

Package ‘macleish’

May 20, 2019

Type Package

Title Retrieve Data from MacLeish Field Station

Version 0.3.4

Date 2019-05-20

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 <<http://www.smith.edu/ceeds/macleish.php>> for more information). This package contains weather data over several years, and spatial data on various man-made and natural structures.

License CC0

LazyData TRUE

Imports dplyr, lubridate, readr, sf

Depends R (>= 2.10), etl

Suggests ggplot2, dbplyr, RSQLite, broom, knitr, ggmap, leaflet, rmarkdown, mgcv, clifro, testthat

URL <http://github.com/beanumber/macleish>

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

RoxygenNote 6.1.1

VignetteBuilder knitr, rmarkdown, etl, dplyr, ggplot2, lubridate, mgcv, leaflet, clifro

NeedsCompilation no

Author Benjamin S. Baumer [aut, cre],
Rose Goueth [aut],
Wencong Li [aut],
Weijia Zhang [aut],
Nicholas Horton [aut]

Maintainer Benjamin S. Baumer <ben.baumer@gmail.com>

Repository CRAN

Date/Publication 2019-05-20 20:10:03 UTC

R topics documented:

etl_extract.etl_macleish	2
macleish_layers	3
maple_sap	4
mass_gis	5
whately_2015	6
Index	8

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` 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

reservoir a reservoir

buildings Buildings at MacLeish

wetlands Wetland areas

trails Hiking trails

schools Schools in Massachusetts

boundary the property boundary

research research plots

soil soil deposits used by Amy Rhodes

contours_30ft 30 foot contours

contours_3m 3 meter contours

Details

Each of the `sf` objects are projected in `epsg:4326` for easy integration with `ggmap` or `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?

mass_gis	<i>Retrieve elevation layers from MassGIS</i>
----------	---

Description

Retrieve elevation layers from MassGIS

Usage

```
mass_gis(layer = "contours250k")  
  
macleish_intersect(x)
```

Arguments

layer	MassGIS layer name to import
x	an <code>sf</code> 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` object.

Intersect a spatial layer with the MacLeish boundary layer

Source

<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/layerlist.html>

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)
```

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 (`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/meters². Solar measurement for Whately

par_density Photosynthetically Active Radiation (sunlight between 400 and 700 nm), in average density of Watts/meters². 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/meters². One of two solar measurements for Orchard

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 `S1rW_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 http://www.smith.edu/ceeds/macleish_monitoring.php

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)
```

Index

*Topic **datasets**

- macleish_layers, 3
- maple_sap, 4
- whately_2015, 6

- etl, 2
- etl_extract.etl_macleish, 2
- etl_transform.etl_macleish
 - (etl_extract.etl_macleish), 2
- etl_transform_help
 - (etl_extract.etl_macleish), 2

- ggmap, 4

- leaflet, 4

- macleish_intersect (mass_gis), 5
- macleish_layers, 3
- maple_sap, 4
- mass_gis, 5

- orchard_2015 (whately_2015), 6

- sf, 4, 5

- tbl_df, 6

- whately_2015, 6