Package 'weatherOz'

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Title An API Client for Australian Weather and Climate Data Resources

Version 3.0.1

Description Provides automated downloading, parsing and formatting of weather data for Australia through API endpoints provided by the Department of Primary Industries and Regional Development (DPIRD) of Western Australia and by the Science and Technology Division of the Queensland Government's Department of Environment and Science (DES). As well as the Bureau of Meteorology (BOM) of the Australian government precis and coastal forecasts, and downloading and importing radar and satellite imagery files. DPIRD weather data are accessed through public APIs provided by DPIRD, <https://www.dpird.wa.gov.au/online-tools/apis/>, providing access to weather station data from the DPIRD weather station network. Australia-wide weather data are based on data from the Australian Bureau of Meteorology (BOM) data and accessed through SILO (Scientific Information for Land Owners) Jeffrey et al. (2001) <doi:10.1016/S1364-8152(01)00008-1>. DPIRD data are made available under a Creative Commons Attribution 3.0 Licence (CC BY 3.0 AU) license <https://creativecommons.org/licenses/by/3.0/au/deed.en>. SILO data are released under a Creative Commons Attribution 4.0 International licence (CC BY 4.0) <https://creativecommons.org/licenses/by/4.0/>. BOM data are (c) Australian Government Bureau of Meteorology and released under a Creative Commons (CC) Attribution 3.0 licence or Public Access Licence (PAL) as appropriate, see <https://www.bom.gov.au/copyright> for further details.

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BugReports https://github.com/ropensci/weatherOz/issues

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dpird_extreme_weather_values *A List of DPIRD Extreme Weather Data Values*

Description

A vector object containing 57 items representing valid values to supply to `get_dpird_extremes()`'s *values* argument taken from the documentation for the DPIRD Weather 2.0 API.

Usage

```
dpird_extreme_weather_values
```

Format

A vector object of 57 items.

Source

https://www.dpird.wa.gov.au/online-tools/apis/

See Also

Other DPIRD: `dpird_minute_values`, `dpird_summary_values`, `find_nearby_stations()`, `find_stations_in()`, `get_dpird_apsim()`, `get_dpird_availability()`, `get_dpird_extremes()`, `get_dpird_minute()`, `get_dpird_summaries()`, `get_stations_metadata()`

Other data: `dpird_minute_values`, `dpird_summary_values`, `silo_daily_values`

dpird_minute_values *A List of DPIRD Minute Weather Data Values*

Description

A vector object containing 12 items representing valid values to supply to `get_dpird_minute()`'s *values* argument taken from the documentation for the DPIRD Weather 2.0 API.

Usage

```
dpird_minute_values
```

Format

A vector object of 12 items.

Source

https://www.dpird.wa.gov.au/online-tools/apis/

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_summary_values, find_nearby_stations(), find_stations_in(), get_dpird_apsim(), get_dpird_availability(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_stations_metadata()

Other data: dpird_extreme_weather_values, dpird_summary_values, silo_daily_values

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dpird_summary_values *A List of DPIRD Summary Weather Data Values*

Description

A vector object containing 75 items representing valid values to supply to get_dpird_summary()'s *values* argument taken from the documentation for the DPIRD Weather 2.0 API.

Usage

```
dpird_summary_values
```

Format

A vector object of 75 items.

Source

https://www.dpird.wa.gov.au/online-tools/apis/

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_minute_values, find_nearby_stations(), find_stations_in(), get_dpird_apsim(), get_dpird_availability(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_stations_metadata()

Other data: dpird_extreme_weather_values, dpird_minute_values, silo_daily_values

`find_forecast_towns` *Find the Nearest Town With a BOM Forecast*

Description

For a given `latitude` and `longitude`, find the nearest town that the BOM provides a forecast for.

Usage

```
find_forecast_towns(longitude = 149.2, latitude = -35.3, distance_km = 100)
```

Arguments

`longitude`	A `numeric` value of longitude in decimal degree (DD) format. By default, Canberra (approximately).
`latitude`	A `numeric` value of latitude in decimal degree (DD) format. By default, Canberra (approximately).
`distance_km`	A `numeric` value of the distance in kilometres from the `latitude` and `longitude` point beyond which values will not be returned.

Value

A `data.table::data.table()` of all forecast towns (in this package) sorted by distance from *latitude* and *longitude*, ascending.

Author(s)

Hugh Parsonage, <hugh.parsonage@gmail.com>, and James Goldie, <me@jamesgoldie.dev>, and Adam H. Sparks, <adamhsparks@gmail.com>

See Also

Other BOM: `get_available_imagery()`, `get_available_radar()`, `get_coastal_forecast()`, `get_precis_forecast()`, `get_radar_imagery()`, `get_satellite_imagery()`, `parse_coastal_forecast()`, `parse_precis_forecast()`

Other metadata: `find_nearby_stations()`, `find_stations_in()`, `get_available_imagery()`, `get_available_radar()`, `get_dpird_availability()`, `get_stations_metadata()`

Examples

```
# find forecast towns near Esperance, WA
find_forecast_towns(longitude = 121.8913, latitude = -33.8614)
```

`find_nearby_stations` *Find the Nearest Weather Stations to a Given Geographic Point or Known Station*

Description

Find nearby weather stations given geographic coordinates or a station code for both of the DPIRD and SILO weather station networks. Either a combination of *latitude* and *longitude* or *station_code* must be provided. A DPIRD API key is only necessary to search for stations in the DPIRD network. If you are not interested in DPIRD stations in Western Australia, you may use this function to query only SILO stations for all of Australia without using a key.

Usage

```
find_nearby_stations(
  longitude = NULL,
  latitude = NULL,
  station_code = NULL,
  distance_km = 100,
  api_key = NULL,
  which_api = "silo",
  include_closed = FALSE
)
```

Arguments

`longitude`	A `numeric` value of longitude in decimal degree (DD) format. Optional and defaults to `NULL`. Required if `station_code` is not provided.
`latitude`	A `numeric` value of latitude in decimal degree (DD) format. Optional and defaults to `NULL`. Required if `station_code` is not provided.
`station_code`	A `string` with the station code for the station of interest. Optional and defaults to `NULL`. Required if `longitude` and `latitude` are not provided.
`distance_km`	A `numeric` value for distance to limit the search from the station or location of interest. Defaults to 100 km.
`api_key`	A `character` string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. If left as `NULL`, defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected. Only used when *which_api* is `DPIRD` or `all`.
`which_api`	A `string` value that indicates which API to use. Defaults to `silo` only. Valid values are `all`, for both SILO (BOM) and DPIRD weather station networks; `silo` for only stations in the SILO network; or `dpird` for stations in the DPIRD network.
`include_closed`	A `Boolean` value that indicates whether closed stations in the DPIRD network should be included in the results. Defaults to `FALSE` with closed stations not included.

Value

A data.table::data.table() with station_code, station_name, latitude, longitude, elev_m, state, owner, and distance. Data are sorted by increasing distance from station or location of interest.

Note

You can request your own API key from DPIRD for free by filling out the form found at https://www.dpird.wa.gov.au/online-tools/apis/.

Author(s)

Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>, and Adam H. Sparks, <adamhsparks@gmail.com>

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_minute_values, dpird_summary_values, find_stations_in(), get_dpird_apsim(), get_dpird_availability(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_stations_metadata()

Other SILO: find_stations_in(), get_data_drill(), get_data_drill_apsim(), get_patched_point(), get_patched_point_apsim(), get_stations_metadata(), silo_daily_values

Other metadata: find_forecast_towns(), find_stations_in(), get_available_imagery(), get_available_radar(), get_dpird_availability(), get_stations_metadata()

Examples

```
## Not run:

# Note that queries to the DPIRD API require you to have your own API key.

# Query WA only stations and return DPIRD's stations nearest to the
# Northam, WA station, "NO", returning stations with 50 km of this station

wa_stn <- find_nearby_stations(
  station_code = "NO",
  distance_km = 50,
  api_key = "your_api_key",
  which_api = "dpird"
)

# Query stations nearest DPIRD's Northam, WA station, "NO" and return both
# DPIRD and SILO/BOM stations within 50 km of this station.

wa_stn <- find_nearby_stations(
  station_code = "NO",
  distance_km = 50,
  api_key = "your_api_key",
  which_api = "all"
)
```

```
# Query Wagga Wagga BOM station finding stations within 200 km of it, note
# that it is not necessary to provide an `api_key` for SILO queries of
# nearby stations.

wagga_stn <- find_nearby_stations(
  latitude = -35.1583,
  longitude = 147.4575,
  distance_km = 200,
  which_api = "silo"
)

## End(Not run)
```

`find_stations_in` *Find Stations Within a Geospatially Defined Geographic Area of Interest*

Description

Given an **sf** polygon or a bounding box as a vector with the minimum and maximum longitude and latitude values, find DPIRD or BOM stations in the SILO network that fall within that defined area or the station nearest the centroid of the area of interest.

Usage

```
find_stations_in(
  x,
  centroid = FALSE,
  api_key = NULL,
  which_api = "all",
  include_closed = FALSE,
  crs = "EPSG:7844"
)
```

Arguments

`x`	One of two types of object: • A `Vector` A four-digit vector defining a bounding box of the area of interest in this order, 'xmin', 'ymin', 'xmax', 'ymax', or • An object of class **sf** defining the area of interest.
`centroid`	`Boolean` A value of `TRUE` or `FALSE` indicating whether you want the centroid only to be used to find the nearest station to the centre of the area of interest. If "n" polygons are supplied, "n" stations are returned. Defaults to `FALSE` with all stations within the area of interest returned.

api_key — A character string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. If left as NULL, defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected. Only used when *which_api* is DPIRD or all.

which_api — A string value that indicates which API to use. Defaults to silo only. Valid values are all, for both SILO (BOM) and DPIRD weather station networks; silo for only stations in the SILO network; or dpird for stations in the DPIRD network.

include_closed — A Boolean value that indicates whether closed stations in the DPIRD network should be included in the results. Defaults to FALSE with closed stations not included.

crs — A string value that provides the coordinate reference system, AKA, "projection" to be used for the point extraction. Defaults to GDA 2020, EPSG:7844. **NOTE** This will override any crs value that your . polygon provides unless you specify it again here, *e.g.*, crs = sf::st_crs(polygon_object_name).

Value

a **data.table** object of weather station(s) within the defined area of interest in an unprojected format, EPSG:4326, WGS 84 – WGS84 - World Geodetic System 1984, used in GPS format.

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_minute_values, dpird_summary_values, find_nearby_stations(), get_dpird_apsim(), get_dpird_availability(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_stations_metadata()

Other SILO: find_nearby_stations(), get_data_drill(), get_data_drill_apsim(), get_patched_point(), get_patched_point_apsim(), get_stations_metadata(), silo_daily_values

Other metadata: find_forecast_towns(), find_nearby_stations(), get_available_imagery(), get_available_radar(), get_dpird_availability(), get_stations_metadata()

Examples

```
# using a (generous) bounding box for Melbourne, Vic using only the SILO API
# for BOM stations, so no API key is needed.

bbox <- find_stations_in(
  x = c(144.470215, -38.160476, 145.612793, -37.622934),
  which_api = "SILO",
  include_closed = TRUE
)
bbox

# Use the same bounding box but only find a single station nearest
# the centroid using only the SILO API for BOM stations
```

```
centroid <- find_stations_in(
  x = c(144.470215, -38.160476, 145.612793, -37.622934),
  which_api = "SILO",
  include_closed = TRUE,
  centroid = TRUE
)
centroid

# Use the `south_west_agricultural_region` data to fetch stations only in the
# south-western portion of WA and plot it with {ggplot2} showing open/closed
# stations just to be sure they're inside the area of interest.

# As this is in WA, we can use the DPIRD network, so we need our API key.
# Using the `south_west_agricultural_region` {sf} object provided.

sw_wa <- find_stations_in(
  x = south_west_agricultural_region,
  api_key = "your_api_key",
  include_closed = TRUE
)

sw_wa
```

`get_available_imagery` *Get a List of Available BOM Satellite Imagery*

Description

Fetch a listing of BOM GeoTIFF satellite imagery from ftp://ftp.bom.gov.au/anon/gen/gms/ to determine which files are currently available for download. Files are available at ten minute update frequency with a 24-hour delete time. It is useful to know the most recent files available and then specify in the `get_satellite_imagery()` function. Ported from **bomrang**.

Usage

```
get_available_imagery(product_id = "all")
```

Arguments

`product_id`	`Character`. BOM product ID of interest for which a list of available images will be returned. Defaults to all images currently available.

Details

Valid BOM satellite Product IDs for GeoTIFF files include:

IDE00420 AHI cloud cover only 2km FD GEOS GIS

IDE00421 AHI IR (Ch13) greyscale 2km FD GEOS GIS

IDE00422 AHI VIS (Ch3) greyscale 2km FD GEOS GIS

IDE00423 AHI IR (Ch13) Zehr 2km FD GEOS GIS

IDE00425 AHI VIS (true colour) / IR (Ch13 greyscale) composite 1km FD GEOS GIS

IDE00426 AHI VIS (true colour) / IR (Ch13 greyscale) composite 2km FD GEOS GIS

IDE00427 AHI WV (Ch8) 2km FD GEOS GIS

IDE00430 AHI cloud cover only 2km AUS equirect. GIS

IDE00431 AHI IR (Ch13) greyscale 2km AUS equirect. GIS

IDE00432 AHI VIS (Ch3) greyscale 2km AUS equirect. GIS

IDE00433 AHI IR (Ch13) Zehr 2km AUS equirect. GIS

IDE00435 AHI VIS (true colour) / IR (Ch13 greyscale) composite 1km AUS equirect. GIS

IDE00436 AHI VIS (true colour) / IR (Ch13 greyscale) composite 2km AUS equirect. GIS

IDE00437 AHI WV (Ch8) 2km AUS equirect. GIS

IDE00439 AHI VIS (Ch3) greyscale 0.5km AUS equirect. GIS

Value

A `vector` of all available files for the requested Product ID(s).

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

References

Australian Bureau of Meteorology (BOM) high-definition satellite images https://www.bom.gov.au/australia/satellite/index.shtml

See Also

Other BOM: `find_forecast_towns()`, `get_available_radar()`, `get_coastal_forecast()`, `get_precis_forecast()`, `get_radar_imagery()`, `get_satellite_imagery()`, `parse_coastal_forecast()`, `parse_precis_forecast()`

Other metadata: `find_forecast_towns()`, `find_nearby_stations()`, `find_stations_in()`, `get_available_radar()`, `get_dpird_availability()`, `get_stations_metadata()`

Examples

```
# Check availability of AHI VIS (true colour) / IR (Ch13 greyscale) composite
# 1km FD GEOS GIS images
imagery <- get_available_imagery(product_id = "IDE00425")

imagery
```

get_available_radar *Get a List of Available BOM Radar Imagery*

Description

Fetch a listing of available BOM RADAR imagery from ftp://ftp.bom.gov.au/anon/gen/radar/ to determine which files are currently available for download. The files available are the most recent RADAR imagery for each location, which are updated approximately every 6 to 10 minutes by the BOM. Ported from **bomrang**.

Usage

```
get_available_radar(radar_id = "all")
```

Arguments

radar_id	Numeric. BOM radar of interest for which a list of available images will be returned. Defaults to all images currently available.

Details

Valid BOM RADAR ID for each location required.

Value

A data.table::data.table() of all selected RADAR locations with location information and *product_ids*.

Author(s)

Dean Marchiori, <deanmarchiori@gmail.com>, and Adam H. Sparks, <adamhsparks@gmail.com>

References

Australian Bureau of Meteorology (BOM) radar image https://www.bom.gov.au/weather-and-climate/rain-radar-and-weather-maps.

See Also

Other BOM: find_forecast_towns(), get_available_imagery(), get_coastal_forecast(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery(), parse_coastal_forecast(), parse_precis_forecast()

Other metadata: find_forecast_towns(), find_nearby_stations(), find_stations_in(), get_available_imagery(get_dpird_availability(), get_stations_metadata()

Examples

```
# Check availability radar imagery for Wollongong (radar_id = 3)
imagery <- get_available_radar(radar_id = 3)

imagery
```

`get_coastal_forecast` *Get a BOM Coastal Waters Forecast*

Description

Fetch the BOM daily Coastal Waters Forecast for a specified state or region.

Usage

```
get_coastal_forecast(state = "AUS")
```

Arguments

`state`	Australian state or territory as full name or postal code. Fuzzy string matching via `base::agrep()` is done. Defaults to `AUS` returning all state forecasts, see details for further information.

Details

Allowed state and territory postal codes, only one state per request or all using 'AUS':

AUS Australia, returns forecast for all states, NT and ACT

ACT Australian Capital Territory (will return NSW)

NSW New South Wales

NT Northern Territory

QLD Queensland

SA South Australia

TAS Tasmania

VIC Victoria

WA Western Australia

Value

A `data.table::data.table()` of an Australia BOM Coastal Waters Forecast.

Author(s)

Dean Marchiori, <deanmarchiori@gmail.com>, and Paul Melloy, <paul@melloy.com.au>

References

Forecast data come from Australian Bureau of Meteorology (BOM) Weather Data Services https://www.bom.gov.au/catalogue/data-feeds.shtml.

And also,

Location data and other metadata come from the BOM anonymous FTP server with spatial data ftp://ftp.bom.gov.au/anon/home/adfd/spatial/, specifically the DBF file portion of a shapefile, ftp://ftp.bom.gov.au/anon/home/adfd/spatial/IDM00003.dbf.

See Also

parse_coastal_forecast

Other BOM: find_forecast_towns(), get_available_imagery(), get_available_radar(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery(), parse_coastal_forecast(), parse_precis_forecast()

Other data fetching: get_data_drill(), get_data_drill_apsim(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_metno_daily_forecast(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery()

Examples

```
get_coastal_forecast(state = "NSW")
```

---

get_data_drill *Get DataDrill Weather Data From SILO*

Description

Fetch nicely formatted weather data from the SILO API of spatially interpolated weather data (DataDrill). The daily climate surfaces have been derived either by splining or kriging the observational data. The returned values contain "source" columns, which denote how the observations were derived. The grid spans 112° to 154°, -10° to -44° with resolution 0.05° latitude by 0.05° longitude (approximately 5 km × 5 km).

Usage

```
get_data_drill(
  longitude,
  latitude,
  start_date,
  end_date = Sys.Date(),
  values = "all",
  api_key = get_key(service = "SILO")
)
```

Arguments

longitude	A single numeric value representing the longitude of the point-of-interest to the hundredths (*e.g.*, 0.05) of a degree.
latitude	A single numeric value representing the latitude of the point-of-interest to the hundredths (*e.g.*., 0.05) of a degree.
start_date	A character string or Date object representing the beginning of the range to query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date.
end_date	A character string or Date object representing the end of the range query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date. Defaults to the current system date.
values	A character string with the type of weather data to return. See **Available Values** for a full list of valid values. Defaults to all with all available values being returned.
api_key	A character string containing your API key, an e-mail address, for the request. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Value

a data.table::data.table() with the weather data queried with the weather variables in alphabetical order. The first eight columns will always be:

- longitude,
- latitude,
- elev_m (elevation in metres),
- date (ISO8601 format, YYYYMMDD),
- year,
- month,
- day,
- extracted (the date on which the query was made)

Column Name Details

Column names are converted from the default returns of the API to be snake_case formatted and where appropriate, the names of the values that are analogous between SILO and DPIRD data are named using the same name for ease of interoperability, *e.g.*, using rbind() to create a data.table that contains data from both APIs.

Available Values

all Which will return all of the following values

rain (mm) Rainfall

max_temp (degrees C) Maximum temperature

min_temp (degrees C) Minimum temperature

vp (hPa) Vapour pressure

vp_deficit (hPa) Vapour pressure deficit

evap_pan (mm) Class A pan evaporation

evap_syn (mm) Synthetic estimate[1]

evap_comb (mm) Combination (synthetic estimate pre-1970, class A pan 1970 onwards)

evap_morton_lake (mm) Morton's shallow lake evaporation

radiation (Mj/m^2) Solar exposure, consisting of both direct and diffuse components

rh_tmax (%) Relative humidity at the time of maximum temperature

rh_tmin (%) Relative humidity at the time of minimum temperature

et_short_crop (mm) FAO56[4] short crop

et_tall_crop (mm) ASCE[5] tall crop[6]

et_morton_actual (mm) Morton's areal actual evapotranspiration

et_morton_potential (mm) Morton's point potential evapotranspiration

et_morton_wet (mm) Morton's wet-environment areal potential evapotranspiration over land

mslp (hPa) Mean sea level pressure

Value information

Solar radiation: total incoming downward shortwave radiation on a horizontal surface, derived from estimates of cloud oktas and sunshine duration[3].

Relative humidity: calculated using the vapour pressure measured at 9am, and the saturation vapour pressure computed using either the maximum or minimum temperature[6].

Evaporation and evapotranspiration: an overview of the variables provided by SILO is available here, https://data.longpaddock.qld.gov.au/static/publications/Evapotranspiration_overview.pdf.

Data codes

Data codes Where possible (depending on the file format), the data are supplied with codes indicating how each datum was obtained.

0 Official observation as supplied by the Bureau of Meteorology

15 Deaccumulated rainfall (original observation was recorded over a period exceeding the standard 24 hour observation period)

25 Interpolated from daily observations for that date

26 Synthetic Class A pan evaporation, calculated from temperatures, radiation and vapour pressure

35 Interpolated from daily observations using an anomaly interpolation method

75 Interpolated from the long term averages of daily observations for that day of year

Author(s)

Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>, and Adam H. Sparks, <adamhsparks@gmail.com>

References

1. Rayner, D. (2005). Australian synthetic daily Class A pan evaporation. Technical Report December 2005, Queensland Department of Natural Resources and Mines, Indooroopilly, Qld., Australia, 40 pp.
2. Morton, F. I. (1983). Operational estimates of areal evapotranspiration and their significance to the science and practice of hydrology, *Journal of Hydrology*, Volume 66, 1-76.
3. Zajaczkowski, J., Wong, K., & Carter, J. (2013). Improved historical solar radiation gridded data for Australia, *Environmental Modelling & Software*, Volume 49, 64–77. DOI: doi:10.1016/j.envsoft.2013.06.013.
4. Food and Agriculture Organization of the United Nations, Irrigation and drainage paper 56: Crop evapotranspiration - Guidelines for computing crop water requirements, 1998.
5. ASCE's Standardized Reference Evapotranspiration Equation, proceedings of the National Irrigation Symposium, Phoenix, Arizona, 2000.
6. For further details refer to Jeffrey, S.J., Carter, J.O., Moodie, K.B. and Beswick, A.R. (2001). Using spatial interpolation to construct a comprehensive archive of Australian climate data, *Environmental Modelling and Software*, Volume 16/4, 309-330. DOI: doi:10.1016/S1364-8152(01)000081.

See Also

Other SILO: `find_nearby_stations()`, `find_stations_in()`, `get_data_drill_apsim()`, `get_patched_point()`, `get_patched_point_apsim()`, `get_stations_metadata()`, `silo_daily_values`

Other data fetching: `get_coastal_forecast()`, `get_data_drill_apsim()`, `get_dpird_apsim()`, `get_dpird_extremes()`, `get_dpird_minute()`, `get_dpird_summaries()`, `get_metno_daily_forecast()`, `get_metno_forecast()`, `get_patched_point()`, `get_patched_point_apsim()`, `get_precis_forecast()`, `get_radar_imagery()`, `get_satellite_imagery()`

Examples

```
## Not run:
# requires an API key as your email address
# Source data from latitude and longitude coordinates (gridded data) for
# max and minimum temperature and rainfall for Southwood, QLD.
wd <- get_data_drill(
  latitude = -27.85,
  longitude = 150.05,
  start_date = "20221001",
  end_date = "20221201",
  values = c("max_temp", "min_temp", "rain"),
  api_key = "your_api_key"
)

## End(Not run)
```

`get_data_drill_apsim` *Get DataDrill Weather Data in the APSIM Format From SILO*

Description

Fetch APSIM .met file formatted weather data from the weather data from the SILO API of spatially interpolated weather data (DataDrill). The daily climate surfaces have been derived either by splining or kriging the observational data. The returned values contain "source" columns, which denote how the observations were derived. The grid spans 112° to 154°, -10° to -44° with resolution 0.05° latitude by 0.05° longitude (approximately 5 km × 5 km).

Usage

```
get_data_drill_apsim(
  longitude,
  latitude,
  start_date,
  end_date = Sys.Date(),
  api_key = get_key(service = "SILO")
)
```

Arguments

`longitude`	A single `numeric` value representing the longitude of the point-of-interest.
`latitude`	A single `numeric` value representing the latitude of the point-of-interest.
`start_date`	A `character` string or `Date` object representing the beginning of the range to query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date.
`end_date`	A `character` string or `Date` object representing the end of the range query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date. Defaults to the current system date.
`api_key`	A `character` string containing your API key, an e-mail address, for the request. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Details

Note that when saving, comments from SILO will be included, but these will not be printed as a part of the resulting `met` object in your R session.

Value

An **apsimx** object of class 'met' with attributes.

Included Values

rain (mm) Rainfall

maxt (degrees C) Maximum temperature

mint (degrees C) Minimum temperature

vp (hPa) Vapour pressure

evap_pan (mm) Class A pan evaporation

radiation (Mj/m^1) Solar exposure, consisting of both direct and diffuse components

Value information

Solar radiation: total incoming downward shortwave radiation on a horizontal surface, derived from estimates of cloud oktas and sunshine duration[2].

Evaporation and evapotranspiration: an overview of the variables provided by SILO is available here, https://data.longpaddock.qld.gov.au/static/publications/Evapotranspiration_overview.pdf.

Data codes

Where the source code is a 6 digit string comprising the source code for the 6 variables. The single digit code for each variable is:

0 an actual observation;

1 an actual observation from a composite station;

2 a value interpolated from daily observations;

3 a value interpolated from daily observations using the anomaly interpolation method for CLIMARC data;

6 a synthetic pan value; or

7 an interpolated long term average.

Saving objects

To save "met" objects the `apsimx::write_apsim_met()` is reexported. Note that when saving, comments from SILO will be included, but these will not be printed as a part of the resulting `met` object in your R session.

Author(s)

Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>, and Adam Sparks, <adamhsparks@gmail.com>

References

1. Rayner, D. (2005). Australian synthetic daily Class A pan evaporation. Technical Report December 2005, Queensland Department of Natural Resources and Mines, Indooroopilly, Qld., Australia, 40 pp.
2. Morton, F. I. (1983). Operational estimates of areal evapotranspiration and their significance to the science and practice of hydrology, *Journal of Hydrology*, Volume 66, 1-76.

See Also

Other SILO: find_nearby_stations(), find_stations_in(), get_data_drill(), get_patched_point(), get_patched_point_apsim(), get_stations_metadata(), silo_daily_values

Other data fetching: get_coastal_forecast(), get_data_drill(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_metno_daily_forecast(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery()

Other APSIM: get_dpird_apsim(), get_patched_point_apsim(), reexports

Examples

```
## Not run:
# requires an API key as your email address
# Source data from latitude and longitude coordinates (gridded data) for
# max and minimum temperature and rainfall for Southwood, QLD.
wd <- get_data_drill_apsim(
  latitude = -27.85,
  longitude = 150.05,
  start_date = "20220101",
  end_date = "20221231",
  api_key = "your_api_key"
)

## End(Not run)
```

---

get_dpird_apsim *Get DPIRD Summary Weather Data in the APSIM Format From the Weather 2.0 API*

Description

Automates the retrieval and conversion of summary data from the DPIRD Weather 2.0 API to an APSIM .met file formatted weather data object.

Usage

```
get_dpird_apsim(
  station_code,
  start_date,
  end_date = Sys.Date(),
  api_key = get_key(service = "DPIRD")
)
```

Arguments

station_code	A character string or factor from get_stations_metadata() of the BOM station code for the station of interest.
start_date	A character string or Date object representing the beginning of the range to query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date.
end_date	A character string or Date object representing the end of the range query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date. Defaults to the current system date.
api_key	A character string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Value

An **apsimx** object of class 'met' with attributes.

Saving objects

To save "met" objects the apsimx::write_apsim_met() is reexported. Note that when saving, comments from SILO will be included, but these will not be printed as a part of the resulting met object in your R session.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_minute_values, dpird_summary_values, find_nearby_stations(), find_stations_in(), get_dpird_availability(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_stations_metadata()

Other data fetching: get_coastal_forecast(), get_data_drill(), get_data_drill_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_metno_daily_forecast(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery()

Other APSIM: get_data_drill_apsim(), get_patched_point_apsim(), reexports

Examples

```
## Not run:
# Get an APSIM format object for Binnu
# Note that you need to supply your own API key

wd <- get_dpird_apsim(
```

```
  station_code = "BI",
  start_date = "20220101",
  end_date = "20221231",
  api_key = "your_api_key"
)

## End(Not run)
```

`get_dpird_availability` *Get the Availability for DPIRD Weather Stations*

Description

Fetch the availability metadata of weather stations in the DPIRD weather station network from the Weather 2.0 API.

Usage

```
get_dpird_availability(
  station_code = NULL,
  start_date = NULL,
  end_date = NULL,
  values = "availability",
  api_key = get_key(service = "DPIRD")
)
```

Arguments

`station_code`	A `character` string of the DPIRD station code for the station of interest. Defaults to `NULL`, returning metadata for all stations during the requested *start_date* and *end_date* interval.
`start_date`	A `character` string representing the beginning of the range to query in the format "yyyy-mm-dd" (ISO8601). This function will return data inclusive of this date. Defaults to `NULL`, returning data for the current year-to-date. Must be sent along with an *end_date*.
`end_date`	A `character` string representing the end of the range query in the format "yyyy-mm-dd" (ISO8601). This function will return data inclusive of this date. Defaults to `NULL`, returning data for the current year-to-date. Must be sent with a *start_date*.
`values`	A `character` string with the type of availability metadata to return. See **Available Values** for a full list of valid values. Defaults to `availability`, returning metadata for all stations.

api_key A character string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Value

a data.table::data.table() with station_code and the requested metadata.

Available Values

- availability (which will return all of the following values),
- availabilityCurrentHour,
- availabilityLast7DaysSince9AM,
- availabilityLast7DaysSince12AM,
- availabilityLast14DaysSince9AM,
- availabilityLast14DaysSince12AM,
- availabilityLast24Hours,
- availabilityMonthToDateSince12AM,
- availabilityMonthToDateTo9AM,
- availabilitySince9AM,
- availabilitySince12AM,
- availabilityTo9AM,
- availabilityYearToDateSince12AM, and
- availabilityYearToDateTo9AM

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_minute_values, dpird_summary_values, find_nearby_stations(), find_stations_in(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_stations_metadata()

Other metadata: find_forecast_towns(), find_nearby_stations(), find_stations_in(), get_available_imagery(get_available_radar(), get_stations_metadata()

Examples

```
## Not run:
# Note that you need to supply your own API key

# Here we check the up time for the current year for Westonia
WS001 <- get_dpird_availability(station_code = "WS001",
                                api_key = "your_api_key")

# Here we check the up time for 2017 for Binnu
BN <- get_dpird_availability(
  station_code = "BI",
  start_date = "20170101",
  end_date = "20171231",
  api_key = "your_api_key"
)

## End(Not run)
```

`get_dpird_extremes` *Get DPIRD Extreme Weather Event Summaries*

Description

Fetch nicely formatted individual extreme weather summaries from the DPIRD Weather 2.0 API.

Usage

```
get_dpird_extremes(
  station_code,
  values = "all",
  api_key = get_key(service = "DPIRD")
)
```

Arguments

`station_code`	A `character` string or `factor` from `get_stations_metadata()` of the BOM station code for the station of interest.
`values`	A `character` string with the type of extreme weather to return. See **Available Values** for a full list of valid values. Defaults to `all`, returning the full list of values unless otherwise specified.
`api_key`	A `character` string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Value

a data.table::data.table() of one row with station_code, station_name, latitude, longitude, date_time of the query and the extreme weather information according to the value(s) selected.

Available Values

- all (which will return all of the following values),
- erosionCondition,
- erosionConditionLast7Days,
- erosionConditionLast7DaysDays,
- erosionConditionLast7DaysMinutes,
- erosionConditionLast14Days,
- erosionConditionLast14DaysDays,
- erosionConditionLast14DaysMinutes,
- erosionConditionMonthToDate,
- erosionConditionMonthToDateDays,
- erosionConditionMonthToDateMinutes,
- erosionConditionMonthToDateStartTime,
- erosionConditionSince12AM,
- erosionConditionSince12AMMinutes,
- erosionConditionSince12AMStartTime,
- erosionConditionYearToDate,
- erosionConditionYearToDateDays,
- erosionConditionYearToDateMinutes,
- erosionConditionYearToDateStartTime,
- frostCondition,
- frostConditionLast7Days,
- frostConditionLast7DaysDays,
- frostConditionLast7DaysMinutes,
- frostConditionLast14Days,
- frostConditionLast14DaysDays,
- frostConditionLast14DaysMinutes,
- frostConditionMonthToDate,
- frostConditionMonthToDateDays,
- frostConditionMonthToDateMinutes,
- frostConditionMonthToDateStartTime,
- frostConditionSince9AM,
- frostConditionSince9AMMinutes,

- frostConditionSince9AMStartTime,
- frostConditionTo9AM,
- frostConditionTo9AMMinutes,
- frostConditionTo9AMStartTime,
- frostConditionYearToDate,
- frostConditionYearToDate,
- frostConditionYearToDateMinutes,
- frostConditionYearToDateStartTime,
- heatCondition,
- heatConditionLast7Days,
- heatConditionLast7DaysDays,
- heatConditionLast7DaysMinutes,
- heatConditionLast14Days,
- heatConditionLast14DaysDays,
- heatConditionLast14DaysMinutes,
- heatConditionMonthToDate,
- heatConditionMonthToDateDays,
- heatConditionMonthToDateMinutes,
- heatConditionMonthToDateStartTime,
- heatConditionSince12AM,
- heatConditionSince12AMMinutes,
- heatConditionSince12AMStartTime,
- heatConditionYearToDate,
- heatConditionYearToDateDays,
- heatConditionYearToDateMinutes, and
- heatConditionYearToDateStartTime

Author(s)

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See Also

Other DPIRD: `dpird_extreme_weather_values`, `dpird_minute_values`, `dpird_summary_values`, `find_nearby_stations()`, `find_stations_in()`, `get_dpird_apsim()`, `get_dpird_availability()`, `get_dpird_minute()`, `get_dpird_summaries()`, `get_stations_metadata()`

Other data fetching: `get_coastal_forecast()`, `get_data_drill()`, `get_data_drill_apsim()`, `get_dpird_apsim()`, `get_dpird_minute()`, `get_dpird_summaries()`, `get_metno_daily_forecast()`, `get_metno_forecast()`, `get_patched_point()`, `get_patched_point_apsim()`, `get_precis_forecast()`, `get_radar_imagery()`, `get_satellite_imagery()`

Examples

```
## Not run:
# Query Bonnie Rock station for wind erosion and heat extreme events
# Note that you need to supply your own API key

xtreme <- get_dpird_extremes(
  station_code = "BR",
  values = c("erosionCondition",
             "heatCondition"),
  api_key = "your_api_key"
)

## End(Not run)
```

`get_dpird_minute` *Get DPIRD Weather Data by the Minute*

Description

Fetch nicely formatted minute weather station data from the DPIRD Weather 2.0 API for a maximum 24-hour period.

Usage

```
get_dpird_minute(
  station_code,
  start_date_time = lubridate::now() - lubridate::hours(24L),
  minutes = 1440L,
  values = "all",
  api_key = get_key(service = "DPIRD")
)
```

Arguments

`station_code`	A `character` string or `factor` from `get_stations_metadata()` of the BOM station code for the station of interest.
`start_date_time`	A `character` string representing the start date and time of the query in the format "yyyy-mm-dd-hh-mm" (ISO8601). Defaults to 24 hours before the current local system time, returning the most recent 24 hour observations rounded to the nearest minute. This function does its best to decipher many date and time formats but prefers ISO8601.
`minutes`	An `integer` value that provides the number of observations to be returned. Defaults to 1440 minutes for 24 hours of observations.
`values`	A `vector` of weather values to query from the API. See **Available Values** section for valid available codes. Defaults to all available values, `all`.

api_key — A character string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Value

a data.table::data.table() with station_code and the date interval queried together with the requested weather variables.

Available Values

- all (which will return all of the following values),
- airTemperature,
- dateTime,
- dewPoint,
- rainfall,
- relativeHumidity,
- soilTemperature,
- solarIrradiance,
- wetBulb,
- wind,
- windAvgSpeed,
- windMaxSpeed, and
- windMinSpeed

Note

Please note this function converts date-time columns from Coordinated Universal Time 'UTC' returned by the API to Australian Western Standard Time 'AWST'.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_minute_values, dpird_summary_values, find_nearby_stations(), find_stations_in(), get_dpird_apsim(), get_dpird_availability(), get_dpird_extremes(), get_dpird_summaries(), get_stations_metadata()

Other data fetching: get_coastal_forecast(), get_data_drill(), get_data_drill_apsim(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_summaries(), get_metno_daily_forecast(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery()

Examples

```
## Not run:

# Note that you need to supply your own API key

get_dpird_minute(
  station_code = "SP",
  start_date_time = "2023-02-01 13:00:00",
  minutes = 1440,
  values = c("airTemperature",
             "solarIrradiance",
             "wind"),
  api_key = "your_api_key"
)

## End(Not run)
```

`get_dpird_summaries` *Get DPIRD Weather Data in Summarised Formats*

Description

Fetch nicely formatted individual station weather summaries from the DPIRD Weather 2.0 API.

Usage

```
get_dpird_summaries(
  station_code,
  start_date,
  end_date = Sys.Date(),
  interval = c("daily", "15min", "30min", "hourly", "monthly", "yearly"),
  values = "all",
  api_key = get_key(service = "DPIRD")
)
```

Arguments

`station_code`	A `character` string or `factor` from `get_stations_metadata()` of the BOM station code for the station of interest.
`start_date`	A `character` string or `Date` object representing the beginning of the range to query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date.
`end_date`	A `character` string or `Date` object representing the end of the range query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date. Defaults to the current system date.

`interval` A `character` string that indicates the time interval to `monthly` or `yearly`. For intervals shorter than 1 day, the time period covered will be midnight to midnight, with the end_date time interval being before midnight - hour/minute values are for the end of the time period. Data for shorter intervals (`15min`, `30min`) are available from January of the previous year.

`values` A `character` string with the type of summarised weather to return. See **Available Values** for a full list of valid values. Defaults to `all` with all available values being returned.

`api_key` A `character` string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Value

a `data.table::data.table()` with `station_code` and the date interval queried together with the requested weather variables in alphabetical order. The first ten columns will always be:

- `station_code`,
- `station_name`,
- `longitude`,
- `latitude`,
- `year`,
- `month`,
- `day`,
- `hour`,
- `minute`, and if `month` or finer is present,
- `date` (a combination of year, month, day, hour, minute as appropriate).

Start Dates

The earliest available data start from August of 2000 for Vasse, "VA".

Column Name Details

Column names are converted from the default returns of the API to be snake_case formatted and where appropriate, the names of the values that are analogous between SILO and DPIRD data are named using the same name for ease of interoperability, *e.g.*, using `rbind()` to create a `data.table` that contains data from both APIs. However, use with caution and don't mix datasets of different time-steps, *i.e.*, this function gets many summary values not just "daily" time-step data. The functions that access the SILO API only provide access to daily data, so don't mix (sub)hourly, monthly or yearly data from DPIRD with SILO.

Available Values

- all (which will return all of the following values),
- airTemperature,
- airTemperatureAvg,
- airTemperatureMax,
- airTemperatureMaxTime,
- airTemperatureMin,
- airTemperatureMinTime,
- apparentAirTemperature,
- apparentAirTemperatureAvg,
- apparentAirTemperatureMax,
- apparentAirTemperatureMaxTime,
- apparentAirTemperatureMin,
- apparentAirTemperatureMinTime,
- barometricPressure,
- barometricPressureAvg,
- barometricPressureMax,
- barometricPressureMaxTime,
- barometricPressureMin,
- barometricPressureMinTime,
- battery,
- batteryMinVoltage,
- batteryMinVoltageDateTime,
- chillHours,
- deltaT,
- deltaTAvg,
- deltaTMax,
- deltaTMaxTime,
- deltaTMin,
- deltaTMinTime,
- dewPoint,
- dewPointAvg,
- dewPointMax,
- dewPointMaxTime,
- dewPointMin,
- dewPointMinTime,
- erosionCondition,

- erosionConditionMinutes,
- erosionConditionStartTime,
- errors,
- etoShortCrop,
- etoTallCrop,
- evapotranspiration,
- evapotranspirationShortCrop,
- evapotranspirationTallCrop,
- frostCondition,
- frostConditionMinutes,
- frostConditionStartTime,
- heatCondition,
- heatConditionMinutes,
- heatConditionStartTime,
- observations,
- observationsCount,
- observationsPercentage,
- panEvaporation,
- panEvaporation12AM,
- rainfall,
- relativeHumidity,
- relativeHumidityAvg,
- relativeHumidityMax,
- relativeHumidityMaxTime,
- relativeHumidityMin,
- relativeHumidityMinTime,
- richardsonUnits,
- soilTemperature,
- soilTemperatureAvg,
- soilTemperatureMax,
- soilTemperatureMaxTime,
- soilTemperatureMin,
- soilTemperatureMinTime,
- solarExposure,
- wetBulb,
- wetBulbAvg,
- wetBulbMax,

- wetBulbMaxTime,
- wetBulbMin,
- wetBulbMinTime,
- wind,
- windAvgSpeed, and
- windMaxSpeed

Note

Please note this function converts date-time columns from Coordinated Universal Time 'UTC' to Australian Western Standard Time 'AWST'.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>, and Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>

See Also

Other DPIRD: dpird_extreme_weather_values, dpird_minute_values, dpird_summary_values, find_nearby_stations(), find_stations_in(), get_dpird_apsim(), get_dpird_availability(), get_dpird_extremes(), get_dpird_minute(), get_stations_metadata()

Other data fetching: get_coastal_forecast(), get_data_drill(), get_data_drill_apsim(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_metno_daily_forecast(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery()

Examples

```
## Not run:
# Note that you need to supply your own API key
# Use default for end date (current system date) to get rainfall

wd <- get_dpird_summaries(
  station_code = "CL001",
  start_date = "20171028",
  api_key = "your_api_key",
  interval = "yearly",
  values = "rainfall"
)

# Only for wind and erosion conditions for daily time interval

wd <- get_dpird_summaries(
  station_code = "BI",
  start_date = "20220501",
  end_date = "20220502",
  api_key = "your_api_key",
  interval = "daily",
  values = c(
```

```
    "wind",
    "erosionCondition",
    "erosionConditionMinutes",
    "erosionConditionStartTime"
  )
)

## End(Not run)
```

---

get_key *Get or Set Up API Keys*

Description

Checks first to get key from your .Rprofile or .Renviron (or similar) file. If it's not found, then it suggests setting it up. Can be used to check that your key that R is using is the key that you wish to be using or for guidance in setting up the keys.

Usage

```
get_key(service = c("DPIRD", "SILO", "METNO"))
```

Arguments

service	(character) The API host i.e., "DPIRD", "SILO", or "METNO".

Details

The suggestion is to use your .Renviron to set up the API keys. However, if you regularly interact with the APIs outside of R using some other language you may wish to set these up in your .bashrc, .zshrc, or config.fish for cross-language use.

Value

A string value with either a DPIRD Weather 2.0 API, SILO and METNO API key value.

Examples

```
## Not run:
  get_key(service = "DPIRD")
  get_key(service = "SILO")
  get_key(service = "METNO")

## End(Not run)
```

`get_metno_daily_forecast` *Get Daily Weather Forecast Data from MET Weather API*

Description

Retrieves daily aggregated weather forecast data from the Norwegian Meteorological Institute (MET.NO) locationforecast API. This is a convenience function that wraps `get_metno_forecast` and aggregates the hourly forecast data into daily summaries.

Usage

```
get_metno_daily_forecast(
  latitude,
  longitude,
  days = 9,
  api_key,
  timeout = 30,
  max_retries = 3,
  retry_delay = 1,
  use_cache = TRUE,
  cache_dir = NULL,
  allow_stale_on_error = TRUE
)
```

Arguments

`latitude`	Numeric. The latitude in decimal degrees for the forecast location. Must be within Australian limits (-44 to -10).
`longitude`	Numeric. The longitude in decimal degrees for the forecast location. Must be within Australian limits (112 to 154).
`days`	Numeric. The number of forecast days to return (1-9, default: 9).
`api_key`	Character. Your email address, required for the User-Agent header as per MET Weather API terms of service.
`timeout`	Numeric. Request timeout in seconds (default: 30).
`max_retries`	Numeric. Maximum number of retry attempts for failed requests (default: 3).
`retry_delay`	Numeric. Base delay between retries in seconds (default: 1.0).
`use_cache`	Logical. Use session-scoped cache and conditional revalidation for MET.NO responses. Defaults to `TRUE`.
`cache_dir`	Character. Optional directory path for cache files. If `NULL` (default), uses `file.path(tempdir(), "metno_cache")`.
`allow_stale_on_error`	Logical. If `TRUE` (default), return stale cached data when MET.NO returns HTTP 429 (rate limit exceeded) and stale cache is available.

Details

The latitude and longitude are truncated to 4 decimal places as per MET Weather API Terms of Service. The daily aggregation includes minimum and maximum temperatures, total precipitation, average and maximum wind speeds, average relative humidity, average air pressure, average cloud fraction, and a dominant weather symbol for the day.

Value

A data.table with daily aggregated weather forecasts, including: date, min_temperature, max_temperature, total_precipitation, avg_wind_speed, max_wind_speed, avg_relative_humidity, avg_pressure, avg_cloud_fraction, and dominant_weather_symbol.

Author(s)

Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>

See Also

Other METNO: get_metno_forecast(), metno_get_dominant_symbol(), metno_resample_data_table(), metno_timeseries_to_data_table()

Other data fetching: get_coastal_forecast(), get_data_drill(), get_data_drill_apsim(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery()

Examples

```
## Not run:
# Example of how to use the function (replace with your actual email)
# daily_forecast <- get_metno_daily_forecast(
#   latitude = -27.5,
#   longitude = 153.0,
#   days = 7,
#   api_key = "your.email@example.com"
# )
# print(daily_forecast)

## End(Not run)
```

---

get_metno_forecast *Get Weather Forecast Data from MET Weather API*

Description

Retrieves weather forecast data from the Norwegian Meteorological Institute locationforecast API and returns the parsed metadata together with a tidy hourly data.table. The response headers Expires and Last-Modified are provided both in their raw RFC 1123 form and parsed to POSIXct for downstream logic.

Usage

```
get_metno_forecast(
  latitude,
  longitude,
  format = c("compact", "complete"),
  api_key = get_key(service = "METNO"),
  timeout = 30,
  max_retries = 3,
  retry_delay = 1,
  use_cache = TRUE,
  cache_dir = NULL,
  allow_stale_on_error = TRUE
)
```

Arguments

latitude	Numeric. Latitude in decimal degrees for the forecast location. Must be within Australian limits (-44 to -10).
longitude	Numeric. Longitude in decimal degrees for the forecast location. Must be within Australian limits (112 to 154).
format	Character. Either "compact" (default) or "complete" for the MET Weather API locationforecast endpoint variant.
api_key	Character. Email address required for the User-Agent header in accordance with MET Weather API terms of service.
timeout	Numeric. Request timeout in seconds (default: 30).
max_retries	Integer. Maximum number of retry attempts on transient failures (default: 3).
retry_delay	Numeric. Base delay between retries in seconds for exponential backoff (default: 1).
use_cache	Logical. Use session-scoped cache and conditional revalidation for MET.NO responses. Defaults to TRUE.
cache_dir	Character. Optional directory path for cache files. If NULL (default), uses file.path(tempdir(), "metno_cache").
allow_stale_on_error	Logical. If TRUE (default), return stale cached data when MET.NO returns HTTP 429 (rate limit exceeded) and stale cache is available.

Value

A named list with elements:

data Hourly forecast as a data.table.

raw The full parsed GeoJSON response (list).

metadata A list containing request parameters, status code, retrieval timestamp, header information (expires_raw, expires, last_modified_raw, last_modified), and cache provenance in metadata$cache.

Author(s)

Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>

See Also

Other METNO: get_metno_daily_forecast(), metno_get_dominant_symbol(), metno_resample_data_table(), metno_timeseries_to_data_table()

Other data fetching: get_coastal_forecast(), get_data_drill(), get_data_drill_apsim(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_metno_daily_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery()

Examples

```
## Not run:
forecast <- get_metno_forecast(
  latitude = -31.95,
  longitude = 115.86,
  api_key = "your.email@example.com"
)
forecast$metadata$expires
utils::head(forecast$data)

## End(Not run)
```

---

get_patched_point *Get PatchedPoint Weather Data From SILO*

Description

Fetch nicely formatted weather data from the SILO API derived from the BOM station observations (PatchedPoint) data.

Usage

```
get_patched_point(
  station_code,
  start_date,
  end_date = Sys.Date(),
  values = "all",
  api_key = get_key(service = "SILO")
)
```

Arguments

station_code	A character string of the BOM station code for the station of interest.
start_date	A character string or Date object representing the beginning of the range to query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date.
end_date	A character string or Date object representing the end of the range query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date. Defaults to the current system date.
values	A character string with the type of weather data to return. See **Available Values** for a full list of valid values. Defaults to all with all available values being returned.
api_key	A character string containing your API key, an e-mail address, for the request. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Value

a data.table::data.table() with the weather data queried with the weather variables in alphabetical order. The first eight columns will always be:

- station_code,
- station_name,
- longitude,
- latitude,
- elev_m (elevation in metres),
- date (ISO8601 format, "YYYYMMDD"),
- year,
- month,
- day,
- extracted (the date on which the query was made)

Column Name Details

Column names are converted from the default returns of the API to be snake_case formatted and where appropriate, the names of the values that are analogous between SILO and DPIRD data are named using the same name for ease of interoperability, *e.g.*, using rbind() to create a data.table that contains data from both APIs.

The SILO documentation provides the following information for the PatchedPoint data.

These data are a continuous daily time series of data at either recording stations or grid points across Australia:

- *Data at station locations consists of observational records which have been supplemented by interpolated estimates when observed data are missing. Datasets are available at approximately 8,000 Bureau of Meteorology recording stations around Australia.*
- *Data at grid points consists entirely of interpolated estimates. The data are taken from the SILO gridded datasets and are available at any pixel on a 0.05° × 0.05° grid over the land area of Australia (including some islands).*

Available Values

all Which will return all of the following values

rain Rainfall

max_temp (degrees C) Maximum temperature

min_temp (degrees C) Minimum temperature

vp (hPa) Vapour pressure

vp_deficit (hPa) Vapour pressure deficit

evap_pan (mm) Class A pan evaporation

evap_syn (mm) Synthetic estimate[1]

evap_comb (mm) Combination (synthetic estimate pre-1970, class A pan 1970 onwards)

evap_morton_lake (mm) Morton's shallow lake evaporation

radiation (Mj/m^2) Solar exposure, consisting of both direct and diffuse components

rh_tmax (%) Relative humidity at the time of maximum temperature

rh_tmin (%) Relative humidity at the time of minimum temperature

et_short_crop (mm) FAO56[4] short crop

et_tall_crop (mm) ASCE[5] tall crop[6]

et_morton_actual (mm) Morton's areal actual evapotranspiration

et_morton_potential (mm) Morton's point potential evapotranspiration

et_morton_wet (mm) Morton's wet-environment areal potential evapotranspiration over land

mslp (hPa) Mean sea level pressure

Value information

Solar radiation: total incoming downward shortwave radiation on a horizontal surface, derived from estimates of cloud oktas and sunshine duration[3].

Relative humidity: calculated using the vapour pressure measured at 9am, and the saturation vapour pressure computed using either the maximum or minimum temperature[6].

Evaporation and evapotranspiration: an overview of the variables provided by SILO is available here, https://data.longpaddock.qld.gov.au/static/publications/Evapotranspiration_overview.pdf.

Data codes

The data are supplied with codes indicating how each datum was obtained.

0 Official observation as supplied by the Bureau of Meteorology

15 Deaccumulated rainfall (original observation was recorded over a period exceeding the standard 24 hour observation period).

25 Interpolated from daily observations for that date.

26 Synthetic Class A pan evaporation, calculated from temperatures, radiation and vapour pressure.

35 Interpolated from daily observations using an anomaly interpolation method.

75 Interpolated from the long term averages of daily observations for that day of year.

Author(s)

Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>, and Adam Sparks, <adamhsparks@gmail.com>

References

1. Rayner, D. (2005). Australian synthetic daily Class A pan evaporation. Technical Report December 2005, Queensland Department of Natural Resources and Mines, Indooroopilly, Qld., Australia, 40 pp.
2. Morton, F. I. (1983). Operational estimates of areal evapotranspiration and their significance to the science and practice of hydrology, *Journal of Hydrology*, Volume 66, 1-76.
3. Zajaczkowski, J., Wong, K., & Carter, J. (2013). Improved historical solar radiation gridded data for Australia, *Environmental Modelling & Software*, Volume 49, 64–77. DOI: doi:10.1016/j.envsoft.2013.06.013.
4. Food and Agriculture Organization of the United Nations, Irrigation and drainage paper 56: Crop evapotranspiration - Guidelines for computing crop water requirements, 1998.
5. ASCE's Standardized Reference Evapotranspiration Equation, proceedings of the National Irrigation Symposium, Phoenix, Arizona, 2000.
6. For further details refer to Jeffrey, S.J., Carter, J.O., Moodie, K.B. and Beswick, A.R. (2001). Using spatial interpolation to construct a comprehensive archive of Australian climate data, *Environmental Modelling and Software*, Volume 16/4, 309-330. DOI: doi:10.1016/S1364-8152(01)000081.

See Also

Other SILO: `find_nearby_stations()`, `find_stations_in()`, `get_data_drill()`, `get_data_drill_apsim()`, `get_patched_point_apsim()`, `get_stations_metadata()`, `silo_daily_values`

Other data fetching: `get_coastal_forecast()`, `get_data_drill()`, `get_data_drill_apsim()`, `get_dpird_apsim()`, `get_dpird_extremes()`, `get_dpird_minute()`, `get_dpird_summaries()`, `get_metno_daily_forecast()`, `get_metno_forecast()`, `get_patched_point_apsim()`, `get_precis_forecast()`, `get_radar_imagery()`, `get_satellite_imagery()`

Examples

```
## Not run:
# requires an API key as your email address
# Source observation data for station Wongan Hills station, WA (008137)
wd <- get_patched_point(station_code = "008137",
                start_date = "2021-06-01",
                end_date = "2021-07-01",
                values = "all",
                api_key = "your_api_key")

## End(Not run)
```

`get_patched_point_apsim` *Get PatchedPoint Weather Data in the APSIM Format From SILO*

Description

Fetch APSIM .met file formatted weather data from the SILO API derived from the BOM station observations (PatchedPoint) data.

Usage

```
get_patched_point_apsim(
  station_code,
  start_date,
  end_date = Sys.Date(),
  api_key = get_key(service = "SILO")
)
```

Arguments

`station_code`	A `character` string or `factor` from `get_stations_metadata()` of the BOM station code for the station of interest.
`start_date`	A `character` string or `Date` object representing the beginning of the range to query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date.
`end_date`	A `character` string or `Date` object representing the end of the range query in the format "yyyy-mm-dd" (ISO8601). Data returned is inclusive of this date. Defaults to the current system date.
`api_key`	A `character` string containing your API key, an e-mail address, for the request. Defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected.

Details

The SILO documentation provides the following information for the PatchedPoint data.

These data are a continuous daily time series of data at either recording stations or grid points across Australia:

- *Data at station locations consists of observational records which have been supplemented by interpolated estimates when observed data are missing. Datasets are available at approximately 8,000 Bureau of Meteorology recording stations around Australia.*
- *Data at grid points consists entirely of interpolated estimates. The data are taken from the SILO gridded datasets and are available at any pixel on a 0.05° × 0.05° grid over the land area of Australia (including some islands).*

Value

An **apsimx** object of class 'met' with attributes.

Included Values

rain (mm) Rainfall

maxt (degrees C) Maximum temperature

mint (degrees C) Minimum temperature

vp (hPa) Vapour pressure

evap_pan (mm) Class A pan evaporation

radiation (Mj/m^1) Solar exposure, consisting of both direct and diffuse components

Value information

Solar radiation: total incoming downward shortwave radiation on a horizontal surface, derived from estimates of cloud oktas and sunshine duration^2.

Evaporation and evapotranspiration: an overview of the variables provided by SILO is available here, https://data.longpaddock.qld.gov.au/static/publications/Evapotranspiration_overview.pdf.

Data codes

Where the source code is a 6 digit string comprising the source code for the 6 variables. The single digit code for each variable is:

0 an actual observation;

1 an actual observation from a composite station;

2 a value interpolated from daily observations;

3 a value interpolated from daily observations using the anomaly interpolation method for CLIMARC data;

6 a synthetic pan value; or

7 an interpolated long term average.

Saving objects

To save "met" objects the `apsimx::write_apsim_met()` is reexported. Note that when saving, comments from SILO will be included, but these will not be printed as a part of the resulting `met` object in your R session.

Author(s)

Rodrigo Pires, <rodrigo.pires@dpird.wa.gov.au>, and Adam Sparks, <adamhsparks@gmail.com>

References

1. Rayner, D. (2005). Australian synthetic daily Class A pan evaporation. Technical Report December 2005, Queensland Department of Natural Resources and Mines, Indooroopilly, Qld., Australia, 40 pp.

2. Morton, F. I. (1983). Operational estimates of areal evapotranspiration and their significance to the science and practice of hydrology, *Journal of Hydrology*, Volume 66, 1-76.

See Also

Other SILO: `find_nearby_stations()`, `find_stations_in()`, `get_data_drill()`, `get_data_drill_apsim()`, `get_patched_point()`, `get_stations_metadata()`, `silo_daily_values`

Other APSIM: `get_data_drill_apsim()`, `get_dpird_apsim()`, `reexports`

Other data fetching: `get_coastal_forecast()`, `get_data_drill()`, `get_data_drill_apsim()`, `get_dpird_apsim()`, `get_dpird_extremes()`, `get_dpird_minute()`, `get_dpird_summaries()`, `get_metno_daily_forecast()`, `get_metno_forecast()`, `get_patched_point()`, `get_precis_forecast()`, `get_radar_imagery()`, `get_satellite_imagery()`

Examples

```
## Not run:
# requires an API key as your email address
# Source observation data for Wongan Hills station, WA (008137)
wd <- get_patched_point_apsim(
  station_code = "008137",
  start_date = "20220101",
  end_date = "20221231",
  api_key = "your_api_key"
)

## End(Not run)
```

`get_precis_forecast` *Get a BOM Daily Précis Forecast*

Description

Fetch nicely formatted daily précis forecast from the BOM, which contains seven-day town forecasts for a specified state or territory. Ported from **bomrang**.

Usage

```
get_precis_forecast(state = "AUS")
```

Arguments

`state`	Australian state or territory as full name or postal code. Fuzzy string matching via `base::agrep()` is done. Defaults to `AUS` returning all state bulletins, see Details for more.

Details

Allowed state and territory postal codes, only one state per request or all using 'AUS'.

AUS Australia, returns forecast for all states, NT and ACT

ACT Australian Capital Territory (will return NSW)

NSW New South Wales

NT Northern Territory

QLD Queensland

SA South Australia

TAS Tasmania

VIC Victoria

WA Western Australia

Value

A `data.table::data.table()` of an Australia BOM précis seven day forecasts for BOM selected towns.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>, Keith Pembleton, <keith.pembleton@usq.edu.au>, and Paul Melloy, <paul@melloy.com.au>

References

Forecast data come from Australian Bureau of Meteorology (BOM) Weather Data Services
https://www.bom.gov.au/catalogue/data-feeds.shtml

Location data and other metadata for towns come from the BOM anonymous FTP server with spatial data
ftp://ftp.bom.gov.au/anon/home/adfd/spatial/, specifically the DBF file portion of a shapefile,
ftp://ftp.bom.gov.au/anon/home/adfd/spatial/IDM00013.dbf.

See Also

parse_precis_forecast

Other BOM: find_forecast_towns(), get_available_imagery(), get_available_radar(), get_coastal_forecast(), get_radar_imagery(), get_satellite_imagery(), parse_coastal_forecast(), parse_precis_forecast()

Other data fetching: get_coastal_forecast(), get_data_drill(), get_data_drill_apsim(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_metno_daily_forecast(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_radar_imagery(), get_satellite_imagery()

Examples

```
# get the short forecast for Western Australia
get_precis_forecast(state = "WA")
```

---

get_radar_imagery *Get BOM Radar Imagery*

Description

Fetch BOM radar imagery from ftp://ftp.bom.gov.au/anon/gen/radar/ and return a **magick** image object. Files available are the most recent radar snapshot which are updated approximately every 6 to 10 minutes. It is suggested to check file availability first by using get_available_radar().

Usage

```
get_radar_imagery(product_id, path = NULL, download_only = FALSE)
```

Arguments

product_id	Character. BOM product ID to download and import. Value is required.
path	Character. A character string with the name where the downloaded file is saved. If not provided, the default value NULL is used which saves the file in an R session temp directory.
download_only	Boolean. Whether the radar image is loaded into the environment as a **magick** object or just downloaded. Defaults to FALSE

Details

Valid BOM RADAR Product IDs for radar imagery can be obtained from `get_available_radar()`.

Value

A **magick** object of the most recent RADAR image snapshot published by the BOM. If `download_only = TRUE` there will be a `NULL` return value with the download path printed in the console as a message.

Author(s)

Dean Marchiori, <deanmarchiori@gmail.com>

References

Australian Bureau of Meteorology (BOM) radar images
https://www.bom.gov.au/weather-and-climate/rain-radar-and-weather-maps

See Also

`get_available_radar()`

Other BOM: `find_forecast_towns()`, `get_available_imagery()`, `get_available_radar()`, `get_coastal_forecast()`, `get_precis_forecast()`, `get_satellite_imagery()`, `parse_coastal_forecast()`, `parse_precis_forecast()`

Other data fetching: `get_coastal_forecast()`, `get_data_drill()`, `get_data_drill_apsim()`, `get_dpird_apsim()`, `get_dpird_extremes()`, `get_dpird_minute()`, `get_dpird_summaries()`, `get_metno_daily_forecast()`, `get_metno_forecast()`, `get_patched_point()`, `get_patched_point_apsim()`, `get_precis_forecast()`, `get_satellite_imagery()`

Examples

```
# Fetch most recent radar image for Wollongong 256km radar
imagery <- get_radar_imagery(product_id = "IDR032")
imagery
```

`get_satellite_imagery` *Get BOM Satellite Imagery*

Description

Fetch BOM satellite GeoTIFF imagery from `ftp://ftp.bom.gov.au/anon/gen/gms/` and return a **terra** `SpatRaster` S4 class (see `[terra::rast()]`) or **stars** S3 `stars` object of GeoTIFF files. Files are available at ten minutes update frequency with a 24-hour delete time. It is suggested to check file availability first by using `get_available_imagery()`. Ported from **bomrang** with modifications.

Usage

```
get_satellite_imagery(product_id, scans = 1, compat = "terra")
```

Arguments

product_id	Character. BOM product ID to download and import as a **terra** SpatRaster S4 class (see [terra::rast()]) or **stars** S3 stars class object. A vector of values from get_available_imagery() may be used here. Value is required.
scans	Integer. Number of scans to download, starting with most recent and progressing backwards, *e.g.*, 1 - the most recent single scan available , 6 - the most recent hour available, 12 - the most recent 2 hours available, etc. Negating will return the oldest files first. Defaults to 1. Value is optional.
compat	Character. A string indicating the R package with which the returned imagery should be formatted for use, one of terra or stars. Defaults to terra.

Details

Valid BOM satellite Product IDs for use with *product_id* include:

IDE00420 AHI cloud cover only 2km FD GEOS GIS

IDE00421 AHI IR (Ch13) greyscale 2km FD GEOS GIS

IDE00422 AHI VIS (Ch3) greyscale 2km FD GEOS GIS

IDE00423 AHI IR (Ch13) Zehr 2km FD GEOS GIS

IDE00425 AHI VIS (true colour) / IR (Ch13 greyscale) composite 1km FD GEOS GIS

IDE00426 AHI VIS (true colour) / IR (Ch13 greyscale) composite 2km FD GEOS GIS

IDE00427 AHI WV (Ch8) 2km FD GEOS GIS

IDE00430 AHI cloud cover only 2km AUS equirect. GIS

IDE00431 AHI IR (Ch13) greyscale 2km AUS equirect. GIS

IDE00432 AHI VIS (Ch3) greyscale 2km AUS equirect. GIS

IDE00433 AHI IR (Ch13) Zehr 2km AUS equirect. GIS

IDE00435 AHI VIS (true colour) / IR (Ch13 greyscale) composite 1km AUS equirect. GIS

IDE00436 AHI VIS (true colour) / IR (Ch13 greyscale) composite 2km AUS equirect. GIS

IDE00437 AHI WV (Ch8) 2km AUS equirect. GIS

IDE00439 AHI VIS (Ch3) greyscale 0.5km AUS equirect. GIS

Value

A **terra** SpatRaster S4 class (see [terra::rast()]) or **stars** S3 stars class object as selected by the user by specifying compat of GeoTIFF images with layers named by BOM product ID, timestamp and band.

Note

The original **bomrang** version of this function supported local file caching using **hoardr**. This version does not support this functionality any longer due to issues with CRAN and **hoardr**.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>

References

Australian Bureau of Meteorology (BOM) high-definition satellite images https://www.bom.gov.au/australia/satellite/index.shtml.

See Also

get_available_imagery()

Other BOM: find_forecast_towns(), get_available_imagery(), get_available_radar(), get_coastal_forecast(), get_precis_forecast(), get_radar_imagery(), parse_coastal_forecast(), parse_precis_forecast()

Other data fetching: get_coastal_forecast(), get_data_drill(), get_data_drill_apsim(), get_dpird_apsim(), get_dpird_extremes(), get_dpird_minute(), get_dpird_summaries(), get_metno_daily_forecast(), get_metno_forecast(), get_patched_point(), get_patched_point_apsim(), get_precis_forecast(), get_radar_imagery()

Examples

```
# Fetch AHI VIS (true colour) / IR (Ch13 greyscale) composite 1km FD
# GEOS GIS {terra} `SpatRaster`` object for most recent single scan
 available

imagery <- get_satellite_imagery(product_id = "IDE00425", scans = 1)
plot(imagery)

# Get a list of available image files and use that to specify files for
# download, downloading the two most recent files available

avail <- get_available_imagery(product_id = "IDE00425")
imagery <- get_satellite_imagery(product_id = avail, scans = 2)
plot(imagery)
```

---

get_stations_metadata *Get Weather Station Metadata for Both DPIRD and SILO Weather Stations*

Description

Download the latest station locations and metadata for stations in the SILO and DPIRD networks. For BOM stations that exist in SILO, but lack metadata from BOM, the rows will exist to indicate that the station is in the SILO data set, but there is no corresponding BOM metadata available.

Usage

```
get_stations_metadata(
  station_code = NULL,
  station_name = NULL,
  which_api = "all",
  api_key = NULL,
  include_closed = FALSE,
  rich = FALSE
)
```

Arguments

station_code	An optional value that should be provided as a single string value or character vector of station codes for which to return metadata. If this or station_name are not provided, all station metadata is returned by default. If this and station_name are both provided, this takes precedence and values corresponding to this input will be returned.
station_name	An optional value that should be provided as either a single string or character vector of station names for which to return metadata. Fuzzy matching is used, *e.g.*, using c("brisbane", "melbourne") will return rows for "Brisbane", "Brisbane Aero", "Mt Brisbane", "City of Melbourne Bay", "Selbourne Kirnbrae", "Maroondah Weir Melbourne Water", "Melbourne Airport" and "Melbourne Botanical Gardens" station_name values. If this or station_code are not provided, all station metadata is returned by default. Using station_code will always override this argument if both are provided.
which_api	A string value that indicates which API to use. Valid values are all, for both SILO (BOM data) and DPIRD APIs; silo for only stations from the SILO API (BOM data); or dpird for stations from the DPIRD Weather 2.0 API. Defaults to all.
api_key	A character string containing your API key from DPIRD, https://www.dpird.wa.gov.au/online-tools/apis/, for the DPIRD Weather 2.0 API. If left as NULL, defaults to automatically detecting your key from your local .Renviron, .Rprofile or similar. Alternatively, you may directly provide your key as a string here. If nothing is provided, you will be prompted on how to set up your R session so that it is auto-detected. Only used when *which_api* is DPIRD or all.
include_closed	A Boolean string indicating whether to include closed stations' metadata. Use TRUE to include these. Defaults to FALSE.
rich	A Boolean string indicating whether to return rich information about DPIRD's weather station(s), this does not affect the SILO stations' metadata, the variables for these observations will be NA. Defaults to FALSE.

Value

A data.table::data.table() of BOM weather stations' metadata for stations available from SILO and weather stations' metadata for stations available from DPIRD's Weather 2.0 API with the following columns sorted by state and station_name.

station_code:	Unique station code. `factor`
station_name:	Unique station name. `character`
start:	Date observations start. `date`
end:	Date observations end. `date`
latitude:	Latitude in decimal degrees. `numeric`
longitude:	Longitude in decimal degrees. `numeric`
state:	State in which the station is located. `character`
elev_m:	Station elevation in metres. `numeric`
source:	Organisation responsible for the data or station maintenance. `character`
include_closed:	Station include_closed, one of 'open' or 'closed'. `character`
wmo:	World Meteorological Organisation, (WMO), number if applicable. `numeric`
`rich` **values**	
capabilities:	a list of the station's capabilities (data that it records). `character`
probe_height:	temperature probe height in metres. `double`
rain_gauge_height	rain gauge height in metres. `double`
wind_probe_heights:	wind probe heights always 3 metres, although some have 10 metre probes. `integer`

Note

For stations in the SILO API, BOM does not report the exact date on which stations opened or closed, only the year. Therefore the `start` and `end` columns will indicate January 1 of the year that a station opened or closed, whereas stations in the DPIRD network have the date to the day. For BOM stations that are closed for the current year, this indicates that the station closed sometime during the current year prior to the request being made. `NA` in the current year indicates a station is still open.

There are discrepancies between the BOM's official station metadata, *e.g.* longitude and latitude values and SILO metadata. In these cases, the BOM metadata is used as it is considered to be the authority on the stations' locations.

The station names are returned by both APIs in full caps. For purposes of cleaner graphs and maps where these data may be sued, this function converts them to proper name formats/title case with the first letter of every word capitalised excepting words like "at" or "on" and keeps acronyms like "AWS" or "PIRSA" or state abbreviations in the station names as all caps.

Author(s)

Adam H. Sparks, `<adamhsparks@gmail.com>`

References

Station location and other metadata are sourced from the Australian Bureau of Meteorology (BOM) webpage, Bureau of Meteorology Site Numbers: https://www.bom.gov.au/climate/cdo/about/site-num.shtml and https://www.bom.gov.au/climate/data/lists_by_element/stations.txt and the DPIRD Weather 2.0 API.

See Also

Other DPIRD: `dpird_extreme_weather_values`, `dpird_minute_values`, `dpird_summary_values`, `find_nearby_stations()`, `find_stations_in()`, `get_dpird_apsim()`, `get_dpird_availability()`, `get_dpird_extremes()`, `get_dpird_minute()`, `get_dpird_summaries()`

Other SILO: find_nearby_stations(), find_stations_in(), get_data_drill(), get_data_drill_apsim(), get_patched_point(), get_patched_point_apsim(), silo_daily_values

Other metadata: find_forecast_towns(), find_nearby_stations(), find_stations_in(), get_available_imagery(), get_available_radar(), get_dpird_availability()

Examples

```
## Not run:
# fetch metadata for all stations available in {weatherOz}
get_stations_metadata(api_key = "your_api_key")

## End(Not run)
```

`parse_coastal_forecast`

Parse BOM Coastal Waters Forecast XML Files

Description

Parse local BOM daily coastal waters forecast XML file(s) for a specified state or territory or all of Australia.

Usage

```
parse_coastal_forecast(state, filepath)
```

Arguments

`state`	Required value of an Australian state or territory as full name or postal code. Fuzzy string matching via `base::agrep()` is done.
`filepath`	A string providing the directory location of the coastal forecast file(s) to parse. See Details for more.

Details

Allowed state and territory postal codes, only one state per request or all using `AUS`.

AUS Australia, returns forecast for all states, NT and ACT

ACT Australian Capital Territory (will return NSW)

NSW New South Wales

NT Northern Territory

QLD Queensland

SA South Australia

TAS Tasmania

VIC Victoria

WA Western Australia

The *filepath* argument will only accept a directory where files are located for parsing. DO NOT supply the full path including the file name. This function will only parse the requested state or all of Australia in the same fashion as `get_coastal_forecast()`, provided that the files are all present in the directory.

Value

A `data.table::data.table()` of an Australia BOM Coastal Waters Forecast.

Author(s)

Dean Marchiori, <deanmarchiori@gmail.com>, and Paul Melloy, <paul@melloy.com.au>

References

Forecast data come from Australian Bureau of Meteorology (BOM) Weather Data Services https://www.bom.gov.au/catalogue/data-feeds.shtml.

Location data and other metadata come from the BOM anonymous FTP server with spatial data ftp://ftp.bom.gov.au/anon/home/adfd/spatial/, specifically the DBF file portion of a shapefile, ftp://ftp.bom.gov.au/anon/home/adfd/spatial/IDM00003.dbf.

See Also

get_coastal_forecast

Other BOM: `find_forecast_towns()`, `get_available_imagery()`, `get_available_radar()`, `get_coastal_forecast()`, `get_precis_forecast()`, `get_radar_imagery()`, `get_satellite_imagery()`, `parse_precis_forecast()`

Other parse: `metno_get_dominant_symbol()`, `metno_resample_data_table()`, `metno_timeseries_to_data_table()`, `parse_precis_forecast()`

Examples

```
# parse the coastal forecast for Queensland

#download to tempfile() using basename() to keep original name
utils::download.file(url = "ftp://ftp.bom.gov.au/anon/gen/fwo/IDQ11290.xml",
              destfile = file.path(tempdir(),
              basename("ftp://ftp.bom.gov.au/anon/gen/fwo/IDQ11290.xml")),
              mode = "wb")

parse_coastal_forecast(state = "QLD", filepath = tempdir())
```

`parse_precis_forecast` *Parse BOM Précis Forecast XML Files*

Description

Parse local BOM daily précis forecast XML file(s) of the seven-day town forecasts for a specified state or territory or all Australia. Ported from **bomrang**.

Usage

```
parse_precis_forecast(state, filepath)
```

Arguments

`state`	Required value of an Australian state or territory as full name or postal code. Fuzzy string matching via `base::agrep()` is done.
`filepath`	A string providing the directory location of the précis file(s) to parse. See Details for more.

Details

Allowed state and territory postal codes, only one state per request or all using 'AUS'.

ACT Australian Capital Territory (will return NSW)

NSW New South Wales

NT Northern Territory

QLD Queensland

SA South Australia

TAS Tasmania

VIC Victoria

WA Western Australia

AUS Australia, returns forecast for all states, NT and ACT

The *filepath* argument will only accept a directory where files are located for parsing. DO NOT supply the full path including the file name. This function will only parse the requested state or all of Australia in the same fashion as `get_precis_forecast()`, provided that the files are all present in the directory.

Value

A `data.table::data.table()` of Australia BOM précis seven-day forecasts for BOM selected towns.

Author(s)

Adam H. Sparks, <adamhsparks@gmail.com>, and Keith Pembleton, <keith.pembleton@usq.edu.au>, and Paul Melloy, <paul@melloy.com.au>

References

Forecast data come from Australian Bureau of Meteorology (BOM) Weather Data Services
https://www.bom.gov.au/catalogue/data-feeds.shtml

Location data and other metadata for towns come from the BOM anonymous FTP server with spatial data
ftp://ftp.bom.gov.au/anon/home/adfd/spatial/, specifically the DBF file portion of a shapefile,
ftp://ftp.bom.gov.au/anon/home/adfd/spatial/IDM00013.dbf

See Also

get_precis_forecast

Other BOM: find_forecast_towns(), get_available_imagery(), get_available_radar(), get_coastal_forecast(), get_precis_forecast(), get_radar_imagery(), get_satellite_imagery(), parse_coastal_forecast()

Other parse: metno_get_dominant_symbol(), metno_resample_data_table(), metno_timeseries_to_data_table(), parse_coastal_forecast()

Examples

```
# parse the short forecast for Western Australia

# download to tempfile() using basename() to keep original name
utils::download.file(url = "ftp://ftp.bom.gov.au/anon/gen/fwo/IDQ11295.xml",
              destfile = file.path(tempdir(),
              basename("ftp://ftp.bom.gov.au/anon/gen/fwo/IDQ11295.xml")),
              mode = "wb")

parse_precis_forecast(state = "QLD", filepath = tempdir())
```

---

silo_daily_values *A List of SILO Daily Weather Values*

Description

A vector object containing 18 items representing valid values to supply to get_patched_point() and get_data_drill()'s *values* argument taken from the documentation for the SILO API.

Usage

```
silo_daily_values
```

Format

A vector object of 57 items.

Source

https://www.longpaddock.qld.gov.au/silo/about/climate-variables/

See Also

Other SILO: find_nearby_stations(), find_stations_in(), get_data_drill(), get_data_drill_apsim(), get_patched_point(), get_patched_point_apsim(), get_stations_metadata()

Other data: dpird_extreme_weather_values, dpird_minute_values, dpird_summary_values

---

south_west_agriculture_region

Western Australia Southwest Agriculture Region Geospatial Polygon

---

Description

An **sf** object of the the WA South West Agricultural Region.

Usage

```
south_west_agricultural_region
```

Format

An sf::sf() polygon object

Details

The zone managed for intensive agricultural activities in South-Western Australia. Also known as the South West Agricultural Area or Clearing Line. This zone defines the easternmost extent of land cleared for agricultural purposes.

Base data sets

Western Australian Land Information Authority - Captured from photographic interpretation of best available orthophotography at date of capture, dates range between 2007 and 2010.

Scale of capture

1:20,000

Coordinate Reference System

EPSG:4326 - WGS 84 – WGS84 - World Geodetic System 1984, used in GPS https://epsg.io/4326

Source

Western Australia Department of Primary Industries and Regional Development under a Creative Commons Attribution 4.0 Licence

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