP. *Geophysical Research Letters*, 33(14), L14810. doi:10.1029/2006GL026152.

See Also

Other palaeoenvironment data: epica2008, lisiecki2005, ngrip2004, ngrip2010, spratt2016

Examples

```
plot(
  x = law2006$year,
  y = law2006$CO2_spl,
  type = "l",
  xlab = "Year AD",
  ylab = expression("CO"[2]~"(ppm)")
)
```

`lisiecki2005` *Global Benthic δ^18O Stack*

Description

A global Pliocene-Pleistocene benthic $\delta^{18}O$ stack.

Usage

```
lisiecki2005
```

Format

A `data.frame` with 2115 observations and 3 variables:

age `numeric`: calendar age (kilo year cal BP).

delta `numeric`: benthic $\delta^{18}O$ (per mil).

error `numeric`: standard error (per mil).

Details

The LR04 stack spans 5.3 Myr and is an average of 57 globally distributed benthic $\delta^{18}O$ records (which measure global ice volume and deep ocean temperature) collected from the scientific literature.

Source

https://www.ncei.noaa.gov/access/paleo-search/study/5847

References

Lisiecki, L. E. and Raymo, M. E. (2005). A Pliocene-Pleistocene stack of 57 globally distributed benthic d18O records. *Paleoceanography*, 20, PA1003. doi:10.1029/2004PA001071

See Also

Other palaeoenvironment data: `epica2008`, `law2006`, `ngrip2004`, `ngrip2010`, `spratt2016`

Other isotopic data: `ngrip2004`, `ngrip2010`, `nydal1996`, `spratt2016`, `vegetation`

Examples

```
plot(
  x = lisiecki2005$age,
  y = lisiecki2005$delta,
  type = "l",
  xlim = c(500, 0),
  xlab = "kilo year BP",
  ylab = expression(delta^{18}*"O")
)
```

`loire` *Medieval Ceramics from the Loire Basin*

Description

A dataset containing the ceramic counts from the Loire Basin (France).

Usage

```
loire
```

Format

A `data.frame` with 332 observations (assemblages) and 331 variables (ceramic types). The first five columns provide background information, the next columns give the MNI of each ceramic types:

site `character`: name of the archaeological site.

city `character`: city.

area `character`: geographical area.

lower `integer`: lower bound of the temporal range (year AD).

upper `integer`: upper bound of the temporal range (year AD).

Source

https://ceramedvaldeloire.huma-num.fr/editions/suppl79racf2022/accueil

References

Husi, P. (dir.). (2022). *La céramique médiévale et moderne du bassin de la Loire moyenne, chrono-typologie et transformation des aires culturelles dans la longue durée (6e-19e s.)*. Suppléments à la revue Archéologique du Centre de la France, 79.

See Also

Other count data: `birds`, `boves`, `chevelon`, `compiegne`, `merzbach`, `mississippi`, `zuni`

merzbach *Merzbach Ceramics*

Description

A dataset containing the ceramic counts from the Merzbach assemblage (Germany). The data are grouped into eight phases.

Usage

```
merzbach
```

Format

A `data.frame` with 8 observations (chronological phases) and 36 variables (pottery motifs).

Source

Crema, E. R. (2016). Sample codes and data for "Revealing patterns of cultural transmission from frequency data: equilibrium and non-equilibrium assumptions". *Zenodo*, v1.0. doi:10.5281/zenodo.187558.

References

Crema, E. R., Kandler, A. & Shennan, S. (2016). Revealing Patterns of Cultural Transmission from Frequency Data: Equilibrium and Non-Equilibrium Assumptions. *Scientific Reports*, 6(1). doi:10.1038/srep39122.

See Also

Other count data: `birds`, `boves`, `chevelon`, `compiegne`, `loire`, `mississippi`, `zuni`

mississippi *Mississippi Ceramics*

Description

A dataset containing ceramic counts from the Mississippi region.

Usage

```
mississippi
```

Format

A `data.frame` with 20 observations and 10 variables (ceramic types):

ParkinPunctate `integer`.

BartonKentMPI `integer`.

Painted `integer`.

FortuneNoded `integer`.

RanchIncised `integer`.

WallsEngraved `integer`.

WallaceIncised `integer`.

RhodesIncised `integer`.

VernonPaulApplique `integer`.

HullEngraved `integer`.

Source

Lipo, C. P., Madsen, M. E. & Dunnell, R. C. (2015). A Theoretically-Sufficient and Computationally-Practical Technique for Deterministic Frequency Seriation. *PLOS ONE*, 10(4), e0124942. doi:10.1371/journal.pone.0124942.

See Also

Other count data: `birds`, `boves`, `chevelon`, `compiegne`, `loire`, `merzbach`, `zuni`

`munsingen` *Münsingen Cemetery*

Description

A dataset of data set of artifact presence/absence for the Celtic Münsingen-Rain cemetery (Switzerland).

Usage

```
munsingen
```

Format

A `data.frame` with 59 observations (graves) and 70 variables (artefact types).

References

Hodson, F. R. (1968). *The La Tene Cemetery at Münsingen-Rain*. Stämpfli, Bern.

Kendall, D. G. (1971). Seriation from abundance matrices. In Hodson, F. R., Kendall, D. G. and Tautu, P. (eds), *Mathematics in the Archaeological and Historical Sciences*. Edinburgh University Press, Edinburgh, 215-232.

See Also

Other artefact data: shipwrecks

Examples

```
heatmap(
  x = as.matrix(munsingen),
  Rowv = NA,
  Colv = NA,
  scale = "none",
  col = c("white", "black")
)
```

---

ngrip2004 *NGRIP 50-year Average*

Description

50-year averaged oxygen isotope data from the North Greenland Ice Core Project (ss09sea time scale).

Usage

```
ngrip2004
```

Format

A data.frame with 4918 observations and 2 variables:

age integer: calendar age (years before 2000 AD), ss09sea time scale.

delta numeric: $\delta^{18}O$ (per mil).

Source

https://www.ncei.noaa.gov/access/paleo-search/study/2481

References

North Greenland Ice Core Project members (2004). High-resolution record of Northern Hemisphere climate extending into the last interglacial period. *Nature*, 431(7005), 147-151. doi:10.1038/nature02805

See Also

Other palaeoenvironment data: epica2008, law2006, lisiecki2005, ngrip2010, spratt2016

Other isotopic data: lisiecki2005, ngrip2010, nydal1996, spratt2016, vegetation

Examples

```
plot(
  x = ngrip2004$age / 1000,
  y = ngrip2004$delta,
  type = "l",
  xlim = c(120, 0),
  xlab = "ss09sea (ka b2k)",
  ylab = expression(delta^{18}*"O")
)
```

`ngrip2010` *NGRIP 20-year Average*

Description

20-year averaged oxygen isotope data from the North Greenland Ice Core Project (GICC05 time scale).

Usage

```
ngrip2010
```

Format

A `data.frame` with 6114 observations and 4 variables:

age `integer`: calendar age (years before 2000 AD), GICC05 time scale (or GICC05modelext when going beyond 60 ka b2k).

depth `numeric`: depth (meters).

delta `numeric`: $\delta^{18}O$ (per mil).

MCE `numeric`: maximum counting error (years).

Note

Use the labels GICC05 (or GICC05modelext when going beyond 60 ka b2k) on graphs.

Source

https://www.iceandclimate.nbi.ku.dk/data/

References

Vinther, B. M., Clausen, H. B., Johnsen, S. J., Rasmussen, S. O., Andersen, K. K., Buchardt, S. L., Dahl-Jensen, D., Seierstad, I. K., Siggaard-Andersen, M.-L., Steffensen, J. P., Svensson, A. M., Olsen, J. & Heinemeier, J. (2006). A synchronized dating of three Greenland ice cores throughout the Holocene. *Journal of Geophysical Research*, 111, D13102. doi:10.1029/2005JD006921.

Rasmussen, S. O., Andersen, K. K., Svensson, A. M., Steffensen, J. P., Vinther, B. M., Clausen, H. B., Siggaard-Andersen, M.-L., Johnsen, S. J., Larsen, L. B., Dahl-Jensen, D., Bigler, M., Röthlisberger, R., Fischer, H., Goto-Azuma, K., Hansson, M. E. & Ruth, U. (2006). A new Greenland ice core chronology for the last glacial termination. *Journal of Geophysical Research*, 111, D06102. doi:10.1029/2005JD006079.

Andersen, K. K., Svensson, A., Johnsen, S. J., Rasmussen, S. O., Bigler, M., Röthlisberger, R., Ruth, U., Siggaard-Andersen, M.-L., Steffensen, J. P., Dahl-Jensen, D., Vinther, B. M. & Clausen, H.B. (2005). The Greenland Ice Core Chronology 2005, 15-42 ka. Part 1: Constructing the time scale. *Quaternary Science Reviews*, 25(23-24):3246-3257. doi:10.1016/j.quascirev.2006.08.002.

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Wolff, E. W., Chappellaz, J., Blunier, T., Rasmussen, S. O. & Svensson, A. (2010). Millennial-scale variability during the last glacial: The ice core record. *Quaternary Science Reviews*, 29:2828-2838. doi:10.1016/j.quascirev.2009.10.013.

See Also

Other palaeoenvironment data: `epica2008`, `law2006`, `lisiecki2005`, `ngrip2004`, `spratt2016`

Other isotopic data: `lisiecki2005`, `ngrip2004`, `nydal1996`, `spratt2016`, `vegetation`

Examples

```
plot(
  x = ngrip2010$age / 1000,
  y = ngrip2010$delta,
  type = "l",
  xlim = c(120, 0),
  xlab = "GICC05",
  ylab = expression(delta^{18}*"O")
)
```

`nydal1996` *ˆ14C Measurements in Atmospheric CO_2*

Description

Corrected ^{14}C measurements from air samples collected at five Norwegian sites from 1962-1993.

Usage

```
nydal1996
```

Format

A `data.frame` with 620 observations and 5 variables:

site `character`: sampling station.

start `Date`: beginning date of the sampling period.

end `Date`: ending date of the sampling period.

delta `numeric`: isotopic ratio $\Delta^{14}C$ (per mil).

sigma `numeric`: error on `delta` (per mil).

Source

Nydal, R. and Lövseth, K. (1996). *Carbon-14 Measurements in Atmospheric CO2 from Northern and Southern Hemisphere Sites, 1962-1993*. ORNL/CDIAC-93; NDP-057. Washington, DC: USDOE Office of Energy Research. doi:10.2172/461185

See Also

Other isotopic data: `lisiecki2005`, `ngrip2004`, `ngrip2010`, `spratt2016`, `vegetation`

Examples

```
plot(
  x = nydal1996$start,
  y = nydal1996$delta,
  type = "p",
  xlab = "Date",
  ylab = expression(Delta^{14}*"C")
)
```

---

shipwrecks *Mediterranean Shipwrecks*

Description

A dataset of Mediterranean shipwrecks.

Usage

```
shipwrecks
```

Format

A `data.frame` with 1784 observations (wrecks) and 13 variables:

name `character`: wreck name.

sea `character`: region of the sea where the wreck was discovered.

country `character`: country where the wreck was discovered.

region `character`: region where the wreck was discovered.

depth_min `integer`: minimum depth of the wreck (m).

depth_max `integer`: maximum depth of the wreck (m).

depth `character`: depth of the wreck (m).

period `character`: chronology (period).

dating `character`: chronology (dating).

date_early `integer`: earliest date.

date_late `integer`: latest date.

origin `character`: place of origin.

destination `character`: place of destination.

Note

This dataset contains typos and needs to be normalized.

Source

Strauss, J. (2013). *Shipwrecks Database*. Version 1.0. Accessed 2022-08-13. URL: https://oxrep.classics.ox.ac.uk/databases/shipwrecks_database/

References

Parker, A. J. (1992). *Ancient Shipwrecks of the Mediterranean and the Roman Provinces*. British Archaeological Reports International Series 580. Oxford.

Strauss, E. J. (2007). *Roman Cargoes: Underwater Evidence from the Eastern Mediterranean*. Doctoral thesis, University College London. URL: https://discovery.ucl.ac.uk/id/eprint/1349806.

See Also

Other artefact data: `munsingen`

spratt2016 *Late Pleistocene Sea Level Stack*

Description

A Late Pleistocene sea level stack based on marine sediment core data (foraminiferal carbonate $\delta^{18}O$).

Usage

```
spratt2016
```

Format

A `data.frame` with 799 observations and 9 variables:

age_calkaBP `integer`: age (calendar kilo year BP).

SeaLev_shortPC1 `numeric`: sea Level (meters above present day), climate reconstructions (scaled first principal component of seven sea level reconstructions (0-430 ka)).

SeaLev_shortPC1_err_sig `numeric`: sea Level standard deviation from bootstrap (meters), climate reconstructions (scaled first principal component of seven sea level reconstructions (0-430 ka)).

SeaLev_shortPC1_err_lo `numeric`: sea Level 95% confidence interval lower bound (meters), climate reconstructions (scaled first principal component of seven sea level reconstructions (0-430 ka)).

SeaLev_shortPC1_err_up `numeric`: sea Level 95% confidence interval upper bound (meters), climate reconstructions (scaled first principal component of seven sea level reconstructions (0-430 ka)).

SeaLev_longPC1 `numeric`: sea Level (meters above present day), climate reconstructions (scaled first principal component of five sea level reconstructions (0-798 ka)).

SeaLev_longPC1_err_sig `numeric`: sea Level standard deviation from bootstrap (meters), climate reconstructions (scaled first principal component of five sea level reconstructions (0-798 ka)).

SeaLev_longPC1_err_lo `numeric`: sea Level 95% confidence interval lower bound (meters), climate reconstructions (scaled first principal component of five sea level reconstructions (0-798 ka)).

SeaLev_longPC1_err_up `numeric`: sea Level 95% confidence interval upper bound (meters), climate reconstructions (scaled first principal component of five sea level reconstructions (0-798 ka)).

Source

https://www.ncei.noaa.gov/access/paleo-search/study/19982

References

Spratt, R. M. and Lisiecki, L. E. (2016). A Late Pleistocene sea level stack. *Climate of the Past*, 12, 1079-1092. doi:10.5194/cp1210792016

See Also

Other palaeoenvironment data: epica2008, law2006, lisiecki2005, ngrip2004, ngrip2010

Other isotopic data: lisiecki2005, ngrip2004, ngrip2010, nydal1996, vegetation

Examples

```
plot(
  x = spratt2016$age_calkaBP,
  y = spratt2016$SeaLev_longPC1,
  type = "l",
  xlim = c(500, 0),
  xlab = "kilo year BP",
  ylab = "Sea level (meters above present)"
)
```

---

stratigraphy *Chronostratigraphic Chart*

Description

The ICS international chronostratigraphic chart (v2022/2).

Usage

```
stratigraphy
```

Format

A `data.frame` with 176 observations and 5 variables:

type character: unit type ("eon", "era", "period", "series" or "stage"). Precambrian and Hadean are informal units.

name character: unit name.

age numeric: numerical age (Ma).

error numeric: error on numerical age (Ma).

parent character: parent unit.

Source

https://stratigraphy.org/ICSchart/ChronostratChart2022-02.pdf

References

Cohen, K. M., Finney, S. C., Gibbard, P. L. and Fan, J.-X. (2013). The ICS International Chronostratigraphic Chart. *Episodes*, 36(3): 199-204. doi:10.18814/epiiugs/2013/v36i3/002

`vegetation` $\delta^{13}C$ *Values for Vegetation*

Description

$\delta^{13}C$ Values for Vegetation

Usage

```
vegetation
```

Format

A `data.frame` with 155 observations and 5 variables:

family `character`: plant family.

species `character`: plant species.

type `character`: C3 or C4 plant.

delta `numeric`: isotopic ratio $\delta^{13}C$ (per mil).

country `character`: country.

Source

Cerling, T. E. and Harris, J. M. (1999). Carbon isotope fractionation between diet and bioapatite in ungulate mammals and implications for ecological and paleoecological studies. *Oecologia*, 120, 347-363. doi:10.1007/s004420050868

See Also

Other isotopic data: `lisiecki2005`, `ngrip2004`, `ngrip2010`, `nydal1996`, `spratt2016`

Examples

```
hist(
  x = vegetation$delta,
  breaks = 20,
  main = "C3 and C4 plants",
  xlab = expression(delta^{13}*"C"),
  xlim = c(-40, 0)
 )

boxplot(
  delta ~ type,
```

```
  data = vegetation,
  horizontal = TRUE,
  xlab = expression(delta^{13}*"C"),
  ylab = "Plant",
  ylim = c(-40, 0)
)
```

---

verre *French Medieval Glass Composition*

Description

Chemical analysis (electron probe X-ray micro analysis) of 398 medieval glass vessels found in France.

Usage

```
verre
```

Format

A `data.frame` with 398 observations and 17 variables:

Site `factor`: `CNL` (Cour Napoléon, Louvre), `ORL` (Orléans), `POI` (Poitiers), `ANG` (Angers), `OMO` (Omonville, Seine Maritime), `ROU` (Rouen), `MEA` (Meaux), `CHL` (Châlons-sur-Marne), `PAI` (Pairu, Argonne, Ardennes), `BER` (Bercettes, Argonne, Ardennes), `BIN` (Binois, Argonne, Ardennes), `CHE` (Chevrie, Argonne, Ardennes), `MIT` (Mitte, Argonne, Ardennes), `MET` (Metz), `CHM` (Chambaran).

Sample `character`: sample code.

Type `character`: typology.

Age `character`: century.

Periode `factor`: `I` (9th-12th century), `II` (13th-first half of the 15th century), `III` (end of the 15th to end of the 16th century), `IV` (end of 16th to end of the 17th century).

Tint `factor`: `?` (unknown), `B` (blue), `CL` (colourless), `CLg` (colourless – greyish tint), `PB` (pale blue; `PGE`: pale greenish), `PGE-B` (pale green-blue or blue-green), `PGY-B` (pale grey-blue), `R` (opaque red), `W` (opaque white), `*av` (added aventurine spots), `*bl` (added thread blue or blue spots), `*r` (added thread opaque red or opaque red spots), `*w` (added thread opaque white).

Na2O `numeric`: Na2O content (percent).

CaO `numeric`: CaO content (percent).

K2O `numeric`: K2O content (percent).

MgO `numeric`: MgO content (percent).

P2O5 `numeric`: P2O5 content (percent).

SiO2 `numeric`: SiO2 content (percent).

Al2O3 `numeric`: Al2O3 content (percent).

FeO numeric: FeO content (percent).

MnO numeric: MnO content (percent).

Cl numeric: Cl content (percent).

Reference character: site reference.

References

Barrera J., Velde B. (1989). A study of french medieval glass composition. *Archéologie médiévale*, 19, 81-130. doi:10.3406/arcme.1989.953.

See Also

Other chemical data: bronze, kommos

Examples

```
plot(
  x = verre$Na2O,
  y = verre$CaO / (verre$CaO + verre$K2O),
  type = "p",
  xlab = expression("Na"[2]*"O (%)"),
  ylab = expression("CaO"/"(CaO"+"K"[2]*"O)")
)
```

---

zuni *Zuni Ceramics*

Description

A dataset containing ceramic counts from the Zuni region of the American Southwest.

Usage

```
zuni
```

Format

A data.frame with 420 observations (assemblages) and 18 variables (ceramic types):

LINO integer: Lino Gray (575-875).

KIAT integer: Kiatuthlanna Black-on-white (850-910).

RED integer: Red Mesa Black-on-white (900-1030).

GALL integer: Gallup Black-on-white (1025-1150).

ESC integer: Escavada Black-on-white (1050-1150).

PUBW integer: Puerco Black-on-white (1050-1200).

RES integer: Reserve Black-on-white (1071-1115).

TULA integer: Tularosa Black-on-white (1175-1300).

PINE integer: Pinedale Black-on-white (1275-1325).

PUBR integer: Puerco Black-on-red (1050-1200).

WING integer: Wingate Black-on-red (1070-1200).

WIPO integer: Wingate Polychrome (1150-1250).

SJ integer: St. Johns Black-on-red/Polychrome (1200-1300).

LSJ integer: St. Johns glaze, Techado Polychrome (1275-1300).

SPR integer: Springerville Polychrome (1250-1300).

PINER integer: Pinedale Black-on-red/Polychrome (1275-1325).

HESH integer: Heshotauthla Polychrome (1285-1400).

KWAK integer: Kwakina Polychrome (1285-1400).

The numbers in brackets correspond to the date range of each type (in AD years).

Source

Peeples, M. A., & Schachner, G. (2012). Refining correspondence analysis-based ceramic seriation of regional data sets. *Journal of Archaeological Science*, 39(8), 2818-2827. doi:10.1016/j.jas.2012.04.040.

See Also

Other count data: birds, boves, chevelon, compiegne, loire, merzbach, mississippi

Index