

[실습] 상세화 예측 실습

예측운영과 정다운

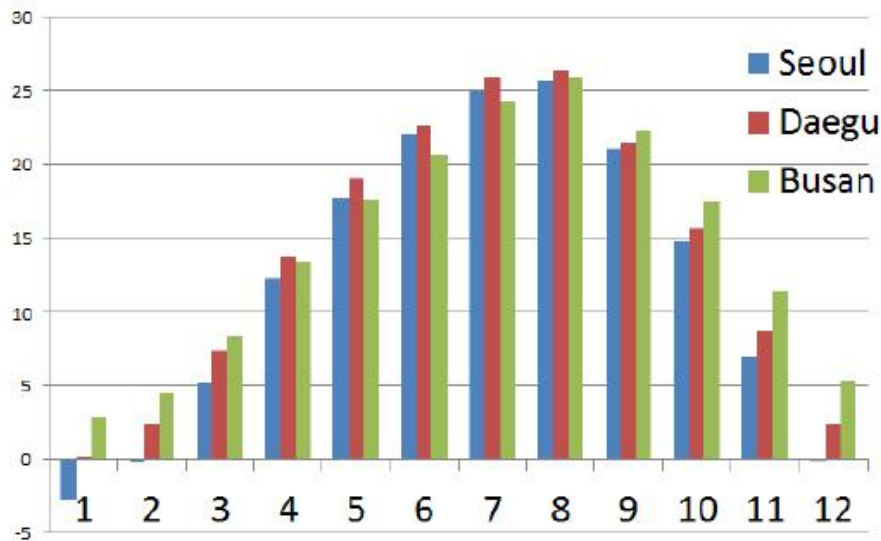


1. 왜 상세화 예측이 필요한가?
2. 자료 처리 실습
3. 상세화 예측 실습
4. 아웃룩 만들어 보기

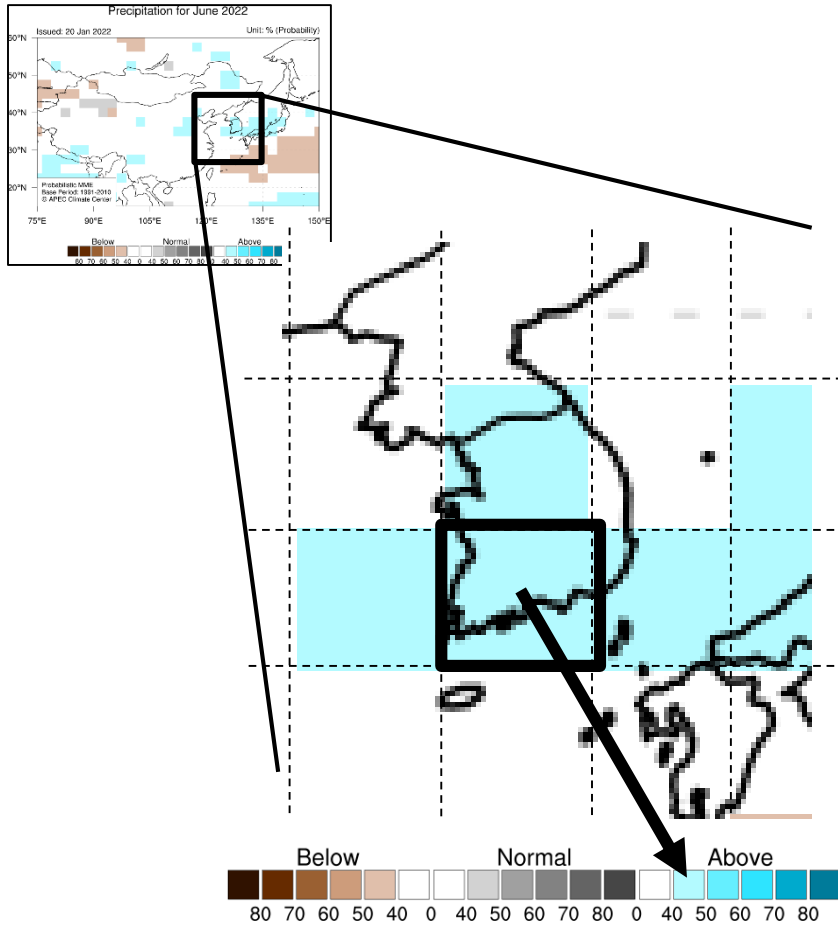


Why downscaled forecast?

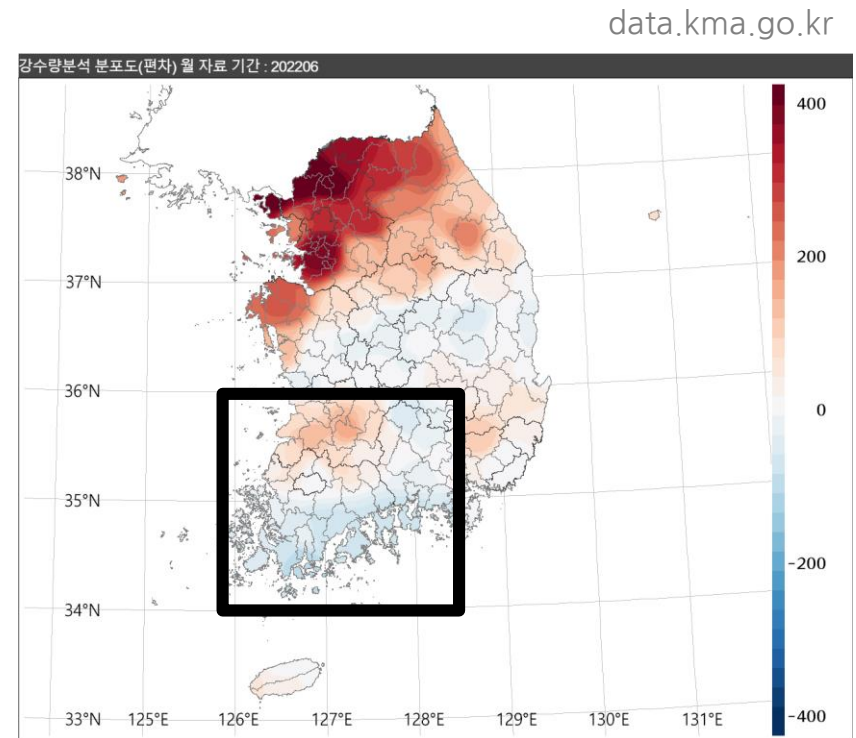
1960-2017, temperature



Why downscaled forecast?



2022 JUN PREC
APCC PMME FORECAST



2022 JUN PREC
관측



1. 왜 상세화 예측이 필요한가?
2. 자료 처리 실습
3. 상세화 예측 실습
4. 아웃룩 만들어 보기





2023년 7월-9월 (JAS)
서울의 강수량은?

Downscaling procedure in CLIK:

Precipitation over Seoul for JAS 2023

지점자료

1973								2023
------	--	--	--	--	--	--	--	------

- Point (uploaded)

전지구 재분석 자료

1979							2023
------	--	--	--	--	--	--	------

- Grid (built-in)
- Reanalysis, CAMS OPI, and OISST

모델 과거예측자료

1983				2022
1983			2018	
1982			2006	

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

Step 1. Prepare input data

기상자료개방포털 (data.kam.go.kr)

Metadata

META.csv

Station
information

Observation
data

PREC.csv
TEMP.csv

Station data itself

Step 1. Prepare input data

기상자료개방포털 (data.kam.go.kr)

Metadata

META.csv

Observation
data

PREC.csv

TEMP.csv

	1	2	3	4	5
1	name	station_id	wmo_id	latitude	longitude
2	Gangneung	105	-999	37.7515	128.891
3	Seoul	108	-999	37.5714	126.9658
4	Daegu	143	-999	35.878	128.653
5	Busan	159	-999	35.1047	129.032

- **Name:** name of the station
- **Station_id:** unique id for the station (integer)
- **WMO_id:** WMO_id for station (integer, any number)
- **Latitude:** latitude for this station (float, for mapping)
- **Longitude:** longitude for this station (float, for mapping)
- **Undefined:** missing data (numeric)
- **Public:** true if your data can be used by others, and false if your data can not be used by others

Data Processing

Step 1. Prepare input data

기상자료개방포털 (data.kam.go.kr)



META.csv



PREC.csv
TEMP.csv

	1	2	3	4	5	6	7							
1	station_id	year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2	105	1973	159.7	2	23.4	62.2	114.2	170.8	79.9	59.5	133.8	116	81.6	1.4
3	105	1974	15.7	51.7	57.2	126	126.5	47.1	264.4	212.4	170.1	96	15.8	37.4
4	105	1975	35.2	81.5	129.3	94.7	86.2	125.7	304.8	85.3	297.7	137.2	297.6	39.2
5	105	1976	0.4	195.8	28.5	80	19.7	96.1	112.1	568.9	91.7	68.4	72.9	79.8
6	105	1977	31.5	7.2	50.6	247.9	46.6	70.8	127.2	138.6	149	69	151.9	21.8
7	105	1978	79.8	106	105.1	32.2	37	206.2	146	279	87.8	348.1	70.3	187.2
8	105	1979	149.8	111.9	96.6	78.9	90.2	219	115.4	165.2	51.7	92	2	16.8
9	105	1980	58.1	5.8	89.2	171	33.6	87.9	309.2	255.6	239.4	30.2	15.8	21.9
10	105	1981	16.8	14.2	48.4	65.5	147	78	250.7	212	383.6	8	108.9	2.9
11	105	1982	27.7	27.8	51	59.8	108.7	60.5	100.4	386.2	0.2	107.6	117.2	8.2
12	105	1983	51.8	19.4	101	56.3	38.1	146.7	164.7	260.7	191.3	137.6	13.4	51.9
13	105	1984	28.7	40	25.3	116.8	51.1	120.8	203.5	185.5	442.7	16.8	111.6	23
14	105	1985	0.1	61.3	40.1	85.9	139.5	98.6	118	635.3	198.9	259.6	43.1	30
15	105	1986	32.3	33.4	14.7	61.7	39.5	118.9	218.2	266.7	179.4	255.4	8.3	63.9
16	105	1987	21.5	126.6	92.4	52.9	79.8	91.5	391	256.3	43.4	71.9	127.4	42.5
17	105	1988	5.3	56.7	47.2	15.1	49.7	141.8	303.9	116.2	458.5	100	41.7	0
18	105	1989	248.5	81.5	174.4	7.1	58.5	157.3	322.3	299.7	167.3	139.4	111.4	96.6
19	105	1990	157	149.4	101.5	81.4	78.1	196.2	151.2	154.5	558.9	123.1	135.6	24.2

- Use notepad.
- Copy and paste the data from EXCEL to Notepad.
- One year per row.
- Data should be delimited by comma (,), space (), tab (), or colon (:).

Data Processing

Step 2. Upload data to CLIK

Dataset ▾ **Processing ▾** My Jobs CLIK API Documents ▾ Help Desk

Downscale

Select observation dataset

Show 10 ▾ entries

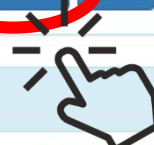
Search:

Dataset Name	Countries	Total Stations	Period(prec)	Period(temp)	Public
Korea 101 Stations	Republic of Korea	101	1973 ~ 2019	1973 ~ 2019	PUBLIC
GHCN	GHCN	3697	1950 ~ 2009		PUBLIC
Asia Region (prec)	Asia	4918	1961 ~ 2004		PUBLIC
Iran stations	Islamic Republic of Iran	31	1951 ~ 2017	1951 ~ 2017	PUBLIC
Kurdistan stations	Islamic Republic of Iran	7	1960 ~ 2021	1960 ~ 2021	PUBLIC

Showing 1 to 5 of 5 entries

Previous 1 Next

Create Edit View Remove



Select station



Data Processing

Step 2. Upload data to CLIK

The screenshot displays the CLIK web interface. A modal window titled "New dataset" is open, allowing for the creation of a new dataset. The "Name" and "Description" fields are both filled with "4 Stations". A red circle highlights the "Create" button, and a hand cursor is pointing at it. The background shows a table of datasets and a map.

Dataset Name	Period(temp)	Public
Korea 101 Stations	1973 ~ 2019	PUBLIC
GHCN	1950 ~ 2009	PUBLIC
Asia Region (prec)	1961 ~ 2004	PUBLIC
Iran stations	1951 ~ 2017	PUBLIC
Kurdistan stations	1960 ~ 2021	PUBLIC

Step 2. Upload data to CLIK

Dataset Processing My Jobs CLIK API Documents Help Desk

Downscale

Select observation dataset

Show 10 entries

Search:

Dataset Name	Countries	Total Stations	Period(prec)	Period(temp)	Public
Korea 101 Stations	Republic of Korea	101	1973 ~ 2019	1973 ~ 2019	PUBLIC
GHCN	GHCN	3697	1950 ~ 2009		PUBLIC
Asia Region (prec)	Asia	4918	1961 ~ 2004		PUBLIC
Iran stations	Islamic Republic of Iran	31	1951 ~ 2017	1951 ~ 2017	PUBLIC
Kurdistan stations	Islamic Republic of Iran	7	1960 ~ 2021	1960 ~ 2021	PUBLIC

4 Stations

Showing 1 to 6 of 6 entries

Previous 1 Next

Create Edit View Remove

Select station



Data Processing

Step 2. Upload data to CLIK

Dataset Processing My Jobs CLIK API Documents Help Desk

Metadata

1

Stations [Dataset : 4 Stations]

Show 10 entries

	1	2	3	4	5	
1	name,	station_id,	wmo_id,	latitude,	longitude,	undefined
2	Gangneung,	105,	-999,	37.7515,	128.891,	-999
3	Seoul,	108,	-999,	37.5714,	126.9658,	-999
4	Daegu,	143,	-999,	35.878,	128.653,	-999
5	Busan,	159,	-999,	35.1047,	129.032,	-999

Station ID	Country	Name	WMO ID	Latitude	Longitude	Undefined
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No data available in table

META.csv

Showing 0 to 0 of 0 entries

Previous Next

Import Export Insert Modify Remove Remove All

Observation data

2

Data

Show 10 entries

	1	2	3	4	5	6	7							
1	station_id,	year,	jan,	feb,	mar,	apr,	may,	jun,	jul,	aug,	sep,	oct,	nov,	dec
2	105,	1973,	159.7,	2,	23.4,	62.2,	114.2,	170.8,	79.9,	59.5,	133.8,	116,	81.6,	1.4
3	105,	1974,	15.7,	51.7,	57.2,	126,	126.5,	47.1,	264.4,	212.4,	170.1,	96,	15.8,	37.4
4	105,	1975,	35.2,	81.5,	129.3,	94.7,	86.2,	125.7,	304.8,	85.3,	297.7,	137.2,	297.6,	39.2
5	105,	1976,	0.4,	195.8,	28.5,	80,	19.7,	96.1,	112.1,	568.9,	91.7,	68.4,	72.9,	79.8
6	105,	1977,	31.5,	7.2,	50.6,	247.9,	46.6,	70.8,	127.2,	138.6,	149,	69,	151.9,	21.8
7	105,	1978,	79.8,	106,	105.1,	32.2,	37,	206.2,	146,	279,	87.8,	348.1,	70.3,	187.2
8	105,	1979,	149.8,	111.9,	96.6,	78.9,	90.2,	219,	115.4,	165.2,	51.7,	92,	2,	16.8
9	105,	1980,	58.1,	5.8,	89.2,	171,	33.6,	87.9,	309.2,	255.6,	239.4,	30.2,	15.8,	21.9
10	105,	1981,	16.8,	14.2,	48.4,	65.5,	147,	78,	250.7,	212,	383.6,	8,	108.9,	2.9
11	105,	1982,	27.7,	27.8,	51,	59.8,	108.7,	60.5,	100.4,	386.2,	0.2,	107.6,	117.2,	8.2
12	105,	1983,	51.8,	19.4,	101,	56.3,	38.1,	146.7,	164.7,	260.7,	191.3,	137.6,	13.4,	51.9
13	105,	1984,	28.7,	40,	25.3,	116.8,	51.1,	120.8,	203.5,	185.5,	442.7,	16.8,	111.6,	23
14	105,	1985,	0.1,	61.3,	40.1,	85.9,	139.5,	98.6,	118,	635.3,	198.9,	259.6,	43.1,	30

Year	Variable	Unit	JAN	FEB
------	----------	------	-----	-----

Showing 0 to 0 of 0 entries

PREC.csv
TEMP.csv

Step 2. Upload data to CLIK

[Dataset](#) ▾ [Processing](#) ▾ [My Jobs](#) [CLIK API](#) [Documents](#) ▾ [Help Desk](#)

Downscale

Select observation dataset

Show ▾ entriesSearch:

Dataset Name	Countries	Total Stations	Period(prec)	Period(temp)	Public
Korea 101 Stations	Republic of Korea	101	1973 ~ 2019	1973 ~ 2019	PUBLIC
GHCN	GHCN	3697	1950 ~ 2009		PUBLIC
Asia Region (prec)	Asia	4918	1961 ~ 2004		PUBLIC
Iran stations	Islamic Republic of Iran	31	1951 ~ 2017	1951 ~ 2017	PUBLIC
Kurdistan stations	Islamic Republic of Iran	7	1960 ~ 2021	1960 ~ 2021	PUBLIC
4 Stations	Republic of Korea	4	1973 ~ 2023	1973 ~ 2023	

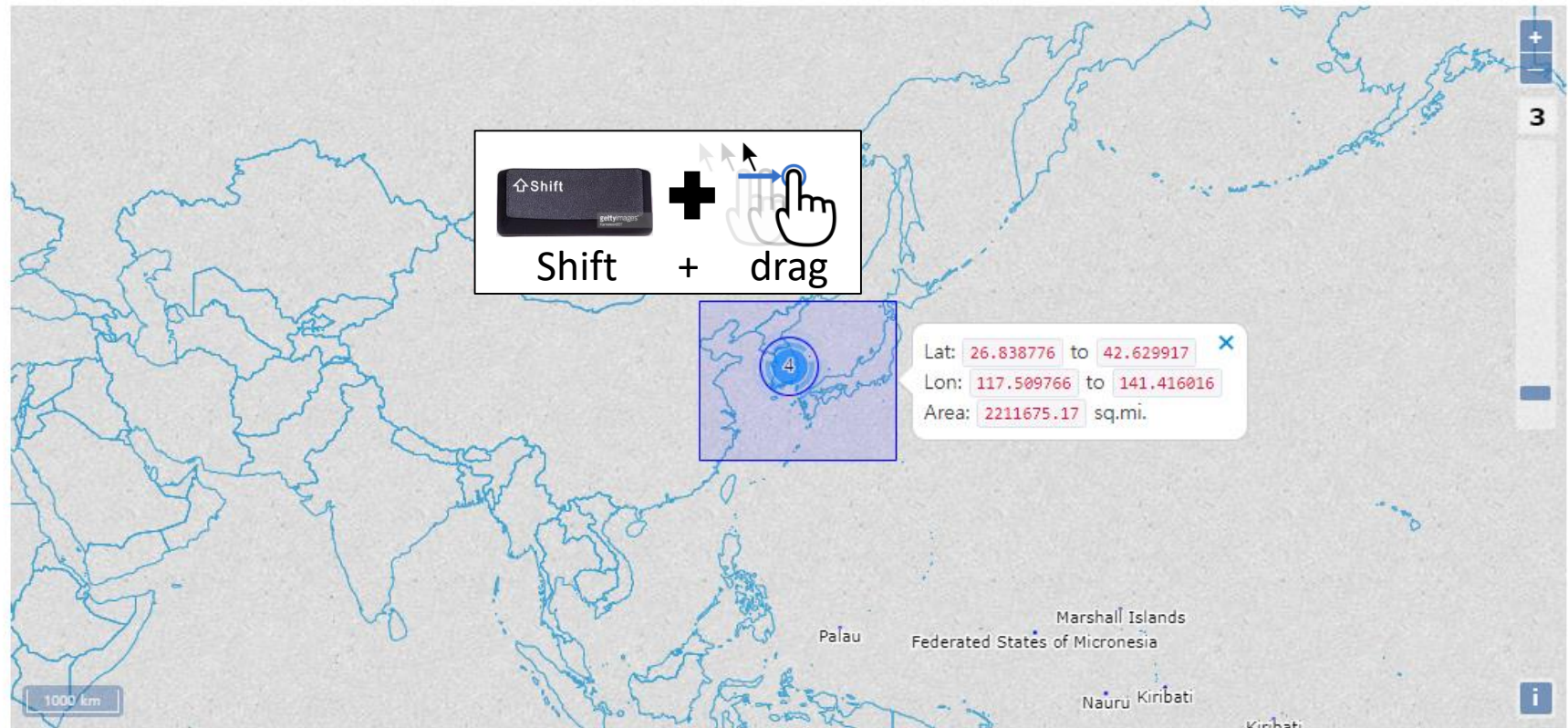
Showing 1 to 6 of 6 entries

[Previous](#) [1](#) [Next](#)[Create](#) [Edit](#) [View](#) [Remove](#)

Data Processing

Step 2. Upload data to CLIK

Select station



How to use?

Show 10 entries

Add Selected Remove All

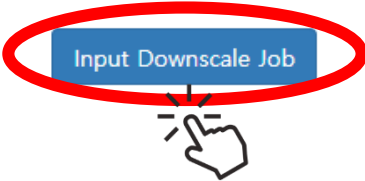
Station ID	Country	Name	Precipitation	Temperature
105	Republic of Korea	Gangneung	1973~2023	1973~2023

Step 2. Upload data to CLIK

Show entriesSearch:

Station ID	Country	Name	Precipitation	Temperature
<input type="radio"/> 105	Republic of Korea	Gangneung	1973~2023	1973~2023
<input checked="" type="radio"/> 108	Republic of Korea	Seoul	1973~2023	1973~2023
<input type="radio"/> 143	Republic of Korea	Daegu	1973~2023	1973~2023
<input type="radio"/> 159	Republic of Korea	Busan	1973~2023	1973~2023

Showing 1 to 4 of 4 entries

[Previous](#) [1](#) [Next](#)

Data Processing

Step 2. Upload data to CLIK

Station information

Dataset : 4 Stations
Station ID : 108
Country : Republic of Korea
Station name : Seoul
Precipitation(1973~2023) , Temperature(1973~2023)

Predictand

Season: Year Season

Variable: Precipitation Temperature

Predictor

Variable: prec slp sst t850 u200 u850 v200 v850 z500


Models: Please select variable.

Training Period: From To

Advanced Options: Method Linear Regression
Significance Level: %
Minimum Pattern Score:

Domain

Latitude ~ Longitude ~



2000 km



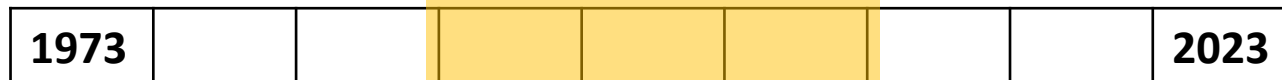
1. 왜 상세화 예측이 필요한가?
2. 자료 처리 실습
3. 상세화 예측 실습
4. 아웃룩 만들어 보기



Downscaling procedure in CLIK: Precipitation over Seoul for JAS 2023

지점자료

- Point (uploaded)

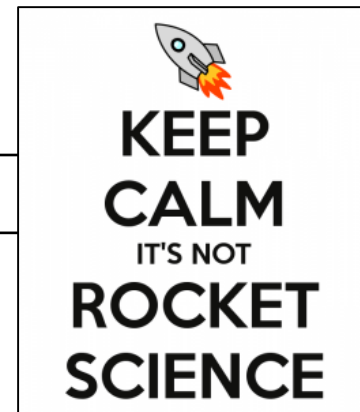


전지구 재분석 자료

- Grid (built-in)
- Reanalysis, CAMS OPI, and OISST

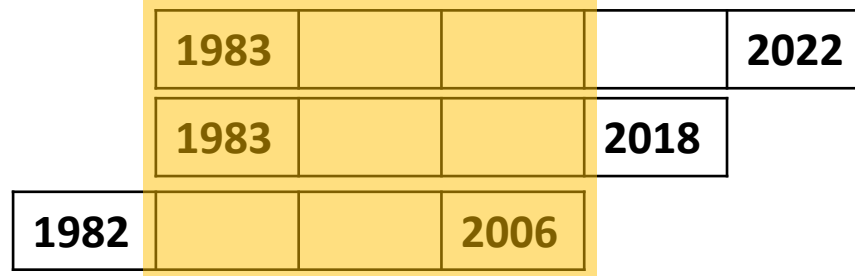


**CORRELATION
&
REGRESSION**



모델 과거예측자료

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



Correlation does not imply causation!

CORRELATION



자동차 판매량

해외여행객수

남극 기압

서울 강수량

아열대 북태평양
기압

코로나 확진자

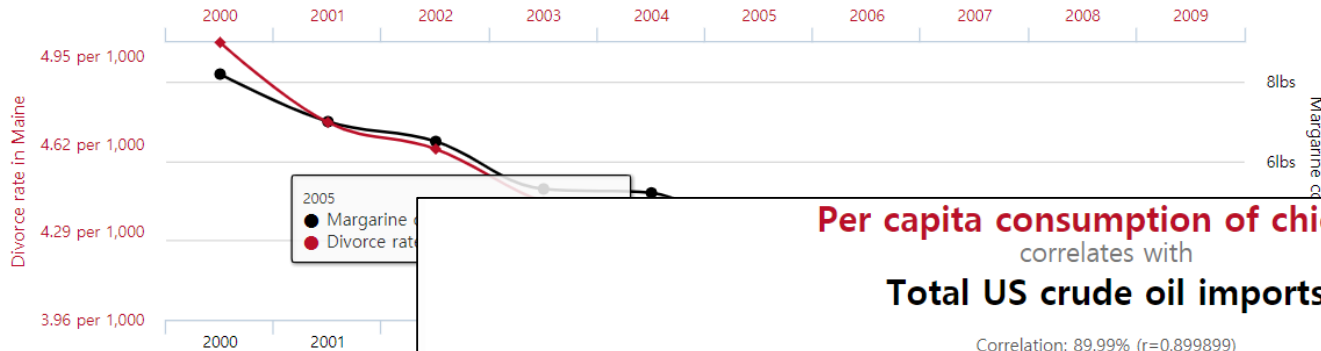
Correlation does not imply causation!

CORRELATION



Divorce rate in Maine correlates with Per capita consumption of margarine

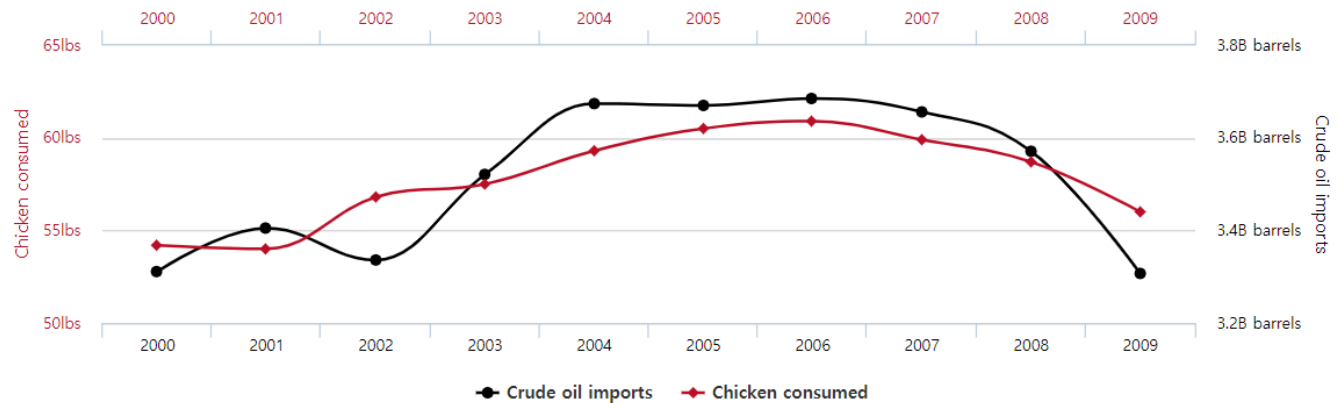
Correlation: 99.26% (r=0.992558)



Data sources: National Vital Statistics Reports and U.S.

Per capita consumption of chicken correlates with Total US crude oil imports

Correlation: 89.99% (r=0.899899)



Data sources: U.S. Department of Agriculture and Dept. of Energy

tylervigen.com

Correlation does not imply causation!

CORRELATION



자동차 판매량

해외여행객수

남극 기압

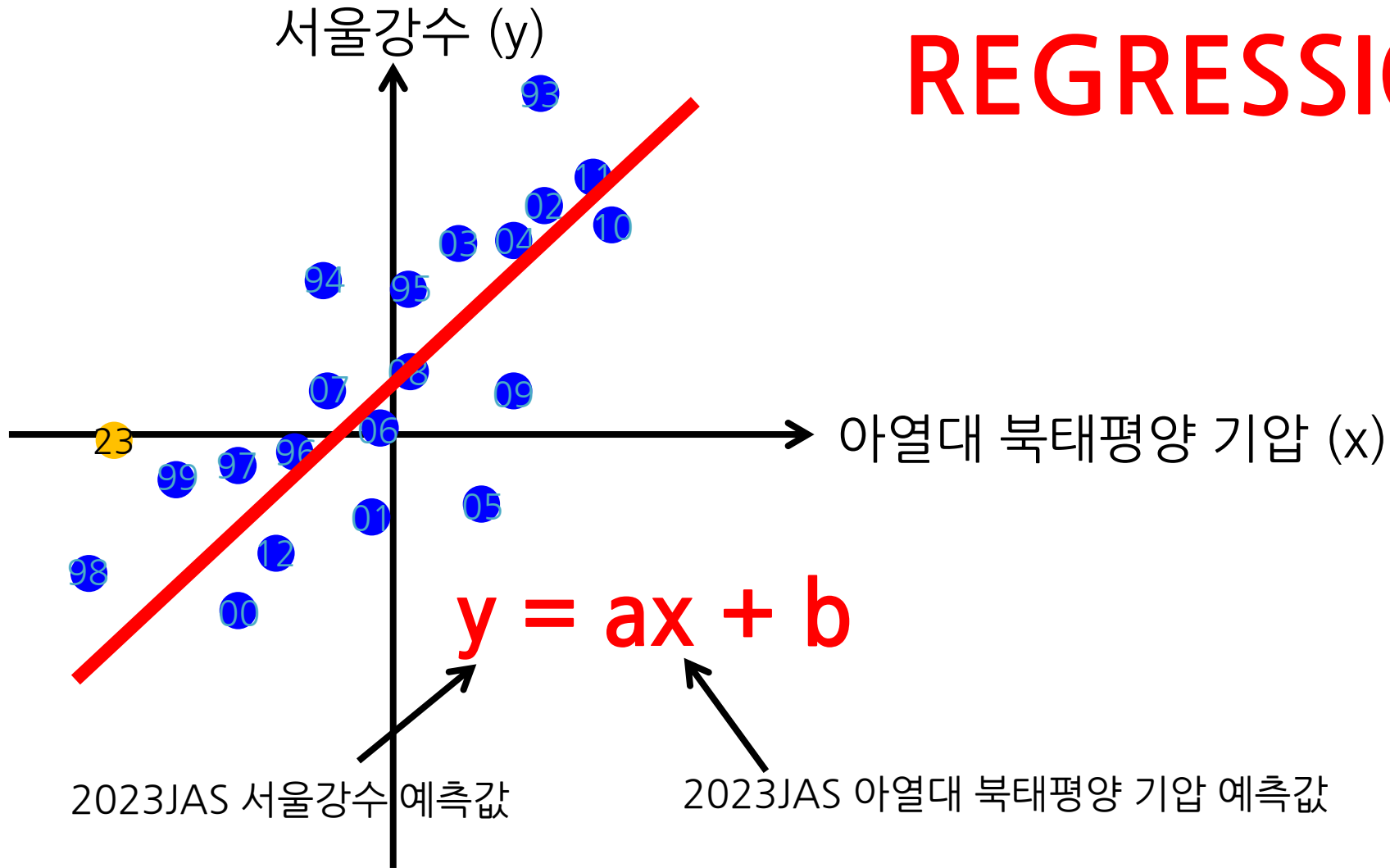
서울 강수량

아열대 북태평양
기압

코로나 확진자

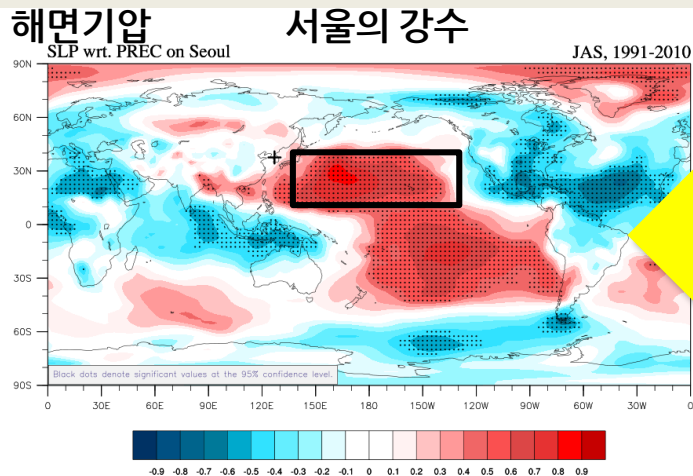
Correlation does not imply causation!

REGRESSION

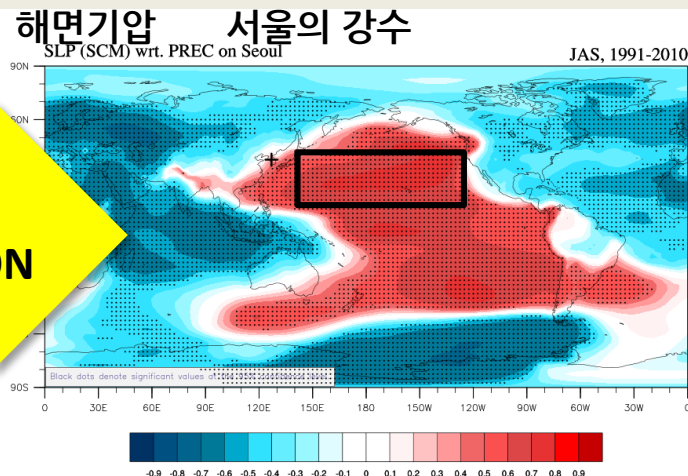


Downscaling procedure in CLIK: Precipitation over Seoul for JAS 2023

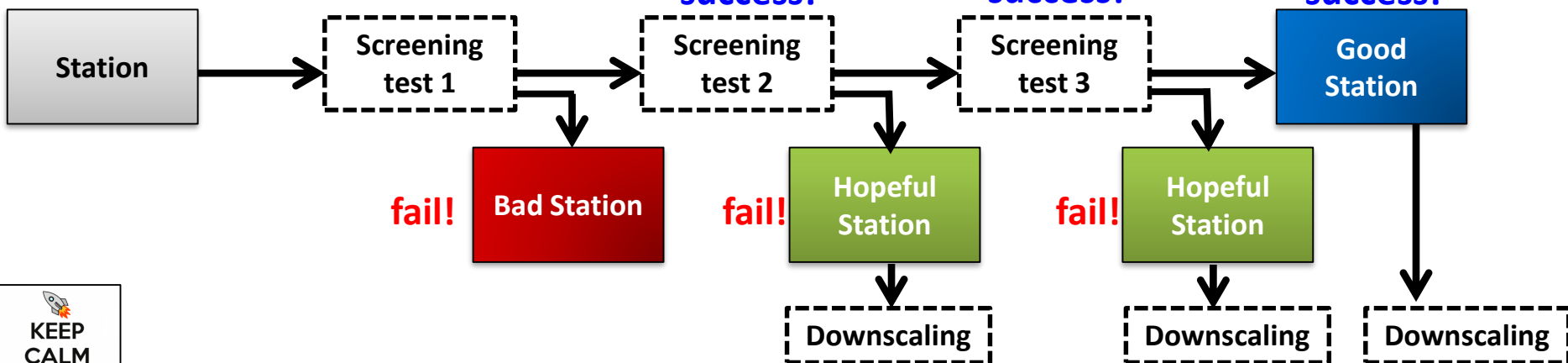
1 재분석자료와 지점자료의 상관관계



2 모델자료와 지점자료의 상관관계 계산



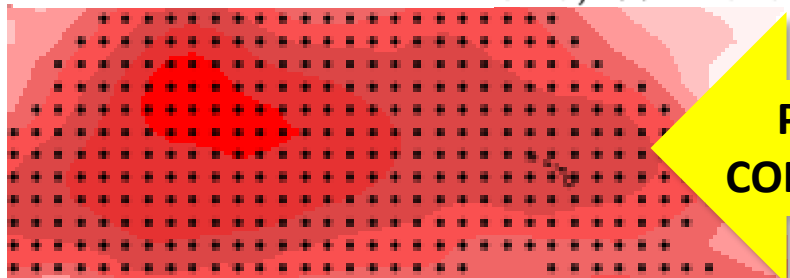
3
PATTERN
CORRELATION



Downscaling procedure in CLIK: Precipitation over Seoul for JAS 2023

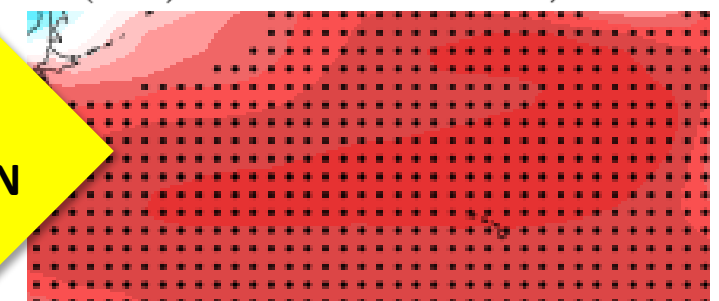
Relationship between 서울강수 & 아열대 북태평양 해면기압

SLP wrt. PREC on Seoul JAS, 1991-2010

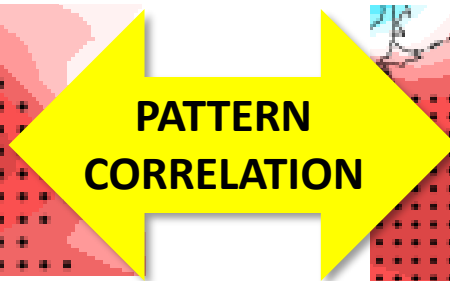


from 관측자료

SLP (SCM) wrt. PREC on Seoul JAS, 1991-2010



from 예측자료



- ① 과거 서울강수가 과거 아열대 북태평양 해면기압과 상관관계가 있고,
- ② 과거 서울강수가 모델이 예측했던 과거 아열대 북태평양 해면기압과 상관관계가 있으며,
- ③ 그 상관관계의 모습이 유사하다면,

Successful downscaling...?



2023년 7월-9월 (JAS)
서울의 강수량은?

Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Downscale

Select observation dataset

Show 10 entries Search:

Dataset Name	Countries	Total Stations	Period(prec)	Period(temp)	Public
Korea 101 Stations	Republic of Korea	101	1973 ~ 2019	1973 ~ 2019	PUBLIC
GHCN	GHCN	3697	1950 ~ 2009		PUBLIC
Asia Region (prec)	Asia	4918	1961 ~ 2004		PUBLIC
Iran stations	Islamic Republic of Iran	31	1951 ~ 2017	1951 ~ 2017	PUBLIC
Kurdistan stations	Islamic Republic of Iran	7	1960 ~ 2021		
4 Stations	Republic of Korea	4	1973 ~ 2023		

Showing 1 to 6 of 6 entries

1

Select station

Shift + drag

Lat: 26.838776 to 42.629917
Lon: 117.509766 to 141.416016
Area: 2211675.17 sq.mi.

How to use?

Show 10 entries

Station ID	Country	Name	Precipitation	Temperature
<input type="radio"/> 105	Republic of Korea	Gangneung	1973~2023	1973~2023
<input checked="" type="radio"/> 108	Republic of Korea	Seoul	1973~2023	1973~2023
<input type="radio"/> 143	Republic of Korea	Daegu	1973~2023	1973~2023
<input type="radio"/> 159	Republic of Korea	Busan	1973~2023	1973~2023

Showing 1 to 4 of 4 entries

Previous 1 Next

4

Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

The screenshot displays the CLIQS web interface for generating a downscaled forecast. The interface is divided into several sections:

- Station information:** Dataset: 4 Stations, Station ID: 108, Country: Republic of Korea, Station name: Seoul, Precipitation(1973~2023), Temperature(1973~2023).
- Predictand:** Season: 2023, Season: 7, Precipitation (selected), Temperature.
- Predictor:** Variable: slp (해면기압), Models: APCC_SCOPS, BOM_ACCESS-S2, CMCC_SPS3.5, ECCS_CANSIPSv2.1, KMA_GLOSEA6GC3.2, METFR_SYS8, MGO_MGOAM-2, NASA_GEOS-S2S-2.1, NCEP_CFSv2, PNU-RDA_CGCMv2.0, UKMO_GLOSEA6. Training Period: From 1993 to 2016 (24 years). Method: Linear Regression, Significance Level: 5%, Minimum Pattern Score: 0.3. All options are set to '자동' (Automatic).
- Domain:** Latitude: 10 ~ 40, Longitude: 140 ~ 230. A map shows the domain with a red box highlighting the area around Seoul. A tooltip shows coordinates: Lat: 10.000000 to 40.000000, Lon: 140.000000 to 230.000000, Area: 14494582.34 sq.mi.

Annotations on the map include:

- 1: SLP wrt. PREC on Seoul JAS, 1991-2010
- 2: SLP (SCM) wrt. PREC on Seoul JAS, 1991-2010
- 3: A yellow circle indicating the location of Seoul.

Additional text on the map: 10~40, 140~230.

Predictor

Advanced Options: Linear Regression, Sig. Level, Min. Pattern Score

Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Acknowledgement for APCC MME / Individual model

When you use the APCC MME and/or individual model data in any documents or publications, please acknowledge us by including the following text, *"The authors acknowledge the APCC MME Producing Centers for making their hindcast/forecast data available for analysis, the APEC Climate Center for collecting and archiving the data, as well as for producing APCC MME predictions."*

Acknowledgement for Clipped CMIP5

When you use other APCC data products in any documents or publications, please acknowledge us by including following text, *"The authors acknowledge the APEC Climate Center for providing the Clipped CMIP5"*. Note that you may have to insert citations or references for these datasets, following the original 'how to cite this datasets' directions posted on the original website for these datasets.

Auto Refresh

All Queued Running Failed Complete

Job type	Submission date	End date	Status
Downscaling	2023-07-05 16:10:58	2023-07-05 16:12:23	Download Edit Result
Downscaling	2023-07-05 16:00:56	2023-07-05 16:07:27	Download Edit Result
Downscaling	2023-07-05 16:00:35	2023-07-05 16:03:42	Download Edit Result
Downscaling	2023-07-05 15:57:22	2023-07-05 15:59:19	Download Edit Result
Downscaling	2023-07-04 16:49:30	2023-07-04 16:51:05	Download Edit Result
Downscaling	2023-07-04 15:16:29	2023-07-04 15:18:03	Download Edit Result
Downscaling	2023-07-04 15:14:17	2023-07-04 15:15:54	Download Edit Result
Downscaling	2023-07-04 14:26:40	2023-07-04 14:27:58	Failed Edit
Downscaling	2023-07-04 14:26:37	2023-07-04 14:27:35	Failed Edit
Downscaling	2023-07-04 14:23:31	2023-07-04 14:26:12	Failed Edit
Downscaling	2023-07-04 14:22:30	2023-07-04 14:24:34	Download Edit Result
Downscaling	2023-07-04 14:20:33	2023-07-04 14:24:09	Download Edit Result



Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Climate Information toolkit (CLIK) Home Dataset Processing My Jobs CLIK API Documents Help Desk Member

Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input type="radio"/> CMCC_SPS3.5 <input type="radio"/> METFR_SYS8 <input type="radio"/> PNU-RDA_CGCMv2.0 <input checked="" type="radio"/> SCM <input type="radio"/> BOM_ACCESS-S2 <input type="radio"/> ECCCS_CANSIPsv2.1 <input type="radio"/> KMA_GLOSEA6GC3.2 <input type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230

Advanced Options

Significance level: 5%
Minimum pattern score: 0.3

Results

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Hopeful	0.732028

Downscaled forecast on the selected station

Correlation = 0.73 PREC_forecasted = 95.03 mm/month

Location

SLP / PREC (hPa / mm/month)

SLP / PREC (hPa / mm/month)

1. Job summary
2. Historical time series of downscaled prediction/observation data, correlation coefficient between them, deterministic forecast, and tercile category of the forecast
3. Location of station
4. Regressed predictor (SLP; observation) field onto the predictand (precipitation) over the selected domain
5. Regressed predictor (SLP; model) field onto the predictand (precipitation) over the selected domain

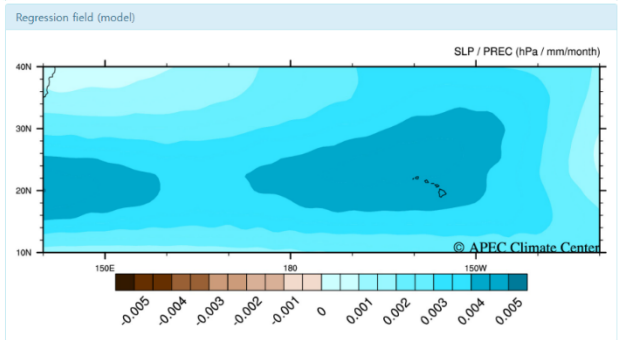
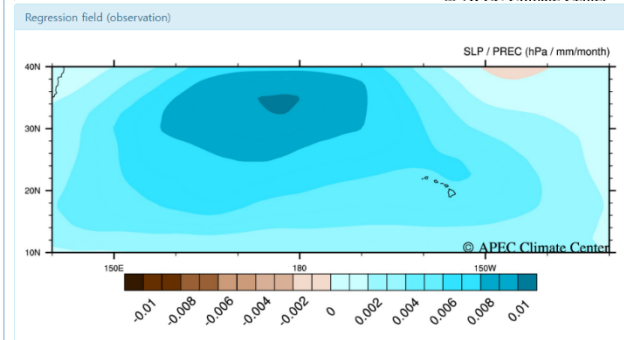
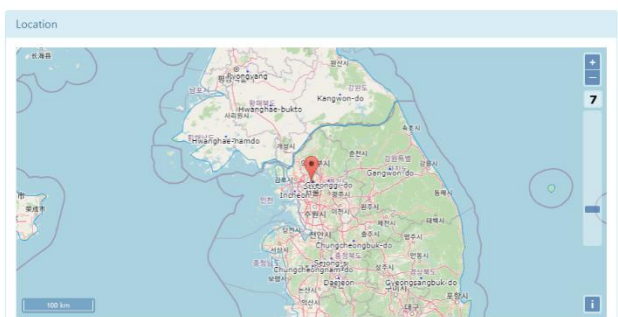
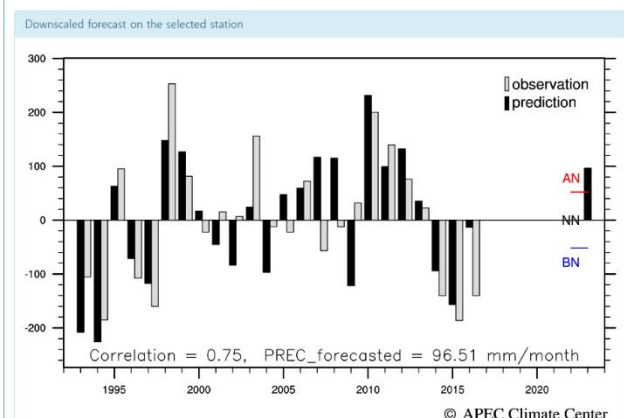
Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input checked="" type="radio"/> CMCC_SPS3.5 <input type="radio"/> METFR_SYS8 <input type="radio"/> PNU-RDA_CGCMv2.0 <input type="radio"/> SCM <input type="radio"/> BOM_ACCESS-S2 <input type="radio"/> ECCS_CANSIPSv2.1 <input type="radio"/> KMA_GLOSEA6GC3.2 <input type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230
Advanced Options			
Significance level	5%		
Minimum pattern score	0.3		

Results

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Good	0.75189



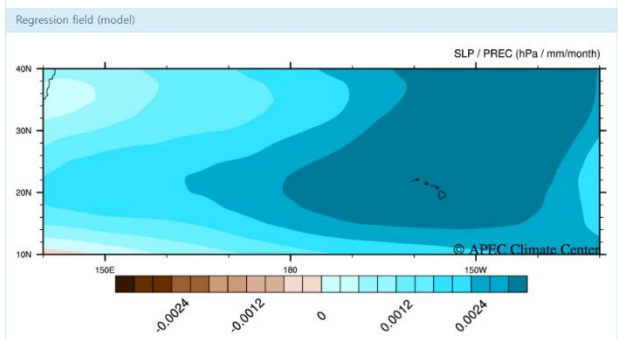
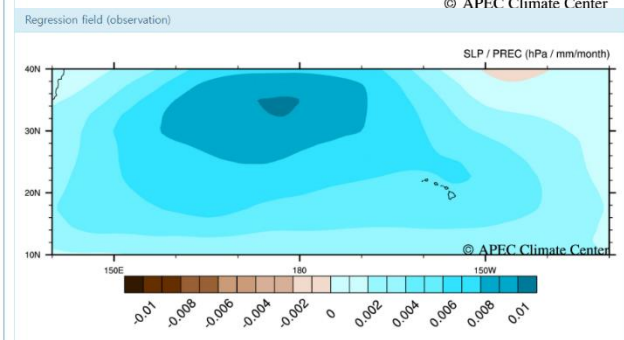
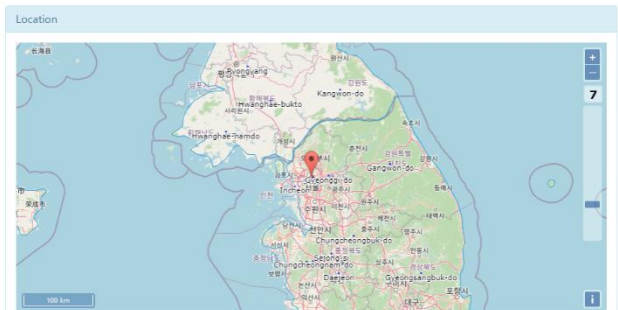
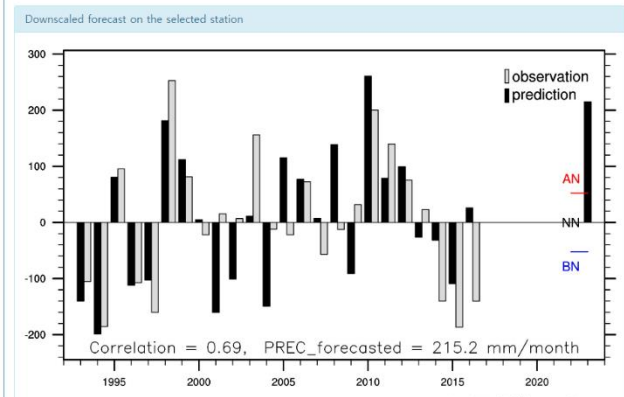
- CMCC SPS3
- Above-normal prec
- Good
- Cor. Coeff: 0.75

Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input type="radio"/> CMCC_SPS3.5 <input checked="" type="radio"/> METFR_SYS8 <input type="radio"/> PNU-RDA_CGCMv2.0 <input type="radio"/> SCM <input type="radio"/> BOM_ACCESS-S2 <input type="radio"/> ECCS_CANSIPsv2.1 <input type="radio"/> KMA_GLOSEA6GC3.2 <input type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230
Advanced Options			
Significance level	5%		
Minimum pattern score	0.3		

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Good	0.687908



- METFR SYS8
- Above-normal prec
- Good
- Cor. Coeff: 0.69

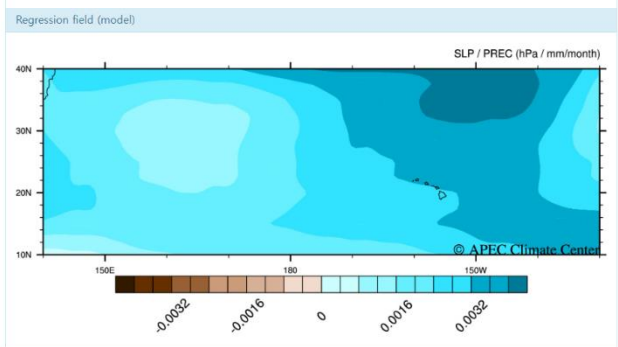
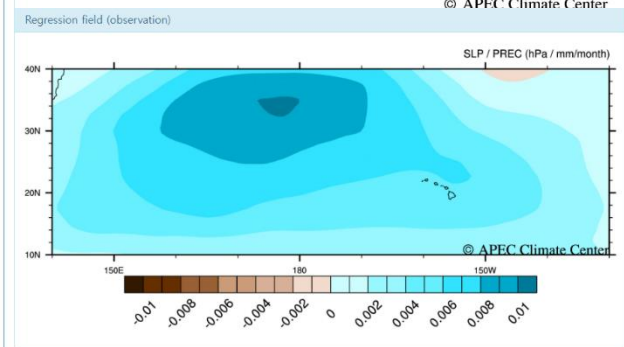
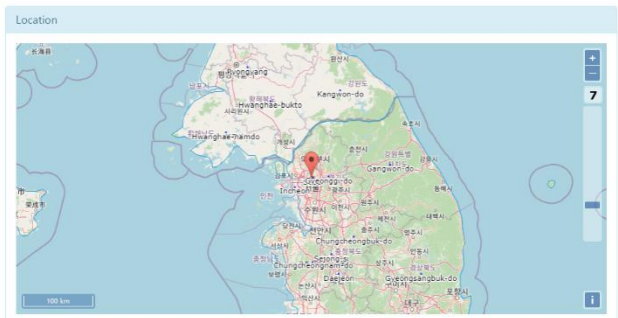
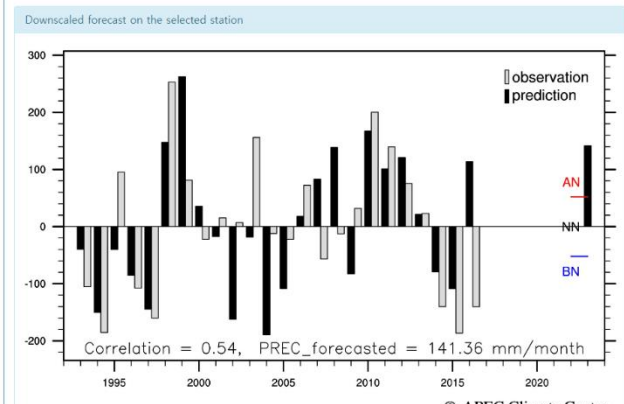
Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input type="radio"/> CMCC_SPS3.5 <input type="radio"/> METFR_SYS8 <input checked="" type="radio"/> PNU-RDA_CGCMv2.0 <input type="radio"/> SCM <input type="radio"/> BOM_ACCESS-S2 <input type="radio"/> ECCS_CANSIPsv2.1 <input type="radio"/> KMA_GLOSEA6GC3.2 <input type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230
Advanced Options			
Significance level	5%		
Minimum pattern score	0.3		

Results

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Good	0.544015



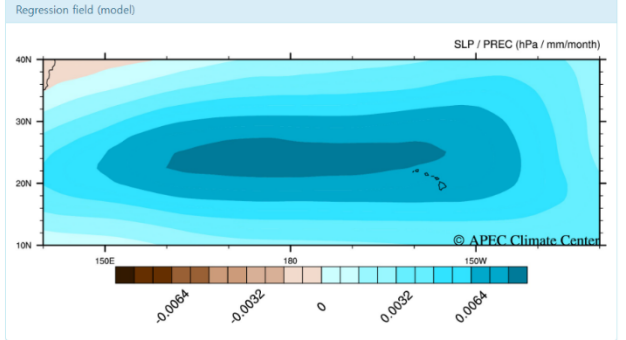
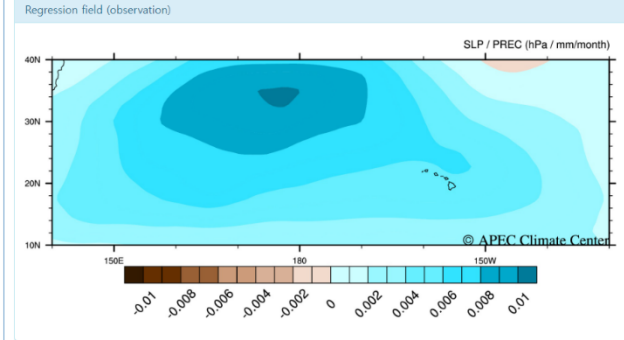
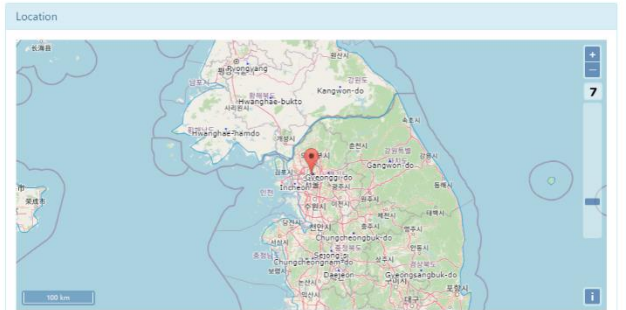
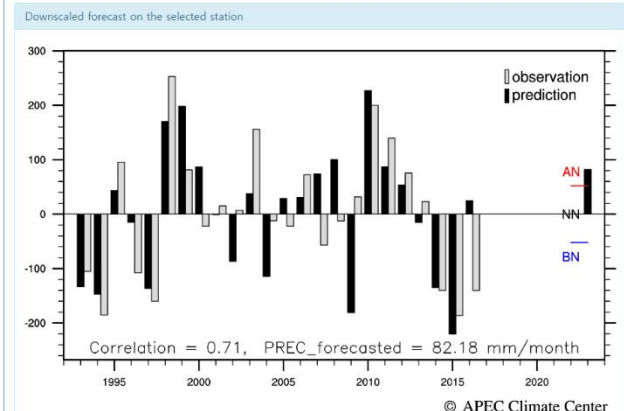
- PNU-RDA CGCMv2.0
- Above-normal prec
- Good
- Cor. Coeff: 0.54

Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input type="radio"/> CMCC_SPS3.5 <input type="radio"/> METFR_SYS8 <input type="radio"/> PNU-RDA_CGCMv2.0 <input type="radio"/> SCM <input checked="" type="radio"/> BOM_ACCESS-S2 <input type="radio"/> ECCO_CANSIPsv2.1 <input type="radio"/> KMA_GLOSEA6GC3.2 <input type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230
Advanced Options			
Significance level	5%		
Minimum pattern score	0.3		

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Hopeful	0.713686



- BOM ACCESS-S2
- Above-normal prec
- Hopeful
- Cor. Coeff: 0.30

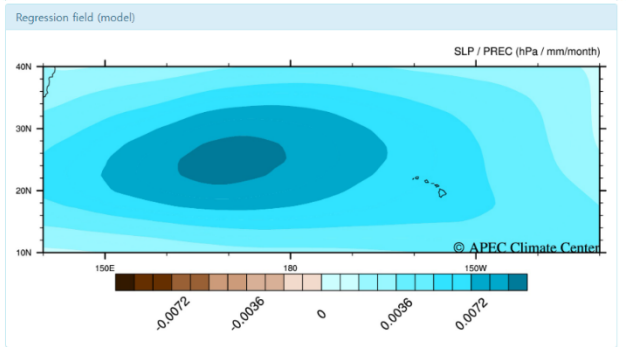
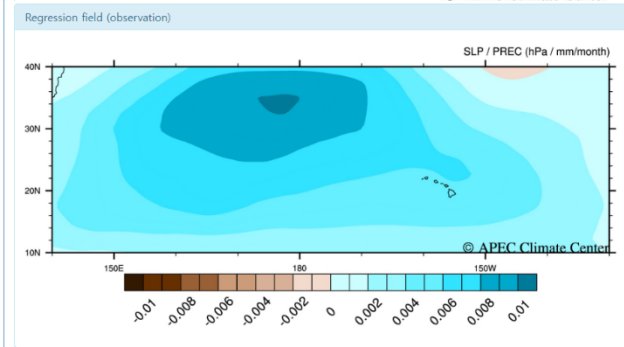
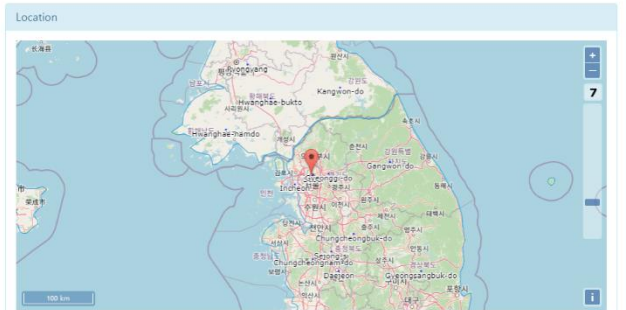
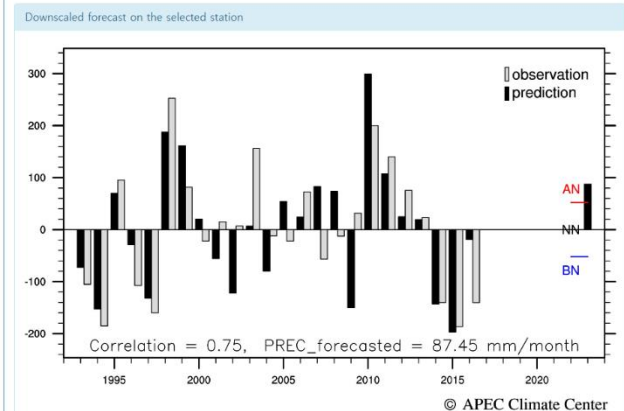
Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input type="radio"/> CMCC_SPS3.5 <input type="radio"/> METFR_SYS8 <input type="radio"/> PNU-RDA_CGCMv2.0 <input type="radio"/> SCM <input type="radio"/> BOM_ACCESS-S2 <input checked="" type="radio"/> ECCC_CANSIPSv2.1 <input type="radio"/> KMA_GLOSEA6GC3.2 <input type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230
Advanced Options			
Significance level	5%		
Minimum pattern score	0.3		

Results

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Hopeful	0.752642



- ECCC CANSIPSv2.1
- Above-normal prec
- Hopeful
- Cor. Coeff: 0.75

Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

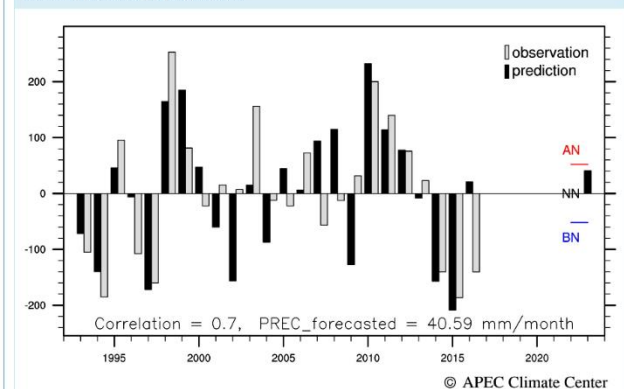
Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input type="radio"/> CMCC_SPS3.5 <input type="radio"/> METFR_SYS8 <input type="radio"/> PNU-RDA_CGCMv2.0 <input type="radio"/> SCM <input type="radio"/> BOM_ACCESS-S2 <input type="radio"/> ECCO_CANSIPSv2.1 <input checked="" type="radio"/> KMA_GLOSEA6GC3.2 <input type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230
Advanced Options			
Significance level	5%		
Minimum pattern score	0.3		

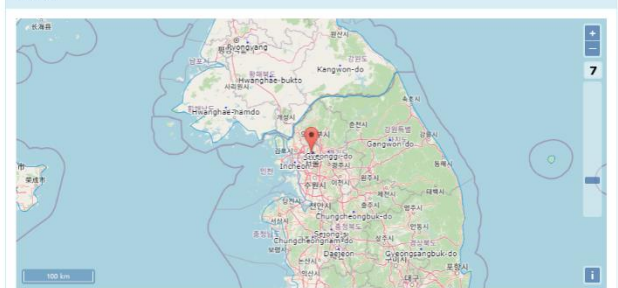
Results

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Hopeful	0.704293

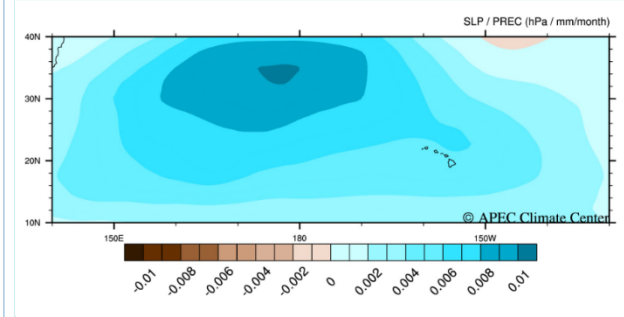
Downscaled forecast on the selected station



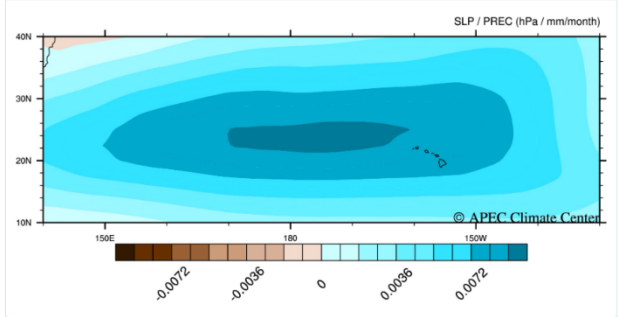
Location



Regression field (observation)



Regression field (model)



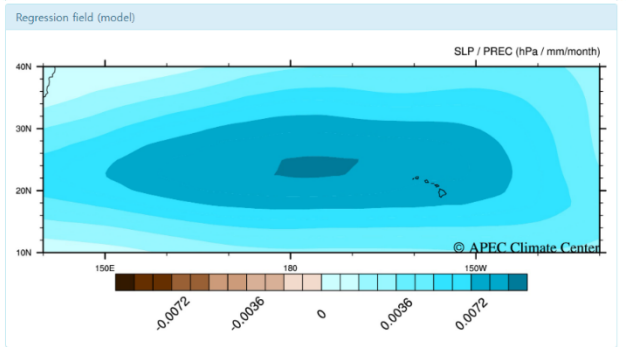
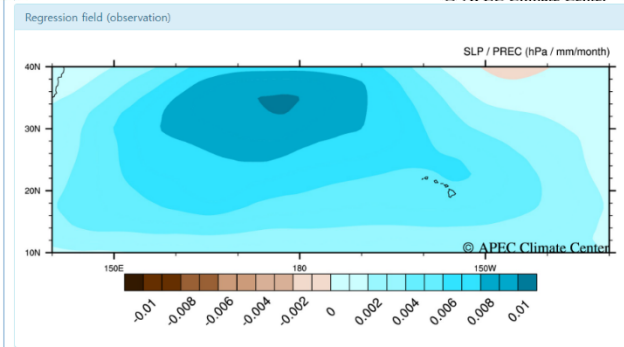
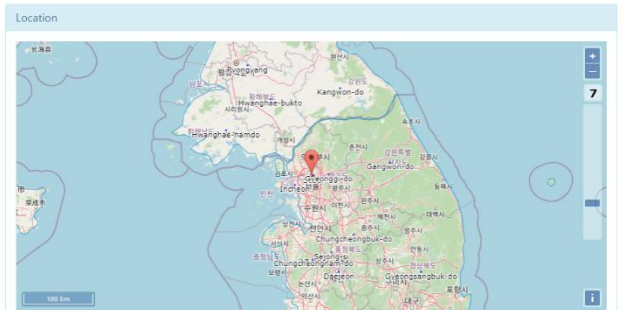
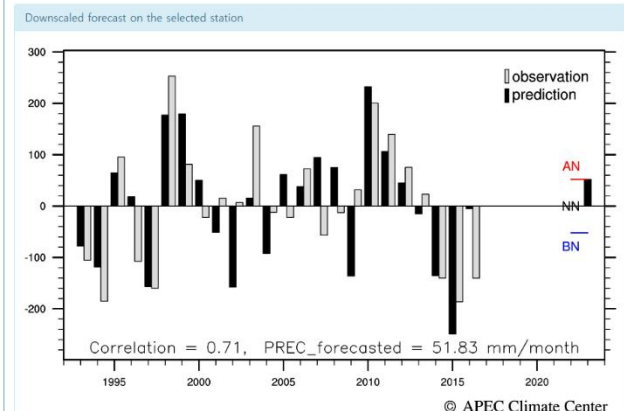
- KMA GLOSEA6GC3.2
- Above-normal prec
- Hopeful
- Cor. Coeff: 0.70

Produce a downscaled forecast : Precipitation over Seoul for JAS 2023

Details of Downscale: 64a5178220dd750006fe8f56

Predictand		Predictor	
Year-Season	2023-7	Training period	1993-2016
Variable	prec	Variable	slp
Dataset	4 Stations	Models	<input type="radio"/> CMCC_SPS3.5 <input type="radio"/> METFR_SYS8 <input type="radio"/> PNU-RDA_CGCMv2.0 <input type="radio"/> SCM <input type="radio"/> BOM_ACCESS-S2 <input type="radio"/> ECCO_CANSIPSv2.1 <input type="radio"/> KMA_GLOSEA6GC3.2 <input checked="" type="radio"/> UKMO_GLOSEA6
Region	108 Seoul	Region	Latitude: 10-40, Longitude: 140-230
Advanced Options			
Significance level	5%		
Minimum pattern score	0.3		

Station ID	Country	Station name	Result	Correlation
108	Republic of Korea	Seoul	Hopeful	0.712919



- UKMO GLOSEA6
- Above-normal prec
- Hopeful
- Cor. Coeff: 0.71

Produce a downscaled forecast : Precipitation over Daejeon for JAS 2023

Downscale

Select observation dataset

Show 10 entries **Korea 101 Stations** Search:

Dataset Name	Countries	Total Stations	Period(prec)	Period(temp)	Public
Korea 101 Stations	Republic of Korea	101	1973 ~ 2019	1973 ~ 2019	PUBLIC
GHCN	World	3697	1950 ~ 2009		PUBLIC
Asia Region (prec)	Asia	4918	1961 ~ 2004		PUBLIC
Iran stations	Islamic Republic of Iran	31	1951 ~ 2017	1951 ~ 2017	PUBLIC
Kurdistan stations	Islamic Republic of Iran	7	1960 ~ 2021	1960 ~ 2021	PUBLIC

Showing 1 to 5 of 5 entries

Previous 1 Next

Create Edit View Remove

2

Lat: 35.798184 to 36.688657
Lon: 126.883858 to 127.845154
Area: 5878.36 sq.mi.

Shift + drag

133 Daejeon

How to use?

Show 10 entries

Station ID	Country	Name	Precipitation	Temperature
<input checked="" type="radio"/> 133	Republic of Korea	Daejeon	1973~2019	1973~2019
<input type="radio"/> 146	Republic of Korea	Jeonju	1973~2019	1973~2019
<input type="radio"/> 226	Republic of Korea	Boeun	1973~2019	1973~2019
<input type="radio"/> 236	Republic of Korea	Buyeo	1973~2019	1973~2019
<input type="radio"/> 238	Republic of Korea	Geumsan	1973~2019	1973~2019

Showing 1 to 5 of 5 entries

Previous 1 Next

3 Add Selected Remove All

4 Input Downscale Job

Produce a downscaled forecast : Precipitation over Daejeon for JAS 2023

Station information

Dataset : Korea 101 Stations
 Station ID : 133
 Country : Republic of Korea
 Station name : Daejeon
 Precipitation(1973~2019) , Temperature(1973~2019)

Predictor

Variable
 prec slp t850 u200 u850 v200 v850 z500

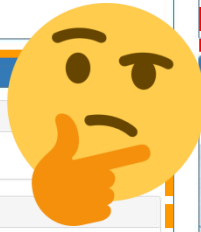
Slp (해면기압)

Models
 APCC_SCOPS BOM_ACCESS-S2 CMCC_SPS3.5 ECCC_CANSIPsv2.1 KMA_GLOSEA6GC3.2
 METFR_SYS8 MGO_MGOAM-2 NASA_GE05-S2S-2.1 NCEP_CFSv2 PNU-RDA_CGCMv2.0
 UKMO_GLOSEA6

BOM ECCC PNU

Training Period
 From 1981 To 2018 38 years

Advanced Options
 Method Linear Regression
 Significance Level 5 %
 Minimum Pattern Score 0.3



Predictand

Season Year 2023 **2022** Season 7 **10**

Variable Precipitation **Precipitation**

Domain

Latitude 10 ~ 40 Longitude 130 ~ 220 **10~40, 130~220**

Apply

2000 km

Downscale

Predictand: 2023 JAS / Precipitation

Predictor: slp / BOM, ECCC, PNU / 아열대북태평양 (10~40, 130~220)



1. 왜 상세화 예측이 필요한가?
2. 자료 처리 실습
3. 상세화 예측 실습
4. 아웃룩 만들어 보기



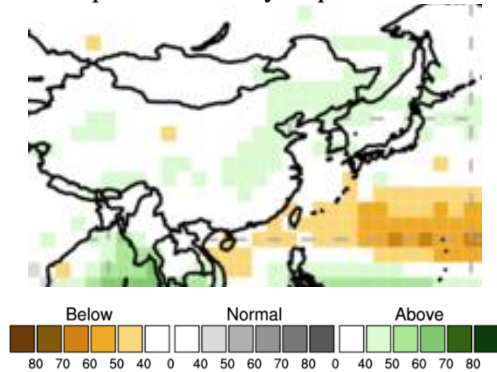
Exercise

Make your own seasonal climate outlook!

2023년 7월-9월 강수 전망

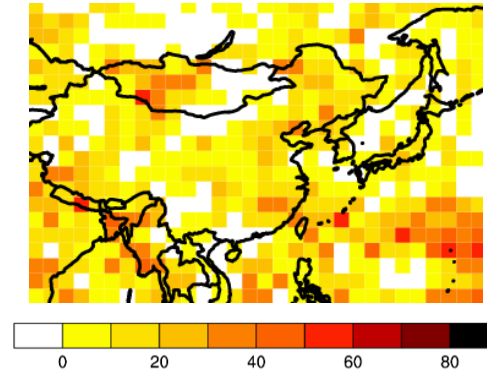
- APCC MME 예측에 따르면 2023년 9월-9월 동안 중국 남동부에서 한반도에 이르는 지역의 강수는 평년보다 적을 경향이 전망됨.
- 상세화 예측에 따르면 서울의 강수는 평년보다 많을 것으로 전망되며 이는 APCC MME 예측과 일관됨.

Precipitation for July-September 2023

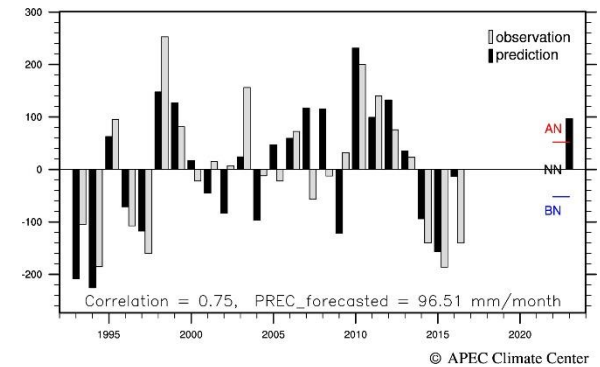


Probability forecast

Heidke Skill Score : PREC, JAS (1993-2016)



Verification



- Predictor: SLP
- Used models: BOM CMCC ECCG KMA METFR PNU UKMO

Downscaled forecast

Exercise

Make your own seasonal climate outlook!

Station information

Any city which you are interested in

Address: Daegu
Station ID : 143
Country : Republic of Korea
Station name : Daegu
Precipitation(1973~2019) , Temperature(1973~2018)

Predictand

Season: **2023 JAS or whatever**

Year: 2022 Season: 11

Variable: Precipitation Temperature

Predictor

Variable

prec slp sst t850 u200 u850 v200 v850 z500

Models

Please select variable.

Training Period

From To

Advanced Options

Method: Linear Regression

Significance Level: 5 %

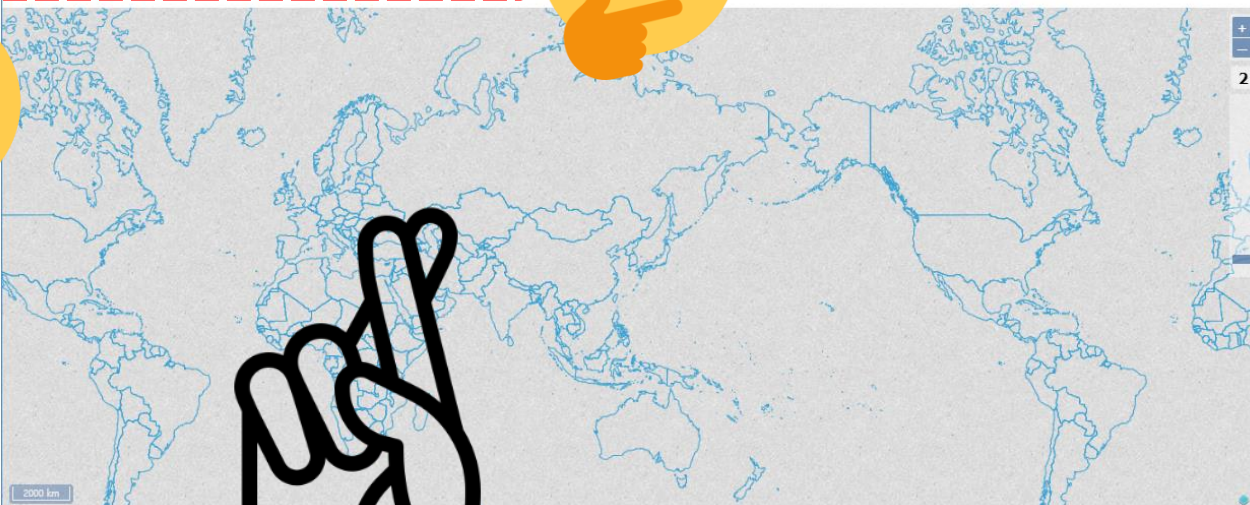
Minimum Pattern Score: 0.3

Domain

Latitude ~ Longitude

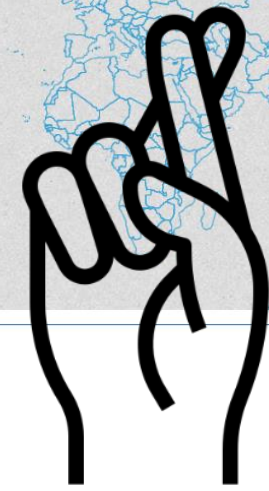
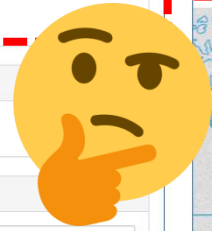
Apply

Check pattern



2000 km

Downscale





කාලගුණ විද්‍යා දෙපාර්තමේන්තුව
வளிமண்டலவியல் திணைக்களம்
DEPARTMENT OF METEOROLOGY
 இலங்கை இலங்கை SRI LANKA

Consensus Seasonal Weather Outlook
July, August and September(JAS)
Seasonal Rainfall and Temperature for Sri Lanka

This forecast was prepared using

- The prevailing global climate conditions.
- Forecasts from different climate models from around the world.
- Statistical downscaling of GCM output using CPT

Issued by Centre for Climate Change Studies (CCCS)

And
 Research Division

(b.4) Probabilistic Forecast for JAS season 2019 using Climate Information Toolkit

A climate information toolkit which has developed by APCC is used for following forecast. For the tool kit APCC has used Collection of Dynamic ensemble seasonal prediction data from National Meteorological and Hydrological Services and research institutes. This includes 14 operations and the models developed by institutes from 10 countries.

Areal rainfall data used as input data to "CLIK" toolkit and Downscaled to districts .SST selected as predictor for all the models. (APCC, MSC, NASA, NCEP, PNU, POAMA).

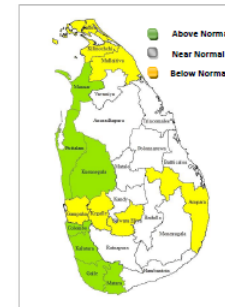


Fig 13: CLIK Multi model Ensemble Probabilistic Forecast for JAS season 2019

According to the CLIK tool there is a higher chance of receiving above normal rainfall in Mammal, Puttalam, Kurunegala, Colombo, Kalutara, Galle and Matara districts (Fig.13). And there is a higher chance of receiving below normal rainfall in Jaffna, Kilinochchi, Mullativu, Ampara, Gampaha, Kegalle and Nuwaraeliya districts. There is no signal in other districts and it indicates equal chances of receiving below normal, near normal and above normal rainfall for these districts.

▲ Sri Lanka’s seasonal climate outlook for July – September 2019



Key messages

1. 상세화 예측의 필요성
2. 기후예측을 위한 다양한 모델: 역학모델/통계모델
3. 예측인자 선정 시 역학관계를 고려하라



Thank you!