

# Package ‘macleish’

May 8, 2026

**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.

**License** CC0

**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

**Author** Benjamin S. Baumer [aut, cre] (ORCID:  
<<https://orcid.org/0000-0002-3279-0516>>),  
Rose Goueth [aut],

Wencong Li [aut],  
 Weijia Zhang [ctb],  
 Nicholas Horton [ctb],  
 Dominique Kelly [aut] (ORCID: <<https://orcid.org/0000-0001-7186-9385>>),  
 Albert Y. Kim [aut] (ORCID: <<https://orcid.org/0000-0001-7824-306X>>)

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

**Repository** CRAN

**Date/Publication** 2025-11-21 20:20:02 UTC

## Contents

etl_extract.etl_macleish . . . . .	2
macleish_layers . . . . .	3
maple_sap . . . . .	5
mass_gis . . . . .	5
phenocam_image_url . . . . .	6
tree_diameter1 . . . . .	7
tree_diameter2 . . . . .	8
whately_2015 . . . . .	9

**Index** **11**

---

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 <a href="#">etl</a> 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)
```

## 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	<i>Maple sap collection at MacLeish</i>
-----------	---

---

**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 `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()` 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 <a href="#">download_phenocam</a>
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](#)

---

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](#)

---

`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<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_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)
```

# Index

## \* datasets

- macleish\_layers, 3
- maple\_sap, 5
- tree\_diameter1, 7
- tree\_diameter2, 8
- whately\_2015, 9

download\_phenocam, 6, 7

dplyr::tbl\_df(), 9

etl, 2

etl\_extract.etl\_macleish, 2

etl\_transform.etl\_macleish  
(etl\_extract.etl\_macleish), 2

etl\_transform\_help  
(etl\_extract.etl\_macleish), 2

leaflet::leaflet(), 4

macleish\_intersect (mass\_gis), 5

macleish\_layers, 3

maple\_sap, 5

mass\_gis, 5

orchard\_2015 (whately\_2015), 9

phenocam\_download (phenocam\_image\_url),  
6

phenocam\_image\_url, 6

phenocam\_image\_url\_midday  
(phenocam\_image\_url), 6

phenocam\_info (phenocam\_image\_url), 6

phenocam\_read\_day\_urls  
(phenocam\_image\_url), 6

phenocam\_read\_monthly\_midday\_urls  
(phenocam\_image\_url), 6

sf::sf(), 4, 5

tree\_diameter1, 7, 9

tree\_diameter2, 8, 8

whately\_2015, 9