Package 'RCzechia'

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Type Package

Title Spatial Objects of the Czech Republic

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Description Administrative regions, rivers and water bodies of the Czech Republic.

URL https://github.com/jlacko/RCzechia

BugReports https://github.com/jlacko/RCzechia/issues

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R topics documented:

RCzechia-package   *RCzechia: Spatial Objects of the Czech Republic*

Description

A selection of spatial objects relevant to the Czech Republic. Due to CRAN package size requirements (5 MB) the objects are stored externally (on Amazon S3) - and therefore could not be implemented as datasets, they are functions returning data frames instead.

Details

To save time (and bandwidth) the downloaded objects are saved locally in 'tempdir' directory when requested and downloaded at most once *per R session*; out of respect to CRAN Repository Policy a more permanent caching on user's side is not attempted.

This means that:

- a working internet connection is required to use the full resolution objects
- all objects need to be called with (possibly empty) braces

For the most frequently used objects - **republika**, **kraje** and **okresy** - a low resolution version is also implemented. The low resolution data sets are stored locally (and working intenet connection is not necessary to use them).

All objects are implemented as sf data frames.

Administrative regions

- republika - borders of the Czech Republic
- kraje - regions / NUTS3 units
- okresy - districts / LAU1 units
- orp_polygony - municipalities with extended powers (obce s rozšířenou působností)

- obce_polygony - municipalities as polygons
- obce_body - municipalities as centroids (points)
- casti - city districts (for cities that implement them)

Natural objects

- reky - rivers
- plochy - water bodies
- lesy - woodland areas (more than 30 ha in area)

Other objects

- silnice - roads
- zeleznice - railoads

Utility functions

In addition three utility functions are implemented to support spatial workflow:

- union_sf - merging polygons based on a key value
- geocode - geocoding (address to coordinates)
- revgeo - reversely gecoding (coordinates to address)

---

casti   *City Parts*

Description

Function taking no parameters and returning data frame of districts of Prague and other major cities as sf polygons.

Usage

```
casti()
```

Format

sf data frame with 142 rows of 4 variables + geometry

KOD Code of the city part / kod mestske casti

NAZEV Name of the city part / nazev mestske casti

KOD_OBEC Code of the city

NAZ_OBEC Name of the city

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 593.6 KB.

Source

---

chr_uzemi   *Protected Natural Areas*

Description

Function returning data frame of protected natural areas (Chráněná území) of the Czech Republic as sf polygons. It has no obligatory parameters.

Usage

```
chr_uzemi()
```

Format

sf data frame with 36 rows of 2 variables + geometry

TYP Type of protected area: Národní park, Chráněná krajinná oblast

NAZEV Name, with Czech accents

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 114 KB.

Source

---

geocode   *Geocode a Czech Address*

Description

This function connects to Czech State Administration of Land Surveying and Cadastre (https://www.cuzk.cz/en) API to geocode an address. As consequence it is implemented only for Czech addresses.

Usage

```
geocode(address, crs = 4326)
```

Arguments

address	point to be geocoded, as character (vector)
crs	coordinate reference system of output; default = WGS84

Format

sf data frame with 3 variables + geometry

target the address searched (address input)

typ type of record matched by API

address address as recorded by RÚIAN

geometry hidden column with spatial point data

Details

Input of the function are an address to geocode (or a vector of addresses) and expected Coordinate Reference System of output (default is WGS84 = EPSG:4326, but in some use cases inž. Křovák = EPSG:5514 may be more relevant).

Output is a sf data frame of spatial points.

Depending on the outcome of matching the address to RÚIAN data there is a number of possible outcomes:

- All items were matched exactly: the returned sf data frame has the same number of rows as there were elements in vector to be geocoded. The field *target* will have zero duplicates.
- Some items had multiple matches: the returned sf data frame has more rows than the there were elements in vector to be geocoded. In the field *target* will be duplicate values. Note that the RÚIAN API limits multiple matches to 10.
- Some (but not all) items had no match in RUIAN data: the returned sf data frame will have fewer rows than the vector to be geocoded elements. Some values will be missing from field *target*.
- No items were matched at all: the function returns NA.

Usage of the ČÚZK API is governed by ČÚZK Terms & Conditions - https://geoportal.cuzk.cz/Dokumenty/Podminky.pdf.

Examples

```
asdf <- geocode("Pod sídlištěm 9") # physical address of ČÚZK
```

---

kraje   *Regions (kraje) of the Czech Republic*

Description

Function returning data frame of NUTS3 administrative units for the Czech Republic as sf polygons. It takes a single parameter resolution - high res (default) or low res polygons.

Usage

```
kraje(resolution = "high")
```

Arguments

resolution   Should the function return high or low resolution shapefile? Allowed values are
               "high" (default) and "low". This parameter affects only the geometry column,
               all other fields remain the same.

Format

sf data frame with 14 rows of 3 variables + geometry

KOD_KRAJ Code of the region, primary key. Use this as key to add other data items.

KOD_CZNUTS3 Code of the region as NUTS3 (kraj).

NAZ_CZNUTS3 Name of the region as NUTS3 (kraj).

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size of high resolution shapefile is 2.9 MB (so use with caution, and patience).

Source

<https://www.arcdata.cz/produkty/geograficka-data/arccr-500>

Examples

```
library(sf)

hranice <- kraje()
plot(hranice, col = "white", max.plot = 1)
```

lesy	*Woodland Areas*

Description

Function returning data frame of woodland areas (lesy) of more than 30 hectares in are of the Czech Republic as `sf` polygons. It has no obligatory parameters.

Usage

```
lesy()
```

Format

`sf` data frame with 2.366 rows of geometry variable only

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 2.1 MB.

Source

<https://www.arcdata.cz/produkty/geograficka-data/arccr-500>

obce_body	*Municipalities / communes (obce) as centerpoints*

Description

Function returning data frame of LAU2 administrative units for the Czech Republic as `sf` points. It takes no parameters.

Usage

```
obce_body()
```

Format

`sf` data frame with 6.258 rows of 14 variables + geometry

KOD_OBEC Code of the level I commune (obec).

NAZ_OBEC Name of the level I commune (obec).

KOD_ZUJ Code of the basic administrative unit (ICZUJ).

NAZ_ZUJ Name of the basic administrative unit (ICZUJ).

KOD_POU Code of the level II commune (obec s poverenym uradem).

NAZ_POU Name of the level II commune (obec s poverenym uradem)).

KOD_ORP Code of the level III commune (obec s rozsirenou pusobnosti).

NAZ_ORP Name of the level III commune (obec s rozsirenou pusobnosti).

KOD_OKRES Code of the district (okres).

KOD_LAU1 Code of the LAU1 administrative unit (okres).

NAZ_LAU1 Name of the LAU1 administrative unit (okres).

KOD_KRAJ Code of the region (kraj).

KOD_CZNUTS3 Code of the NUTS3 unit (kraj)

NAZ_CZNUTS3 Name of the NUTS3 unit (kraj)

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 270 KB.

Source

https://www.arcdata.cz/produkty/geograficka-data/arccr-500

---

obce_polygony   *Municipalities / communes (obce) as polygons*

Description

Function returning data frame of LAU2 administrative units for the Czech Republic as sf polygons. It takes no parameters.

Usage

```
obce_polygony()
```

Format

sf data frame with 6.258 rows of 14 variables + geometry

KOD_OBEC Code of the level I commune (obec).

NAZ_OBEC Name of the level I commune (obec).

KOD_ZUJ Code of the basic administrative unit (ICZUJ).

NAZ_ZUJ Name of the basic administrative unit (ICZUJ).

KOD_POU Code of the level II commune (obec s poverenym uradem).

NAZ_POU Name of the level II commune (obec s poverenym uradem)).

KOD_ORP Code of the level III commune (obec s rozsirenou pusobnosti).

NAZ_ORP Name of the level III commune (obec s rozsirenou pusobnosti).

KOD_OKRES Code of the district (okres).

KOD_LAU1 Code of the LAU1 administrative unit (okres).

NAZ_LAU1 Name of the LAU1 administrative unit (okres).

KOD_KRAJ Code of the region (kraj).

KOD_CZNUTS3 Code of the NUTS3 unit (kraj)

NAZ_CZNUTS3 Name of the NUTS3 unit (kraj)

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 36.3 MB (so use with caution, and patience).

Source

https://www.arcdata.cz/produkty/geograficka-data/arccr-500

Examples

```
library(sf)
library(dplyr)

praha <- obce_polygony() %>%
   filter(NAZ_LAU1 == "Praha")

plot(praha, max.plot = 1)
```

---

okresy *Districts (okresy)*

Description

Function returning data frame of LAU1 administrative units for the Czech Republic as sf polygons. It takes a single parameter resolution - high res (default) or low res polygons.

Usage

```
okresy(resolution = "high")
```

Arguments

resolution   Should the function return high or low resolution shapefile? Allowed values are "high" (default) and "low". This parameter affects only the geometry column, all other fields remain the same.

Format

sf data frame with 77 rows of 6 variables + geometry

KOD_OKRES Code of the district (okres).

KOD_LAU1 Code of the district as LAU1 unit (okres), primary key. Use this as key to add other data items.

NAZ_LAU1 Name of the district as LAU1 unit (okres).

KOD_KRAJ Code of the region.

KOD_CZNUTS3 Code of the region as NUTS3 (kraj).

NAZ_CZNUTS3 Name of the region (kraj).

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size of high resolution shapefile is 6.1 MB (so use with caution, and patience).

Source

https://www.arcdata.cz/produkty/geograficka-data/arccr-500

Examples

```
library(sf)

hranice <- okresy()
plot(hranice, col = "white", max.plot = 1)

object.size(okresy("low"))
object.size(okresy("high"))
```

---

orp_polygony   *Obce s rozsirenou pusobnosti*

Description

Function returning data frame of municipalities with extended powers (obce s rozšířenou působností) as sf polygons. It takes no parameters.

Usage

```
orp_polygony()
```

Format

sf data frame with 206 rows of 10 variables + geometry

KOD_ORP Code of the level III commune (obec s rozsirenou pusobnosti).

NAZ_ZKR_ORP Short name of the level III commune (obec s rozsirenou pusobnosti).

NAZ_ORP Full name of the level III commune (obec s rozsirenou pusobnosti).

KOD_RUIAN RUIAN (Registr uzemni identifikace, adres a nemovitosti) code.

KOD_OKRES Code of the district (okres).

KOD_LAU1 Code of the LAU1 administrative unit (okres).

NAZ_LAU1 Name of the LAU1 administrative unit (okres).

KOD_KRAJ Code of the region (kraj).

KOD_KRAJ Code of the region (kraj).

KOD_CZNUTS2 Code of the NUTS3 unit (kraj)

NAZ_CZNUTS2 Name of the NUTS3 unit (kraj)

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 9 MB (so use with caution, and patience).

Source

https://www.arcdata.cz/produkty/geograficka-data/arccr-500

---

plochy	*Water Bodies*

Description

Function returning data frame of water bodies of the Czech Republic as sf polygons. It takes no parameters.

Usage

```
plochy()
```

Format

sf data frame with 480 rows of 5 variables + geometry

TYP Type of water body: 1 = dam, 2 = pond, 3 = lake

NAZEV Name, with Czech accents

NAZEV_ASCII Name, without Czech accents

VYSKA water level, meters above sea level

Major Boolean indicating major water bodies

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 118.6 KB.

Source

https://www.arcdata.cz/produkty/geograficka-data/arccr-500

---

reky	*Rivers*

Description

Function returning data frame of rivers of the Czech Republic as `sf` lines. It takes no parameters.

Usage

```
reky()
```

Format

`sf` data frame with 6.198 rows of 4 variables + geometry:

TYP Type of river: 1 = natural, 2 = man-made, 3 = fictional

NAZEV Name, with Czech accents

NAZEV_ASCII Name, without Czech accents

Major Boolean indicating one of the major rivers.

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 1 MB.

Source

https://www.arcdata.cz/produkty/geograficka-data/arccr-500

republika	*Republika*

Description

Boundaries of the Czech Republic as `sf` polygon.

Usage

```
republika(resolution = "high")
```

Arguments

resolution   Should the function return high or low resolution shapefile? Allowed values are
                "high" (default) and "low". This parameter affects only the geometry column,
                all other fields remain the same.

Format

`sf` data frame with 1 row of 1 variable + geometry:

Details

Due to package size constraints the data are stored externally (and a working internet connection is
required to use the package). Downloaded size of high resolution shapefile is 949.7 KB.

Source

<https://www.arcdata.cz/produkty/geograficka-data/arccr-500>

Examples

```
library(sf)

hranice <- republika()
plot(hranice, col = "white")
```

---

revgeo   *Reversely Geocode a Czech Address*

Description

This function connects to Czech State Administration of Land Surveying and Cadastre (https://www.cuzk.cz/en) API to reversely geocode an address. As consequence it is implemented only for Czech addresses.

Usage

```
revgeo(coords)
```

Arguments

coords   coordinates to be reverse geocoded; expected as sf data frame of spatial points

Details

Input of the function is a sf data frame of spatial points, and output a vector of characters.

The function returns the same sf data frame as input, with added field revgeocoded; it contains the result of operation. If the data frame contained a column named revgeocoded it gets overwritten.

In case of reverse geocoding failures (e.g. coordinates outside of the Czech Republic and therefore scope of ČÚZK) NA is returned.

Usage of the ČÚZK API is governed by ČÚZK Terms & Conditions - https://geoportal.cuzk.cz/Dokumenty/Podminky.pdf.

Examples

```
library(dplyr)
library(sf)

brno <- obce_polygony() %>% # shapefile of Brno
   filter(NAZ_OBEC == "Brno")

pupek_brna <- st_centroid(brno) # calculate centroid

adresa_pupku <- revgeo(pupek_brna)$revgeocoded # address of the center
```

---

silnice	*Road Network*

Description

Function returning data frame of roads of the Czech Republic as `sf` lines. It has no obligatory parameters.

Usage

```
silnice()
```

Format

`sf` data frame with 18.979 rows of 4 variables + geometry:

TRIDA Class of the road: highway = dálnice, speedway = rychlostní silnice, 1st clas road = silnice I. třídy, 2nd class road = silnice II. třídy, 3rd class road = silnice III. třídy, other road = neevidovaná silnice

CISLO_SILNICE Local road code

MEZINARODNI_OZNACENI International road code

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 1.5 MB.

Source

<https://www.arcdata.cz/produkty/geograficka-data/arccr-500>

---

union_sf	*Aggregate Polygons in a* `sf` *Object*

Description

The function aggregates polygons of geometry column of a `sf` data frame according to values of a single data column. It has outcome comparable to `unionSpatialPolygons` from `maptools` package, except that it works on `sf` and not `sp` objects.

Usage

```
union_sf(data, key, tolerance = 1, planarCRS = 5514)
```

Arguments

`data`	sf data frame to be aggregated
`key`	name of column to define the output objects
`tolerance`	buffer size for avoiding artefacts (slivers); default is one meter
`planarCRS`	planar CRS for avoiding artefacts (slivers); default is EPSG:5514 = ing. Křovák

Details

The function has data frame as the first argument, so it is pipe friendly. It retains only geometry and key value, dropping all other columns (they are easy to re-attach using tidyverse/dplyr workflow if required).

During processing the sf data frame is temporarily transformed to planar coordinates and - to avoid artefacts (slivers) at the place of former boundaries - buffered; the default values of `planarCRS` and `tolerance` should cover most situations in the Czech Republic and near abroad.

Examples

```
NUTS3 <- union_sf(okresy(), "KOD_CZNUTS3")
  # assembles NUTS3 regions from LAU1 regions of Czech Republic = equivalent to kraje() in geometry

plot(NUTS3)
```

---

zeleznice	*Railroad Network*

Description

Function returning data frame of railorads of the Czech Republic as `sf` lines. It has no obligatory parameters.

Usage

```
zeleznice()
```

Format

`sf` data frame with 3.525 rows of 4 variables + geometry:

ELEKTRIFIKACE is the railroad electrified?: yes = ano, no = ne

KATEGORIE category: international = mezinárodní, local = vnitrostátní

KOLEJNOST track: single = jednokolejní, double = dvojkolejní, more = tří a vícekolejní

ROZCHODNOST gauge: standard = normální, narrow = úzkokolejka

Details

Due to package size constraints the data are stored externally (and a working internet connection is required to use the package). Downloaded size is 285 KB.

Source

<https://www.arcdata.cz/produkty/geograficka-data/arccr-500>

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