

Package ‘nasapower’

September 23, 2020

Type Package

Title NASA POWER API Client

Version 2.0.0

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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Imports APSIM, crul, curl, lubridate, jsonlite, readr, tibble, utils

RoxygenNote 7.1.1

Encoding UTF-8

Language en-AU

NeedsCompilation no

Repository CRAN

LazyData TRUE

ByteCompile TRUE

Suggests apsimx, ggplot2, knitr, purrr, terra, rmarkdown, rnaturalearth, sf, testthat, vcr

VignetteBuilder knitr

X-schema.org-applicationCategory Tools

X-schema.org-keywords NASA, meteorological-data, weather, global, weather, weather-data, meteorology, NASA-POWER, agroclimatology, earth-science, data-access, climate-data

X-schema.org-isPartOf <https://ropensci.org>

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Date/Publication 2020-09-23 11:40:03 UTC

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create_met	<i>Deprecated function to create an APSIM met file from POWER data</i>
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Description

Get POWER values for a single point or region and create an APSIM met file suitable for use in APSIM for crop modelling; saving it to local disk.

Usage

```
create_met(lonlat, dates, dsn, file_out, missing_csv = FALSE)
```

Arguments

lonlat	A numeric vector of geographic coordinates for a cell or region entered as x, y coordinates. See argument details for more.
dates	A character vector of start and end dates in that order, e.g., <code>dates = c("1983-01-01", "2017-12-31")</code> . See argument details for more.
dsn	A file path where the resulting text file should be stored.
file_out	A file name for the resulting text file, e.g. "Kingsthorpe.met". A ".met" extension will be appended if given or otherwise specified by user.
missing_csv	A Boolean value indicating whether a csv file is to be written to disk with a record of missing values. If 'FALSE', the default, no file is created, only a message is emitted. If 'TRUE' a csv file is created with a record of all missing values in the .met file.

Details

This function is essentially a wrapper for [get_power prepareMet](#) and [writeMetFile](#) that simplifies the querying of the POWER API and writes the met to local disk.

The weather values from POWER for temperature are 2 metre max and min temperatures, “T2M_MAX” and “T2M_MIN”; radiation, “ALLSKY_SFC_SW_DWN”; and rain, “PRECTOT” from the POWER AG community on a daily time-step.

Further details for each of the arguments are provided in their respective sections following below.

Value

A text file in met format saved to local disk for use in APSIM crop modelling.

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(151.81, -27.48)`.

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 southwestern corner of Australia: `lonlat = c(112.5, -55.5, 115.5, -50.5)`. *Max bounding box is 10 x 10 degrees of 1/2 x 1/2 degree data, i.e., 100 points maximum in total.*

Argument details for dates

If dates is unspecified, defaults to a start date of 1983-01-01 (the earliest available data) and an end date of current date according to the system.

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.

Note

This function is deprecated and will be removed in a future release of **nasapower**. Please use [get_power_apsim_met](#) from the **apsimx** package if you require this functionality.

Author(s)

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

Examples

```
# Create a met file for Kingsthorpe, Qld
# from 1985-01-01 to 1985-06-30 and
# save it in the current R session
# tempdir() as `APSIM_example.met`
```

```
create_met(lonlat = c(151.81, -27.48),
           dates = c("1985-01-01", "1985-12-31"),
```

```
dsn = tempdir(),
file_out = "APSIM_example.met"
)
```

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)

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

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

```

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 Normal 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 \geq 70 % At 00 GMT
FRQ_NROVRCST_70_03_GMT Frequency Of Near-overcast Skies \geq 70 % At 03 GMT
FRQ_NROVRCST_70_06_GMT Frequency Of Near-overcast Skies \geq 70 % At 06 GMT
FRQ_NROVRCST_70_09_GMT Frequency Of Near-overcast Skies \geq 70 % At 09 GMT
FRQ_NROVRCST_70_12_GMT Frequency Of Near-overcast Skies \geq 70 % At 12 GMT
FRQ_NROVRCST_70_15_GMT Frequency Of Near-overcast Skies \geq 70 % At 15 GMT
FRQ_NROVRCST_70_18_GMT Frequency Of Near-overcast Skies \geq 70 % At 18 GMT
FRQ_NROVRCST_70_21_GMT Frequency Of Near-overcast Skies \geq 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

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