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CLIK (CLimate Information toolkit) User Manual

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1. Introduction

CLIK (CLimate Information Toolkit), based on the cloud platform, provides digitized APCC Multi-Model Ensemble prediction, individual models, and BSISO (Boreal Summer IntraSeasonal Oscillation). As external data, it provides ERA5 (ECMWF), NCEP Reanaysis and clipped CMIP5 data. It also provides seasonal MME and verification services using individual models selected by the user, Clipping sevice, Composite service, Masking service.

Users can download climate data in a familiar manner, directly from our webpage. In addition, users who are familiar with using the API can download the data from their own software using the API without accessing the homepage.

2. Main page

Figure 1 shows the main page of CLIK (CLimate Information Toolkit), which provides basic information and menus.

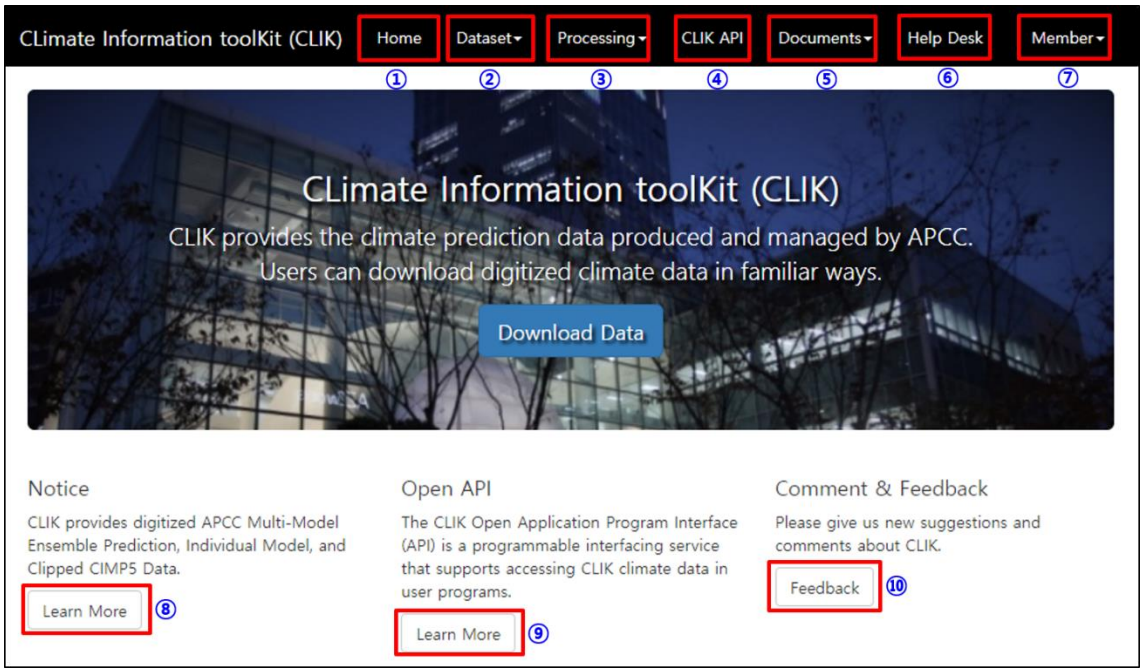


Figure 1. Main page

Table 1 gives the description of the head menus.

Table 1. Head menus

Menu	Description
① Dataset	Each dataset menu provides an overview and download service.
② Processing	This menu provides data processing service such as seasonal forecast (MME), verification, clipping, composition, and masking.
③ My Jobs	This menu is used to view job lists and processing results and will appear after login to CLIK.
④, ⑨ CLIK API	In this menu user can find usages and examples for using the API.
⑤ Document	The manuals and tutorials of CLIK are located here.
⑥, ⑩ Help Desk	The user can ask for help regarding the use of the CLIK service. Suggestions, errors and inconveniences can also be reported using feedback.
⑦ Member	In this menu, users can register an account and log in.
⑧ Notice	Users can view notifications of service.

The main page shows the latest data of APCC MME and Glosea5GC2 (KMA Model) (Figure 2). If a user selects the links of the latest dataset, the dataset pages will appear.

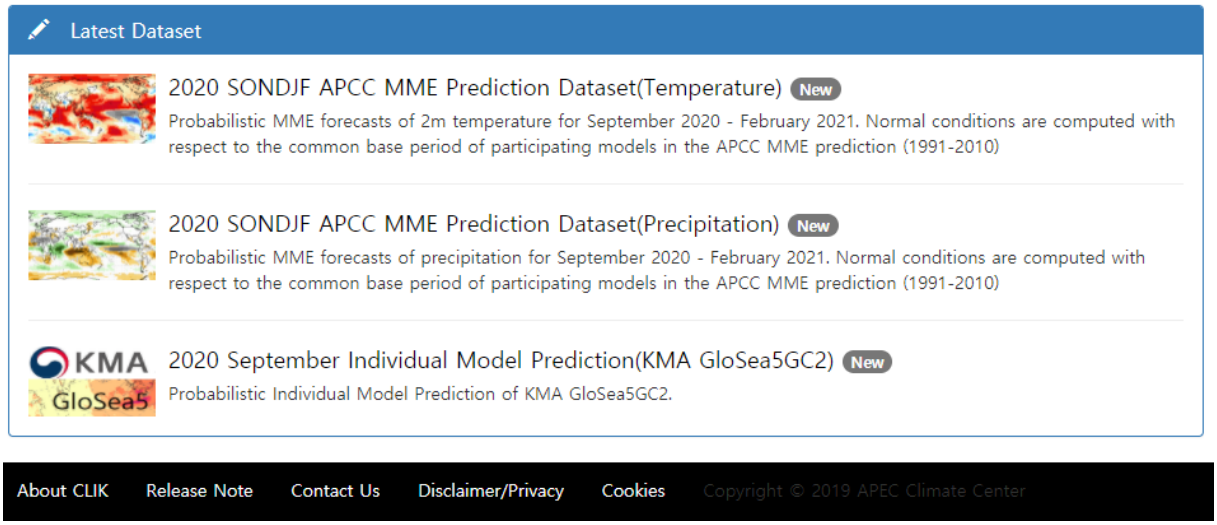


Figure 2. Latest dataset and tail menus

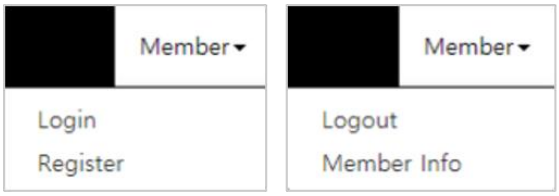
The tail menus provide basic information about CLIK. The descriptions can be found in Table 2.

Table 2. Tail menus

Menu	Description
About CLIK	This menu shows the basic information about the CLIK.
Release Note	This menu provides release history of CLIK.
Contact Us	Users can send feedback about CLIK through email.
Disclaimer/Privacy	This menu provides the privacy policy.
Cookies	This menu provides information about generating and using cookies.

3. Member

Figure 3 shows the sub menu of Member.



Before login After login

Figure 3. Member menu

3.1. Register

If the user did not previously have an account with APCC, they could create a new account by selecting Register under the Member menu (Figure 3). User registration and management of CLIK uses Single Sign On (SSO) system.

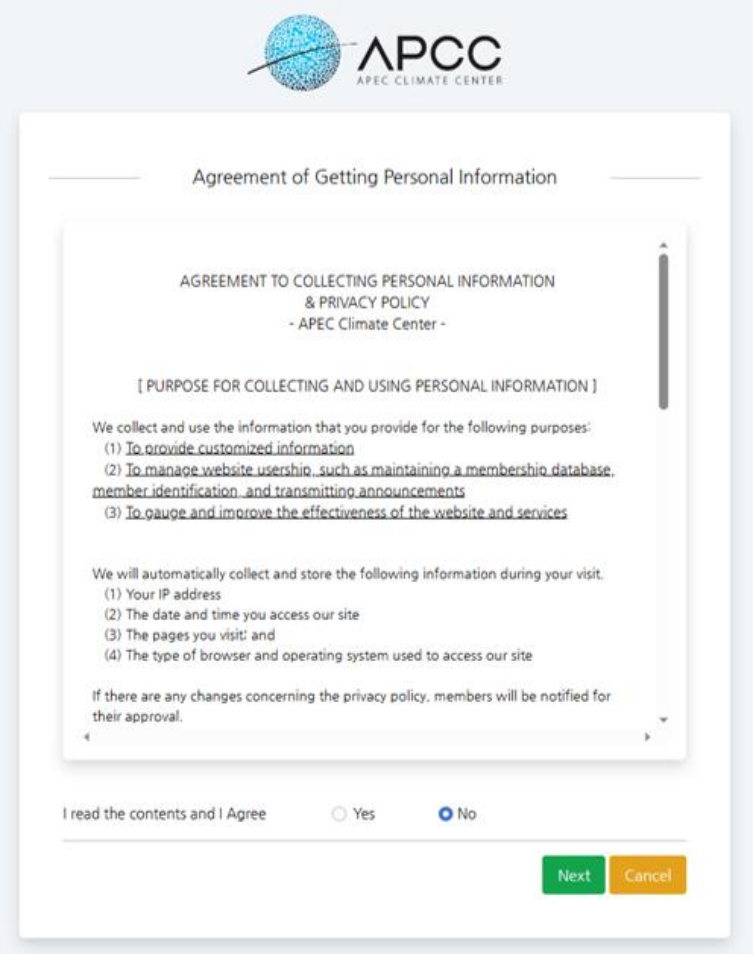


Figure 4. Member registration in APCC Single Sign On System (SSO)

The APCC Single Sign On (SSO) System manages user accounts of all APCC information systems. The APCC SSO allows users to log in to almost all APCC web services using a single account.

3.2. Login

The login menu in Figure 3 is used to log in to CLIK. When you select login menu, you will be redirected to the login page of APCC SSO system.

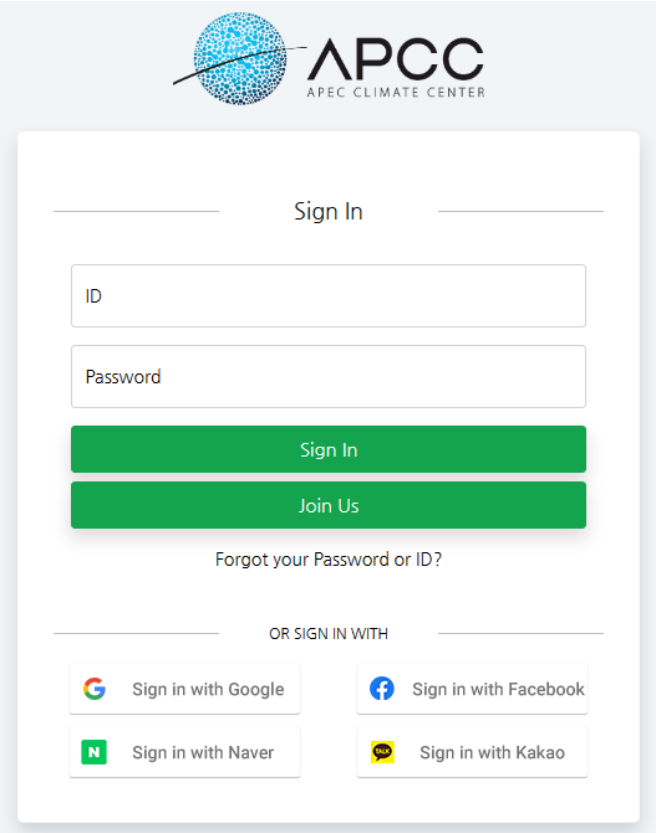


Figure 5. Login page

When you enter your ID and Password and select the "**Sign In**" button, you will be logged into the web service. If you don't have a user account, you can select the "**Join Us**" button to sign up. You can also log in using your Googole, Facebook, KaKao or Naver accounts.

3.3. Member Info

Member Info provides basic information and the API Key of the member. To use the APCC Open API service, please get key using "**Publication**" button.

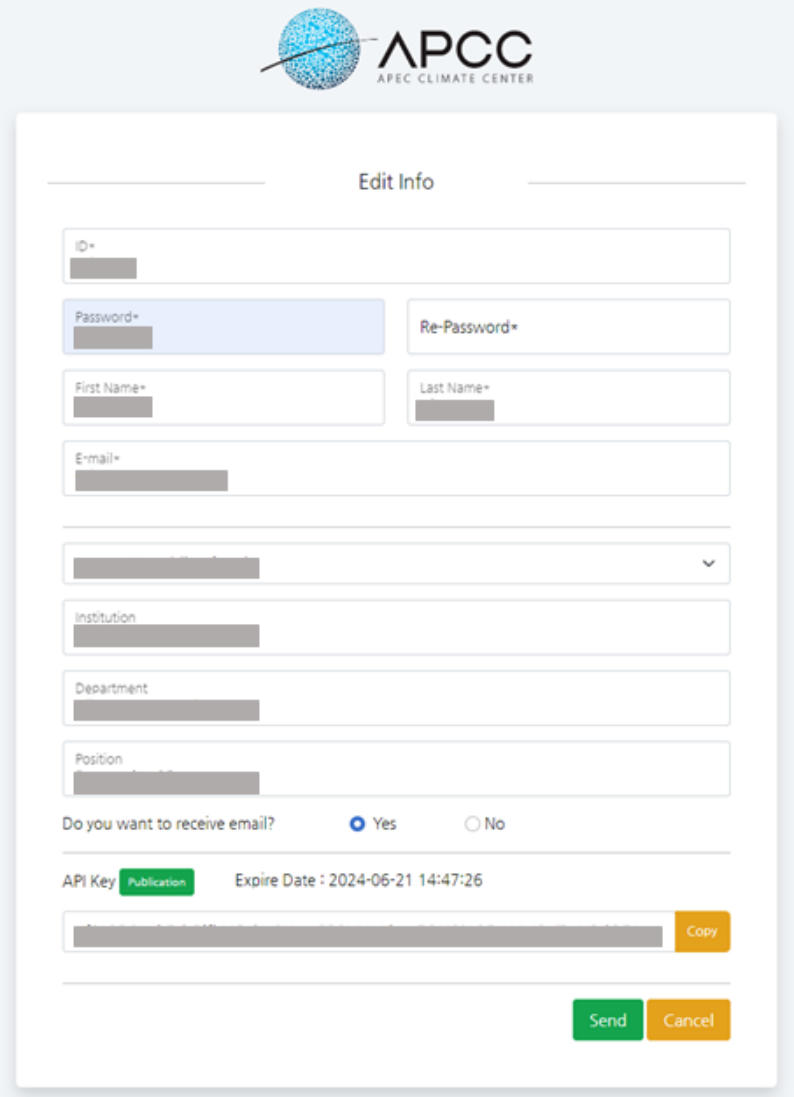


Figure 6. Member Info

4. Dataset

Figure 7 shows the Dataset menu. CLIK currently provides a Multi-Model Ensemble Forecast (MME), MME Individual Model, High resolution MME, Boreal Summber IntraSeasonal Oscillation (BSISO) CMIP5 and ERA5. CLIK provides two types of lead month for MME, 3 and 6-month.

Figure 7. Dataset menu

Dataset pages are separated into Overview and Download (Figure 8). The Overview tab shows the details of the dataset. Users can use requesting and downloading services at the Download tab.

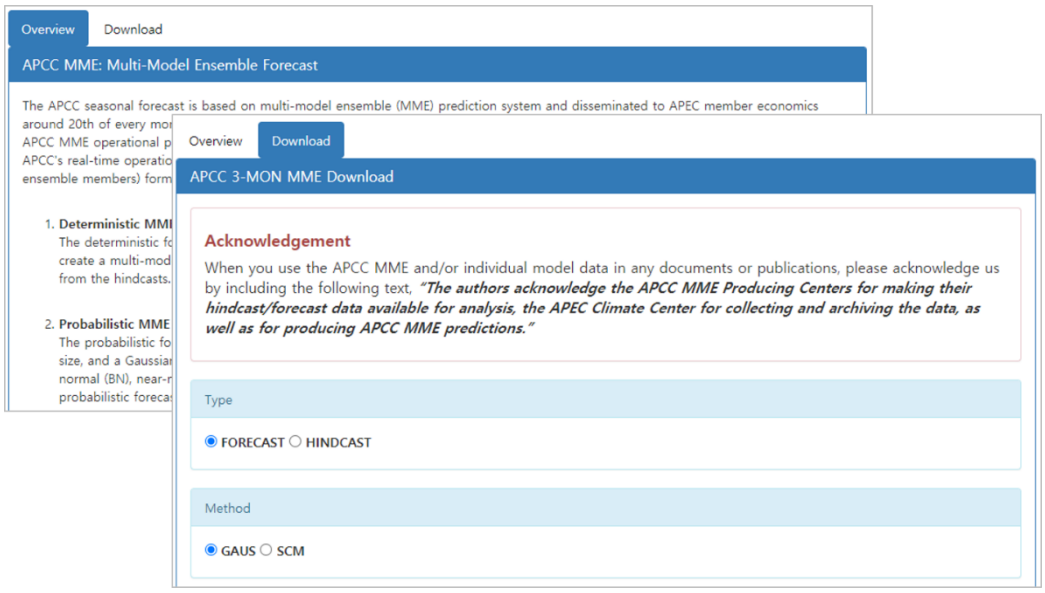


Figure 8. Dataset page

4.1. Multi-Model Ensemble (MME) dataset

On the download tab, users can request to download the data by selecting the properties of the data such as method, variables, and period.

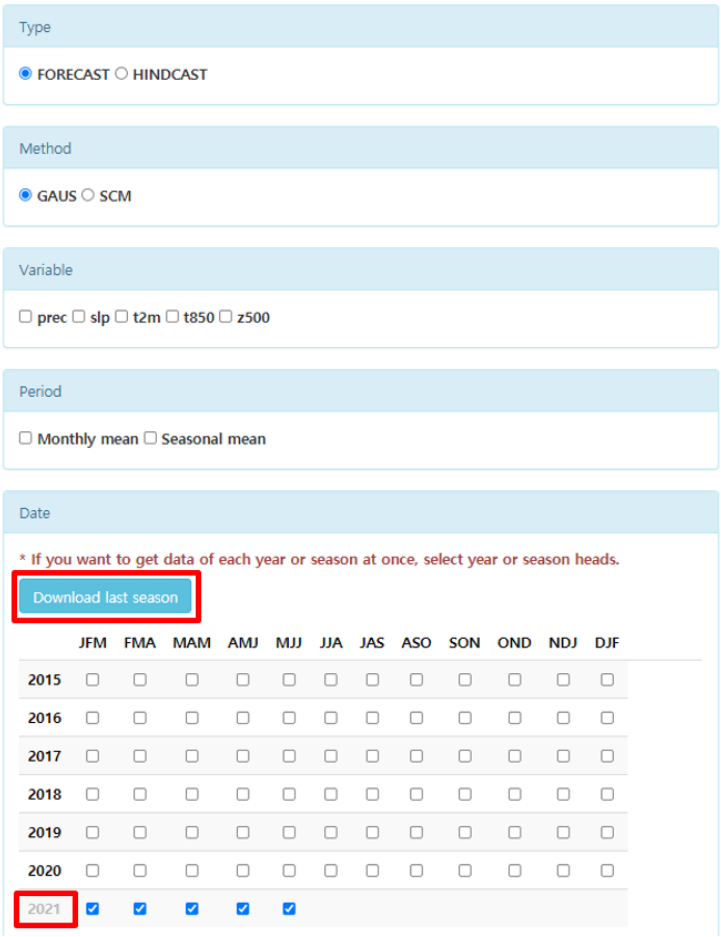


Figure 9. Selecting options for MME dataset

① Type: Select data type of MME.

② Methods: Select either SCM (DMME using Simple Composite Method) or GAUS (PMME using GAUSSIAN approximation) for MME prediction.

③ Variables: Select variables (Details of variables can be found in the Overview tab).

④ Period: Select period types. “Seasonal mean” refers to the mean of “Monthly mean”.

⑤ Date: Select the appropriate date to download. Select the horizontal or vertical headings of the table to select a complete year or season.

⑥ Click the “Request” button.

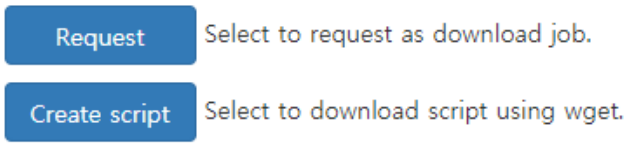


Figure 10. Request data

By clicking “**Download last season**” (Figure 9), users can download the compressed file (zip) containing data for the latest season (including type and method selected by the user). If the user selects the “**Request**” button, as shown in Figure 10, a job for downloading data is registered. If the user is not logged in, the “**Request**” button is disabled, as shown in Figure 11.

Figure 11. Request button when not logged in

The “**Create script**” button in Figure 10 sends a script (Figure 12) for downloading data directly to the user's local server or computer using the wget command. The script file will be downloaded immediately.

```
# You can set verifying the certificate or not.
#certificate_option="--no-check-certificate"
certificate_option=""

#------------------------------------------------------------------------
# This script was written using bash.
# You can modify using the other shell(csh, ksh, windows command, and so on), other commands and options.
# If you want curl command, you can change command to 'curl' instead of 'wget'.
# But you need to change some options. Please check details at manuals of wget, curl.
#------------------------------------------------------------------------
echo `date '+%F %T'`" Now start to download."

#------------------------------------------------------------------------------
# Each file of the same variable has the same file name.
# So please set(change) the folder to save file, or set file path to use '-O' option
#------------------------------------------------------------------------------

wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/GAUS/JAN/JFM/2021/prec.nc -O 3-MON_FORECAST_GAUS_JAN_JFM_2021_prec.nc
wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/GAUS/JAN/JFM/2021/slp.nc -O 3-MON_FORECAST_GAUS_JAN_JFM_2021_slp.nc
wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/GAUS/JAN/JFM/2021/t2m.nc -O 3-MON_FORECAST_GAUS_JAN_JFM_2021_t2m.nc
wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/GAUS/JAN/JFM/2021/t850.nc -O 3-MON_FORECAST_GAUS_JAN_JFM_2021_t850.nc
wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/GAUS/JAN/JFM/2021/z500.nc -O 3-MON_FORECAST_GAUS_JAN_JFM_2021_z500.nc
```

Figure 12. Downloading script using wget

To download data using the script shown in Figure 12, the script needs to be modified according to the environment.

① certificate_option: Set “--no-check-certificate” if you do not want to verify the certificate used for https communication on your server or computer.

② “-O”: The “-O” option allows you to specify the location and file name to be saved.

Table 3 shows a URL for downloading data. For the values in square brackets ("[ ]"), refer to the option values in Figure 9. Month is the name of the month, e.g., JAN or FEB, and Season is indicated by the first letters of three consecutive months, e.g., JFM or FMA, similar to the column headings of the Date panel in Figure 9.

Table 3. Download URL of MME

Period	URL
Monthly Mean	https://download.apcc21.org/**MME**/ [**Lead Month**] / **[Type]** / [**Method**] / [**Month]** / [**Year**] / [**Variable**].nc
Seasonal Mean	https://sdownload.apcc21.org/**MME**/ [**Lead Month**] / [**Type**] / [**Method**] / [**Month**] / [**Season**] / [**Year**] / [**Variable**].nc

4.2. MME Individual Model

On the download tab, users can request to download the data by selecting the appropriate properties, including institute, model, and variable.

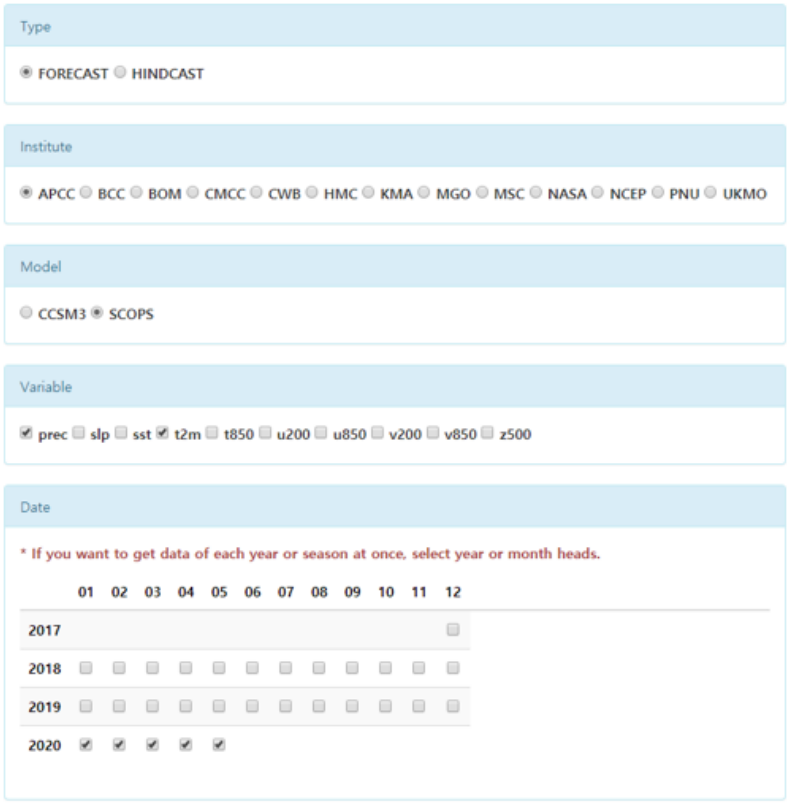


Figure 13. Selecting options for Individual Model dataset (FORECAST type)

① Type: Select data type.

② Year: Select a production year. This option is enabled when selecting the HINDCAST type (Figure 14).

③ Institute: Choose a model provider.

④ Model: Select a model name.

⑤ Variables: Select variables (details of variables can be found in the Overview tab).

⑥ Date: Select the desired date to download. Select the horizontal or vertical headings of the table to select a complete year or season.

⑦ Click the "**Request**" button.

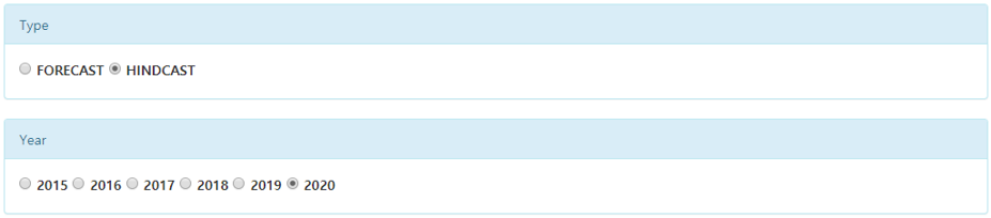


Figure 14. Year option for Individual Model dataset (HINDCAST type)

The "**Create script**" button sends a script (Figure 15) for downloading data directly to the user's local server or computer using the wget command. The script file will be downloaded immediately.

```
#---------------------
# Personal setting
#---------------------

# chane to your user id
userid="userid"
# change to your password
password="password"
# cookie file path(You can change to the other file.)
cookie_path="apcc.cookies"
# option to save cookies. If you want to save cookies, don't use the cookie option.
#cookie_option=""
cookie_option="--load-cookies ${cookie_path} --save-cookies ${cookie_path} --keep-session-cookies "

# You can set verifying the certificate or not.
#certificate_option="--no-check-certificate"
certificate_option=""

echo `date '+%F %T'`" Now start to download."

#-------------------------------------------------------------------------------
# Each file of the same variable has the same file name.
# So please set(change) the folder to save file, or set file path to use '-O' option
#-------------------------------------------------------------------------------

wget ${cookie_option} --user=${userid} --password=${password} ${certificate_option}
https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/APR/2021/prec.nc -O FORECAST_APCC_SCOPS_APR_2021_prec.nc
wget ${cookie_option} --user=${userid} --password=${password} ${certificate_option}
https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/APR/2021/slp.nc -O FORECAST_APCC_SCOPS_APR_2021_slp.nc
wget ${cookie_option} --user=${userid} --password=${password} ${certificate_option}
https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/APR/2021/sst.nc -O FORECAST_APCC_SCOPS_APR_2021_sst.nc
```

Figure 15. Downloading script using wget

To download data using the script shown in Figure 15, the script needs to be modified according to the user's programming environment.

① userid, password: Enter your ID and password.
② cookie_option: If you do not want to store cookies related to the website, you can empty the contents of cookie_option. If you do not save cookies, the command will require authentication for every subsequent download, which may delay data transmission.
③ certificate_option: Set "--no-check-certificate" if you do not want to verify the certificate used for https communication on your server or computer.
④ "-O": The "-O" option allows you to specify the location and file name to be saved.

Table 4 shows the URLs for downloading data. For the values in square brackets ("[ ]"), refer to the option values in Figure 13 and Figure 14. Month is the name of the desired month, e.g., JAN and FEB.

Table 4. Download URL of individual model

Type	URL
FORECAST	https://sdownload.apcc21.org/MODEL/FORECAST/ [**Institute**]_[**Model**] / [**Month**] / [**Year**] / [**Variable**].nc
HINDCAST	https://sdownload.apcc21.org/**MODEL**/ HINDCAST**[Hindcast Year]** / [**Institute**]_[**Model**] / [**Month**] / [**Year**] / [**Variable**].nc

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."

4.3. High Resolution MME

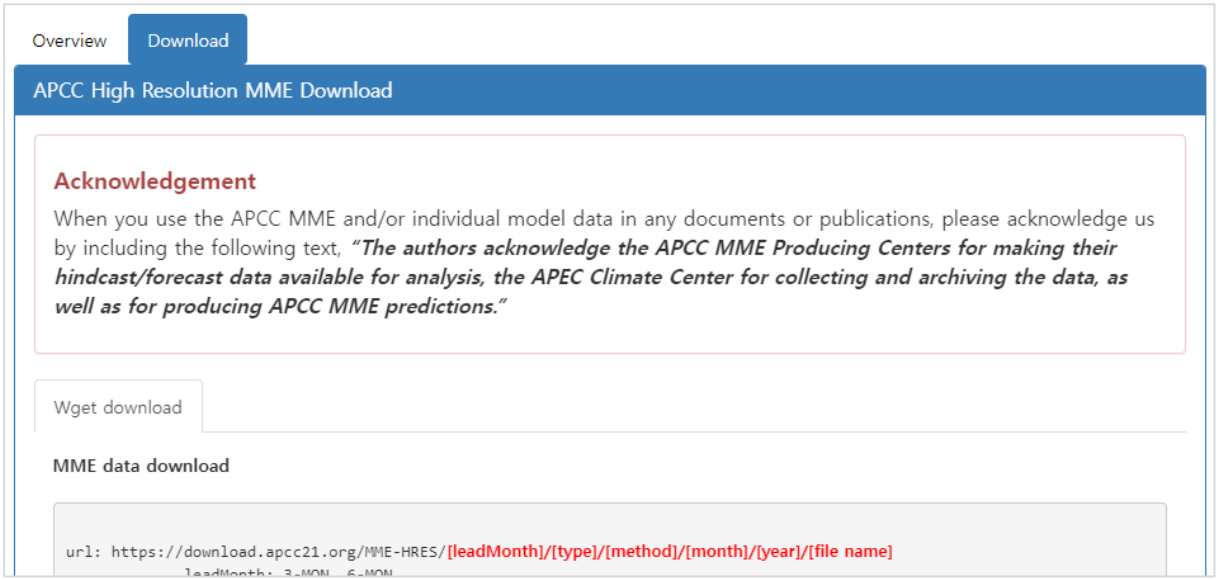


Figure 16. High Resolution MME Download

Unlike low-resolution MME data in Sections 4.1 and 4.2, CLIK do not provide homepage download service for high-resolution MME data, but only wget download service. The Download page in Figure 16 explains how to download data using wget and provides sample commands. As shown in Figure 17, the user selects [leadMonth], [type], [method], [month], [year] and [file name] of the MME data to be downloaded, and then uses the wget command to download the data.

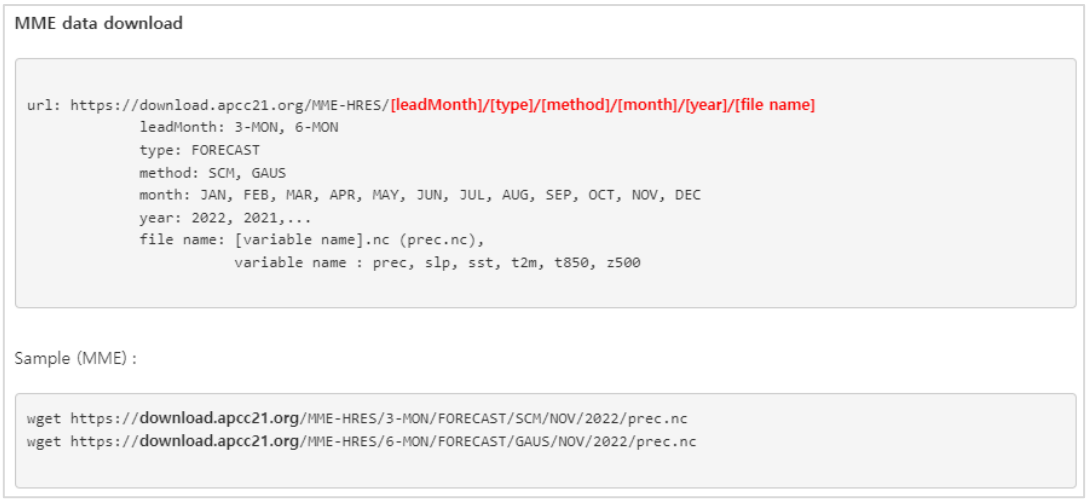


Figure 17. High Resolution MME Download - MME

Model data can also be downloaded by selecting [type], [model], [month], [year], and [file name] as shown in Figure 18.

Figure 18. High Resolution MME Download – MME Model

4.4. BSISO

APCC BSISO is produced from May to October and some models are updated daily. CLIK provides forecast and monitoring data. On the download tab, users can request to download data by selecting the appropriate properties, including data type, institute, and model (Figure 19).

① Type: Select data type.
② Institute: Select institute
③ Model: Select model name.
④ Date: Select the appropriate date to download.
⑤ Select files to download
⑥ Click the “**Request**” button.

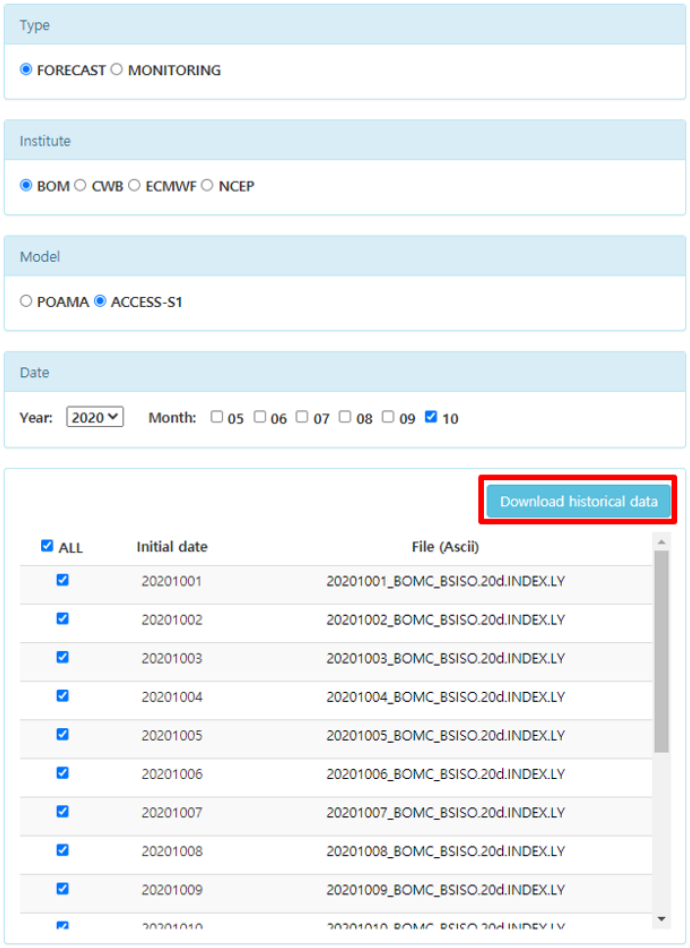


Figure 19. Selecting options for FORECAST data of BSISO dataset

Users can download compressed data files (zip) with the "**Download historical data**" button.

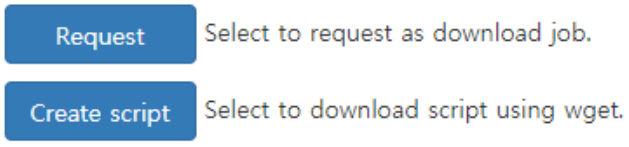


Figure 20. Request BSISO data

If the user selects the "**Request**" button, as shown in Figure 20, a job for downloading data is registered. The "Create script" button in Figure 20 sends a script (Figure 21) for downloading data directly to the user's local server or computer using the wget command. The script file will be downloaded immediately.

```
# You can set verifying the certificate or not.
#certificate_option="--no-check-certificate"
certificate_option=""

#------------------------------------------------------------------------
# This script was written using bash.
# You can modify using the other shell(csh, ksh, windows command, and so on), other commands and options.
# If you want curl command, you can change command to 'curl' instead of 'wget'.
# But you need to change some options. Please check details at manuals of wget, curl.
#------------------------------------------------------------------------
echo `date '+%F %T'`" Now start to download."

#------------------------------------------------------------------------------
# Each file of the same variable has the same file name.
# So please set(change) the folder to save file, or set file path to use '-O' option
#------------------------------------------------------------------------------

wget ${certificate_option} https://download.apcc21.org/BSISO/FCST/BOM/ACCESS-S1/2020/20201017_BOMC_BSISO.20d.INDEX.LY
-O FCST_BOM_ACCESS-S1_2020_20201017_BOMC_BSISO.20d.INDEX.LY
wget ${certificate_option} https://download.apcc21.org/BSISO/FCST/BOM/ACCESS-S1/2020/20201016_BOMC_BSISO.20d.INDEX.LY
-O FCST_BOM_ACCESS-S1_2020_20201016_BOMC_BSISO.20d.INDEX.LY
wget ${certificate_option} https://download.apcc21.org/BSISO/FCST/BOM/ACCESS-S1/2020/20201015_BOMC_BSISO.20d.INDEX.LY
-O FCST_BOM_ACCESS-S1_2020_20201015_BOMC_BSISO.20d.INDEX.LY
```

Figure 21. Downloading script using wget

A monitoring file contains data for one year. Users can directly select and download files for each year and can also download the entire monitoring database by selecting "**Download all data**" (Figure 22).

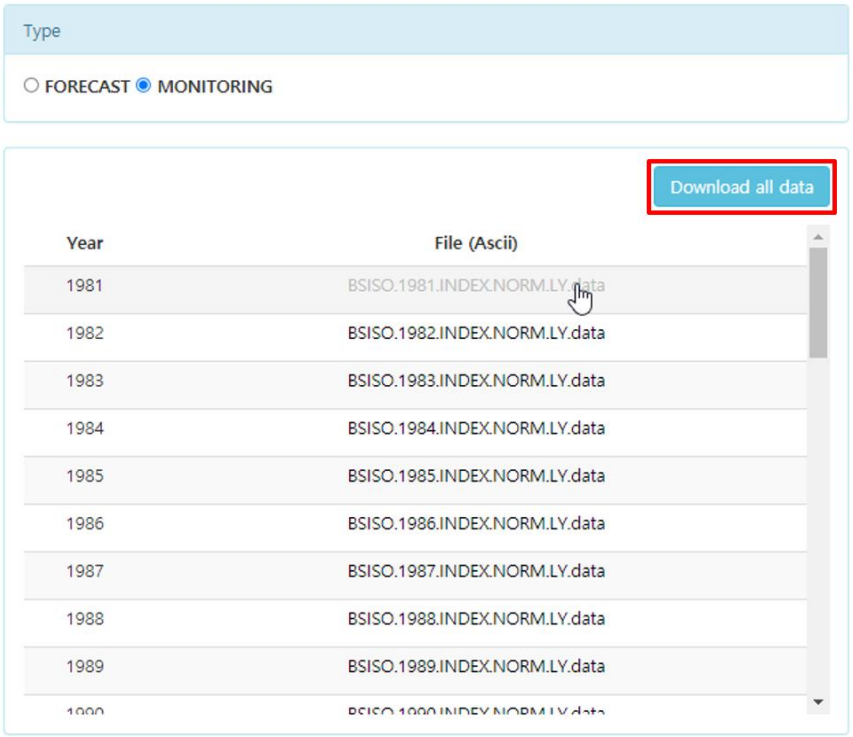


Figure 22. Downloading monitoring data of BSISO dataset

4.5. CMIP5

Users can request to download CMIP5 data clipped by region. Users can check the latitude and longitude of each region by pointing the code of each region with the mouse (Figure 23).

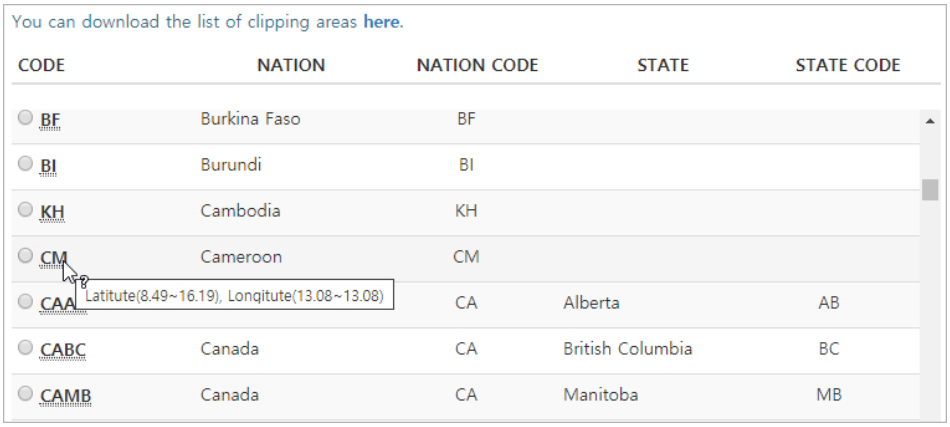


Figure 23. Nations (States) list of CMIP5

① Date: Select a nation or a state for download.
② Click the "**Request**" button.

CMIP5 data for the following nations are provided separately under state.

- United States
- Russia
- China
- Canada

To download a script using wget, select the "**Create script**" button. Unlike other data, CMIP5 data can be downloaded without user authentication: hence, no user setting or cookie setting is required. Table 5 shows the download URL of the data. The values in square brackets ("[ ]") in Table 5 are the CODE values in Figure 23.

Table 5. Download URL of CMIP5

URL
http://download.apcc21.org/CMIP5/cmip5_daily_**[CODE]**.zip

4.6. ERA5

The ERA5 page provides a way to download ECMWF's ERA5 reanalysis data. A detailed

description of ERA5 data is provided on the Overview tab on ERA5 page.

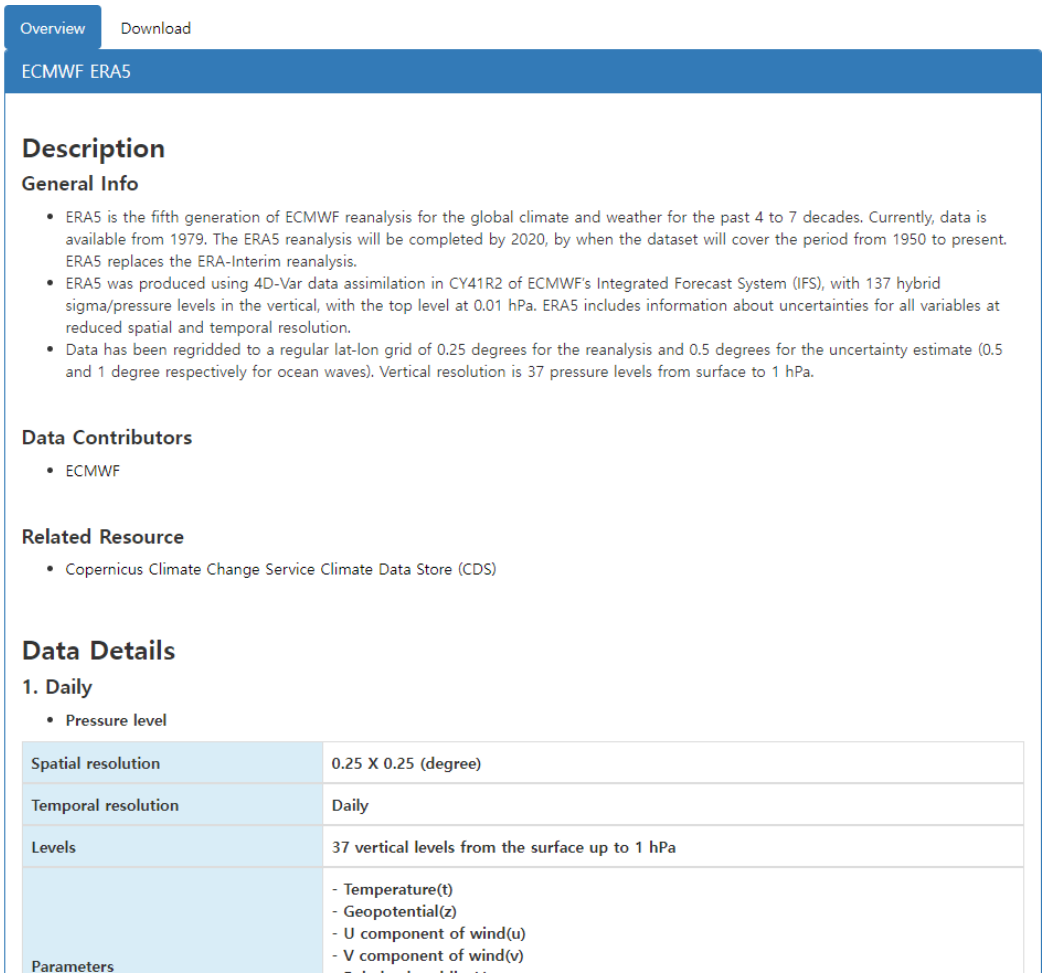


Figure 24. ERA5 page – Overview tab

CLIK provides the data structure and download method (wget and CLIK API service) for downloading ERA5 data. The data structure can be checked in the Data structure tab.

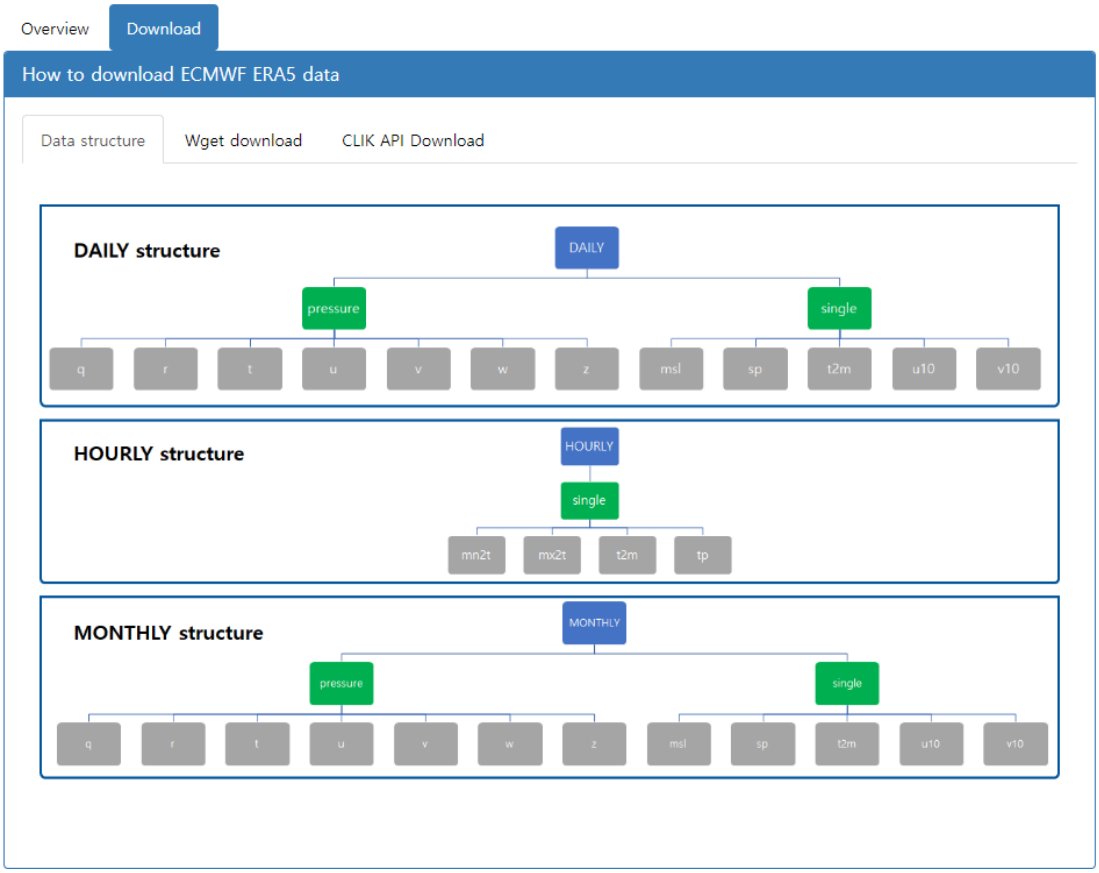


Figure 25. ERA5 Data structure

ERA5 data can be downloaded using the samples on the Wget download tab and CLIK API Download tab of the Download tab. The user selects the '[timestep], [level], [variable name] and [file name]' of data to be downloaded. And the user creates wget and CLIK API service scripts to download the selected variable. User can download data using the created script.

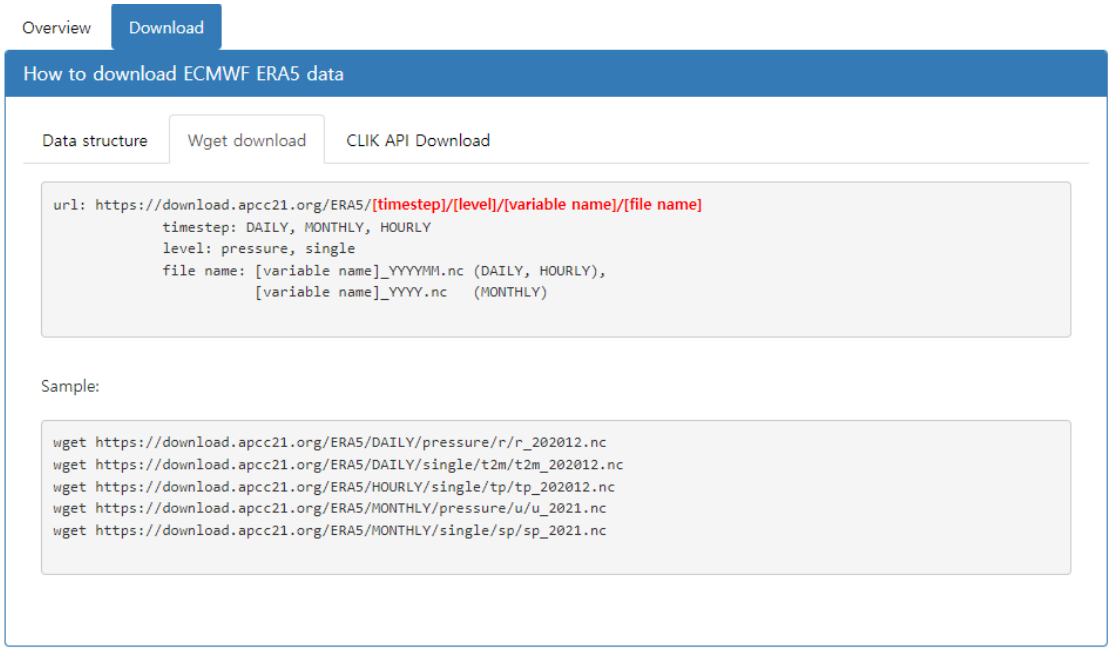


Figure 26. Usage of ERA5 wget download

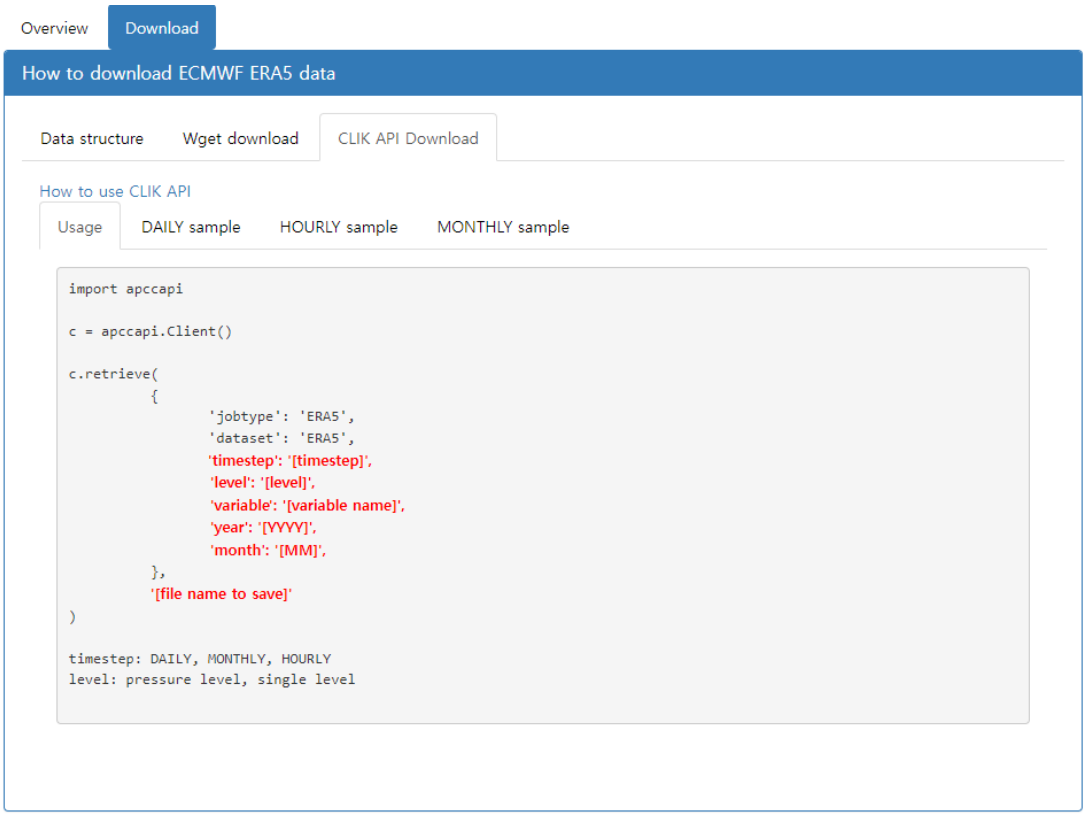


Figure 27. ERA5 CLIK API Download usage

4.7. NCEP Reanalisys

The NCEP Reanalysis page provides information on how to download NCEP1 and NCEP2 reanalysis data. The Overview tab of the NCEP Reanalysis page in the figure below provides a detailed description of the NCEP data.

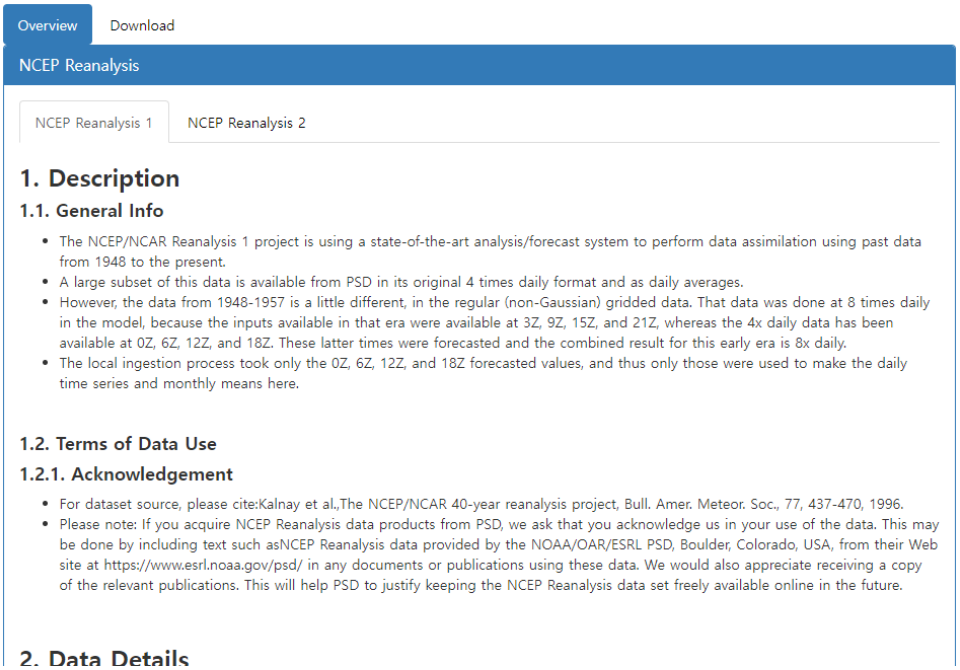


Figure 28. NCEP Reanalysis page – Overview tab

CLIK provides wget and CLIK API services to download NCEP data. You can see how to download data from the Download tab.

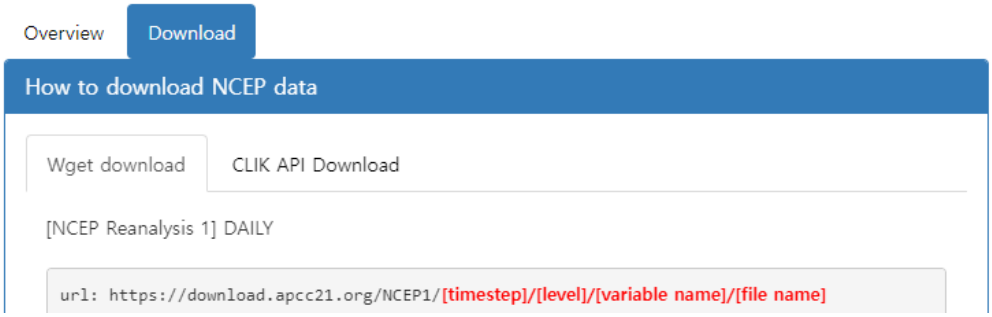


Figure 29. NCEP Reanalysis page – Download tab

Users can download NCEP data by referring to the samples in the Wget download tab and CLIK API Download tab in Figure 31. The user can select [timestep], [level], [variable name] and [file name] of the data to download and write wget or CLIK API script to download the desired data.

[NCEP Reanalysis 1] DAILY

```
url: https://download.apcc21.org/NCEP1/[timestep]/[level]/[variable name]/[file name]
             timestep: DAILY
             level: other_gauss, pressure, surface, surface_gauss
             variable name: other_gauss   -> dswrf.ntat, ulwrf.ntat, uswrf.ntat
                            pressure      -> air, hgt, omega, rhum, shum, uwnd, vwnd
                            surface       -> pres.sfc, slp
                            surface_gauss -> air.2m, dlwrf.sfc, dswrf.sfc, lhtfl.sfc, prate.sfc, shtfl.sfc, shum.2m, tmax
             file name: [variable name].gauss.YYYY.nc (other_gauss, surface_gauss),
                        [variable name].YYYY.nc   (pressure, surface)
```

Sample:

```
wget https://download.apcc21.org/NCEP1/DAILY/other_gauss/dswrf.ntat/dswrf.ntat.gauss.2022.nc
wget https://download.apcc21.org/NCEP1/DAILY/pressure/air/air.2022.nc
wget https://download.apcc21.org/NCEP1/DAILY/surface/pres.sfc/pres.sfc.2022.nc
wget https://download.apcc21.org/NCEP1/DAILY/surface_gauss/air.2m/air.2m.gauss.2022.nc
```

Figure 30. Usage of NCEP Reanalysis 1 - wget download

[NCEP Reanalysis 2] DAILY

```
import apccapi

c = apccapi.Client()

c.retrieve(
          {
                 'jobtype': 'NCEP2',
                 'dataset': 'NCEP2',
                 'timestep': '[timestep]',
                 'level': '[level]',
                 'year': '[YYYY]',
                 'variable': '[variable name]',
          },
          '[file name to save]'
)

timestep: DAILY
level: gaussian_grid, pressure, surface
variable name: gaussian_grid -> air.2m, dlwrf.sfc, dswrf.ntat, dswrf.sfc, lhtfl.sfc, prate.sfc, pres.sfc, shtfl.sfc,
               pressure      -> air, hgt, omega, rhum, uwnd, vwnd
               surface       -> mslp, pres.sfc
```

Figure 31. Usage of NCEP Reanalysis 2 – CLIK API download

5. Processing

Figure 32 shows the Processing menu. The processing menu provides Prediction (Seasonal forecasting), Verification, Downscale, Clipping, Composite, and Masking services. These services provide MME and verification results in the form of images and NetCDF files that are based on the models selected by the user.

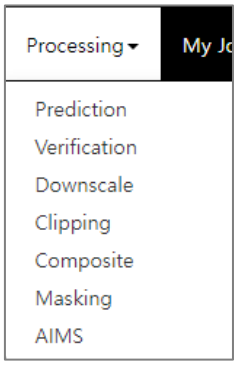


Figure 32. Processing menu

5.1. Prediction

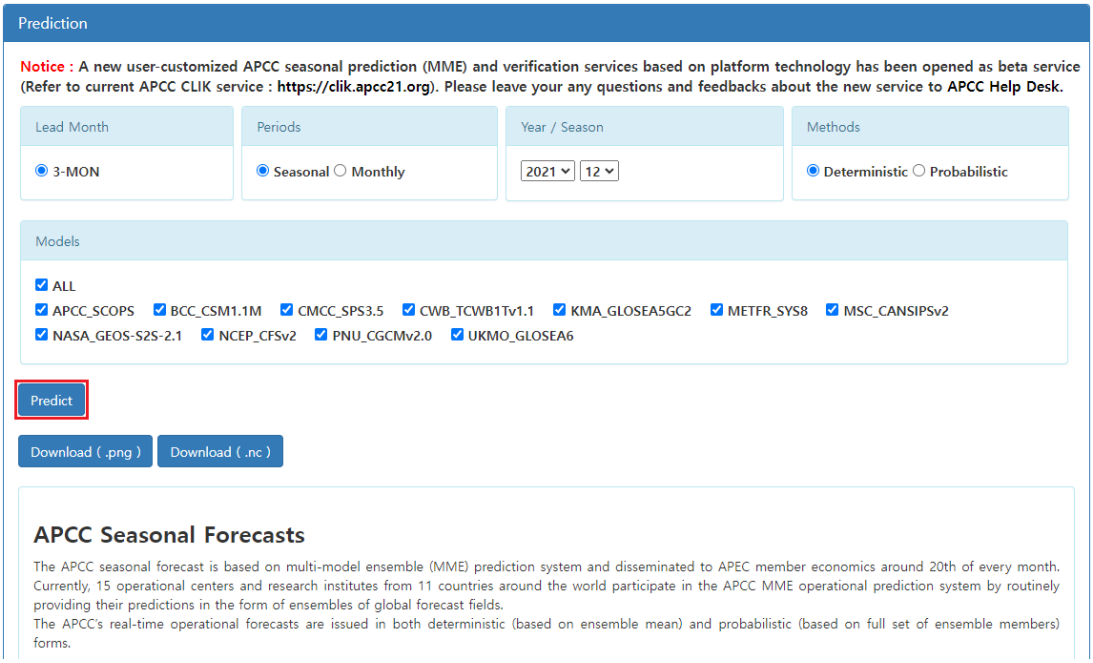


Figure 33. Selecting options for prediction

Users can request MME (Multi-Model Ensemble) data by selecting year, season, MME method, and models on the Prediction page.

Users can request data in the following ways:

① Periods: Select seasonal or monthly
② Year / Season: Select the year and season you want to produce
③ Methods: Select MME method
④ Models: Select models to participate in MME production
⑤ Select "**Predict**" button

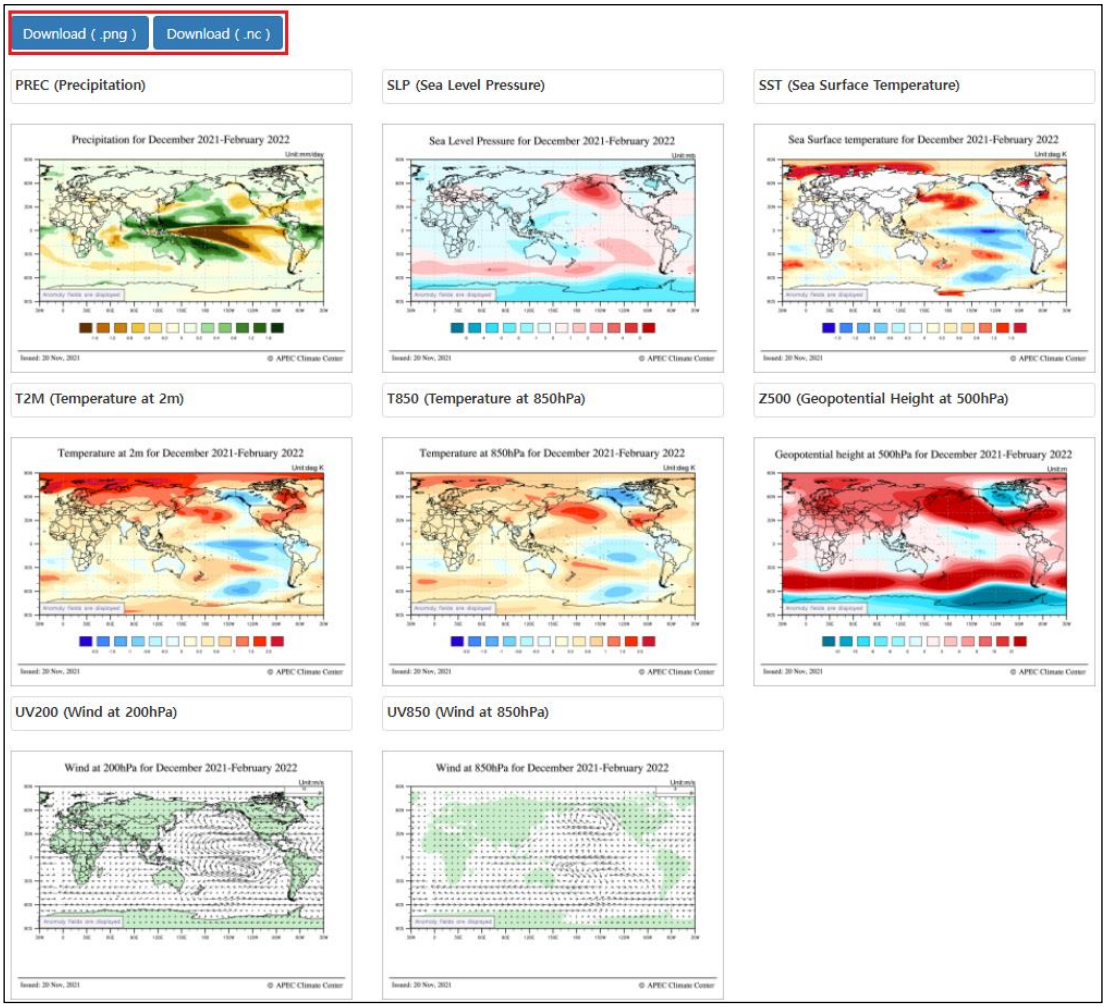


Figure 34. Prediction plot images

If data that satisfies the options selected by the user already exists, the images will be displayed at the bottom of the page (Figure 34). Clicking on an image will display an enlarged image. In the Deterministic method, the wind variable (UV200, UV850) will also be provided. Users can download the images or NetCDF files of all variables by selecting the "**Download**" button.

The prediction page provides monthly forecast results (Figure 35). When the user selects the monthly forecast, three tabs are added to the result page. Thus, the user can view the

results by month.

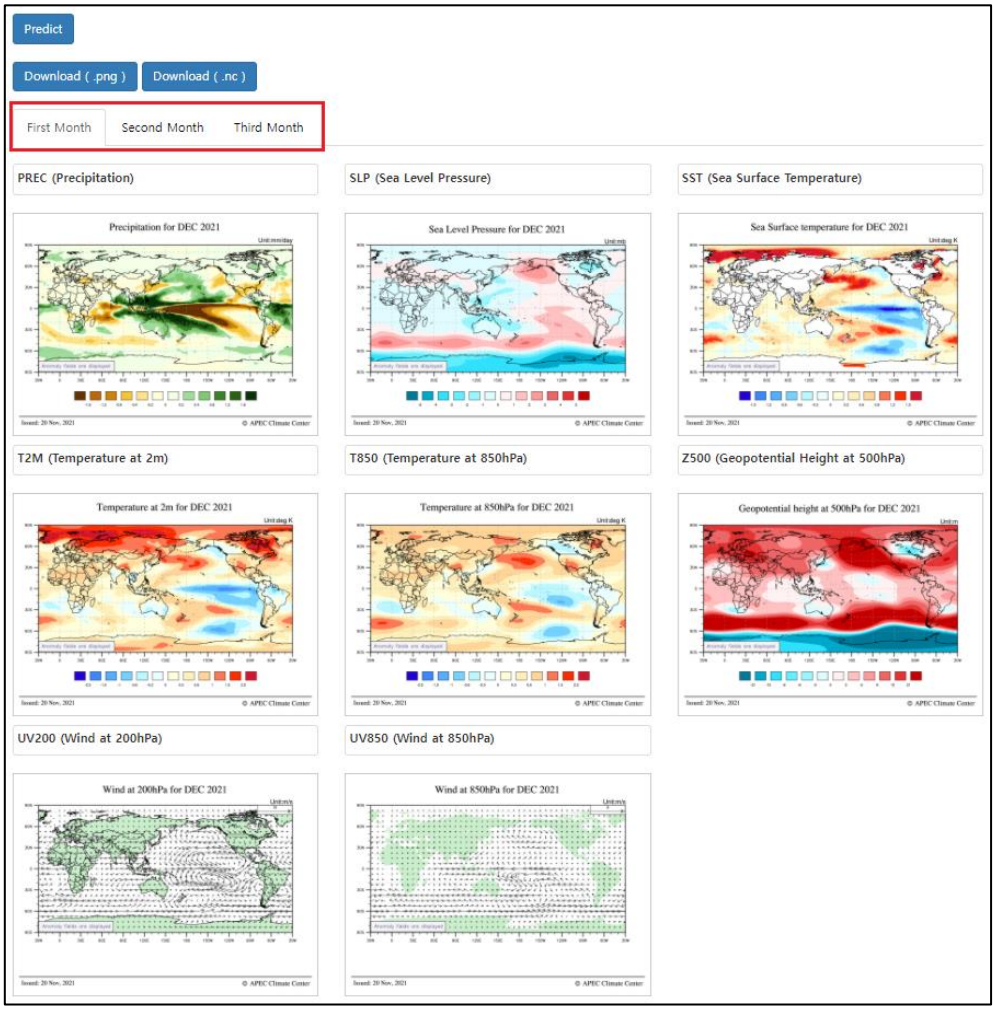


Figure 35. Prediction monthly plot images.

If there is no data produced based on the conditions set by the users, a new job is created, as shown in Figure 36. Users can visit the **My Jobs** menu to view the progress of the job, and download the data after completion. Users can view the plot images, as shown in Figure 34, by selecting the same options on the prediction page.

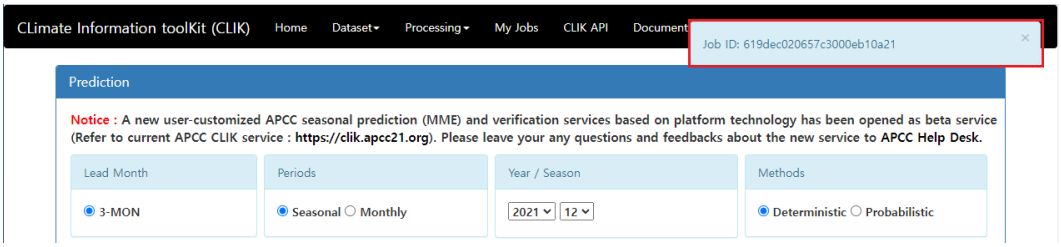


Figure 36. Registration of new prediction job

A notification such as the one shown in Figure 37, will be displayed if the job is currently being processed. After a few minutes, the data can be viewed by clicking the "**Predict**" button.

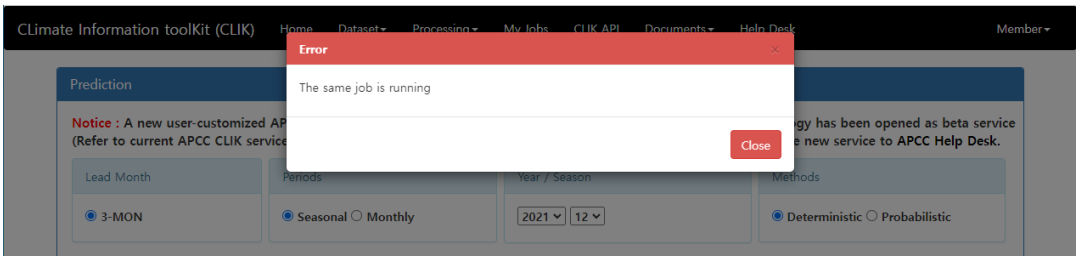


Figure 37. Notification of the job in progress

5.2. Verification

Users can request seasonal hindcast verification data by selecting year, season, verification skills, variable, and models on the Verification page.

① Year / Season: Select the year and season you want to produce
② Skills: Select a verification skill (Table 6)
③ Variable: Select a variable to produce
④ Models: Select models to participate in the production
⑤ Select "**Verify**" button

Table 6. Verification skills for hindcast

Skills	MME Class	Long name
SR	Deterministic	Success Rate
ACC	Deterministic	Anomaly Correlation Coefficient
HSS	Probabilistic	Heidke Skill Score
ROC Curve	Probabilistic	Relative Operating Characteristics Curve

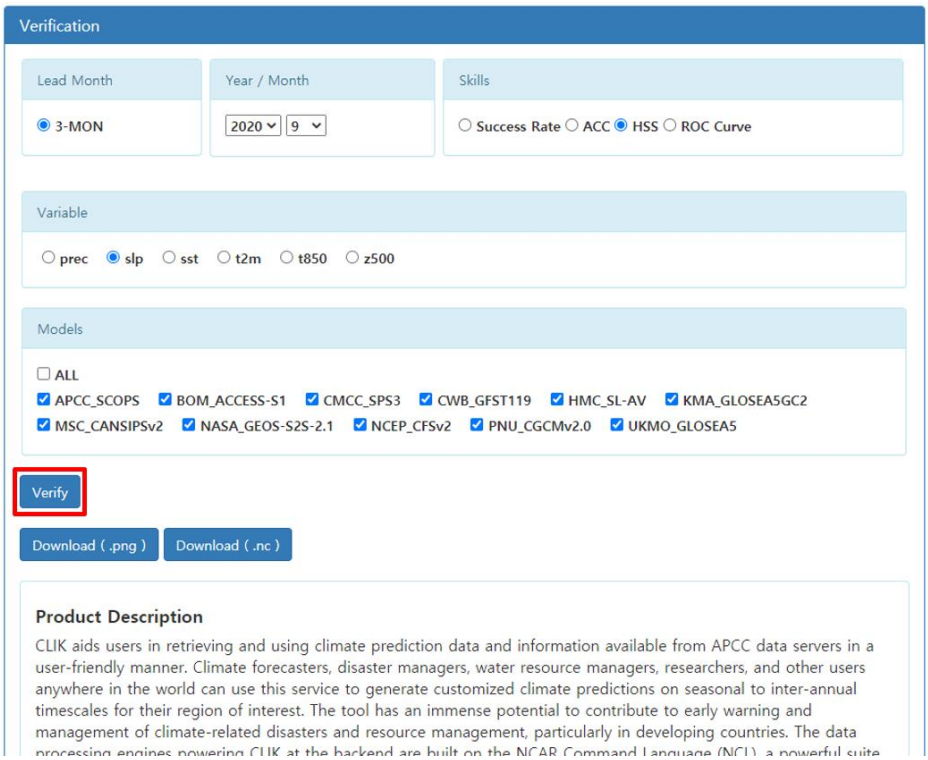


Figure 38. Selecting options for Verification

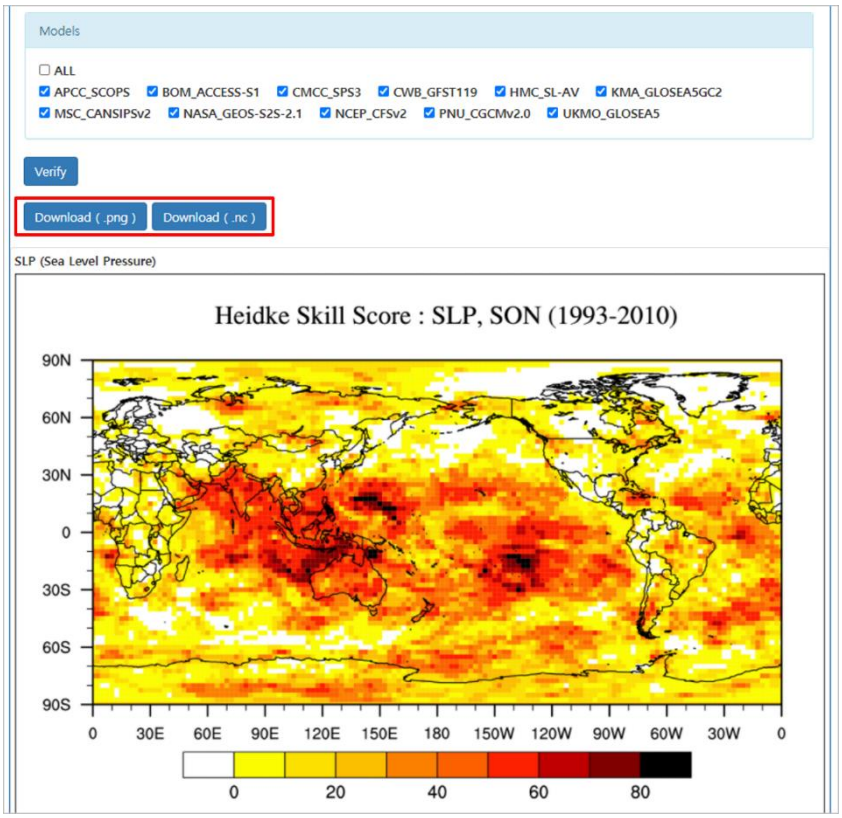


Figure 39. Verification plot image

If there are already data that satisfy the options selected by the user, the plot image of the result is displayed at the bottom of the page as shown in Figure 39. When users select an image, a larger image is displayed. In addition, users can download the plot image or the NetCDF file by selecting the "**Download**" button.

If there is no data produced according to the conditions by the users, a new job is created as shown in Figure 40. Users can move to the My Jobs menu to check the progress of the job, and download the data after completion (Figure 41). In addition, users can view the plot image as shown in Figure 39 by selecting the same options on the Verification page.

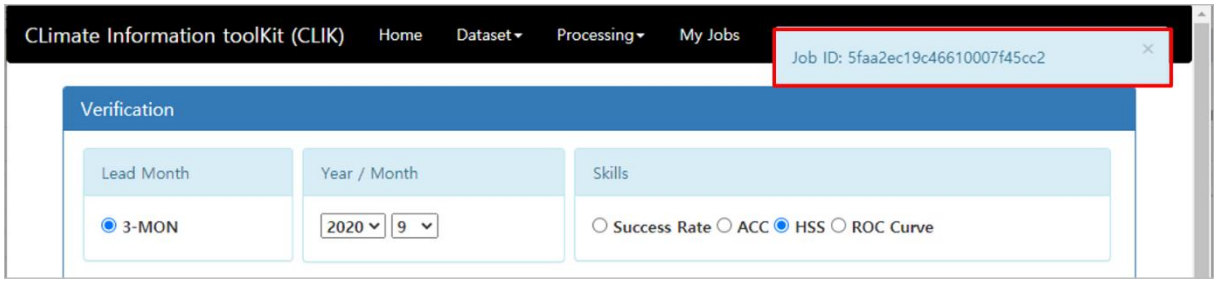


Figure 40. Registration of new verification job

Figure 41. Details of the verification job

5.3. Downscale

In order to process downscale prediction information, observation values of stations are required. CLIK provides functions for users to input and edit observation data. If you select the Downscale menu, the "**Observation dataset**" table is displayed (Figure 42). The user must first add or select an observation dataset from the table.

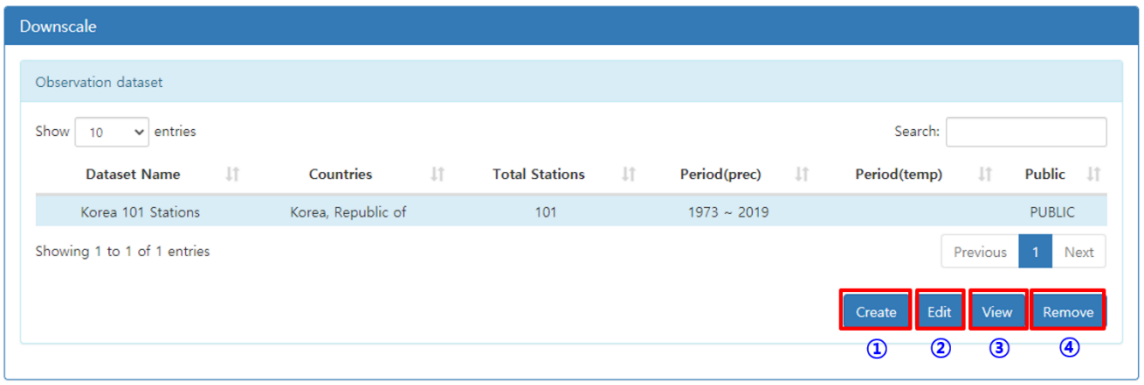


Figure 42. The observation dataset table for downscale

The contents of the observation dataset table in Figure 42 are as follows:

Table 7. Observation dataset table

Title	Description
Dataset Name	The name of the observation dataset
Countries	Countries included in the dataset
Total Stations	The number of stations in the dataset
Period(prec)	The period of precipitation data
Period(temp)	The period of temperature data

Users can manage their observation data using the buttons in Figure 42. The role of each button is explained in Table 8.

Table 8. Buttons to manage observation dataset

Button	Role
Create	Create a new observation dataset
Edit	Edit a selected dataset
View	View details of a selected dataset
Remove	Remove a selected dataset

As shown in Figure 42, when the user selects a dataset, the locations of stations are displayed on the map. After selecting an observation station on the map, the user can request downscaling.

5.3.1. Management of observation dataset

5.3.1.1. Creation of observation dataset

If you select the "**Create**" button in Figure 42, a popup will be displayed where you can enter the dataset name and description (Figure 43).

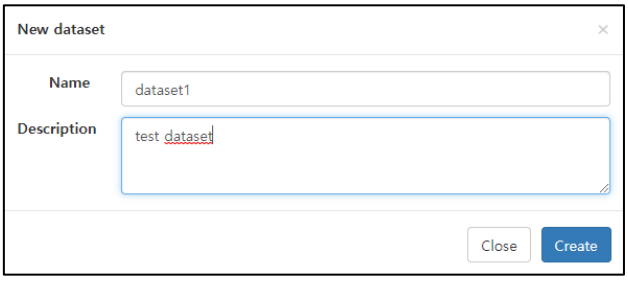


Figure 43. New dataset

After entering the name and description, click the "**Create**" button to add a new observation dataset to the observation dataset table (Figure 44).

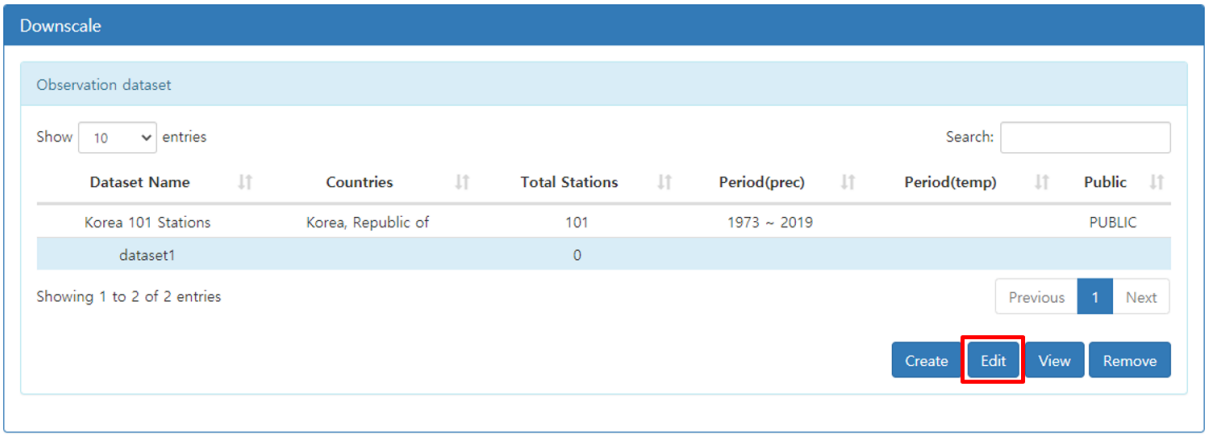


Figure 44. The observation dataset table after adding a new dataset

5.3.1.2. Editing an observation dataset

Users can create and manage their own observation dataset. To edit a dataset, select the observation dataset in the table and click the "**Edit**" button as shown in Figure 44. When stations and observation values are already added to the observation dataset, the contents will be displayed as shown in Figure 45.

Users can register, edit, and remove stations, and add, modify, and remove observation values for the station. By using the Import function, you can input all values from files written in CSV format; by using the Export function, you can download the currently saved data in a CSV format file.

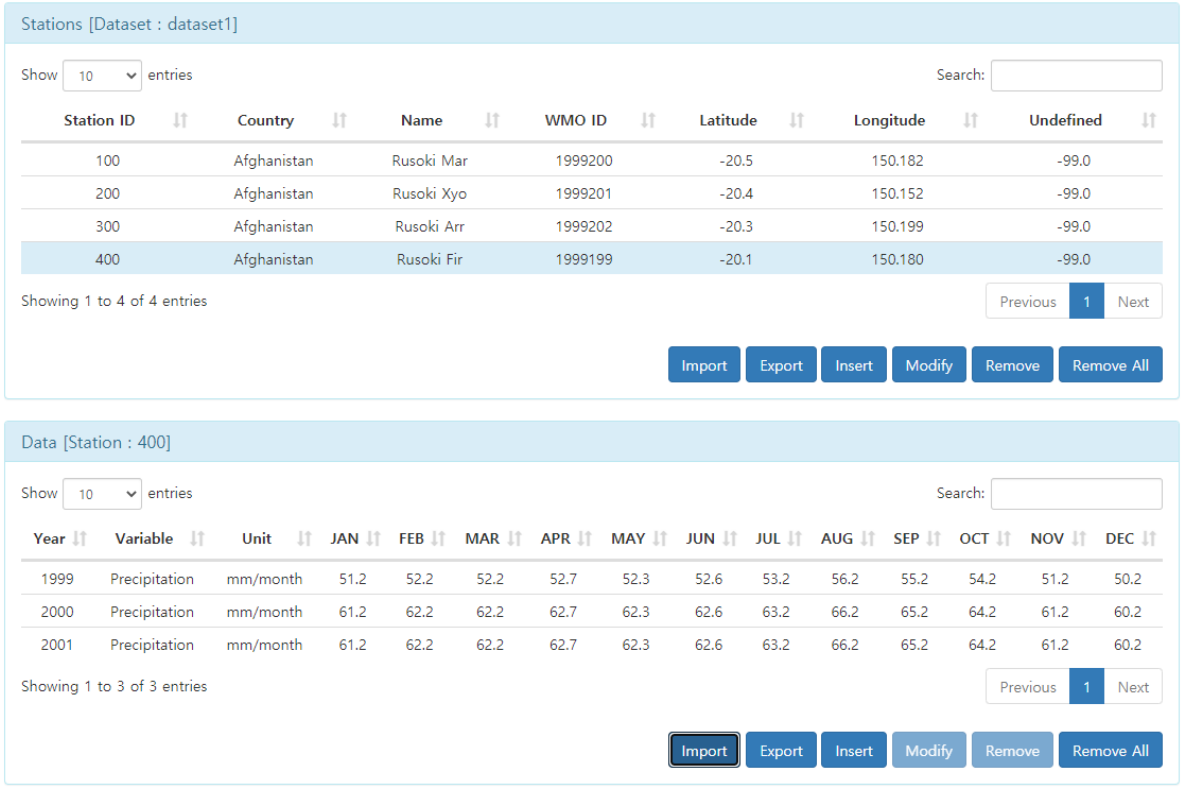


Figure 45. Modification of an observation dataset

If the user checks the "**PUBLIC**" box (Figure 46), the observation dataset is published to all users.

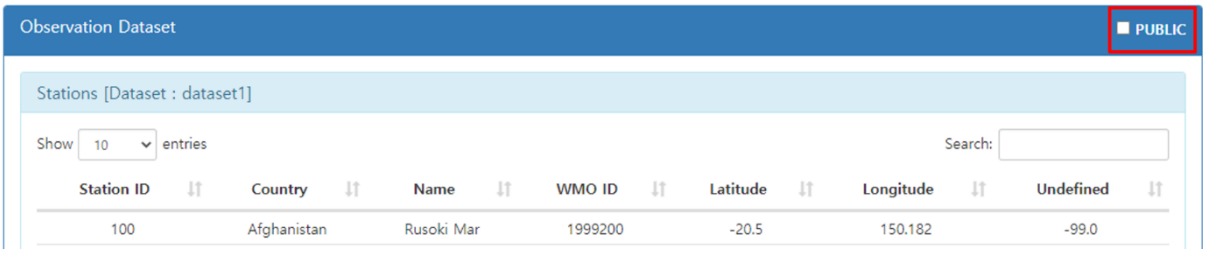


Figure 46. Specify the publication of your data to all users

5.3.1.3. Management of stations

Users can manage observation stations using the buttons in the Stations area (Figure 45). Table 9 explains the functions of buttons to manage stations.

Table 9. Buttons to manage stations.

Button	Role
Import	Input multiple stations by uploading CSV file

Export	Download all stations in CSV format
Insert	Add a station
Modify	Edit a selected station
Remove	Remove a selected station
Remove All	Remove all stations

The user can select the “**Insert**” button and input a station (Figure 47).

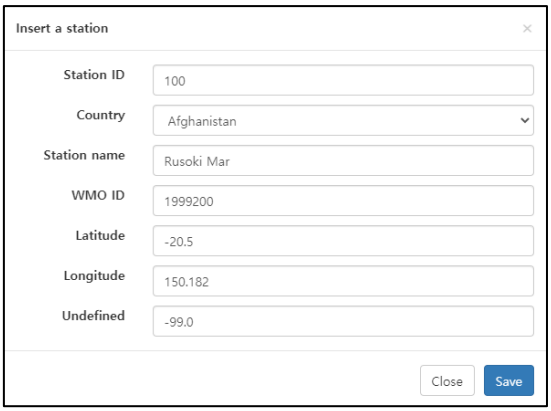


Figure 47. Insert a station information

If the user enters the station information and selects the “**Save**” button, the station is added to the table. To input multiple stations at once, select the “**Import**” button.

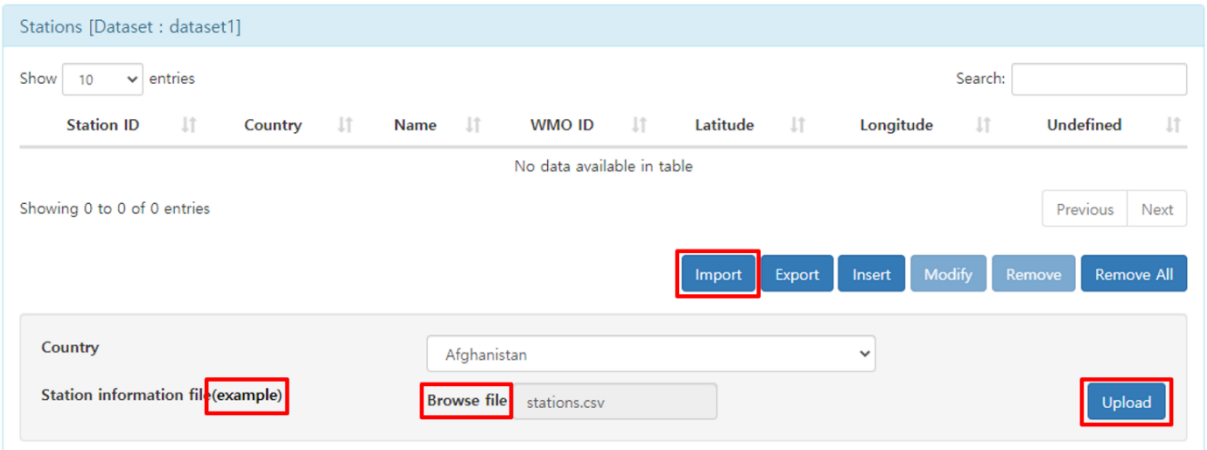


Figure 48. Import station information

If you select the “**Import**” button, a GUI to upload a file is displayed as shown in Figure 48. To add all the station information in the CSV file, the user must select a country name, click “**Browse file**” to select a CSV file, and press the “**Upload**” button.

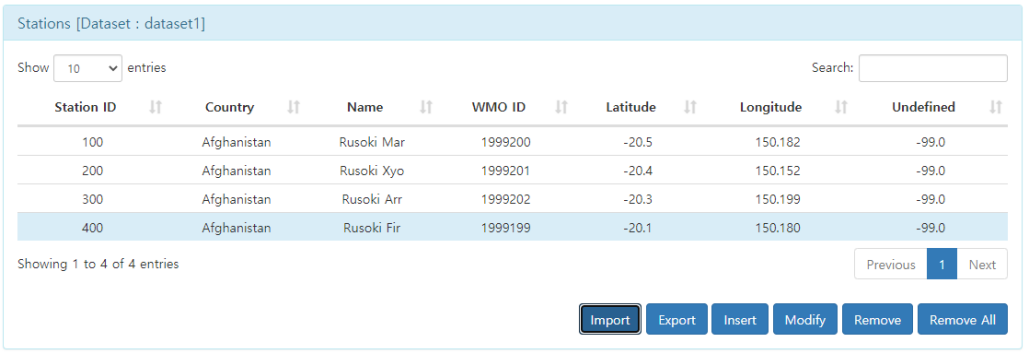


Figure 49. The imported stations

The CSV file creation rules can be viewed by selecting "**example**" in Figure 48.

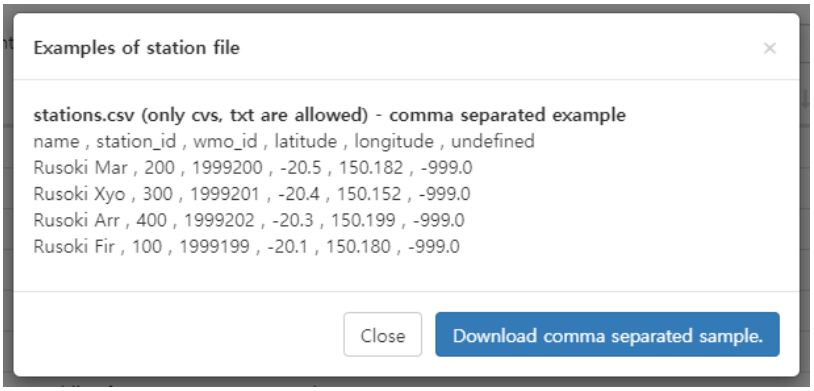


Figure 50. Examples of station file

	A	B	C	D	E	F
1	name	station_id	wmo_id	latitude	longitude	undefined
2	Rusoki Ma	100	1999200	-20.5	150.182	-99
3	Rusoki Xy	200	1999201	-20.4	150.152	-99
4	Rusoki Arr	300	1999202	-20.3	150.199	-99
5	Rusoki Fir	400	1999199	-20.1	150.18	-99
6						

Figure 51. The station file (CSV)

If the user selects the "**Download comma separated sample**" button in Figure 50, a sample file can be downloaded (Figure 51).

If the user selects the "**Export**" button, all currently saved stations can be downloaded in csv file format. Also, if the user clicks the "**Remove**" button after selecting a station, the user can delete the selected station and all observation values related to the station. The user can delete all stations by selecting the "**Remove All**" button.

5.3.1.4. Management of observation values

The method of managing observation values is similar to managing stations. If you select a station at the table (Figure 49), the observation values of the stations are displayed as shown in Figure 52.

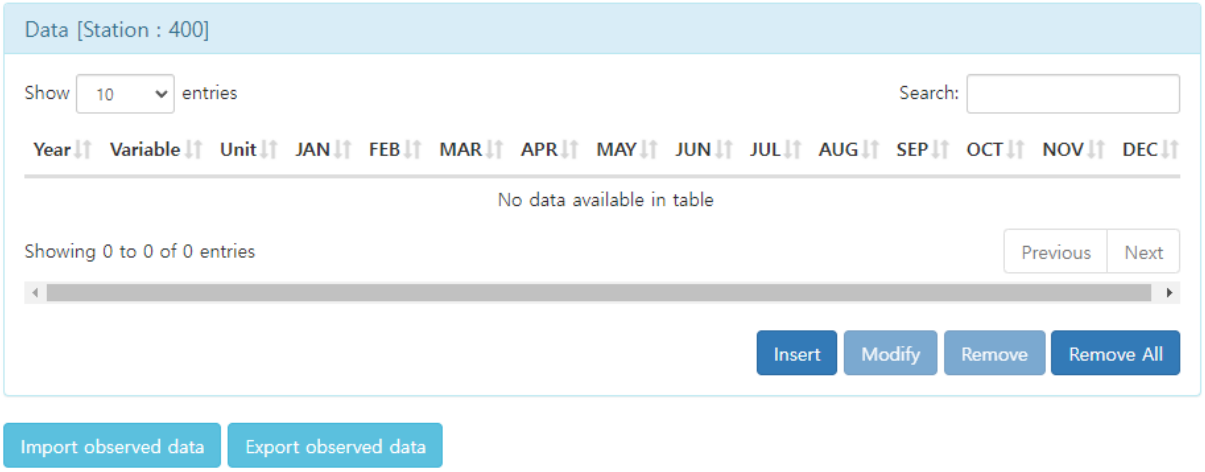


Figure 52. Observed data table

Table 10 explains the functions of the buttons in the observation values area (Figure 52).

Table 10. Buttons to manage observed data

Button	Role
Import observed data	Input all observation values by uploading a CSV file
Export observed data	Download all saved observation values in CSV format
Insert	Add observation values
Modify	Edit observation values
Remove	Remove a selected observation value
Remove All	Remove all observation values

Observation values can be input by selecting the "**Insert**" button. Input the year, an observation variable (precipitation or temperature), and observation values for each month as shown in Figure 53, and click the "**Save**" button.

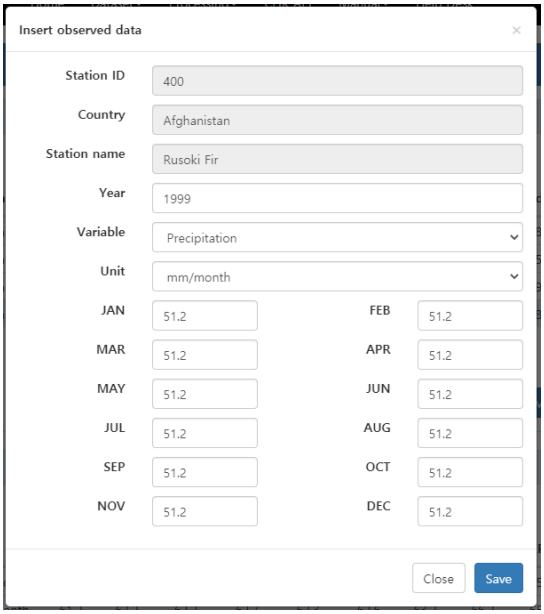


Figure 53. Input of observed data

Similar to stations, observation values can be input by using a CSV file. If you select the "**Import observed data**" button, a GUI to upload a CSV file is displayed as shown in Figure 54.

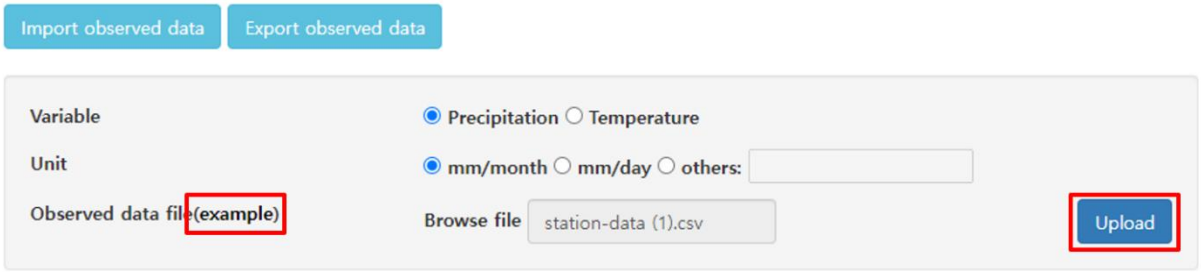


Figure 54. Import observed data file

After selecting the type and unit of observation variable, select the CSV file, and click the "**Upload**." If you select "**example**", you can see an example of the observation values file.

If you select "**Download comma separated sample.**" in Figure 55, you can download a sample CSV file.

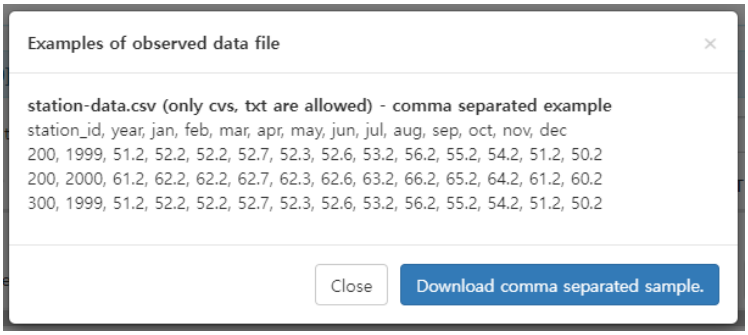


Figure 55. Example of observed data file

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	station_id	year	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2	400	1999	51.2	52.2	52.2	52.7	52.3	52.6	53.2	56.2	55.2	54.2	51.2	50.2
3	400	2000	61.2	62.2	62.2	62.7	62.3	62.6	63.2	66.2	65.2	64.2	61.2	60.2
4	400	2001	61.2	62.2	62.2	62.7	62.3	62.6	63.2	66.2	65.2	64.2	61.2	60.2

Figure 56. The example of observed data file (CSV)

5.3.1.5. View observation dataset

Users who do not have observation data can use public observation data. Open observation data are displayed to all users, as shown in Figure 57. The user can check the observation stations and values by selecting the "**View**" button after selecting the observation dataset.

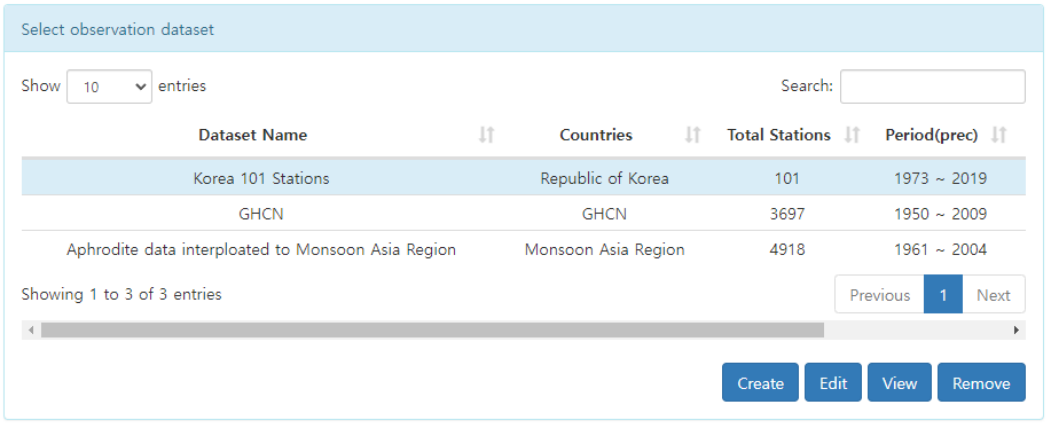


Figure 57. The public observation datasets

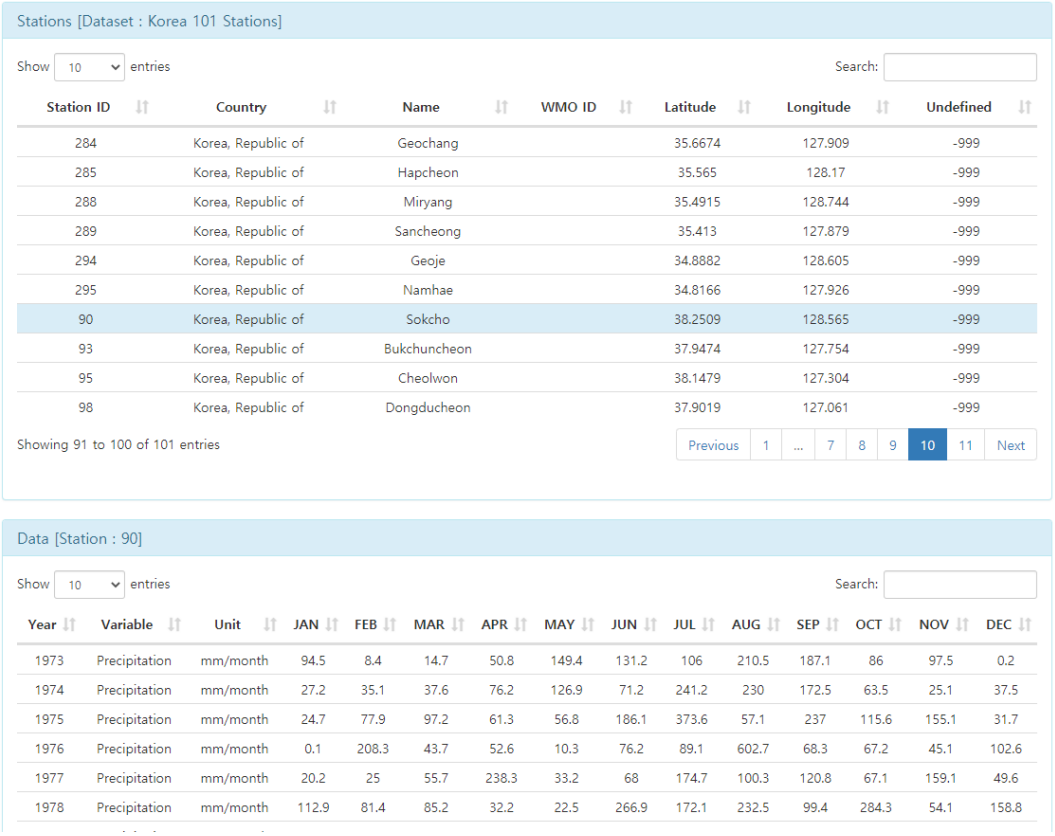


Figure 58. View of the public dataset

5.3.2. Selecting a station

To request a downscaling, the user must first select a station. As shown in Figure 59, if you select a dataset from the observation dataset table, stations are displayed on the map (Figure 60). If you press and hold the "**Shift**" key and left mouse button and drag the map, the related stations will be selected.

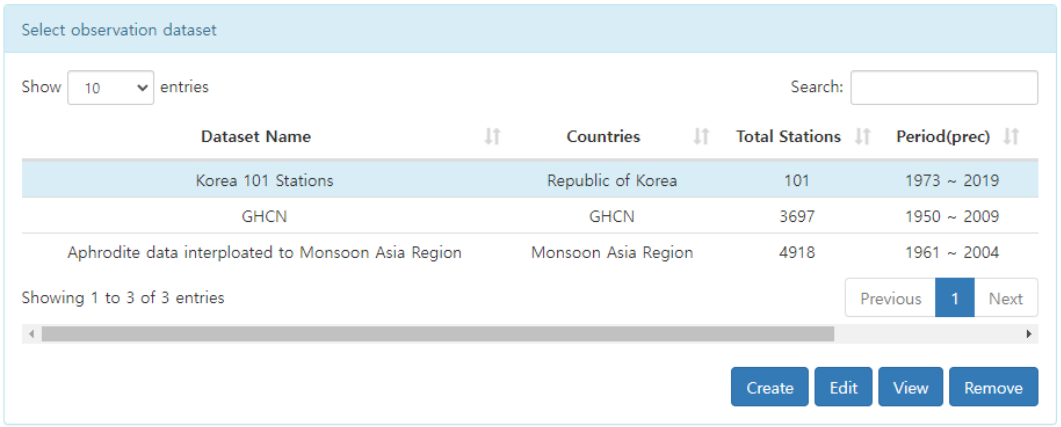


Figure 59. Selection of observation data

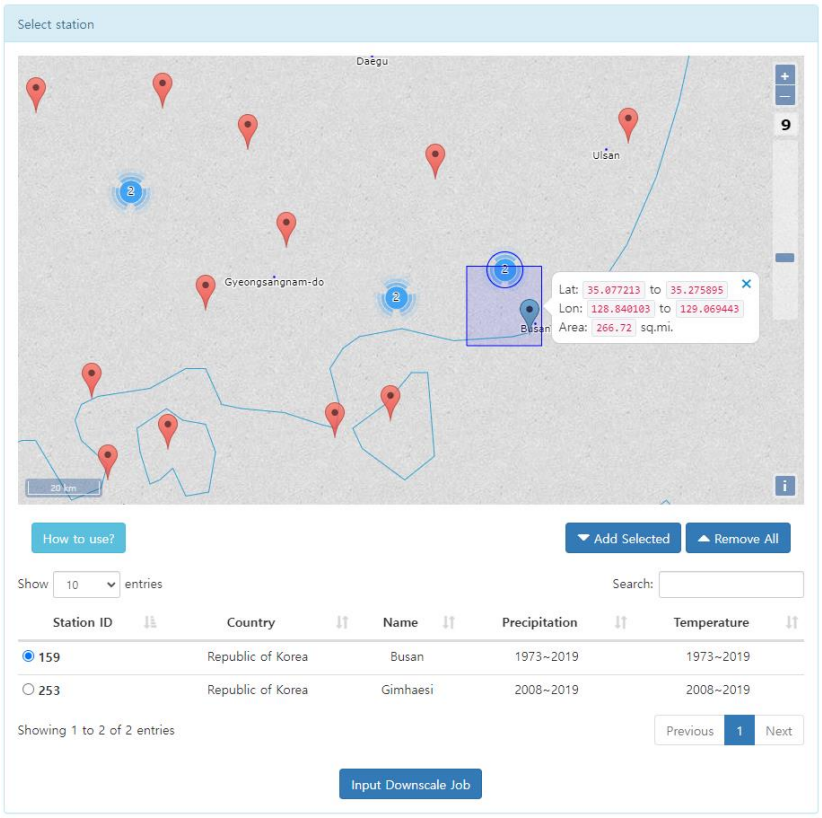


Figure 60. Selecting a station

If you select stations on the map and click the "**Add Selected**" button, the stations are added to the table below (Figure 60). Click the "**How to use?**" button to get more detailed instructions on how to select stations. After selecting a desired station from the table, click the "**Input Downscale Job**" button to request the downscaling job.

5.3.3. Request for downscaling

When the user selects a station and requests to input a downscaling job, the webpage to input operation conditions will be displayed (Figure 61).

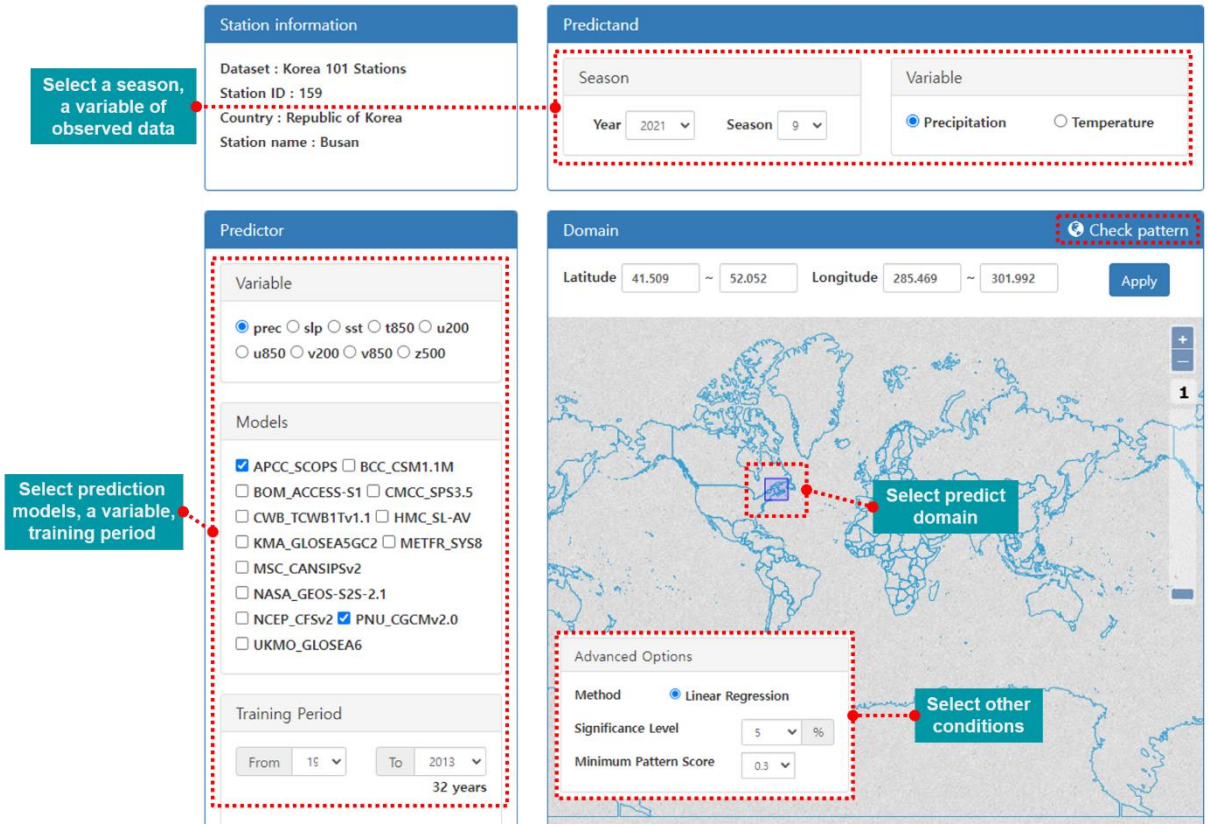


Figure 61. Input a downscale job

The GUI is divided into four parts. In the Station information section, information regarding the selected station will be displayed. In the Predictand part, the user can select the season (year, month) and observation variables.

Users can select forecast information in the Predictor section. After you select a Variable, models that provide the variable will be displayed. After selecting the desired models from the model list, select the training period. In the Advanced Options section, default values are selected and can be changed as desired.

In the Domain part, you need to select the predict domain. You can select the region by dragging the map while pressing the "**Shift**" key and the left mouse button, or specify the latitude and longitude directly in the GUI. If "**Check pattern**" is selected (Figure 61), the correlation map shown in Figure 62 will be displayed. If you select the image in Figure 62, it will be enlarged

Finally, select the "**Downscale**" button to request downscaling.

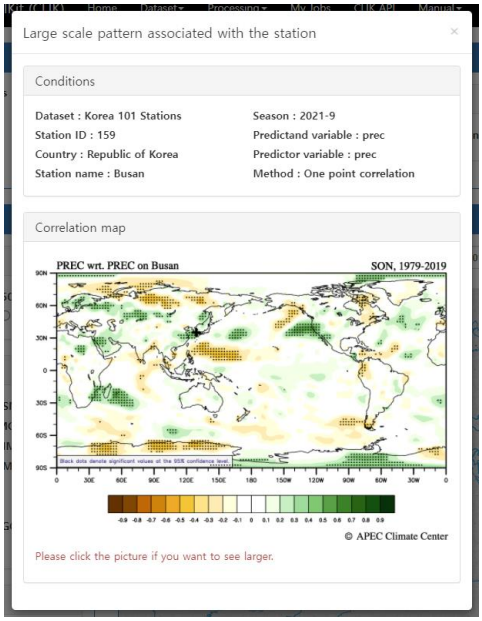


Figure 62. The correlation map

5.3.4. View results

After a job is requested, you can view the progress in the "**My Jobs**" menu. The result of downscaling depends on the selected observation information, the models, and the predict domain. A downscaling job may fail in certain cases. If the job is successful, "**Download**," "**Edit**," and "**Result**" buttons will be displayed as shown in Figure 63.

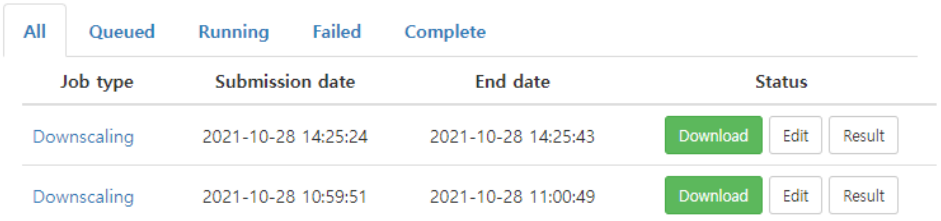


Figure 63. The status of downscale jobs

When the user selects the "**Download**" button, the result file is downloaded. When selecting the "**Edit**" button, the preferences of the user will be displayed, as shown in Figure 61. The user can adjust the conditions and request the operation again.

When selecting the "**Result**" button, the downscaling result will be displayed. Conditions selected by the user are displayed as shown in Figure 64. If you select the desired model from the model list, the result shown in Figure 65 will be displayed.

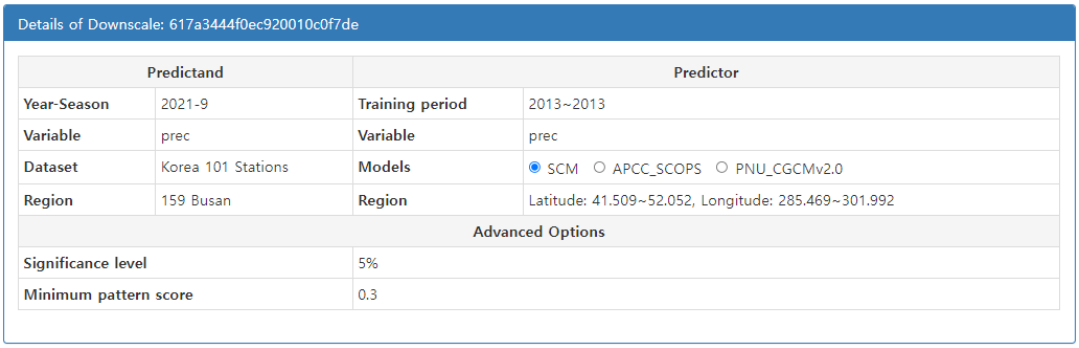


Figure 64. The result of the downscale job: Input conditions

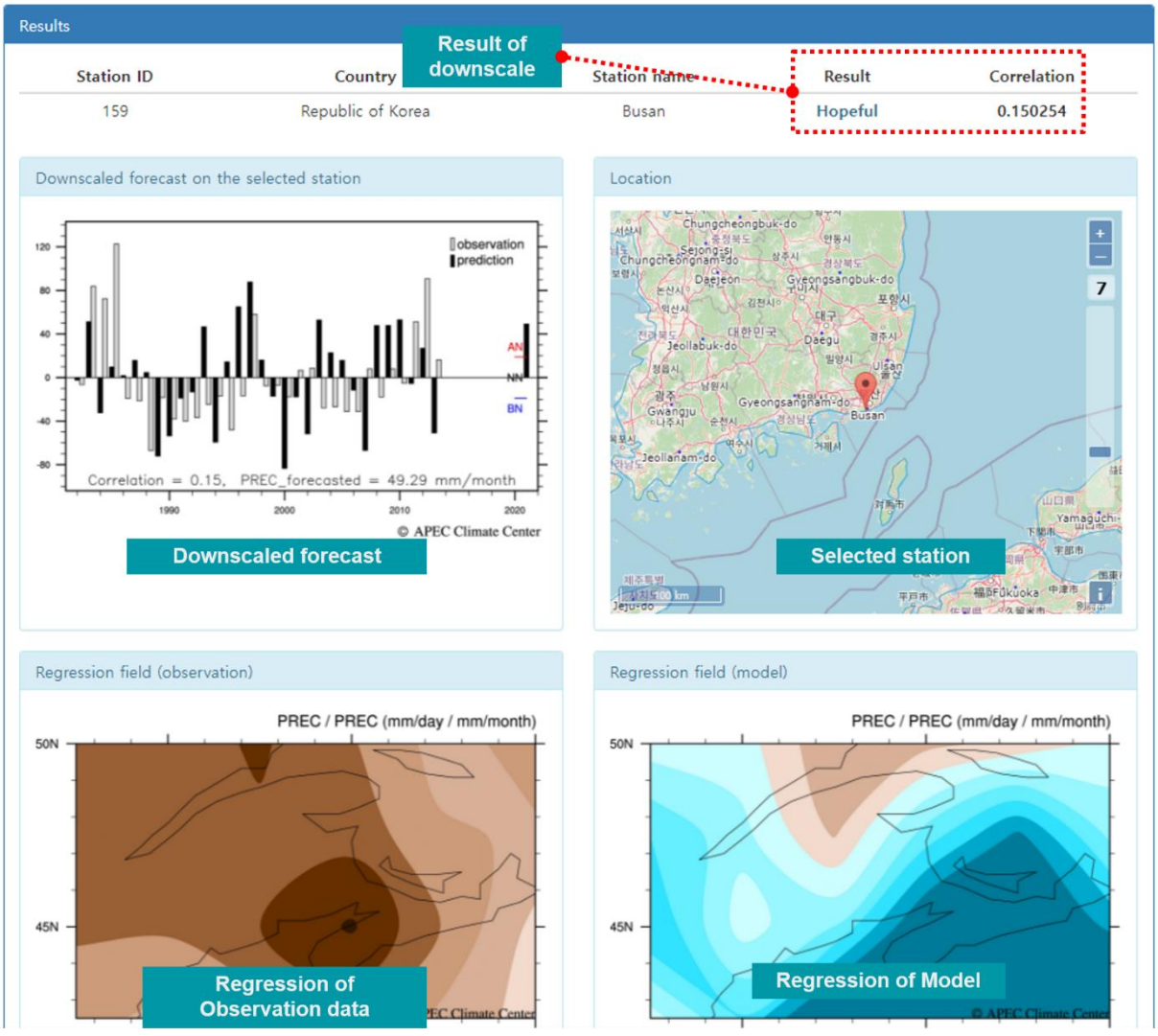


Figure 65. The result of the downscale job: Results of each model

5.4. Clipping

Figure 66 shows Clipping page. The user can use these functions by selecting the Processing - Clipping menu.

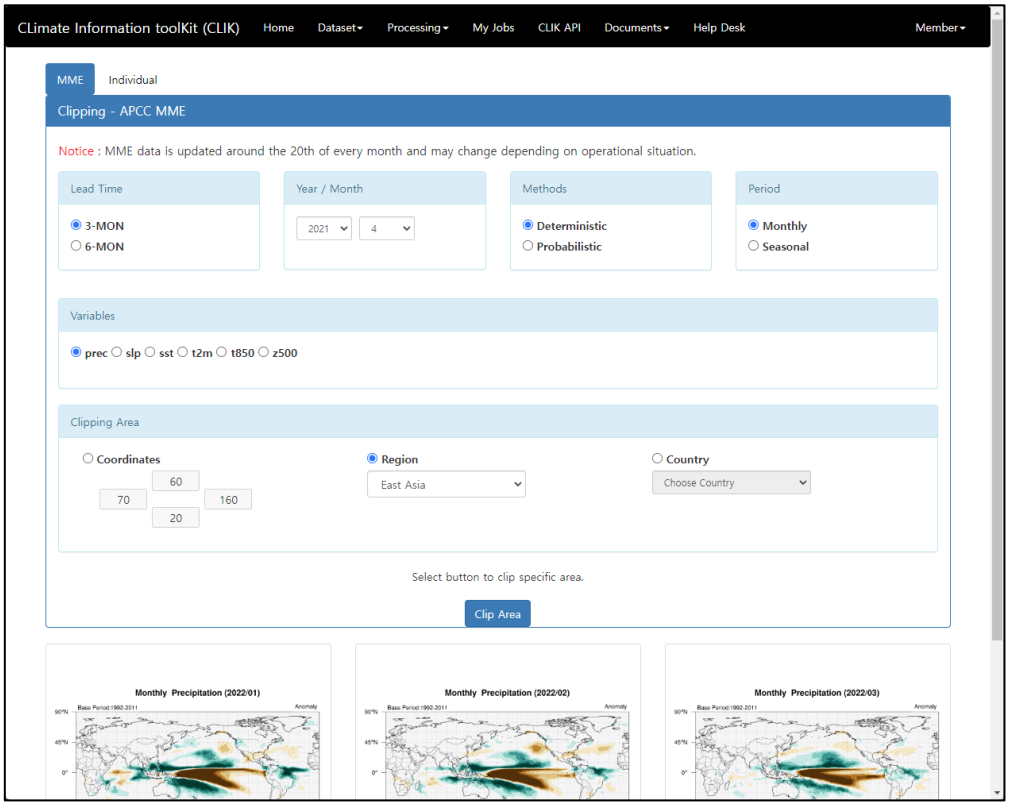


Figure 66. The web interface for data extraction.

Users can configure the desired information of climate data, such as Model, Lead Time, Year/Month, Method, and Period, in the "Processing - Clipping" menu on the web page. Based on the selected information, users can extract information by choosing a location or entering coordinates. Users have the option to download the calculated results as predicted data in the form of an image file(.png).

By selecting "MME" from the top tab, users can navigate to the "Clipping - MME" menu. The menu for configuring conditions for extracting MME (Multi-Model Ensemble) data in the Clipping menu is shown in Figure 67.

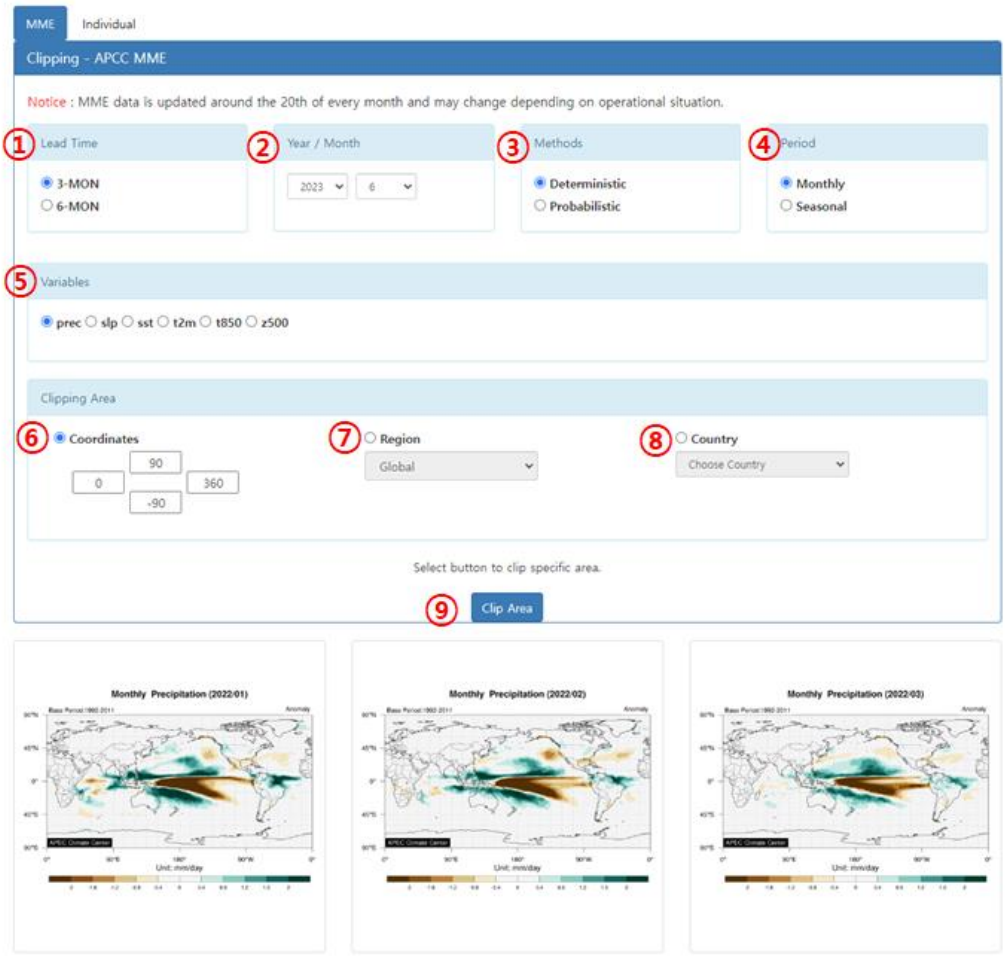


Figure 67. MME data processing criteria screen

The detailed configuration of the condition menu for MME data extraction is as follows:

① Lead Time: Users can select data for 3 months or 6 months in the Lead Time menu. (MME provides data for 3 months or 6 months.)

② Year/Month: Users can choose the year/month of the desired data for extraction. (MME data is usually issued around the 15th of the month.)

③ Method: It offers both Deterministic and Probabilistic methods, and users can select.

④ Period: In the Period menu, users can choose between Monthly averages and Seasonal averages.

⑤ Variable: Users can select variables of the MME model from the Variable menu.

⑥ Coordinates: Users can directly input latitude and longitude coordinates to set the region for extraction.

⑦ Region: Users can utilize frequently used regions by selecting them from the Region menu.

⑧ Country: Users can input coordinates specific to the desired country for data extraction by selecting the Country menu. Selecting a country will automatically input the

coordinates in the Coordinates section.

Furthermore, selecting "Individual" from the top tab will navigate to the "Clipping - APCC Individual Model" tab. The menu for configuring conditions to extract Individual Model data in the Clipping menu is shown in Figure 68.

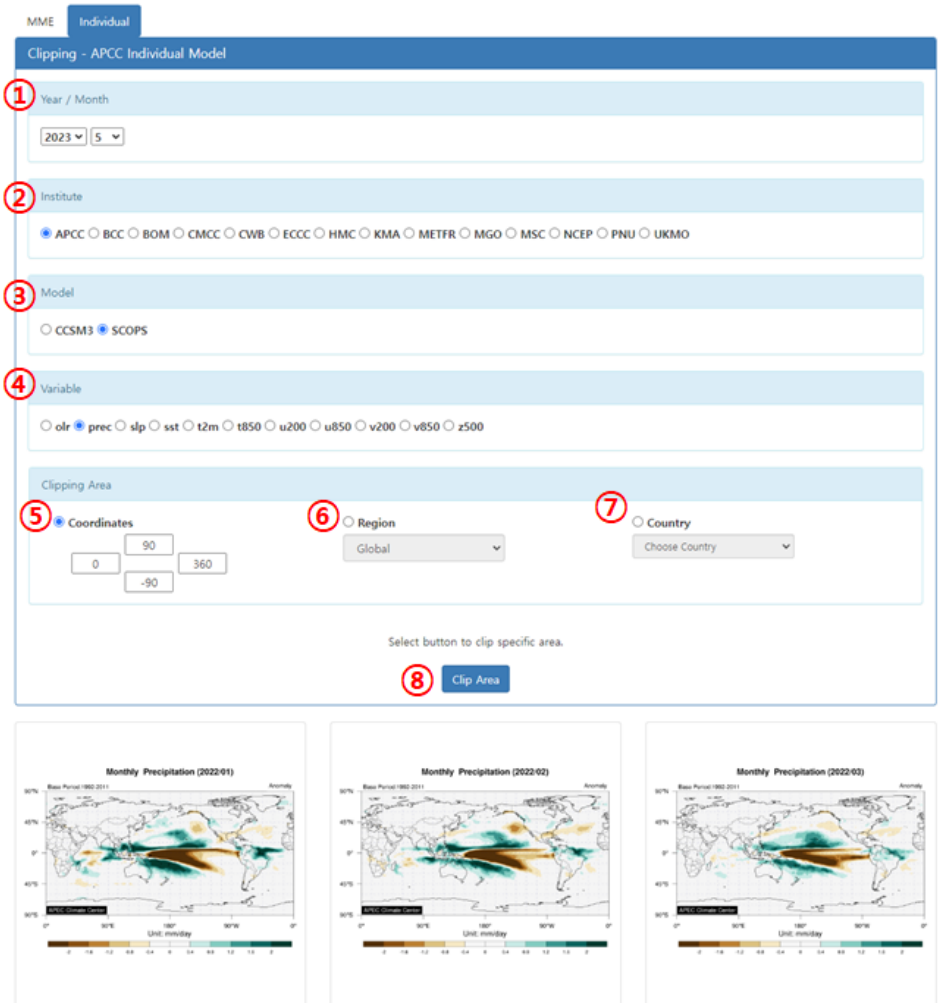


Figure 68. Individual model data processing criteria screen

① Year/Month: Users can select the year/month of the desired data for extraction.

② Institute: Users can choose the institution that produced each model.

③ Model: Through the Model menu, users can check the list of models produced by each research institution and select the desired model.

④ Variable: Users can select each variable included in the respective models from the Variable menu.

⑤ Coordinates: Users can directly input latitude and longitude coordinates to set the region for extraction.

⑥ Region: Users can utilize frequently used regions by selecting them from the Region

menu.

⑦ Country: Users can input coordinates specific to the desired country for data extraction by selecting the Country menu. Selecting a country will automatically input the coordinates in the Coordinates section.

Users can check the results for the selected variables and regions through the bottom section of the web page. By selecting the corresponding map on the screen, an enlarged view will appear, and users can right-click to save the result image.

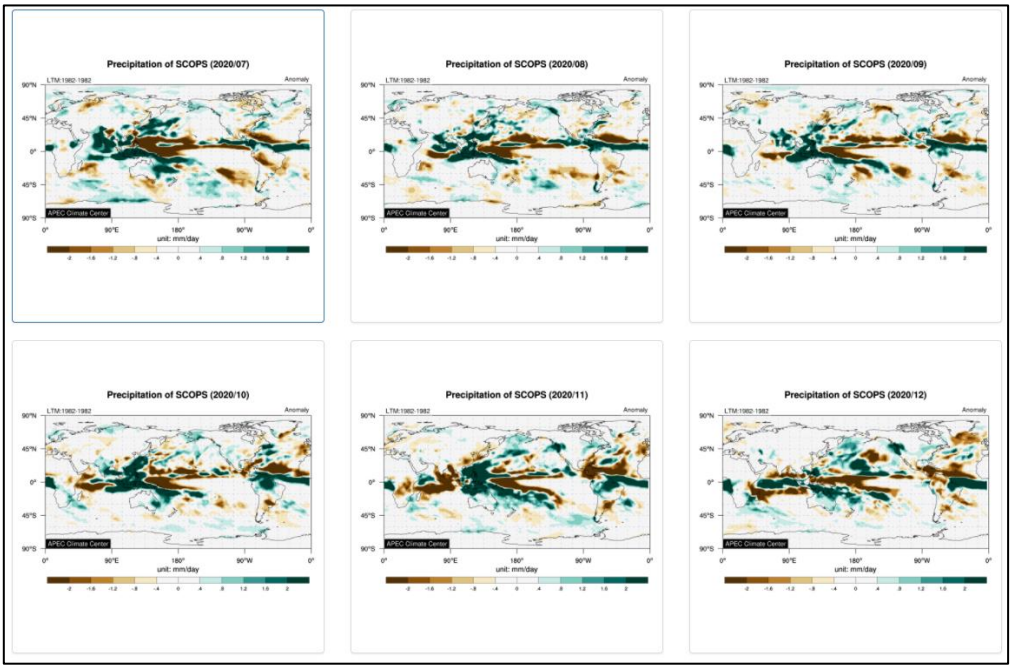


Figure 69. Anomaly results of SCOPS model

5.5. Composite

The climate data processing system provides the ability to synthesize forecasts, observations, and time periods such as years, months, etc. Users can access the feature via the Processing – Composite menu

The Composite feature provides synthesis of seasonal predictions and observations. Users can check the composite results by selecting for the desired year and month and selecting multiple conditions.

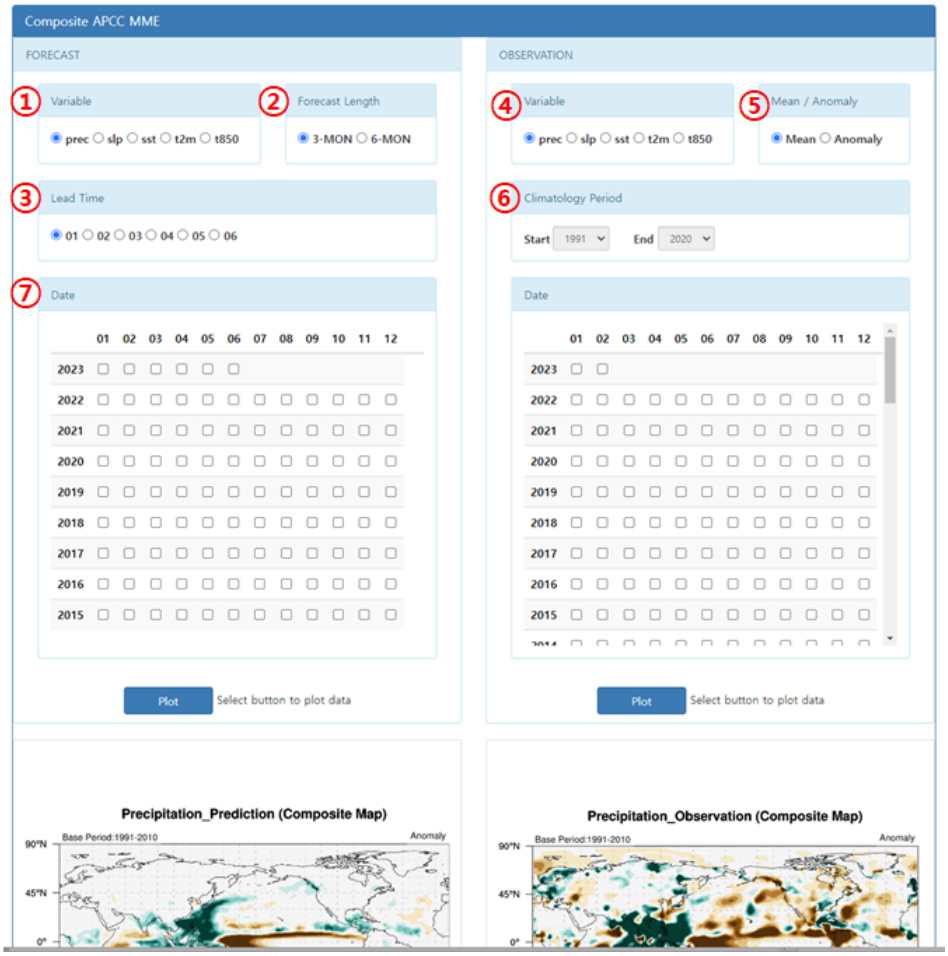


Figure 70. Conditional input screen for the synthesis of predictive and observational data

① Forecast - Variable: Through the selection in the Variable menu, users can choose variables for seasonal prediction data.

② Forecast - Forecast Length: In Forecast Length, users can choose between two types of forecast data: MME 6 months and MME 3 months.

③ Forecast - Lead Time: Users can set the lead time for the selected year/month.

④ Observation - Variable: Users can select variables for observation data.

⑤ Observation - Mean/Anomaly: For observation data, users can choose between Mean and Anomaly.

⑥ Climatology Period: In Anomaly, users can set the climatology period.

⑦ Date: Users can select the desired year/month for synthesis. Selecting the number on the left represents the entire corresponding year, and selecting the month at the top represents the entire selected month.

After configuring the selected conditions as described above, clicking the Plot button in the middle of the screen will display the synthesis result of the prediction data and observation data, as shown in the figure below.

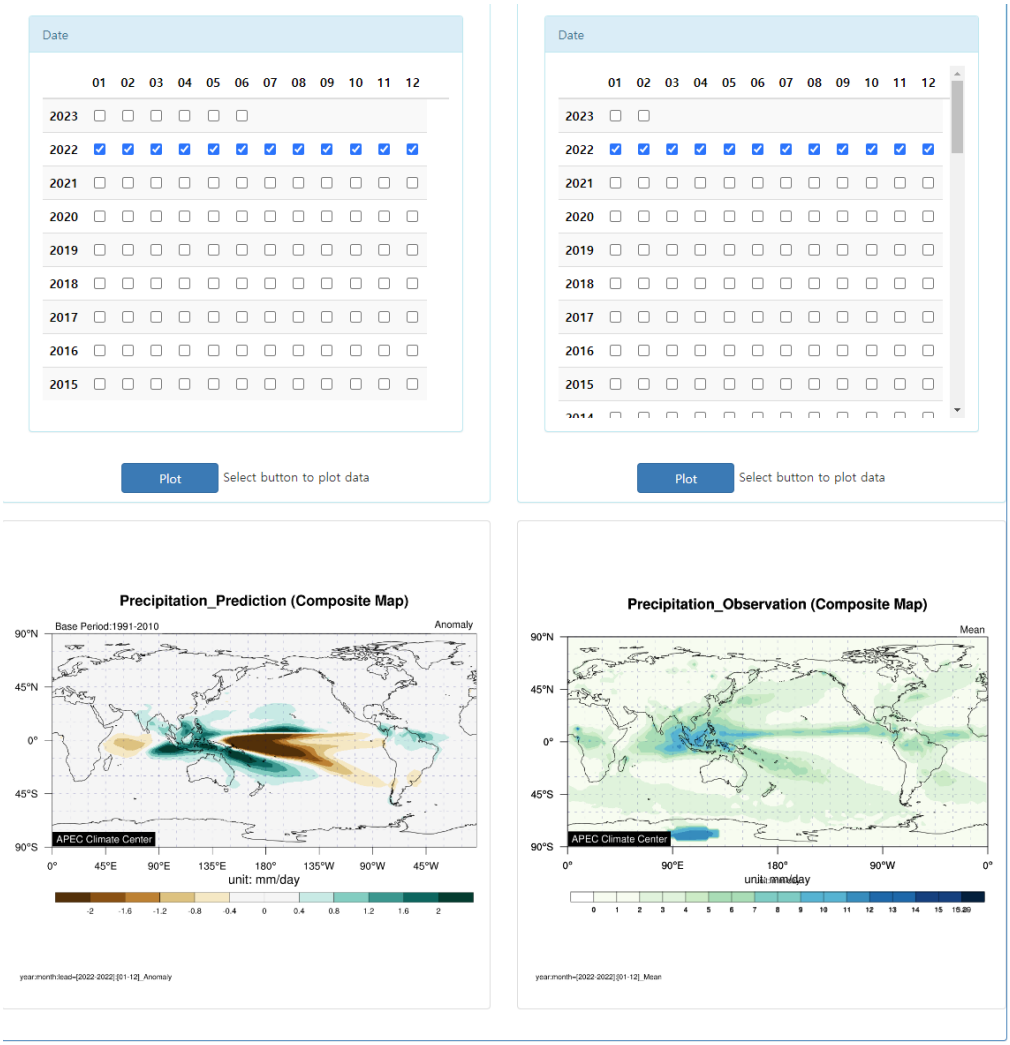


Figure 71. Composite Results Screen

5.6. Masking

Masking provides geographic information-based masking data for precise extraction of climate data. Users can access this functionality through the Processing - Masking menu. The initial screen of the Masking menu is shown in the figure below.

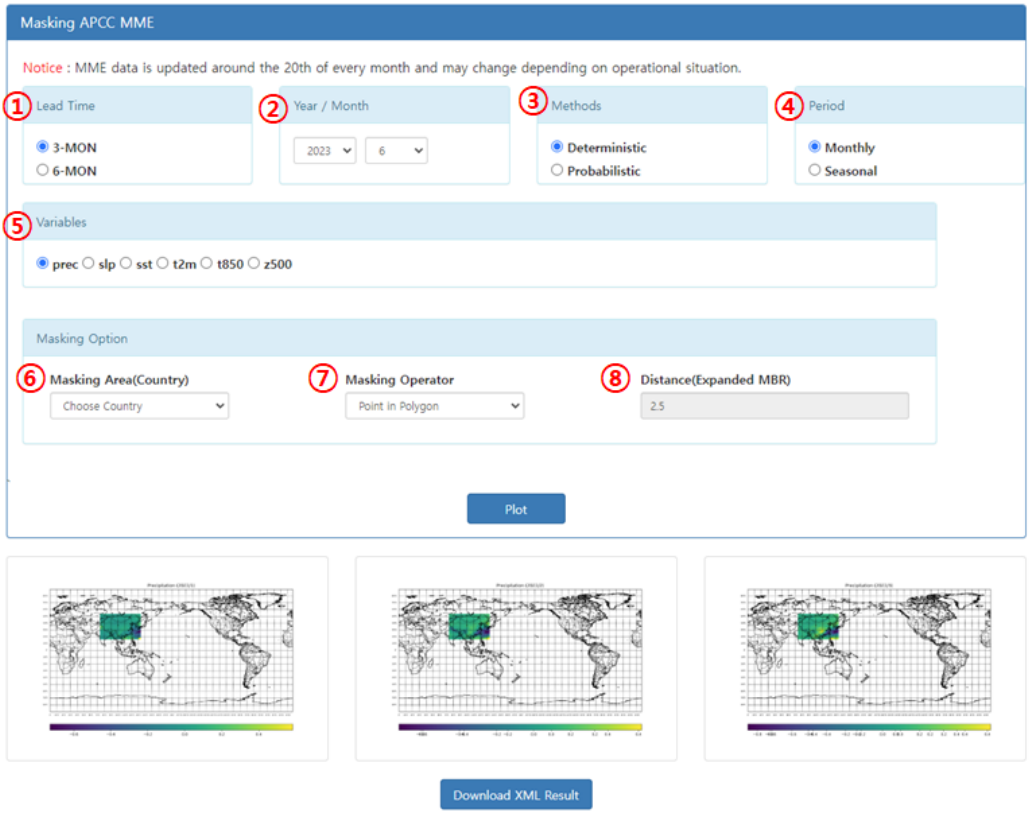


Figure 72. Processing – Masking Menu Screen

The options available in the Masking screen for precise data extraction are as follows:

① Lead Time: Users can select data for 3 months/6 months from the Lead Time menu. (MME provides data for 3 months/6 months)

② Year / Month: Users can select the desired year/month for data extraction. (MME data is typically published around the 15th of each month)

③ Method: Provides deterministic and probabilistic techniques and allows for selection.

④ Period: From the Period menu, users can choose between monthly average (Monthly) and seasonal average (Seasonal).

⑤ Variable: Users can select variables from the MME model from the Variable menu.

⑥ Masking Area: In the Masking feature, the masking area is selected based on country boundaries.

⑦ Masking Operator: The Masking feature provides four operators for masking: Point in Polygon, Rectangle Intersects Polygon, Point in MBR (Minimum Bounding Rectangle), and Point in Expanded MBR.

⑧ Distance: Activated in Point in Expanded MBR, it expands the MBR based on the entered value.

Table 11. Maksing operators

Masking Operator	Description
Point in Polygon	Determines if a point is inside a given polygon. It checks whether the point is within the boundaries and interior of the polygon.
Point in MBR (Minimum Bounding Rectangle)	Determines if a point is within the given MBR. MBR is the minimum-sized rectangle that surrounds the country boundary.
Point in Expanded MBR (Minimum Bounding Rectangle)	Determines if a point is within the expanded area of the MBR (based on the Distance value). It extends the MBR of the country boundary to create a rectangular area for determination.
Rectangle (Cell Boundary) Intersects Polygon	Determines if a rectangle (cell boundary) intersects with a polygon. It checks for overlap or intersection between the cell boundary and the polygon.

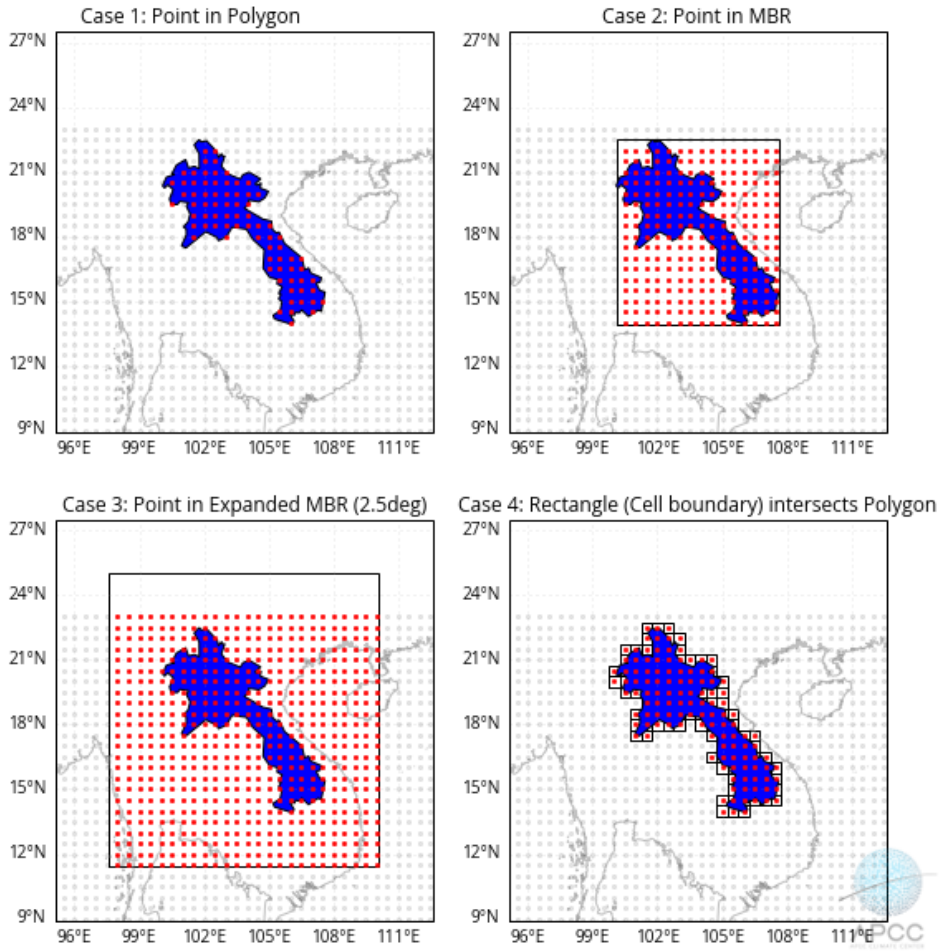


Figure 73. Comparison of Masking Operator

After setting the desired extraction conditions as mentioned above, when the user selects the Plot button at the bottom of the screen, the Masking result will be displayed as shown in the figure below. Additionally, by selecting the Download XML Result button on the result screen, the masking results can be downloaded in XML format.

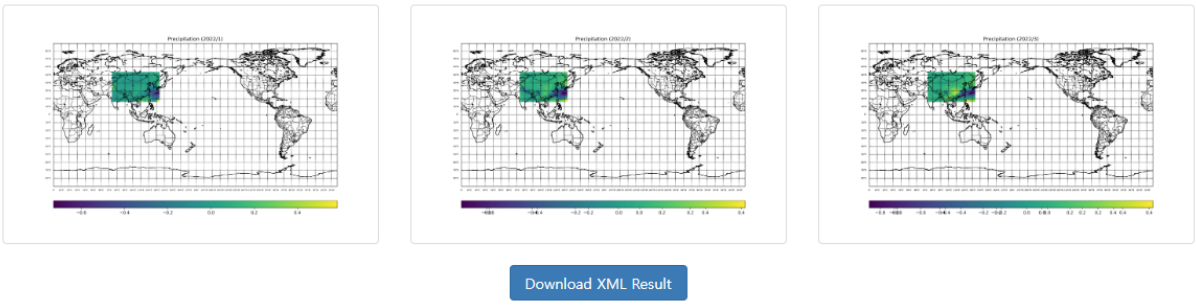


Figure 74. Masking Result Screen

5.7. AIMS

AIMS is an easy-to-use climate change scenario detailing tool for climate change experts and non-experts. The Processing – AIMS menu on the climate service platform introduces AIMS and a link to download AIMS client programs/manuals/sample data.

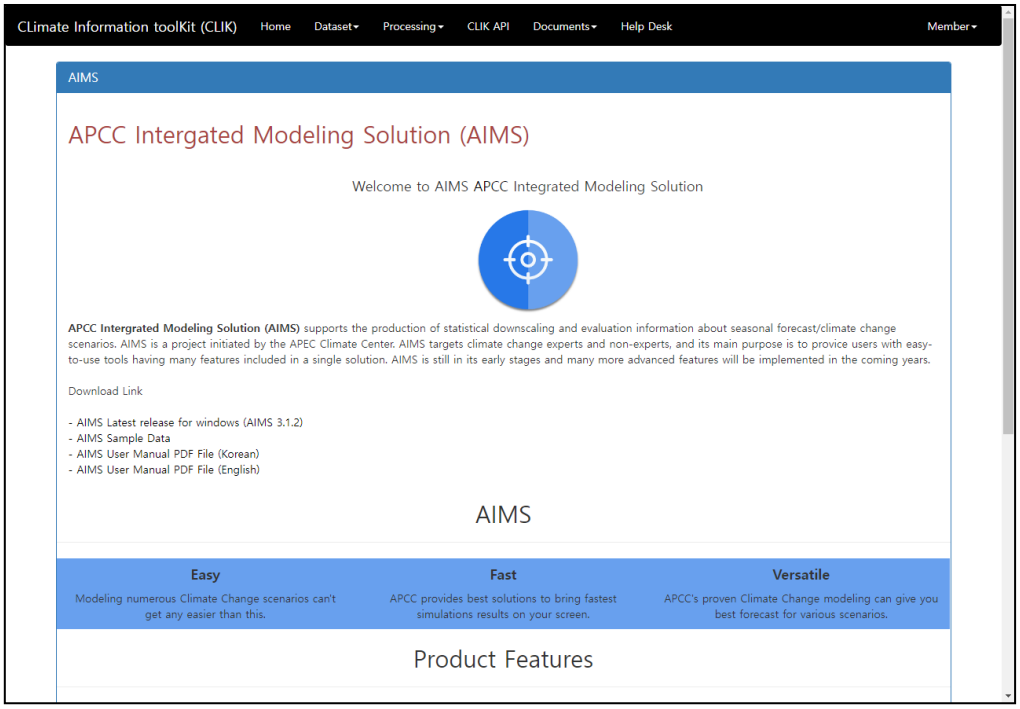


Figure 75. Processing - AIMS menu

AIMS is a stand-alone program that requires a separate installation, not a web program

that runs in a web browser, and requires a separate installation for use on a PC. AIMS operates on Windows 7 or higher 64-bit Windows systems and requires 8GB or more of memory and 100GB or more of storage space. The detailed information is provided in the manual provided on the AIMS page.

6. My Jobs

After submitting the download request in the Download tab, he Job ID will appear at the top right of the screen (Figure 76), and will disappear soon thereafter.

Figure 76. Notification of Job ID

The My Jobs menu allows the user to view the status of the jobs requested.

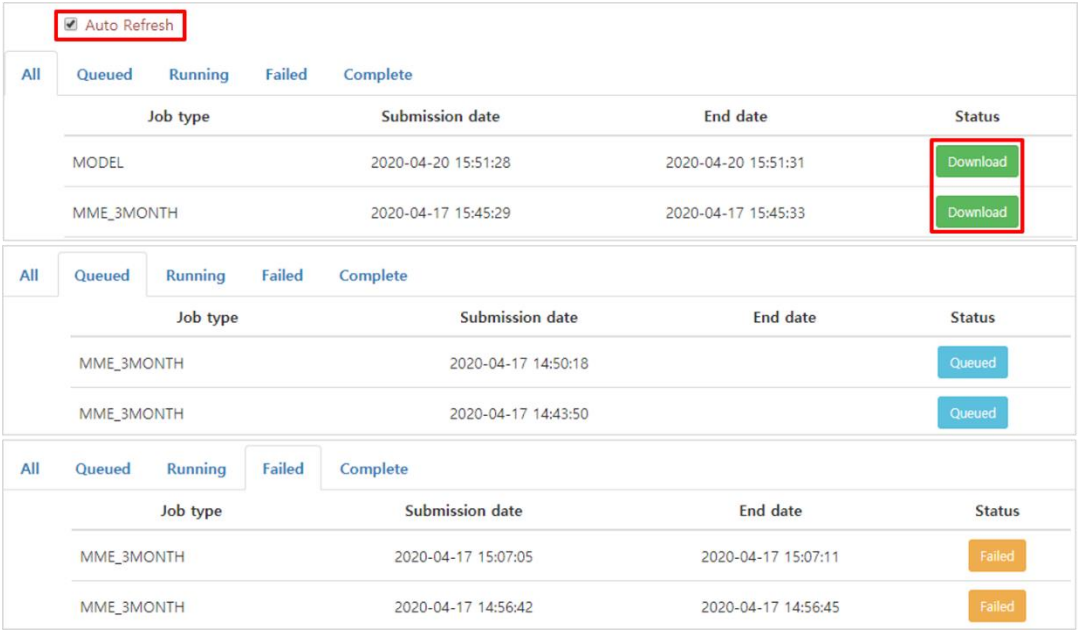


Figure 77. Job list

- The jobs list is automatically updated every 30s when "**Auto Refresh**" is checked, and shows the submitted and completed time.
- The user can view the current status of a job. There are four states: Queued, Running, Failed, and Complete.
- When the job is completed, the results can be downloaded by selecting the "**Download**" button.
- Users can view the details of a job by selecting the job type when they do not check "**Auto Refresh**." In the case of a failed job, the reason for the error will be displayed (Figure 78).

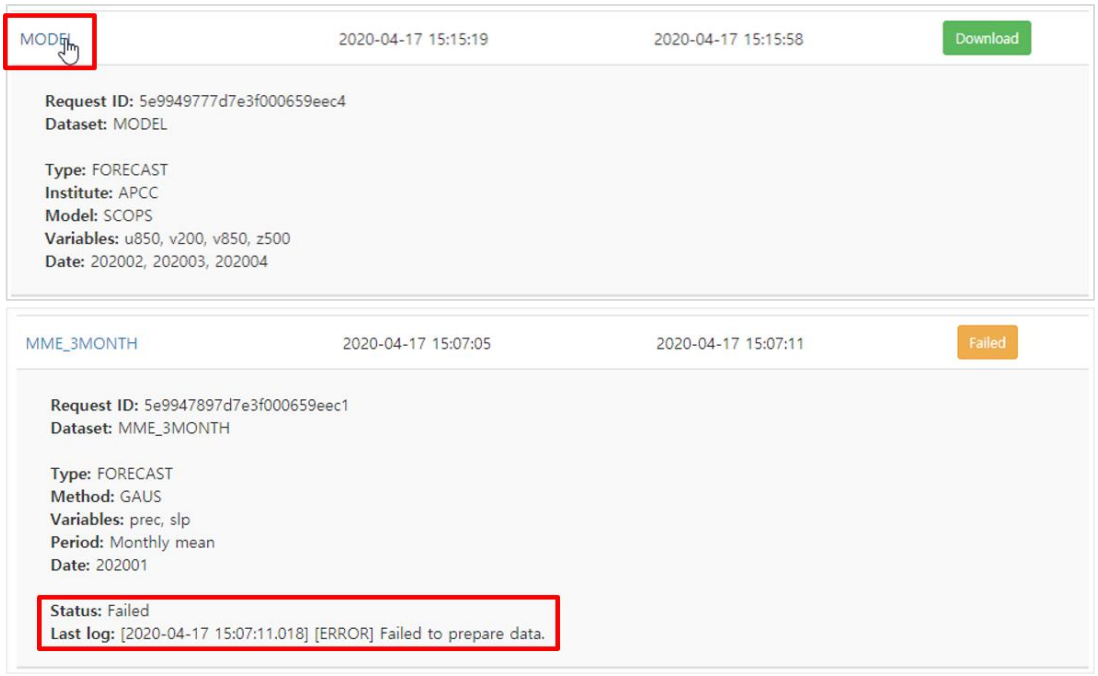


Figure 78. The details related to a Job

7. CLIK API

The CLIK Open Application Program Interface (API) is a service that provides programmatic access to data. This chapter will explain how to use the CLIK API and show some examples.

7.1. Set the API key

The API key is essential for using the CLIK API. The key can be set as follows:

① If you do not have an account, please self-register at the Registration menu.
② If you are not logged in, please login and get your key at the Member Info menu.
③ Copy the code displayed below, in the file $HOME/apccapi.properties.

```
key=810050f2-727e-5ed3-a871-b7a881a04d34
request_url=https://request.apcc21.org/apccdata
status_url=https://request.apcc21.org/status
```

Figure 79. apccapi.properties

7.2. Install the API Client

CLIK provides the API client in Python and Java language although we recommend using the Python client.

① Download the API client at CLIK API page or directly.
② Install API client by running the commands mentioned below (Table 12) in the working folder.

To download using the wget command directly and to install, please use the following command.

Table 12. Download and install commands for API Client

Python	$ wget http://download.apcc21.org/pythonapi -O apccapi.tar.gz $ tar xvf apccapi.tar.gz
Java	$ wget http://download.apcc21.org/javaapi -O apccapi-1.0.jar

7.3. Use the API client

Once the API client is installed, it can be used to request data. If users request more than two data files, they receive a zip file; otherwise, they will receive a NetCDF file.

Users can download data using Python, as shown in the samples below. Please find the values such as type, method and variable on the Dataset and Processing page.

```
#!/usr/bin/env python
import apccapi
c = apccapi.Client()
c.retrieve(
   {
       'jobtype': 'MME',
       'dataset': 'MME_3MONTH',
       'type': 'FORECAST',
       'method': 'SCM',
       'variable': ['prec', 't2m'],
       'period': ['Monthly mean'],
       'yearmonth': ['201909', '201910']
   },
   'mme3.zip'
)
```

Figure 80. Sample using Python: MME (3-Month)

```
#!/usr/bin/env python
import apccapi
c = apccapi.Client()
c.retrieve(
   {
       'jobtype': 'MME',
       'dataset': 'MME_6MONTH',
       'type': 'HINDCAST',
       'method': 'GAUS',
       'variable': ['prec', 't2m'],
       'period': ['Monthly mean', ‘Seasonal mean’],
       'yearmonth': ['201909']
```

```
    },
    'mme6.zip'
)
```

Figure 81. Sample using Python: MME (6-Month)

```
#!/usr/bin/env python
import apccapi
c = apccapi.Client()
c.retrieve(
    {
        'jobtype': 'MODEL',
        'dataset': 'MODEL',
        'type': 'FORECAST',
        'institute': 'APCC',
        'model': 'SCOPS',
        'variable': ['prec', 't2m'],
        'yearmonth': ['201909']
    },
    'model.zip'
)
```

Figure 82. Sample using Python: Model

```
#!/usr/bin/env python
import apccapi
c = apccapi.Client()
c.retrieve(
    {
        'jobtype': 'CMIP5',
        'dataset': 'CMIP5',
        'code': 'AD',
    },
    'cmip5.zip'
)
```

Figure 83. Sample using Python: CMIP5

```
#!/usr/bin/env python
import apccapi
c = apccapi.Client()
```

```
c.retrieve(
   {
      'jobtype': 'ERA5',
      'dataset': 'ERA5',
      'timestep': 'DAILY',
      'level': 'single level',
      'variable': 't2m',
      'year': '2020',
      'month': '12'
   },
   'daily_t2m_202012.zip'
)
```

Figure 84. Sample using Python: ERA5

```
#!/usr/bin/env python
import apccapi
c = apccapi.Client()
c.retrieve(
   {
      'jobtype': 'NCEP1',
      'dataset': 'NCEP1',
      'timestep': 'DAILY',
      'level': 'pressure',
      'year': '2022',
      'variable': 'air',
   },
   'air.2022.nc'
)
```

Figure 85. Sample using Python: NCEP1

```
#!/usr/bin/env python
import apccapi
c = apccapi.Client()
c.retrieve(
   {
      'jobtype': 'NCEP2',
      'dataset': 'NCEP2',
      'timestep': 'DAILY',
```

```
        'level': 'pressure',
        'year': '2022',
        'variable': 'air',
    },
    'air.2022.nc'
)
```

Figure 86. Sample using Python: NCEP2

7.4. Using Clipping API Client

The Clipping function of the CLIK also provides an API Client in the Python programming language. The Python Clipping API Client can be downloaded and used from the Clipping tab on the CLIK API Page.

The Clipping API can be used in the following ways:

```
import clippingapi
import json
import requests

c = clippingapi.Client()

request = {
        'lead_month': '3-MON',
        'variable': 'prec',
        'method': 'SCM',
        'period': 'Monthly mean',
        'iyear': '2021',
        'imonth': '2',
        'cowest': '188',
        'coeast': '191',
        'conorth': '-11',
        'cosouth': '-15'
}

# If the target file extension is .png, you can download the png file.
# If you need nc file, you can download the nc file by setting the file extension to .nc.
```

```
target = "clipping_output.png"
#target = "clipping_output.nc"

c.clip(request, target)
```

Figure 87. Sample of using clipping Python API

As shown in Figure 87, you can download the desired data by directly entering the desired data value into the request variable and executing the Python command. The input values (e.g., lead_month, variable, method, period, iyear, and imonth) in the above example are the same as those entered through the GUI on the CLIK homepage Processing – Clipping. In addition, the user may extract information for desired coordinates by specifying the values for cowest, coeast, conorth, and cosouth.

Figure 88. Result of running clipping Python API