

# Package ‘macleish’

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**Type** Package

**Title** Retrieve Data from MacLeish Field Station

**Version** 0.3.6

**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 (>= 3.5), etl

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

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

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

**RoxygenNote** 7.1.0

**Encoding** UTF-8

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

**NeedsCompilation** no

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**Repository** CRAN

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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` 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 Google Maps 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?

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mass_gis	<i>Retrieve elevation layers from MassGIS</i>
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**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/meters<sup>2</sup>. Solar measurement for Whately

**par\_density** Photosynthetically Active Radiation (sunlight between 400 and 700 nm), in average density of Watts/meters<sup>2</sup>. 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<sup>2</sup>. 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 `S1rW_Avg` or 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](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)
```

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