Package 'rfcipPRF'

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Type Package

Title Tools for RMA Pasture, Rangeland, and Forage (PRF) Insurance Data Access and Analysis

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Description Provides a unified framework for retrieving, cleaning, caching, and analyzing
Pasture, Rangeland, and Forage (PRF) Rainfall and Vegetation Index data published
by the United States Department of Agriculture (USDA) Risk Management Agency (RMA).
The package streamlines access to the official PRF repository, automates discovery
and download of rainfall and vegetation index archives, and maintains local caches
of the official RMA PRF grid shapefile used to spatially align insurance indices.
These utilities serve as a computational foundation for PRF insurance policy
simulation, actuarial calibration, and applied research on weather-based risk
management instruments. The package supports reproducible workflows for academic
research, extension analyses, and crop insurance policy evaluation.

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URL <https://github.com/you/rfcipPRF>

BugReports <https://github.com/you/rfcipPRF/issues>

Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.2

VignetteBuilder knitr

Depends R (>= 4.1.0)

Imports data.table, stringr, rfcip

Remotes github::dylan-turner25/rfcip, github::UrbanInstitute/urbnmapr

Suggests terra, tidyr, readr, rvest, xml2, tools, utils, knitr, rmarkdown, testthat (>= 3.0.0)

LazyData true

Cite-us If you find it useful, please consider staring the repository and citing the following studies
- Tsiboe, F. and Turner, D. (2025). ``Incorporating buy-
up price loss coverage into the United States
farm safety net.'' Applied Economic Perspectives and Policy.
- Tsiboe, F., et al. (2025). ``Risk reduction impacts of crop insurance in the United States.''
Applied Economic Perspectives and Policy.
- Gaku, S. and Tsiboe, F. (2024). Evaluation of alternative farm safety net program combination
strategies. Agricultural Finance Review.

Contents

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clear_rfcipPRF_cache   *Clear the rfcipPRF cache of downloaded data files*

Description

Deletes the entire cache directory used by **rfcipPRF** to store downloaded data files. Useful to force
a re-download or free disk space.

Usage

```
clear_rfcipPRF_cache()
```

Value

Invisibly returns NULL. Prints the directory that was cleared.

---

collate_cdls_key *Collate CDL keys across years and map to consolidated categories*

Description

Collate CDL keys across years and map to consolidated categories

Usage

```
collate_cdls_key(cdls_key_file_list)
```

Arguments

cdls_key_file_list

Character vector of .rds files produced by fetch_nass_cdls() Each file should contain columns: cdl_value, cdl_category, year

Value

list with:

- mapped: data.table(year, cdl_value, cdl_category_raw, cdl_category)
- unmapped: data.table of any raw labels not covered by the mapping

---

create_prf_raster *Create a PRF Grid-ID Raster Aligned to a CPC Precipitation Grid*

Description

Builds a single-band terra::SpatRaster where each cell holds the **PRF grid ID** (GRIDCODE) aligned to a reference **CPC precipitation** raster (NetCDF). Internally, this:

1. downloads/reads a CPC sample precipitation grid (NetCDF) as a raster,
2. loads the official PRF grid shapefile,
3. reprojects the PRF polygons to the CPC raster CRS,
4. assigns PRF grid identifiers onto the CPC raster footprint.

Usage

```
create_prf_raster(
  cpc_us_precip_sample_raster_url = NULL,
  official_prf_grid_directory = NULL,
  control = rfcipPRF_control()
)
```

Arguments

cpc_us_precip_sample_raster_url

                  Character scalar. HTTP(S) URL to a sample **CPC precipitation** NetCDF file to
                  provide the target grid/CRS. If NULL, the value is pulled from control$cpc_us_precip_sample_ras

official_prf_grid_directory

                  Character scalar. Directory containing the **official PRF grid shapefile** compo-
                  nents (e.g., official_RMA_RI_grid.shp, .dbf, .prj, .shx, .cpg). If NULL, the
                  directory is set to the **rfcipPRF** cache after calling fetch_official_prf_grid().

control   A list of configuration parameters; see rfcipPRF_control(). Must include
                  cpc_us_precip_sample_raster_url if you do not pass the URL explicitly.

Details

This helper ensures that downstream PRF index calculations can use a raster perfectly aligned to a
CPC precipitation grid for spatial lookups, zonal operations, or joins to PRF grid cells.

If official_prf_grid_directory is NULL, the function will call fetch_official_prf_grid()
to download and extract the official PRF grid into the user cache (see **rfcipPRF** cache path below).

Cache location used when not provided explicitly: tools::R_user_dir("rfcipPRF", which =
"cache")/prf_adm

Value

A terra::SpatRaster with a single layer named "grid_id", aligned to the CPC precipitation
raster grid. Cell values are PRF grid identifiers (from GRIDCODE). (Returned object is not written to
disk by this function.)

Notes and Pitfalls

- Ensure the **PRF grid** is correctly **reprojected** to the CPC raster CRS before assigning/rasterizing
  identifiers.

- If you need a faithful polygon-to-raster transfer (no averaging), use terra::rasterize()
  with field = "GRIDCODE" on the CPC template raster.

- The function downloads the CPC NetCDF to a temporary file via utils::download.file().

---

fetch_latest_prf_indices

                  Download, extract, and save the latest RMA PRF rainfall index data

---

Description

Retrieves the most recent **Rainfall Index (RI)** dataset published by RMA, extracts the raw *.txt
file, cleans key fields, and saves a fast-to-load .rds file for downstream use.

Usage

```
fetch_latest_prf_indices(
  output_directory = NULL,
  rma_indices_inventory = NULL,
  control = rfcipPRF_control()
)
```

Arguments

output_directory
                 Character path for the saved `.rds` file. Defaults to `tools::R_user_dir("rfcipPRF", "cache")/prf_adm`.

rma_indices_inventory
                 Optional `data.table/data.frame` manifest of available PRF index files (typically from [`fetch_prf_indices_urls()`](#)). If NULL, the manifest is fetched automatically.

control   A list of control parameters; see [`rfcipPRF_control()`](#).

Value

Invisibly returns NULL. Writes rmaRainfallIndices.rds to output_directory.

Output columns

The saved dataset includes (when present):

actual_index Numeric rainfall index value.

commodity_year Year of the PRF index.

interval_code PRF interval (bi-monthly) code.

insurance_plan_code RMA plan code (often 13 or 14).

Commodity0088, Commodity1191 Commodity-specific columns.

---

fetch_nass_cdls   *Fetch USDA NASS Cropland Data Layer (CDL) GeoTIFF(s) and class key*

Description

Downloads the CDL 30 m raster(s) for one or more years (2008 through last year), unzips the .tif, extracts the class key from the accompanying metadata, and saves the key as an .rds alongside the raster. Skips work for files that already exist. Returns an invisible data.table summary of what happened.

Usage

```
fetch_nass_cdls(
  years = as.integer(format(Sys.Date(), "%Y")) - 1,
  output_directory = NULL,
  overwrite = FALSE,
  max_retries = 3,
  nass_cdls_repository_url = NULL
)
```

Arguments

years	Integer scalar or vector of years to fetch (2008 ... last_year). Default: last year (i.e., current year - 1).
output_directory	
	Directory where year folders will be created. Default: "data-raw/usda_nass/cdls"
overwrite	Logical; re-download even if files exist. Default FALSE.
max_retries	Integer; download retry attempts. Default 3.
nass_cdls_repository_url	
	Base URL for CDL datasets. Default: "https://www.nass.usda.gov/Research_and_Science/Cropland/

Value

(invisible) data.table with columns: year, zip_path, tif_path, key_path, status

---

fetch_official_prf_grid

Download and extract the official RMA PRF grid shapefile

Description

Downloads and unzips the official **RMA Pasture, Rangeland, and Forage (PRF)** grid shapefile package used for indexing PRF Rainfall and Vegetation datasets. The PRF grid defines the spatial reference system used in rainfall and vegetation index calculations.

Usage

```
fetch_official_prf_grid(
  output_directory = NULL,
  official_prf_url = NULL,
  control = rfcipPRF_control()
)
```

Arguments

output_directory	
	Character scalar. Directory path where the PRF grid ZIP file will be saved and extracted. Defaults to an internal package cache under the user's R cache directory.
official_prf_url	
	Character scalar. Direct URL to the RMA PRF grid ZIP file. If NULL (default), the function automatically discovers it from fetch_prf_indices_urls().
control	a list of control parameters; see rfcipPRF_control().

Details

Identification Information:

Citation

- **Originator:** Grazing Management Systems
- **Publication Date:** 8/22/2009

- **Title:** *official_RMA_RI_grid*
- **Edition:** 1.0
- **Geospatial Data Presentation Form:** vector digital data
- **Online Linkage:** http://prfri-rma-map.tamu.edu/default.aspx

Description

- **Abstract:** Official Grid for the United States Department of Agriculture, Risk Management Agency, Pasture, Rangeland and Forage Rainfall Index Insurance program (http://www.rma.usda.gov/policies/pasturerangeforage/). The grid represents an arbitrary placement of boundaries for the Rainfall Index product that encompasses the raster images produced for daily rainfall by the National Oceanic and Atmospheric Administration Unified Precipitation Database (ftp://ftp.cpc.ncep.noaa.gov/precip/wd52ws/us_daily/README).

- **Purpose:** Grid established to set boundaries for the United States Department of Agriculture, Risk Management Agency, Pasture, Rangeland and Forage Vegetation Index Insurance program (http://www.rma.usda.gov/policies/pasturerangeforage/). Grid cells represent a unique area where an index is calculated for insurance purposes.

Operational Details:

This helper function automates retrieval of the **"official_RMA_RI_grid.zip"** file from the USDA Risk Management Agency's public repository. The file contains the reference PRF grid shapefile components (`.shp`, `.dbf`, `.prj`, `.shx`, and `.cpg`) used to spatially align PRF index data.

If no `official_prf_url` is supplied, the function internally calls `fetch_prf_indices_urls()` to discover the latest available grid package. The downloaded file is cached in the user's R cache directory (`tools::R_user_dir("rfcipPRF", which = "cache")/prf_adm`) unless another directory is specified.

Value

Invisibly returns `NULL`. The extracted PRF grid files are saved to `output_directory`.

---

fetch_prf_indices_urls

Fetch available PRF (Pasture, Rangeland, and Forage) index data URLs

---

Description

Discovers and compiles all available **Rainfall** and **Vegetation** index file URLs from the official RMA PRF repository by parsing the HTML index page and constructing a manifest by year and type.

Usage

```
fetch_prf_indices_urls(
  rma_indices_repository_url = NULL,
  control = rfcipPRF_control()
)
```

Arguments

rma_indices_repository_url

                     Character scalar. Base URL to the RMA index repository. Defaults to `"https://pubfs-rma.fpac.u`

control   A list of control parameters; see `rfcipPRF_control()`.

Details

Steps:

1. Read the HTML index page.

2. Extract and normalize file names and URLs.

3. Identify Rainfall/Vegetation archives (excluding annual forage and CRS ZIPs).

4. Parse available years; construct object-friendly names.

5. Return a tidy manifest and (optionally) grid-file URLs.

Value

A `list` with:

index_df data.table with columns index_variable (Rainfall/Vegetation), commodity_year, file_name, and url (absolute).

grids_rainfall Character vector of rainfall grid ZIP URLs (if any).

grids_vegetation Character vector of vegetation grid ZIP URLs (if any).

---

get_prf_adm_county_base_value

                     PRF ADM County Base Value (2011+)

Description

Returns **county-level base values** for the PRF insurance program by averaging county_base_value across records for **Plan 13** (PRF) and **Commodity 88** (Pasture/Rangeland/Forage) in the ADM dataset A00810_Price.

Usage

```
get_prf_adm_county_base_value(
  year = as.numeric(format(Sys.Date(), "%Y")) - 1,
  force = TRUE
)
```

Arguments

year   Integer. Target PRF commodity year; default is last year.

force   Logical; passed to `rfcip::get_adm_data()` to force refresh.

Details

Works for **commodity_year >= 2011**. Earlier years are not supported.

Value

A `data.table` with columns:

- `commodity_year`, `state_code`, `county_code`
- `county_base_value` (mean over matching rows)

See Also

Other prf-fcip-core: [get_prf_adm_dates()](), [get_prf_adm_rates()](), [get_prf_adm_subsidy_percent()](),
[get_prf_fcip_dataset()](), [get_prf_sobtpu()]()

---

get_prf_adm_dates *PRF ADM Key Dates by Interval (2011+)*

Description

Retrieves **PRF key dates** (e.g., sales closing, acreage reporting) by (`commodity_year`, `state_code`,
`county_code`, `type_code`, `interval_code`) from ADM dataset `A00200_Date`. For overlapping
rows, returns the **max** date per field.

Usage

```
get_prf_adm_dates(
  year = as.numeric(format(Sys.Date(), "%Y")) - 1,
  force = TRUE
)
```

Arguments

year	Integer. Target PRF commodity year; default is last year.
force	Logical; passed to [rfcip::get_adm_data()]().

Details

- Filters to **Plan 13**, **Commodity 88**.
- Renames `practice_code` to `interval_code`.
- Works for **commodity_year >= 2011**.

Value

A `data.table` keyed by the grouping columns, with one column per `*_date` field present in ADM
(values are per-group maxima).

See Also

Other prf-fcip-core: [get_prf_adm_county_base_value()](), [get_prf_adm_rates()](), [get_prf_adm_subsidy_percent(]()
[get_prf_fcip_dataset()](), [get_prf_sobtpu()]()

get_prf_adm_rates	*PRF ADM Base Rates and Payment Factors (2011+, schema change in 2017)*

Description

Retrieves **PRF base rates** and **payment factors** by grid and interval from ADM. Uses `A01005_AreaRiskRate` for **2011-2016** and the `A00030_InsuranceOffer` -> `A01130_AreaCoverageLevel` -> `A01135_AreaRate` chain for **2017+**.

Usage

```
get_prf_adm_rates(
  year = as.numeric(format(Sys.Date(), "%Y")) - 1,
  force = TRUE
)
```

Arguments

year	Integer. Target PRF commodity year; default is last year.
force	Logical; passed to `rfcip::get_adm_data()` to force refresh.

Details

- Filters to **Plan 13**, **Commodity 88**.

- Renames sub_county_code to grid_id.

- Aggregates to mean base_rate and payment_factor by (commodity_year, state_code, county_code, grid_id, interval_code, type_code, coverage_level_percent).

- Works for **commodity_year >= 2011**.

Value

A `data.table` with the grouping columns above plus:

- base_rate, payment_factor (means)

See Also

Other prf-fcip-core: `get_prf_adm_county_base_value`(), `get_prf_adm_dates`(), `get_prf_adm_subsidy_percent`(
`get_prf_fcip_dataset`(), `get_prf_sobtpu`()

get_prf_adm_subsidy_percent

PRF ADM Subsidy Percent by Coverage Level (2011+)

Description

Retrieves **PRF subsidy percent** by coverage_level_percent from ADM dataset A00070_SubsidyPercent. Uses reinsurance_year as commodity_year.

Usage

```
get_prf_adm_subsidy_percent(
  year = as.numeric(format(Sys.Date(), "%Y")) - 1,
  force = TRUE
)
```

Arguments

year	Integer. Target PRF commodity year; default is last year.
force	Logical; passed to `rfcip::get_adm_data()`.

Details

Aggregates to the **max** subsidy_percent per (commodity_year, coverage_level_percent). Works for **commodity_year >= 2011**.

Value

A data.table with columns:

- commodity_year, coverage_level_percent, subsidy_percent

See Also

Other prf-fcip-core: `get_prf_adm_county_base_value()`, `get_prf_adm_dates()`, `get_prf_adm_rates()`, `get_prf_fcip_dataset()`, `get_prf_sobtpu()`

get_prf_fcip_dataset   *Download PRF ADM and SOB data*

Description

Convenience wrapper that returns one of several **PRF ADM and SOB** datasets for a given year: "sobtpu", "rates", "dates", "subsidy_percent", "county_base_value", or "final_grid_index" (derived from previously saved rainfall index data).

Usage

```
get_prf_fcip_dataset(
  dataset = "rates",
  year = as.numeric(format(Sys.Date(), "%Y")) - 1,
  force = TRUE
)
```

Arguments

dataset   Character. One of "rates", "dates", "subsidy_percent", "county_base_value",
           "final_grid_index". Default: "rates".

year   Integer. Target PRF commodity year; default is last year.

force   Logical; passed to underlying ADM getters; ignored for "final_grid_index".

Details

- Works for .
- "sobtpu" -> get_prf_sobtpu()
- "rates" -> get_prf_adm_rates()
- "dates" -> get_prf_adm_dates()
- "subsidy_percent" -> get_prf_adm_subsidy_percent()
- "county_base_value" -> get_prf_adm_county_base_value()
- "final_grid_index" reads a local RDS (default path: "data-raw/releases/prf_adm/rmaRainfallIndices.rc
  filters to Commodity0088 == 1, insurance_plan_code == 13, and aggregates mean actual_index
  by (grid_id, commodity_year, interval_code).

Value

A data.table specific to the requested dataset.

See Also

Other prf-fcip-core: get_prf_adm_county_base_value(), get_prf_adm_dates(), get_prf_adm_rates(),
get_prf_adm_subsidy_percent(), get_prf_sobtpu()

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get_prf_sobtpu   *PRF Summary of Business data*

Description

Retrieves **Pasture, Rangeland, and Forage (PRF)** Summary of Business (SoB TPU) records for a
given year and returns county/interval aggregates of insured acres, liability, premium, subsidy, and
indemnities. Filters to **Plan 13** (PRF) and **Commodity 88** (Pasture/Rangeland/Forage).

Usage

```
get_prf_sobtpu(year = as.numeric(format(Sys.Date(), "%Y")), force = TRUE)
```

Arguments

year	Integer. Target year; default is current year.
force	Logical; passed to `rfcip::get_sob_data()` to force refresh.

Details

- Works for **commodity_year >= 2007**.

- Excludes rows where **both** net_reporting_level_amount and liability_amount are zero/NA/Inf/-Inf/NaN (rows with one of the two present are kept).

- Aggregates by (commodity_year, state_code, county_code, type_code, practice_code, coverage_level_percent) and then renames practice_code to interval_code.

Value

A data.table with columns:

- Keys: commodity_year, state_code, county_code, type_code, interval_code (renamed from practice_code), coverage_level_percent

- Aggregates: insured_acres, liability_amount, total_premium_amount, subsidy_amount, indemnity_amount

See Also

Other prf-fcip-core: `get_prf_adm_county_base_value()`, `get_prf_adm_dates()`, `get_prf_adm_rates()`, `get_prf_adm_subsidy_percent()`, `get_prf_fcip_dataset()`

---

rfcipPRF_control	*Create a control/config list for rfcipPRF*

Description

Initializes a named list of configuration parameters used across the PRF utilities (e.g., base repository URL, CI settings).

Usage

```
rfcipPRF_control(
  rma_indices_repository_url = NULL,
  cpc_us_precip_sample_raster_url = NULL,
  continuous_integration_session = FALSE
)
```

Arguments

rma_indices_repository_url
                Character scalar. Base URL to the RMA index repository. Defaults to

cpc_us_precip_sample_raster_url
                Character scalar. Base URL to a CPC precipitation NetCDF

continuous_integration_session
                Logical; if TRUE, you can use it to tweak timeouts or skip long-running downloads in CI.

Value

A named list with elements `rma_indices_repository_url` and `continuous_integration_session`.

Index