Agenda

1. Icebreaker: A little interaction
2. Package update
   - s2dv
   - startR
   - wiki

3. ClimProjDiags review

4. RandomWalkTest function (Carlos)

5. Q&A

Icebreaker

Package update

s2dv

New version **v0.1.1**

- Change license to Apache License 2.0
- New functions: Ano(), Composite(), PlotAno(), Smoothing(), AMV(), GSAT(), SPOD(), TPI(), GMST(), Persistence(), RandomWalkTest()
- Bugfixes and enhancement: Regression(), Trend(), PlotClim(), MeanDims(), Season(), Clim(), RMS(), RMSSS()

See details in:

- NEWS.md
- CRAN

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s2dv

Next Step

- Bugfixes and enhancement: Persistence(), Corr()
  - Corr() accepts the member dimension now. You can calculate ensemble mean or individual member correlation as you need. (you can use it from branch develop-Corr_member)

- New functions
  - (1)   ACC(), Ano_CrossValid(), EOF()
  - (2)   Histo2Hindcast(), NAO()
  - (3)   Filter(), ProbBins(), ProjectField(), RatioRMS(), RatioSDRMS(), Cluster(), UltimateBrier(), Spread(), SVD(), Alpha()

New FAQ

https://earth.bsc.es/gitlab/es/startR/-/blob/master/inst/doc/faq.md

7. Start() fails retrieving data

If you get the following error message:

```
Exploring files... This will take a variable amount of time depending
*   on the issued request and the performance of the file server...
Error in R_nc4_open: No such file or directory
Error in file_var_reader(NULL, file_object, NULL, var_to_read, synonims) :
  Either 'file_path' or 'file_object' must be provided.
```

check if your path contains the label var in the path. If not, try to added it as part of the path or the file name. Where var is the variable to retrieve from files.
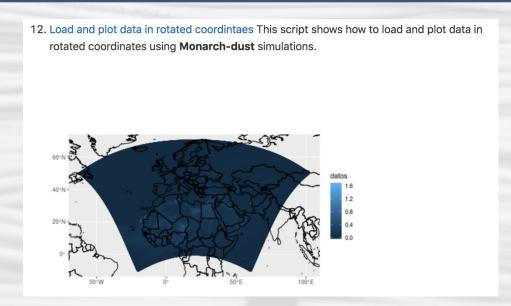
The path should contain a label for the variable. Ex:

```
path <- '/my/path/to/the/data/ $var$/file.nc'
data <- Start(var = 'tas', time = 'all', lon = 'all', lat = 'all')
```

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startR

New Use Case

12. Load and plot data in rotated coordintaes This script shows how to load and plot data in rotated coordinates using **Monarch-dust** simulations.

This use case shows how to load data from **Monarch-dustclim** simulations which are in a **rotated polar grid** and **how to plot them with ggplot2**.

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Updates on the Earth wiki R tools

https://earth.bsc.es/wiki/doku.php

How to access

way 1:
Starting at BSC
➤   Group internal tools for running simulations
➤   s2dv - CSTools - ClimProjDiags
→ Rtools

way 2:
Tools → Rtools

What to find

A)   General R tools page
B)   Specific package pages

-   **Links to CRAN, GitLab**
-   **Minutes, presentations, videos…**
-   **R tips (e.g. modules to load)**

Suggestions, new materials and improvements are welcomed!

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ClimProjDiags

Introduction to ClimProjDiags

https://earth.bsc.es/gitlab/es/ClimProjDiags

Formatting functions

DailyAno(): Daily anomalies

SeasonSelect(): Selects a season from daily data for multidimensional arrays

SelBox(): Selects spatial region

Subset(): Subsets an N-dimensional array (along, indices, drop parameters)

WeightedMean(): Calculate spatial area-weighted average

Vignettes

→ Anomaly agreement

→ Diurnal temperature range indicator

→ Extreme indices t90p, t10n, rx5days, cdd, wx

→ Heat and coldwaves duration

Computing Indicators

AnoAgree(): Percentage of anomalies which agrees with the sign of the mean anomaly

Climdex(): Wrapper to compute ETCCDI* climate change indices

CombineIndices(): Combine weighted indices

DTRIndicator(): Diurnal temperature range indicator

DTRRef(): Diurnal temperature range

Extremes(): Sum of spell lengths exceeding daily threshold

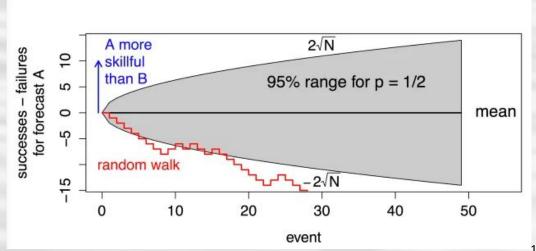**Threshold()**: Daily thresholds based on quantiles

WaveDuration(): Heat and cold waves duration

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*Expert Team on Climate Change Detection and Indices

RandomWalkTest

RandomWalkTest

Documentation: https://cran.r-project.org/web/packages/s2dv/s2dv.pdf

Description: Forecast comparison of the skill obtained with 2 forecasts (with respect to a common reference) based on Random Walks, with significance estimate at the 95% confidence level, as in DelSole and Tippett (2015).

Suitable for MAE, RMSSS, RPS, …
Not suitable for correlation.

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RandomWalkTest

Usage: RandomWalkTest(skill_A, skill_B, time_dim = "sdate", ncores = NULL)

Arguments:
- **skill_A**: numerical array of the time series of the skill with the forecaster A's.

- **skill_B**: numerical array of the time series of the skill with the forecaster B's. The dimensions should be identical as parameter 'skill_A'.

- **time_dim**: A character string indicating the name of the dimension along which the tests are computed. The default value is 'sdate'.

- **ncores**: An integer indicating the number of cores to use for parallel computation. The default value is NULL.
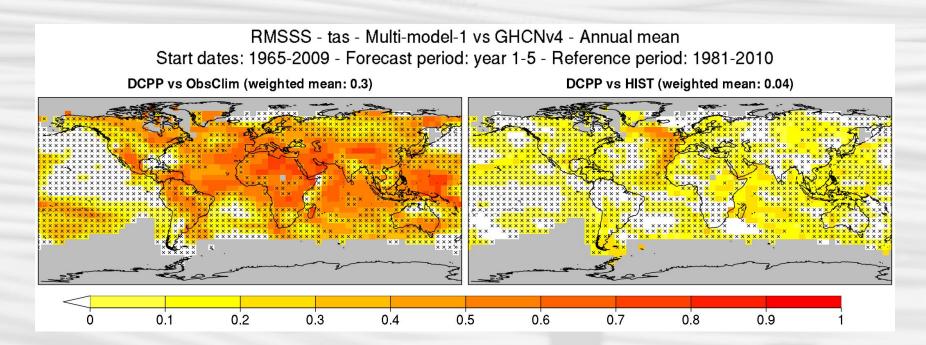
RandomWalkTest

Return (a list of 2):

- **$score**: A numerical array with the same dimensions as the input arrays except 'time_dim'. The number of times that forecaster A has been better than forecaster B minus the number of times that forecaster B has been better than forecaster A (for skill positively oriented). If $score is positive forecaster A is better than forecaster B, and if $score is negative forecaster B is better than forecaster B.

- **$signif**: A logical array with the same dimensions as the input arrays except 'time_dim'. Whether the difference is significant or not at the 5 significance level.

RandomWalkTest

Example:

```
> fcst_A <- array(c(11:50), dim = c(sdate = 10, lat = 2, lon = 2))

> fcst_B <- array(c(21:60), dim = c(sdate = 10, lat = 2, lon = 2))

> reference <- array(1:40, dim = c(sdate = 10, lat = 2, lon = 2))

> skill_A <- abs(fcst_A - reference)

> skill_B <- abs(fcst_B - reference)

> RandomWalkTest(skill_A = skill_A, skill_B = skill_B, time_dim = 'sdate', ncores = 1)
```

Dots indicate that the skill values obtained with both forecast are NOT statistically different at the 95% confidence level.

Q & A

Next meeting: 8th Jan. 2021 (Friday 4pm)

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