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R user meeting

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Agenda

1. Ice-breaker: The betrayal of `1:length(x)`
2. News
 - `startR`
 - `s2dv`
 - `CSTools`
 - `CSIndicators`
 - `CSDownscale`
 - `esviz`
 - `SUNSET`
3. User presentation: `SUNSET + Compute()` use case
4. Q&A

Ice-breaker: The betrayal of 1:length(x)



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The betrayal of 1:length(x)

1:length(x) can betray you when x is empty!!!

```
> x <- character(0)
> length(x)
[1] 0
> 1:length(x)
[1] 1 0
```

So a loop you expected to run 0 times can run twice.

Use seq_along(x):

```
> seq_along(x)
integer(0)

for (i in seq_along(x)) {
  ...
}
```

startR



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Compute(): Autosubmit executions sometimes stuck

When using Compute() with Autosubmit (e.g. [startR use case 2.15](#)), sometimes the function gets stuck, without returning a result, even if all the chunks have finished successfully.

This is possibly due to leftover files from old executions in the `/esarchive/autosubmit/ <expid>/proj/` directory, since the number of files in the directory is not what Compute() expects.

We are working on a way to handle this automatically, but it is recommended to **clean this directory before running a new startR workflow.**

issue: https://gitlab.earth.bsc.es/es/startR/-/work_items/219

status: working on it

s2dv



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RPSS(): returning p-values

- RPSS() returns an array of RPSS values and a logical array indicating statistical significance.
- Now it also returns a numeric array of p-values when:
 - Significance test: `sig_method` is "RandomWalk"
 - Test type of the significance test `sig_method.type` is not "two.sided.aprox"
- NOTE: Default values are not changed.

		sig_method.type				
		two.sided.aprox (default)	two.sided	one.sided	greater	less
sig_method	RandomWalk (default)	No	Yes	-	Yes	Yes
	Diebold-Mariano	-	No	No	-	-

- = unsupported combination

MR: https://gitlab.earth.bsc.es/es/s2dv/-/merge_requests/214

status: in master

CSTools



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CST_BindDim(): Bugfix in metadata handling

CST_BindDim() binds together two or more s2dv_cube objects along the specified dimension. The function puts together the metadata as well as the data.

When binding along the forecast time dimension, the code was not selecting the elements in `$attrs$Variable$metadata` correctly. This sometimes caused the function to fail.

This bugfix will be included in the next release of CSTools.

MR: https://gitlab.earth.bsc.es/external/cstools/-/merge_requests/248/
status: in master

CSIndicators



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PeriodStandardization(): Parameter 'handle_infinity'

PeriodStandardization() is used to compute the Standardized Precipitation - Evapotranspiration Index (SPEI).

When the parameter 'handle_infinity' is set to TRUE, positive or negative infinite values are replaced by the maximum or minimum value of that grid point. However, this does not work when all of the values for that grid point are infinite.

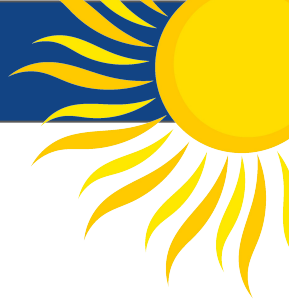
Question: How should the function handle this?

- Replace with the minimum/maximum value of the dataset?
- Return infinity anyway?
- Return NA?
- Other?

issue: https://gitlab.earth.bsc.es/es/csindicators/-/work_items/70

status: in discussion

New function: SolarPVpot()

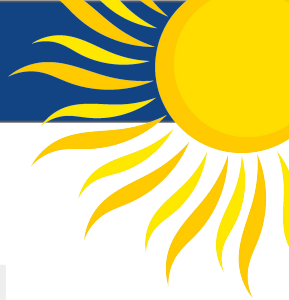


SolarPVpot(): solar photovoltaic (PV) potential

- Estimates solar PV generation from meteorological data.
- Expressed as a capacity factor: % of the maximum possible energy produced per PV grid cell.
- Calculates a value for each input element, preserving the input dimensions.
- Two formulations are available:
 - `order = "first"`: radiation + temperature
 - `order = "second"`: radiation + temperature + wind (default)
- Input data:

Input	Variable	Units
Surface solar radiation	rsds	W/m ²
Surface temperature	tas	Kelvin, Celsius or Fahrenheit
Surface wind speed	wind	m/s

New function: SolarPVpot()



With `s2dv_cube` objects:

```
pv <- CST_SolarPVpot(rsds = rsds_cube, tas = tas_cube, wind = wind_cube,  
                    order = "second", ncores = NULL)
```

With numeric arrays, vectors or scalars:

```
pv <- SolarPVpot(rsds = rsds, tas = ta, wind = wind,  
               order = "second", ncores = NULL)
```

- Inputs must have matching dimensions and lengths

MR: https://gitlab.earth.bsc.es/es/csindicators/-/merge_requests/94
status: in branch dev-SolarPVpot

CSDownscale



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LogisticReg: Bug with unrepresented prob categories

When one of the requested probability categories is not represented in the sample, the `LogisticReg()` function returns an error (if `exp_cor` is `NULL`) or incorrect results (if `exp_cor` is not `NULL`). This is due to incorrect input being passed to the `multinom()` function.

Without `exp_cor`:

```
Error in multinom(y ~ ., data = df[-window, ], trace = FALSE) :  
need two or more classes to fit a multinom model
```

With `exp_cor`:

```
> res3$data[1, 1:3, 1, 1] # dims are c("sdate", "cat", "lat", "lon")  
[1] 0.9325731 0.9325731 0.9325731
```

issue: https://gitlab.earth.bsc.es/es/csdownscale/-/work_items/20

status: working on it... ideas welcome!



esviz



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New release: v0.0.4

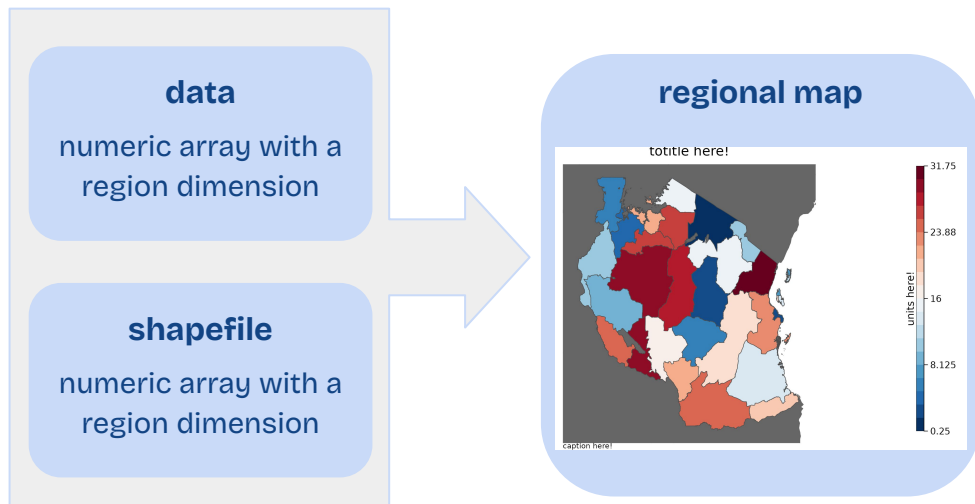
New release: esviz/0.0.4

- Fixed incompatibility with R-devel version 
- **Development:**
 - BarPlotCat(): New parameters to configure transparency, labels and text sizes.
 - VizEquiMap(): New parameter to configure caption height.
- **Bugfixes:**
 - VizCombinedMap(): Fix plot alignment issues by moving mask drawing to VizEquiMap().
 - ColorBarDiscrete(): Fix the use of deprecated scale parameters.

New functions for spatially aggregated data

VizPolygonsMap()

Plot one value per region using polygon geometries instead of a regular lat/lon grid



Matching the regions between data and shapefile:

- Set `id_shape_col` to match data region IDs to a shapefile column.
- Use row order (function will not validate the order)

New functions for spatially aggregated data

- **Different projections:** default is Robinson: “[ESRI:54030](#)”
- **Map styling:** brks, cols, mask, dots, legend options, triangle ends, titles and captions
- **Background:** optional bkg_shapefile, otherwise a default background from rnaturalearth is drawn. Both options have styling parameters.

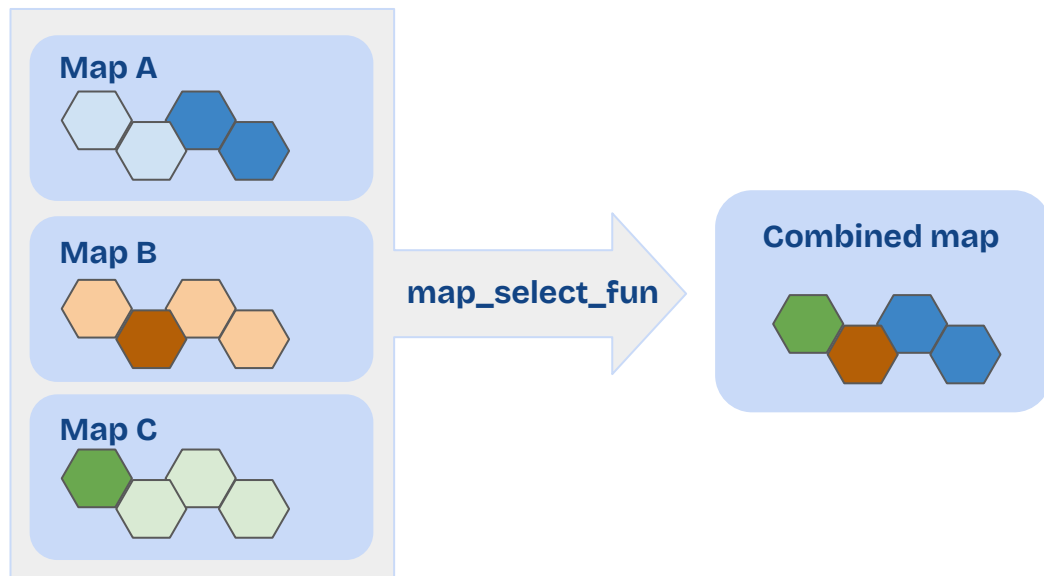
```
VizPolygonsMap(data, shapefile, dots = dots, brks = seq(-10, 10, length.out = 11),  
               toptitle = 'synthetic example', vertical = FALSE,  
               caption = 'Robinson Projection',  
               bar_extra_margin = c(0, 1, 0, 1), width = 8, height = 6)
```

MR: https://gitlab.earth.bsc.es/es/esviz/-/merge_requests/44
status: in master

New functions for spatially aggregated data

VizCombinedPolygonsMap()

Combine several regional maps into one map by selecting the most relevant map in each region



- 1) Looks across `map_dim` for every region
- 2) Uses **`map_select_fun`** to select the winning map
- 3) Delegates the polygon drawing to **`VizPolygonsMap()`** (shapefile is required)

MR: https://gitlab.earth.bsc.es/es/esviz/-/merge_requests/56
status: in branch dev-VizCombinedPolygonsMap

SUNSET



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Maps for spatially aggregated data

- Regional plots are automatically generated when spatially aggregated data are detected
 - SUNSET checks whether the data contains a 'region' dimension → the workflow switches to polygon based plotting.

- The regional geometries are taken from the recipe:

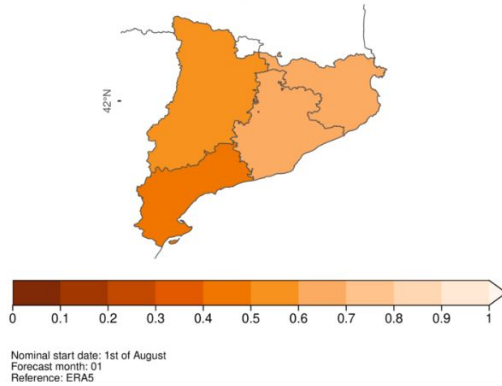
```
Analysis:  
  Workflow:  
    Spatial_aggregation:  
      Shapefile_mask: path/to/regions.shp
```

- Internal function use:
 - VizPolygonsMap(): skill metrics, forecast ensemble mean, extreme probabilities
 - VizCombinedPolygonsMap(): most likely terciles
- Graphical options can be customised via `output_conf`

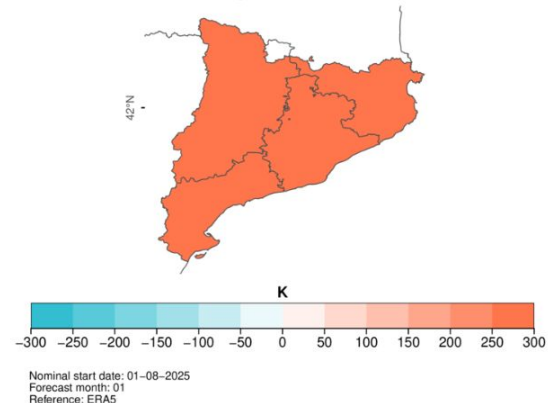
MR: https://gitlab.eearth.bsc.es/es/sunset/-/merge_requests/308
status: in master (WIP)

Maps for spatially aggregated data

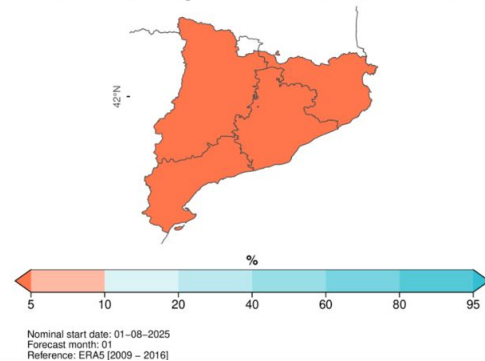
ECMWF SEAS5 (v5.1) / 2 Metre Temperature
CRPS / August / 2009–2016



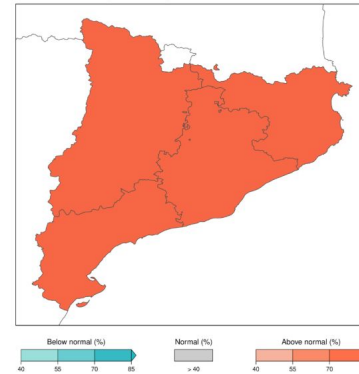
ECMWF SEAS5 (v5.1) / 2 Metre Temperature
Ensemble median / August 2025 / Start date: 01–08–2025



ECMWF SEAS5 (v5.1) / 2 Metre Temperature
Below 10% / August 2025 / Start date: 01–08–2025



ECMWF SEAS5 (v5.1) / 2 Metre Temperature
Most Likely Tercile / August 2025 / Start date: 01–08–2025



How to use Compute() in SUNSET

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New use case: follow along!

Hands-on 2.1: Computation of the Heat Index for a large region, using startR::Compute()

MR: https://gitlab.earth.bsc.es/es/sunset/-/merge_requests/357
status: in branch usecase-compute

Thanks for joining