CLIK hands-on (part IV):

Multi Model Downscaling using CLIK
(http://clik.apcc21.org)

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Downscaling procedure in CLIK

**Station data**
- Point (uploaded)

**Global observation data**
- Grid (built-in)
- Reanalysis: NCEP2; atmospheric variables
- Satellite: CAMS OPI; precipitation

**Model data**
- Grid (built-in)
- Hindcast by dynamical models

http://clik.apcc21.org
Downscaling procedure in CLIK

**STEP I**
- Station data
- Global observation data

Screening test 1
- No → Bad Stations
- Yes → Hopeful Stations

**STEP II**
- Hopeful Stations
- Model data

Screening test 2
- No → Remain as “Hopeful Station”
- Yes → Good Stations

**STEP III**
- Downscaled Forecast for the station
- Downscaling

Model data
- Good Stations
- Model data

http://clik.apcc21.org
Downscaling procedure in CLIK

**Screening test 1:**
- Do the station data and the global map from observation data have a relationship based on “significance level”? ✓
- Does the station data have relationship with the large-scale climate pattern? ✓

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**STEP 1**

Correlation map of *global observation* vs. station
Downscaling procedure in CLIK

Screening test 2:

- Can the dynamical models reproduce the relationship between the global observation and hopeful station data?
- Screen based on the “minimum pattern correlation”.

**STEP II**

- **Hopeful Stations**
  - Yes: Good Stations
  - No: Remain as “Hopeful Station”

- **Model data**

Correlation map of global observation vs. station

Correlation map of model data vs. station

Heatmaps showing sst vs. prec and sst (scm) vs. prec over the JJA season.
Downscaling procedure in CLIK

Downscaling process:

- Based on the linear regression model
- \( y = a + bx \)

**STEP III**

- Good Stations
- Model data

- Downscaled Forecast for the station
The station data has relationship with the global observational SST over some areas.

Dynamical models can reproduce the relationship between observation and station data.

We hope a successful downscaling by CLIK system...
Precipitation over Daegu for OND 2018?
Produce a downscaled forecast:
precipitation over Daegu for OND 2018
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Job description
Seoul / 2018 OND / TEMP / SST
(up to you)
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictand: season
2018 OND
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictand: variable

Temperature
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictor: variable

SST
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictor: Models

APCC + MSC + NASA + NCEP + PNU
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictor: Training Period
Common period of selected models
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictor: Method
Linear Regression
A. Set options

Predictor: Advanced Options
Significance Level: 5%
Minimum Pattern Score: 0.1
Produce a downscaled forecast:
precipitation over Daegu for OND 2018

**CLIK downscaling**

*A way to localize existing coarse climate information*

CLIK downscaling is mainly based on station to Large Scale Meteorological Field (LSMF) relationship. \( Y = aX + b \) By utilizing the simulated LSMF \( X \), predictor, CLIK estimates seasonal mean precipitation/temperature \( Y \), predictand at specific station.

**Empirical relationship: LSMP (OBS) \( \rightarrow \) local station rainfall**

**LSMP (MME) \( \rightarrow \) Local station rainfall**

**Screening test 1**

**Screening test 2**
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictor: Domain
The northwestern North Pacific

- Set options
  - Daegu / 2018 OND / PREC / SST
  - Precipitation over Daegu for OND 2018
  - Predictor: Domain
    - The northwestern North Pacific
  - Set options:
    - Variable: Precipitation
    - Domain: Northwestern North Pacific
Produce a downscaled forecast: precipitation over Daegu for OND 2018

A. Set options

Predictor: Domain
The northwestern North Pacific
Produce a downscaled forecast: precipitation over Daegu for OND 2018

Large scale pattern associated with station 143 on Daegu

- Season: OND
- Station variable: PREC
- Reanalysis variable: SST
- Period: From 1982 to 2008
- Method: One point correlation

Domain: North Pacific

http://clik.apcc21.org
## Produce a downscaled forecast: precipitation over Daegu for OND 2018

### Predictor: Domain

The northwestern North Pacific

### A. Set options

**Job description**

- **Daegu / 2018 OND / PREC / SST**

**Predictand**

- **Season**
  - Year: **2018**
  - Season: **OND**
- **Variable**
  - Precipitation

**Predictor**

- **Variable**
  - PREC
  - SLP
  - U850
  - V200
  - SST

- **Models**
  - APCC
  - CMCC
  - MSC
  - NASA
  - NCEP
  - PNU
  - POAMA

- **Training Period**
  - From: **1983**
  - To: **2007**

- **Method**
  - Linear Regression

- **Advanced Options**
  - Significance Level: **5.0%**
  - Minimum Pattern Score: **0.3**

**Domain**

- **Latitude**: -25 ~ 15
- **Longitude**: 160 ~ 300

[Run with new selections]

[Image of online tool interface]

[http://clik.apcc21.org]
Produce a downscaled forecast: precipitation over Daegu for OND 2018

Let’s try!
Produce a downscaled forecast:
precipitation over Daegu for OND 2018

Let’s try!

Job description:
Daegu / 2018 OND / TEMP / SST

Predictand:
2018 OND, Temperature

Predictor:
SST
APCC+MSC+NASA+NCEP+PNU+POAMA
25N-50N, 120E-200E
B. Check results

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<th>STATE</th>
<th>DESCRIPTION</th>
<th>CREATED</th>
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B. Check results

### My Page

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<th>DOWNSCALE ID</th>
<th>DATE/TIME</th>
<th>PREDICTAND</th>
<th>YEAR/SEASON</th>
<th>TRAINING PERIOD</th>
<th>VARIABLE</th>
<th>DATASET</th>
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<th>SIGNIFICANCE LEVEL</th>
<th>MINIMUM PATTERN SCORE</th>
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<td>2018 / 10</td>
<td>1983 / 2007</td>
<td>SST</td>
<td>Korea 50 Stations [ID:2]</td>
<td>1 Stations</td>
<td>5%</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Description:**
Daegu / 2018 OND / PREC / SST

**Feedback:**
C. Check results.

1. Job summary
2. Historical time series of hindcast and station data, Correlation coefficient, Deterministic forecast, Tercile category of the forecast
3. Location of station
4. Relationship pattern between the predictor (sst, observation) and the station data (precipitation) over the selected area
5. Relationship pattern between the predictor (sst, model) and the station data (precipitation) over the selected area
Exercise

Make your own seasonal climate outlook for OND 2018!

[Image of a website interface with options for selecting variables, models, and domains for climate prediction.]
Thank you!