Seasonal forecast of extreme events with S2dverification

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ICTP summer school, Attribution and Prediction of Extremes Events,
Trieste, Italy, July 20th – August 1st 2014

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):

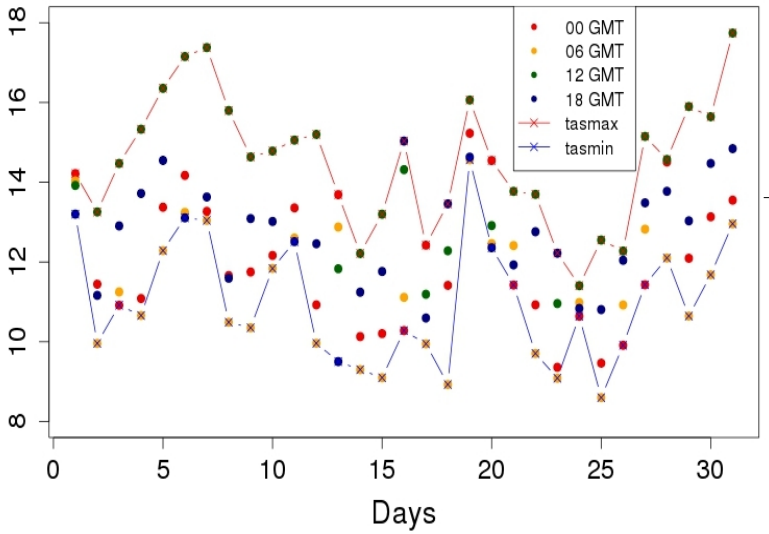
- ERA-interim: monthly extreme ERAINT.sh
- ENSEMBLES: monthly extreme ENSEMBLES.sh

→ 4 variables (10m wind module, precipitations, tasmin, tasmax)

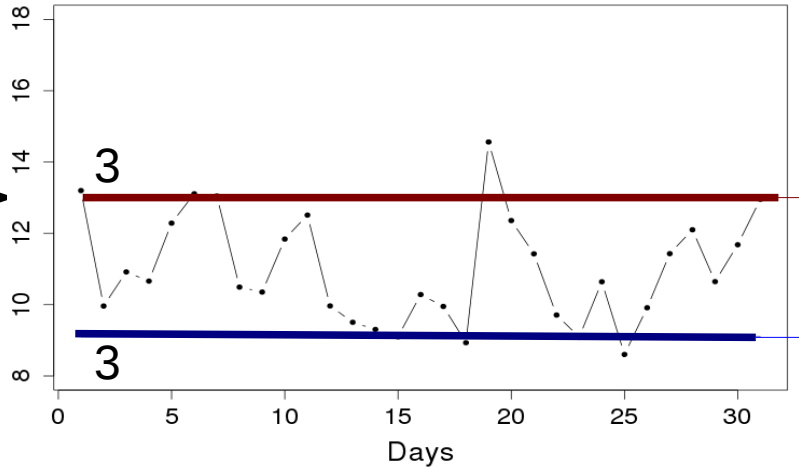
Extreme variables

6 hourly and 12 hourly data

6-hourly temperature
Jan 2013 BCN



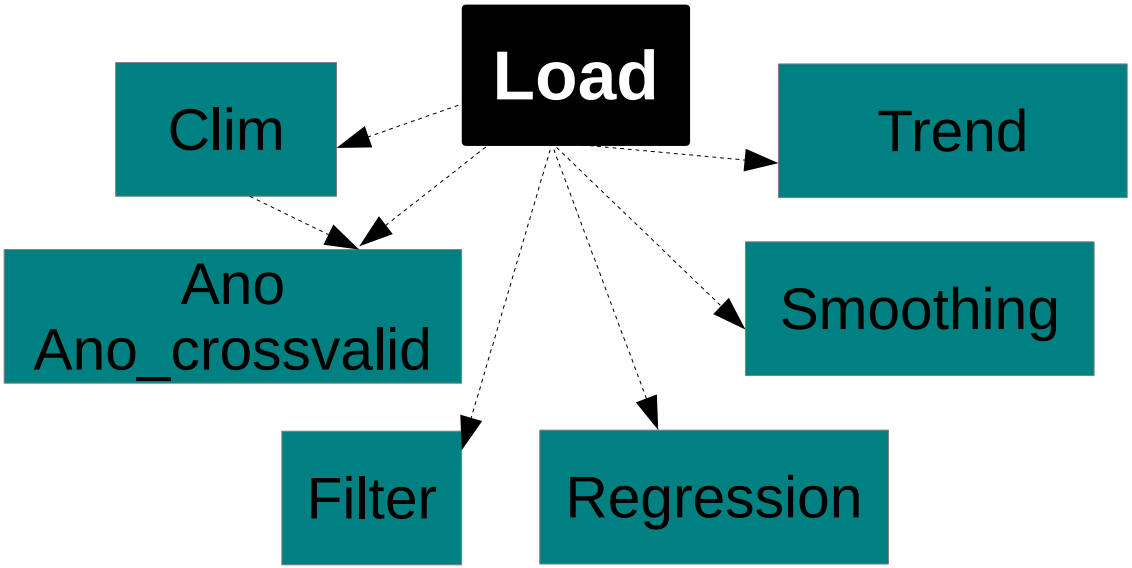
Calculate daily values
Tasmin/Tasmax
Total precipitations

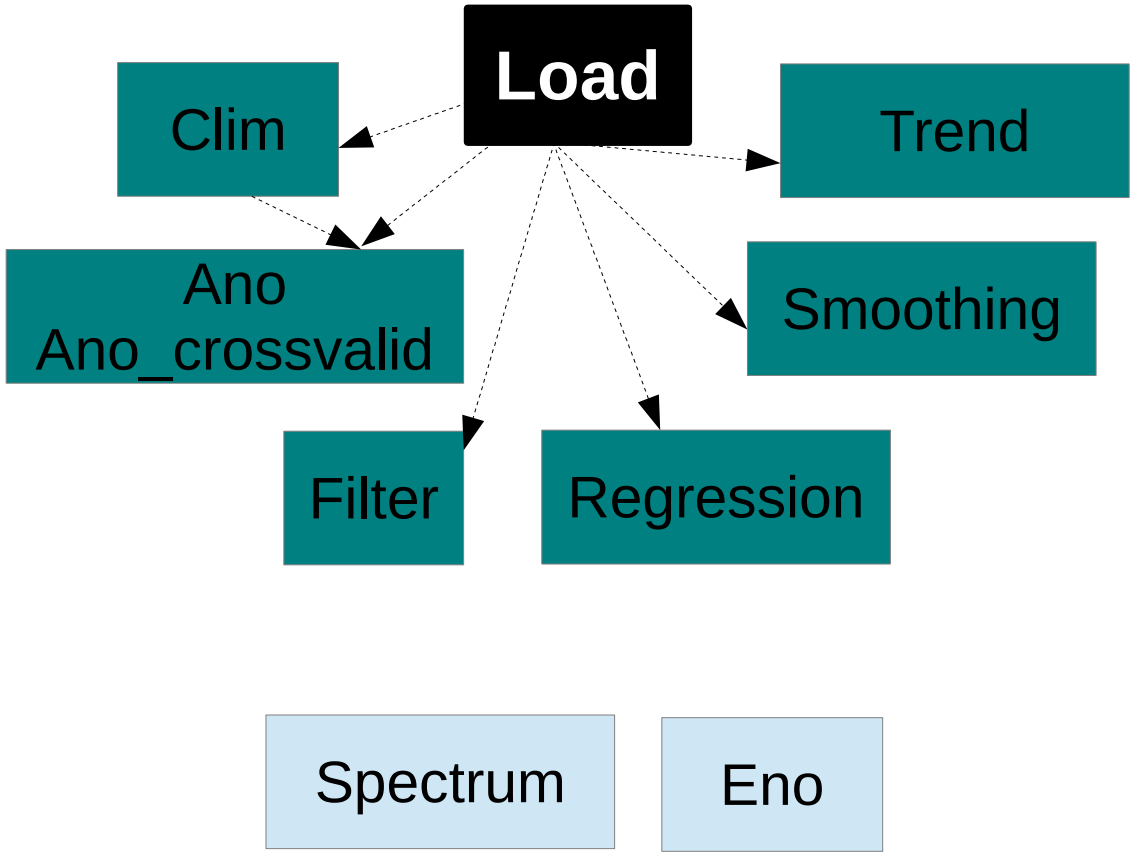


Monthly extreme variables

90th percentile

10th percentile


Load
Clim
Trend
Ano
Ano_crossvalid
Smoothing
Filter
Regression



EnLarge

LeapYear

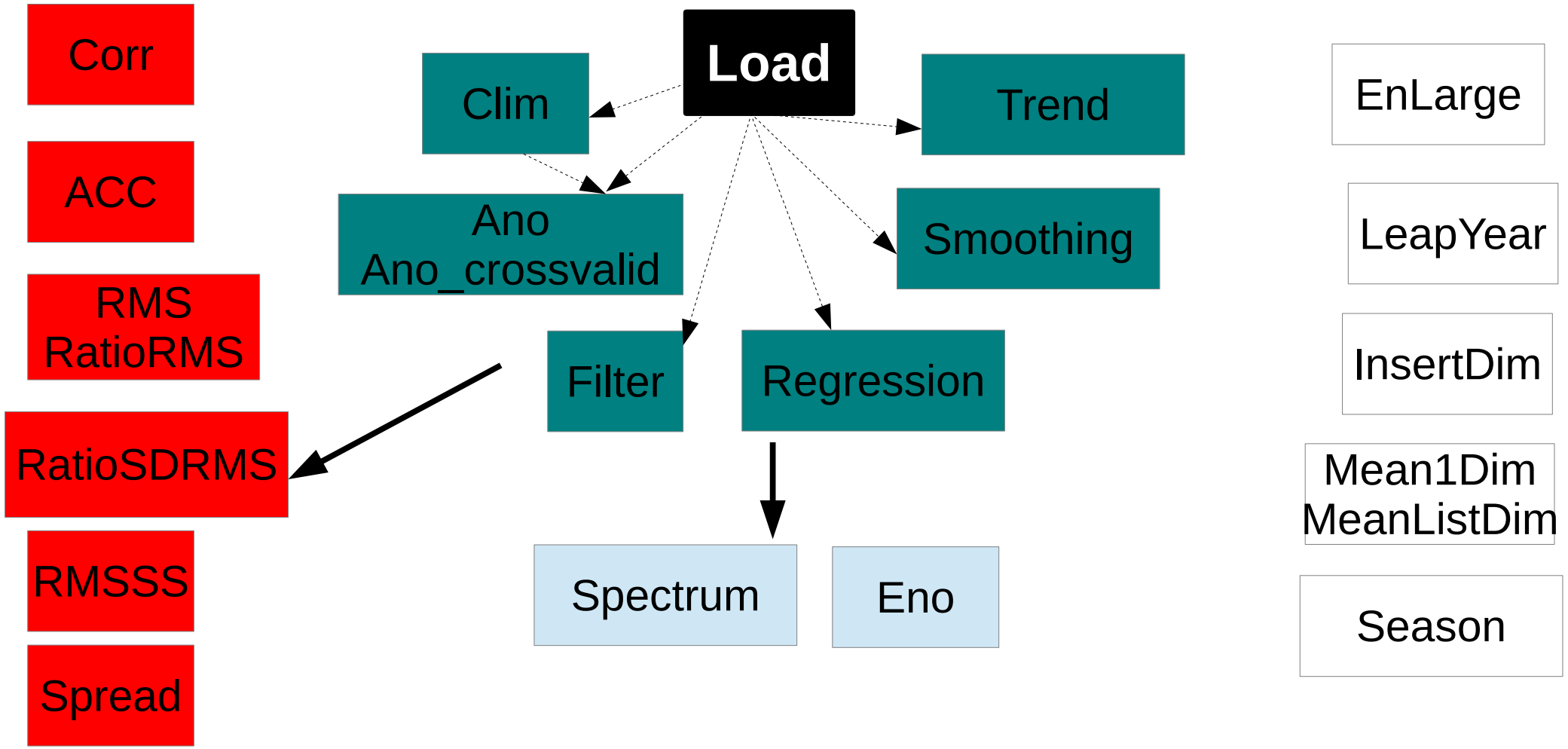
InsertDim

Mean1Dim
MeanListDim

Season

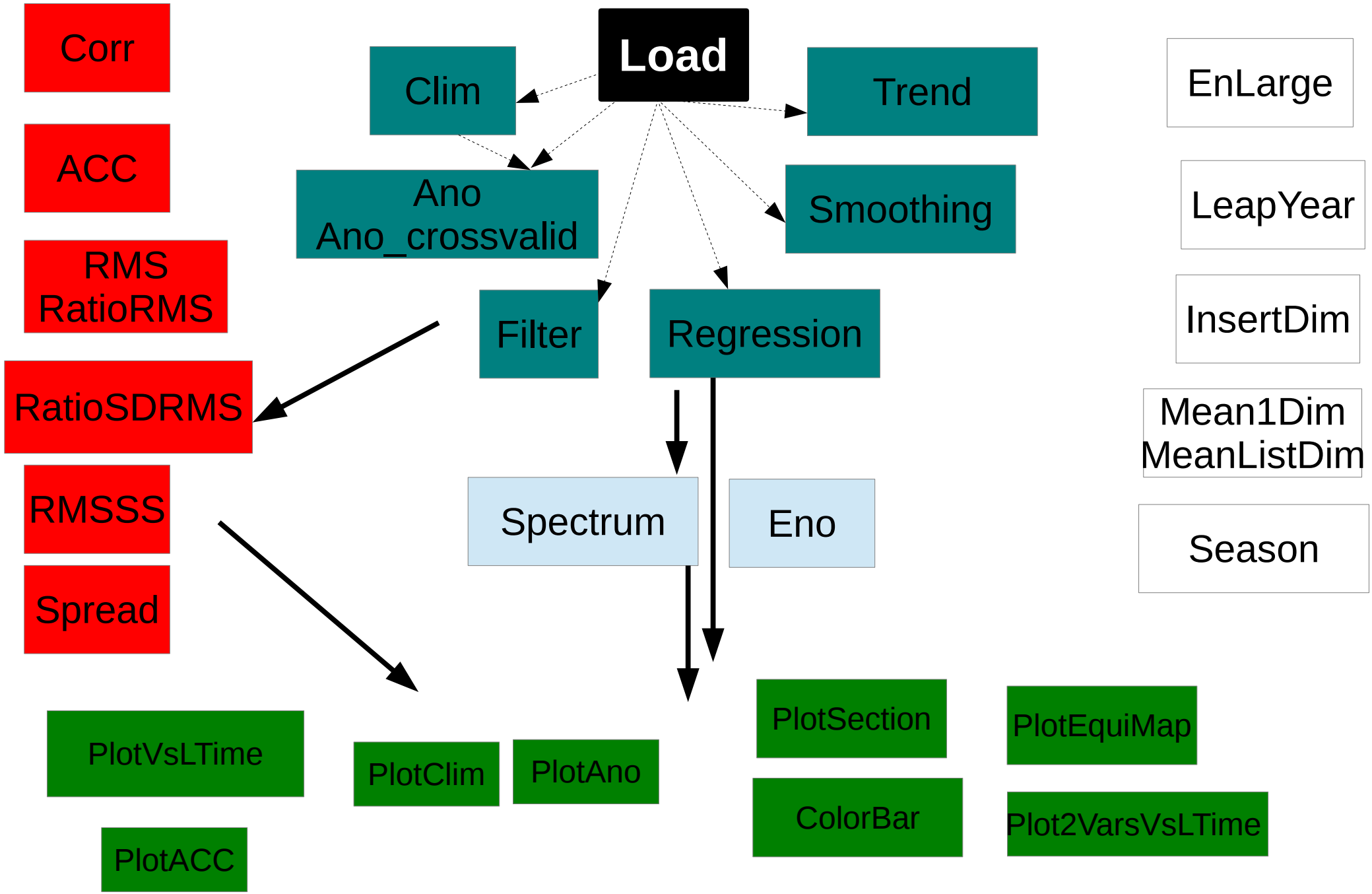
Seasonal forecasting of extreme events

Climate Forecasting Unit

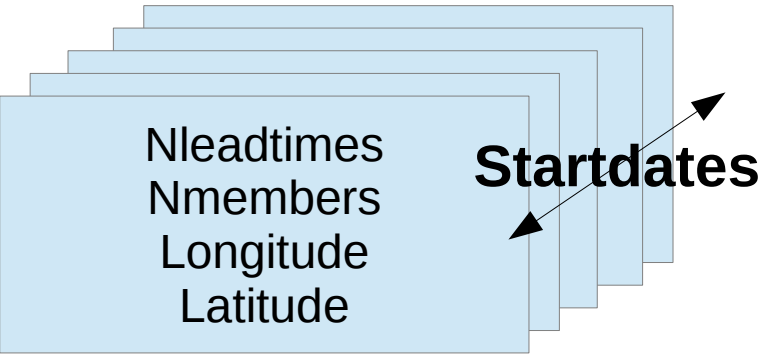


Seasonal forecasting of extreme events

Climate Forecasting Unit

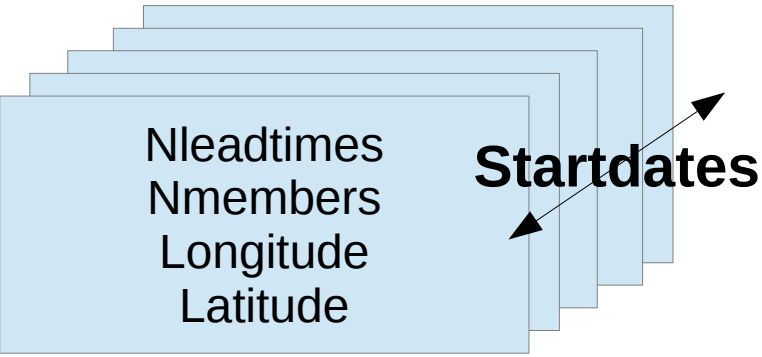


Model 1



Load

Model 2



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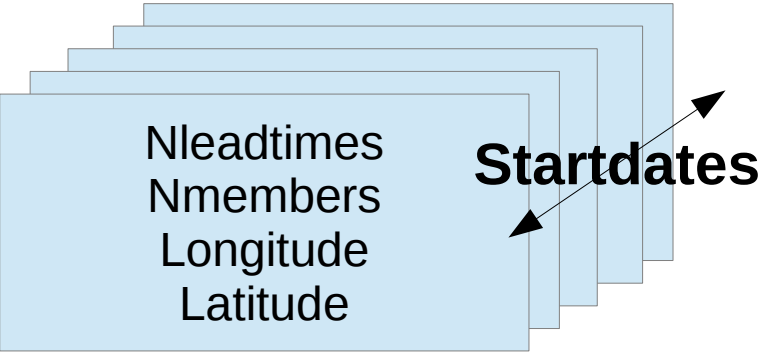
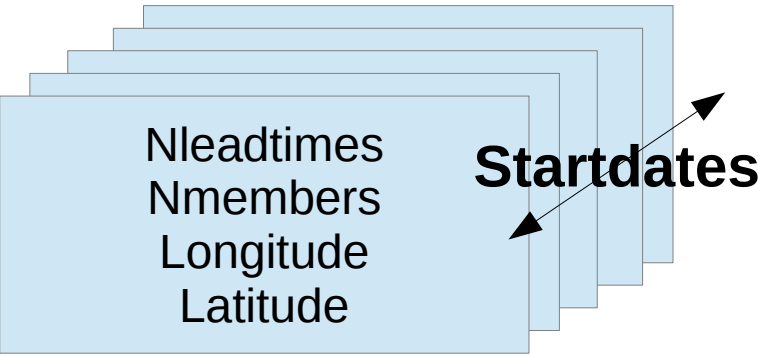
Seasonal forecasting of extreme events

Climate Forecasting Unit

Model 1



Model 2



Load

Observation 1

1998 January
Longitude
Latitude

1979 February
Longitude
Latitude

2005 November
Longitude
Latitude

2005 December
Longitude
Latitude

Observation 2

1979 January
Longitude
Latitude

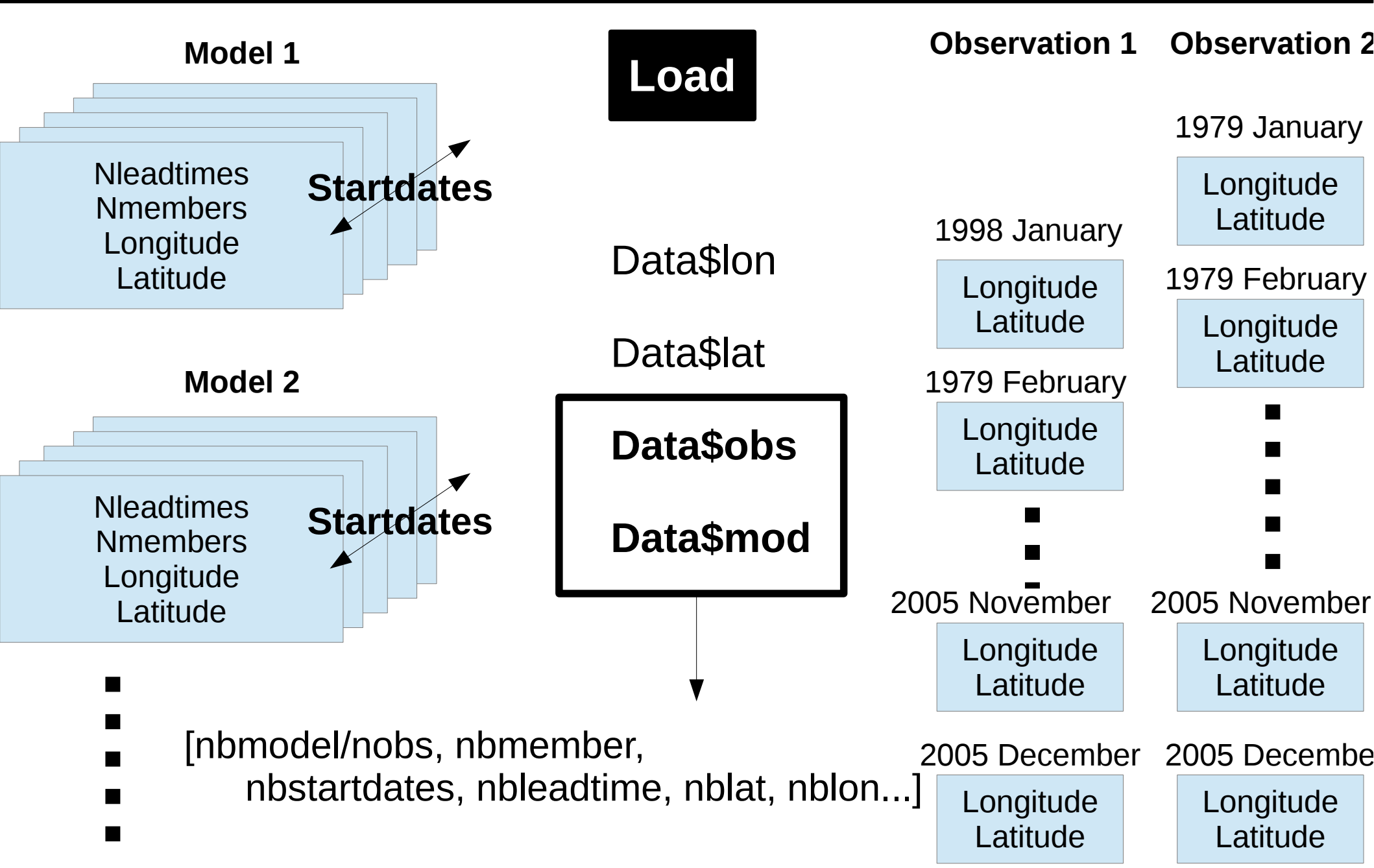
1979 February
Longitude
Latitude

2005 November
Longitude
Latitude

2005 Decembe
Longitude
Latitude

Seasonal forecasting of extreme events

Climate Forecasting Unit



Load

Data$lon

Data$lat

Data$obs

Data$mod

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

Seasonal forecasting of extreme events

Corr

ACC

RMS
RatioRMS

RatioSDRMS

RMSSS

Spread

Load

Data$lon

Data$lat

Data$obs

Data$mod

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

Trend

Smoothing

Regression

Filter

Clim

Ano
Ano_crossvalid

Presentation of data

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

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

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

Period 1979-Now.

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

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

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

Start!

Before opening R (directly in the terminal):

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

Or in Rstudio:

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

Open R:

```
>Library(s2verification)
```

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]

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" , sizetit = 0.6, units = "",
        brks = interval, cols = color, axelab = F, labW = F, intylat = 20, intxlon = 20,
        square=TRUE, filled.continents=FALSE)
```