Package 'slga'

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Type Package

Title Data Access Tools for the Soil and Landscape Grid of Australia

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Description

Provides access to soil and landscape grid of Australia raster datasets via existing open geospatial consortium web coverage services. See <https://www.csiro.au/soil-and-landscape-grid>.

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Depends R (>= 2.10)

Imports httr, raster, sf (>= 0.9-0), utils, xml2

Suggests covr, knitr, pkgdown, rmarkdown, testthat

VignetteBuilder knitr

Encoding UTF-8

LazyData true

RoxygenNote 7.1.0

URL https://github.com/obrl-soil/slga

BugReports https://github.com/obrl-soil/slga/issues

NeedsCompilation no

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R topics documented:

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slga-package   *slga: Data Access Tools for the Soil and Landscape Grid of Australia*

Description

Provides access to Soil and Landscape Grid of Australia raster datasets via existing Open Geospatial Consortium Web Coverage Services. See <https://www.clw.csiro.au/aclep/soilandlandscapegrid/>.

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See Also

Useful links:

- <https://github.com/obrl-soil/slga>
- Report bugs at <https://github.com/obrl-soil/slga/issues>

---

bne_surface_clay   *Central Brisbane surface clay content*

Description

A rasterStack containing modelled estimated percent clay content for central Brisbane, in South East Queensland.

Usage

```
bne_surface_clay
```

Format

An object of class `RasterStack` of dimension 121 x 145 x 3.

Details

The dataset was retrieved from the National Soil Attributes Clay WCS on 2019/07/07 using the demonstration code in `get_soils_data`.

The dataset has three named layers. The first is the estimated value, the second is the 5% confidence limit, and the third is the 95% confidence limit.

The dataset is in WGS84 (EPSG:4326) and has a resolution of 3 arc seconds, which is approximately 80x90m when projected into EPSG:28355 or EPSG:3577.

Note that some off-shore areas have a value of 0 rather than NA. A coastline masking layer will be required to safely remove these values.

---

check_avail | *Validate soils product/attribute combination*

Description

Check whether the requested soils attribute is available for the requested soils product.

Usage

```
check_avail(product = NULL, attribute = NULL)
```

Arguments

product | Character, one of the options from column 'Code' in `slga_product_info` where Type = 'Soil'.

attribute | Character, one of the options from column 'Code' in `slga_attribute_info`.

Value

Logical; TRUE if available

Examples

```
check_avail('NAT', 'CFG')
check_avail('SA',  'CFG')
```

`get_lscape_data`   *Get SLGA landscape data*

Description

Downloads SLGA gridded landscape data in raster format from public WCS services.

Usage

```
get_lscape_data(product = NULL, aoi = NULL, write_out = FALSE, filedir)
```

Arguments

`product`	Character, one of the options from column 'Short_Name' in `slga_product_info`, where Type = 'Landscape'.
`aoi`	Vector of WGS84 coordinates defining a rectangular area of interest. The vector may be specified directly in the order xmin, xmax, ymin, ymax, or the function can derive an aoi from the boundary of an 'sf' or 'raster' object.
`write_out`	Boolean, whether to write the retrieved dataset to the working directory as a GeoTiff. Defaults to FALSE.
`filedir`	directory in which to write files if write_out == TRUE.

Value

Raster dataset for a single landscape product.

Note

- An aoi larger than 1x1 decimal degree is retrieveable, but be aware that download file size will be large. If you want a dataset that covers more than ~3x3', it may be faster to download the full GeoTIFF from the CSIRO Data Access Portal and crop out your AOI using GDAL.

- Output rasters are aligned to the parent dataset rather than the aoi. Further resampling may be required for some applications.

Examples

```
# get slope data for central Brisbane
aoi <- c(152.95, -27.55, 153.07, -27.45)
bne_slope <- get_lscape_data(product = 'SLPPC', aoi = aoi, write_out = FALSE)

# get slope, aspect and relief class data for central Brisbane
bne_SAR <- lapply(c('SLPPC', 'ASPCT', 'RELCL'), function(t) {
  get_lscape_data(product = t, aoi = aoi, write_out = FALSE)
})
```

---

get_lscape_point   *Get SLGA point landscape data*

Description

Get SLGA landscape covariate data at a point location.

Usage

```
get_lscape_point(
  product = NULL,
  poi = NULL,
  buff = 0L,
  buff_shp = c("square", "circle"),
  stat = "median"
)
```

Arguments

product	Character, one of the options from column 'Short_Name' in `slga_product_info`, where Type = 'Landscape'.
poi	WGS84 coordinates defining a point of interest. Supply an sf-style point object or a length-2 numeric vector (x, y).
buff	Length-1 integer. Use if a summarised value around a point is desired. Defaults to 0L, which returns the exact value(s) of the pixel under the 'poi'. A 'buff' value of 1 will return a summary of the pixels in a one-cell range, etc.
buff_shp	One of 'square' or 'circle'. Use with buff > 0. Defaults to 'square', in which case all values within the buffer are summarised. A circular mask is applied to the data before summarising otherwise.
stat	Summary method applied where buff > 0. Defaults to median. Other options include mean, modal, min, max, sd, IQR, quantile, and summary.

Value

An data.frame with requested values.

Note

If you have many points within a relatively small area, it will likely be more efficient to grab a raster covering the whole area and extract summary values yourself.

Examples

```
# get the slope at a point
slope_pt <- get_lscape_point('SLPPC', c(153,-27.5))
```

```
# get the average slope within ~300m of a point
avg_slope <- get_lscape_point('SLPPC', c(153, -27.5),
                              buff = 3, buff_shp = 'circle', stat = 'mean')
```

---

get_soils_data   *Get SLGA soils data*

Description

Downloads SLGA gridded soils data in raster format from public WCS services.

Usage

```
get_soils_data(
  product = NULL,
  attribute = NULL,
  component = "ALL",
  depth = NULL,
  aoi = NULL,
  write_out = FALSE,
  filedir
)
```

Arguments

product	Character, one of the options from column 'Short_Name' in slga_product_info, where Type = 'Soil'.
attribute	Character, one of the options from column 'Code' in slga_attribute_info.
component	Character, one of the following:

  - 'VAL' - predicted value surface.
  - 'CLO' - lower 95% confidence interval surface.
  - 'CHI' - upper 95% confidence interval surface.
  - 'CIS' - both confidence interval surfaces.
  - 'ALL' - value and both confidence interval surfaces.

  Defaults to 'ALL'.

depth	Integer from 1 to 6. The numbers correspond to the following depth ranges:

  1. 0 to 5 cm.
  2. 5 to 15 cm.
  3. 15 to 30 cm.
  4. 30 to 60 cm.
  5. 60 to 100 cm.
  6. 100 to 200 cm.

aoi	Vector of WGS84 coordinates defining a rectangular area of interest. The vector may be specified directly in the order xmin, ymin, xmax, ymax, or the function can derive an aoi from the boundary of an 'sf' or 'raster' object.
write_out	Boolean, whether to write the retrieved dataset to disk. Defaults to FALSE.
filedir	directory in which to write files if write_out == TRUE.

Value

Raster stack or single raster, depending on the value of 'component'.

Note

- An aoi larger than 1x1 decimal degree is retrieveable, but be aware that download file size will be large. If you want a dataset that covers more than ~3x3', it may be faster to download the full GeoTIFF from the CSIRO Data Access Portal and crop out your AOI using GDAL.

- Output rasters are aligned to the parent dataset rather than the aoi. Further resampling may be required for some applications.

- specify 'depth = 1' for attributes 'DES' and 'DER' as they are whole-of-profile parameters.

Examples

```
# get surface clay data for central Brisbane
aoi <- c(152.95, -27.55, 153.07, -27.45)
bne_surface_clay <- get_soils_data(product = 'NAT', attribute = 'CLY',
                                   component = 'ALL', depth = 1,
                                   aoi = aoi, write_out = FALSE)

# get estimated clay by depth for central Brisbane
bne_all_clay <- lapply(seq.int(6), function(d) {
  get_soils_data(product = 'NAT', attribute = 'CLY',
                 component = 'VAL', depth = d,
                 aoi = aoi, write_out = FALSE)
})
bne_all_clay <- raster::brick(bne_all_clay)
```

---

get_soils_point   *Get SLGA point data*

Description

Get SLGA modelled soil data at a point location.

Usage

```
get_soils_point(
  product = NULL,
  attribute = NULL,
  component = "ALL",
  depth = NULL,
  poi = NULL,
  buff = 0L,
  buff_shp = c("square", "circle"),
  stat = "median"
)
```

Arguments

product	Character, one of the options from column 'Short_Name' in `slga_product_info`, where Type = 'Soil'.
attribute	Character, one of the options from column 'Code' in `slga_attribute_info`
component	Character, one of the following:

- 'VAL' - predicted value surface.
- 'CLO' - lower 95% confidence interval surface.
- 'CHI' - upper 95% confidence interval surface.
- 'CIS' - both confidence interval surfaces.
- 'ALL' - value and confidence interval surfaces.

Defaults to 'ALL'.

depth	Integer, a number from 1 to 6. The numbers correspond to the following depth ranges:

1. 0 to 5 cm.
2. 5 to 15 cm.
3. 15 to 30 cm.
4. 30 to 60 cm.
5. 60 to 100 cm.
6. 100 to 200 cm.

poi	WGS84 coordinates defining a point of interest. Supply an sf-style point object (length-1 sfg or sfc, or single-row sf data frame) or a length-2 numeric vector (x, y).
buff	Length-1 integer. Use if a summarised value around a point is desired. Defaults to 0L, which returns the exact value(s) of the pixel under the 'poi'. A 'buff' value of 1 will return a summary of the pixels in a one-cell range, etc.
buff_shp	One of 'square' or 'circle'. Use with buff > 0. Defaults to 'square', in which case all values within the buffer are summarised. A circular mask is applied to the data before summarising otherwise.
stat	Summary method applied where buff > 0. Defaults to median. Other options include mean, modal, min, max, sd, IQR, quantile, and summary.

Value

An data.frame with requested values.

Note

If you have many points within a relatively small area, it will likely be more efficient to grab a raster covering the whole area and extract summary values yourself.

Examples

```
# get predicted clay value for 60-100cm at a point
clay_pt <- get_soils_point('NAT', 'CLY', 'VAL', 5, c(153,-27.5))

# get the average predicted clay content for 60-100cm within ~300m
avg_clay <- get_soils_point('NAT', 'CLY', 'ALL', 5, c(153, -27.5),
                            buff = 3, buff_shp = 'circle', stat = 'mean')
```

---

metadata_lscape   *download SLGA landscape metadata*

Description

Retrieves metadata from Soil and Landscape Grid of Australia landscape WCS endpoints in XML or list format.

Usage

```
metadata_lscape(product = NULL, req_type = "desc", format = "native")
```

Arguments

product	Character, one of the options from column 'Short_Name' in slga_product_info, where 'Type' = 'Landscape'.
req_type	Character; one of 'cap' or 'desc'. Defaults to 'desc'.
format	Character; one of 'xml' or 'native'. Defaults to 'native'.

Value

A list or xml document object, depending on the value of 'format'.

Note

Parameter 'product' is optional for 'req_type = 'desc'', leave out to get metadata for all available landscape products.

Examples

```
slp_md <- slga::metadata_lscape('SLPPC', format = 'native')
```

---

metadata_soils *download SLGA soils metadata*

Description

Retrieves metadata from Soil and Landscape Grid of Australia soils WCS endpoints in XML or list format.

Usage

```
metadata_soils(
  product = NULL,
  attribute = NULL,
  component = NULL,
  depth = NULL,
  req_type = "desc",
  format = "native"
)
```

Arguments

product   Character, one of the options from column 'Short_Name' in slga_product_info.

attribute   Character, one of the options from column 'Code' in slga_attribute_info,
            where 'Type' = 'Soil'.

component   Character, one of 'VAL', 'CLO', or 'CHI'.

depth   Integer, a number from 1 to 6. The numbers correspond to the following depth ranges:

            1. 0 to 5 cm.
            2. 5 to 15 cm.
            3. 15 to 30 cm.
            4. 30 to 60 cm.
            5. 60 to 100 cm.
            6. 100 to 200 cm.

req_type   Character; one of 'cap' or 'desc'. Defaults to 'desc'.

format   Character; one of 'xml' or 'native'. Defaults to 'native'.

Value

A list or xml document object, depending on the value of 'format'.

Examples

```
cly_md <- slga::metadata_soils('NAT', 'CLY', format = 'native')
```

---

slga_attribute_info   *SLGA Attribute Information*

Description

A data frame containing information about the modelled soils attributes available from the Soil and Landscape Grid of Australia.

Usage

```
slga_attribute_info
```

Format

A data frame with 14 observations and 4 variables

Name Attribute name

Code Short code for attribute

Units Attribute measurement units

Transformation Attribute measurement scaling

NAT Whether the attribute is available as part of this product.

NAT_3D Whether the attribute is available as part of this product.

SA Whether the attribute is available as part of this product.

TAS Whether the attribute is available as part of this product.

WA Whether the attribute is available as part of this product.

Source

See also https://www.clw.csiro.au/aclep/soilandlandscapegrid/ProductDetails-SoilAttributes.html

---

slga_product_info *SLGA Product Information*

Description

A data frame containing information about the products available from the Soil and Landscape Grid of Australia.

Usage

slga_product_info

Format

A data frame with 23 observations and 14 variables

Type Product Type - Soil or Landscape

Product Product Name

Short_Name Product short name

Code Product code

xmin left bounding longitude in decimal degrees

xmax right bounding longitude in decimal degrees

ymin bottom latitude in decimal degrees

ymax top bounding latitude in decimal degrees

offset_x Cell resolution in x dimension

offset_y Cell resolution in y dimension

origin_x x coordinate result of raster::origin() for this dataset.

origin_y y coordinate result of raster::origin() for this dataset.

ncol number of raster cells in x dimension

nrow number of raster cells in y dimension

Details

All datasets are projected in EPSG:4326 (WGS84). Grid parameters have been retrieved from metadata viewable with WCS DescribeCoverage requests.

Source

See also https://www.clw.csiro.au/aclep/soilandlandscapegrid/ProductDetails-SoilAttributes.html

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