



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación



s2dverification update meeting

20/02/2017

Mailing list:

s2dverification@bsc.es

Wiki:

<https://earth.bsc.es/wiki/doku.php?id=tools:s2dverification>



- News in v2.8.0
- Working with file-per-chunk until v2.9.0
- Other issues
- Recent and ongoing developments
- Future plans
 - New Load (v2.9.0)
 - Compatibility break (v3.0.0)

- Licence change from GPL-3 to LGPL-3
- New `veriApply` compatible score functions
 - `.BrierScore`, `.Corr`, `.RMS`, `.RMSSS`, `.RatioRMS`, `.RatioSDRMS` and `.Trend`
 - You can check examples of each in `?BrierScore`, `?Corr`, ...

```
# Take the data and compute anomalies
data <- Load('tos', 'i00k', 'erainterim', paste0(1985:2005,
'1101'),
           leadtimax = 6, output = 'lonlat')
ano <- Ano_CrossValid(data$mod, data$obs)

# Corr in the classical way
corr <- Corr(Mean1Dim(ano$ano_exp, 2), Mean1Dim(ano$ano_obs, 2))

# Corr with multicore
Corr2 <- s2dverification:::.Corr
require(easyVerification)
corr2 <- veriApply("Corr2", ano$ano_exp, Mean1Dim(ano$ano_obs, 2),
                  ensdim = 2, tdim = 3, parallel = TRUE)
```

90 sec.

40 sec.

- Added warning in `Load` when extrapolating

```
data <- Load('tos', 'i100k', NULL, '19851101',  
            leadtimemax = 1, output = 'lonlat',  
            grid = 'r1000x500')  
* Loading... This may take several minutes...  
! Warning: the dataset with index 1 in 'exp' is originally on a  
grid coarser than the common grid and it has been extrapolated.  
Check the results carefully. It is recommended to specify as common  
grid the coarsest grid among all requested datasets via the  
parameter 'grid'.
```

- `CDORemap`, to interpolate R arrays with CDO

```
# Minimal array interpolation  
tas <- array(1:50, dim = c(25, 50))  
names(dim(tas)) <- c('lat', 'lon')  
lon <- seq(0, 360 - 360/50, length.out = 50)  
lat <- seq(-90, 90, length.out = 25)  
tas2 <- CDORemap(tas, lon, lat, 'r200x100', 'bil', TRUE)  
dim(tas2$data_array)  
lat lon  
100 200
```

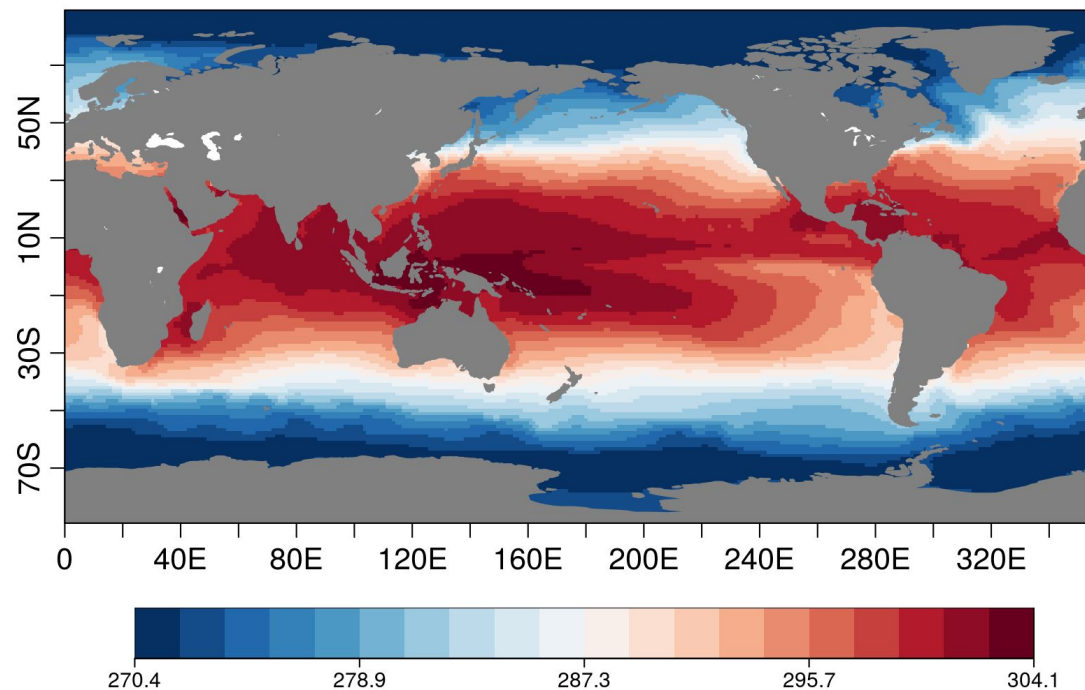
- **ArrayToNetCDF**, to save R arrays with metadata in NetCDF files

```
# Multiple arrays can be provided in a list
a <- array(1:400, dim = c(5, 10, 4, 2))
names(dim(a)) <- c('lat', 'lon', 'time', 'var')
ArrayToNetCDF(list(tos = a, prlr = a), 'tmp.nc')
```

```
> ncdump -h tmp.nc
netcdf tmp {
dimensions:
    lat = 5 ;
    lon = 10 ;
    time = UNLIMITED ; // (4 currently)
variables:
    float tos_1(time, lon, lat) ;
    float tos_2(time, lon, lat) ;
    float prlr_1(time, lon, lat) ;
    float prlr_2(time, lon, lat) ;
}
```

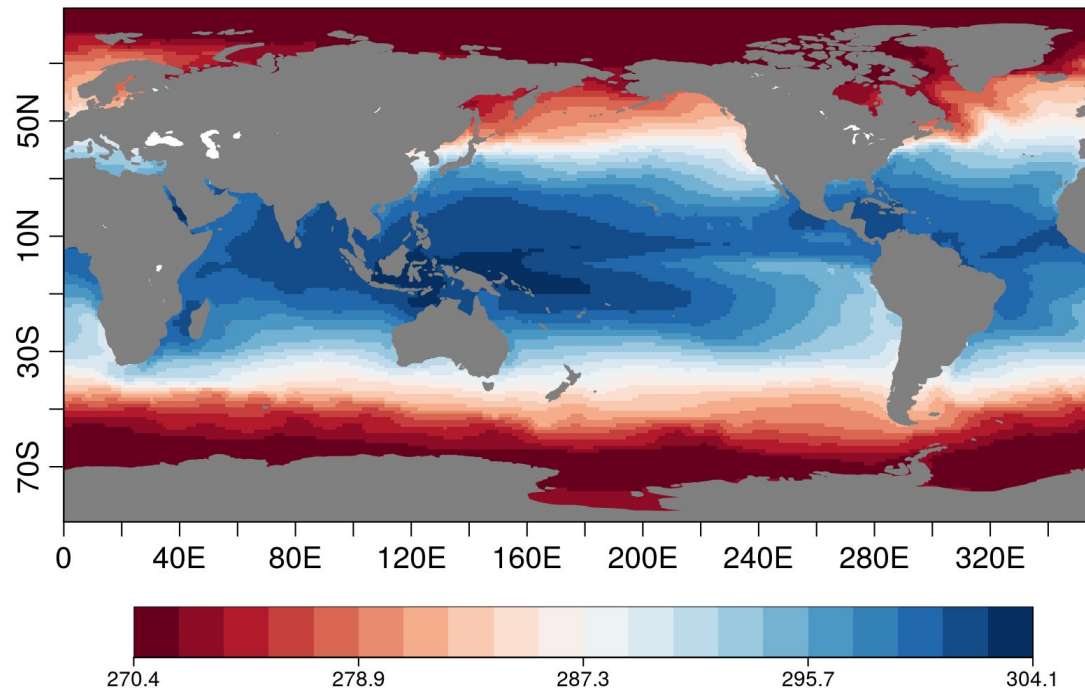
- Colour-blind friendly colour bars

```
# Take the data and compute anomalies  
data <- Load('tos', 'i100k', NULL, '19851101',  
            leadtimemax = 1, output = 'lonlat')  
PlotEquiMap(data$mod[1, 1, 1, 1, , ], data$lon, data$lat)
```



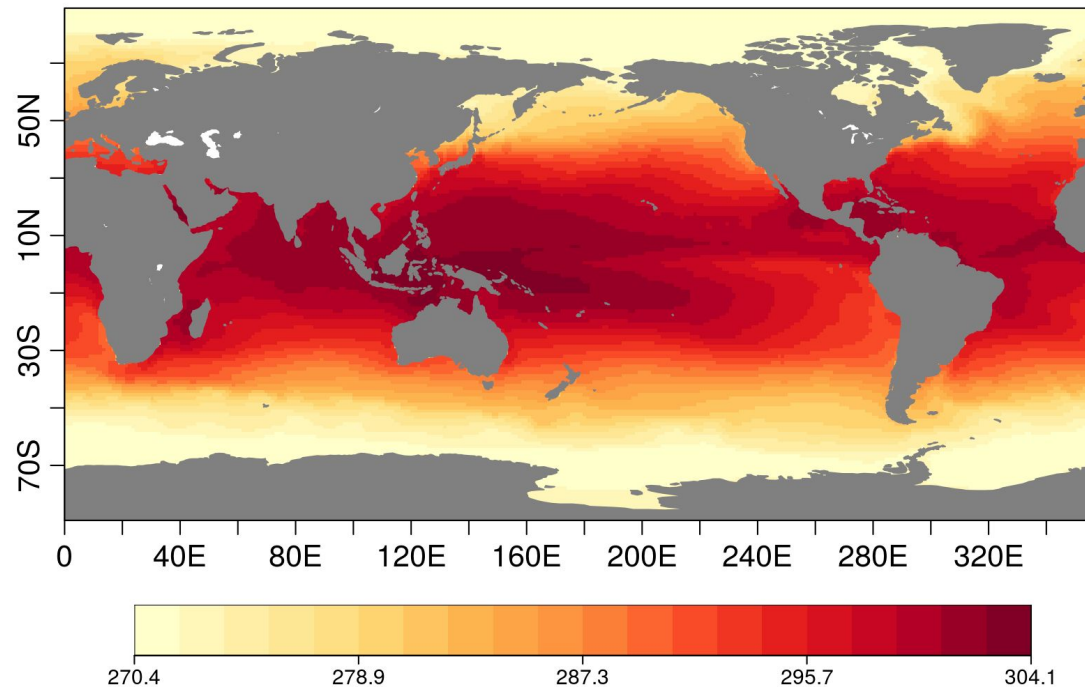
- Colour-blind friendly colour bars

```
# Take the data and compute anomalies  
data <- Load('tos', 'i100k', NULL, '19851101',  
            leadtimemax = 1, output = 'lonlat')  
PlotEquiMap(data$mod[1, 1, 1, 1, , ], data$lon, data$lat,  
            color_fun = clim.palette('redblue'))
```



- Colour-blind friendly colour bars

```
# Take the data and compute anomalies  
data <- Load('tos', 'i100k', NULL, '19851101',  
            leadtimemax = 1, output = 'lonlat')  
PlotEquiMap(data$mod[1, 1, 1, 1, , ], data$lon, data$lat,  
            color_fun = clim.palette('yellowred'))
```



- Two options:
 - Using current version of Load() multiple times and merging results
 - Script in /shared/earth/software/scripts/LoadChunks.R
 - Specify manually the path patterns
 - Specify manually names of members and chunks for each s. date
 - Specify manually the number of forecast time-steps per chunk

```
source('/shared/earth/software/scripts/LoadMembersChunks.R')

new_exp <- paste0('/esarchive/exp/ecearth/t00p/monthly_mean/',
                 '$VAR_NAME$_f6h/$VAR_NAME$_Omon_EC-EARTH3_t00p_',
                 'S $START_DATE$ $MEMBER$ $CHUNK$.nc')

members <- list('19900101' = 'r1ilp1')
chunks <- list('19900101' = c('199001-199001', '199002-199002'))

data <- LoadMembersChunks('tos', new_exp, 'erainterim', '19900101',
                          members, chunks, ftimes_per_chunk = 1,
                          output = 'lonlat')
```

- Using new Load in the branch develop-load-enh, still under development and with missing features

- How to modify s2dverification functions
 - Sometimes if you copy and modify the code of a s2dv function it stops working
 - It is because some s2dv functions depend on 'internal' s2dv functions
 - It can be fixed by loading the Utils.R file in your new code:

```
source('~/.s2dverification/R/Utils.R')  
PlotAno <- function(.....) {  
  .....  
  your modifications  
  .....  
}
```

- If you only need to do a small temporary change:

```
library(s2verification)  
fix(PlotAno)
```

- Other issues?

- Development strategy:

<https://earth.bsc.es/wiki/doku.php?id=tools:s2dverification#development>

- Create branch, push your code, create merge request, assign two testers.

- Ongoing developments:

- Chloé's correlation difference?
- Nicola's enhancements in PlotEquiMap?
- Martin's enhancements in PlotStereoMap and PlotSection
- François' JoCoMo matrix?
- Verónica's hatching?
- Omar's filled oceans in PlotEquiMap
- Omar's function to compute reliability
- Verónica + Llorenç PlotMostLikelyTercile?
- ???

? = branch does not exist

- Omar: Chloés correlation difference is stuck because of a bug in the package psych, which it relies upon.
- All: Let's contact psych developers and keep going with the initial plan.
- All: Vero's hatching PlotEquiMap will be added in a new branch in the git project
- Nico + Omar: Filled oceans relied on an external tools. We will try to look for an alternative when doing the release of v3.0.0.
- Omar: Has developed s2dv-compatible functions to calculate ensemble inflation.
- Javi: Derive-x and derive-y functions. To be added in s2dv? Or in a new separate package?
- Nico: These will be added in a new branch for now.

- Pending branches to test

Branch names	Pending testers	Deadline
develop-RMSE_boot	Chloé, Omar	?
develop-SealceModes	?, ?	?
develop-AreaWeights	Chloé, ?	?
develop-PlotClim	Nico + Alasdair to add	v3.0.0
develop_contours_plotsection	Nico + Alasdair to add	v3.0.0
develop_filled_oceans	Nico + Alasdair to add	v3.0.0
develop_calibrate	?, ?	?

- **New Load (v2.9.0)**
 - Will be much more general
 - Will be called e.g. CubeLoad
 - Load will call CubeLoad inside
 - Interface to Load will not change
 - You will be able to use CubeLoad directly for advanced cases

- **Compatibility break (v3.0.0)**
 - Will use common metadata model with QA4Seas and downscaleR
 - Metadata will be propagated and accordingly modified
 - You will be able to use the functions with simple arrays as now
 - PlotTimeSeries will be made available
 - Score functions will use veriApply by default
 - Some design issues will be solved: it will be easier to use, no need for some tricks to communicate between functions
 - Package name will change to s2dv



Other questions?



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EXCELENCIA
SEVERO
OCHOA

Thanks