Package 'macleish'

November 21, 2025

Type Package

Title Retrieve Data from MacLeish Field Station

Version 0.3.10

Description Download data from the Ada and Archibald MacLeish Field
Station in Whately, MA. The Ada
and Archibald MacLeish Field Station is a 260-acre patchwork of
forest and farmland located in West Whately, MA that provides opportunities
for faculty and students to pursue environmental research, outdoor
education, and low-impact recreation
(see <https://www.smith.edu/discover-smith/smith-action/sustainable-smith/macleish-field-station> for more information).
This package contains
weather data over several years, and spatial data on various man-made and
natural structures.

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LazyData TRUE

Imports dplyr, lubridate, phenocamr, readr, rvest, sf, stringr, xml2

Depends R (>= 4.1), etl

Suggests ggplot2, dbplyr, RSQLite, broom, knitr, leaflet, purrr,
rmarkdown, markdown, mgcv, testthat

URL <https://github.com/beanumber/macleish>,

<http://beanumber.github.io/macleish/>

BugReports <https://github.com/beanumber/macleish/issues>

RoxygenNote 7.3.3

Encoding UTF-8

VignetteBuilder knitr

NeedsCompilation no

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etl_extract.etl_macleish

Extract weather data

Description

Retrieve data from the Macleish Field Station weather monitors

Usage

```
## S3 method for class 'etl_macleish'
etl_extract(obj, ...)

## S3 method for class 'etl_macleish'
etl_transform(obj, ...)

etl_transform_help(obj, ...)
```

Arguments

obj	an etl object
...	arguments passed to methods

Examples

```
macleish <- etl("macleish")
str(macleish)

## Not run:
macleish |>
  etl_extract() |>
  etl_transform() |>
  etl_load()
whately <- macleish |>
  tbl("whately")
orchard <- macleish |>
  tbl("orchard")

whately |>
  summarize(N = n(), avg_temp = mean(temperature))
orchard |>
  summarize(N = n(), avg_temp = mean(temperature))

# check data types
whately |>
  glimpse()

# if using SQLite, datetimes will get converted to integers
whately <- whately |>
  mutate(when_datetime = datetime(when, 'unixepoch'))
whately |>
  glimpse()

# show the most recent data -- should be within the past hour
whately |>
  collect() |>
  tail()

# show that no time-shifting is happening
if (require(ggplot2)) {
macleish |>
  tbl("whately") |>
  collect() |>
  mutate(when = lubridate::ymd_hms(when)) |>
  filter(lubridate::year(when) == 2012 & month(when) == 12 & day(when) == 20) |>
  ggplot(aes(x = when, y = temperature)) + geom_line()
}

## End(Not run)
```

---

macleish_layers   *MacLeish spatial data*

Description

Shapefiles from the MacLeish Field Station. The field station itself is located at `lat = 42.449167`, `lon = -72.679389`. These data contain information about various man-made and natural structures surrounding the field station.

Usage

```
macleish_layers
```

Format

A `list` of `sf::sf()` objects, each providing a different layer.

landmarks Landmarks

forests Type of dominant tree in individual forests, as noted by Jesse Bellemare

streams local streams

challenge_courses Challenge courses on the property

buildings Buildings at MacLeish

wetlands Wetland areas

boundary the property boundary

research research plots

soil soil deposits used by Amy Rhodes

trails Hiking trails

camp_sites Two camp sites

elevation 30 foot elevation contours

Details

Each of the `sf::sf()` objects are projected in `epsg:4326` for easy integration with Google Maps or `leaflet::leaflet()` objects.

Examples

```
names(macleish_layers)
macleish_layers[["buildings"]]

if (require(sf)) {
 plot(macleish_layers[["buildings"]])
}
```

---

maple_sap *Maple sap collection at MacLeish*

Description

Maple sap collection at MacLeish

Usage

```
maple_sap
```

Format

when the date of collection

sap how much sap was collected, in gallons

Comments comments

People who was there?

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mass_gis *Retrieve elevation layers from MassGIS*

Description

Retrieve elevation layers from MassGIS

Usage

```
mass_gis(layer = "contours250k")

macleish_intersect(x)
```

Arguments

layer   MassGIS layer name to import

x   an [sf::sf()](sf::sf()) object

Details

This function will download shapefiles from MassGIS, unzip them, transform the projection to EPSG:4326, compute their intersection with the boundary of the MacLeish property, and return the resulting [sf::sf()](sf::sf()) object.

Intersect a spatial layer with the MacLeish boundary layer

Source

https://www.mass.gov/info-details/massgis-data-layers

Examples

```
## Not run:
# have to download the shapefiles...could take a while...
elevation <- mass_gis()
macleish_elevation <- macleish_intersect(elevation)
if (require(sf)) {
  plot(macleish_elevation)
}

dcr_trails <- mass_gis("dcrtrails")


## End(Not run)
```

---

phenocam_image_url   *Retrieve images from Phenocam*

Description

Phenocam contains over 70,000 images taken from MacLeish. Photos have been taken every 30 minutes since February 2017.

Usage

```
phenocam_image_url(when = NULL, ...)

phenocam_read_day_urls(x = Sys.Date())

phenocam_read_monthly_midday_urls(x = Sys.Date())

phenocam_image_url_midday(x = Sys.Date())

phenocam_info()

phenocam_download(...)
```

Arguments

when	a string to be converted into a date-time
...	arguments passed to download_phenocam
x	a Date

References

<https://phenocam.nau.edu/webcam/sites/macleish/>

See Also

download_phenocam

Examples

```
phenocam_image_url()
phenocam_image_url("2021-12-25 12:05:05")
## Not run:
phenocam_read_day_urls()

## End(Not run)
## Not run:
phenocam_read_monthly_midday_urls()

## End(Not run)
## Not run:
phenocam_image_url_midday(Sys.Date() - 3)
phenocam_image_url_midday(Sys.Date() - 365)

## End(Not run)
## Not run:
phenocam_info()

## End(Not run)
## Not run:
phenocam_download()
df <- read_phenocam(file.path(tempdir(),"macleish_DB_1000_3day.csv"))
print(str(df))

## End(Not run)
```

---

tree_diameter1 *MacLeish Data Plot 1*

Description

Data on change in tree diameter (in centimeters) for parasitic Hemlock Woolly Adelgid dominated areas on the Western side of MacLeish. Tree diameter was measured at 1.4 meters high above the ground.

Usage

```
tree_diameter1
```

Format

Module Module number that represents one of the 10 subplot modules that are 110 m and 20 x 50 m. There are five 10 x 10 modules along central 50 m axis.

Tag Tag numbers used to identify each tree.

Species Tree species include Red Maple (Acer rubrum), Sweet Birch (Betula lenta), Paper Birch (Betula papyrifera), American Beech (Fagus grandifolia), American witch-hazel (Hamamelis virginiana), Eastern White Pine (Pinus strobus), Northern Red Oak (Quercus rubra), and Eastern Hemlock (Tsuga canadensis).

Position Stage of growth for each individual tree. The emergent position are the tallest trees, followed by canopy, subcanopy, and finally, sapling trees, which are the smallest trees.

Year Data collected from 2010-2015 in the fall semesters.

Notes Notes collected on the wellbeing of tree species, including notes on death or poor health.

Diameter Tree diameter measured in centimeters and at 1.4 meters high above the ground.

People Data obtained from Jesse Bellemare and Smith College students from BIO364-365 courses.

See Also

tree_diameter2

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  tree_diameter2   *MacLeish Data Plot 2*

Description

Data on change in tree diameter (in centimeters) for parasitic Hemlock Woolly Adelgid dominated areas on the Western side of MacLeish. Tree diameter was measured at 1.4 meters high above the ground.

Usage

    tree_diameter2

Format

Module Module number that represents one of the 10 subplot modules that are 110 m and 20 x 50 m. There are five 10 x 10 modules along central 50 m axis.

Tag Tag numbers used to identify each tree.

Species Tree species include Red Maple (Acer rubrum), Sweet Birch (Betula lenta), American Beech (Fagus grandifolia), Eastern White Pine (Pinus strobus), Northern Red Oak (Quercus rubra), and Eastern Hemlock (Tsuga canadensis).

Year Data collected from 2009-2012 in the fall semesters.

Notes Notes collected on the wellbeing of tree species, including notes on death or poor health.

Diameter Tree diameter measured in centimeters and at 1.4 meters high above the ground.

People Data obtained from Jesse Bellemare and Smith College students from BIO364-365 courses.

See Also

tree_diameter1

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whately_2015   *Weather data from Macleish Field Stations*

Description

Weather data collected at the Macleish Field Station in Whately, MA during 2015.

Usage

```
whately_2015

orchard_2015
```

Format

For both, a data frame (dplyr::tbl_df()) with roughly 52,560 rows and 8 or 9 variables.

The following variables are values that are found in either the `whately_2015` or `orchard_2015` data tables.

All variables are averaged over the 10 minute interval unless otherwise noted.

when Timestamp for each measurement set in Eastern Standard Time.

temperature average temperature, in Celsius

wind_speed Wind speed, in meters per second

wind_dir Wind direction, in degrees

rel_humidity How much water there is in the air, in millimeters

pressure Atmospheric pressure, in millibars

rainfall Total rainfall, in millimeters

solar_radiation Amount of radiation coming from the sun, in Watts/meters^2. Solar measurement for Whately

par_density Photosynthetically Active Radiation (sunlight between 400 and 700 nm), in average density of Watts/meters^2. One of two solar measurements for Orchard

par_total Photosynthetically Active Radiation (sunlight between 400 and 700 nm), in average total over measurement period of Watts/meters^2. One of two solar measurements for Orchard

An object of class `tbl_df` (inherits from `tbl`, `data.frame`) with 52547 rows and 9 columns.

Details

The Macleish Field Station is a remote outpost owned by Smith College and used for field research. There are two weather stations on the premises. One is called WhatelyMet and the other is OrchardMet.

The WhatelyMet station is located at (42.448470, -72.680553) and the OrchardMet station is at (42.449653, -72.680315).

WhatelyMet is located at the end of Poplar Hill Road in Whately, Massachusetts, USA. The meteorological instruments of WhatelyMet (except the rain gauge) are mounted at the top of a tower 25.3 m tall, well above the surrounding forest canopy. The tower is located on a local ridge at an elevation 250.75m above sea level.

OrchardMet is located about 250 m north of the first tower in an open field next to an apple orchard. Full canopy trees (~20 m tall) are within 30 m of this station. This station has a standard instrument configuration with temperature, relative humidity, solar radiation, and barometric pressure measured between 1.5 and 2.0 m above the ground. Wind speed and direction are measured on a 10 m tall tower and precipitation is measured on the ground. Ground temperature is measured at 15 and 30 cm below the ground surface 2 m south of the tower. The tower is located 258.1 m above sea level. Data collection at OrchardMet began on June 27th, 2014.

The variables shown above are weather data collected at WhatelyMet and OrchardMet during 2015. Solar radiation is measured in two different ways: see SlrW_Avgor the PAR variables for Photosynthetic Active Radiation.

Note that a loose wire resulted in erroneous temperature reading at OrchardMet in late November, 2015.

Source

These data are recorded at https://www.smith.edu/discover-smith/smith-action/sustainable-smith/center-environment-ecological-design-sustainability

Examples

```
## Not run:
#' # loose wire anomalies
if (require(dplyr) & require(ggplot2) & require(lubridate)) {
 orchard_2015 |>
 filter(month(when) == 11) |>
   ggplot(aes(x = when, y = temperature)) +
   geom_line() + geom_smooth()
}

## End(Not run)
```

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