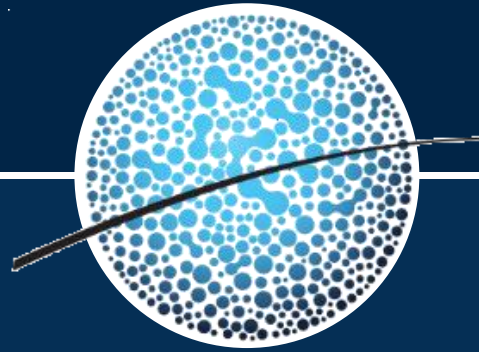


CLIK hands-on (PART IV):  
**Multi Model Downscaling Using  
CLIK**  
(<http://clik.apcc21.org>)

Yoojin Kim



- ✓ **Downscaling the forecast for your station data which was uploaded in the 'Data Processing Part'**



# Downscaling procedure

# Downscaling procedure in CLIK

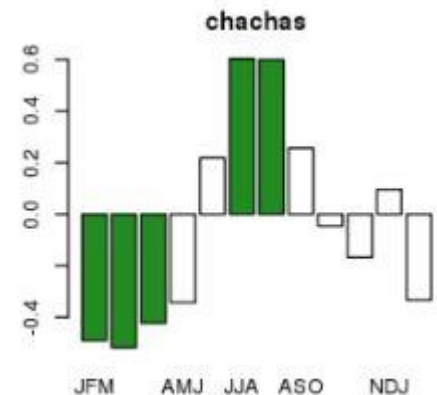
## ● Observation data

- Station: point (uploaded)
- Reanalysis (NCEP 2; atmospheric variables), Satellite (CAMS\_OPI; precipitation): global gridded (built-in)

## ● Model data (hindcast by dynamical models)

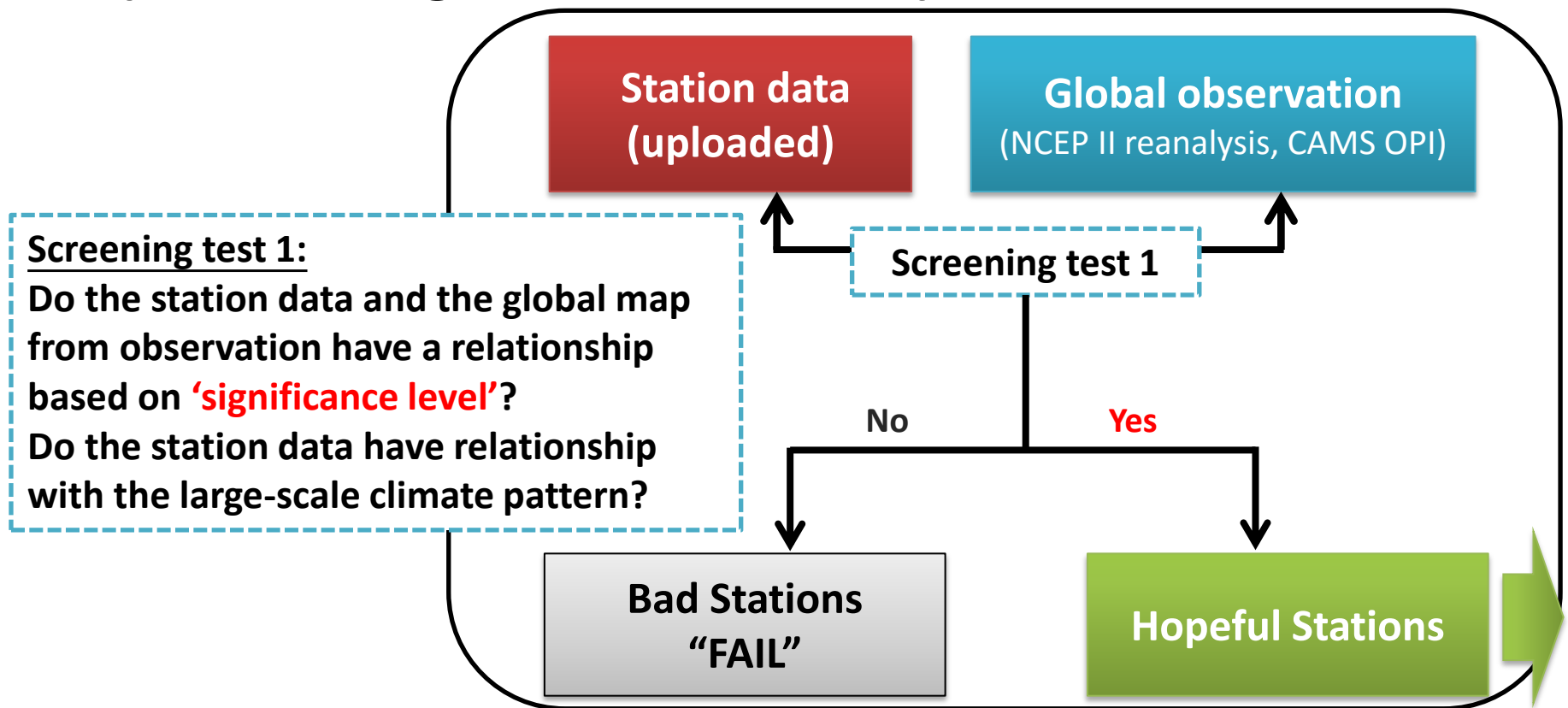
- Global gridded (built-in)

✓ Target : Chachas JFM precipitation



# Downscaling procedure in CLIK

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



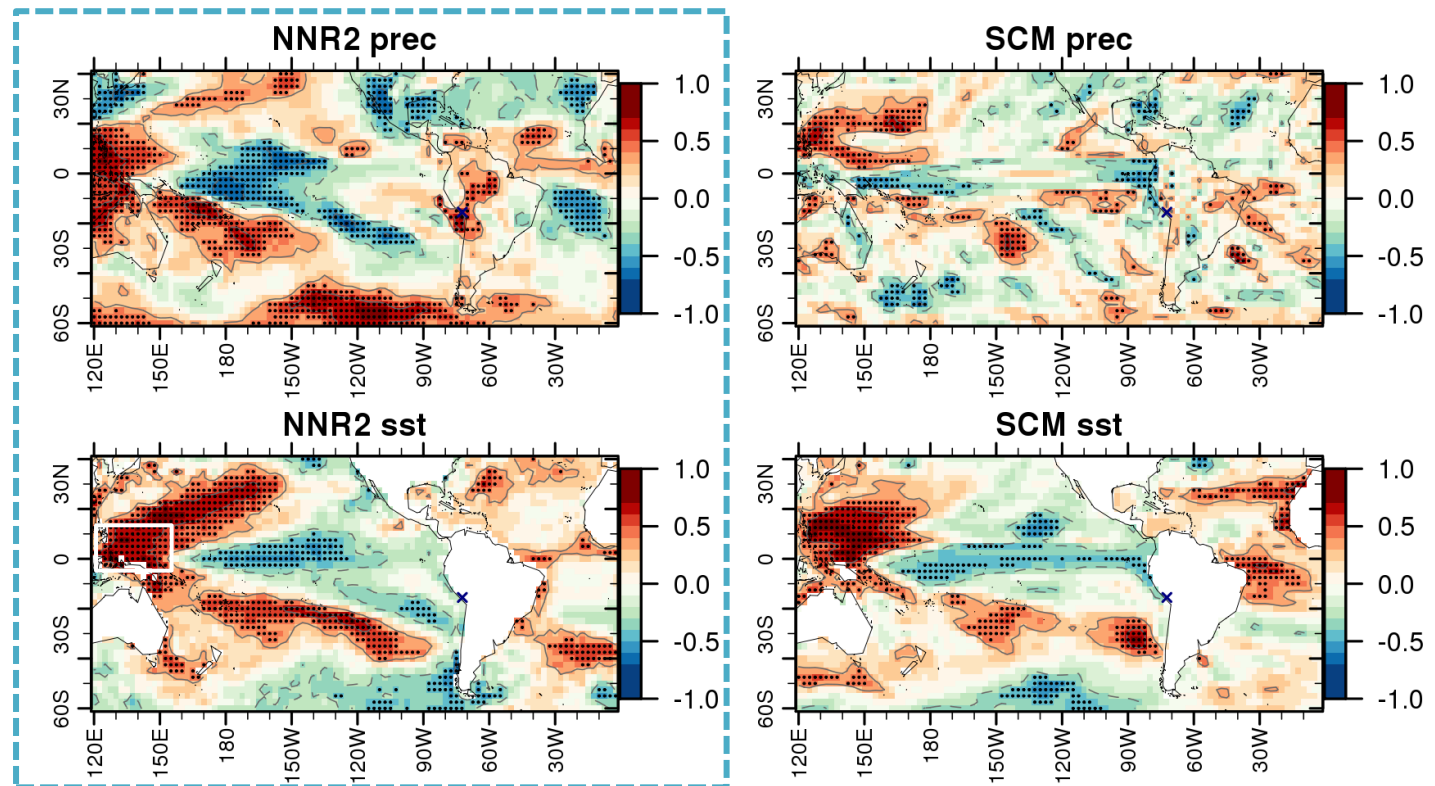
# Downscaling procedure in CLIK

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

Correlation map  
of global  
observation vs.  
station (Chachas)

Hopeful station?

chachas [JFM]





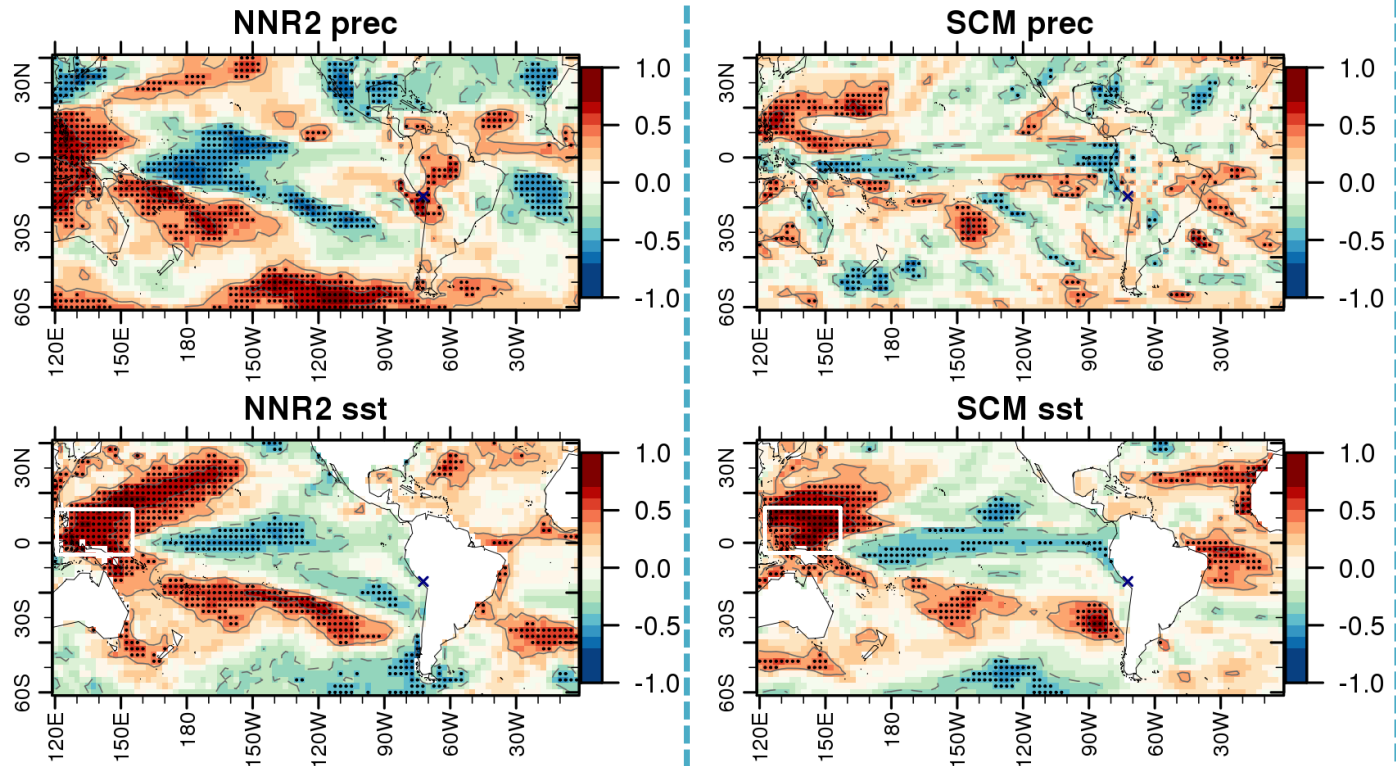
# Downscaling procedure in CLIK

- **Step 2. Screening process**  
**(global observation vs. dynamical models)**

Correlation map  
of model data vs.  
station (Chachas)

chachas [JFM]

Correlation map  
of global  
observation vs.  
station (Chachas)

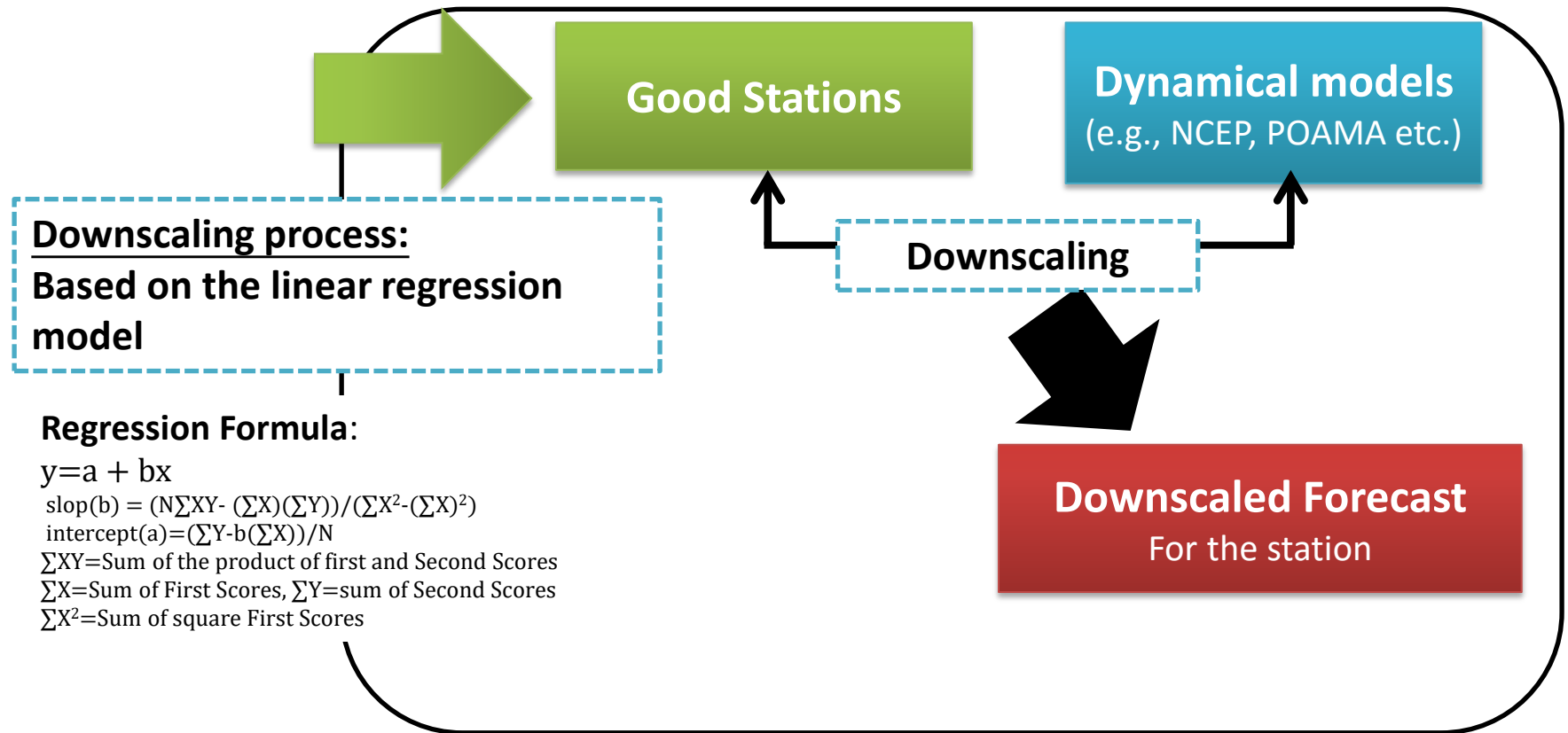


Good station?



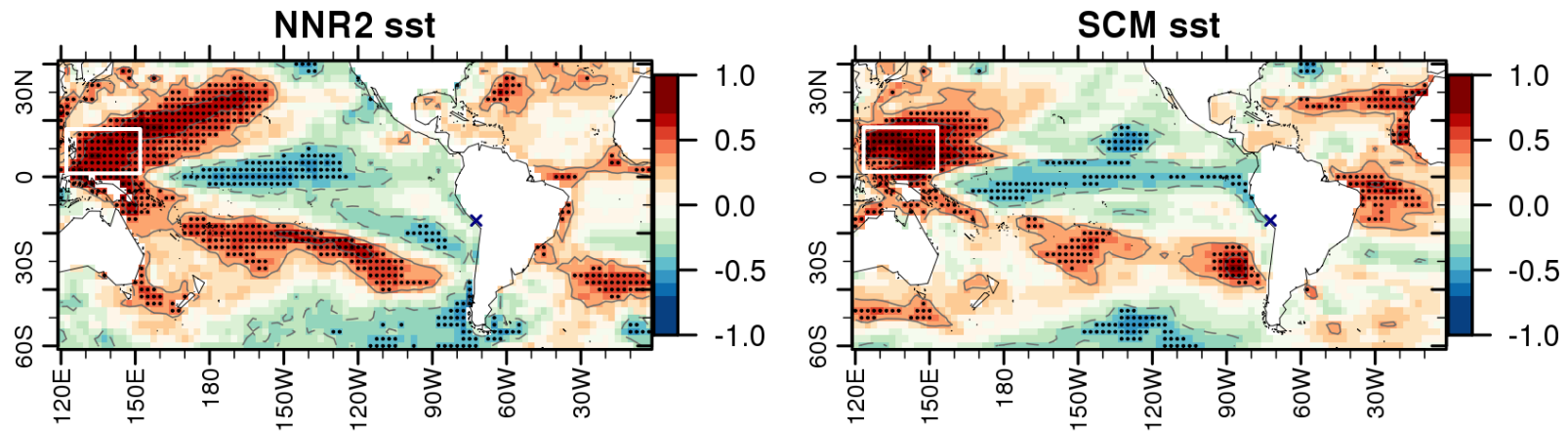
# Downscaling procedure in CLIK

## ● Step 3. Downscaling

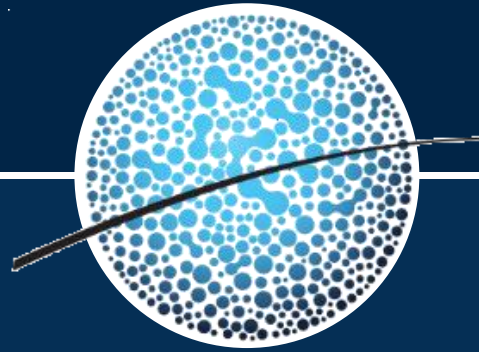


# Downscaling procedure in CLIK

## Relationship between Chachas station prcp. & ...



- 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

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

Then follow me.  
Click NEXT



Select Dataset / Station

Dataset Name	Countries	Total Stations	Period(prec)	Period(temp)	Public
Korea 60 Stations	Korea, Republic of	60	1973 ~ 2...	1973 ~ 2...	PUBLIC
peru	Peru	2	1964 ~ 2...	N/A	yoojin1
koreameah	Korea, Republic of	1	1973 ~ 2...	N/A	yoojin1

Create
Edit
Remove

Add
Remove

Station (2)				
Station ID	Name	Precipitation	Temperature	
786	Huancane	1981/1 ~ 2015/12	N/A	
157312	chachas	1964/1 ~ 2016/12	N/A	

Common data period of selected stations

Month	1	2	3	4	5	6	7	8	9	10	11	12
1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964
Precipitation	~	~	~	~	~	~	~	~	~	~	~	~

NEXT



# Produce a downscaled forecast

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

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
Form: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5 %  
Minimum Pattern Score: 0.1

**Downscaling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150 [Apply](#)

[Previous](#) [Downscale](#)



# Produce a downscaled forecast

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

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
Form: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5 %  
Minimum Pattern Score: 0.1

**Downscaling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150 Apply

Map showing the Downscaling Region with a highlighted area in Southeast Asia. A tooltip displays: Lat: 0.000000 Lon: 120.000000 150.000000 Area: 1442720

5000km

Previous Downscale

Select prediction season  
2016 JFM

# Produce a downscaled forecast

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

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
Form: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5%  
Minimum Pattern Score: 0.1

**Downscaling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150 Apply

Lat: 0.000000  
Lon: 120.000000  
150.000000  
Area: 1442726

5000km

Previous Downscale

Select predictor variable  
SST

# Produce a downscaled forecast

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

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
Form: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5%  
Minimum Pattern Score: 0.1

**Downscaling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150 Apply

Lat: 0.000000  
Lon: 120.000000  
150.000000  
Area: 1442726

5000km

Previous Downscale

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, ...,

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
Form: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5 %  
Minimum Pattern Score: 0.1

**Downscaling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150

Select predictand (two)  
Precipitation

# Produce a downscaled forecast

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

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
Form: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5%  
Minimum Pattern Score: 0.1

**Downsampling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150 Apply

Lat: 0.000000  
Lon: 120.000000  
150.000000  
Area: 1442726

5000km

Previous Downscale

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, ...,

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
From: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5%  
Minimum Pattern Score: 0.1

**Downscaling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150 Apply

Map showing the Downscaling Region with a highlighted area in Southeast Asia. Coordinates: Lat: 0.000000, Lon: 120.000000, 150.000000, Area: 1442720. Scale: 5000km.

Previous Downscale

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, ...,

**Prediction Season**  
Year: 2016 Season: SON

**Variable**  
 PREC  T850  Z500  
 SLP  U850  V850  
 U200  V200  SST

**Models**  
 APCC  MSC  NASA  
 NCEP  PNU  POAMA

**Predictand**  
 Precipitation  Temperature

**Training Period**  
Form: 1982 To: 2010

**Method**  
 LinearRegression

**Advanced Options**  
Significance Level: 5%  
Minimum Pattern Score: 0.1

**Downscaling Region**  
Latitude: 0 ~ 10 Longitude: 120 ~ 150 Apply

World map showing the selected region in the Western Pacific. A tooltip displays: Lat: 0.000000, Lon: 120.000000, 150.000000, Area: 1442726. A 5000km scale bar is visible at the bottom left of the map.

Previous Downscale

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

# Produce a downscaled forecast

## B. Results

My Page

JOB ID	TYPE	STATE	RESULT DATA	CREATED	UPDATED
4236	Downscale	success	download	2016-08-22 21:14:57	2016-08-22 21:15:09
4235	Downscale	success	download	2016-08-22 21:08:37	2016-08-22 21:15:09
4234	Downscale	success	download	2016-08-22 20:04:45	2016-08-22 20:05:02
4233	Downscale	fail		2016-08-22 20:02:18	2016-08-22 20:02:18
4226	Downscale	fail		2016-08-22 13:00:04	2016-08-22 13:00:05
4175	Downscale	fail		2016-06-08 15:31:29	2016-06-08 15:31:29
4174	Downscale	fail		2016-06-08 15:24:34	2016-06-08 15:24:39
4173	Downscale	fail		2016-06-08 15:22:57	2016-06-08 15:23:00
4172	Downscale	fail		2016-06-08 15:21:13	2016-06-08 15:21:20
4171	Downscale	fail		2016-06-08 14:15:08	2016-06-08 14:15:13

Showing 1 to 10 of 81 entries

Previous 1 2 3 4 5 ... 9 Next

Details

JOB ID	4236	CREATE At	2016-08-22 21:14:57
DOWNSCALE ID	3540	UPDATE At	2016-08-22 21:15:09
PREDICTAND		PREDICTOR	
YEAR/SEASON	2016 / 6	Training Period	1982 / 2004
PREDICTAND	PREC	VARIABLE	PREC
DATASET	Aphrodite data interpolated to Monsoon Asia Region [ID:7602]	MODELS	NCEP
STATION	3 Stations	REGION	Lat -10 -10/ Lon 50-130
SIGNIFICANCE LEVEL			5%
MINIMUM PATTERN SCORE			0.3
FEEDBACK			

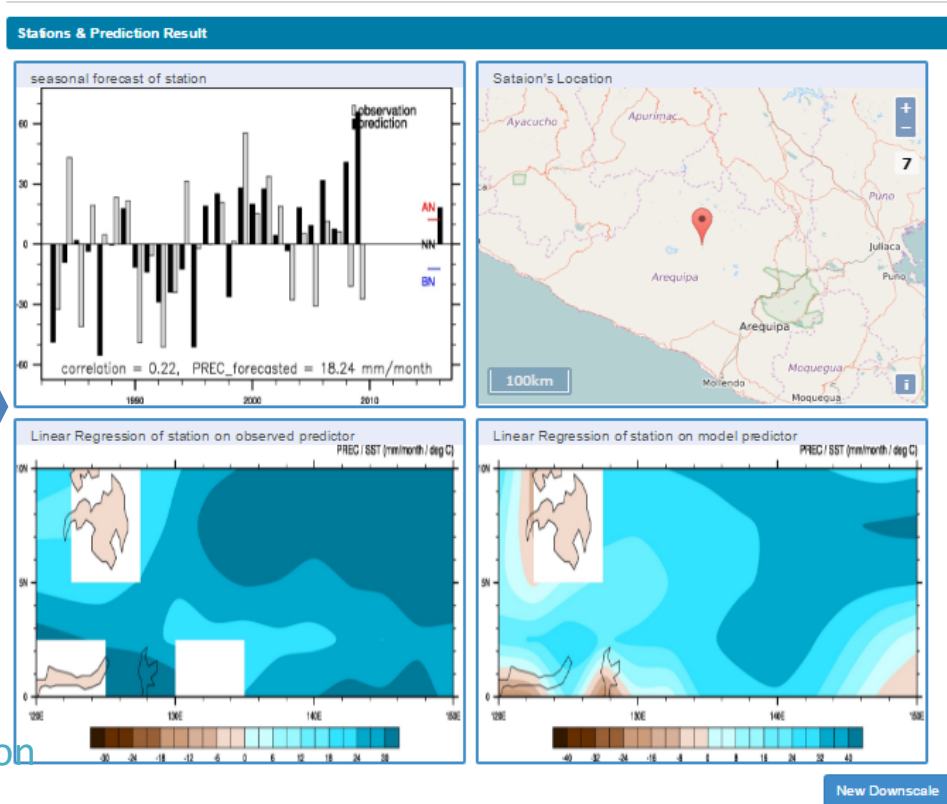
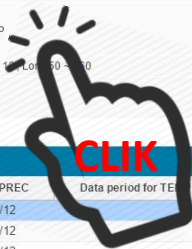
ViewResult Edit

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

Details					
PREDICTAND		PREDICTOR			
YEAR/SEASON	2016 /6	Training Period	1982 /2004		
PREDICTAND	PREC	VARIABLE	PREC		
DATA SET	Aphrodite data Interpolated to Monsoon Asia Region	MODELS	☉ NCEP		
REGION	11 Stations	REGION	Lat: -10 ~ 10, Lon: 90 ~ 110		
SIGNIFICANCE LEVEL	5%				
MINIMUM PATTERN SCORE	0.3				
<input checked="" type="checkbox"/> List up hopeful & good result stations only					
Selected Stations					
Station ID	Result	Name	Data period for PREC	Data period for TEM	Correlation
97014000	Good	Mapangnet/manado_Indonesia	1961/1 ~ 2004/12		0.308431
97014001	Good	Amurang	1961/1 ~ 2004/12		0.308376
97014002	Good	Talisei	1961/1 ~ 2004/12		0.306781
97026001	Hopeful	Noancan	1961/1 ~ 2004/12		0.287869
97026002	Good	Modayak	1961/1 ~ 2004/12		0.295097
97028000	Hopeful	Tolitoli_Indonesia	1961/1 ~ 2004/12		0.416711

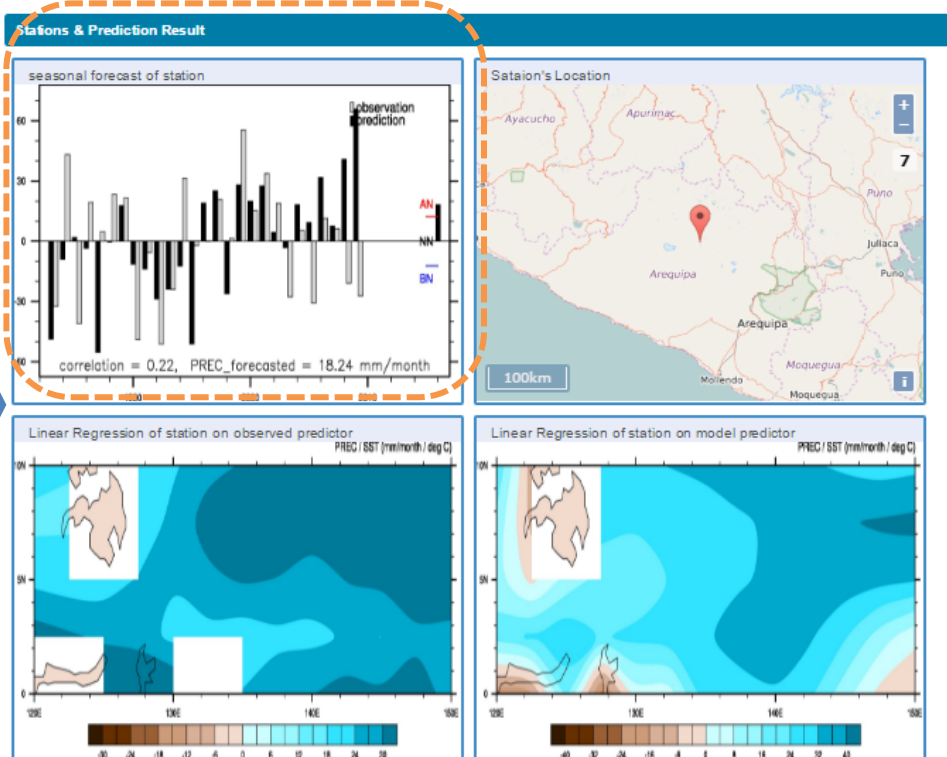
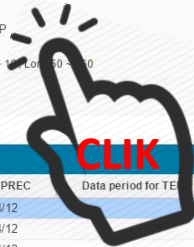


5. Select 'MODELS'.
  6. Click the station ID where you are interested in. Then you can see the prediction results for each station.
- Good: found relationship with global observation & dynamical models
  - Hopeful: found relationship with global observation but not with dynamical models.

# Produce a downscaled forecast

## B. Results

Details					
PREDICTAND	PREDICTOR				
YEAR/SEASON	2016 /6	Training Period	1982 /2004		
PREDICTAND	PREC	VARIABLE	PREC		
DATA SET	Aphrodite data Interpolated to Monsoon Asia Region	MODELS	© NCEP		
REGION	11 Stations	REGION	Lat: -10 ~ 10, Lon: 90 ~ 110		
SIGNIFICANCE LEVEL	5%				
MINIMUM PATTERN SCORE	0.3				
☑ List up hopeful & good result stations only					
Selected Stations					
Station ID	Result	Name	Data period for PREC	Data period for TE	Correlation
97014000	Good	Mapangnet/manado_Indonesia	1961/1 ~ 2004/12		0.308431
97014001	Good	Amurang	1961/1 ~ 2004/12		0.308376
97014002	Good	Talisei	1961/1 ~ 2004/12		0.306781
97026001	Hopeful	Noancan	1961/1 ~ 2004/12		0.287869
97026002	Good	Modayak	1961/1 ~ 2004/12		0.295097
97028000	Hopeful	Tolitoli_Indonesia	1961/1 ~ 2004/12		0.416711



Historical station time series & historical prediction time series (hindcast) for the station

Correlation coefficient skill

Deterministic forecast

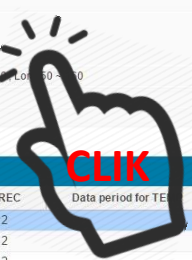
Tercile category of the forecast

New Downscale

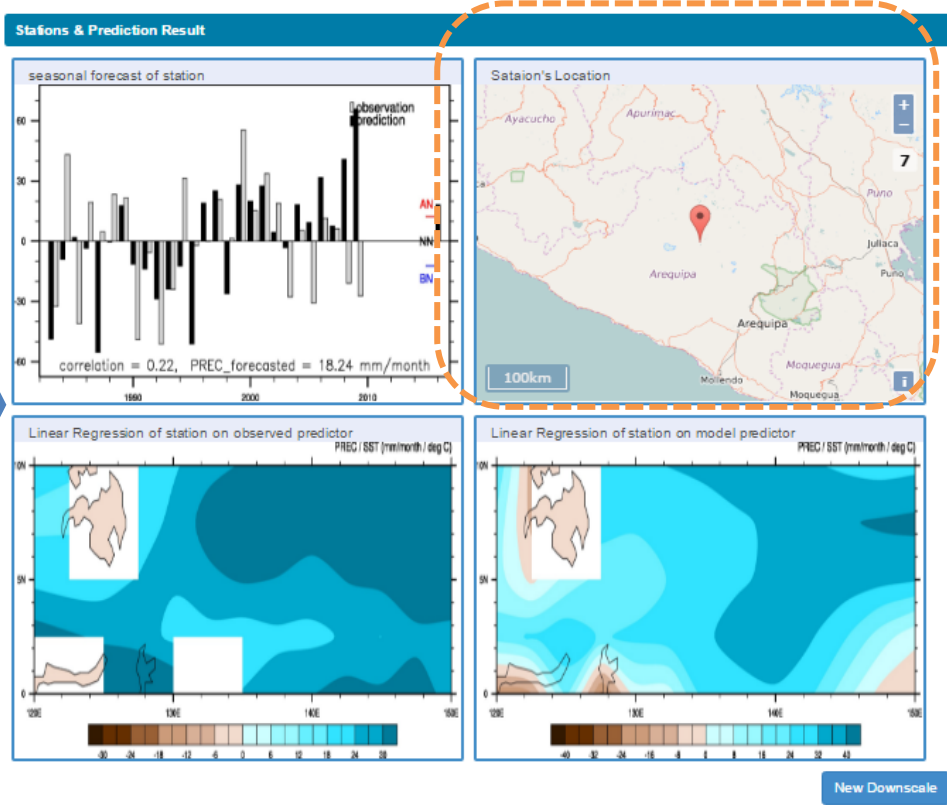
# Produce a downscaled forecast

## B. Results

Details					
PREDICTAND	PREDICTOR				
YEAR/SEASON	2016 /6	Training Period	1982 /2004		
PREDICTAND	PREC	VARIABLE	PREC		
DATA SET	Aphrodite data Interpolated to Monsoon Asia Region	MODELS	☉ NCEP		
REGION	11 Stations	REGION	Lat: -10 ~ 10, Lon: 90 ~ 110		
SIGNIFICANCE LEVEL	5%				
MINIMUM PATTERN SCORE	0.3				
<input checked="" type="checkbox"/> List up hopeful & good result stations only					
Selected Stations					
Station ID	Result	Name	Data period for PREC	Data period for TE	Correlation
97014000	Good	Mapanget/manado_Indonesia	1961/1 ~ 2004/12		0.308431
97014001	Good	Amurang	1961/1 ~ 2004/12		0.308376
97014002	Good	Talisei	1961/1 ~ 2004/12		0.306781
97026001	Hopeful	Noancan	1961/1 ~ 2004/12		0.287869
97026002	Good	Modayak	1961/1 ~ 2004/12		0.295097
97028000	Hopeful	Tolitoli_Indonesia	1961/1 ~ 2004/12		0.416711



Location of the station

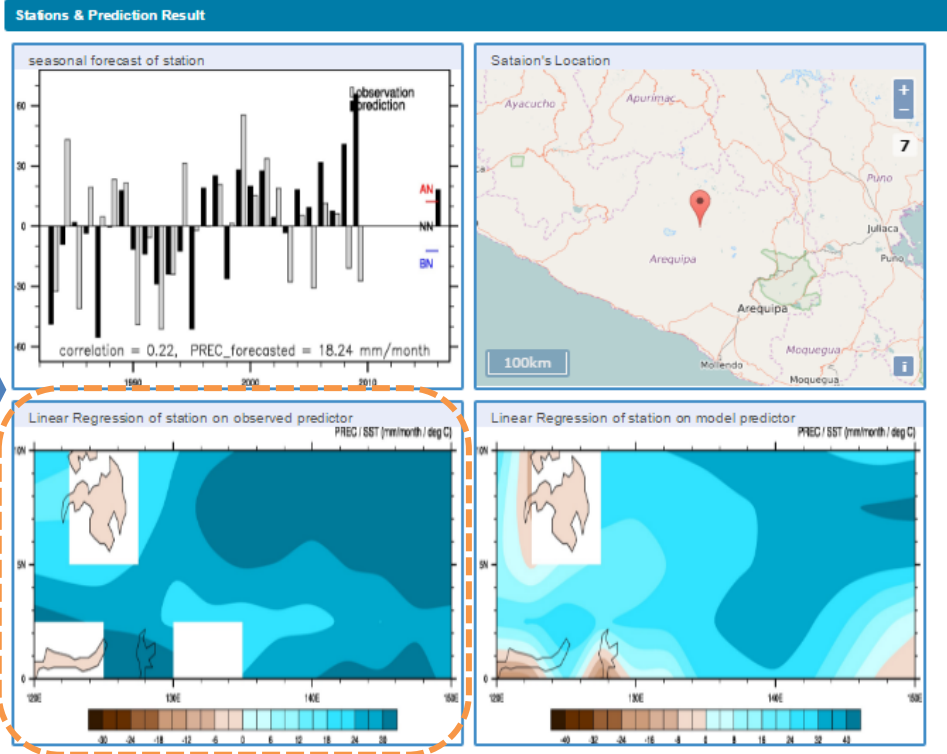
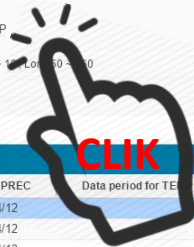




# Produce a downscaled forecast

## B. Results

Details					
PREDICTAND	PREDICTOR				
YEAR/SEASON	2016 /6	Training Period	1982 /2004		
PREDICTAND	PREC	VARIABLE	PREC		
DATA SET	Aphrodite data Interpolated to Monsoon Asia Region	MODELS	☉ NCEP		
REGION	11 Stations	REGION	Lat: -10 ~ 10, Lon: 100 ~ 110		
SIGNIFICANCE LEVEL	5%				
MINIMUM PATTERN SCORE	0.3				
☑ Listup hopeful & good result stations only					
Selected Stations					
Station ID	Result	Name	Data period for PREC	Data period for TEM	Correlation
97014000	Good	Mapangnet/manado_Indonesia	1961/1 ~ 2004/12		0.308431
97014001	Good	Amurang	1961/1 ~ 2004/12		0.308376
97014002	Good	Talisei	1961/1 ~ 2004/12		0.306781
97026001	Hopeful	Noancan	1961/1 ~ 2004/12		0.287869
97026002	Good	Modayak	1961/1 ~ 2004/12		0.295097
97028000	Hopeful	Tolitoli_Indonesia	1961/1 ~ 2004/12		0.416711



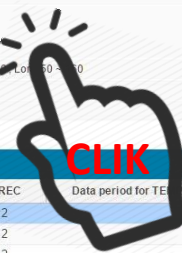
Relationship between the predictor, SST from the global observation data & the station data over the selected area (western Pacific)  
(Test of the 1<sup>st</sup> screening)

New Downscale

# Produce a downscaled forecast

## B. Results

Details					
PREDICTAND	PREDICTOR				
YEAR/SEASON	2016 /6	Training Period	1982 /2004		
PREDICTAND	PREC	VARIABLE	PREC		
DATA SET	Aphrodite data Interpolated to Monsoon Asia Region	MODELS	☉ NCEP		
REGION	11 Stations	REGION	Lat: -10 ~ 10, Lon: 90 ~ 110		
SIGNIFICANCE LEVEL	5%				
MINIMUM PATTERN SCORE	0.3				
<input checked="" type="checkbox"/> Listup hopeful & good result stations only					
Selected Stations					
Station ID	Result	Name	Data period for PREC	Data period for TEM	Correlation
97014000	Good	Mapangnet/manado_Indonesia	1961/1 ~ 2004/12		0.308431
97014001	Good	Amurang	1961/1 ~ 2004/12		0.308376
97014002	Good	Talisei	1961/1 ~ 2004/12		0.306781
97026001	Hopeful	Noancan	1961/1 ~ 2004/12		0.287869
97026002	Good	Modayak	1961/1 ~ 2004/12		0.295097
97028000	Hopeful	Tolitoli_Indonesia	1961/1 ~ 2004/12		0.416711



### Stations & Prediction Result

#### seasonal forecast of station

#### Station's Location

#### Linear Regression of station on observed predictor

PREC / SST (mm/month / deg C)

#### Linear Regression of station on model predictor

PREC / SST (mm/month / deg C)

Relationship pattern between the model data & the station data over the selected area  
(Test of the 2<sup>nd</sup> screening)

# Produce a downscaled forecast

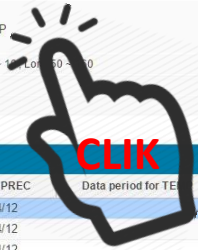
## B. Results

**Details**

PREDICTAND		PREDICTOR	
YEAR/SEASON	2016 /6	Training Period	1982 /2004
PREDICTAND	PREC	VARIABLE	PREC
DATASET	Aphrodite data Interpolated to Monsoon Asia Region	MODELS	⊗ NCEP
REGION	11 Stations	REGION	Lat: -10 ~ 10, Lon: 90 ~ 110
SIGNIFICANCE LEVEL	5%		
MINIMUM PATTERN SCORE	0.3		
<input checked="" type="checkbox"/> List up hopeful & good result stations only			

**Selected Stations**

Station ID	Result	Name	Data period for PREC	Data period for TEM	Correlation
97014000	Good	Mapanget/manado_Indonesia	1961/1 ~ 2004/12		0.308431
97014001	Good	Amurang	1961/1 ~ 2004/12		0.308376
97014002	Good	Talisei	1961/1 ~ 2004/12		0.306781
97026001	Hopeful	Noancan	1961/1 ~ 2004/12		0.287869
97026002	Good	Modayak	1961/1 ~ 2004/12		0.295097
97028000	Hopeful	Tolitoli_Indonesia	1961/1 ~ 2004/12		0.416711



**Stations & Prediction Result**

**seasonal forecast of station**

**Station's Location**

**Linear Regression of station on observed predictor**

PREC / SST (mm/month / deg C)

**Linear Regression of station on model predictor**

PREC / SST (mm/month / deg C)

**New Downscale**

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.**