Package 'ocedata'

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Title Oceanographic Datasets for Oce

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Depends R (>= 2.15), methods

Enhances oce

BugReports https://github.com/dankelley/ocedata/issues?sort=created&direction=desc&state=open

Description Several important and Oceanographic datasets are provided. These are particularly useful to the Oce package, but can be helpful in a general context, as well.

URL http://dankelley.github.com/ocedata/

LazyLoad yes

LazyData no

NeedsCompilation no

Repository CRAN

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R topics documented:

`airHalifax` *Time-series of wind and temperature at Halifax, Canada.*

Description

A sample air dataset in the form of a data frame with columns containing `t`, containing `u`, containing `v`, and containing `temperature`.

Usage

```
data(airHalifax)
```

Author(s)

Dan Kelley

`beaufort` *Beaufort scale relationship of wind speed to wave height*

Description

A data frame containing `wind`, the wind speed in m/s, and `height`, the probable wave height in m, both as suggested in the Beaufort Scale.

Usage

```
data(beaufort)
```

Source

The data were downloaded from http://www.metoffice.gov.uk/weather/marine/guide/beaufortscale.html on April 20, 2014. Many other sources are also available.

Examples

```
data(beaufort, package="ocedata")
plot(beaufort$wind, beaufort$height)
```

`buoy` *Measurements made at a buoy off Halifax*

Description

Hourly observations made between March 3rd and April 18th of 2014, at the Environment Canada 3-metre discus buoy situated at (44.502N 63.403W) near Halifax Harbour.

The contents of the buoy data frame are as follows (other items in the data file are ignored).

`t` time of observation, in `POSISct` format

`wind` wind speed in m/s

`direction` direction from which the wind is blowing, measured in degrees clockwise of true North.

`height` wave height in metres

`period` wave period in seconds

`pa` atmospheric pressure in kPa

`Ta` air temperature in degC

`Tw` water temperature in degC

About two percent of the observation times are missing.

Usage

```
data(buoy)
```

Source

The data were downloaded as a file named 44258.txt in April 2014 from http://www.ndbc.noaa.gov/data/realtime2/, and made into a data frame. See [1] and [2] for information on the data in such buoys, and [3] for more on this particular buoy. The code to create the dataset is given below.

```
d <- read.table("44258.txt", stringsAsFactors=FALSE, skip=2)
t <- ISOdatetime(d[,1], d[,2], d[,3], d[,4], d[,5], 0, tz="UTC")
o <- order(t)
## missing data
d[d == "MM"] <- NA
## put oldest first
t <- t[o]
d <- d[o,]
footPerMetre <- 39.3701 / 12
direction <- as.numeric(d[,6])
wind <- as.numeric(d[,7])
height <- as.numeric(d[,9])
period <- as.numeric(d[,10])
pa <- as.numeric(d[,13])
Ta <- as.numeric(d[,14])
Tw <- as.numeric(d[,15])
```

References

1. http://www.ndbc.noaa.gov/NDBCHandbookofAutomatedDataQualityControl2009.pdf
2. http://www.ndbc.noaa.gov/measdes.shtml
3. http://www.ndbc.noaa.gov/station_page.php?station=44258

Examples

```
## Not run:
library(oce)
data(buoy, package="ocedata")
par(mfrow=c(3,1))
oce.plot.ts(buoy$t, buoy$wind, ylab="Wind Speed [m/s]")
oce.plot.ts(buoy$t, buoy$height, ylab="Wave height [m]")
oce.plot.ts(buoy$t, buoy$period, ylab="Wave period [s]")

## End(Not run)
```

`coastlineWorldMedium` *World coastlines at medium and fine-scale resolution*

Description

World coastlines at medium and fine-scale resolution

Usage

```
data(coastlineWorldMedium)
data(coastlineWorldFine)
```

Details

These datasets are analogous to `coastlineWorld` in the Oce package, but they are of finer resolution; a comparison table follows.

- `coastlineWorld` is a coarse resolution 1:110M (with 10,696 points), suitable for world-scale plots plotted at a small size, e.g. inset diagrams
- `coastlineWorldMedium` resolution 1:50M (with 100,954 points), suitable for world- or basin-scale plots
- `coastlineWorldFine` resolution 1:10M (with 552,670 points), suitable for shelf-scale plots

Author(s)

Dan Kelley

Source

Downloaded from `http://www.naturalearthdata.com`, in files `ne_50m_admin_0_countries.shp` for `coastlineWorldMedium`, and `ne_10m_admin_0_countries.shp` for `coastlineWorldFine`.

See Also

The documentation for `coastline-class` in the Oce package explains the structure of coastline objects and discusses functions that deal with them.

The `maps` package provides a database named `world` that has 27221 points, putting it intermediate between the Oce default and coarse versions.

conveyor *Conveyor-belt path*

Description

Locations that yield a spline that roughly matches Broecker's conveyor-belt path.

Usage

```
data(conveyor)
```

Source

The data were digitized from Figure 1 of Broecker (1991), by a multistep process. First, a world map was drawn with `mapPlot` from the `oce` package, using a projection (Mercator) that seemed similar to Broecker's. Second, `locator` was used to digitize points along his conveyor-belt pathlines. No projection information being provided by Broecker, this had to be done by coastline reference. Third, the x-y data were converted to lon-lat space using `map2lonlat()` in the `oce` package. When this was done, splines were fitted to the data and the resultant paths were drawn on the map (using code like that given in the example). Then, some adjustments were made to the data files, to get the splines to more faithfully represent the paths on Broecker's diagram.

References

Broecker, W. S., 1991. The great ocean conveyor. *Oceanography*, 4: 79-89.

Examples

```
## Not run:
library(oce)
data(coastlineWorld)
par(mar=rep(1,4))
mapPlot(coastlineWorld, projection="+proj=wintri +lon_0=70")
data(conveyor, package="ocedata")
## Main path
lon <- subset(conveyor, path==1)$longitude
lat <- subset(conveyor, path==1)$latitude
mapLines(lon, lat, col="blue", lwd=3)
## Secondary path (in Indian Ocean)
lon <- subset(conveyor, path==2)$longitude
lat <- subset(conveyor, path==2)$latitude
mapLines(lon, lat, col="darkgreen", lwd=3)

## End(Not run)
```

drag — *Wind drag coefficient*

Description

Wind drag coefficients for wind-profile and eddy-covariance methods, summarized in Figure 3 of Garratt (1977). The data are stored in a data frame with four columns: `U` is wind speed in m/s; `Cd` is for (neutral) drag coefficient; `n` is the number of data measurements represented by the value; and `method` is a factor with two levels: `profile` and `eddy`, for two methods of inferring `Cd`.

Usage

```
data(drag)
```

Source

Data digitized from Figure 3 of Garratt (1977) by Dan Kelley.

References

J. R. Garratt, 1977. Review of drag coefficients over oceans and continents. *Monthly Weather Review*, 105:915-927.

Examples

```
## Not run:
library(ocedata)
data(drag)
par(mar=c(3,3,1,1), mgp=c(2, 0.7, 0))
plot(drag$U, drag$Cd, pch=ifelse(drag$method == "profile", 1, 19),
     xlab="U [m/s]", ylab=expression(C[D]),
     xlim=c(0, 22), ylim=c(0, 3e-3))
legend("topleft", pch=c(1,19), legend=c("profile method", "eddy covariance method"))

## End(Not run)
```

endeavour — *Cook's Endeavour cruise track*

Description

Time, longitude, and latitude for the H.M.S. Endeavour cruise, 1768-1771

Usage

```
data(endeavour)
```

Source

The data were extracted from an XML file contained within a zipfile provided at the Australian government website http://www.data.gov.au/dataset/7f03ac78-7210-4702-8cd5-f3e373f4097b, last checked 2015 Feb 5.

Examples

```
## Not run:
library(oce)
data(coastlineWorld)
data(endeavour, package="ocedata")
mapPlot(coastlineWorld, type='l', proj='+proj=moll', fill='lightgray')
mapPoints(endeavour$longitude, endeavour$latitude, pch=20, cex=2/3, col='red')

## End(Not run)
```

---

geosecs235 *GEOSECS station 235 data*

Description

GEOSECS station 235 data

Usage

```
data(geosecs235)
```

Source

Data from http://iridl.ldeo.columbia.edu/SOURCES/.GEOSECS/ISTA/237/VALUE/data.cdf

References

D. E. Kelley and Van Scoy, K. A., 1999. A basin-wide estimate of vertical mixing in the upper pycnocline: spreading of bomb tritium in the North Pacific Ocean. *Journal of Physical Oceanography*, 29: 1759–1771.

Examples

```
## Not run:
library(oce)
data(geosecs235, package="ocedata")
## reproduce part of Figure 10 of Kelley and Van Scoy (1999)
plotProfile(geosecs235, xtype="tritium", type='p', ylim=c(600, 0))

## End(Not run)
```

giss *Time series of NASA/GISS land-ocean temperature index*

Description

A data frame containing the Goddard Institute for Space Studies (GISS) time series of surface temperature anomaly, with columns named `year` for decimal year (sampled monthly and represented at mid-month) and `index` for the temperature anomaly. The details of the original data processing are provided in [2] and [3]. The data were downloaded from http://data.giss.nasa.gov/gistemp/tabledata_v3/GLB.Ts+dSST.txt in September of 2014 and processed as follows.

```
l <- readLines("giss.dat") # http://data.giss.nasa.gov/gistemp/tabledata_v3/GLB.Ts+dSST.txt
l <- l[grep("^[1-2].*", l)]          # ignore headers at start, and every 20 years
l <- l[grep("\*", l, invert=TRUE)]    # ignore partial lines
## year is in char 1 to 4; data in 0.01degC are in char 8 to 65
startyear <- scan(textConnection(l[1]), n=1)
index <- 0.01 * scan(textConnection(substr(l, 8, 65)))
year <- 1/24 + seq(startyear, by=1/12, length.out=length(Ta))
giss <- data.frame(year=year, index=index)
```

Usage

```
data(giss)
```

Source

The data were downloaded from [1]. See the NASA webpage [2] for a description of the data processing done by NASA, and [3] for a scientific paper on the matter.

References

1. http://data.giss.nasa.gov/gistemp/tabledata_v3/GLB.Ts+dSST.txt

2. http://data.giss.nasa.gov/gistemp

3. J. Hansen, R. Ruedy, M. Sato and K. Lo, 2010. Global surface temperature change. Rev. Geophys., 48, RG4004. (http://pubs.giss.nasa.gov/abs/ha00510u.html)

gs *Gulf Stream position*

Description

Monthly latitude and longitude of Gulf Stream position, averaged from 1973 to 1992, according to Drinkwater et al. 1994 (page 103), in the form of a list containing `month`, the numbers 1 through 12, `longitude`, the longitudes in degrees east, and `latitude`, a matrix of latitudes, with columns for months and rows for longitudes. The data were entered by hand by Dan Kelley, and may suffer errors resulting from typos and inaccurate reading of occasionally blurry digits.

Usage

```
data(gs)
```

Source

Depatment of Fisheries and Oceans online library (http://www.dfo-mpo.gc.ca/Library/166053.pdf).

References

K. F. Drinkwater, R. A Myers, R. G. Pettipas and T. L. Wright, 1994. Climatic data for the northwest Atlantic: the position of the shelf/slope front and the northern boundary of the Gulf Stream between 50W and 75W, 1973-1992. Canadian Data Report of Fisheries and Ocean Sciences 125. Department of Fisheries and Oceans, Canada.

Examples

```
## Not run:
library(oce)
data(gs, package="ocedata")
data(coastlineWorldMedium, package="ocedata")
plot(coastlineWorldMedium,
     clon=mean(gs$longitude), clat=mean(gs$latitude), span=3200)
data(topoWorld)
contour(topoWorld[["longitude"]]-360,
        topoWorld[["latitude"]], -topoWorld[["z"]],
        level=1000*(1:5), col='brown', add=TRUE)
for (i in gs$month)
    lines(gs$longitude, gs$latitude[,i], col='blue')

## End(Not run)
```

---

levitus *Annually-averaged sea-surface temperature and salinity*

Description

Sea-surface temperature and salinity from the 2013 version of the World Ocean Atlas (WOA), commonly referred to as the "Levitus" atlas, in the form of a list containing `longitude`, `latitude`, and sea-surface salinity `SSS` and temperature `SST`.

Usage

```
data(levitus)
```

Details

The `levitus` dataset was constructed as follows. (The details need be adjusted only slightly for other depths, or other datasets such as oxygen, nutrients, etc.) First, the netcdf datafile was downloaded from the source listed below, a URL known to work in January 2015. Then, the following code was executed to extract the top level from the salinity and temperature matrices, and to store them in an `.rda` file.

```
library(oce)
library(ncdf4)

con <- nc_open("/data/oar/levitus/woa13_decav_t00_01.nc")
longitude <- ncvar_get(con, "lon")
latitude <- ncvar_get(con, "lat")
SST <- ncvar_get(con, "t_an")[,,1]
nc_close(con)

con <- nc_open("/data/oar/levitus/woa13_decav_s00_01.nc")
SSS <- ncvar_get(con, "s_an")[,,1]
nc_close(con)

levitus <- list(longitude=longitude, latitude=latitude, SSS=SSS, SST=SST)
save(levitus, file='levitus.rda')
tools::resaveRdaFiles("levitus.rda") # compact the file
```

Author(s)

The atlas was constructed by NOAA personnel [1, 2, 3]. The top level was extracted and packaged in `ocedata` by Dan Kelley.

Source

- http://data.nodc.noaa.gov/thredds/fileServer/woa/WOA13/DATA/temperature/netcdf/decav/1.00/woa13_decav_t00_01.nc
- http://data.nodc.noaa.gov/thredds/fileServer/woa/WOA13/DATA/salinity/netcdf/decav/1.00/woa13_decav_s00_01.nc

References

[1] http://www.nodc.noaa.gov/OC5/woa13/

[2] Locarnini, R. A., A. V. Mishonov, J. I. Antonov, T. P. Boyer, H. E. Garcia, O. K. Baranova, M. M. Zweng, C. R. Paver, J. R. Reagan, D. R. Johnson, M. Hamilton, and D. Seidov, 2013. World Ocean Atlas 2013, Volume 1: Temperature. S. Levitus, Ed., A. Mishonov Technical Ed.; NOAA Atlas NESDIS 73, 40 pp.

[3] Zweng, M.M, J.R. Reagan, J.I. Antonov, R.A. Locarnini, A.V. Mishonov, T.P. Boyer, H.E. Garcia, O.K. Baranova, D.R. Johnson, D.Seidov, M.M. Biddle, 2013. World Ocean Atlas 2013, Volume 2: Salinity. S. Levitus, Ed., A. Mishonov Technical Ed.; NOAA Atlas NESDIS 74, 39 pp.

Examples

```
## Not run:
library(oce)
data(levitus, package="ocedata")
attach(levitus)
par(mfrow=c(2,1))
imagep(longitude, latitude, SST, col=oceColorsJet, zlim=c(-2, 30))
imagep(longitude, latitude, SSS, col=oceColorsJet, zlim=c(20, 40))

## End(Not run)
```

---

munk *Munk's (1966) temperature profile*

Description

Temperature profile digitized from the left-hand panel of Munk's Figure 1.

Usage

```
data(munk)
```

References

Walter H. Munk, 1966. Abyssal recipes. Deep-Sea Research, 13, 707-730.

Examples

```
## Not run:
library(ocedata)
data(munk)
plot(munk$temperature, munk$depth,
     ylim=rev(range(munk$depth)), xlab="Temperature [degC]", ylab="Depth [km]")

## End(Not run)
```

---

nao *North Atlantic Oscillation Index*

Description

This is the North Oscillation Index, downloaded in May 2014 and processed as follows.

```
d <- scan("http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.as
isYear <- d > 1900
index <- d[!isYear]
year <- 1/24 + seq(d[isYear][1], by=1/12, length.out=length(index))
nao <- data.frame(year=year, index=index)
```

Usage

```
data(nao)
```

Author(s)

Dan Kelley

Source

http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.ascii.table

---

oceans *Geometries of the five world oceans.*

Description

Surface areas, average depths, and maximum depths for five world oceans, calculated from the ETOPO-1 dataset. Area is in square metres (converted from square kilometres on the NOAA site), and depths are in metres.

Usage

```
data(oceans)
```

Source

Data were downloaded from the NOAA website http://ngdc.noaa.gov/mgg/global/etopo1_ocean_volumes.html in October 2012.

References

Amante, C. and B. W. Eakins, ETOPO1 1 Arc-Minute Global Relief Model: Procedures, Data Sources and Analysis. NOAA Technical Memorandum NESDIS NGDC-24, 19 pp, March 2009.

Examples

```
## Not run:
library(oce)
data(oceans, package="ocedata")
dotchart(oceans$Area, rownames(oceans), main="Surface Area [m^2]",
         xlim=c(0, max(oceans$Area)))

## End(Not run)
```

ocedata *Datasets for the oce package*

Description

Provides datasets for use in oceanographic analysis.

Details

Some commonly-used oceanographic datasets are too large to be stored within an analysis package such as `oce`, or are of sufficient general interest to merit inclusion in a separate package. Such datasets are provided here, for use by Oceanographers using the `oce` package or other more general packages.

papa *OWS Papa hydrographic record during 2010*

Description

This dataset holds the temperature and salinity measured at Ocean Weather Station Papa (50N, 145W) in the year 2010. Time and vertical coordinate are in vectors `papa$t` and `papa$z`, while temperature, salinity and σ_θ are in the matrices `papa$temperature`, `papa$salinity` and `papa$sigmaTheta`. This is an excerpt from a larger dataset that spans 2007-06-08 to 2012-10-24, and it has been trimmed to just those z values that are common to the larger dataset, namely -1, -10, -20, -45, -80, -100, -120, -150, and -200. Time is sampled daily, from 2011-01-01 12:00:00 to 2011-12-31 12:00:00 UTC.

Usage

```
data(papa)
```

Source

Salinity is from http://www.pmel.noaa.gov/stnP/data/daily/s50n145w_dy.ascii and temperature is from http://www.pmel.noaa.gov/stnP/data/daily/t50n145w_dy.ascii. Although there is a data file for σ_θ on the NOAA website, here it was calculated with `swSigmaTheta` in the Oce package.

References

The larger data set is described at http://www.pmel.noaa.gov/stnP/, and related datasets can be found at http://www.pmel.noaa.gov/stnP/data.html in various formats.

Examples

```
## Not run:
library(oce)
data(papa, package="ocedata")
par(mfrow=c(3,1))
imagep(papa$t, papa$z, papa$temperature, col=oceColorsJet, filledContour=TRUE)
imagep(papa$t, papa$z, papa$salinity, col=oceColorsJet, filledContour=TRUE)
imagep(papa$t, papa$z, papa$sigmaTheta, col=oceColorsJet, filledContour=TRUE)
plot(papa$t, papa$temperature[,1], type='l',ylim=range(papa$temperature), lwd=2)
for (i in 2:dim(papa$temperature)[2])
    lines(papa$t, papa$temperature[,i], col=i, lwd=2)
legend("topleft", title="z [m]", lwd=2, legend=papa$z, col=1:length(papa$z), bg="white")
plot(papa$t, papa$salinity[,1], type='l',ylim=range(papa$salinity), lwd=2)
for (i in 2:dim(papa$salinity)[2])
    lines(papa$t, papa$salinity[,i], col=i, lwd=2)
legend("topleft", title="z [m]", lwd=2, legend=papa$z, col=1:length(papa$z), bg="white")
plot(papa$t, papa$sigmaTheta[,1], type='l',ylim=range(papa$sigmaTheta), lwd=2)
for (i in 2:dim(papa$sigmaTheta)[2])
    lines(papa$t, papa$sigmaTheta[,i], col=i, lwd=2)
legend("topleft", title="z [m]", lwd=2, legend=papa$z, col=1:length(papa$z), bg="white")

## End(Not run)
```

---

redfieldNC — *Redfield's (1934) NO3 and total CO2 data*

Description

Data digitized from Redfield's (1934) Figure 3, showing NO_3 dependence on total CO_2.

Usage

```
data(redfieldNC)
```

Source

Data digitized by Dan Kelley from a scanned copy of Redfield (1934).

References

Alfred C. Redfield, 1934. On the proportions of organic derivations in sea water and their relation to the composition of plankton. Pages 177–192 in James Johnstone Memorial Volume, University Press of Liverpool.

See Also

See redfieldNP and redfieldPlankton.

Examples

```
## Not run:
library(oce)
data(redfieldNC, package="ocedata")
plot(redfieldNC$CO2, redfieldNC$NO3, xlab=expression(CO[2]), ylab=expression(NO[3]))
slope <- 1/7
abline(-275.5, slope, lwd=3)
abline(-288.5, slope, lwd=3)

## End(Not run)
```

---

redfieldNP *Redfield's (1934) NO3 and PO4 data*

Description

Data digitized from Redfield's (1934) Figure 1, showing NO_3 dependence on PO_4. This dataset is used in Chapter 4 of Kelley (2012).

Usage

```
data(redfieldNP)
```

Source

Data digitized by Dan Kelley from a scanned copy of Redfield's (1934) Figure 1, showing the dependence of NO_3 on PO_4.

References

Dan Kelley, in preparation. Oceanographic Analysis with R. Springer Verlag.

Alfred C. Redfield, 1934. On the proportions of organic derivations in sea water and their relation to the composition of plankton. Pages 177–192 in James Johnstone Memorial Volume, University Press of Liverpool.

See Also

See redfieldNC and redfieldPlankton.

Examples

```
## Not run:
data(redfieldNP, package="ocedata")
plot(redfieldNP$PO4, redfieldNP$NO3, xlab=expression(PO[4]), ylab=expression(NO[3]))
abline(0, 20, lwd=3)                    # line N:P = 20:1, as shown by Redfield

## End(Not run)
```

redfieldPlankton *Redfield's (1934) Table II*

Description

Contents of Redfield's (1934) Table II, containing columns for sampled species, carbon content by weight (normalized to 100), Nitrogen content by weight, and Phosphorus content by weight. This dataset is used in Chapter 4 of Kelley (2013).

Usage

```
data(redfieldPlankton)
```

Source

Data entered verbatim (sans italics for species name) by Dan Kelley from Redfield's (1934) Table II.

References

Dan Kelley, in preparation. Oceanographic Analysis with R. Springer Verlag.

Alfred C. Redfield, 1934. On the proportions of organic derivations in sea water and their relation to the composition of plankton. Pages 177–192 in James Johnstone Memorial Volume, University Press of Liverpool.

See Also

See redfieldNP and redfieldNC.

Examples

```
## Not run:
library(ocedata)
data(redfieldPlankton)
par(mfrow=c(1,2))
boxplot(redfieldPlankton$Nitrogen)
abline(h=16.7, col='gray')
boxplot(redfieldPlankton$Phosphorus)
abline(h=1.85, col='gray')

## End(Not run)
```

riley *Riley's (1946) observation and theory of phytoplankton concentration*

Description

Riley's (1946) observation and theory of phytoplankton concentration. The list `riley` contains three entries.

- `riley$fig21points` is a data frame representing the data shown in Riley's Figure 21. Resulting from digitization of his graph, this is a list containing `day` (day in year) and `P` (phytoplankton concentraiton, in grams of Carbon per square meter.
- `riley$fig21curve` is a data frame with columns named `day` and `P`, containing a digitized trace of the curve with which Riley illustrates his numerical solution of the differential equations for phytoplankton growth.
- `DEparameters` is a list containing data about twice per month, in elements `day` for the day of the year, `Ph` for phytoplankton growth rate, `R` for phytoplankton respiration rate, and `G` for the rate at which zooplankton graze on phytoplankton. The rates are in inverse days.

This is used in Chapter 4 of Kelley (2013).

Usage

```
data(riley)
```

Source

`riley$fig21points` is based on manual manual digitization of Riley's Figure 21. `riley$fig21curve` are based on manual digitization of Riley's theoretical curve in the same figure, fitted to a spline with `splinefun`, which yields a function that can be used to predict at any time. `riley$DEparameters` was transcribed from Riley's appendix.

References

Dan Kelley, in preparation. Oceanographic Analysis with R. Springer Verlag.

Gordon A. Riley, 1946. Factors controlling phytoplankton populations on Georges Bank. Journal of Marine Research, 6(1): 54-73.

Examples

```
## Not run:
data(riley, package="ocedata")
plot(riley$fig21points$day, riley$fig21points$P, xlab="Day of Year", ylab="Phytoplankton [gC/m^2]")
lines(riley$fig21curve$day, riley$fig21curve$P)

## End(Not run)
```

RRprofile *Seawater profile used by Reiniger and Ross (1968)*

Description

This is the hydrographic profile used by Reiniger and Ross (1968) to illustrate the use of their method for interpolating oceanographic data.

Usage

```
data(RRprofile)
```

Source

Table 2 of Reiniger and Ross (1968).

References

R.F. Reiniger and C.K. Ross, 1968. A method of interpolation with application to oceanographic data. *Deep Sea Research*, **15**, 185-193.

Examples

```
## Not run:
library(oce)
data(RRprofile, package="ocedata")
par(mgp=getOption('oceMgp'))
par(mar=c(3,3,1,1))
ctd <- as.ctd(RRprofile$salinity, RRprofile$temperature, RRprofile$depth)
plot(ctd)
zz <- seq(0,2000,5)
plot(RRprofile$temperature, RRprofile$depth, ylim=c(500,0), xlim=c(2,11),
     xlab="Temperature", ylab="Depth [m]")
TT <- oceApprox(RRprofile$depth, RRprofile$temperature, zz)
lines(TT, zz)
a <- approx(RRprofile$depth, RRprofile$temperature, zz)
lines(a$y, zz, col='red')
s <- smooth.spline(RRprofile$depth, RRprofile$temperature)
lines(predict(s, zz)$y, zz, col='blue')
legend("topright", lwd=1, col=c("black", "red", "blue"),
      legend=c("oceSmooth", "approx", "smooth.spline"), cex=2/3)

## End(Not run)
```

schmitt — *Schmitt's (1981) NACW temperature-salinity data*

Description

Schmitt's (1981) temperature-salinity data for North Atlantic Central Water.

Usage

```
data(schmitt)
```

Source

Data were digitized from Schmitt's Figure 1, to a tolerance of about half the symbol size in that diagram. Schmitt reported the original data source as a cruise of the vessel T. G. Thompson in 1970, and a location of 25.2N and 35.8W.

References

R. W. Schmitt, 1981. Form of the temperature-salinity relationship in central water: evidence for double-diffusive mixing. *Journal of Physical Oceanography*, 11:1015-1026.

Examples

```
## Not run:
library(oce)
data(schmitt, package="ocedata")
plotTS(as.ctd(schmitt$S, schmitt$theta, 0))

## End(Not run)
```

secchi — *Secchi depth dataset*

Description

Measurements of secchi depth in the North and Baltic Seas

Usage

```
data(secchi)
```

Source

The data were downloaded as a file named `Secchi_Ships.csv` in October 2013 from http://ocean.ices.dk/Project/SECCHI/, and made into a data frame with new variable names, for use in R. See references for more on the data.

References

Thorkild Aarup 2002, Transparency of the North Sea and Baltic Sea–a Secchi Depth data mining study, *Oceanologia*, 44(3), 323-337.

Examples

```
## Not run:
library(oce)
data(secchi, package="ocedata")
mapPlot(coastlineWorld, longitudelim=c(-5, 20), latitudelim=c(50, 66),
        grid=5, fill='gray', proj="lambert",
        parameters=c(lat0=50, lat1=65))
col <- rev(oceColorsJet(100))[rescale(secchi$depth, xlow=0, xhigh=20, rlow=1, rhigh=100)]
mapPoints(secchi$longitude, secchi$latitude, pch=20, cex=1, col=col)
mapPolygon(coastlineWorld, col='gray')

## End(Not run)
```

---

soi *Southern Oscillation Index*

Description

A data frame containing the Southern Oscillation Index with columns named `year` for decimal year (sampled monthly and represented at mid-month) and `index` for the index. The data frame was created in September of 2014 as follows.

```
f <- "http://www.cgd.ucar.edu/cas/catalog/climind/SOI.signal.ascii"
d <- as.matrix(read.table(f, header=FALSE))
nYear <- nrow(d)
startYear <- d[1, 1]
endYear <- d[nYear, 1]
## Centre times to mid-month
year <- 1 / 24 + seq(from=startYear, by=1/12, length.out=nYear*12)
index <- as.vector(t(d[,-1]))
## Trim -99.99 values (may be some at start or end)
missing <- index < -90
year <- year[!missing]
index <- index[!missing]
soi <- data.frame(year=year, index=index)
```

Usage

```
data(soi)
```

Author(s)

Dan Kelley

Source

http://www.cgd.ucar.edu/cas/catalog/climind/SOI.signal.ascii

Examples

```
data(soi, package="ocedata")
## Source website graphs 1950 to 2014 (although they smooth data)
recent <- subset(soi, year > 1950)
plot(recent$year, recent$index, type='l', xlab="Year", ylab="SOI")
```

---

topo2 *World topograph data, on a 2-degree grid.*

Description

World topograph data, on a 2-degree grid.

Usage

```
data(topo2)
```

Source

The data are calculated from the `z` entry in the documentation for `topoWorld` in the `oce` package, smoothed with the Oce function `matrixSmooth` with `passes=2`, and then subsetted to 2 degrees of latitude and longitude.

Examples

```
## Not run:
library(oce)
data(topo2)
# Image with default axes
imagep(topo2)
x <- seq(.25, 358.25, 2)
y <- seq(-89.75, 88.25, 2)
# Coastline with sensible axes
contour(x, y, topo2, level=0, drawlabels=FALSE)

## End(Not run)
```

turbulence *Grant et al. (1962) turbulence data*

Description

Turbulence spectrum phi, as a function of wavenumber k for a run starring at 0905h on October 3, 1959, with data in their Appendix 1 and graph in their Figure 9 and Appendix 1. The units are c.g.s., that is k is in cm^{-2} and phi is in cm^3/s^2.

Usage

```
data(turbulence)
```

References

H. L. Grant and R. W. Stewart and A. Moilliet, 1962. Turbulence spectra from a tidal channel. Journal of Fluid Mechanics, 12(2): 241-268.

Examples

```
## Not run:
## Recreate Fig 9 of Grant et al. (1962), with intercept
## chosen to mimic the published figure
data(turbulence, package="ocedata")
plot(log10(turbulence$k), log10(turbulence$phi),
     xlab=expression(log[10]*k), ylab=expression(log[10]*phi), pch=20)
grid()
power <- -5/3
intercept <- -0.3
abline(intercept, power)

## End(Not run)
```

wilson *Wilson's (1963) table of seafloor spreading*

Description

Wilson's (1963) table of seafloor spreading.

Usage

```
data(wilson)
```

Source

Data transcribed from Wilson's (1963) Table 1, taking only the first 3 columns, and only those rows for which Wilson reported an estimate of spreading rate.

References

J. Tuzo Wilson, 1963. Evidence from islands on the spreading of ocean floors. *Nature*, 197(4867):536-538. //dx.doi.org/10.1038/197536a0.

Examples

```
## Not run:
data(wilson, package="ocedata")
attach(wilson)
plot(wilson$Age, wilson$Distance, xlab="Age [My]", ylab="Distance [km]",
     xlim=c(125,0), ylim=c(0,4000))
abline(0,4000/125)
m <- lm(Distance~Age-1, data=wilson)
## Wilson reports in cm/year; 1cm/y = 1km/1My * 1e5 / 1e6
spreadingRate <- as.numeric(coef(m)) / 10
print(spreadingRate)
abline(m, col='red')

## End(Not run)
```

Index