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Centro Nacional de Supercomputación

R user meeting

04/07/2024

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Agenda

1. Ice-breaker: The browser() function
2. News
 - General R
 - s2dv
 - esviz
 - SUNSET
3. Presentation: ShapeToMask() developments
4. Q&A

Ice-breaker: The browser() function



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The browser() function

[The browser\(\) function](#) is a very useful tool for debugging in R because it allows us to “browse” (inspect) an environment when we run the code in the terminal or an IDE like RStudio.

It acts as a “breakpoint” in the code. For example, we can use it inside a function:

```
fun <- function(x) {  
  x <- x + 20  
  y <- mean(x)  
  browser() # inspect the function environment here  
  return(y)  
}
```

The browser() function

When we call the function and it reaches that line, the browser will open in the terminal:

```
data <- array(1:10)
data
# [1] 1 2 3 4 5 6 7 8 9 10
result <- fun(x = data)
# Called from: fun(x = data)
# We can see the value of x and y inside the fun environment
Browse[1]> x
# [1] 21 22 23 24 25 26 27 28 29 30
Browse[1]> y
# [1] 25.5
Browse[1]> f # exit browser and continue the execution
```

The browser() function: conditions

We can also add conditions to the browser() call using the 'expr' parameter. For example, adding a debug flag to the function:

```
fun <- function(x, debug = FALSE) {  
  x <- x + 20  
  y <- mean(x)  
  browser(expr = {debug}) # Activate only if debug is TRUE  
}  
fun(x = data, debug = TRUE)
```

Or activating the browser inside a loop only when a condition is met:

```
j <- 0  
for (i in 1:10) {  
  j <- i + j  
  browser(expr = {i == 2}) # Activate only when i is 2  
}
```

The browser() function: commands

Several commands can be used inside the browser environment to navigate it. Some useful ones:

- ★ **c**: exit the browser and continue execution at the next statement.
- ★ **f**: finish execution of the current loop or function.
- ★ **help**: print a list of all available browser commands.
- ★ **where**: print a stack trace of all active function calls.
- ★ **Q**: exit the browser and top-level prompt.

General R



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BSC-ES Software stack on MN5

The official BSC-ES software stack is now installed on MN5.

All the instructions are available in the wiki:

<https://earth.bsc.es/wiki/doku.php?id=computing:mn5>

The R version installed on MN5 is **4.3.3**. The module that contains most of the libraries is:
R-bundle-CRAN/2023.12-foss-2023b

The module will likely be missing some key packages; if you need an R package installed or there is any issue with the module, as always please open an issue in [the Requests GitLab](#) and tag Stamen Miroslavov (@smirosla).

s2dv



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Next release

We are planning to have a new release of s2dv ASAP. The new release is necessary because it fixes a [bug](#) in CDORemap() that only appears in **R>4.2.x**, and most all of our new machines have higher R versions.

It will also include enhancements and bugfixes for several other functions, as well as one new function SprErr() to compute the spread-to-error ratio. You can see the list of planned developments in the issue:

<https://earth.bsc.es/gitlab/es/s2dv/-/issues/109>



esviz



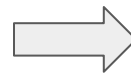
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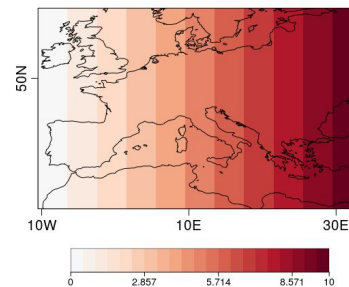
Color bar boundaries in VizEquiMap()

There two new parameters in `VizEquiMap()` which allow users to indicate whether they want the lower and upper limits of the color bars to be included.

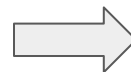
```
# default  
VizEquiMap(...,  
            include_lower_boundary = TRUE,  
            include_upper_boundary = TRUE)
```



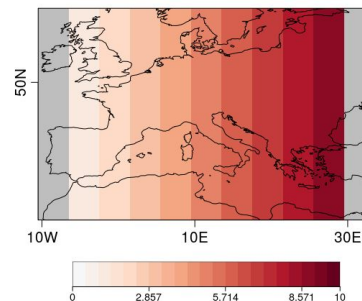
Default plot



```
VizEquiMap(...,  
            include_lower_boundary = FALSE,  
            include_upper_boundary = FALSE)
```



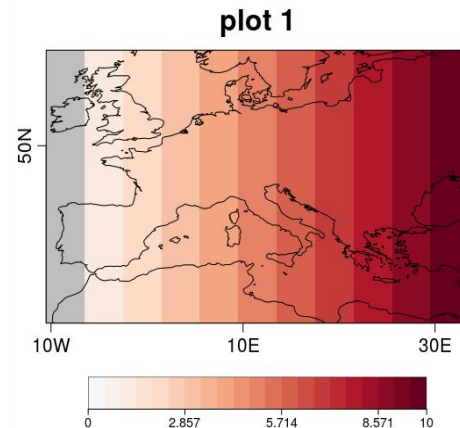
'= FALSE'



Color bar boundaries in VizEquiMap()

- ★ **Question:** do you think that this **warning** is informative or unnecessary?

```
VizEquiMap(data, lon = lons, lat = lats,  
  filled.continents = F,  
  bar_limits = c(0, 10),  
  toptitle = "plot 1",  
  cols = cols_white_red,  
  colNA = "grey",  
  triangle_ends = c(F, F),  
  include_lower_boundary = FALSE)
```



Warning message:

```
In ColorBarContinuous(brks, cols, FALSE, subsampleg, bar_limits, :  
  There are variable values equal to the lower limit of the colour bar,  
  the lower triangle end has been disabled and 'include_lower_boundary =  
  FALSE.' These will be painted in the colour for NA values.
```

Color bar boundaries in VizEquiMap()

- ★ **Request:** the development is in branch `dev-ColorBarContinuous_boundaries` in the esviz repository. If you can test that it works with your data we can merge it into master.

Issue: <https://earth.bsc.es/gitlab/es/esviz/-/issues/15>

status: in branch `dev-ColorBarContinuous_boundaries`

SUNSET



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Bugfix in daily data loading

In /esarchive, some daily variables are stored under a folder named 'daily', while others are stored under 'daily_mean'.

In SUNSET, the labels `daily` and `daily_mean` can be used interchangeably, but there was a bug that caused an error for some variables when specifying 'daily' instead of 'daily_mean' in the recipe.

The bug is now fixed and in the master branch.

Issue: <https://earth.bsc.es/gitlab/es/sunset/-/issues/125>

status: in master

Mean Bias and Spread-to-error Ratio significance

The significance computation for the Mean Bias and Spread-to-error ratio has been added to the Skill module and to the Scorecards computations.

Additionally, the Scorecards code has been refactored, and now the computation part should be included in the user-defined script:

```
(...)  
# Compute skill metrics  
skill_metrics <- Skill(recipe, data)  
# Compute statistics  
statistics <- Statistics(recipe, data)  
# Pre-computations required for the scorecards  
Scorecards_calculations(recipe, data = data,  
                        skill_metrics = skill_metrics,  
                        statistics = statistics)
```

MR: https://earth.bsc.es/gitlab/es/sunset/-/merge_requests/141

status: in branch dev_sprErr_significance

Hard-coded absolute paths

Sometimes when we are testing a new development, we add some paths to the code and forget to remove them later.

In order to prevent problems, we are including **a new unit test** that checks all the code in SUNSET to detect any absolute paths that have been hard-coded. If you contribute with a development and the GitLab pipeline fails, please check the error messages!

 Open **vagudets** requested to merge `dev-add_ukmo_check` into `master` 6 days ago

Overview **0** Commits **1** **Pipelines 1** Changes **2**

Status	Pipeline	Triggerer	Stages
--------	----------	-----------	--------

MR: https://earth.bsc.es/gitlab/es/sunset/-/merge_requests/132

status: in branch dev-test-hardcoded_paths

User presentation



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shapeToMask

Working with regular grids (Projections)

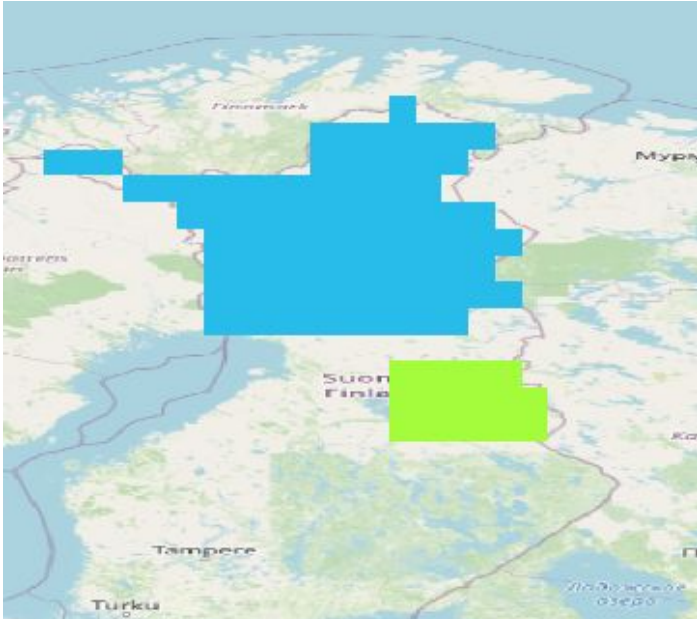
- Degrees - EPSG4326
- Meters - EPSG3857

Match Shapefile proj with NetCDF files

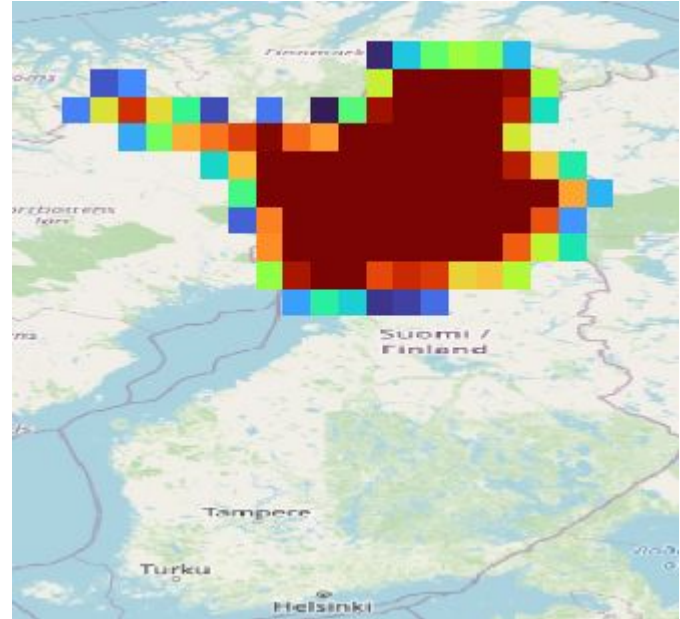
```
if (units == 'degrees') {  
  shp <- sf::st_transform(shp, 4326)  
} else if (units == 'meters') {  
  shp <- sf::st_transform(shp, 3857)  
}
```

shapeToMask

compute_area_coverage = **FALSE**

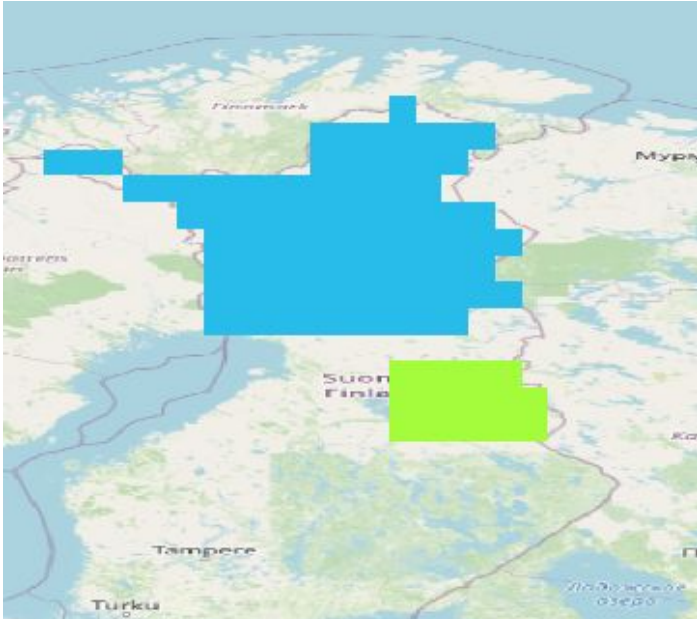


compute_area_coverage = **TRUE**



shapeToMask

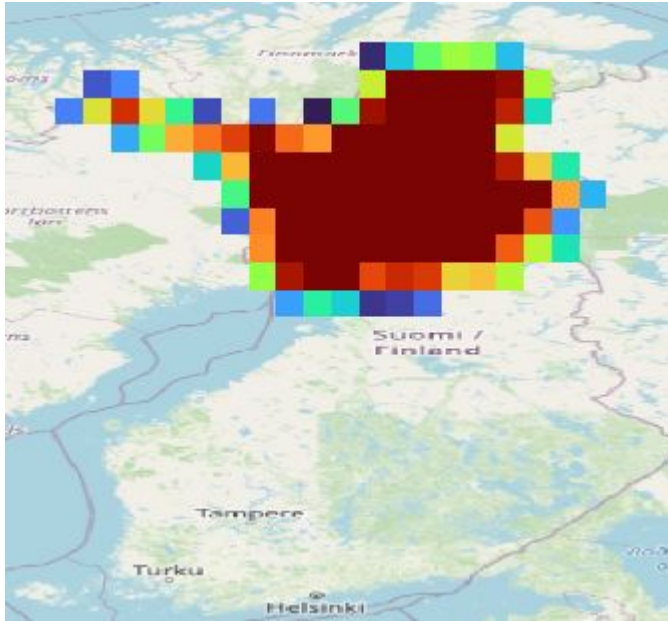
`compute_area_coverage = FALSE`



- Uniband Netcdf
- Values 1 to n (depends of the number of polygons)
- More restrictive

shapeToMask

`compute_area_coverage = TRUE`



- Multiband Netcdf (depends of the number of polygons)
- Values 0 - 1 (%)
- Less restrictive

shapeToMask

Metadata

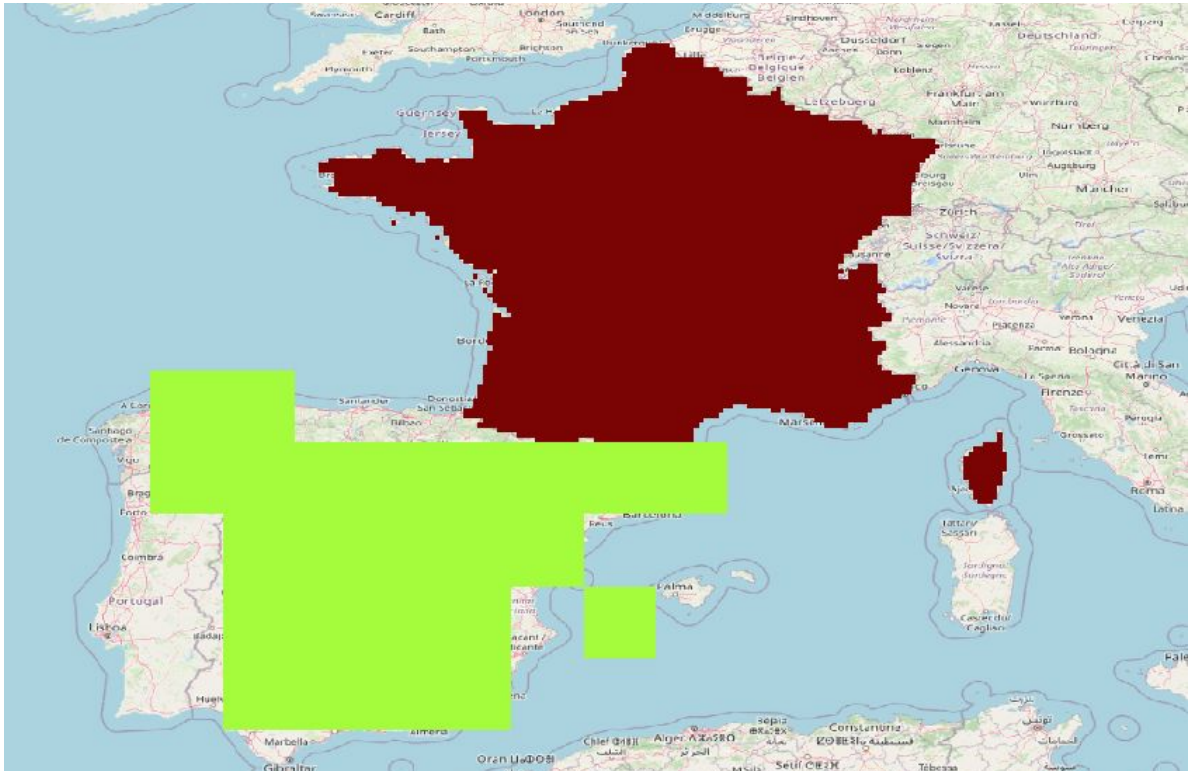
- Projection
- Reference polygons with values:
 - Uniband reference values
 - Multiband reference bands

▼ Attributes:

```
crs :                EPSG4326
shapes_values :      id = FI1D7, name = Lappi, shape_val = 1
                    id = FI1D8, name = Kainuu, shape_val = 2
                    id = SI031, name = Pomurska, shape_val = 3
                    id = SI032, name = Podravska, shape_val = 4
```

shapeToMask

Quality input data



shapeToMask

New parameters

- name_shp_col
 - id_shp_col
- } Name of the columns on shp file
- units
- }
 - Degrees
 - Meters
- lat_dim
 - lon_dim
- }
 - lat, latitude, y, j (default)
 - lon, longitude, x, i (default)
 - Other possible options

Q&A



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Thanks for joining