Package 'nasapower'

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Type Package

Title NASA POWER API Client

Version 3.0.0

URL https://docs.ropensci.org/nasapower/

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

Description Client for 'NASA' 'POWER' global meteorology, surface solar energy and climatology data 'API'. 'POWER' (Prediction Of Worldwide Energy Resource) data are freely available global meteorology and surface solar energy climatology data for download with a resolution of 1/2 by 1/2 arc degree longitude and latitude and are funded through the 'NASA' Earth Science Directorate Applied Science Program. For more on the data themselves, a web-based data viewer and web access, please see <https://power.larc.nasa.gov/>.

Depends R (>= 3.5.0)

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R topics documented:

`get_power` *Get NASA POWER data from the POWER web API*

Description

Get POWER global meteorology and surface solar energy climatology data and return a tidy data frame `tibble` object. All options offered by the official POWER API are supported.

Usage

```
get_power(
  community,
  pars,
  temporal_average,
  lonlat,
  dates = NULL,
  site_elevation = NULL
)
```

Arguments

`community`	A character vector providing community name: "AG", "SB" or "SSE". See argument details for more.

`pars` A character vector of solar, meteorological or climatology parameters to download. See `parameters` for a full list of valid values and definitions. If downloading "CLIMATOLOGY" a maximum of three `pars` can be specified at one time, for "DAILY" and "INTERANNUAL" a maximum of 20 can be specified at one time.

`temporal_average` Temporal average for data being queried, supported values are "DAILY", "INTERANNUAL" and "CLIMATOLOGY". See argument details for more.

`lonlat` A numeric vector of geographic coordinates for a cell or region entered as x, y coordinates or "GLOBAL" for global coverage (only used for "CLIMATOLOGY"). See argument details for more.

`dates` A character vector of start and end dates in that order, *e.g.*, `dates = c("1983-01-01","2017-12-31")`. Not used when `temporal_average` is set to "CLIMATOLOGY". See argument details for more.

`site_elevation` A user-supplied value for elevation at a single point in metres. If provided this will return a corrected atmospheric pressure value adjusted to the elevation provided. Only used with 'lonlat' as a single point of x, y coordinates, not for use with "GLOBAL" or with a regional request.

Value

A data frame of POWER data including location, dates (not including "CLIMATOLOGY") and requested parameters. A header of metadata is included.

Argument details for "community"

There are three valid values, one must be supplied. This will affect the units of the parameter and the temporal display of time series data.

AG Provides access to the Agroclimatology Archive, which contains industry-friendly parameters formatted for input to crop models.

SB Provides access to the Sustainable Buildings Archive, which contains industry-friendly parameters for the buildings community to include parameters in multi-year monthly averages.

SSE Provides access to the Renewable Energy Archive, which contains parameters specifically tailored to assist in the design of solar and wind powered renewable energy systems.

Argument details for `temporal_average`

There are three valid values.

DAILY The daily average of `pars` by day, month and year.

INTERANNUAL The monthly average of `pars` by year.

CLIMATOLOGY The monthly average of `pars` at the surface of the earth for a given month, averaged for that month over the 30-year period (Jan. 1984 - Dec. 2013).

Argument details for `lonlat`

For a single point To get a specific cell, 1/2 x 1/2 degree, supply a length-two numeric vector giving the decimal degree longitude and latitude in that order for data to download, *e.g.*, `lonlat = c(-89.5,-179.5)`.

For regional coverage To get a region, supply a length-four numeric vector as lower left (lon, lat) and upper right (lon, lat) coordinates, *e.g.*, `lonlat = c(xmin,ymin,xmax,ymax)` in that order for a given region, *e.g.*, a bounding box for the south western corner of Australia: `lonlat = c(112.5,-55.5,115.5,-50.5)`. *Maximum area processed is 4.5 x 4.5 degrees (100 points).

For global coverage To get global coverage for CLIMATOLOGY, supply "GLOBAL" while also specifying "CLIMATOLOGY" for the `temporal_average`.

Argument details for `dates`

If one date only is provided, it will be treated as both the start date and the end date and only a single day's values will be returned, *e.g.*, `dates = "1983-01-01"`. When `temporal_average` is set to "INTERANNUAL", use only two year values (YYYY), *e.g.* `dates = c(1983,2010)`. This argument should not be used when `temporal_average` is set to "CLIMATOLOGY".

The weather values from POWER for temperature are 2 metre max and min temperatures, "T2M_MAX" and "T2M_MIN"; radiation, "ALLSKY_SFC_SW_DWN"; rain, "PRECTOT"; relative humidity at 2 metres, "RH2M"; and wind at 2 metres "WS2M" from the POWER 'AG' community on a daily time-step.

If further parameters are desired, the user may pass them along.

Note

The associated metadata are not saved if the data are exported to a file format other than a native R data format, *e.g.*, .Rdata, .rda or .rds.

Author(s)

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References

https://power.larc.nasa.gov/docs/methodology/ https://power.larc.nasa.gov

Examples

```
# Fetch daily "AG" community temperature, relative
# humidity and precipitation for January 1 1985
# for Kingsthorpe, Queensland, Australia
ag_d <- get_power(
  community = "AG",
  lonlat = c(151.81, -27.48),
  pars = c("RH2M", "T2M", "PRECTOT"),
  dates = "1985-01-01",
  temporal_average = "DAILY"
)
```

```
# Fetch single point climatology for air temperature
ag_c_point <- get_power(
  community = "AG",
  pars = "T2M",
  c(151.81, -27.48),
  temporal_average = "CLIMATOLOGY"
)

ag_c_point

# Fetch global AG climatology for air temperature
ag_c_global <- get_power(
  community = "AG",
  pars = "T2M",
  lonlat = "GLOBAL",
  temporal_average = "CLIMATOLOGY"
)

ag_c_global

# Fetch interannual solar cooking parameters
# for a given region
sse_i <- get_power(
  community = "SSE",
  lonlat = c(112.5, -55.5, 115.5, -50.5),
  dates = c("1984", "1985"),
  temporal_average = "INTERANNUAL",
  pars = c("CLRSKY_SFC_SW_DWN", "ALLSKY_SFC_SW_DWN")
)

sse_i
```

---

nasapower-defunct *Defunct functions in* R*hrefhttps://CRAN.R-project.org/package=nasapower***nasapower** *These functions are gone, no longer available.*

- create_icasa*: This function is defunct.*
- create_met*: This function is defunct.*

Description

Defunct functions in **nasapower**

These functions are gone, no longer available.

- create_icasa: This function is defunct.
- create_met: This function is defunct.

Usage

```
create_met(...)

create_icasa(...)
```

Arguments

...	unused arguments

Details

'create_met()' is now defunct and has been removed from **nasapower**

'create_icasa()' is now defunct and has been removed from **nasapower**

---

parameters *NASA POWER parameters available for download*

Description

An R `list` object of POWER parameters and metadata available for querying from the POWER database.

Usage

```
parameters
```

Format

A list with 161 weather and climate parameters contained within the database.

ALLSKY_SFC_LW_DWN Downward Thermal Infrared (Longwave) Radiative Flux

ALLSKY_SFC_SW_DWN All Sky Insolation Incident on a Horizontal Surface

ALLSKY_SFC_SW_DWN_00_GMT All Sky Insolation Incident On A Horizontal Surface at 00 GMT

ALLSKY_SFC_SW_DWN_03_GMT All Sky Insolation Incident On A Horizontal Surface at 03 GMT

ALLSKY_SFC_SW_DWN_06_GMT All Sky Insolation Incident On A Horizontal Surface at 06 GMT

ALLSKY_SFC_SW_DWN_09_GMT All Sky Insolation Incident On A Horizontal Surface at 09 GMT

ALLSKY_SFC_SW_DWN_12_GMT All Sky Insolation Incident On A Horizontal Surface at 12 GMT

ALLSKY_SFC_SW_DWN_15_GMT All Sky Insolation Incident On A Horizontal Surface at 15 GMT

ALLSKY_SFC_SW_DWN_18_GMT All Sky Insolation Incident On A Horizontal Surface at 18 GMT

ALLSKY_SFC_SW_DWN_21_GMT All Sky Insolation Incident On A Horizontal Surface at 21 GMT

ALLSKY_SFC_SW_DWN_MAX_DIFF Maximum Monthly Difference From Monthly Averaged All Sky Insolation

ALLSKY_SFC_SW_DWN_MIN_DIFF Minimum Monthly Difference From Monthly Averaged All Sky Insolation

ALLSKY_TOA_SW_DWN Top-of-atmosphere Insolation

CDD0 Cooling Degree Days Above 0 C

CDD10 Cooling Degree Days Above 10 C

CDD18_3 Cooling Degree Days Above 18.3 C

CLD_AMT Daylight Cloud Amount

CLD_AMT_00_GMT Cloud Amount at 00 GMT

CLD_AMT_03_GMT Cloud Amount at 03 GMT

CLD_AMT_06_GMT Cloud Amount at 06 GMT

CLD_AMT_09_GMT Cloud Amount at 09 GMT

CLD_AMT_12_GMT Cloud Amount at 12 GMT

CLD_AMT_15_GMT Cloud Amount at 15 GMT

CLD_AMT_18_GMT Cloud Amount at 18 GMT

CLD_AMT_21_GMT Cloud Amount at 21 GMT

CLRSKY_DIFF Clear Sky Diffuse Radiation On A Horizontal Surface

CLRSKY_NKT Normalized Clear Sky Insolation Clearness Index

CLRSKY_SFC_SW_DWN Clear Sky Insolation Incident on a Horizontal Surface

DIFF Diffuse Radiation On A Horizontal Surface

DIFF_MAX Maximum Diffuse Radiation On A Horizontal Surface

DIFF_MIN Minimum Diffuse Radiation On A Horizontal Surface

DNR Direct Normal Radiation

DNR_MAX Maximum Direct Normal Radiation

DNR_MAX_DIFF Maximum Difference From Monthly Averaged Direct Normal Radiation

DNR_MIN Minimum Direct Normal Radiation

DNR_MIN_DIFF Minimum Difference From Monthly Averaged Direct Norma l Radiation

EQVLNT_NO_SUN_BLACKDAYS_1 Equivalent Number Of NO-SUN Or BLACK Days Over A Consecutive 1-day Period

EQVLNT_NO_SUN_BLACKDAYS_14 Equivalent Number Of NO-SUN Or BLACK Days Over A Consecutive 14-day Period

EQVLNT_NO_SUN_BLACKDAYS_21 Equivalent Number Of NO-SUN Or BLACK Days Over A Consecutive 21-day Period

EQVLNT_NO_SUN_BLACKDAYS_3 Equivalent Number Of NO-SUN Or BLACK Days Over A Consecutive 3-day Period

EQVLNT_NO_SUN_BLACKDAYS_7 Equivalent Number Of NO-SUN Or BLACK Days Over A Consecutive 7-day Period

EQVLNT_NO_SUN_BLACKDAYS_MONTH Equivalent Number Of NO-SUN Or BLACK Days Over A Consecutive Month Period

FROST_DAYS Frost Days

FRQ_BRKNCLD_10_70_00_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 00 GMT

FRQ_BRKNCLD_10_70_03_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 03 GMT

FRQ_BRKNCLD_10_70_06_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 06 GMT

FRQ_BRKNCLD_10_70_09_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 09 GMT

FRQ_BRKNCLD_10_70_12_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 12 GMT

FRQ_BRKNCLD_10_70_15_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 15 GMT

FRQ_BRKNCLD_10_70_18_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 18 GMT

FRQ_BRKNCLD_10_70_21_GMT Frequency Of Broken-cloud Skies 10 - 70 % At 21 GMT

FRQ_CLRSKY_0_10_00_GMT Frequency Of Clear Skies < 10 % At 00 GMT

FRQ_CLRSKY_0_10_03_GMT Frequency Of Clear Skies < 10 % At 03 GMT

FRQ_CLRSKY_0_10_06_GMT Frequency Of Clear Skies < 10 % At 06 GMT

FRQ_CLRSKY_0_10_09_GMT Frequency Of Clear Skies < 10 % At 09 GMT

FRQ_CLRSKY_0_10_12_GMT Frequency Of Clear Skies < 10 % At 12 GMT

FRQ_CLRSKY_0_10_15_GMT Frequency Of Clear Skies < 10 % At 15 GMT

FRQ_CLRSKY_0_10_18_GMT Frequency Of Clear Skies < 10 % At 18 GMT

FRQ_CLRSKY_0_10_21_GMT Frequency Of Clear Skies < 10 % At 21 GMT

FRQ_NROVRCST_70_00_GMT Frequency Of Near-overcast Skies >= 70 % At 00 GMT

FRQ_NROVRCST_70_03_GMT Frequency Of Near-overcast Skies >= 70 % At 03 GMT

FRQ_NROVRCST_70_06_GMT Frequency Of Near-overcast Skies >= 70 % At 06 GMT

FRQ_NROVRCST_70_09_GMT Frequency Of Near-overcast Skies >= 70 % At 09 GMT

FRQ_NROVRCST_70_12_GMT Frequency Of Near-overcast Skies >= 70 % At 12 GMT

FRQ_NROVRCST_70_15_GMT Frequency Of Near-overcast Skies >= 70 % At 15 GMT

FRQ_NROVRCST_70_18_GMT Frequency Of Near-overcast Skies >= 70 % At 18 GMT

FRQ_NROVRCST_70_21_GMT Frequency Of Near-overcast Skies >= 70 % At 21 GMT

HDD0 Heating Degree Days Below 0 C

HDD10 Heating Degree Days Below 10 C

HDD18_3 Heating Degree Days Below 18.3 C

INSOL_MIN_CONSEC_1 Minimum Available Insolation Over A Consecutive 1-day Period

INSOL_MIN_CONSEC_14 Minimum Available Insolation Over A Consecutive 14-day Period

INSOL_MIN_CONSEC_21 Minimum Available Insolation Over A Consecutive 21-day Period

INSOL_MIN_CONSEC_3 Minimum Available Insolation Over A Consecutive 3-day Period

INSOL_MIN_CONSEC_7 Minimum Available Insolation Over A Consecutive 7-day Period

INSOL_MIN_CONSEC_MONTH Minimum Available Insolation Over A Consecutive Month Period

KT Insolation Clearness Index

KT_CLEAR Clear Sky Insolation Clearness Index

MIDDAY_INSOL Midday Insolation Incident On A Horizontal Surface

NKT Normalized Insolation Clearness Index

NO_SUN_BLACKDAYS_MAX Maximum NO-SUN Or BLACK Days

PHIS Surface Geopotential

PRECTOT Precipitation

PS Surface Pressure

PSC Corrected Atmospheric Pressure (Adjusted For Site Elevation)

QV2M Specific Humidity at 2 Meters

RH2M Relative Humidity at 2 Meters

SG_DAY_COZ_ZEN_AVG Daylight Average Of Hourly Cosine Solar Zenith Angles

SG_DAY_HOUR_AVG Daylight Hours

SG_DEC_AVG Declination

SG_HR_AZM_ANG_AVG Hourly Solar Azimuth Angles

SG_HR_HRZ_ANG_AVG Hourly Solar Angles Relative To The Horizon

SG_HR_SET_ANG Sunset Hour Angle

SG_MAX_HRZ_ANG Maximum Solar Angle Relative To The Horizon

SG_MID_COZ_ZEN_ANG Cosine Solar Zenith Angle At Mid-Time Between Sunrise And Solar Noon

SG_NOON Solar Noon

SI_EF_TILTED_SURFACE_HORIZONTAL Solar Irradiance for Equator Facing Horizontal Surface

SI_EF_TILTED_SURFACE_LAT_MINUS15 Solar Irradiance for Equator Facing Latitude Minus 15 Tilt

SI_EF_TILTED_SURFACE_LATITUDE Solar Irradiance for Equator Facing Latitude Tilt

SI_EF_TILTED_SURFACE_LAT_PLUS15 Solar Irradiance for Equator Facing Latitude Plus 15 Tilt

SI_EF_TILTED_SURFACE_VERTICAL Solar Irradiance for Equator Facing Vertical Surface

SI_EF_OPTIMAL Solar Irradiance Optimal

SI_EF_OPTIMAL_ANG Solar Irradiance Optimal Angle

SI_EF_OPTIMAL_ANG_ORT Solar Irradiance Tilted Surface Orientation

SI_EF_TRACKER Solar Irradiance Irradiance Tracking the Sun

SI_EF_TILTED_SURFACE Solar Irradiance for Equator Facing Tilted Surfaces (Set of Surfaces)

SI_EF_MIN_TILTED_SURFACE_HORIZONTAL Minimum Solar Irradiance for Equator Facing Horizontal Surface

SI_EF_MIN_TILTED_SURFACE_LAT_MINUS15 Minimum Solar Irradiance for Equator Facing Latitude Minus 15 Tilt

SI_EF_MIN_TILTED_SURFACE_LATITUDE Minimum Solar Irradiance for Equator Facing Latitude Tilt

SI_EF_MIN_TILTED_SURFACE_LAT_PLUS15 Minimum Solar Irradiance for Equator Facing Latitude Plus 15 Tilt

SI_EF_MIN_TILTED_SURFACE_VERTICAL Minimum Solar Irradiance for Equator Facing Vertical Surface

SI_EF_MIN_OPTIMAL Minimum Solar Irradiance Optimal

SI_EF_MIN_OPTIMAL_ANG Minimum Solar Irradiance Optimal Angle

SI_EF_MIN_OPTIMAL_ANG_ORT Minimum Solar Irradiance Tilted Surface Orientation

SI_EF_MIN_TRACKER Minimum Solar Irradiance Irradiance Tracking the Sun

SI_EF_MIN_TILTED_SURFACE Minimum Solar Irradiance for Equator Facing Tilted Surfaces (Set of Surfaces)

SI_EF_MAX_TILTED_SURFACE_HORIZONTAL Maximum Solar Irradiance for Equator Facing Horizontal Surface

SI_EF_MAX_TILTED_SURFACE_LAT_MINUS15 Maximum Solar Irradiance for Equator Facing Latitude Minus 15 Tilt

SI_EF_MAX_TILTED_SURFACE_LATITUDE Maximum Solar Irradiance for Equator Facing Latitude Tilt

SI_EF_MAX_TILTED_SURFACE_LAT_PLUS15 Maximum Solar Irradiance for Equator Facing Latitude Plus 15 Tilt

SI_EF_MAX_TILTED_SURFACE_VERTICAL Maximum Solar Irradiance for Equator Facing Vertical Surface

SI_EF_MAX_OPTIMAL Maximum Solar Irradiance Optimal

SI_EF_MAX_OPTIMAL_ANG Maximum Solar Irradiance Optimal Angle

SI_EF_MAX_OPTIMAL_ANG_ORT Maximum Solar Irradiance Tilted Surface Orientation

SI_EF_MAX_TRACKER Maximum Solar Irradiance Irradiance Tracking the Sun

SI_EF_MAX_TILTED_SURFACE Maximum Solar Irradiance for Equator Facing Tilted Surfaces (Set of Surfaces)

SR Surface Roughness

SRF_ALB Surface Albedo

T10M Temperature at 10 Meters

T10M_MAX Maximum Temperature at 10 Meters

T10M_MIN Minimum Temperature at 10 Meters

T10M_RANGE Temperature Range at 10 Meters

T2M Temperature at 2 Meters

T2MDEW Dew/Frost Point at 2 Meters

T2MWET Wet Bulb Temperature at 2 Meters

T2M_MAX Maximum Temperature at 2 Meters

T2M_MIN Minimum Temperature at 2 Meters

T2M_RANGE Temperature Range at 2 Meters

TM_ZONES Climate Thermal and Moisture Zones

TQV Total Column Precipitable Water

TS Earth Skin Temperature

TS_AMP Earth Skin Temperature Amplitude

TS_MAX Maximum Earth Skin Temperature

TS_MIN Minimum Earth Skin Temperature

TS_RANGE Earth Skin Temperature Range

T_ZONES Climate Thermal Zones

U10M Eastward Wind at 10 Meters

V10M Northward Wind at 10 Meters

WS10M Wind Speed at 10 Meters

WS10M_MAX Maximum Wind Speed at 10 Meters

WS10M_MIN Minimum Wind Speed at 10 Meters

WS10M_RANGE Wind Speed Range at 10 Meters

WS2M Wind Speed at 2 Meters

WS2M_MAX Maximum Wind Speed at 2 Meters

WS2M_MIN Minimum Wind Speed at 2 Meters

WS2M_RANGE Wind Speed Range at 2 Meters

WS50M Wind Speed at 50 Meters

WS50M_MAX Maximum Wind Speed at 50 Meters

WS50M_MIN Minimum Wind Speed at 50 Meters

WS50M_RANGE Wind Speed Range at 50 Meters

WSC Corrected Wind Speed (Adjusted For Elevation)

Author(s)

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Source

https://power.larc.nasa.gov/system/parameters.json

References

https://power.larc.nasa.gov/docs/

Index