

Seasonal forecast of extreme events with S2dverification

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Presentation of data

MODEL DATA: ENSEMBLES prediction system

ENSEMBLES Multi-model:

- INGV's ECHAM5/OPA
- IFM Kiel's ECHAM5/OM1
- ECMWF's IFS/HOPE
- Météo-France's ARPEGE/OPA
- UK Met Office's HadGEM2

9 members each, with different initial conditions.

Seasonal forecasts between 1979 until 2005

1 start dates: May

June July Augue

ERA-interim reanalysis data

Period 1979-Now.



Calculate monthly extreme variables

**2 bash scripts developed at the IC3
(based on cdo and nco):**

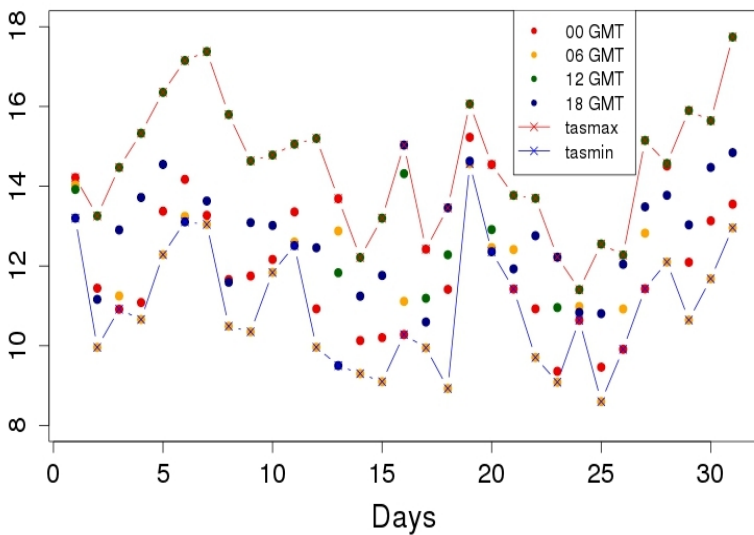
- ERA-interim: monthly extreme ERAINT.sh
 - ENSEMBLES: monthly extreme ENSEMBLES.sh
- 4 variables (10m wind module,
precipitations, tasmin, tasmax)



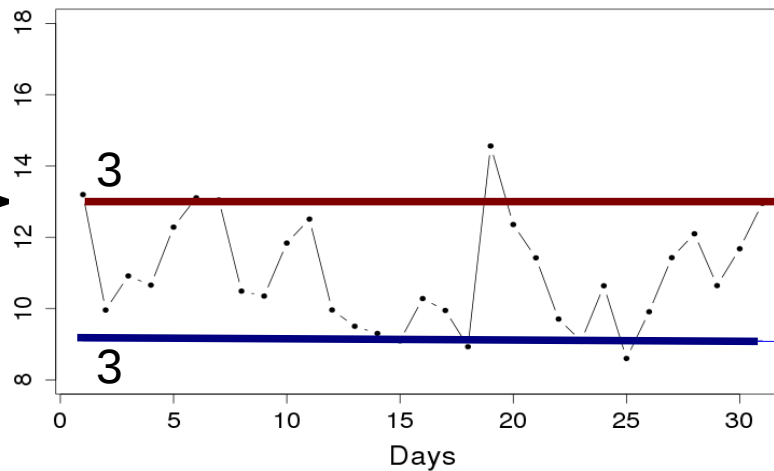
Extreme variables

6 hourly and 12 hourly data

6-hourly temperature
Jan 2013 BCN



Calculate daily values
Tasmin/Tasmax
Total precipitations

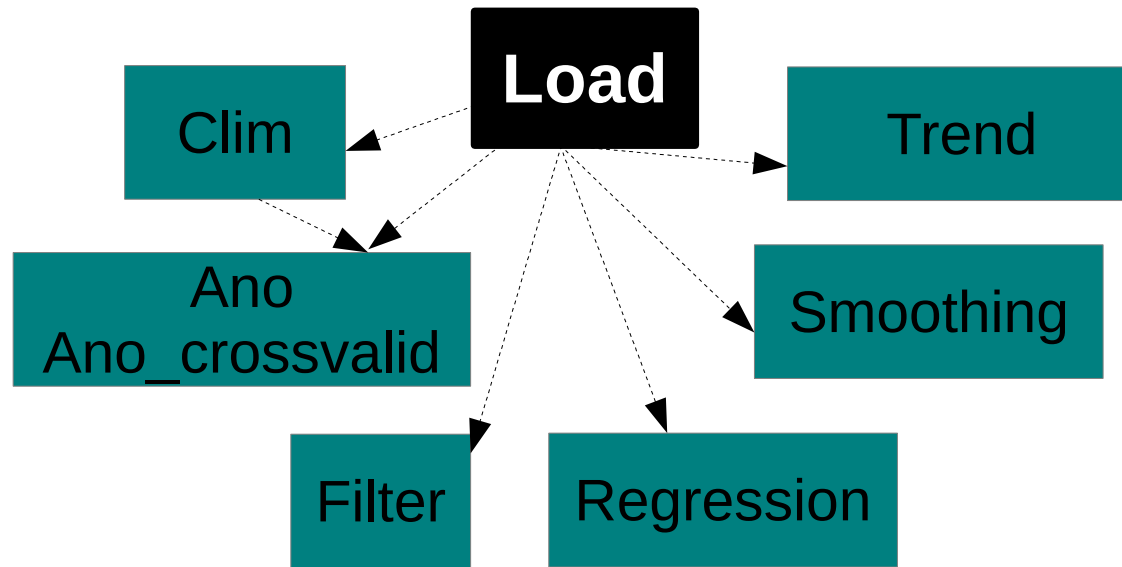


Monthly extreme variables

90th percentile

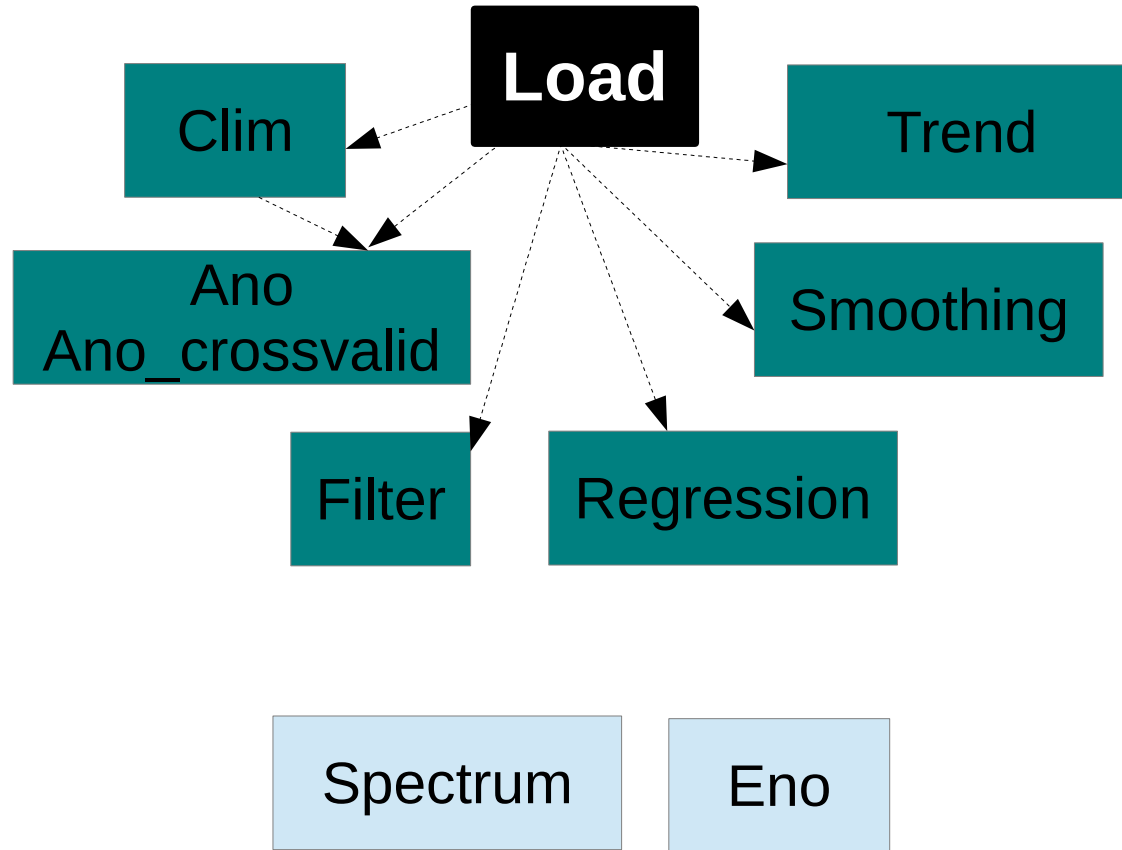
10th percentile

Seasonal forecasting of extreme events





Seasonal forecasting of extreme events



EnLarge

LeapYear

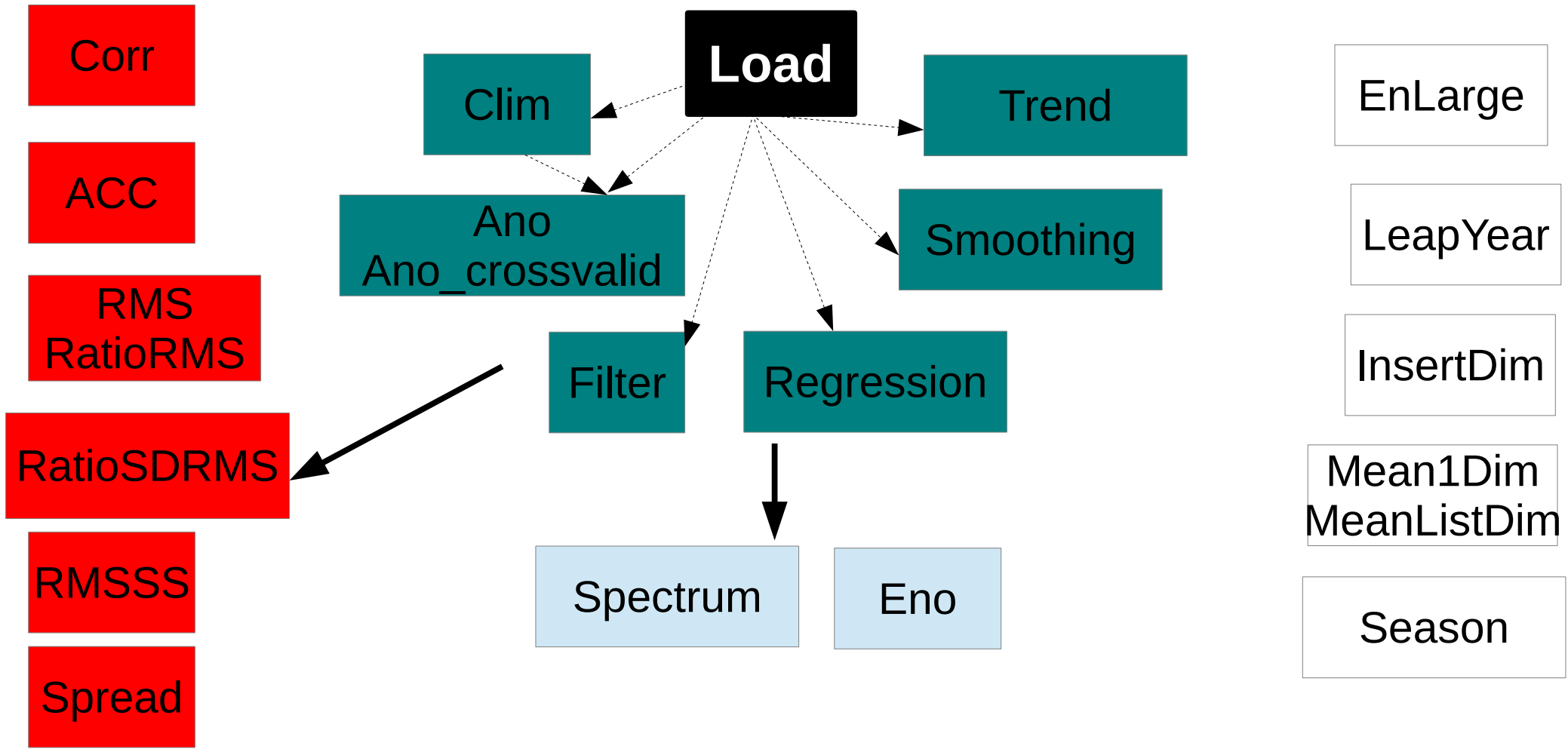
InsertDim

Mean1Dim
MeanListDim

Season

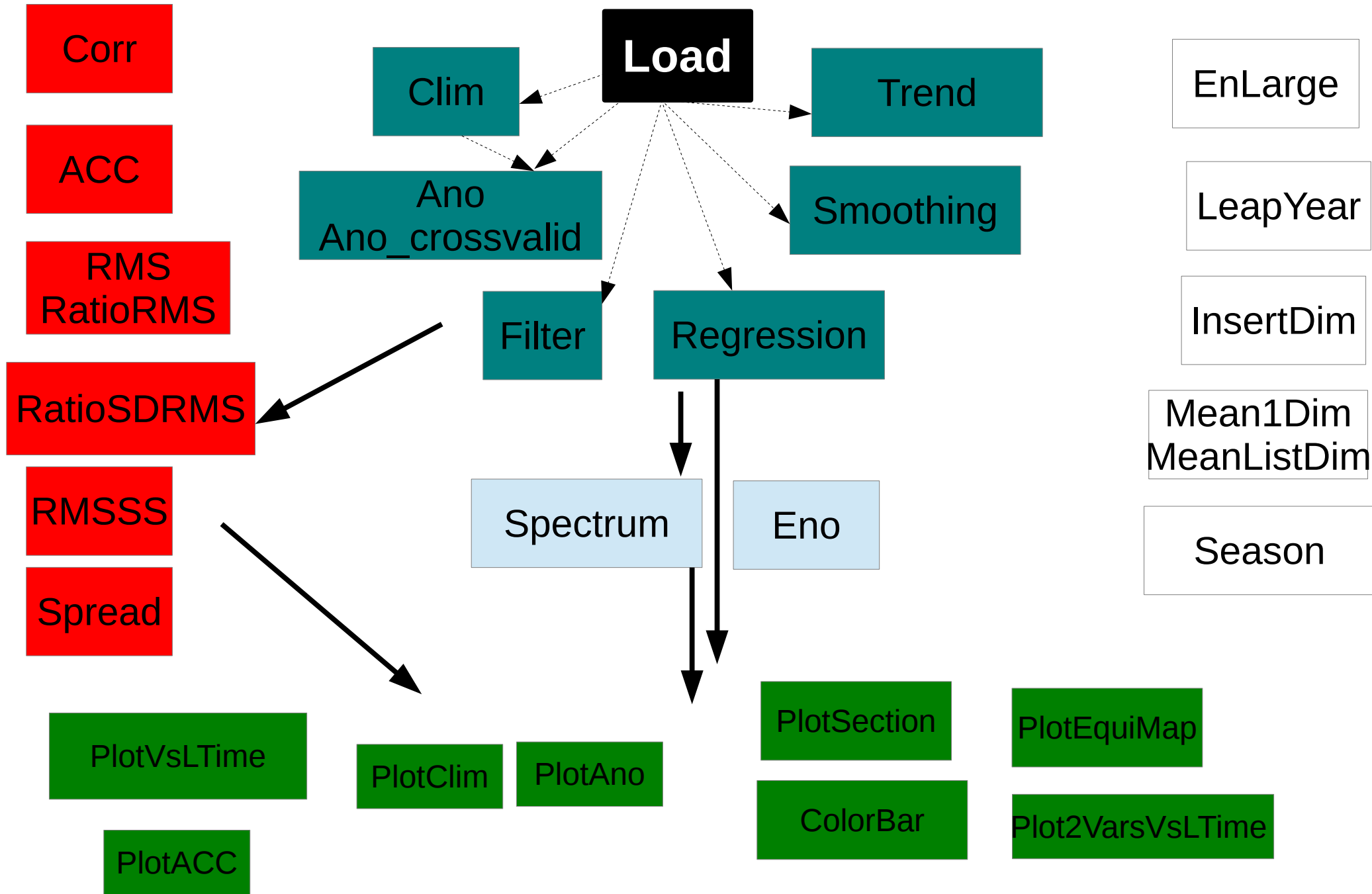


Seasonal forecasting of extreme events



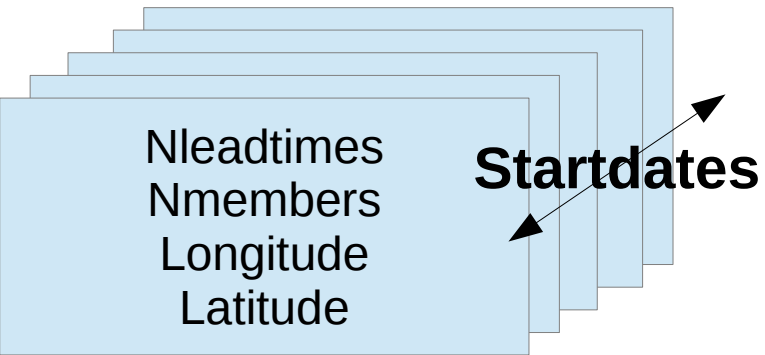


Seasonal forecasting of extreme events



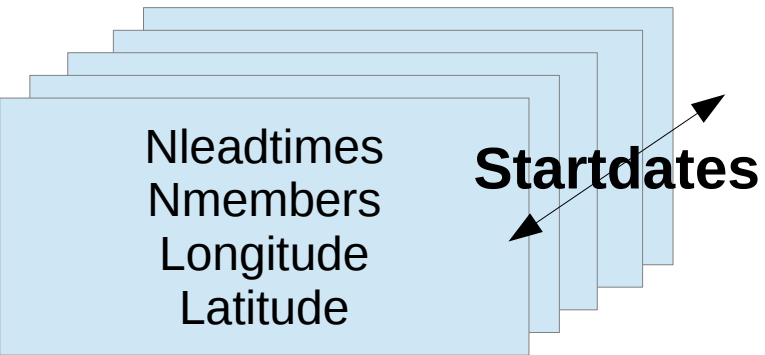


Model 1



Load

Model 2



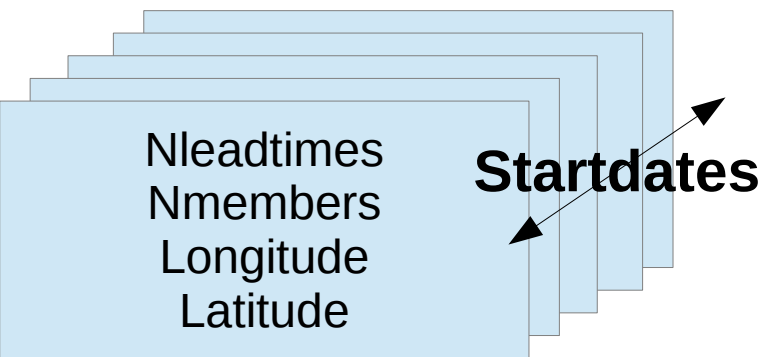
-
-
-
-
-



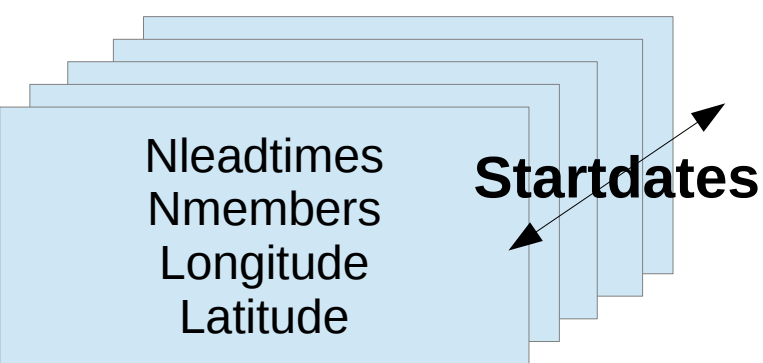
Seasonal forecasting of extreme events

Load

Model 1

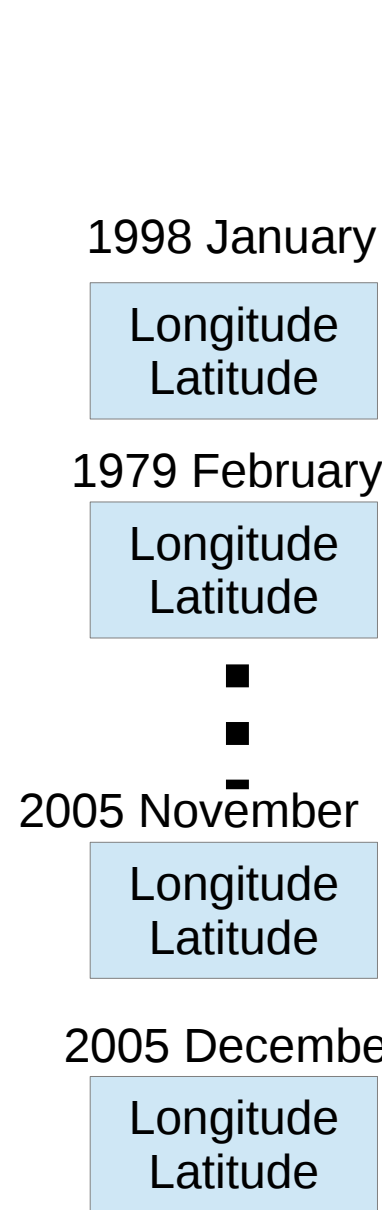


Model 2

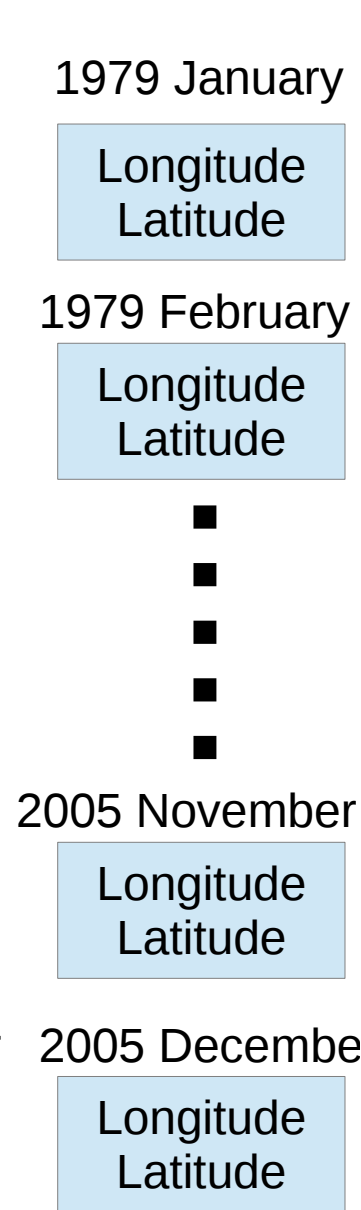


-
-
-
-
-

Observation 1

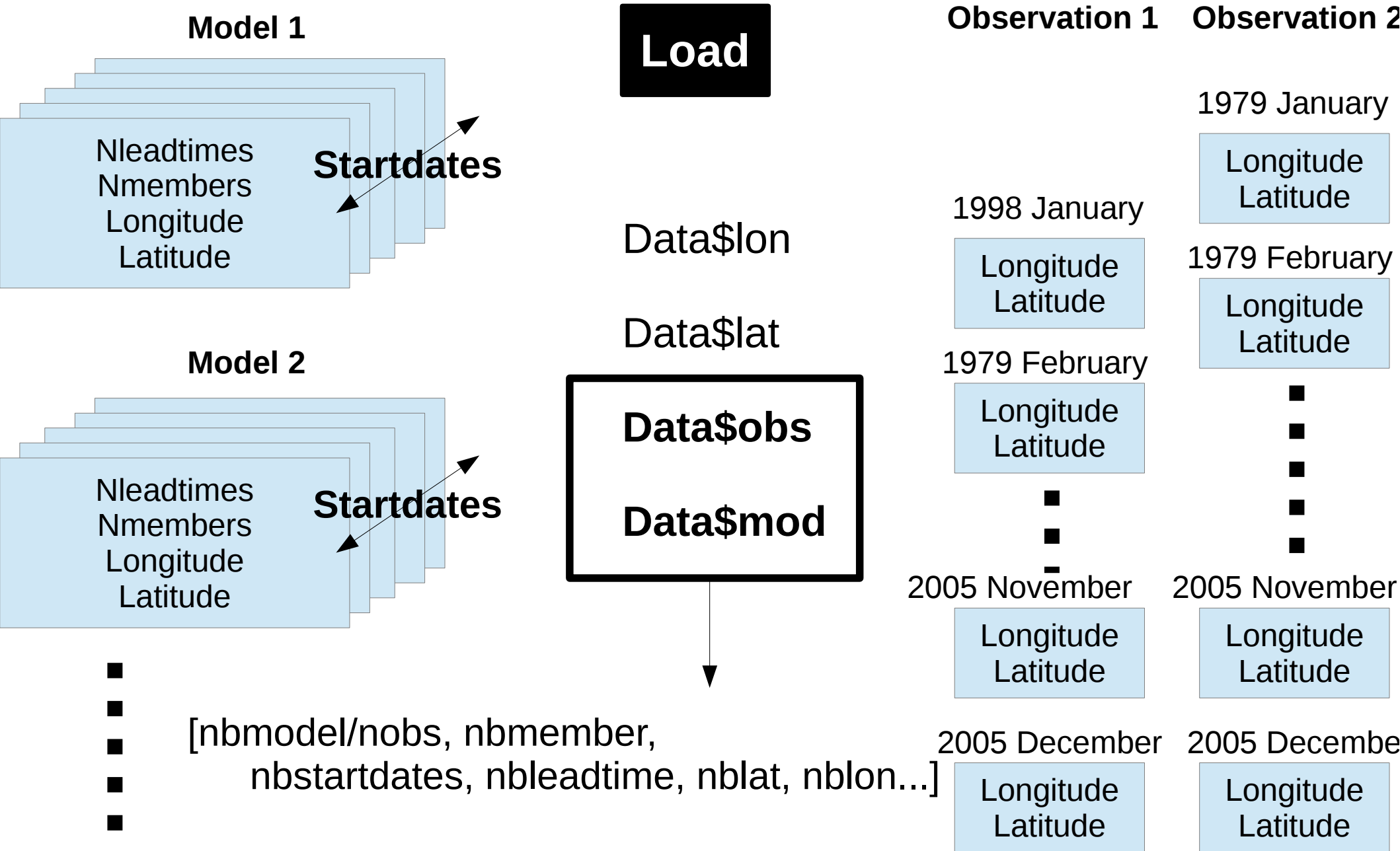


Observation 2





Seasonal forecasting of extreme events





Load

Data\$lon

Data\$lat

Data\$obs

Data\$mod



[nbmodel/nobs, nbmember,
nbstartdates, nbleadtime, nblat, nblon...]



Seasonal forecasting of extreme events

Corr

Load

Trend

ACC

Smoothing

RMS
RatioRMS

Data\$lon

Regression

RatioSDRMS

Data\$lat

Filter

RMSSS

Data\$nobs

Clim

Spread

Data\$mod

[nbmodel/nobs, nbmember,
nbstartdates, nbleadtime, nblat, nblon...]

Ano
Ano_crossvalid



Presentation of data

MODEL DATA: ENSEMBLES prediction system

ENSEMBLES Multi-model:

- INGV's ECHAM5/OPA [nbmodel, nbmember, nbstartdates, nbleadtime, nblat, nblon...]
- IFM Kiel's ECHAM5/OM1
- ECMWF's IFS/HOPE dim(Datatas\$mod): [5, 9, 27, 3, 73, 144]
- Météo-France's ARPEGE/OPA
- UK Met Office's HadGEM2 dim(Datatasmax\$mod): [5, 9, 27, 3, 73, 144]

9 members each, with different initial conditions.

Seasonal forecasts between 1979 until 2005

1 start dates: May

June July August (1month leadtime)

ERA-interim reanalysis data

[nbobs, nbmember, nbstartdates, nbleadtime, nblat, nblon...]

Period 1979-Now.

dim(Datatas\$obs): [1, 1, 27, 3, 73, 144]

dim(Datatasmax\$obs): [5, 9, 27, 3, 73, 144]



Start!

Before opening R copy paste these 4 lines in the terminal:

```
bash #(to change the shell)
```

```
R_LIBS="/afs/ictp.it/public/c/cprodhom/R/x86_64-pc-linux-gnu-library/3.0"
```

```
export R_LIBS
```

```
R
```

Or in Rstudio:

```
.libPaths("/afs/ictp.it/public/c/cprodhom/R/x86_64-pc-linux-gnu-library/3.0")
```

Open R:

```
>library(s2dverification)
```

Open the R archive:

```
>load("/afs/ictp.it/public/c/cprodhom/tas-tasmax.RData")
```

!not the same than Load of s2dverification



Correlation

Load

dim(Datatas\$mod):
[5, 9, 27, 3, 144, 73]

dim(Datatas\$obs):
[1, 1, 27, 3, 144, 73]

*Ensemble
Mean*

Mean1Dim
MeanListDim

Ensmeanmod=Mean1Dim(Datatas\$mod,2)

Ensmeanobs=Mean1Dim(Datatas\$obs,2)

dim(Ensmeanmod) → [5, 27, 3, 73, 144]

dim(Ensmeanobs) → [1, 27, 3, 73, 144]

corrskill

Corr

cor=Corr(Ensmeanmod, Ensmeanobs,
posloop=1, poscor=2)

dim(Ensmeancor) → [5, 1, ~~3~~, 4, 73, 144]

- 1: Lower confidence interval
- 2: Correlation value
- 3: higher confidence interval
- 4: p-value



Plot: corrskill for cmcc, August

corrskill

Corr

```
cor=Corr(Ensmeanmod, Ensmeanobs,
         posloop=1, poscor=2)
```

```
dim(Ensmeancor) → [5, 1, 3, 4, 73, 144]
```

colorbar

```
min=-1
max=1
int=(max-min)/20
interval=seq(min,max,int)
color=c("blue4","blue3","blue","dodgerblue3","dodgerblue2",
       "dodgerblue1","steelblue1","cadetblue2","cadetblue1",
       "white","white","gold","goldenrod","chocolate","orangered","firebrick1",
       "firebrick3","firebrick","firebrick4","red4")
```

Plot

PlotEquiMap

```
PlotEquiMap(cor[1,1,3,2,,], Datatas$lon, Datatas$lat,
            toptitle = "cmcc July start May" , sizerit = 0.6, units = "",
            brks = interval, cols = color, axelab = F, labW = F, intylat = 20, intxlon = 20,
            square=TRUE, filled.continents=FALSE)
```