



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación



**EXCELENCIA
SEVERO
OCHOA**

R tools user meeting

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04/06/2021

Agenda

1. Icebreaker back to life!!!
2. News
 - startR
 - s2dv
3. Indicators for the Agricultural sector in CSIndicators package (Chung)
4. Q&A

Icebreaker

Icebreaker

- Which statistics you use in your analysis or will be interested in exploring them? They can be deterministic or probabilistic metrics, and they can be in in-house packages or external ones. Could you do a list of their names?
- Go to the agenda:
<https://docs.google.com/document/d/1VqnwgeimqNLODfqAyPjIY9XprGD5JQ-NPqzQF6nNDS0/edit?usp=sharing>

startR

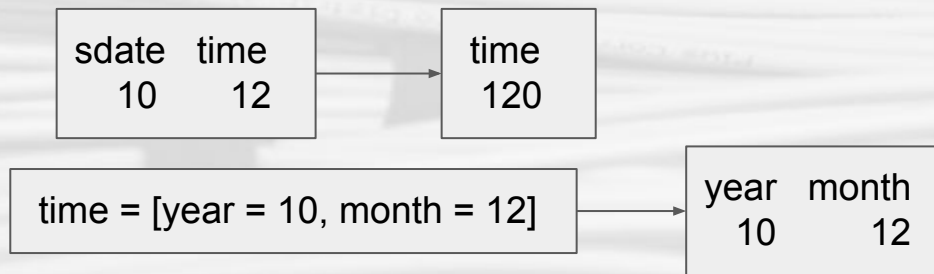
New release v2.1.0-4

- Start() parameter 'merge_across_dims_narm' is set to TRUE by default now (It was FALSE before.) It is only functional when 'merge_across_dims = TRUE'.
- Bugfixes for mixed dimensions when reshaping parameters are used.
- Revise the FAQ: How to assign latitude and longitude in Start()
<https://earth.bsc.es/gitlab/es/startR/-/blob/master/inst/doc/faq.md#11-select-the-longitudelatitude-region>

Reshaping parameters

- Reshaping parameters:

- `merge_across_dims`:
- `merge_across_dims_narm`
- `split_multiselected_dims`



- '`merge_across_dims_narm`' is an additional step for '`merge_across_dims`'

→ First, consider the original dimensions without merging. Is there any NAs?

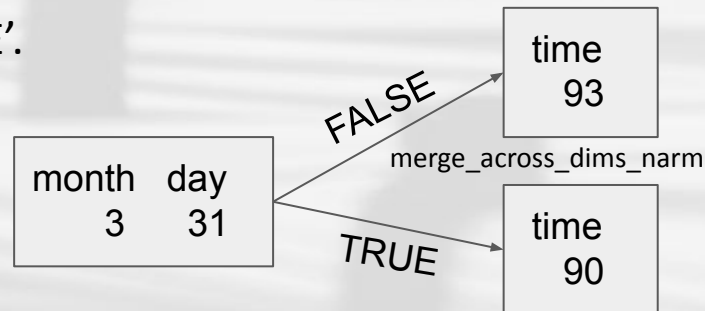
→ If yes, do you want to keep those NAs after merging?

→ If no, use '`merge_across_dims_narm = TRUE`'.

For example, daily data for Jan, Feb, and Mar.

Feb. has 28 days only, so the last 3 positions

are NAs.



Reshaping parameters

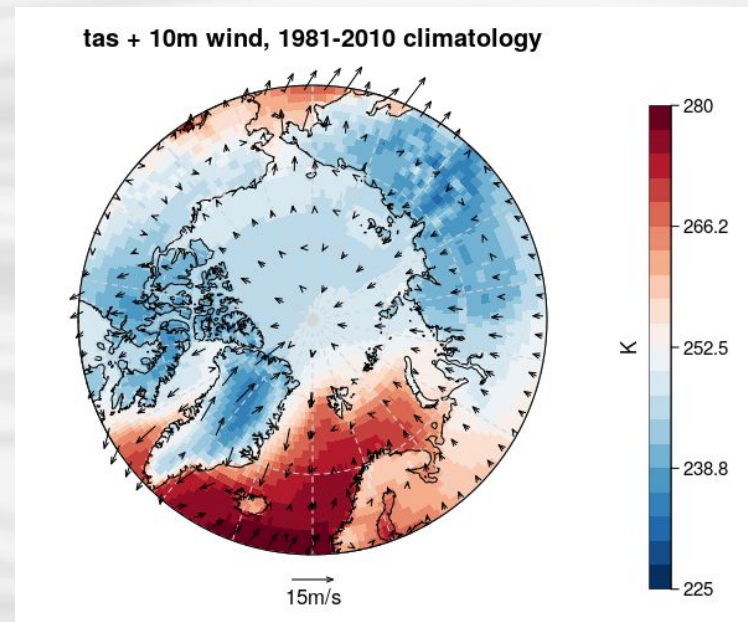
- Keep in mind that even the data array is going to be reshaped, Start() firstly forms an array based on each file it reads, then merge/split it as requested.
- values() may behave different from indices() and 'all'.
If the data structures of the files are not consistent, it's better to use values(). E.g., daily data that have different days each file.
If the data structures of the files are the same, indices() and 'all' are easy to use.
E.g., monthly data from the same dataset.

s2dv

PlotStereomap(): arrows

New feature: plotting **arrows** on stereographic projection map

The usage is almost the same as the arrow feature in PlotEquiMap()



Load(): regrid issue

Problem: Load() didn't regrid the data if the length of spatial dimensions is identical with the assigned 'grid'.

For example, CMCC has [lon = 360, lat = 180], and lon = c(0.5, 1.5, ..., 359.5). The Load() call below wants to regrid the data to "r360x180". If the regrid happened, lon would become c(0, 1, ..., 359).

```
path_cmcc <-  
"/esarchive/exp/cmcc/system3_m1-c3s/monthly_mean/  
g500_f12h/$VAR_NAME$_$START_DATE$.nc"
```

```
data <- Load("g500",  
  exp = list(CMCC = list(name = "CMCC",  
                          path = path_cmcc)),  
  obs = NULL,  
  sdates = "19931101",  
  output = "lonlat",  
  grid = "r360x180")
```

```
range(tmp1$lon)
```

```
[1] 0.5 359.5
```

→ No regrid, still c(0.5, 1.5, ..., 359.5)

Solution:

Regrid the data as long as parameter 'grid' is specified.

Indicators for the Agricultural sector in CSIndicators package

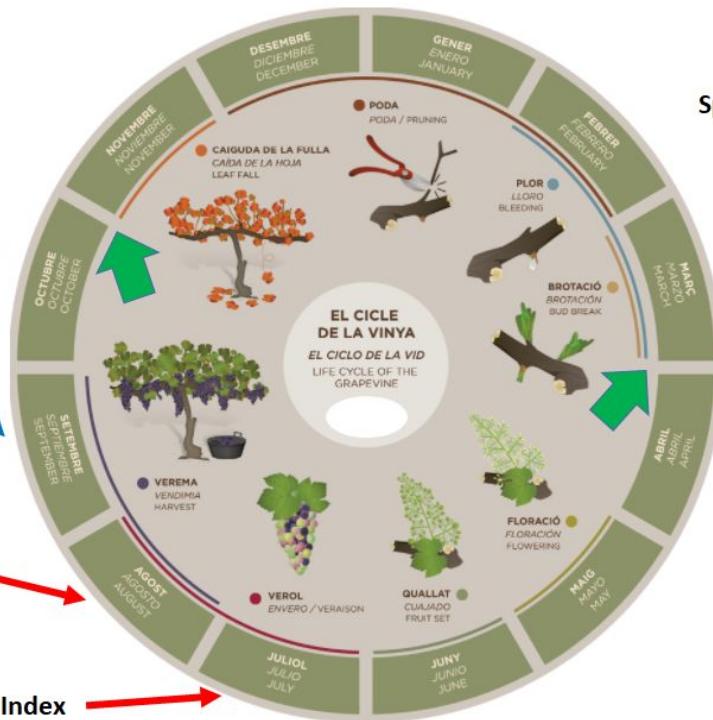
CSIndicators package



Harvest total precipitation

Number of heat stress days - 35°C

Warm Spell Duration Index



Spring total precipitation

Growing Season Temperature

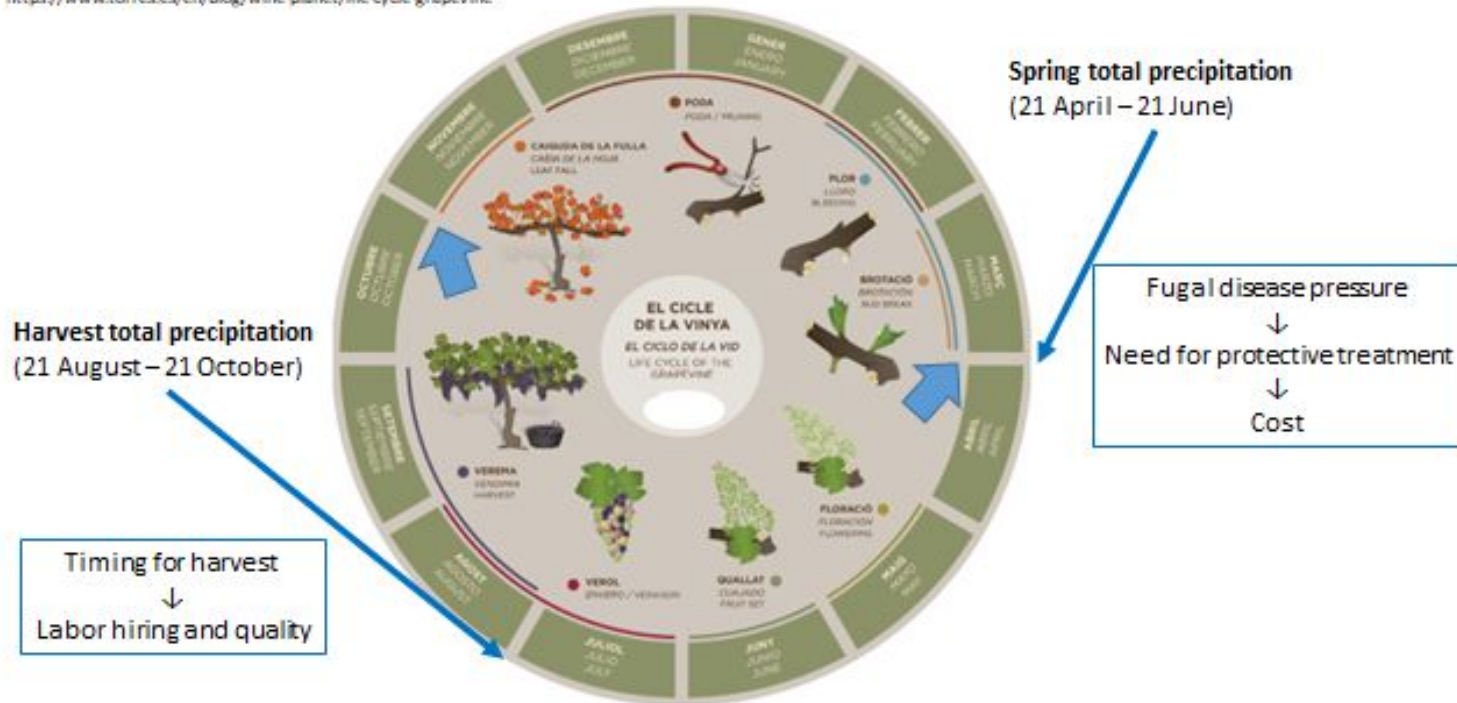
Growing Degree Days

- Precipitation
- Average temperature
- Maximum temperature

<https://www.torres.es/en/blog/wine-planet/life-cycle-grapevine>

CSIndicators package

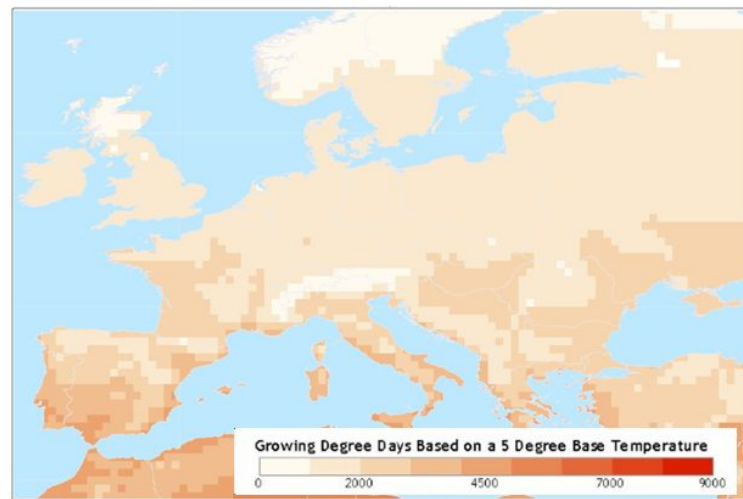
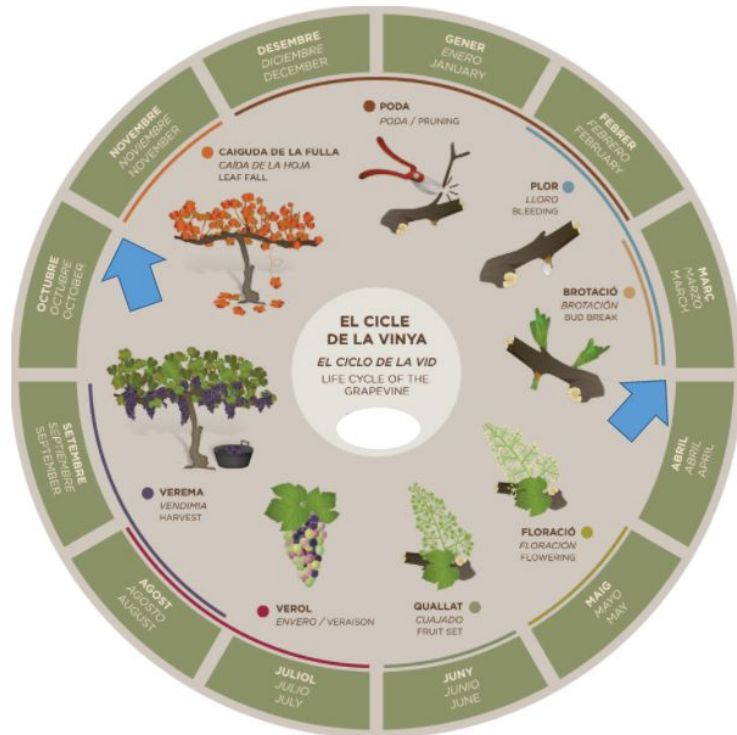
<https://www.torres.es/en/blog/wine-planet/life-cycle-grapevine>



```
SprR_exp <- CST_PeriodAccumulation(prlr_exp, start = list(21, 4), end = list(21, 6))
```


CSIndicators package

<https://nelson.wisc.edu/sage/data-and-models/atlas/maps.php?datasetid=31&includerelatedlinks=1&dataset=31>



Growing Degree Days

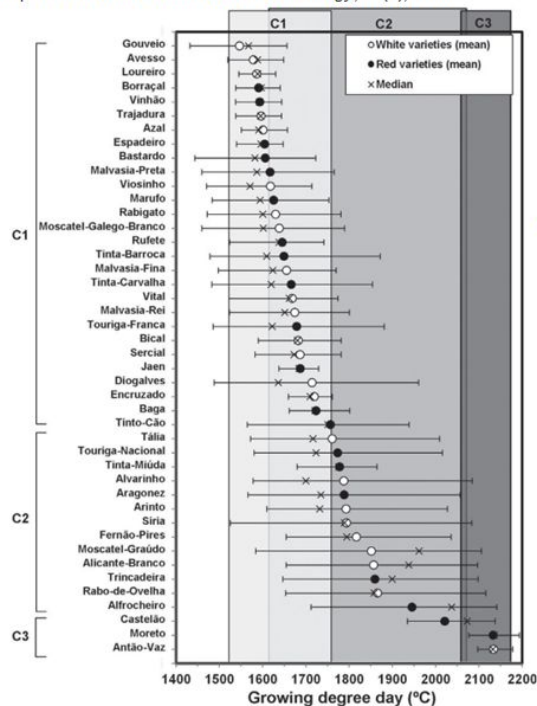
(Sum of daily differences between daily average temperatures and 10°C between 1st April to 31st October)

Growing Season Temperature

(Average of daily average temperatures between 1st April to 31st October)

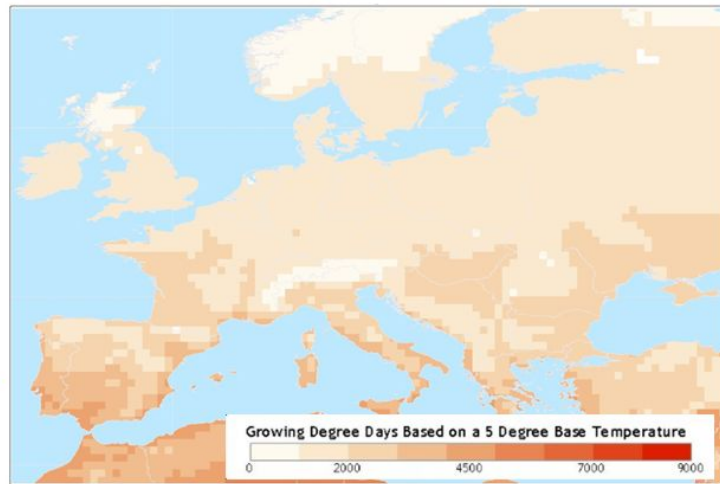
CSIndicators package

Fraga, H., Santos, J. A., Malheiro, A. C., Oliveira, A. A., Moutinho-Pereira, J., & Jones, G. V. (2016). Climatic suitability of Portuguese grapevine varieties and climate change adaptation. *International Journal of Climatology*, 36(1), 1-12.



Variety

Locations



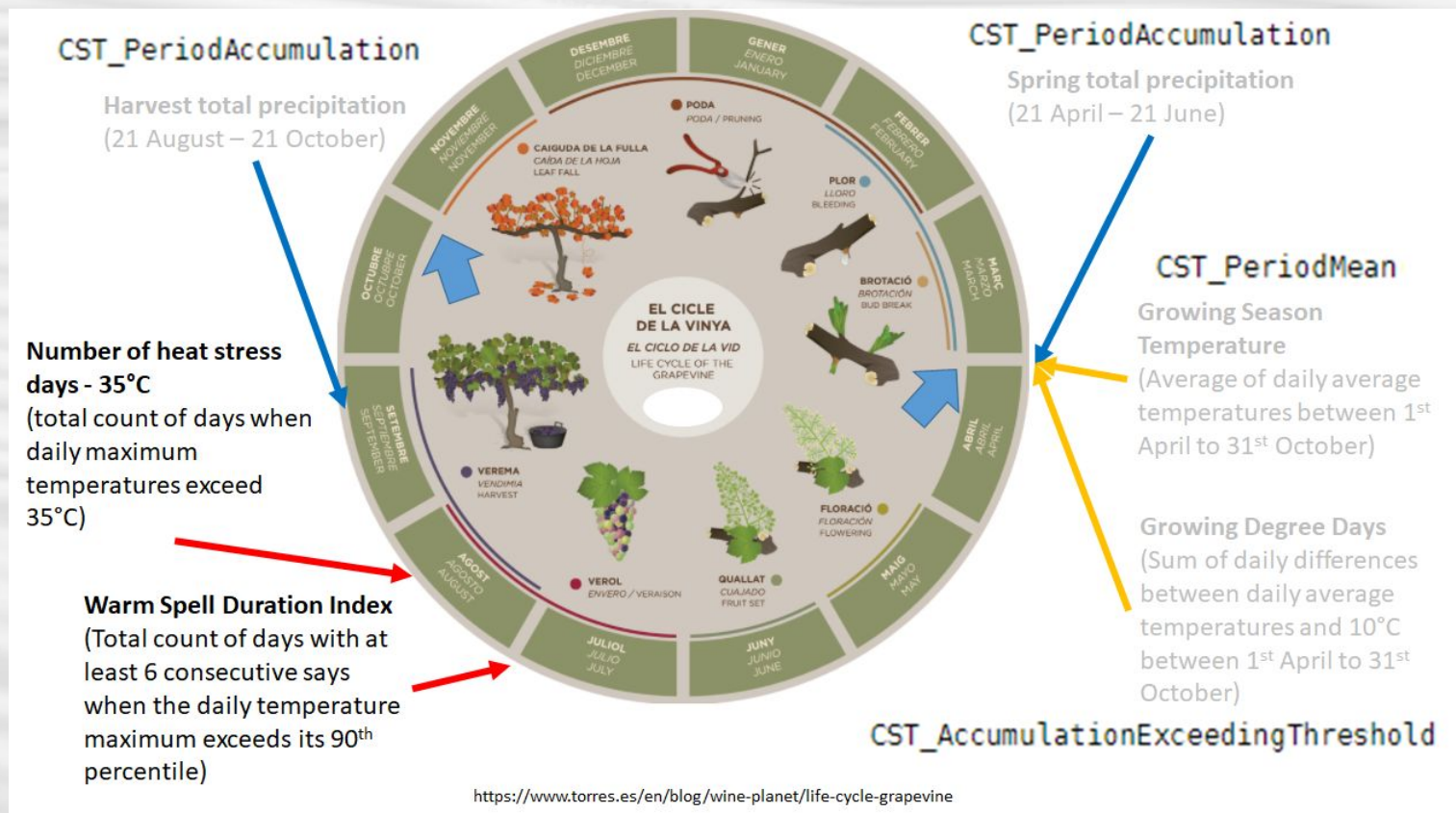
<https://nelson.wisc.edu/sage/data-and-models/atlas/maps.php?datasetid=31&includerelatedlinks=1&dataset=31>

Growing Degree Days

(Sum of daily differences between daily average temperatures and 10°C between 1st April to 31st October)

```
GDD_exp <- CST_AccumulationExceedingThreshold(tas_exp, threshold = 10, diff = TRUE)
```


CSIndicators package



CSIndicators package

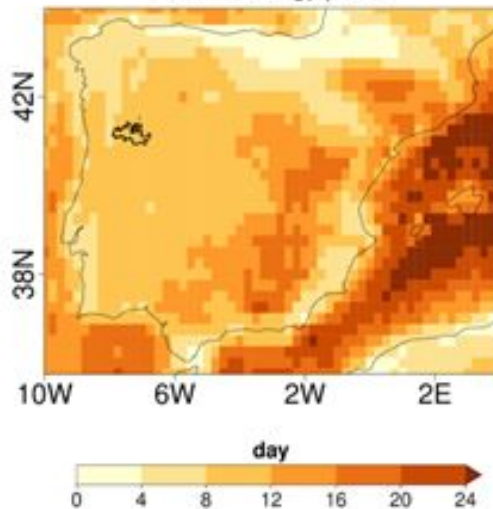
Warm Spell Duration Index

(Total count of days with at least 6 consecutive days when the daily temperature maximum exceeds its 90th percentile)

```
tx_p <- CST_Threshold(tasmax_obs, threshold = 0.9)
```

```
WSDI_exp <- CST_TotalSpellTimeExceedingThreshold(tasmax_exp, threshold = tx_p, spell = 6)
```

Climatology | ERA5



WSDI signals when warm regions start to become too extreme



extreme berry and leaf dehydration
berry skin sunburn, leaf and shoot
excessive water depletion

<https://cran.r-project.org/web/packages/CSIndicators/vignettes/AgriculturalIndicators.html>

Q & A

Next meeting: 9th July 2021 (Friday 4 pm)