CLIK hands-on (part Ⅳ):

Multi Model Downscaling using CLIK

(http://clik.apcc21.org)

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APCC APEC CLIMATE CENTER

Downscaling procedure in CLIK

Station data

- Point (uploaded)

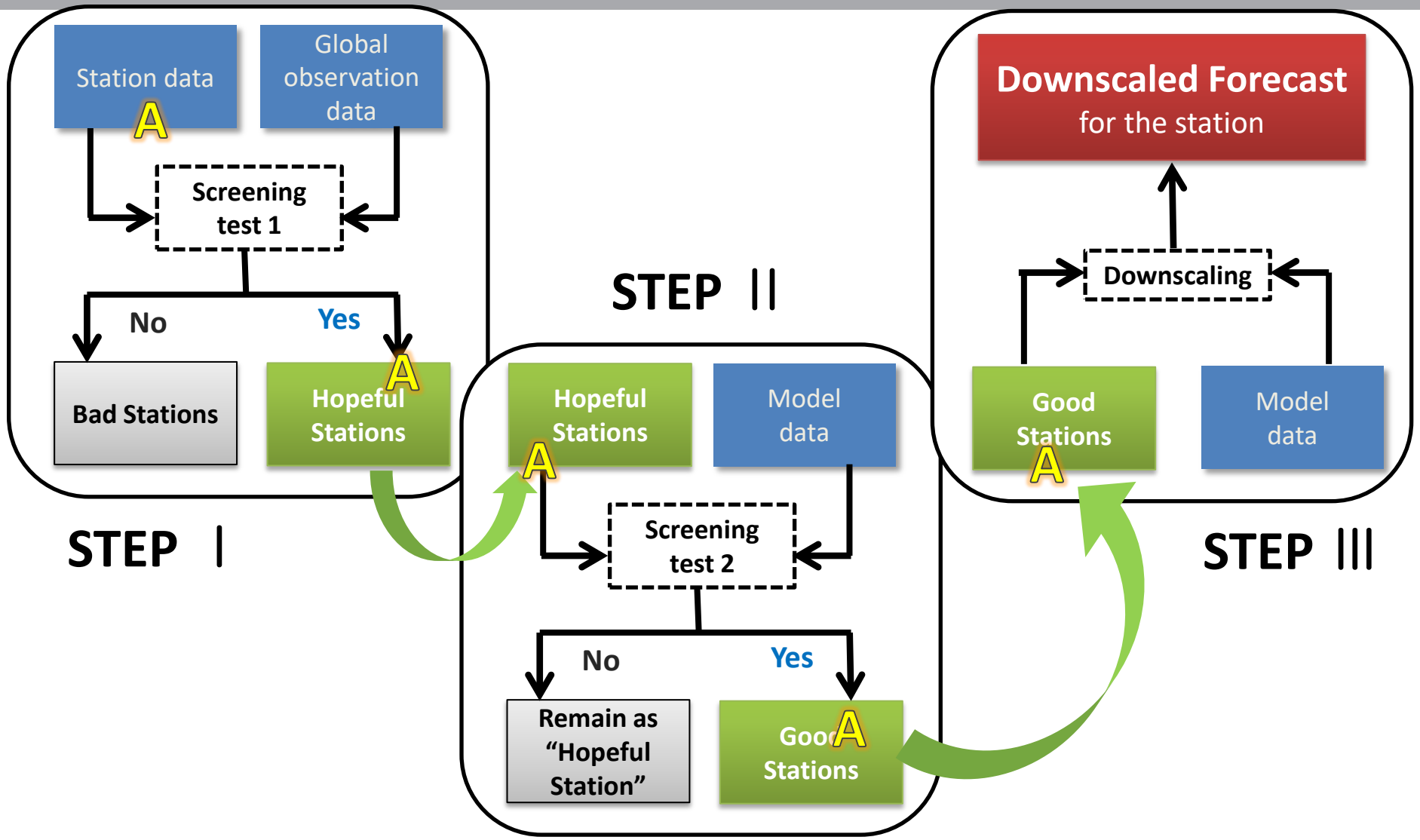
Global observation data

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

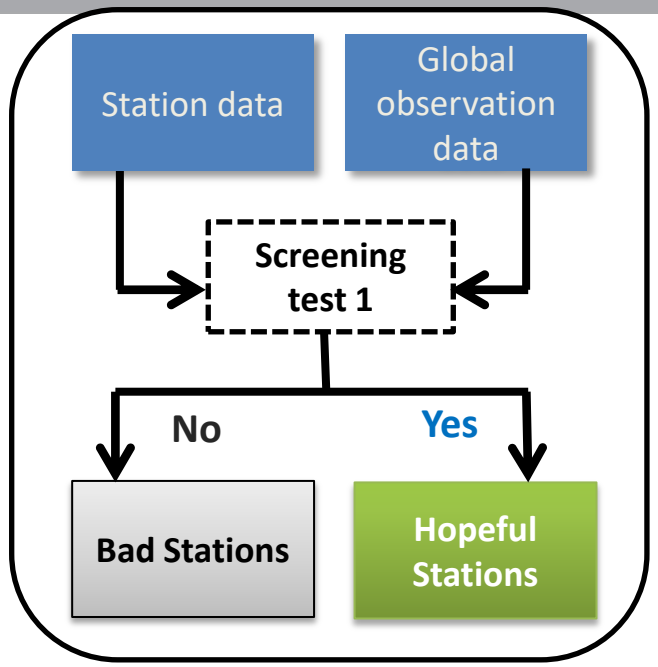
Model data

- Grid (built-in)
- Hindcast by dynamical models

Downscaling procedure in CLIK



Downscaling procedure in CLIK

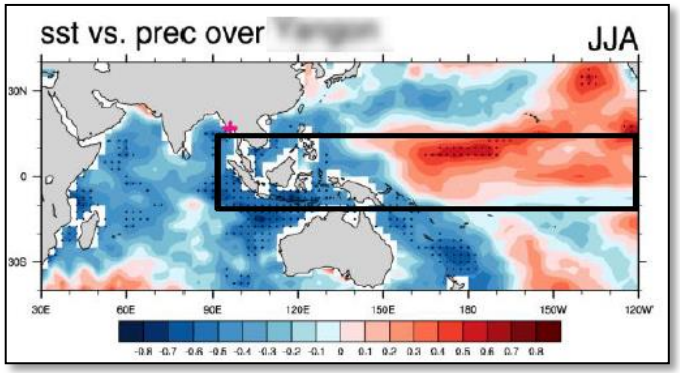


STEP I

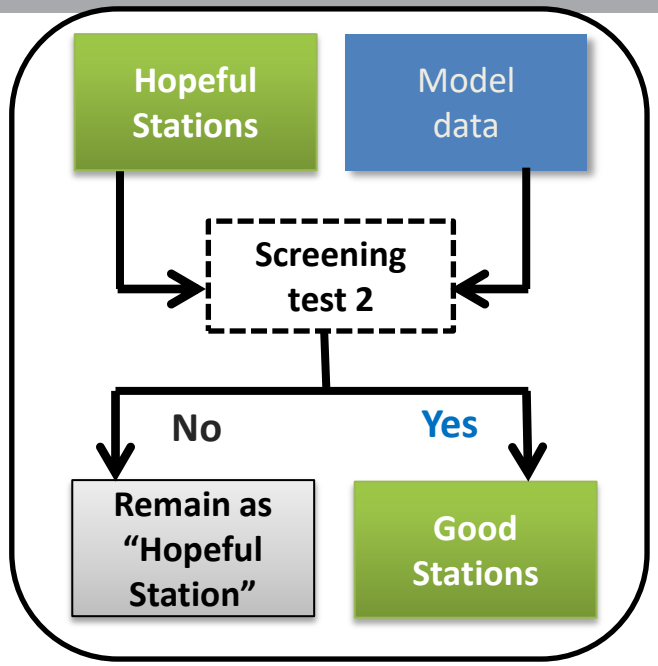
Screening test 1:

- ✓ 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?

Correlation map of **global observation** vs. station



Downscaling procedure in CLIK

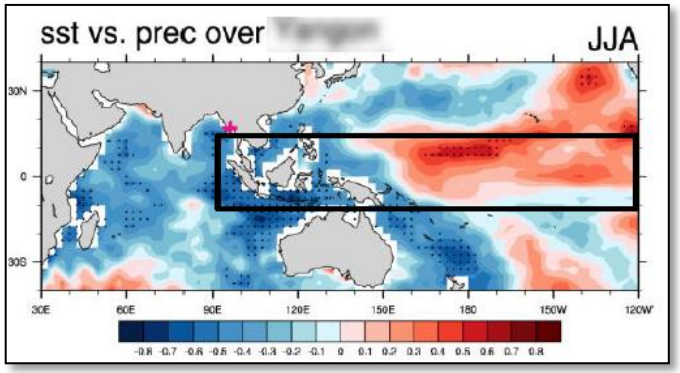


Screening test 2:

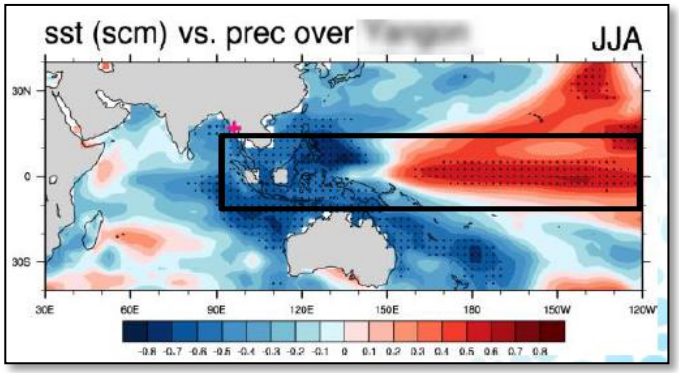
- ✓ Can the dynamical models reproduce the relationship between the global observation and hopeful station data?
- ✓ Screen based on the "minimum pattern correlation".

STEP II

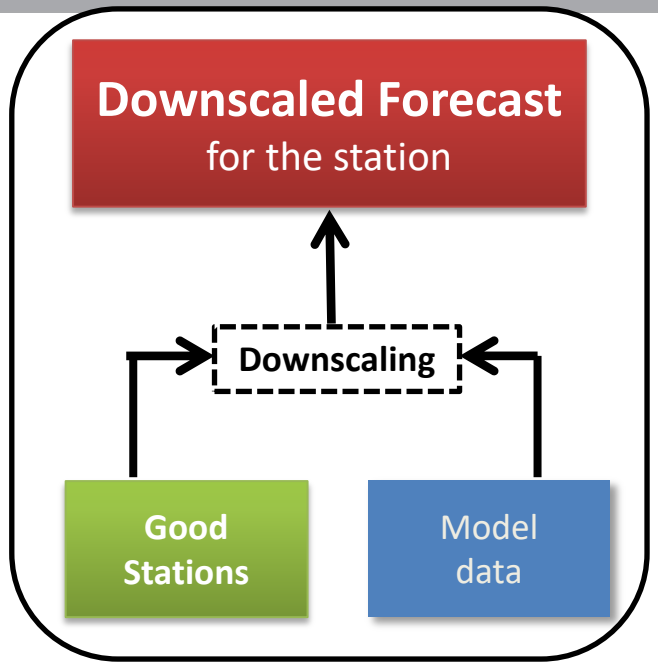
Correlation map of **global observation** vs. station



Correlation map of **model data** vs. station



Downscaling procedure in CLIK



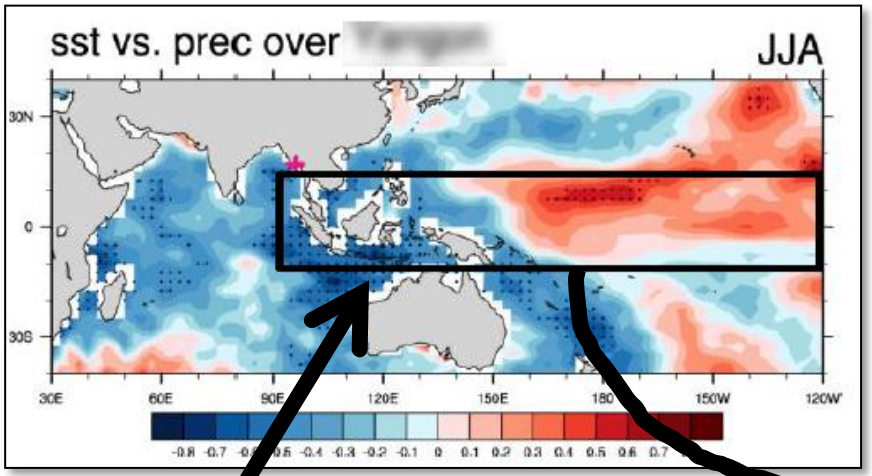
STEP III

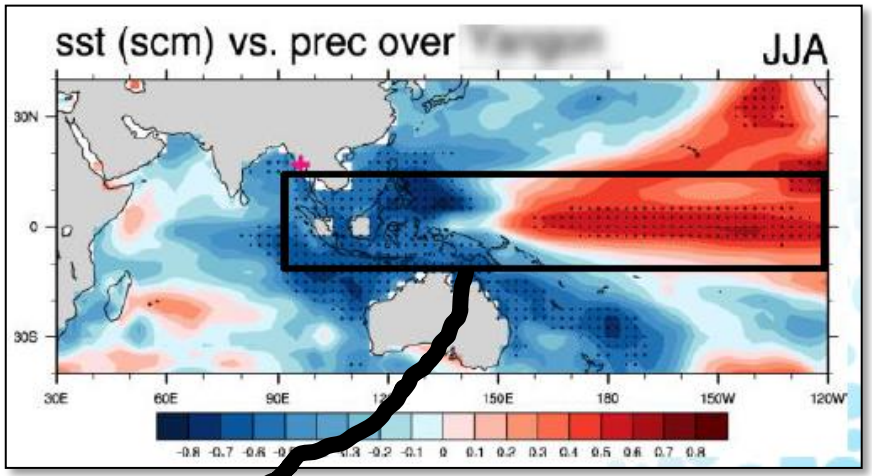
Downscaling process:

- ✓ Based on the linear regression model
- ✓ $y=a+bx$

Downscaling procedure in CLIK

Relationship between precipitation over a 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...

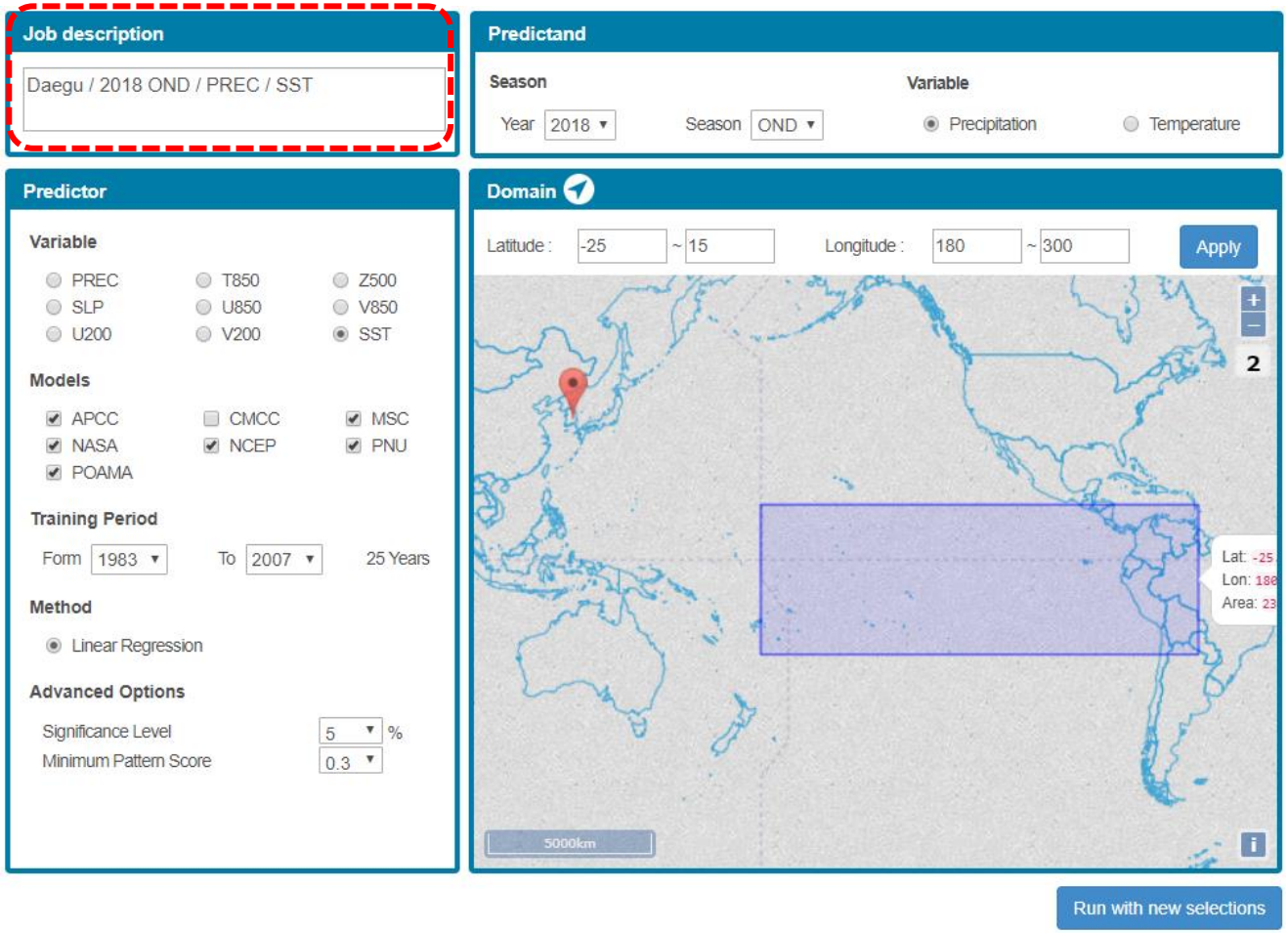
Precipitation over Daegu for OND 2018?

Produce a downscaled forecast :

precipitation over Daegu for OND 2018

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



A. Set options

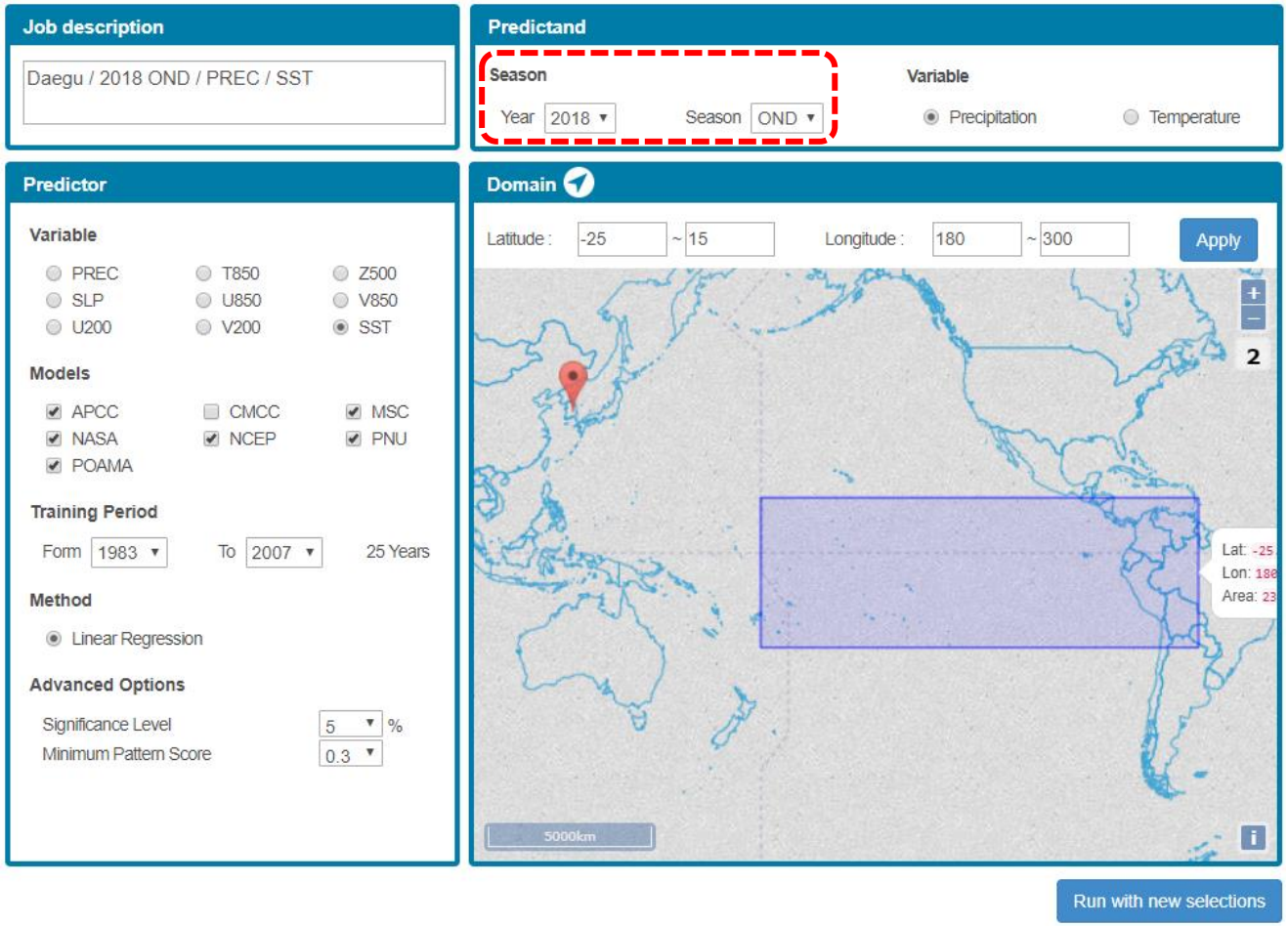
Job description

Seoul / 2018 OND / TEMP / SST

(up to you)

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



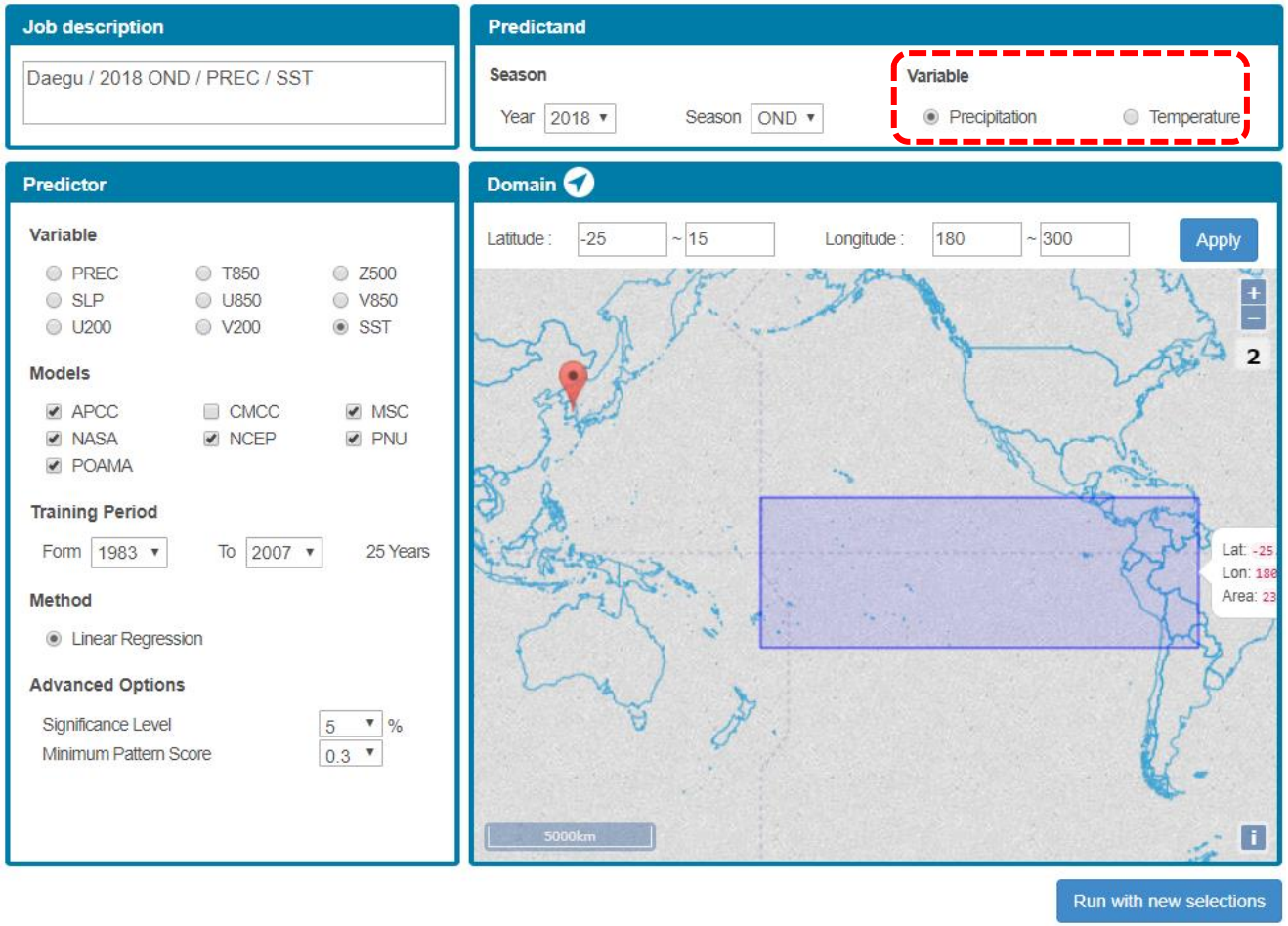
A. Set options

Predictand: season

2018 OND

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



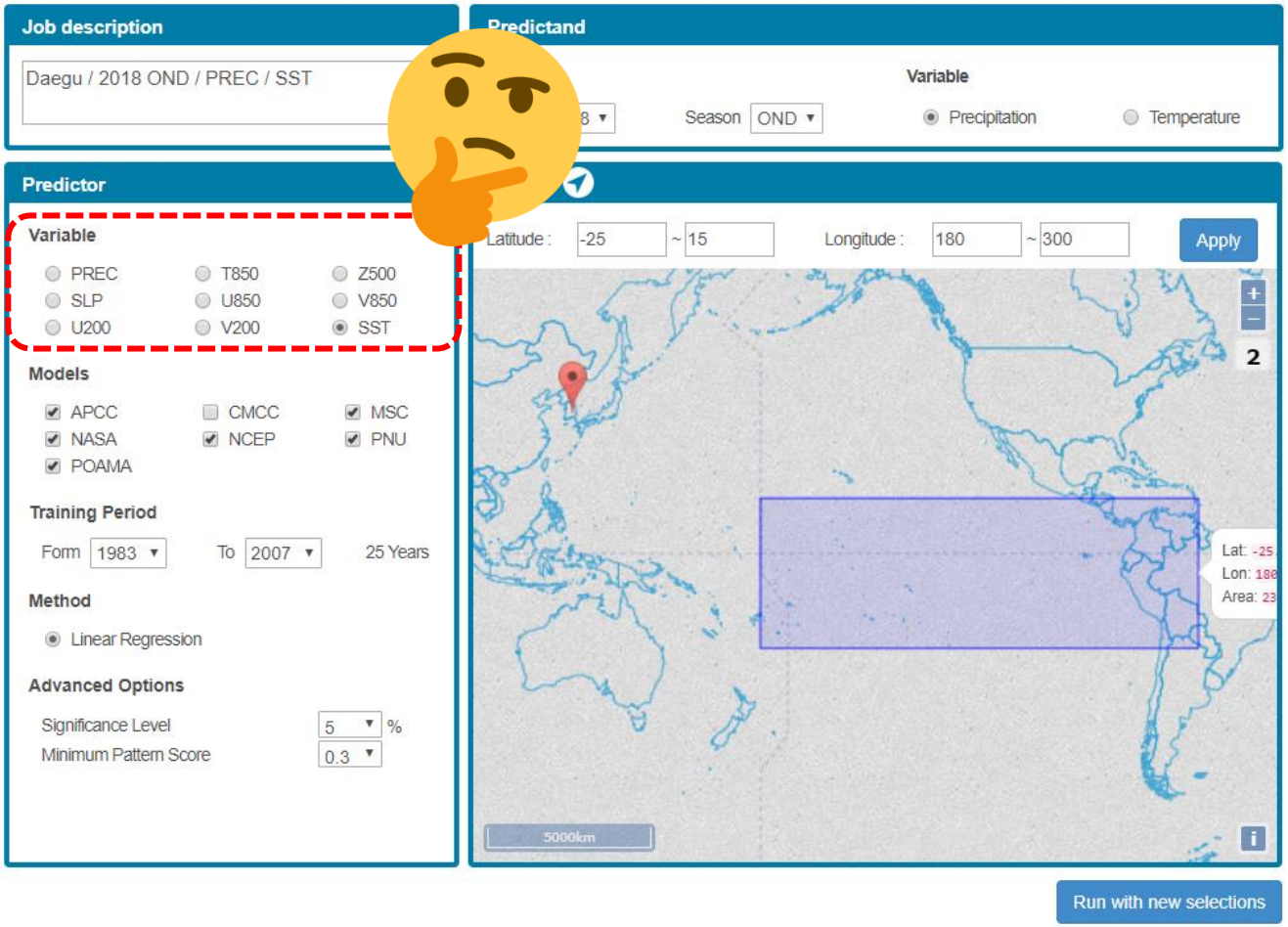
A. Set options

Predictand: variable

Temperature

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



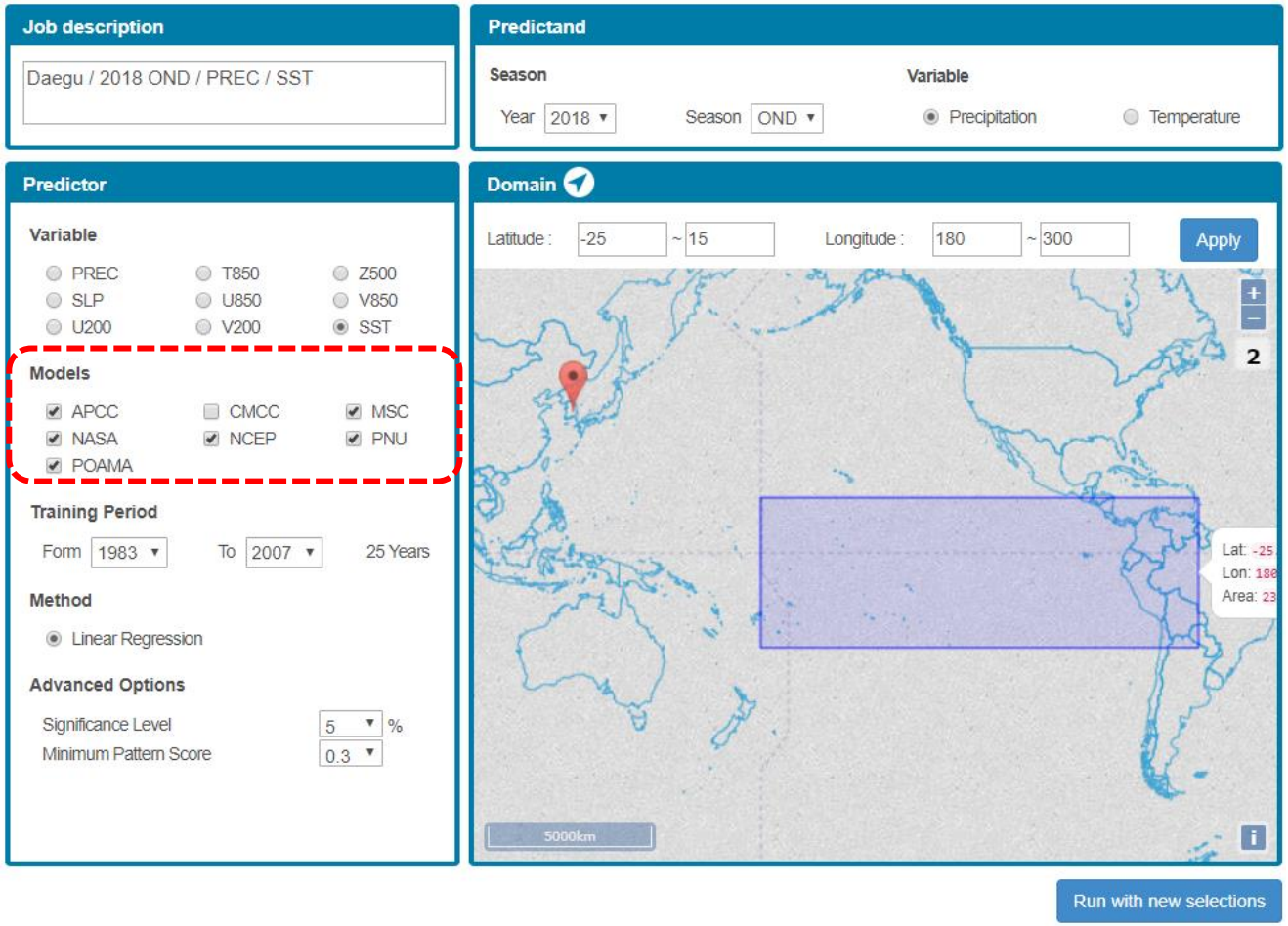
A. Set options

Predictor: variable

SST

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



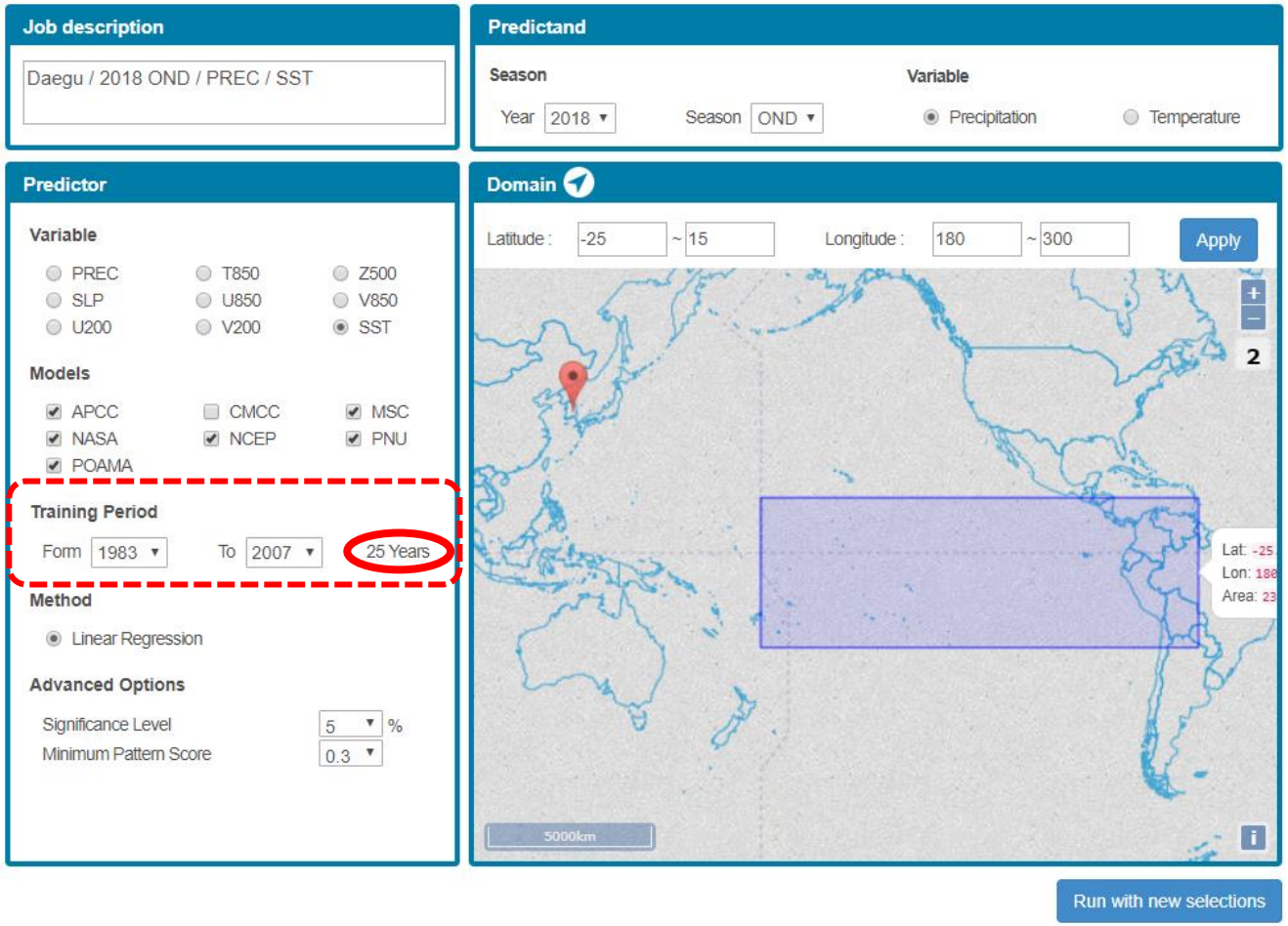
A. Set options

Predictor: Models

APCC + MSC + NASA + NCEP + PNU

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



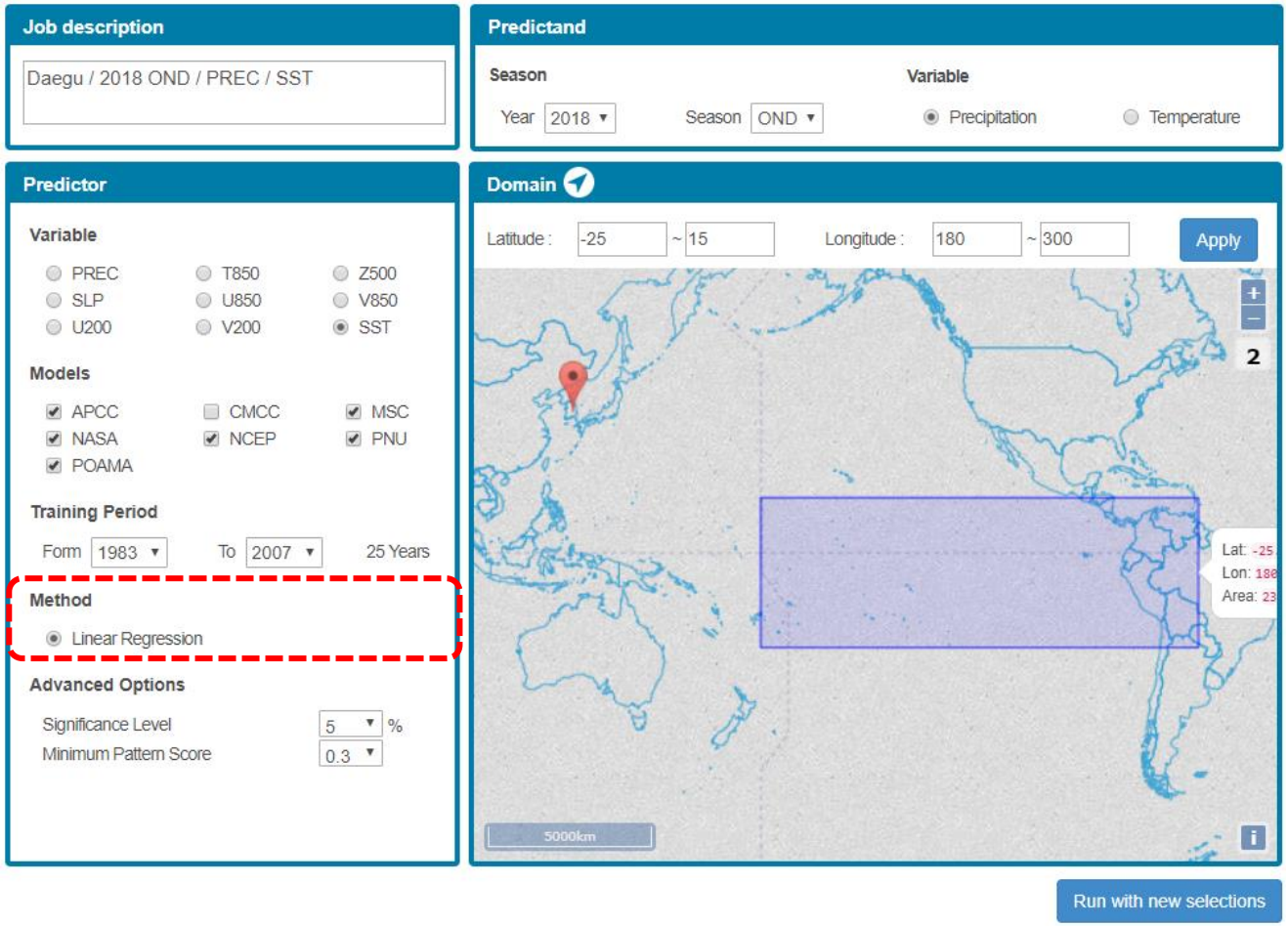
A. Set options

Predictor: Training Period

Common period of selected models

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



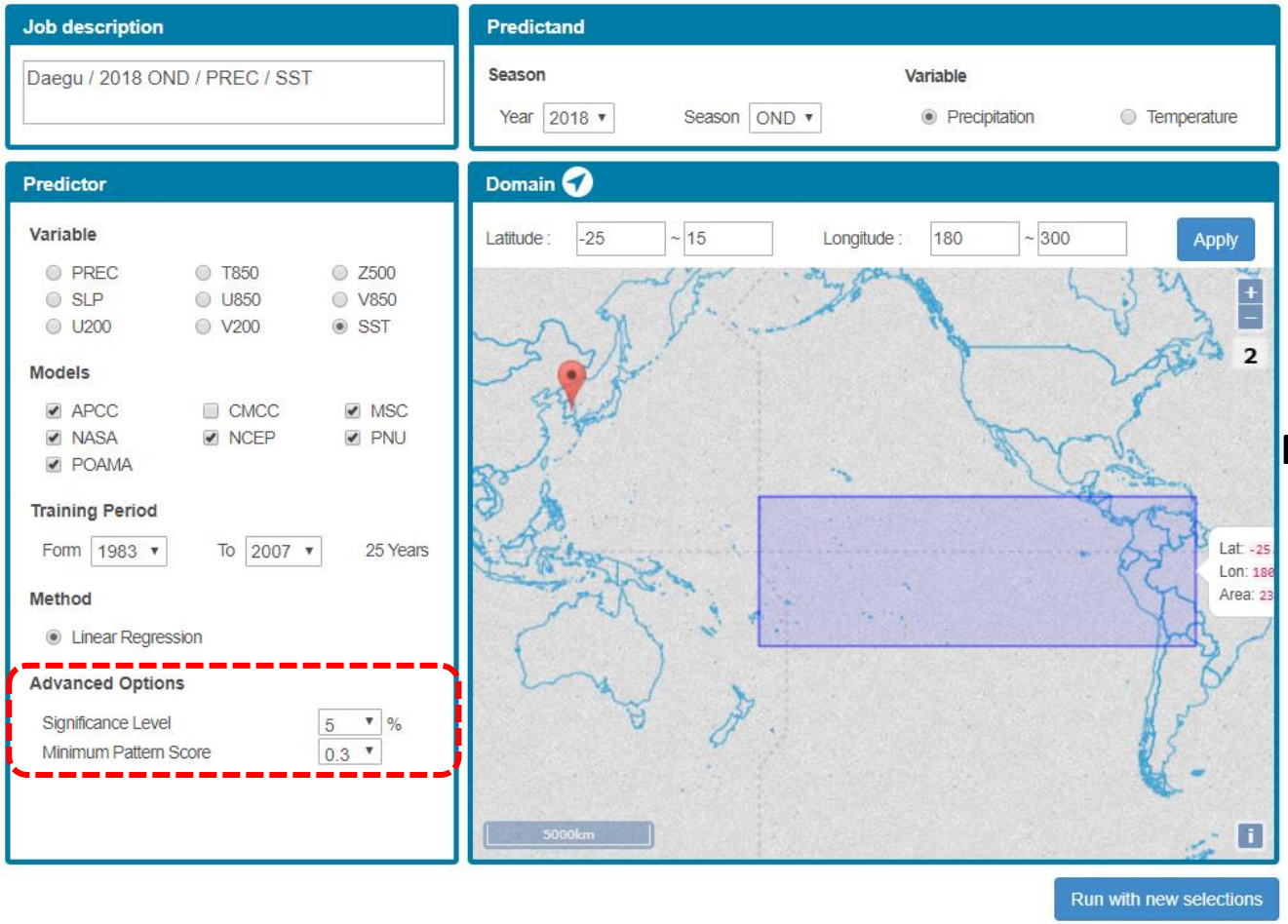
A. Set options

Predictor: Method

Linear Regression

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



A. Set options

Predictor: Advanced Options

Significance Level: 5%

Minimum Pattern Score: 0.1

Produce a downscaled forecast :

precipitation over Daegu for OND 2018

Job description

Daegu / 2018 OND / PREC / SST

Predictor

Variable

○ PREC	○ T850	○ Z500
○ SLP	○ U850	○ V850
○ U200	○ V200	◉ SST

Models

☑ APCC	☐ CMCC	☑ MSC
☑ NASA	☑ NCEP	☑ PNU
☑ POAMA		

Training Period

Form 1983 ▾ To 2007 ▾ 25 Years

Method

◉ Linear Regression

Advanced Options

Significance Level 5 ▾ %

Minimum Pattern Score 0.3 ▾

CLIK downscaling

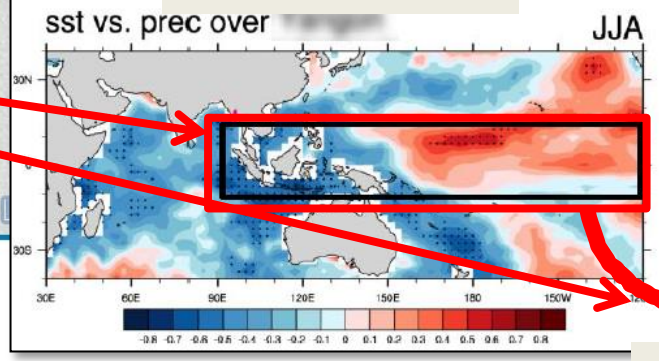
A way to localize existing coarse climate information

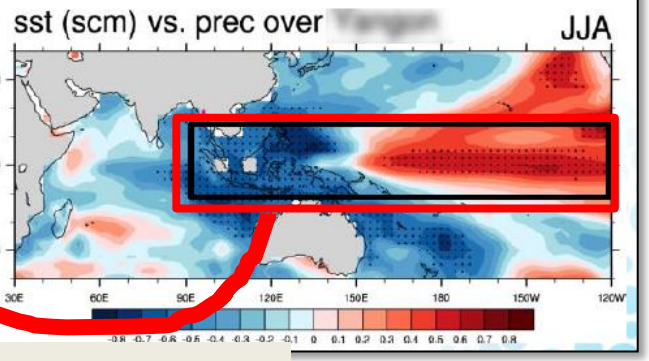
CLIK downscaling is mainly based on station to Large Scale Meteorological Field (LSMF) relationship. (Y = a*X + b) By utilizing the simulated LSMF (X, predictor), CLIK estimates seasonal mean precipitation/temperature (Y, predictand) at specific station.

Empirical relationship: LSMP (OBS) ~ local station rainfall

LSMP (MME) → Local station rainfall

Screening test 1

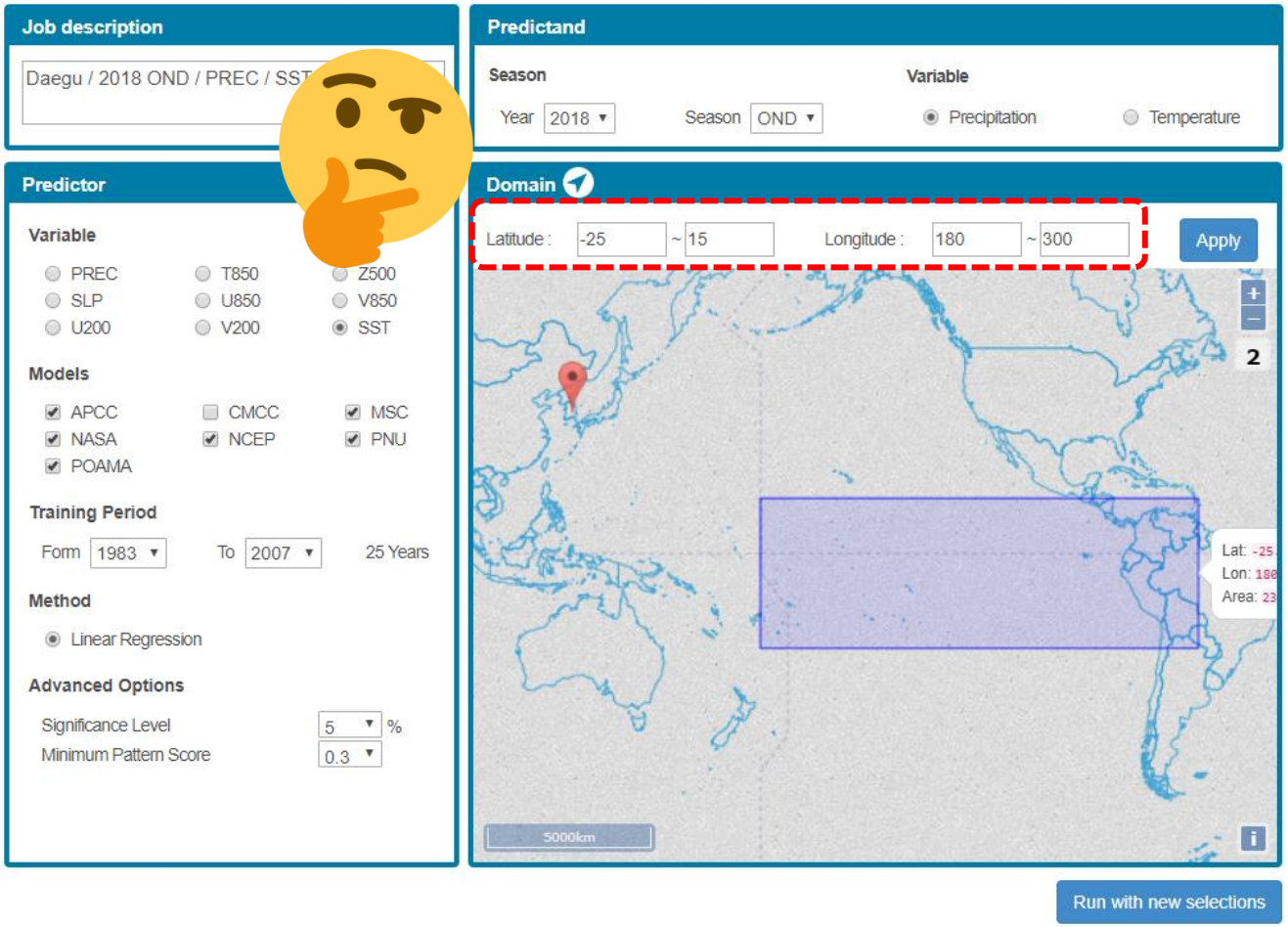




Screening test 2

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



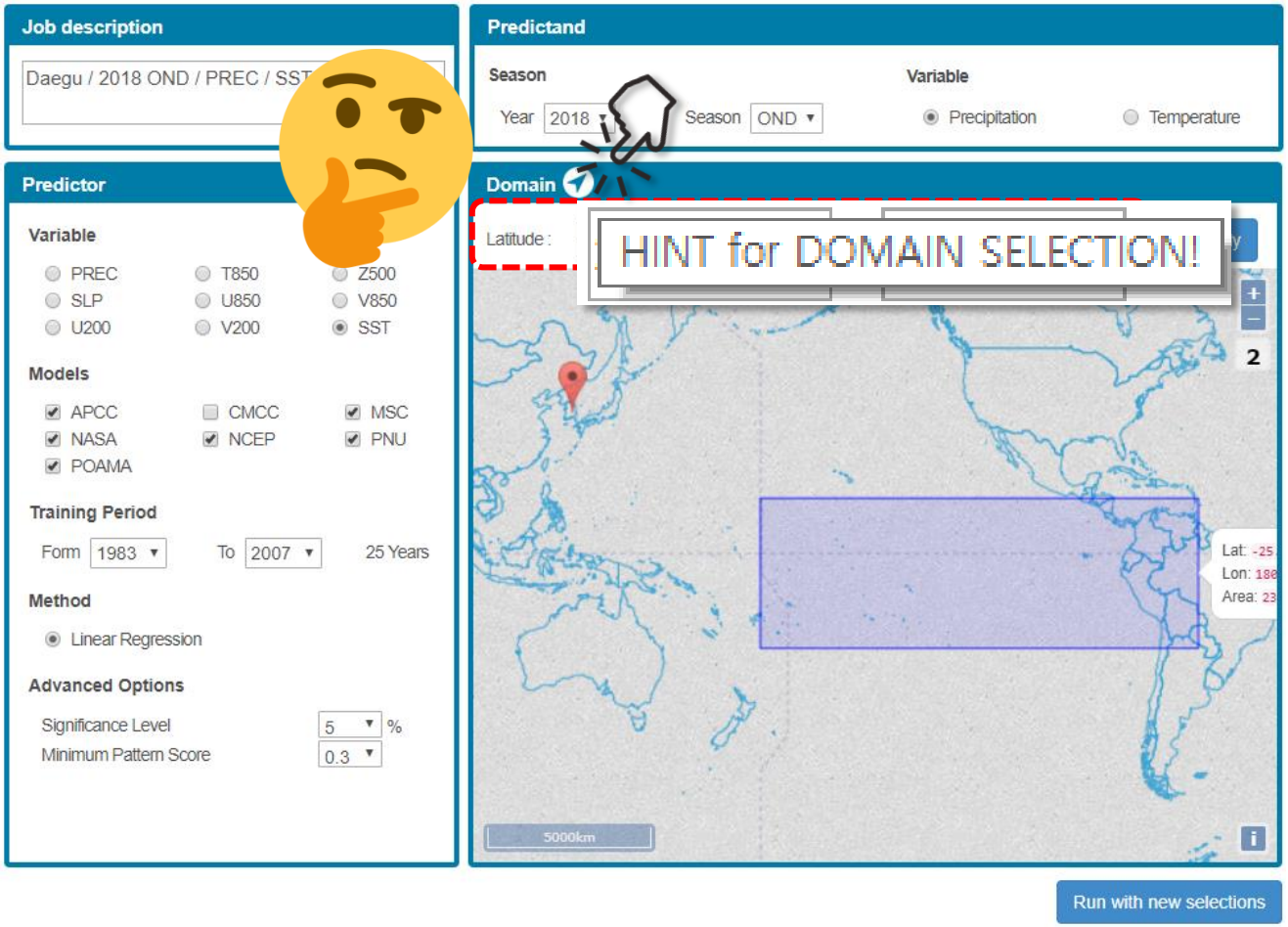
A. Set options

Predictor: Domain

The northwestern North Pacific

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

Correlation - Chrome

주의 요함 | clik.apcc21.org/view/popup/correlation.html?grdvar=sst&stnvar=prec&season=OND&station=Daegu&stnid=143&stnl...

Large scale pattern associated with station 143 on Daegu

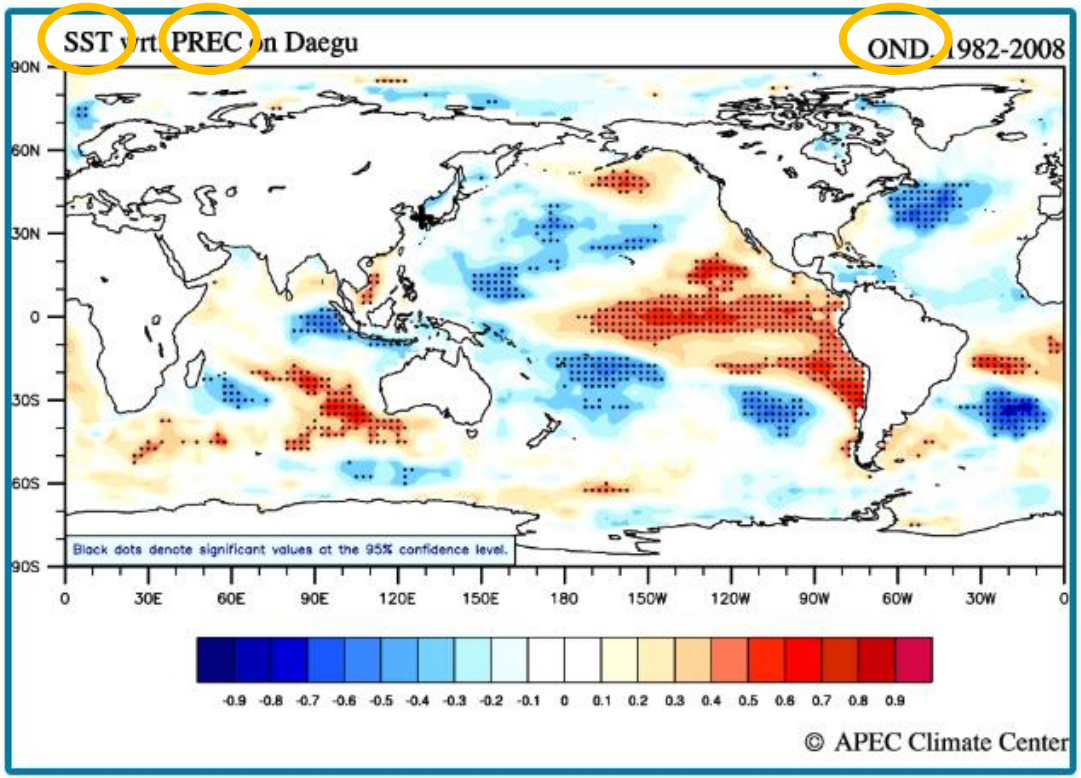
Season OND

Station variable PREC

Reanalysis variable SST

Period From 1982 to 2008

Method One point correlation



Run with new selections

Job descripti

Daegu / 2018

Predictor

Variable

PREC
SLP
U200

Models

APCC
NASA
POAMA

Training Peri

Form 1983

Method

Linear Re

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Significance L
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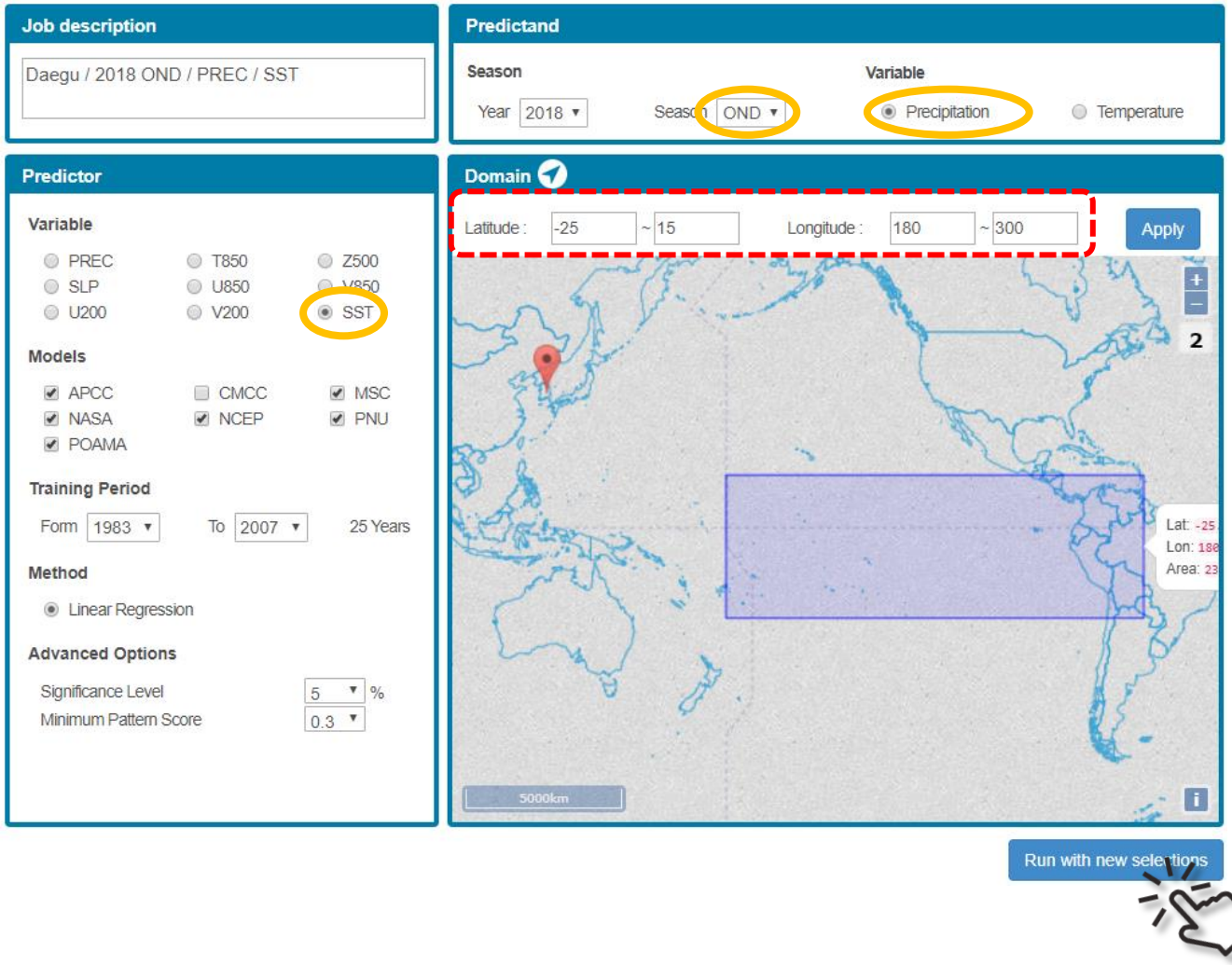
Produce a downscaled forecast :

precipitation over Daegu for OND 2018



A. Set options

Predictor: Domain

The northwestern North Pacific

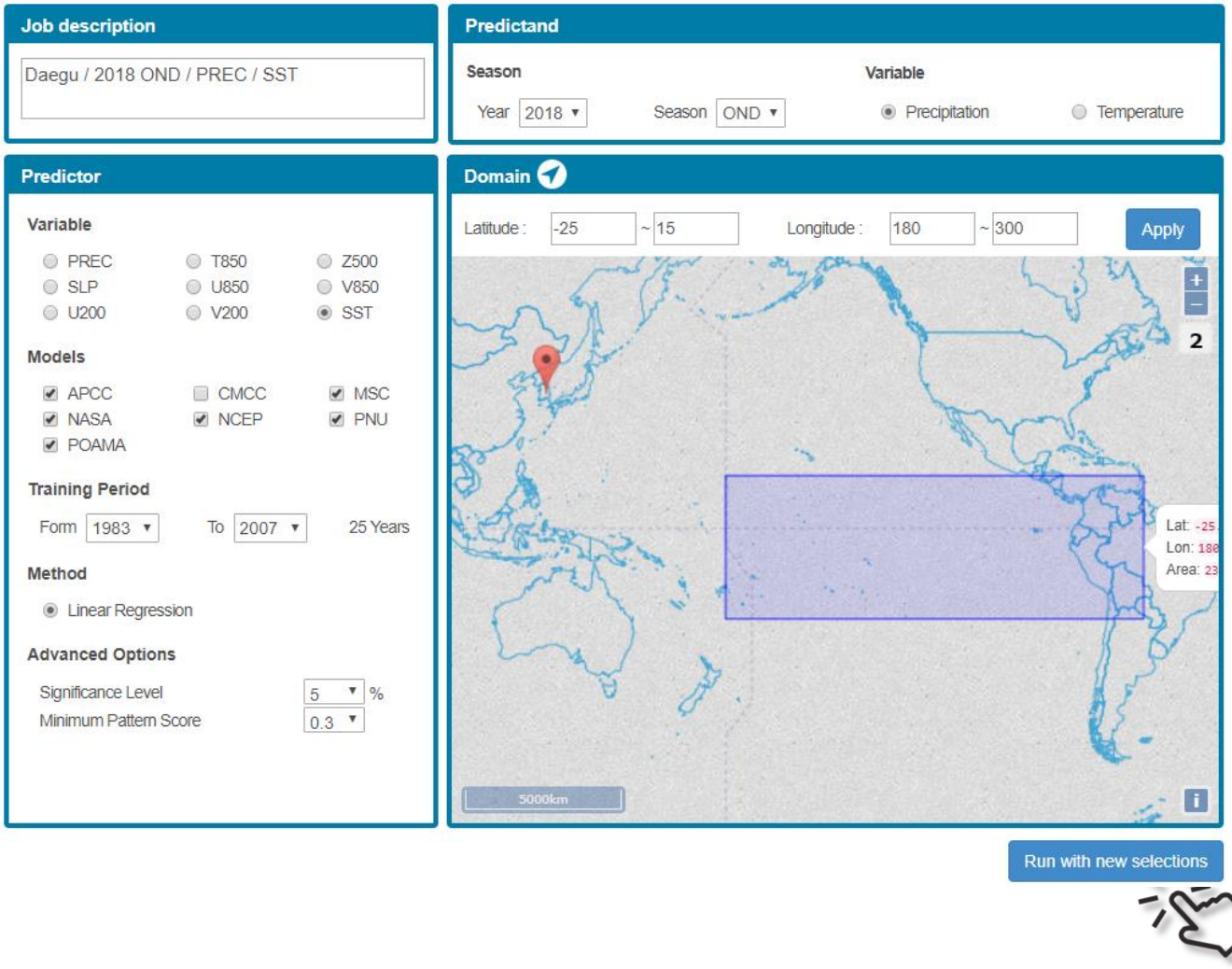
Produce a downscaled forecast :

precipitation over Daegu for OND 2018

Let's try!

Produce a downscaled forecast :

precipitation over Daegu for OND 2018



Let's try!

Job description:
Daegu / 2018 OND / TEMP / SST

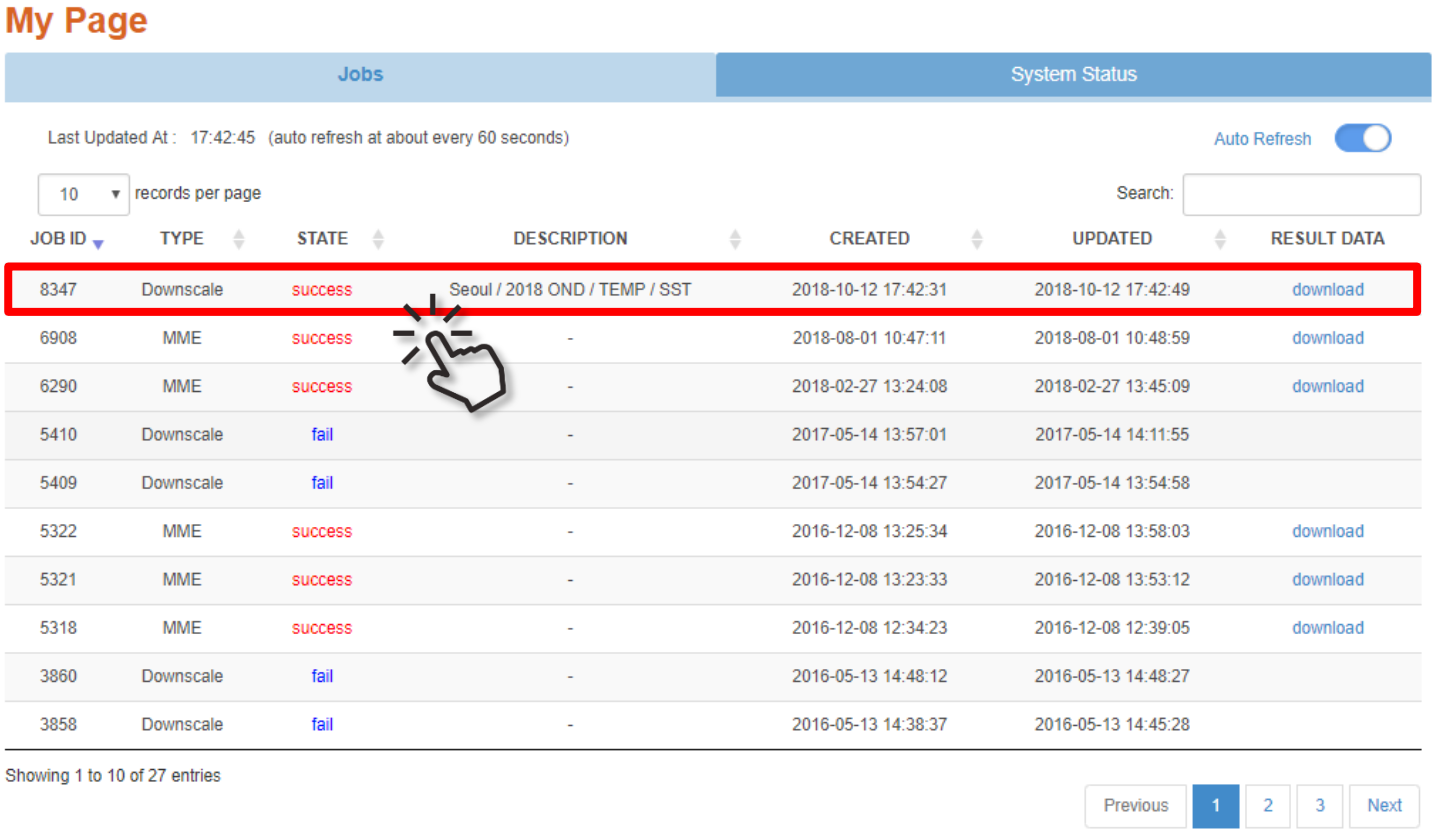
Predictand:
2018 OND, Temperature

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

Produce a downscaled forecast :

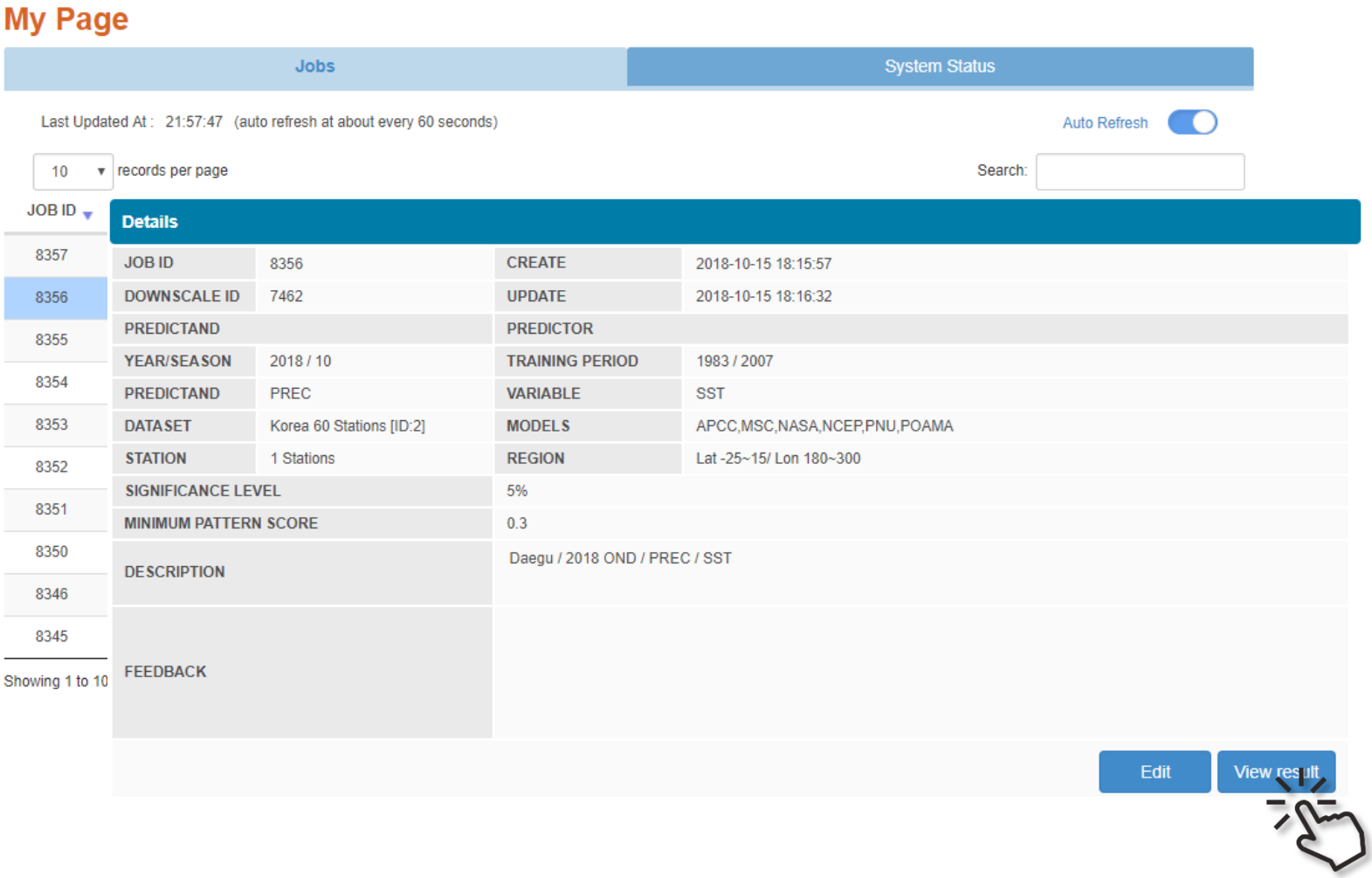
precipitation over Daegu for OND 2018

B. Check results



Produce a downscaled forecast :
precipitation over Daegu for OND 2018

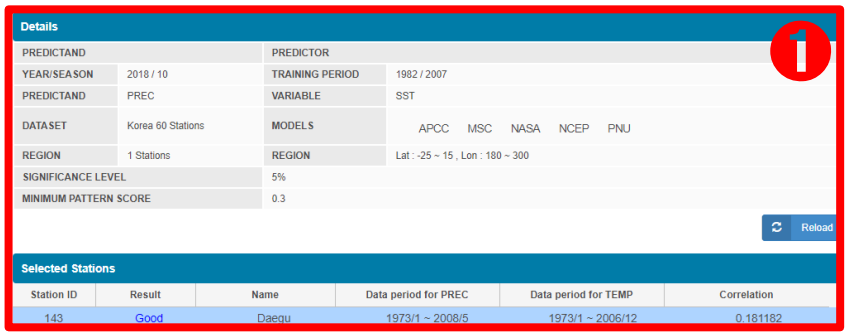
B. Check results

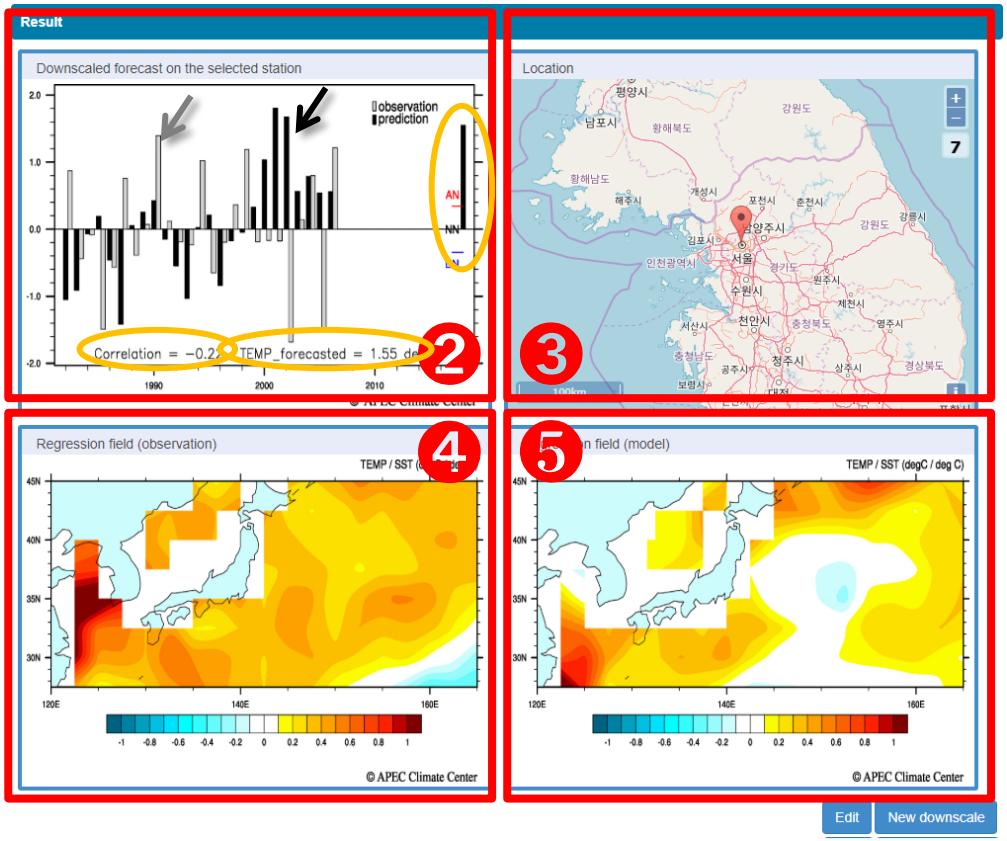


Produce a downscaled forecast :

precipitation over Daegu for OND 2018

C. Check results.

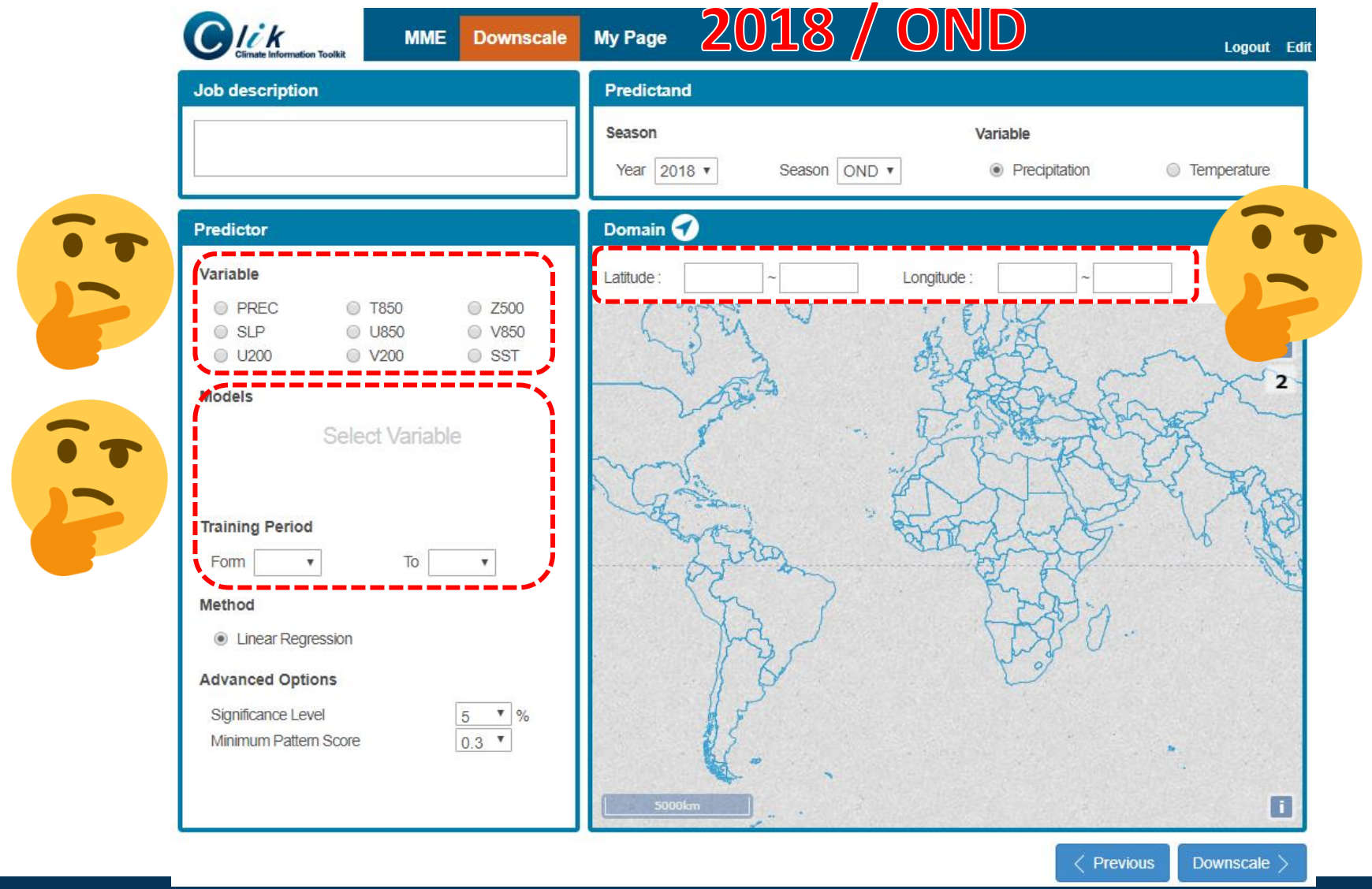




1. Job summary
2. Historical time series of hindcast and station data, Correlation coefficient, Deterministic forecast, Tercile category of the forecastLocation of the station
3. Location of station
4. Relationship pattern between the predictor (sst, observation) and the station data (precipitation)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




Thank you!