CLIK hands-on (PART IV):
Multi Model Downscaling Using CLIK
(http://clik.apcc21.org)

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Downscaling the forecast for your station data which was uploaded in the ‘Data Processing Part’
Downscaling procedure
Downscaling procedure in CLIK

- **Observation data**
  - Station: point (uploaded)
  - Reanalysis (NCEP 2; atmospheric variables), Satellite (CAMS_OPI; precipitation): global gridded (built-in)

- **Model data (hindcast by dynamical models)**
  - Global gridded (built-in)

- **Target**: Chachas JFM precipitation
Downscaling procedure in CLIK

Step 1. Screening process
(station vs. global observation)

Screening test 1:
Do the station data and the global map from observation have a relationship based on ‘significance level’?
Do the station data have relationship with the large-scale climate pattern?

Station data (uploaded)
Global observation (NCEP II reanalysis, CAMS OPI)

Bad Stations “FAIL”
Hopeful Stations
Step 1. Screening process
(station vs. global observation)

Correlation map of global observation vs. station (Chachas)

Hopeful station?
Step 2. Screening process
(global observation vs. dynamical models)

Hopeful Stations

Dynamical models (e.g., NCEP, POAMA etc.)

Screening test 2

Screening test 2:
Can the dynamical models reproduce the relationship between the global observation and hopeful stations?
Screen based on the ‘minimum pattern correlation’.

Remain as ‘Hopeful Stations’

Good Stations

No

Yes
Step 2. Screening process
(good observation vs. dynamical models)

Correlation map of global observation vs. station (Chachas)

Good station?
Downscaling procedure in CLIK

Step 3. Downscaling

Downscaling process:
Based on the linear regression model

Regression Formula:
y = a + bx
slop(b) = (N\Sigma XY - (\Sigma X)(\Sigma Y)) / (\Sigma X^2 - (\Sigma X)^2)
intercept(a) = (\Sigma Y - b(\Sigma X)) / N
\Sigma XY = Sum of the product of first and Second Scores
\Sigma X = Sum of First Scores, \Sigma Y = sum of Second Scores
\Sigma X^2 = Sum of square First Scores

Dynamical models (e.g., NCEP, POAMA etc.)
The station data has relationship with the global observation SST in some areas.

Dynamical models can reproduce the relationship between observation and station.

We hope a successful downscaling by CLIK system...
Let’s do it!
Entering station data into CLIK

a. Follow my example step. (successful!)
b. Details of the downscaling procedure
c. Explaining the downscaling results
d. You can try other downscaling.

Then follow me.
Click NEXT
Produce a downscaled forecast

A. Select variables, models, training period, ...,
Produce a downscaled forecast

A. Select variables, models, training period, ...

Select prediction season
2016 JFM
Produce a downscaled forecast

A. Select variables, models, training period, ...

Select predictor variable SST
Produce a downscaled forecast

A. Select variables, models, training period, ...

<table>
<thead>
<tr>
<th>Prediction Season</th>
<th>Downscaling Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year: 2016</td>
<td>Latitude: 0 - 10</td>
</tr>
<tr>
<td>Season: SCN</td>
<td>Longitude: 120 - 150</td>
</tr>
</tbody>
</table>

### Variable
- PRCG
- SLP
- U850
- V850
- U1000
- V1000
- SST

### Models
- APCC
- MSC
- NASA
- NCEP
- PNU
- POAMA

### Predictand
- Precipitation
- Temperature

### Training Period
- From: 1982
- To: 2010

### Method
- Linear Regression

### Advanced Options
- Significance Level: 5%
- Minimum Pattern Score: 0.1

Select predictor models
NCEP, NASA, POAMA, APCC
(All the models have 2016 JFM SST are shown as default)
Produce a downscaled forecast

A. Select variables, models, training period, …,

Select predictand (two)
Precipitation
Produce a downscaled forecast

A. Select variables, models, training period, ...

Select training period
Common period of model and station data is shown as default. 1982-2010
Produce a downscaled forecast

A. Select variables, models, training period, …,

Select options for screening
Significance level 5%
Test value for the screening test 1: relationship between station (Chachas prcp.) and global observation (SST)

Minimum pattern score 0.1
Test value for the screening test 2: Resemblance of dynamical model pattern (SST) with the global observation (SST) over the predictor area
Produce a downscaled forecast

A. Select variables, models, training period, ...

Downscaling region (predictor area)
0-10N, 120E-150E
Western Pacific region
Produce a downscaled forecast

B. Results

<table>
<thead>
<tr>
<th>JOB ID</th>
<th>TYPE</th>
<th>STATE</th>
<th>RESULT DATA</th>
<th>CREATED</th>
<th>UPDATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>4236</td>
<td>Downscale</td>
<td>success</td>
<td>download</td>
<td>2016-08-22 21:14:57</td>
<td>2016-08-22 21:14:57</td>
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<tr>
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<td>Downscale</td>
<td>success</td>
<td>download</td>
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<td>2016-08-22 21:08:37</td>
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<tr>
<td>4234</td>
<td>Downscale</td>
<td>success</td>
<td>download</td>
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<td>2016-08-22 20:44:55</td>
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<tr>
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<td>fail</td>
<td>download</td>
<td>2016-08-22 20:02:18</td>
<td>2016-08-22 20:02:18</td>
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<td>2016-08-08 15:24:34</td>
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<tr>
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<td>download</td>
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<td>2016-08-08 15:21:13</td>
</tr>
<tr>
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<td>fail</td>
<td>download</td>
<td>2016-08-08 14:15:13</td>
<td>2016-08-08 14:15:13</td>
</tr>
</tbody>
</table>

1. You will see the ‘state’ of the process. After the process is done, you will see ‘fail’ or ‘success’.
2. Click the job line to see the brief results.
3. You can download the results anytime.
4. Click ‘ViewResults’ button to see the detailed results of downscaling.
Produce a downscaled forecast

B. Results

5. Select ‘MODELS’.
6. Click the station ID where you are interested in. Then you can see the prediction results for each station.
   - Good: found relationship with global observation & dynamical models
   - Hopeful: found relationship with global observation but not with dynamical models.
Produce a downscaled forecast

B. Results

Historical station time series & historical prediction time series (hindcast) for the station
Correlation coefficient skill
Deterministic forecast
Tercile category of the forecast
Produce a downscaled forecast

B. Results

<table>
<thead>
<tr>
<th>Selected Stations</th>
<th>Location of the station</th>
</tr>
</thead>
<tbody>
<tr>
<td>97014801</td>
<td>Dakar</td>
</tr>
<tr>
<td>97014802</td>
<td>Good</td>
</tr>
<tr>
<td>97026001</td>
<td>Good</td>
</tr>
<tr>
<td>97026002</td>
<td>Good</td>
</tr>
<tr>
<td>97026000</td>
<td>Hopeful</td>
</tr>
</tbody>
</table>
Produce a downscaled forecast

B. Results

Relationship between the predictor, SST from the global observation data & the station data over the selected area (western Pacific) (Test of the 1st screening)
Produce a downscaled forecast

B. Results

Relationship pattern between the model data & the station data over the selected area
(Test of the 2\textsuperscript{nd} screening)
Produce a downscaled forecast

B. Results

CLIK

New Downscale
Moves to selection page
Produce a downscaled forecast

If the downscaling fails, be patient and try more!

- Find the large scale climate system (predictor) that affects local climate.
- Tropical area can be good choice (dynamical models have good skill).
- Find correlation maps that we provide you.
Thank you.