

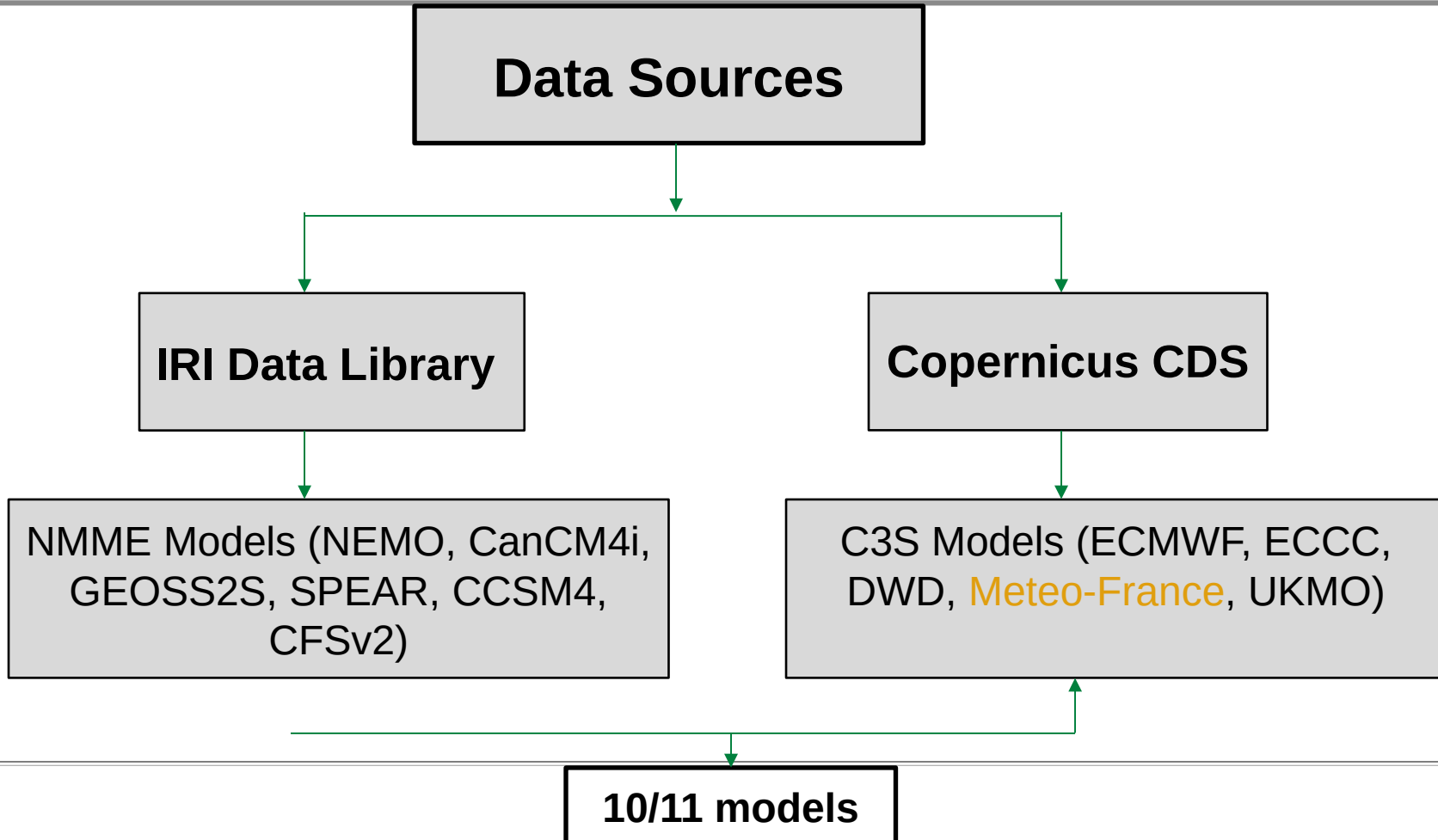
# Procedures To Generate Seasonal Forecasts Using Ensemble Regression

**Institutional Linkages, South-South Partnerships and Capacity  
Building Hands-on Workshops on  
Objective Climate Forecasts for Agriculture and Food Security  
Sector in Eastern and Southern Africa**

**30<sup>th</sup> August to 04<sup>th</sup> September 2021**

**Victoria Falls, Zimbabwe**

# Data Sources and Models to Produce the Seasonal Forecast



# Techniques for Producing the Seasonal Forecast

## Techniques



```
graph TD; Techniques[Techniques] --> LocalRegression[Local Regression]; Techniques --> CCA[Canonical Correlation Analysis (CCA)]; LocalRegression --> LocalRegressionDescription[Regressing model ensemble mean values against observation at each grid point]; CCA --> CCADescription[Identification of the optimal temporal co-variability/correlation between GCM-predicted rainfall in tropics and observed rainfall over the domain of interest.];
```

### Local Regression

Regressing model ensemble mean values against observation at each grid point

### Canonical Correlation Analysis (CCA)

Identification of the optimal temporal co-variability/correlation between GCM-predicted rainfall in tropics and observed rainfall over the domain of interest.



# Login to Training Account

## 1. Logging into the ICPAC cluster using the country access credentials and go to your working directory

- i. Login to training account

```
ssh -X training@197.254.1.14
```

- ii. Go to /gcm/Aug2021/Rscripts

```
cd name/gcm/Aug2021/Rscripts
```



# Main Scripts and Functions

```
[forecast@master Rscripts]$ ls
allocate.R                write2ncEnsRgrTT.R
allocateTT.R             write2ncMeanBsc.R
analdat                  write2ncRegr.R
epsfiles                  z0GCMs11LeadPrecDownload.ncl
FlexibleFcstParam.R     z0GCMs11LeadTrefDownload.ncl
getCPT                   zallocfunExtended.ncl
old                       zDat0p1deg_getEnsRegrTT.ncl
PlotCorrelationTT.ncl   zFcst11LeadDriverEnsBiasReg.R
plotForecastTT.ncl     zFcstPrec11LeadDriverEnsBiasReg.R
precip                   zFcstTref11LeadDriverEnsBiasReg.R
temperatures            zStatFunctionsEnsBiasRegPrec.R
write2ncEnsRgrPrec.R    zStatFunctionsEnsBiasRegTT.R
write2ncEnsRgr.R
[forecast@master Rscripts]$
```

1. Downloading Scripts for Precip & Temp

2. Calibration Scripts for Precip & Temp using EnsReg

3. Plotting Scripts for Temp



# Main Scripts and Functions

```
[ghacof@master Rscripts]$ ls -r
zStatFunctionsEnsBiasRegTT.R
zStatFunctionsEnsBiasRegPrec.R
zFcstTref11LeadDriverEnsBiasReg.R
zFcstPrec11LeadDriverEnsBiasReg.R
zDat0p1deg_getEnsRegrTT.ncl
zallocfunExtended.ncl
z0GCMs11LeadTrefDownload.ncl
z0GCMs11LeadPrecDownload.ncl
write2ncRegr.R
write2ncMeanBsc.R
[ghacof@master Rscripts]$ █
```

write2ncEnsRgr.R

temperatures  
precip

Raw Forecast Data

plotForecastTT.ncl

PlotCorrelationTT.ncl

getCPT

CPT+EnsReg  
Working Directory

FlexibleFcstParam.R

epsfiles

Maps/Plots

analdat

Calibrated Forecast  
and Skills (netCDF)

allocate.R



## Download precipitation forecast data

- i. Open **z0GCMs11LeadPrecDownload.ncl** and check the **Initial Month (XXX)** and **available model data**, then run the ncl script

```
vi z0GCMs11LeadPrecDownload.ncl
```

```
ncl z0GCMs11LeadPrecDownload.ncl
```



# Run the precipitation R-scripts to get the calibrated (or bias corrected) forecast

- i. Open **zFcstPrec11LeadDriverEnsBiasReg.R** using the vi editor and check the **Initial Month** and **Model Names** (among others) are correctly set

vi zFcstPrec11LeadDriverEnsBiasReg.R

- ii. Run R-script on **screen mode** (This will take sometime):

screen

Rscript zFcstPrec11LeadDriverEnsBiasReg.R

**ctrl-A and D** To detach the screen

**screen -r [ID]** To resume your screen session

**screen -ls** To find the session ID list

**screen -X -S [ID] kill** To kill a detached screen





# Process the CPT and EnsReg outputs under getCPT directory by editing three shell scripts

- i. Change to the getCPT directory  
`cd getCPT`
- ii. Open `getdata.sh` and check the specified variables up to line 27  
`vi getdata.sh`
- iii. Open `plotFcst.sh` and check the specified variables up to line 82  
`vi plotFcst.sh`
- iv. Open `plotSkill.sh` and check the specified variables up to line 61  
`vi plotSkill.sh`
- v) Check `plotAllForecast.csh`. Run the code to run the above 3 codes  
`./plotAllForecast.csh`

