# Package 'mesonet'

July 28, 2025

**Type** Package

**Title** Download and Process Oklahoma Mesonet Data

**Version** 0.0.1

**Date** 2025-07-24

**Maintainer** Phillip D. Alderman <phillip.alderman@okstate.edu>

**Description** A collection of functions to download and process weather data from the Oklahoma Mesonet <https://mesonet.org>. Functions are available for downloading station metadata, downloading Mesonet time series (MTS) files, importing MTS files into R, and converting soil temperature change measurements into soil matric potential and volumetric soil moisture.

**License** GPL-2

**Encoding** UTF-8

**RoxygenNote** 7.3.2

**Suggests** tinytest

**Imports** methods, stats, units

**Depends** R (>= 4.2.0)

**NeedsCompilation** no

**Author** Phillip D. Alderman [aut, cre]

**Repository** CRAN

**Date/Publication** 2025-07-28 19:00:02 UTC

## Contents

---

mnet_calc_mp                    *Calculate soil matric potential for Oklahoma Mesonet data*

---

### Description

Calculate soil matric potential from delta-T soil temperature change data from the Oklahoma Mesonet using the equation from Zhang et al (2019) <doi:10.2136/sssaj2018.12.0481>: $MP = 2083/(1 + exp(-3.35*(Tref-3.17)))$ where Tref is the measured delta-T data

### Usage

```
mnet_calc_mp(data)
```

### Arguments

data                a data frame that contains columns for delta-T temperature change data (i.e.
                    TR05, TR25, TR60, TR75)

### Value

a data frame containing new columns with matric potential (kPa) for each column of delta-T temperature change data.

### Examples

```
mesonet_data <- data.frame(TR05 = 3.17, TR25 = 2.17, TR60 = 2.0, TR75 = 1.0)

mnet_calc_mp(mesonet_data)
```

---

mnet_calc_vwc                *Calculate soil volumteric water content for Oklahoma Mesonet data*

---

### Description

Calculate soil volumetric water content from delta-T soil temperature change data from the Oklahoma Mesonet using mnet_calc_mp to calculate matric potential and mnet_van_genuchten to calculate the corresponding volumetric water content using parameters provided by mnet_site_info.

### Usage

```
mnet_calc_vwc(data, site_info = NULL)
```

### Arguments

data          a data frame that contains a column of Mesonet station identifier codes (i.e. STID) and columns for delta-T temperature change data (i.e. TR05, TR25, TR60, TR75)

site_info     a data frame with site and soil information for each Oklahoma Mesonet station as returned by mnet_site_info. If NULL, mnet_site_info will be used to download this information internally

### Value

a data frame containing new columns with volumetric water content for each column of delta-T temperature change data.

### Examples

```
# Create example dataset
mesonet_data <- data.frame(STID = "ACME", DATE = as.POSIXct("2025-01-01"),
                           TR05 = 3.17, TR25 = 2.17, TR60 = 2.0, TR75 = 1.0)

mnet_calc_vwc(mesonet_data)
```

---

| mnet_concatenate | *Concatenate subdaily Oklahoma Mesonet records for multiple dates or stations.* |
|---|---|

---

### Description

Concatenate subdaily Oklahoma Mesonet records for multiple dates or stations.

### Usage

```
mnet_concatenate(
  stid = NULL,
  start_date = NULL,
  end_date = NULL,
  site_info = NULL,
  file_cache = NULL
)
```

### Arguments

| | |
|---|---|
| stid | a character vector of four-digit station identifiers for the Mesonet stations from which to download data |
| start_date | the first date for which to download data specified in Central Standard Time (i.e. "America/Costa_Rica") zone as a Date or POSIXt object or a string with the format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-digit numeric month and DD is the two-digit day of month |
| end_date | the final date for which to download data specified in Central Standard Time (i.e. "America/Costa_Rica") zone as a Date or POSIXt object or a string with the format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-digit numeric month and DD is the two-digit day of month |
| site_info | a data frame with site and soil information for each Oklahoma Mesonet station as returned by mnet_site_info. If NULL, mnet_site_info will be used to download this information internally |
| file_cache | a character string providing a path to the local Mesonet file cache. If NULL, the function will search for the local file cache and if not found will prompt the user to create one. |

### Value

A data frame with Oklahoma Mesonet data. See below for a list of variables including column ID, name, unit and description:

| ID | Name | Unit | Description |
|---|---|---|---|
| PRES | Station Atmospheric Pressure | kPa | 5-minute averaged atmospheri |
| RAIN | Precipitation | millimeters | Liquid precipitation accumula |
| RELH | Relative Humidity | percent | 5-minute averaged relative hur |

| | | | |
|---|---|---|---|
| SRAD | Solar Radiation | watts per square meter | 5-minute averaged downwellin |
| STID | Station ID | | Station ID |
| STNM | Station Number | | Station Number |
| TA9M | Air Temperature at 9m | degrees Celsius | 5-minute averaged air tempera |
| TAIR | Air Temperature | degrees Celsius | 5-minute averaged air tempera |
| TB05 | Temperature Under Bare Soil at 5cm | degrees Celsius | 15-minute averaged temperatu |
| TB10 | Temperature Under Bare Soil at 10cm | degrees Celsius | 15-minute averaged temperatu |
| TIME | Time | minutes after base time | Minutes after base time (typica |
| TR05 | Soil Moisture Calibrated Delta-T at 5cm | degrees Celsius | 30-minute calibrated change ir |
| TR25 | Soil Moisture Calibrated Delta-T at 25cm | degrees Celsius | 30-minute calibrated change ir |
| TR60 | Soil Moisture Calibrated Delta-T at 60cm | degrees Celsius | 30-minute calibrated change ir |
| TR75 | Soil Moisture Calibrated Delta-T at 75cm | degrees Celsius | 30-minute calibrated change ir |
| TS05 | Temperature Under Native Vegetation at 5cm | degrees Celsius | 15-minute averaged temperatu |
| TS10 | Temperature Under Native Vegetation at 10cm | degrees Celsius | 15-minute averaged temperatu |
| TS25 | Temperature Under Native Vegetation at 25cm | degrees Celsius | 15-minute averaged temperatu |
| TS30 | Temperature Under Native Vegetation at 30cm | degrees Celsius | 15-minute averaged temperatu |
| TS45 | Temperature Under Native Vegetation at 45cm | degrees Celsius | 15-minute averaged temperatu |
| TS60 | Temperature Under Native Vegetation at 60cm | degrees Celsius | 15-minute averaged temperatu |
| VW05 | Volumetric soil water Under Native Vegetation at 5cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| VW25 | Volumetric soil water Under Native Vegetation at 25cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| VW45 | Volumetric soil water Under Native Vegetation at 45cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| WDIR | Wind Direction | degrees | 5-minute averaged wind direct |
| WDSD | Wind Direction Standard Deviation | degrees | Standard deviation of wind dir |
| WMAX | Maximum Wind Speed | meters per second | Highest 3-second wind speed a |
| WS2M | 2m Wind Speed | meters per second | 5-minute averaged wind speed |
| WSPD | Wind Speed | meters per second | 5-minute averaged wind speed |
| WSSD | Wind Speed Standard Deviation | meters per second | Standard deviation of wind spe |
| WVEC | Wind Vector | meters per second | 5-minute averaged wind veloci |

### Examples

```
mnet_concatenate(stid = "ACME",
                 start_date = "1994-01-01",
                 end_date = "1994-01-05")
```

---

mnet_download_mts          *Download Mesonet Time Series files*

---

### Description

Downloads Mesonet Time Series (MTS) files from the Oklahoma Mesonet for a given set of station identifiers and date range

**Usage**

```
mnet_download_mts(
  stid,
  start_date = NULL,
  end_date = NULL,
  root_url = mnet_root_url(),
  site_info = NULL,
  file_cache = NULL,
  ask = !silent,
  silent = FALSE
)
```

**Arguments**

| | |
|---|---|
| stid | a character vector of four-digit station identifiers for the Mesonet stations from which to download data |
| start_date | the first date for which to download data specified in Central Standard Time (i.e. "America/Costa_Rica") zone as a Date or POSIXt object or a string with the format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-digit numeric month and DD is the two-digit day of month |
| end_date | the final date for which to download data specified in Central Standard Time (i.e. "America/Costa_Rica") zone as a Date or POSIXt object or a string with the format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-digit numeric month and DD is the two-digit day of month |
| root_url | the root url from which to download MTS files (see mnet_root_url) |
| site_info | a data frame with site and soil information for each Oklahoma Mesonet station as returned by mnet_site_info. If NULL, mnet_site_info will be used to download this information internally |
| file_cache | a character string providing a path to the local Mesonet file cache. If NULL, the function will search for the local file cache and if not found will prompt the user to create one. |
| ask | whether or not to ask about creating a local Mesonet file cache |
| silent | whether to suppress output to terminal (TRUE) or allow output to terminal (FALSE) |

**Value**

invisibly returns a character vector of the URLs for the downloaded files

**Examples**

```
mnet_download_mts("ACME",
                  start_date = "1994-01-01",
                  end_date = "1994-01-05")
```

---

| | |
|---|---|
| mnet_drop_units | *Drop units from all columns of Oklahoma Mesonet data frame* |

---

### Description

Drop units from all columns of Oklahoma Mesonet data frame

### Usage

```
mnet_drop_units(df)
```

### Arguments

df                        a data frame with units columns

### Value

A data frame with identical data, but without units

### Examples

```
mesonet_data <- data.frame(
    DATE = as.POSIXct(757382400, tz = "UTC")) |>
  within({
  RELH = units::set_units(31, "percent")
  TAIR = units::set_units(NA_real_, "Celsius")
  WSPD = units::set_units(4.6, "m/s")
  WVEC = units::set_units(4.5, "m/s")
  WDIR = units::set_units(182, "degrees")
  RAIN = units::set_units(0, "mm")
  PRES = units::set_units(97.939, "kPa")
  SRAD = units::set_units(0, "W/m^2")
  TA9M = units::set_units(14.1, "Celsius")
  WS2M = units::set_units(4, "m/s")
  STID = "ACME"
 })

mnet_drop_units(mesonet_data)
```

---

| mnet_read_mts | *Read an Oklahoma Mesonet time series file* |
|---|---|

---

### Description

Read an Oklahoma Mesonet time series file

### Usage

```
mnet_read_mts(file_path)
```

### Arguments

file_path          file path to a single Oklahoma Mesonet time series (MTS) file

### Value

A data frame with Oklahoma Mesonet data. See `mnet_variable_definition()` or the table below
for the ID, variable name, unit and description for each column.

| ID | Name | Unit | Description |
|---|---|---|---|
| PRES | Station Atmospheric Pressure | kPa | 5-minute averaged atmospheri |
| RAIN | Precipitation | millimeters | Liquid precipitation accumulat |
| RELH | Relative Humidity | percent | 5-minute averaged relative hur |
| SRAD | Solar Radiation | watts per square meter | 5-minute averaged downwellir |
| STID | Station ID | | Station ID |
| STNM | Station Number | | Station Number |
| TA9M | Air Temperature at 9m | degrees Celsius | 5-minute averaged air tempera |
| TAIR | Air Temperature | degrees Celsius | 5-minute averaged air tempera |
| TB05 | Temperature Under Bare Soil at 5cm | degrees Celsius | 15-minute averaged temperatu |
| TB10 | Temperature Under Bare Soil at 10cm | degrees Celsius | 15-minute averaged temperatu |
| TIME | Time | minutes after base time | Minutes after base time (typica |
| TR05 | Soil Moisture Calibrated Delta-T at 5cm | degrees Celsius | 30-minute calibrated change ir |
| TR25 | Soil Moisture Calibrated Delta-T at 25cm | degrees Celsius | 30-minute calibrated change ir |
| TR60 | Soil Moisture Calibrated Delta-T at 60cm | degrees Celsius | 30-minute calibrated change ir |
| TR75 | Soil Moisture Calibrated Delta-T at 75cm | degrees Celsius | 30-minute calibrated change ir |
| TS05 | Temperature Under Native Vegetation at 5cm | degrees Celsius | 15-minute averaged temperatu |
| TS10 | Temperature Under Native Vegetation at 10cm | degrees Celsius | 15-minute averaged temperatu |
| TS25 | Temperature Under Native Vegetation at 25cm | degrees Celsius | 15-minute averaged temperatu |
| TS30 | Temperature Under Native Vegetation at 30cm | degrees Celsius | 15-minute averaged temperatu |
| TS45 | Temperature Under Native Vegetation at 45cm | degrees Celsius | 15-minute averaged temperatu |
| TS60 | Temperature Under Native Vegetation at 60cm | degrees Celsius | 15-minute averaged temperatu |
| VW05 | Volumetric soil water Under Native Vegetation at 5cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| VW25 | Volumetric soil water Under Native Vegetation at 25cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| VW45 | Volumetric soil water Under Native Vegetation at 45cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| WDIR | Wind Direction | degrees | 5-minute averaged wind direct |
| WDSD | Wind Direction Standard Deviation | degrees | Standard deviation of wind dir |

| WMAX | Maximum Wind Speed | meters per second | Highest 3-second wind speed a |
| WS2M | 2m Wind Speed | meters per second | 5-minute averaged wind speed |
| WSPD | Wind Speed | meters per second | 5-minute averaged wind speed |
| WSSD | Wind Speed Standard Deviation | meters per second | Standard deviation of wind spe |
| WVEC | Wind Vector | meters per second | 5-minute averaged wind veloc: |

### Examples

```
# Create example file cache
local_cache <- mnet_test_cache(mts_files = TRUE)

example_file <- file.path(local_cache, "mts/1994/01/01/19940101acme.mts")

# Read data from example file
mnet_read_mts(example_file)

# Clean up example file cache
unlink(local_cache, recursive = TRUE)
```

---

mnet_requisition_list  *Calculate a requisition list for Oklahoma Mesonet MTS files*

---

### Description

Calculate a requisition list of Mesonet Time Series (MTS) files from the Oklahoma Mesonet for given stations and dates

### Usage

```
mnet_requisition_list(
  stid = NULL,
  start_date = NULL,
  end_date = NULL,
  site_info = NULL,
  file_cache = NULL,
  ask = TRUE
)
```

### Arguments

stid           a character vector of four-digit station identifiers for the Mesonet stations from
               which to download data

start_date     the first date for which to download data specified in Central Standard Time (i.e.
               "America/Costa_Rica") zone as a Date or POSIXt object or a string with the
               format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-
               digit numeric month and DD is the two-digit day of month

| end_date | the final date for which to download data specified in Central Standard Time (i.e. "America/Costa_Rica") zone as a Date or POSIXt object or a string with the format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-digit numeric month and DD is the two-digit day of month |
|---|---|
| site_info | a data frame with site and soil information for each Oklahoma Mesonet station as returned by mnet_site_info. If NULL, mnet_site_info will be used to download this information internally |
| file_cache | a character string providing a path to the local Mesonet file cache. If NULL, the function will search for the local file cache and if not found will prompt the user to create one. |
| ask | whether or not to ask about creating a local Mesonet file cache |

## Value

a data frame containing paths for the MTS files required for the requested stations and dates

## Examples

```
mnet_requisition_list("ACME",
                      start_date = "1994-01-01",
                      end_date = "1994-01-05")
```

---

| mnet_retrieve | *Retrieve Oklahoma Mesonet subdaily data* |
|---|---|

---

## Description

Retrieves data from the Oklahoma Mesonet for a given set of station identifiers and date range

## Usage

```
mnet_retrieve(
  stid,
  start_date = NULL,
  end_date = NULL,
  root_url = mnet_root_url(),
  site_info = NULL,
  file_cache = NULL,
  ask = !silent,
  silent = FALSE
)
```

## Arguments

| | |
|---|---|
| `stid` | a character vector of four-digit station identifiers for the Mesonet stations from which to download data |
| `start_date` | the first date for which to download data specified in Central Standard Time (i.e. "America/Costa_Rica") zone as a Date or POSIXt object or a string with the format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-digit numeric month and DD is the two-digit day of month |
| `end_date` | the final date for which to download data specified in Central Standard Time (i.e. "America/Costa_Rica") zone as a Date or POSIXt object or a string with the format YYYY-MM-DD, where YYYY is the four-digit year, MM is the two-digit numeric month and DD is the two-digit day of month |
| `root_url` | the root url from which to download MTS files (see [mnet_root_url](mnet_root_url)) |
| `site_info` | a data frame with site and soil information for each Oklahoma Mesonet station as returned by [mnet_site_info](mnet_site_info). If NULL, [mnet_site_info](mnet_site_info) will be used to download this information internally |
| `file_cache` | a character string providing a path to the local Mesonet file cache. If NULL, the function will search for the local file cache and if not found will prompt the user to create one. |
| `ask` | whether or not to ask about creating a local Mesonet file cache |
| `silent` | whether to suppress output to terminal (TRUE) or allow output to terminal (FALSE) |

## Value

A data frame with Oklahoma Mesonet data. See below for a list of variables including column ID, name, unit and description:

| ID | Name | Unit | Description |
|---|---|---|---|
| PRES | Station Atmospheric Pressure | kPa | 5-minute averaged atmospheri |
| RAIN | Precipitation | millimeters | Liquid precipitation accumulat |
| RELH | Relative Humidity | percent | 5-minute averaged relative hur |
| SRAD | Solar Radiation | watts per square meter | 5-minute averaged downwellin |
| STID | Station ID | | Station ID |
| STNM | Station Number | | Station Number |
| TA9M | Air Temperature at 9m | degrees Celsius | 5-minute averaged air tempera |
| TAIR | Air Temperature | degrees Celsius | 5-minute averaged air tempera |
| TB05 | Temperature Under Bare Soil at 5cm | degrees Celsius | 15-minute averaged temperatu |
| TB10 | Temperature Under Bare Soil at 10cm | degrees Celsius | 15-minute averaged temperatu |
| TIME | Time | minutes after base time | Minutes after base time (typica |
| TR05 | Soil Moisture Calibrated Delta-T at 5cm | degrees Celsius | 30-minute calibrated change in |
| TR25 | Soil Moisture Calibrated Delta-T at 25cm | degrees Celsius | 30-minute calibrated change in |
| TR60 | Soil Moisture Calibrated Delta-T at 60cm | degrees Celsius | 30-minute calibrated change in |
| TR75 | Soil Moisture Calibrated Delta-T at 75cm | degrees Celsius | 30-minute calibrated change in |
| TS05 | Temperature Under Native Vegetation at 5cm | degrees Celsius | 15-minute averaged temperatu |
| TS10 | Temperature Under Native Vegetation at 10cm | degrees Celsius | 15-minute averaged temperatu |
| TS25 | Temperature Under Native Vegetation at 25cm | degrees Celsius | 15-minute averaged temperatu |

| | | | |
|---|---|---|---|
| TS30 | Temperature Under Native Vegetation at 30cm | degrees Celsius | 15-minute averaged temperatu |
| TS45 | Temperature Under Native Vegetation at 45cm | degrees Celsius | 15-minute averaged temperatu |
| TS60 | Temperature Under Native Vegetation at 60cm | degrees Celsius | 15-minute averaged temperatu |
| VW05 | Volumetric soil water Under Native Vegetation at 5cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| VW25 | Volumetric soil water Under Native Vegetation at 25cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| VW45 | Volumetric soil water Under Native Vegetation at 45cm | cm^3^ cm^-3^ | 5-minute averaged volumetric |
| WDIR | Wind Direction | degrees | 5-minute averaged wind direct |
| WDSD | Wind Direction Standard Deviation | degrees | Standard deviation of wind dir |
| WMAX | Maximum Wind Speed | meters per second | Highest 3-second wind speed a |
| WS2M | 2m Wind Speed | meters per second | 5-minute averaged wind speed |
| WSPD | Wind Speed | meters per second | 5-minute averaged wind speed |
| WSSD | Wind Speed Standard Deviation | meters per second | Standard deviation of wind sp |
| WVEC | Wind Vector | meters per second | 5-minute averaged wind veloci |

### Examples

```
mnet_retrieve(stid = "ACME",
                  start_date = "1994-01-02",
                  end_date = "1994-01-03")
```

---

mnet_root_url                    *Root url for Oklahoma Mesonet Time Series files*

---

### Description

Root url for Oklahoma Mesonet Time Series files

### Usage

```
mnet_root_url(data_source = "mesonet")
```

### Arguments

data_source     the data source for which to provide the url: "mesonet" for the Oklahoma Mesonet,
                "fcars" for the USDA ARS station network in the Fort Cobb watershed, or "ars"
                for the USDA ARS station network in the Little Washita watershed

### Value

a character string with the root URL for the desired Mesonet data source

## Examples

```
mnet_root_url()

mnet_root_url("fcars")
```

---

| mnet_site_info | *Download Mesonet site and soil information for all Mesonet sites* |
|---|---|

---

## Description

Downloads a table of Mesonet site and soil information from the Oklahoma Mesonet website.

## Usage

```
mnet_site_info(
  url = "https://api.mesonet.org/index.php/export/station_location_soil_information",
  file_cache = NULL,
  clear_cache = FALSE
)
```

## Arguments

| | |
|---|---|
| url | the url to the page on the Oklahoma Mesonet website where site and soil information are stored |
| file_cache | a character string providing a path to the local Mesonet file cache. If NULL, the function will search for the local file cache and if not found will prompt the user to create one. |
| clear_cache | whether to clear cached copy of site and soil information and re-download |

## Details

Variable descriptions for Mesonet site and soil information.

| Variable | Description |
|---|---|
| stnm | Station Number |
| stid | Station Identifier |
| name | Station Name |
| city | Nearest Incorporated Town |
| rang | Range From Town To Station |
| cdir | Compass Direction From Town To Station |
| cnty | County |
| nlat | North Latitude |
| elon | East Longitude |
| elev | Elevation In Meters |
| cdiv | Oklahoma Climate Division |

| clas | Station Class |
|------|---------------|
| wcr05 | 5 cm Residual Water Content (cm3/cm3) |
| wcs05 | 5 cm Saturated Water Content (cm3/cm3) |
| a05 | 5 cm Alpha Constant (1/kPa) |
| n05 | 5 cm N Constant (dimensionless) |
| bulk5 | 5 cm Soil Bulk Density (g/cm3) |
| grav5 | 5 cm Soil Percentage Gravel |
| sand5 | 5 cm Soil Percentage Sand |
| silt5 | 5 cm Soil Percentage Silt |
| clay5 | 5 cm Soil Percentage Clay |
| text5 | 5 cm Soil Texture Class |
| wcr25 | 25 cm Residual Water Content (cm3/cm3) |
| wcs25 | 25 cm Saturated Water Content (cm3/cm3) |
| a25 | 25 cm Alpha Constant |
| n25 | 25 cm N Constant |
| bulk25 | 25 cm Soil Bulk Density |
| grav25 | 25 cm Soil Percentage Gravel |
| sand25 | 25 cm Soil Percentage Sand |
| silt25 | 25 cm Soil Percentage Silt |
| clay25 | 25 cm Soil Percentage Clay |
| text25 | 25 cm Soil Texture Class |
| wcr60 | 60 cm Residual Water Content (cm3/cm3) |
| wcs60 | 60 cm Saturated Water Content (cm3/cm3) |
| a60 | 60 cm Alpha Constant |
| n60 | 60 cm N Constant |
| bulk60 | 60 cm Soil Bulk Density |
| grab60 | 60 cm Soil Percentage Gravel |
| sand60 | 60 cm Soil Percentage Sand |
| silt60 | 60 cm Soil Percentage Silt |
| clay60 | 60 cm Soil Percentage Clay |
| text60 | 60 cm Soil Texture Class |
| wcr75 | 75 cm Residual Water Content (cm3/cm3) |
| wcs75 | 75 cm Saturated Water Content (cm3/cm3) |
| a75 | 75 cm Alpha Constant |
| n75 | 75 cm N Constant |
| bulk75 | 75 cm Soil Bulk Density |
| grav75 | 75 cm Soil Percentage Gravel |
| sand75 | 75 cm Soil Percentage Sand |
| silt75 | 75 cm Soil Percentage Silt |
| clay75 | 75 cm Soil Percentage Clay |
| text75 | 75 cm Soil Texture Class |
| datc | Date Commissioned |
| datd | Date De-Commissioned |

**Value**

a data frame containing site and soil information. See Details for definition of variable descriptions.

### Examples

```
mnet_site_info()
```

---

mnet_summarize          *Produce a daily summary of Oklahoma Mesonet subdaily data*

---

### Description

Produce a daily summary of Oklahoma Mesonet subdaily data

### Usage

```
mnet_summarize(
  sub_daily,
  tz = "Etc/GMT+6",
  interval = "1 day",
  include_qc_variables = FALSE
)
```

### Arguments

sub_daily          a data frame with subdaily measurements from the Oklahoma Mesonet such as
                   that produced by mnet_read_mts().

tz                 a length-one character vector specifying which time zone to use for daily sum-
                   mary. Use base::OlsonNames() to obtain a listing of valid available time
                   zones.

interval           the interval over which to summarize data. May be defined as a difftime object
                   (see base::difftime()) or a character value compatible with units::as_units().
                   Tested intervals include "1 day" (the default), "30 min", and "1 hour", although
                   other intervals may work (e.g. "3 hours").

include_qc_variables

                   a length-one logical vector specifying whether or or not to include quality con-
                   trol variables (e.g. number of errant observations) in the output

### Value

A data frame with daily summaries of Oklahoma Mesonet data. See mnet_variable_definition()
or the table below for the ID, variable name, unit and description for each column.

| ID | Variable Name | Unit |
|---|---|---|
| 2AVG | Average Wind Speed at 2m | meters per second |

| | | |
|---|---|---|
| 2BAD | Number of Errant 2m Wind Speed Observations | number of 5-minute observatio |
| 2DEV | Standard Deviation of Wind Speed at 2m | meters per second |
| 2MAX | Maximum 2m Wind Speed | meters per second |
| 2MIN | Minimum 2m Wind Speed | meters per second |
| 9AVG | Average Air Temperature at 9m | degrees Celsius |
| 9BAD | Number of Errant 9m Air Temperature Observations | number of 5-minute observatio |
| ABAD | Number of Errant Solar Radiation Observations | number of 5-minute observatio |
| AMAX | Maximum Solar Radiation | Watts per square meter |
| AMAXO | Maximum Solar Radiation Observation Number | 5-minute observation number |
| ATOT | Total Solar Radiation | mega Joules per square meter |
| B5AV | Average Temperature Under Bare Soil at 5cm | degrees Celsius |
| B5BD | Number of Errant Temperature Under Bare Soil at 5cm Observations | number of 15-minute observati |
| B5MN | Minimum Temperature Under Bare Soil at 5cm | degrees Celsius |
| B5MNO | Minimum Temperature Under Bare Soil at 5cm Observation Number | 15-minute observation number |
| B5MX | Maximum Temperature Bare Soil at 5cm | degrees Celsius |
| B5MXO | Maximum Temperature Under Bare Soil at 5cm Observation Number | 15-minute observation number |
| BAVG | Average Temperature Under Bare Soil at 10cm | degrees Celsius |
| BBAD | Number of Errant Temperature Under Bare Soil at 10cm Observations | number of 15-minute observati |
| BMAX | Maximum Temperature Bare Soil at 10cm | degrees Celsius |
| BMAXO | Maximum Temperature Under Bare Soil at 10cm Observation Number | 15-minute observation number |
| BMIN | Minimum Temperature Under Native Vegetation at 10cm | degrees Celsius |
| BMINO | Minimum Temperature Under Bare Soil at 10cm Observation Number | 15-minute observation number |
| CDEG | Cooling Degree Days | degrees Celsius |
| DATE | Date of summary in Central Standard Time | |
| DAVG | Average Dewpoint Temperature | degrees Celsius |
| DBAD | Number of Errant Dewpoint Temperature Observations | number of 5-minute observatio |
| DMAX | Maximum Dewpoint Temperature | degrees Celsius |
| DMAXO | Maximum Daily Dewpoint Temperature Observation Number | 5-minute observation number |
| DMIN | Minimum Dewpoint Temperature | degrees Celsius |
| DMINO | Minimum Daily Dewpoint Temperature Observation Number | 5-minute observation number |
| HAVG | Average Humidity | percent |
| HBAD | Number of Errant Humidity Observations | number of 5-minute observatio |
| HDEG | Heating Degree Days | degrees Celsius |
| HMAX | Maximum Humidity | percent |
| HMAXO | Maximum Daily Humidity Observation Number | 5-minute observation number |
| HMIN | Minimum Humidity | percent |
| HMINO | Minimum Daily Humidity Observation Number | 5-minute observation number |
| HTBAD | Number of Errant Heat Index Observations | number of 5-minute observatio |
| HTMX | Maximum Heat Index Temperature | degrees Celsius |
| HTMXO | Maximum Daily Heat Index Observation Number | 5-minute observation number |
| IBAD | Number of Errant Wind Direction Observations | number of 5-minute observatio |
| MSLP | Mean Sea Level Pressure | inches of mercury |
| PAVG | Average Station Pressure | inches of mercury |
| PBAD | Number of Errant Station Pressure Observations | number of 5-minute observatio |
| PDFQ | Primary Wind Direction Frequency | percentage |
| PDIR | Primary Wind Direction | 16-point cardinal direction |
| PMAX | Maximum Station Pressure | inches of mercury |
| PMAXO | Maximum Daily Station Pressure Observation Number | 5-minute observation number |

| | | |
|---|---|---|
| PMIN | Minimum Station Pressure | inches of mercury |
| PMINO | Minimum Daily Station Pressure Observation Number | 5-minute observation number |
| R05BD | Number of Errant Soil Moisture Calibrated Delta-T at 5cm Observations | number of 30-minute observati |
| R25BD | Number of Errant Soil Moisture Calibrated Delta-T at 25cm Observations | number of 30-minute observati |
| R60BD | Number of Errant Soil Moisture Calibrated Delta-T at 60cm Observations | number of 30-minute observati |
| R75BD | Number of Errant Soil Moisture Calibrated Delta-T at 75cm Observations | number of 30-minute observati |
| RAIN | Rain | inches |
| RBAD | Number of Errant 5-minute Rain Observations | number of 5-minute observatio |
| RMAX | Maximum 5-minute Rainfall Rate | inches per hour |
| RNUM | Number of 5-minute Rainy Periods | number of 5-minute observatio |
| S25AV | Average Temperature Under Native Vegetation at 25cm | degrees Celsius |
| S25BD | Number of Errant Temperature Under Native Vegetation at 25cm Observations | number of 15-minute observati |
| S25MN | Minimum Temperature Under Native Vegetation at 25cm | degrees Celsius |
| S25MX | Maximum Temperature Under Native Vegetation at 25cm | degrees Celsius |
| S25NO | Minimum Temperature Under Native Vegetation at 25cm Observation Number | 15-minute observation number |
| S25XO | Maximum Temperature Under Native Vegetation at 25cm Observation Number | 15-minute observation number |
| S3AV | Average Temperature Under Native Vegetation at 30cm | degrees Celsius |
| S3BD | Number of Errant Temperature Under Native Vegetation at 30cm Observations | number of 15-minute observati |
| S3MN | Minimum Temperature Under Native Vegetation at 30cm | degrees Celsius |
| S3MNO | Minimum Temperature Under Native Vegetation at 30cm Observation Number | 15-minute observation number |
| S3MX | Maximum Temperature Under Native Vegetation at 30cm | degrees Celsius |
| S3MXO | Maximum Temperature Under Native Vegetation at 30cm Observation Number | 15-minute observation number |
| S5AV | Average Temperature Under Native Vegetation at 5cm | degrees Celsius |
| S5BD | Number of Errant Temperature Under Native Vegetation at 5cm Observations | number of 15-minute observati |
| S5MN | Minimum Temperature Under Native Vegetation at 5cm | degrees Celsius |
| S5MNO | Minimum Temperature Under Native Vegetation at 5cm Observation Number | 15-minute observation number |
| S5MX | Maximum Temperature Under Native Vegetation at 5cm | degrees Celsius |
| S5MXO | Maximum Temperature Under Native Vegetation at 5cm Observation Number | 15-minute observation number |
| S60AV | Average Temperature Under Native Vegetation at 60cm | degrees Celsius |
| S60BD | Number of Errant Temperature Under Native Vegetation at 60cm Observations | number of 15-minute observati |
| S60MN | Minimum Temperature Under Native Vegetation at 60cm | degrees Celsius |
| S60MX | Maximum Temperature Under Native Vegetation at 60cm | degrees Celsius |
| S60NO | Minimum Temperature Under Native Vegetation at 60cm Observation Number | 15-minute observation number |
| S60XO | Maximum Temperature Under Native Vegetation at 60cm Observation Number | 15-minute observation number |
| SAVG | Average Temperature Under Native Vegetation at 10cm | degrees Celsius |
| SBAD | Number of Errant Temperature Under Native Vegetation at 10cm Observations | number of 15-minute observati |
| SDFQ | Secondary Wind Direction Frequency | percentage |
| SDIR | Secondary Wind Direction | 16-point cardinal direction |
| SMAX | Maximum Temperature Under Native Vegetation at 10cm | degrees Celsius |
| SMAXO | Maximum Temperature Under Native Vegetation at 10cm Observation Number | 15-minute observation number |
| SMIN | Minimum Temperature Under Native Vegetation at 10cm | degrees Celsius |
| SMINO | Minimum Temperature Under Native Vegetation at 10cm Observation Number | 15-minute observation number |
| STID | Station ID | |
| TAVG | Average Air Temperature | degrees Celsius |
| TBAD | Number of Errant 1.5m Air Temperature Observations | number of 5-minute observatio |
| TMAX | Maximum Daily Air Temperature | degrees Celsius |
| TMAXO | Maximum Daily Air Temperature Observation Number | 5-minute observation number |
| TMIN | Minimum Daily Air Temperature | degrees Celsius |

| TMINO | Minimum Daily Air Temperature Observation Number | 5-minute observation number |
| TR05 | Soil Moisture Calibrated Delta-T at 5cm | degrees Celsius |
| TR25 | Soil Moisture Calibrated Delta-T at 25cm | degrees Celsius |
| TR60 | Soil Moisture Calibrated Delta-T at 60cm | degrees Celsius |
| TR75 | Soil Moisture Calibrated Delta-T at 75cm | degrees Celsius |
| VDEF | Average Daily Vapor Deficit | millibars |
| WBAD | Number of Errant Wind Speed Observations | number of 5-minute observatio |
| WCBAD | Number of Errant Wind Chill Observations | number of 5-minute observatio |
| WCMN | Minimum Wind Chill Index Temperature | degrees Celsius |
| WCMNO | Minimum Daily Wind Chill Observation Number | 5-minute observation number |
| WDEV | Standard Deviation of Wind Speed at 10m | meters per second |
| WMAX | Maximum Wind Gust | meters per second |
| WMAXO | Maximum Wind Gust Observation Number | 5-minute observation number |
| WSMN | Minimum Wind Speed | meters per second |
| WSMNO | Minimum Wind Speed Observation Number | 5-minute observation number |
| WSMX | Maximum Wind Speed | meters per second |
| WSMXO | Maximum Wind Speed Observation Number | 5-minute observation number |
| WSPD | Average Wind Speed | meters per second |

### Examples

```
# Retrieve some data to summarize:
mesonet_data <- mnet_retrieve(stid = "ACME",
                              start_date = "1994-01-02",
                              end_date = "1994-01-03")

# Interval is 1 day by default:
mnet_summarize(mesonet_data)

# Summarize to hourly:
mnet_summarize(mesonet_data,
               interval = "1 hour")
```

mnet_test_cache                    *Create example local mesonet file cache*

### Description

Create an example local mesonet file cache for running tests and examples

**Usage**

```
mnet_test_cache(
  file_cache,
  site_info = FALSE,
  mts_files = FALSE,
  rds_files = FALSE
)
```

**Arguments**

| | |
|---|---|
| file_cache | an optional character string that provides a path to the directory to use for the local mesonet file cache. If missing, a new directory will be created within the temporary directory for the current session. |
| site_info | a logical value indicating whether to create an example version of the site_info.csv file in the local file cache |
| mts_files | a logical value indicating whether to create example versions of Mesonet Time Series (MTS) files in the local file cache |
| rds_files | a logical value indicating whether to create example versions of processed Mesonet data in the form of R data serialized (RDS) files in the local file cache |

**Value**

Invisibly returns the full path to the test file cache

**Examples**

```
# Create test cache directory and write site info file
test_cache <- mnet_test_cache(site_info = TRUE)

# Create test cache directory and write MTS and RDS files
test_cache <- mnet_test_cache(mts_files = TRUE,
                              rds_files = TRUE)

# Remove test cache directory
unlink(test_cache, recursive = TRUE)
```

---

mnet_van_genuchten      *Calculate volumetric soil water content with van Genuchten curve*

---

**Description**

Calculate volumetric soil water content using the van Genuchten curve

**Usage**

```
mnet_van_genuchten(MP, WCr, WCs, a, n)
```

## Arguments

| | |
|---|---|
| MP | a vector of matric potential at which to calculate volumetric soil water content |
| WCr | residual water content for dry soil |
| WCs | saturated water content for wet soil |
| a | the alpha parameter for the van Genuchten equation related to the inverse of the air entry suction |
| n | the n parameter for the van Genuchten equation related to the pore-size distribution |

## Value

a vector of volumetric soil water content values

## Examples

```
mnet_van_genuchten(-100, 0.034, 0.41, 0.273, 1.39)
```

---

mnet_variable_definition

*Find Mesonet variable definition*

---

## Description

Provide definition of a requested set of Mesonet variables including (by default) the standard variable identifier (ID), name, unit, and description.

## Usage

```
mnet_variable_definition(
  id,
  columns = c("ID", "Variable Name", "Unit", "Description")
)
```

## Arguments

| | |
|---|---|
| id | a string or regular expression to use for retrieving definitions of Mesonet variables |
| columns | a character vector of columns to include in the output. Possible values include any combination of "ID", "Variable Name", "Unit" or "Description" |

## Value

a data frame with Mesonet variable definitions filtered by the id argument

**Examples**

```
mnet_variable_definition("RAIN")

mnet_variable_definition("^2")

mnet_variable_definition("^2",
                         columns = c("ID", "Variable Name", "Unit"))
```

# Index