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2023 APCC 기후정보 생산 및 활용 사용자 워크숍

APCC 기후서비스 통합 플랫폼

기후자료서비스 실습

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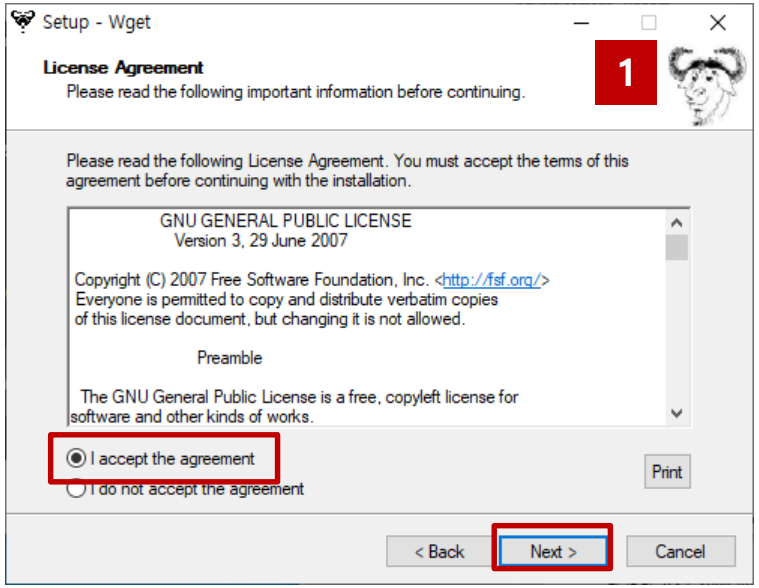
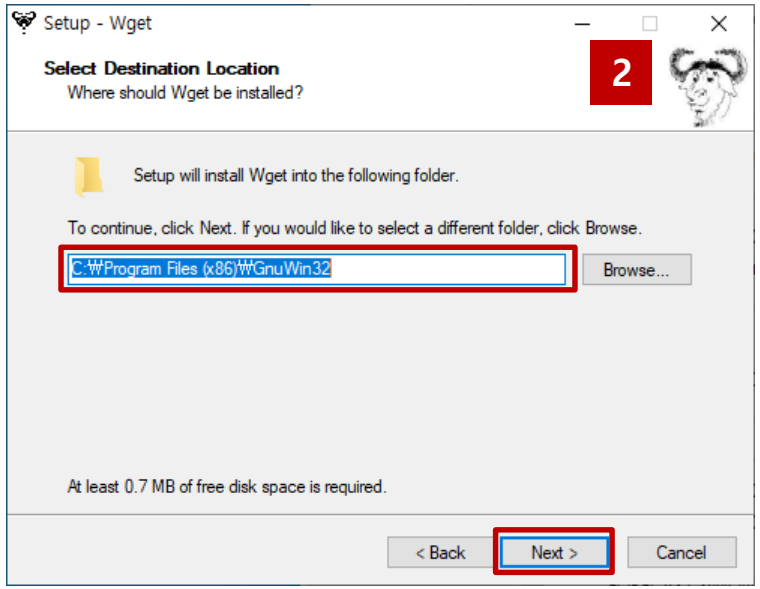
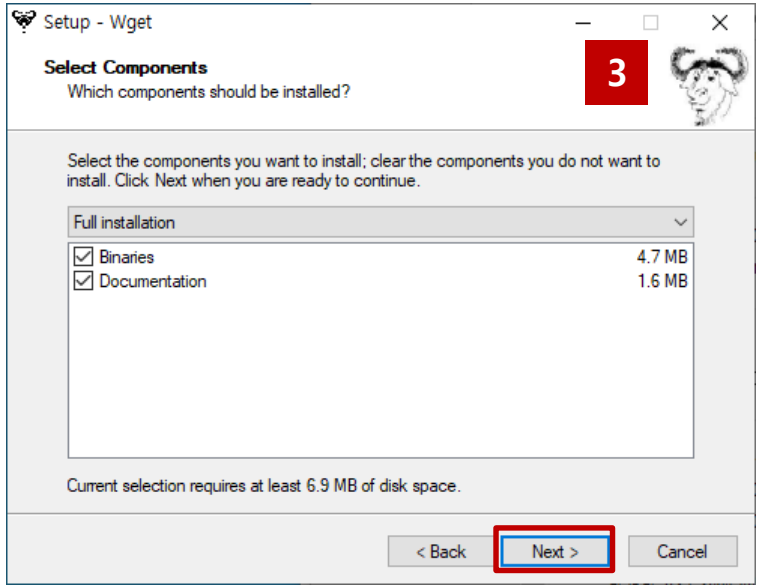
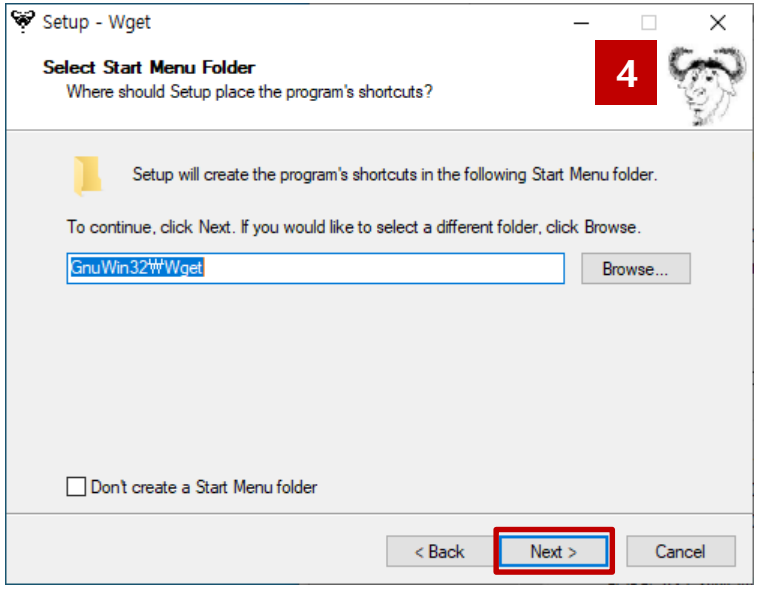
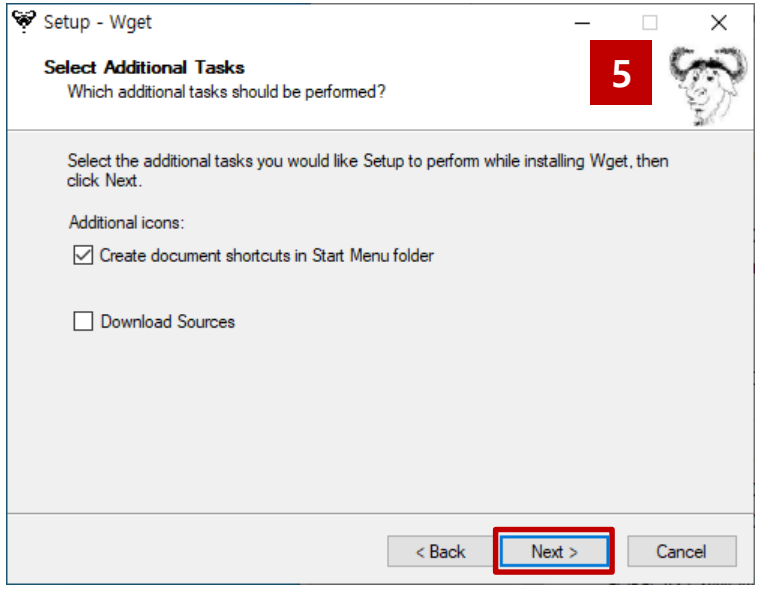
| GnuWin wget 설치: wget-1.11.4-1-setup.exe

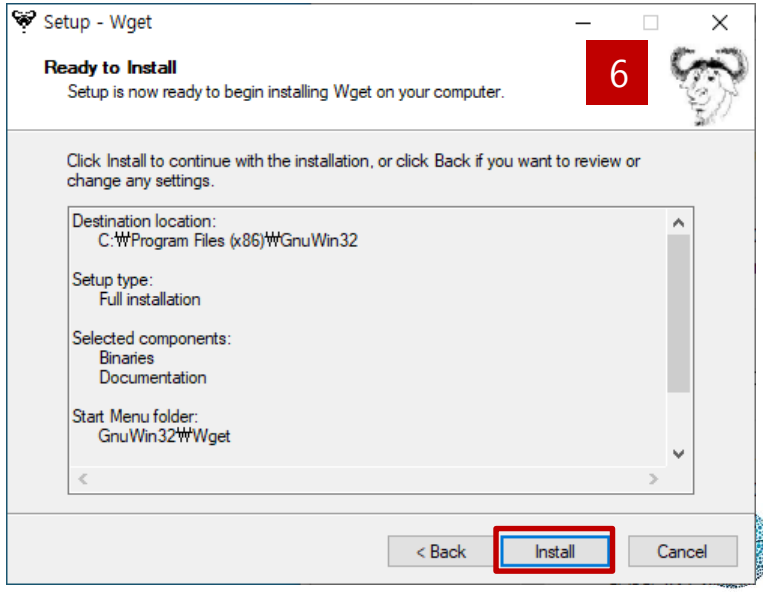












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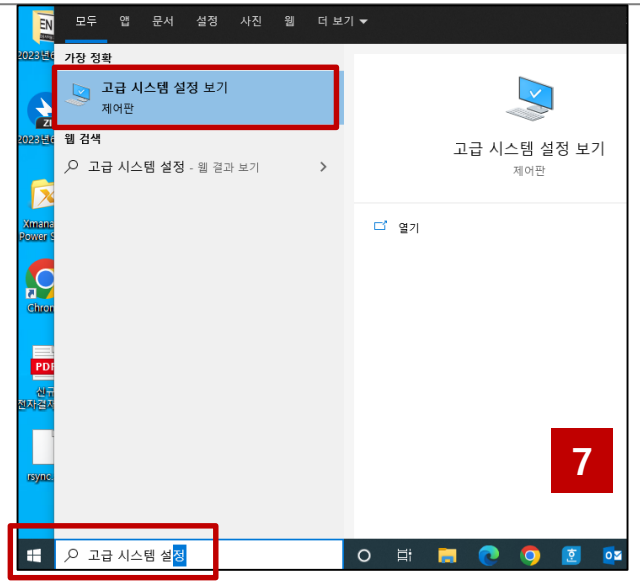
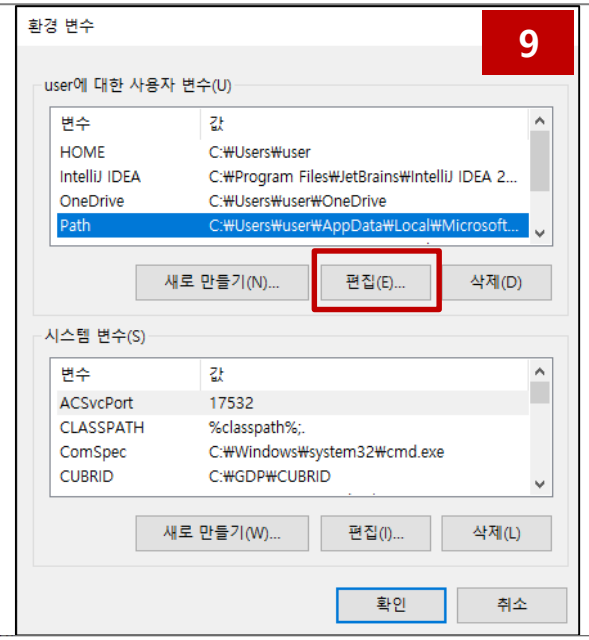
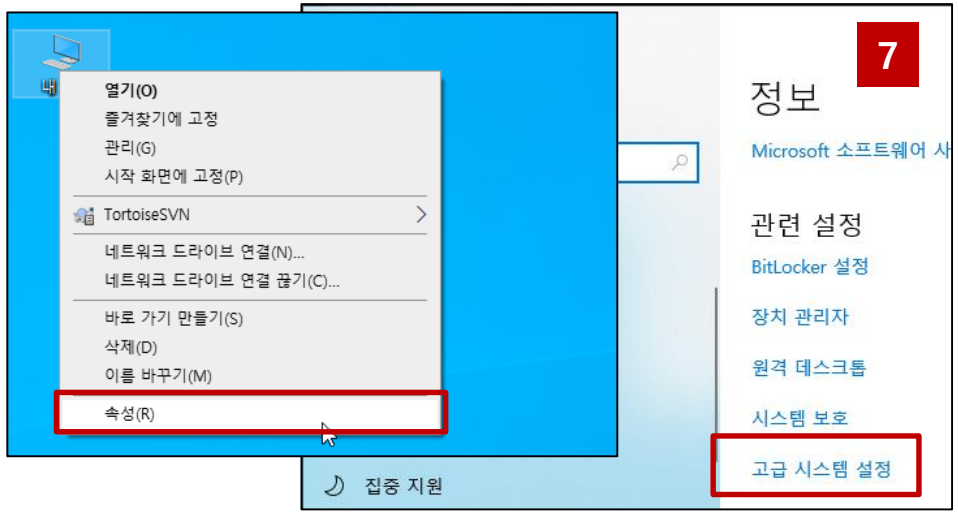
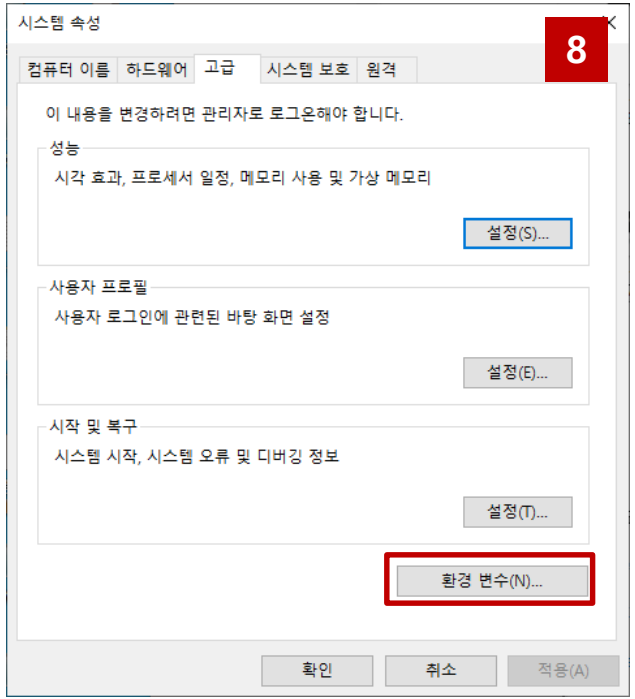
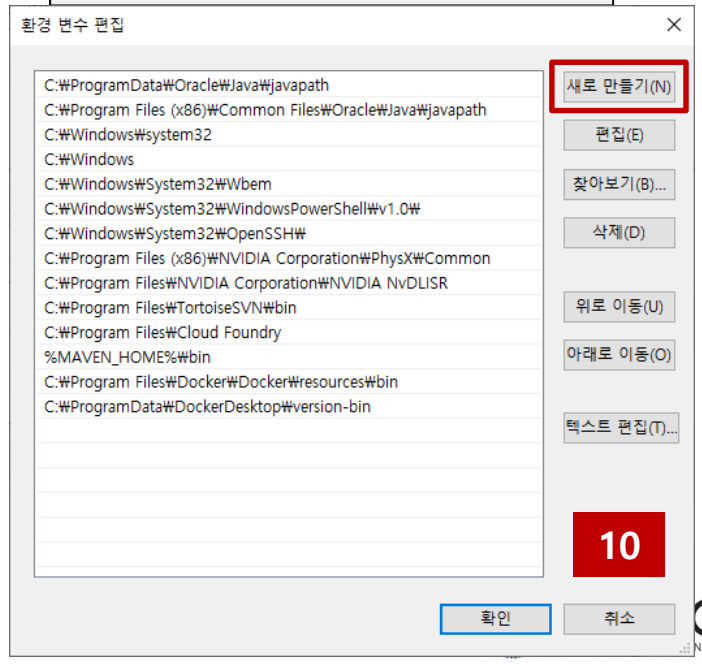
| GnuWin wget 설치: wget-1.11.4-1-setup.exe











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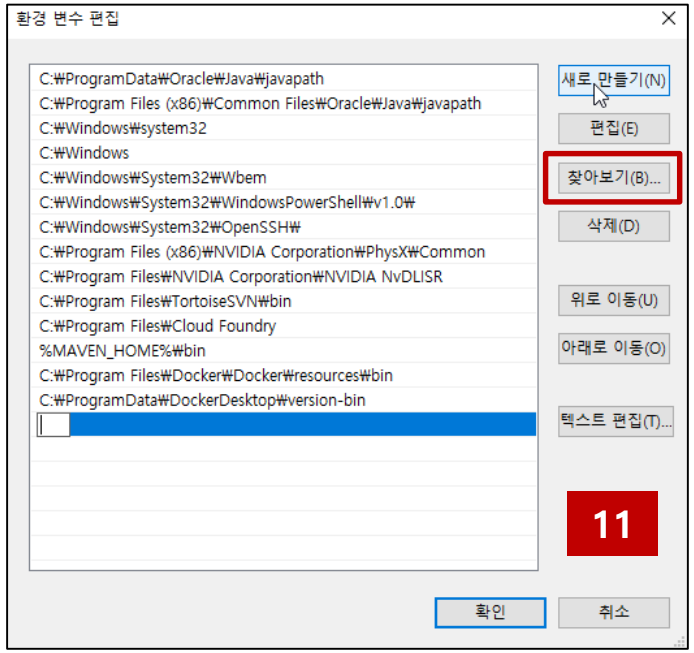

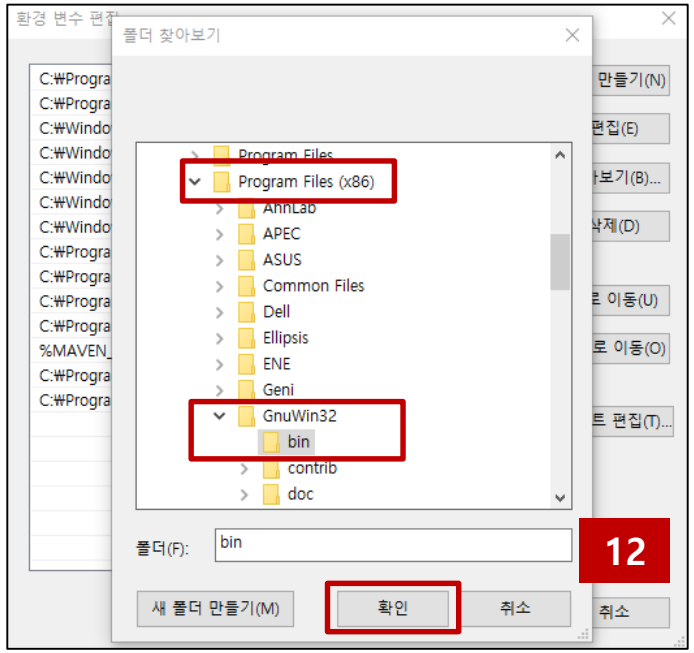

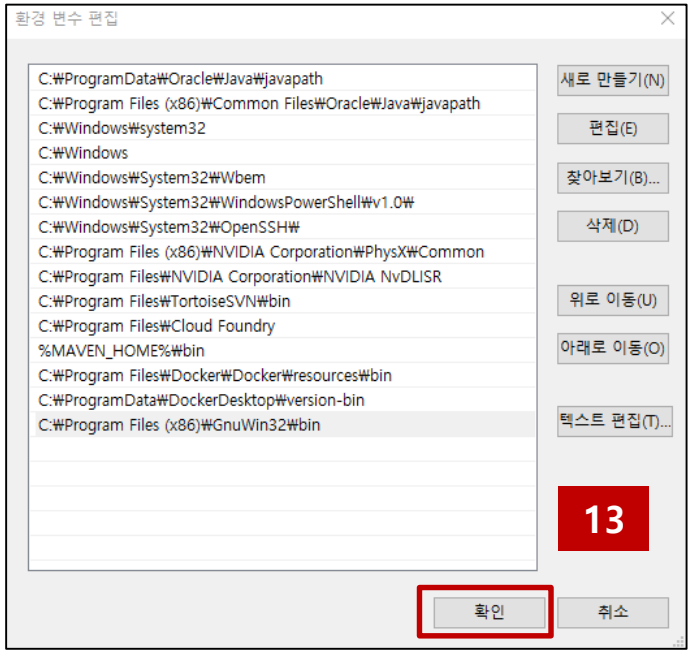

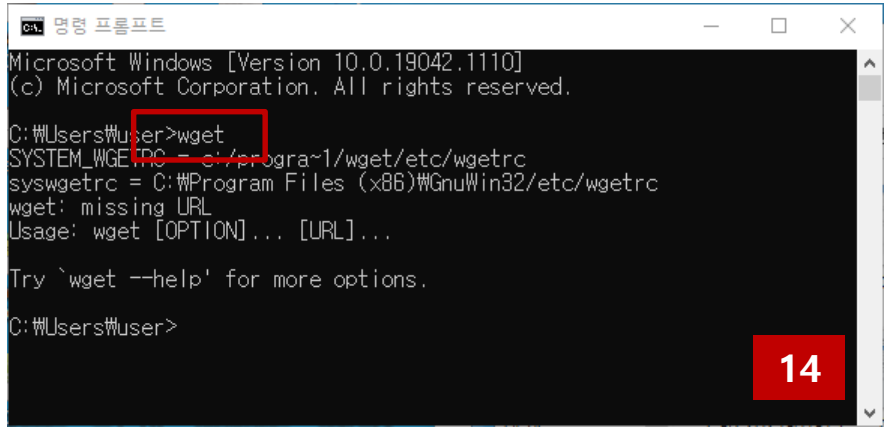

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| MME (저해상도 2.5 x 2.5) – Overview

APCC 계절예측

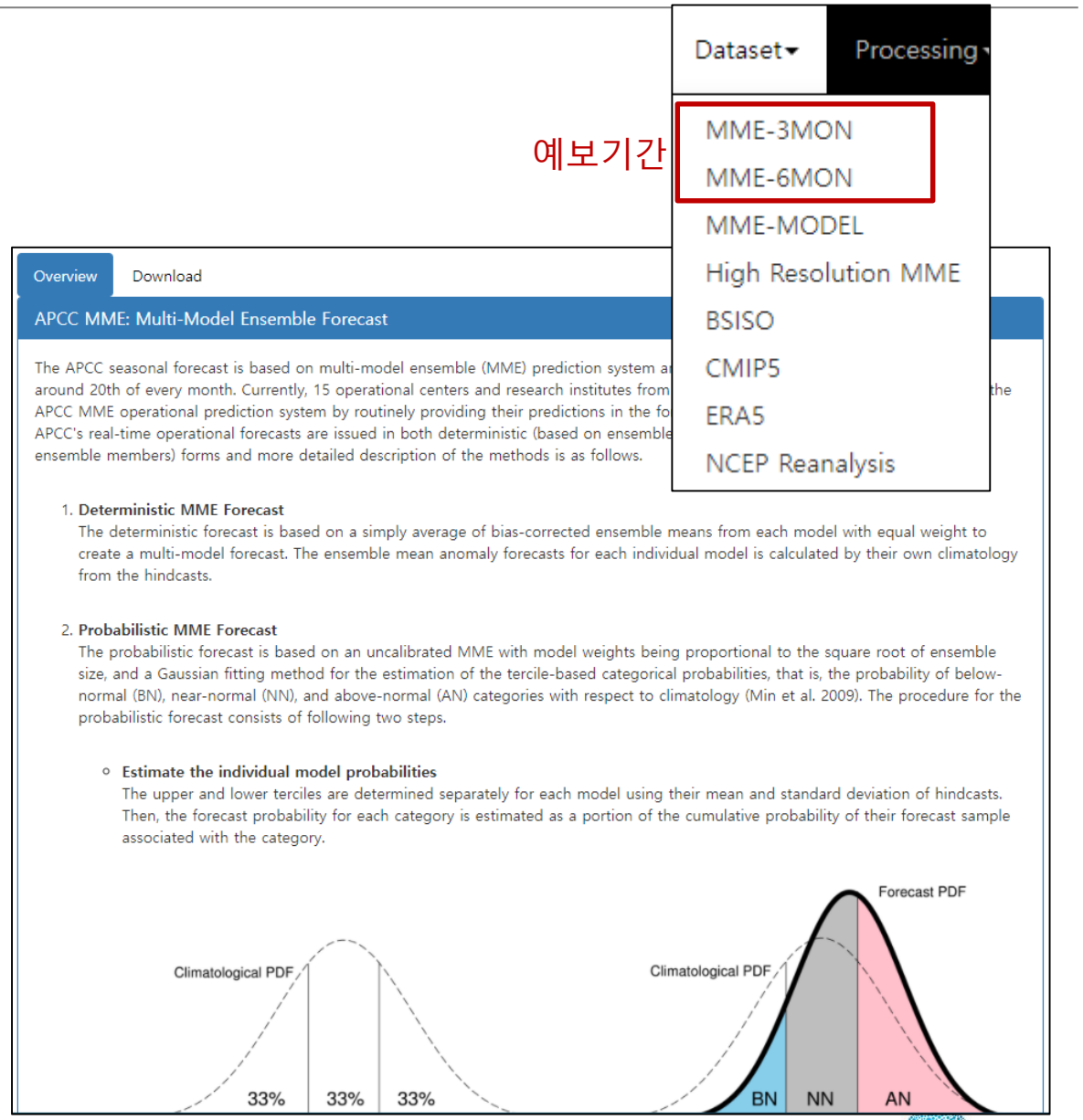
- APEC 회원국 기상청 및 연구 기관으로 부터 수집된 전 지구 예측 모델의 300개 이상의 앙상블 자료를 종합
- 다중 모델 앙상블(Multi-Model Ensemble, MME) 기법 적용
- 3개월, 6개월 예측자료 제공
- Forecast(기후예측), Hindcast(과거 기후 재현)
- Monthly mean/Seasonal mean 구분 제공

단정 예측(Deterministic MME)

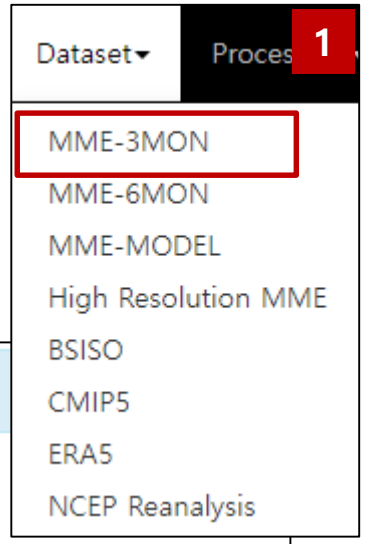
- 개별 모델의 앙상블 예측 값을 각 모델에 동일한 가중치를 부여하여 종합하는 방식
- 예측 값은 편차(기후 값 혹은 평년 값과의 차이)로 제공됨
- 기후 값, 평년 값: 평년 기간 동안의 평균값
- Simple Composite Method (SCM)

확률 예측(Probabilistic MME)

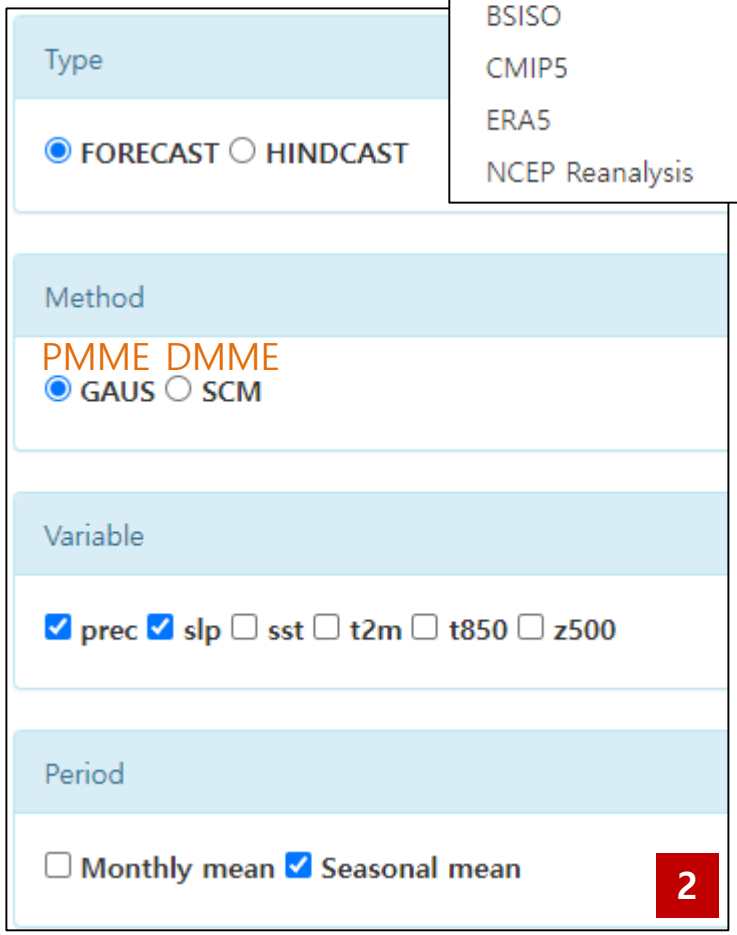
- 개별 모델의 예측 확률을 각 모델별로 가중치를 부여하여 통합하는 방식
- 확률 값 범주: 평년보다 높을 확률, 평년과 비슷할 확률, 평년보다 낮을 확률
- Gaussian fitting method (GAUS)



| MME – Download



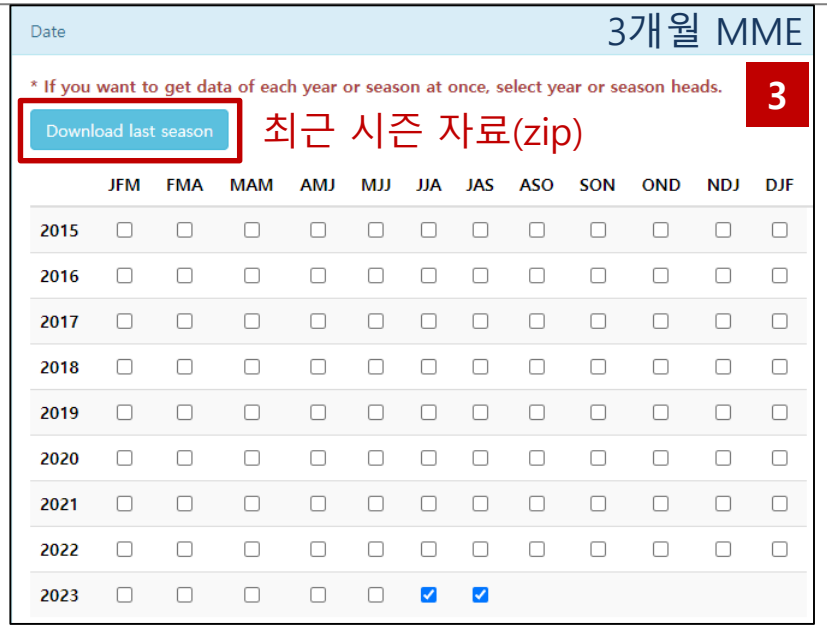
MME 자료 Type 선택



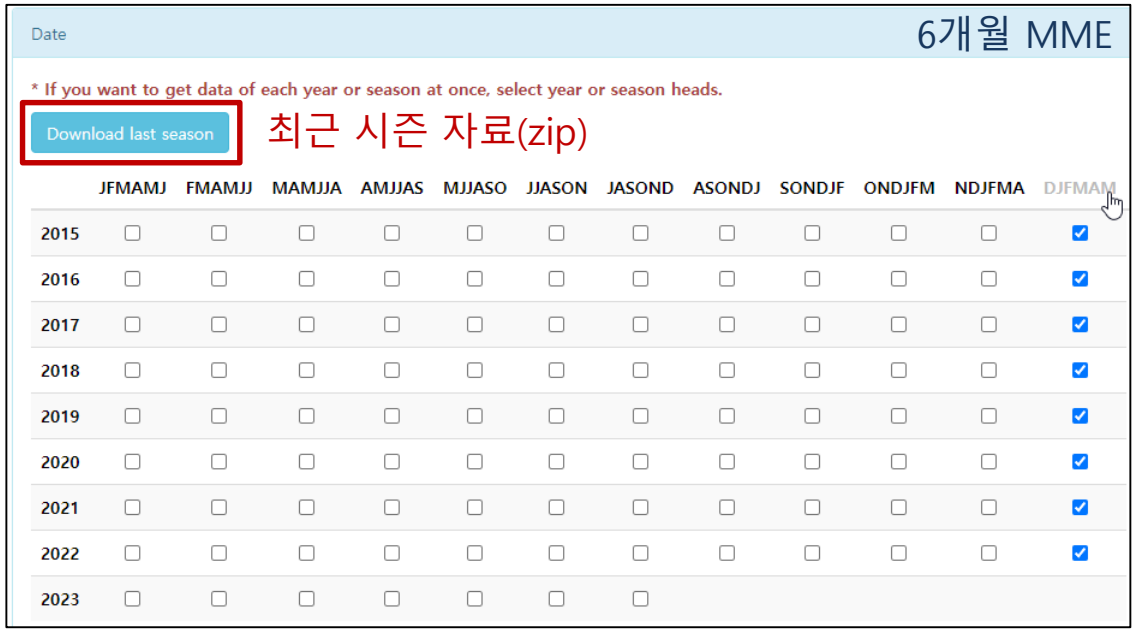
MME 기법 선택

MME 변수 선택

자료 통계 기간 선택



자료 년도, 시즌 선택



[실습]
- 예보기간 : 3개월
- 자료 Type : Forecast
- MME 기법 : GAUS
- 변수 : prec, slp
- 자료 통계 기간: Seasonal mean
- 자료 기간: 2023년 6, 7월

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| MME – Download

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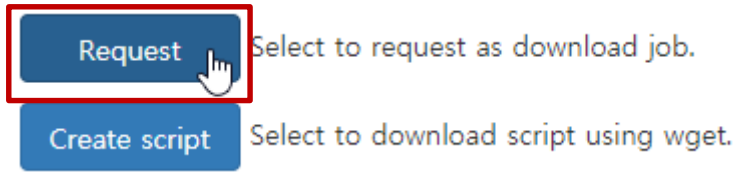
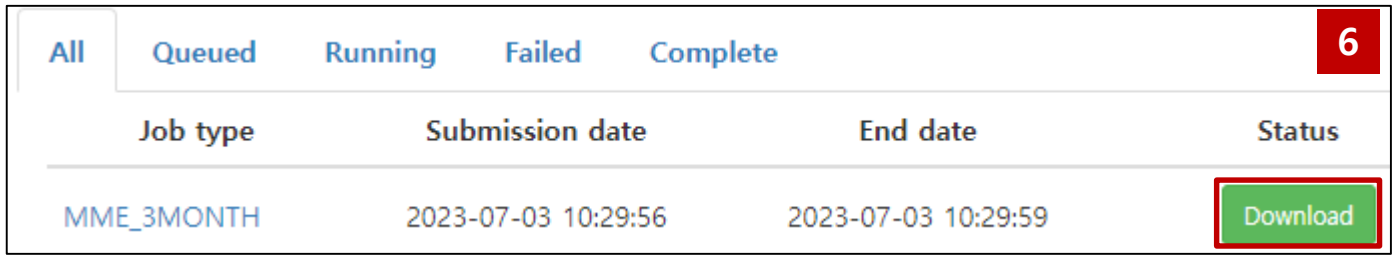


자료 요청 후 Job 생성

5

6



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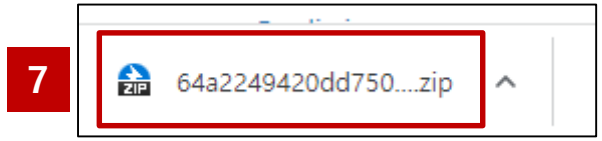
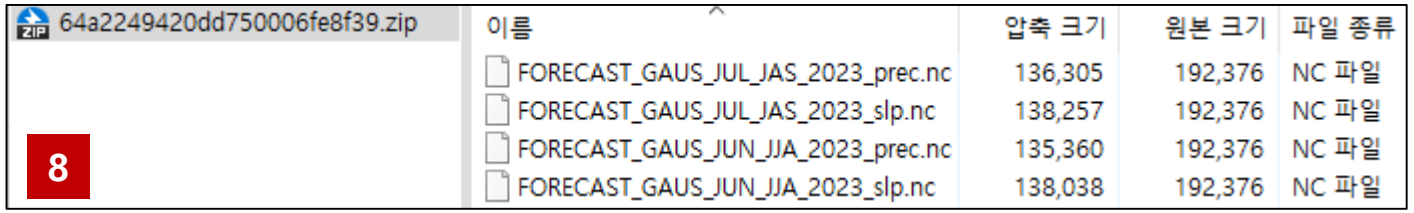
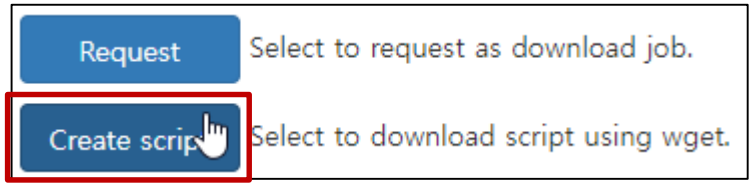


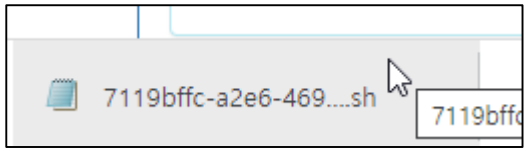
8



| MME – Script Download

Request와 같은 방법으로 옵션 선택 후 script 요청





[실습]
- 자료 : MME
- 예보기간 : 3개월
- 자료 Type : Forecast
- MME 기법 : SCM
- 변수 : prec, slp
- 자료 통계 기간: Monthly mean
- 자료 기간: 2023년 7월

```
#!/bin/bash
#

# 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/SCM/JUL/2023/prec.nc -O 3-MON_FORECAST_SCM_JUL_2023_prec.nc
wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JUL/2023/slp.nc -O 3-MON_FORECAST_SCM_JUL_2023_slp.nc
```

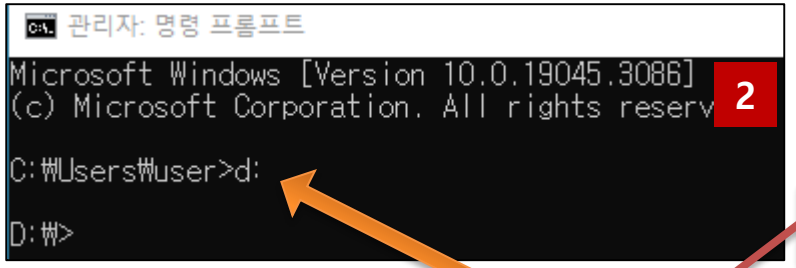
인증서 검증 여부

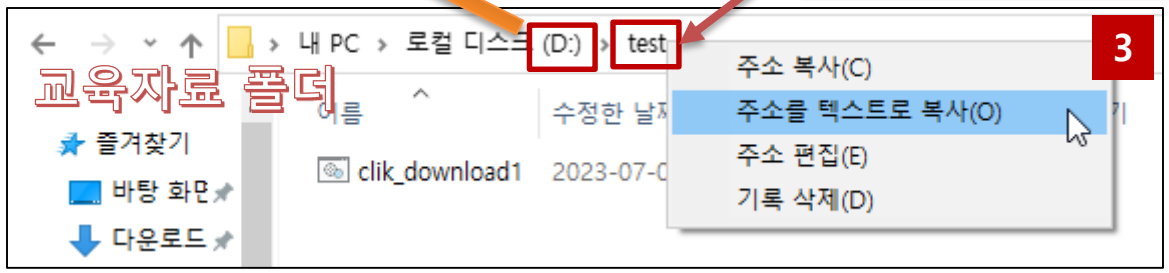
다운로드 파일명 지정

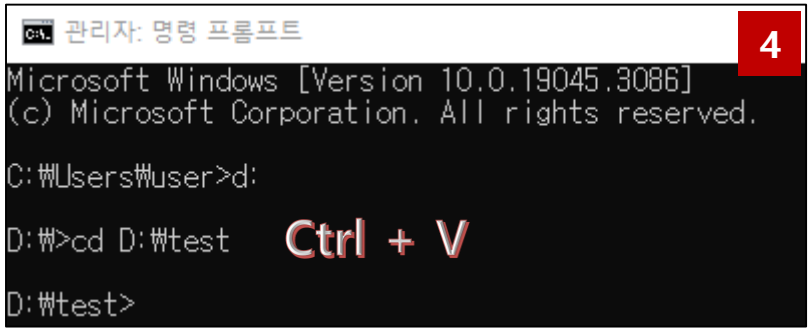
[실습]
- 자료 : MME
- 예보기간 : 3개월
- 자료 Type : Forecast
- MME 기법 : SCM
- 변수 : prec, slp
- 자료 기간: 2023년 7월

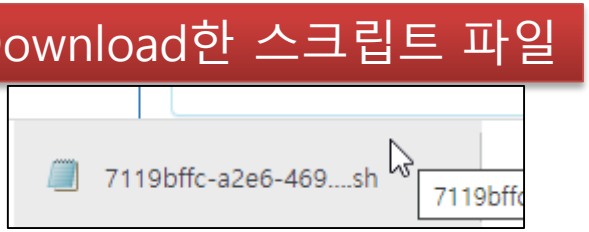
| MME – Script 실행

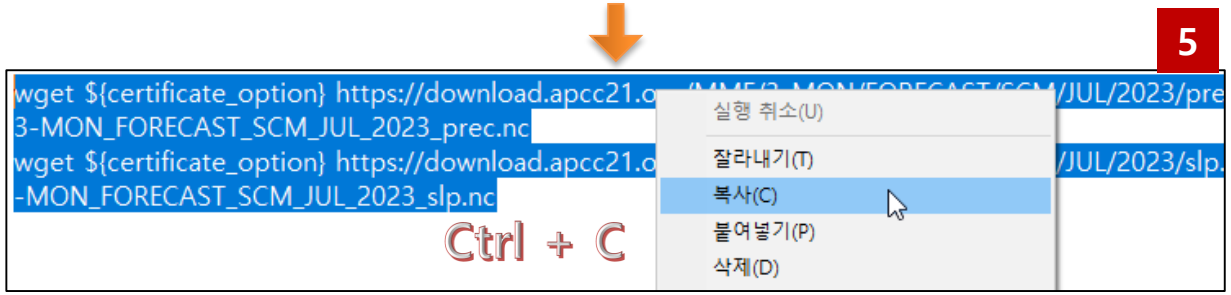
Windows의 경우 Windows Batch 파일 형식으로 편집 → 명령 프롬프트 (cmd) 에서 batch 실행

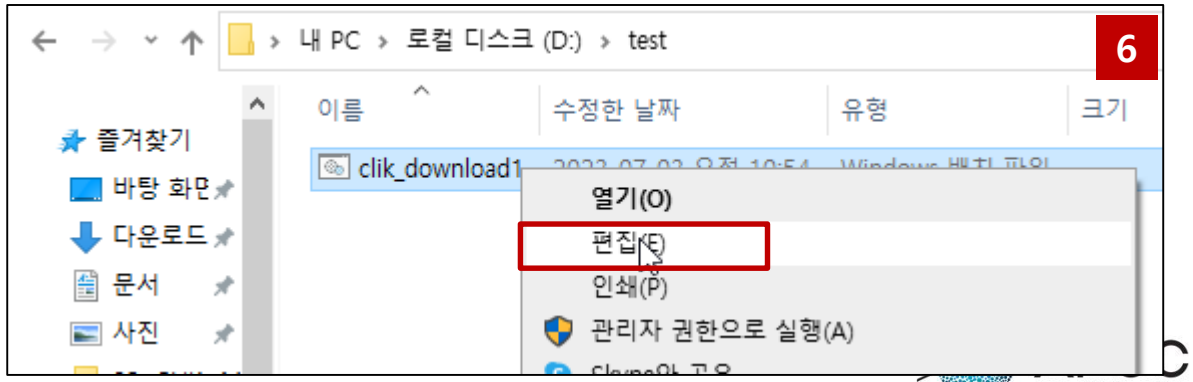












| MME – Script 실행

Windows의 경우 Windows Batch 파일 형식으로 편집 → 명령 프롬프트 (cmd) 에서 batch 실행

7

clik_download1 - Windows 메모장

파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)

```
@ECHO OFF
set certificate_option=--no-check-certificate
```

Ctrl + V

실행 취소(U)
잘라내기(T)
복사(C)
붙여넣기(P)
삭제(D)

8

*clik_download1 - Windows 메모장

파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)

```
@ECHO OFF
set certificate_option=--no-check-certificate

wget %certificate_option% https://download.apcc21.org/MME
wget %certificate_option% https://download.apcc21.org/MME
```

수정

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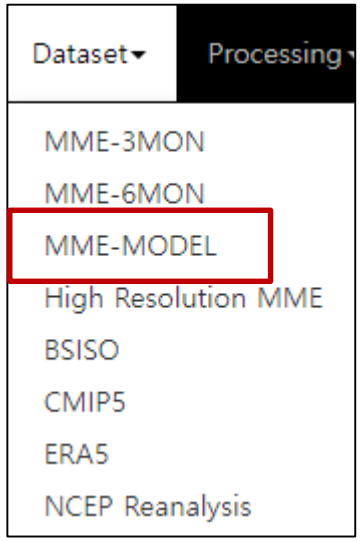
관리자: 명령 프롬프트

```
D:₩test>clik_download1.bat
SYSTEM_WGETRC = c:/progra~1/wget/etc/wgetrc
syswgetrc = C:₩Program Files (x86)₩GnuWin32/etc/wgetrc
--2023-07-03 11:01:44--  https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JUL/2023/prec.nc
Resolving download.apcc21.org... 10.200.111.213
Connecting to download.apcc21.org|10.200.111.213|:443... connected.
WARNING: cannot verify download.apcc21.org's certificate, issued by `/CN=haproxyCA':
  Unable to locally verify the issuer's authority.
WARNING: certificate common name `haproxySSL' doesn't match requested host name `download.apcc21.org'.
HTTP request sent, awaiting response... 200 OK
Length: 148784 (145K) [application/x-netcdf]
Saving to: `3-MON_FORECAST_SCM_JUL_2023_prec.nc'

100%[======================================================================>] 148,784     --.-K/s   in 0.03s

2023-07-03 11:01:44 (4.42 MB/s) - `3-MON_FORECAST_SCM_JUL_2023_prec.nc' saved [148784/148784]

SYSTEM_WGETRC = c:/progra~1/wget/etc/wgetrc
syswgetrc = C:₩Program Files (x86)₩GnuWin32/etc/wgetrc
--2023-07-03 11:01:44--  https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JUL/2023/slp.nc
Resolving download.apcc21.org... 10.200.111.213
Connecting to download.apcc21.org|10.200.111.213|:443... connected.
WARNING: cannot verify download.apcc21.org's certificate, issued by `/CN=haproxyCA':
  Unable to locally verify the issuer's authority.
WARNING: certificate common name `haproxySSL' doesn't match requested host name `download.apcc21.org'.
HTTP request sent, awaiting response... 200 OK
Length: 148784 (145K) [application/x-netcdf]
Saving to: `3-MON_FORECAST_SCM_JUL_2023_slp.nc'

100%[======================================================================>] 148,784     --.-K/s   in 0.03s

2023-07-03 11:01:45 (4.27 MB/s) - `3-MON_FORECAST_SCM_JUL_2023_slp.nc' saved [148784/148784]
```

| MME Model (저해상도 2.5 x 2.5) – Overview

현재 11개국 15개 Model 자료 제공

- 선행시간(발표일로부터 예측된 각 시점까지의 예측 수행 기간)은 모델마다 다름
- Forecast/Hindcast 구분 제공
- Hindcast는 매년 생산된 자료세트를 제공하며 제공하는 Hindcast 기간은 모델마다 다름
- 모델정보 상세 설명 참고: www.apcc21.org/ser/global/modelDescription.do



Overview | Download

APCC MME Individual Models

Multi-Model Ensemble(MME) technique is one of the efficient solutions to improve the climate forecast skills. The basic idea of MME is to avoid inherent model errors and minimize the uncertainties by using independent and skillful models. For better forecast compared to single model forecast, APCC adopts one deterministic and one probabilistic MME methods by collecting individual model forecast data from 15 centers/institutions in 11 countries.

MME participating models

Table 1. Organization

Center/Institution	Country	System name
APCC	Korea	SCoPS
BCC	China	CSM1.1m
BoM	Australia	ACCESS-S2
CMCC	Italy	SPS3.5
CWB	Chinese Taipei	TCWB1Tv1.1
ECCC	Canada	CANSIPSv2.1
HMC	Russia	SL-AV
KMA	Korea	GloSea6GC3.2
METFR	France	SYS8
MGO	Russia	MGOAM-2
NCEP	United States of America	CFSv2

| MME Model – Download

자료 Type 선택

기관 선택

Model 선택

변수 선택

Type FORECAST 2

◉ FORECAST ○ HINDCAST

Institute

◉ APCC ○ BCC ○ BOM ○ CMCC ○ CWB ○ ECCC ○ HMC ○ KMA ○ METFR ○ MGO ○ MSC ○ NCEP ○ PNU ○ PNU-RDA ○ UKMO

Model

○ CCSM3 ◉ SCOPS

Variable

☐ olr ☐ prec ☐ slp ☑ sst ☑ t2m ☐ t850 ☐ u200 ☐ u850 ☐ v200 ☐ v850 ☐ z500

자료 생산 년도 선택

Type HINDCAST

○ FORECAST ◉ HINDCAST

Year

○ 2015 ○ 2016 ○ 2017 ○ 2018 ○ 2019 ○ 2020 ○ 2021 ○ 2022 ◉ 2023

Institute

◉ APCC ○ BCC ○ BOM ○ CMCC ○ CWB ○ ECCC ○ HMC ○ KMA ○ METFR ○ MGO ○ NCEP ○ PNU ○ PNU-RDA ○ UKMO

Model

◉ SCOPS

Variable

☑ olr ☑ prec ☑ slp ☐ sst ☐ t2m ☐ t850 ☐ u200 ☐ u850 ☐ v200 ☐ v850 ☐ z500

Dataset ▾ Proc 1

- MME-3MON
- MME-6MON
- MME-MODEL
- High Resolution MME
- BSISO
- CMIP5
- ERA5
- NCEP Reanalysis

[실습]
- 자료 Type : Forecast
- 기관 : APCC
- Model : SCOPS
- 변수 : sst, t2m
- 자료 기간: 2023년 7월

자료 년도, 시즌 선택

Date 3

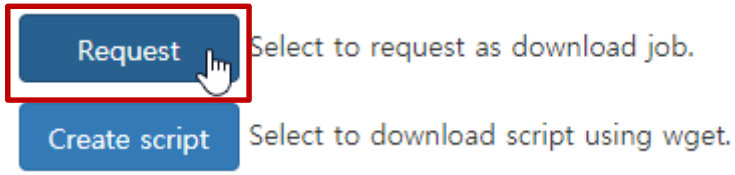
* If you want to get data of each year or season at once, select year or month heads.

	01	02	03	04	05	06	07	08	09	10	11	12
2017												☐
2018	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2019	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2020	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2021	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2022	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2023	☐	☐	☐	☐	☐	☐	☑					

APCC APEC CLIMATE CENTER

| MME Model – Download

4

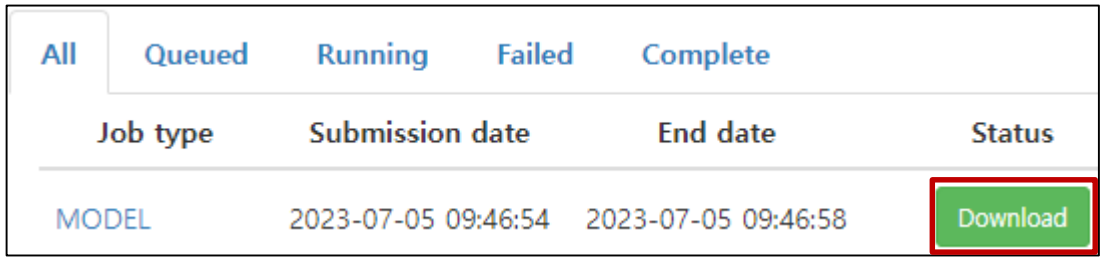


자료 요청 후 Job 생성

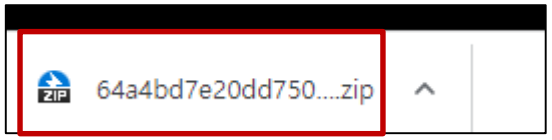
5

6

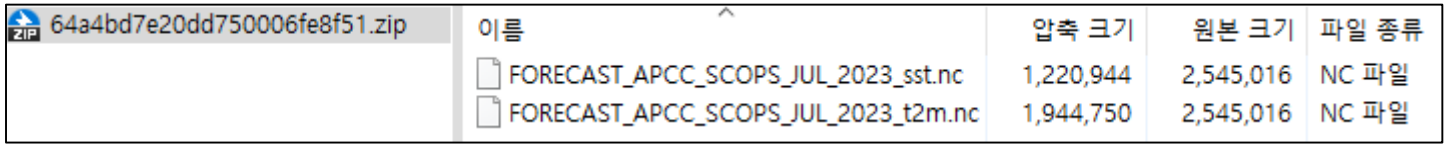
7



8



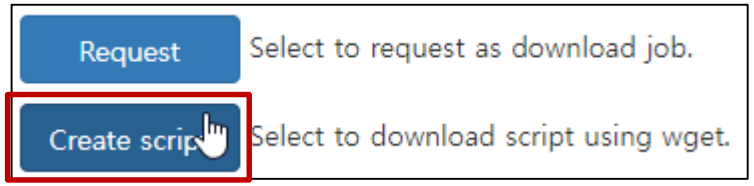
9



APCC
APEC CLIMATE CENTER

| MME Model – Script Download

Request와 같은 방법으로 옵션 선택 후 Script 요청



[실습]
- 자료 Type : Forecast
- 기관 : APCC
- Model : SCOPS
- 변수 : sst, t2m
- 자료 기간: 2023년 7월

```
# 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/JUL/2023/sst.nc -O FORECAST_APCC_SCOPS_JUL_2023_sst.nc
wget ${cookie_option} --user=${userid} --password=${password} ${certificate_option} https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/JUL/2023/t2m.nc -O FORECAST_APCC_SCOPS_JUL_2023_t2m.nc
```

아이디, 패스워드 설정

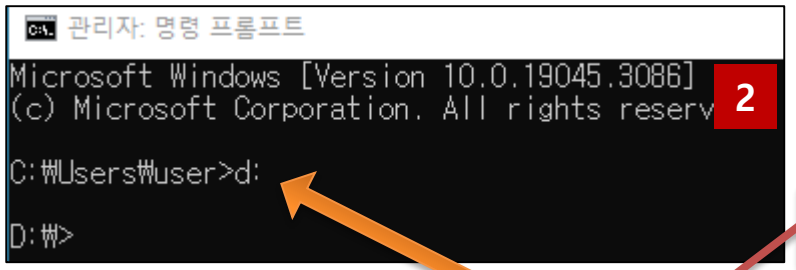
쿠키 저장 여부

다운로드 파일명 지정

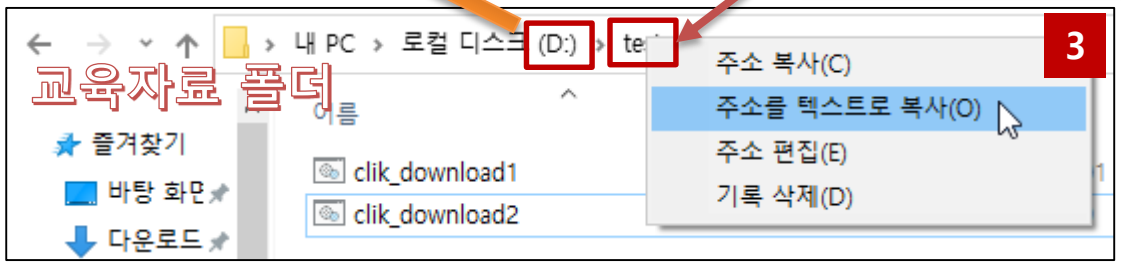
| MME Model – Script 실행

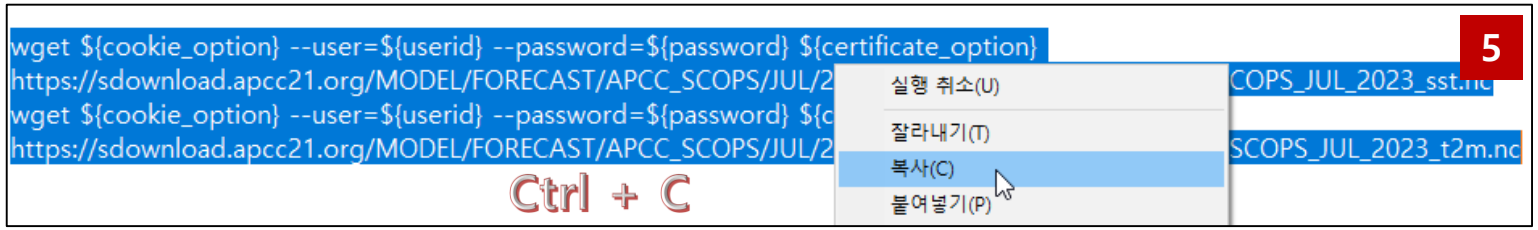
Windows의 경우 Windows Batch 파일 형식으로 편집 → 명령 프롬프트 (cmd) 에서 batch 실행

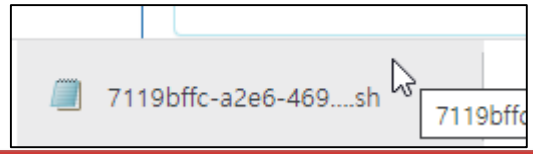
[실습]
- 자료 Type : Forecast
- 기관 : APCC
- Model : SCOPS
- 변수 : sst, t2m
- 자료 기간: 2023년 7월



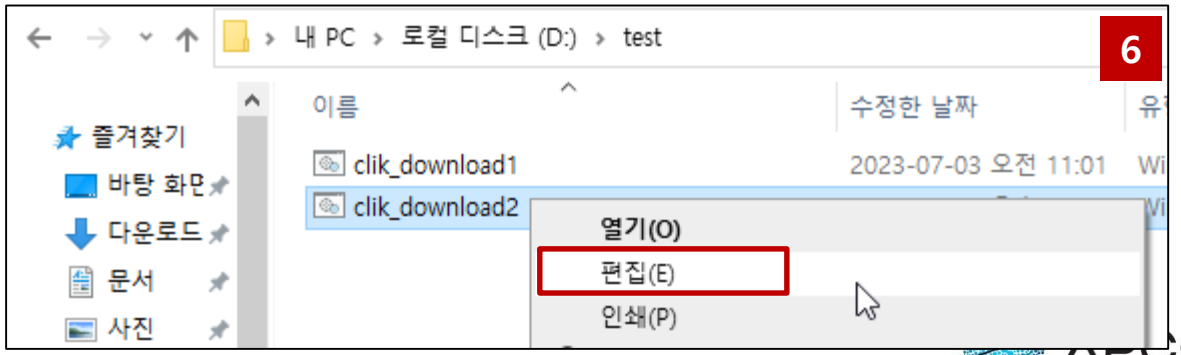
마우스 오른쪽 버튼







Download한 스크립트 파일



| MME Model – Script 실행

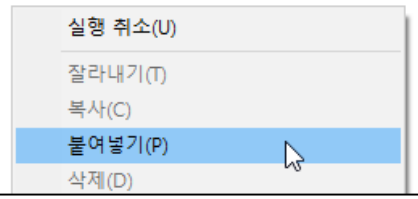
Windows의 경우 Windows Batch 파일 형식으로 편집 → 명령 프롬프트 (cmd) 에서 batch 실행

7

clik_download2 - Windows 메모장

파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)

```
@ECHO OFF

set userid=userid
set password=password
set cookie_path=apcc.cookies
set cookie_option=--save-cookies=%cookie_path% --load-cookies=%cookie_path% --keep-session-cookies
set certificate_option=--no-check-certificate
```



Ctrl + V

8

*clik_download2 - Windows 메모장

파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)

```
@ECHO OFF

set userid=userid
set password=password
set cookie_path=apcc.cookies
set cookie_option=--save-cookies=%cookie_path% --load-cookies=%cookie_path% --keep-session-cookies
set certificate_option=--no-check-certificate

wget %cookie_option% --user=%userid% --password=%password% %certificate_option%
https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/JUL/2023/sst.nc -O FORECAST_APCC_SCOPS_JUL_2023_sst.nc
wget %cookie_option% --user=%userid% --password=%password% %certificate_option%
https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/JUL/2023/t2m.nc -O FORECAST_APCC_SCOPS_JUL_2023_t2m.nc
```

9

관리자: 명령 프롬프트

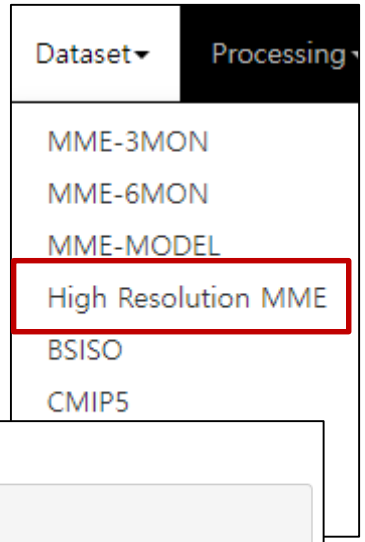
```
D:₩test>clik_download2.bat
SYSTEM_WGETRC = c:/progra~1/wget/etc/wgetrc
syswgetrc = C:₩Program Files (x86)₩GnuWin32/etc/wgetrc
Cannot open cookies file `apcc.cookies': No such file or directory
--2023-07-05 10:24:34--  https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/JUL/2023/sst.nc
Resolving sdownload.apcc21.org... 10.200.111.213
Connecting to sdownload.apcc21.org|10.200.111.213|:443... connected.
WARNING: cannot verify sdownload.apcc21.org's certificate, issued by `/CN=haproxyCA':
  Unable to locally verify the issuer's authority.
WARNING: certificate common name `haproxySSL' doesn't match requested host name `sdownload.apcc21.org'.
HTTP request sent, awaiting response... 401 Unauthorized
Reusing existing connection to sdownload.apcc21.org:443.
HTTP request sent, awaiting response... 200 OK
Length: 2545016 (2.4M) [application/x-netcdf]
Saving to: `FORECAST_APCC_SCOPS_JUL_2023_sst.nc'

100%[======================================>] 2,545,016   1.14M/s   in 2.1s

2023-07-05 10:24:36 (1.14 MB/s) - `FORECAST_APCC_SCOPS_JUL_2023_sst.nc' saved [2545016/2545016]

SYSTEM_WGETRC = c:/progra~1/wget/etc/wgetrc
syswgetrc = C:₩Program Files (x86)₩GnuWin32/etc/wgetrc
--2023-07-05 10:24:36--  https://sdownload.apcc21.org/MODEL/FORECAST/APCC_SCOPS/JUL/2023/t2m.nc
Resolving sdownload.apcc21.org... 10.200.111.213
Connecting to sdownload.apcc21.org|10.200.111.213|:443... connected.
ify sdownload.apcc21.org's certificate, issued by `/CN=haproxyCA':
 verify the issuer's authority.
e common name `haproxySSL' doesn't match requested host name `sdownload.apcc21.org'.
 awaiting response... 200 OK
.4M) [application/x-netcdf]
T_APCC_SCOPS_JUL_2023_t2m.nc'

==========>] 2,545,016   890K/s   in 2.8s

 (890 KB/s) - `FORECAST_APCC_SCOPS_JUL_2023_t2m.nc' saved [2545016/2545016]
```

APCC
APEC CLIMATE CENTER

| High Resolution MME – Overview

고해상도 MME, MME Model

- 1 x 1 (deg) 해상도 MME
- 기타 사항은 저해상도 MME와 거의 동일
- wget 다운로드 기능만 제공
  (다운로드 방법은 저해상도와 동일)



MME data download

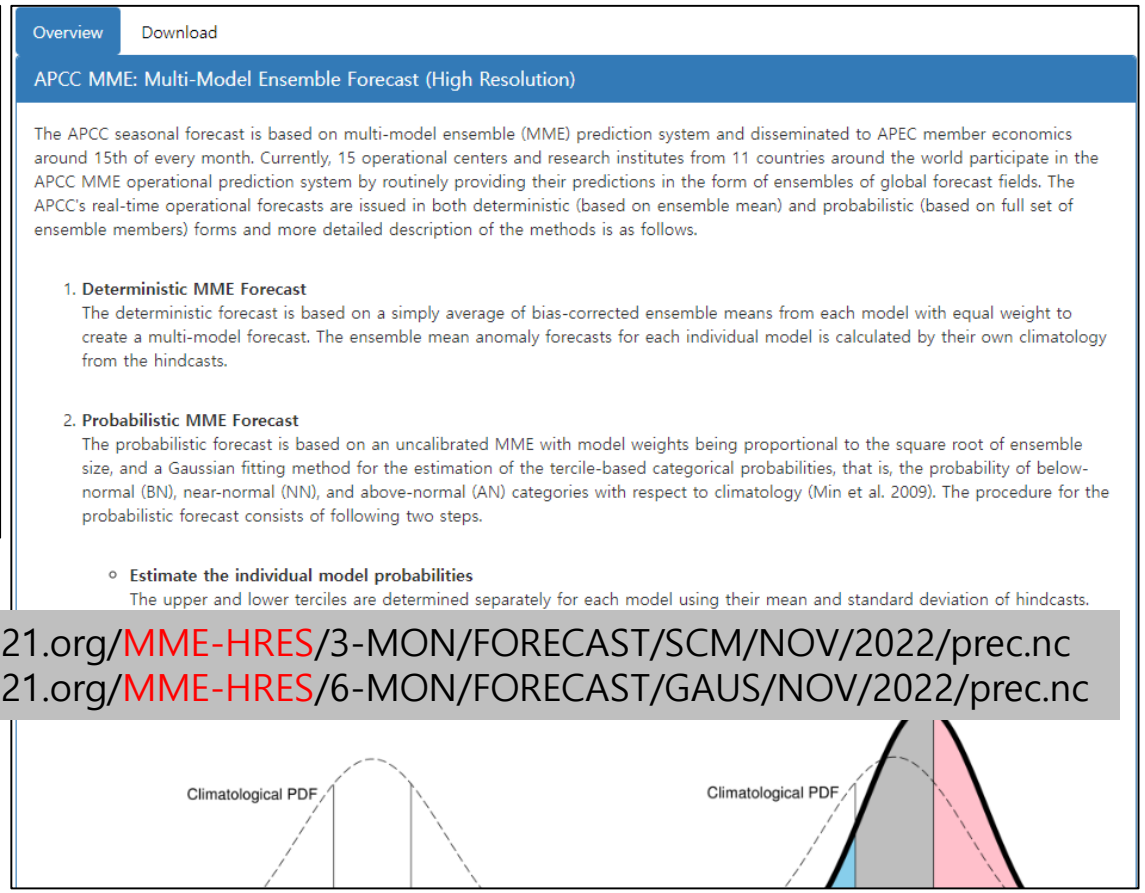
```
url: https://download.apcc21.org/MME-HRES/[leadMonth]/[type]/[method]/[month]/[year]/[file name]
             leadMonth: 3-MON, 6-MON
             type: FORECAST
             method: SCM, GAUS
             month: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
             year: 2022, 2021,...
             file name: [variable name].nc (prec.nc),
                        variable name : prec, slp, sst, t2m, t850, z500
```

wget https://download.apcc21.org/MME-HRES/3-MON/FORECAST/SCM/NOV/2022/prec.nc
wget https://download.apcc21.org/MME-HRES/6-MON/FORECAST/GAUS/NOV/2022/prec.nc

Model data download

```
url: https://sdownload.apcc21.org/MODEL-HRES/[type]/[model]/[month]/[year]/[file name]
             type: FORECAST, HINDCASTyyyy
             model: APCC_SCOPS, BCC_CSM1.1M, BOM_ACCESS-S2, CMCC_SPS3.5, CWB_TCWB1Tv1.1, ECCC_CANSIPSv2.1, HMC_SL-AV,
                    KMA_GLOSEA6GC3.2, METFR_SYS8, MGO_MGOAM-2, NASA_GEOS-S2S-2.1, NCEP_CFSv2, PNU-RDA_CGCMv2.0, UKMO_GLOSI
             month: JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
             year: FORECAST - 2022, 2021,...
                   HINDCAST - APCC(1983~2013),
                              ECCC(1980~2020),
                              NASA(1981~2016),
             file name: [variable name].nc (pre
             variable name : prec, slp, sst, t2m, t850, z500
```

wget --user=*userid* –password=*passwd* https://sdownload.apcc21.org/MODEL-HRES/FORECAST/APCC_SCOPS/NOV/2022/prec.nc
wget --user=*userid* –password=*passwd* https://sdownload.apcc21.org/MODEL-HRES/HINDCAST2022/METFR_SYS8/NOV/1993/sst.nc
wget --user=*userid* –password=*passwd* https://sdownload.apcc21.org/MODEL-HRES/HINDCAST2023/APCC_SCOPS/JAN/1983/prec.nc



| BSISO – Overview

여름철 계절내 진동 지수

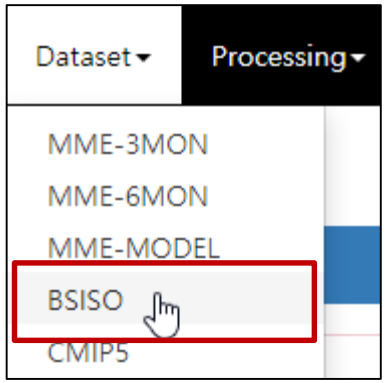
- Boreal Summer Intraseasonal Oscillation (BSISO)
- 5~10월 감시 및 예측정보 제공

감시정보

- Monitoring
- 5~10월 매일 제공

예측정보

- 세계기상기구 수치실험실무단의 협조를 받아 수치모델에 기반한 BSISO 예측정보 제공
- 4개 기관의 Model 예측정보 제공
- 모델 상세정보: www.apcc21.org/ser/bsisoModelDescription.do



Overview | Download

APCC BSISO (Boreal Summer Intraseasonal Oscillation) Index

The Boreal Summer Intraseasonal Oscillation (BSISO), one of the dominant phenomena over the Asian summer monsoon region, is characterized by northward/northeastward propagation over the Indian summer monsoon region and northward/northwestward propagation over the Western North Pacific-East Asian region, including equatorial eastward propagation.

The BSISO forecast activity has been initiated in 2013 with the goal of improving our ability to understand and forecast the BSISO based on numerical models in cooperation with the CAS/WCRP Working Group on Numerical Experimentation (WGNE) Madden Julian Oscillation (MJO) Task Force, and hosted at the APEC Climate Center (APCC).

The method to define the BSISO indices uses multivariate empirical orthogonal functions (MV-EOF) analysis of daily mean outgoing longwave radiation (OLR) and 850-hPa zonal wind (U850) anomalies over the Asian summer monsoon region (10S-40N, 40-160E) from 1 May to 31 October (Lee et al. 2013). The OLR and U850 anomalies are obtained by removing the slow annual cycle (mean and first three harmonics of climatological annual variation) as well as the effect of interannual variability by subtracting the running mean of the last 120 days as in Wheeler and Hendon (2004). The two anomaly fields are each normalized by their area averaged temporal standard deviation over the Asian summer monsoon region. After applying the MV-EOF on the normalized OLR and U850 anomalies, the first four MV-EOF modes are identified as important for representing the BSISO over the Asian summer monsoon region.

BSISO participating models

Table 1. Organization

Abbreviation for model	Center/Institution	Country	System name
BOM	Bureau of Meteorology	Australia	ACCESS-S2
CWB	Central Weather Bureau	Chinese Taipei	TCWB1T1.1
ECM	European Centre for Medium-Range Weather Forecasts	ECMWF council	ECMWF Ensemble Forecast
CFS	National Oceanic and Atmospheric Administration	United States of America	CFSv2
CFS	National Oceanic and Atmospheric Administration	United States of America	GFS

BSISO – Download (Forecast)

자료 Type 선택

Type 1
FORECAST MONITORING

기관 선택

Institute
BOM CWB ECMWF NCEP

Model 선택

Model
POAMA ACCESS-S1 ACCESS-S2

기간 선택

Date
Year: 2023 Month: 05 06

파일 선택

2
Download historical data

모델의 전체 자료 다운로드

ALL	Initial date	File (Ascii)
✓	20230601	20230601_BOMC_BSISO.20d.INDEX.LY
✓	20230602	20230602_BOMC_BSISO.20d.INDEX.LY
✓	20230603	20230603_BOMC_BSISO.20d.INDEX.LY
✓	20230603	20230603_BOMC_BSISO.20d.INDEX.LY
✓	20230604	20230604_BOMC_BSISO.20d.INDEX.LY
✓	20230605	20230605_BOMC_BSISO.20d.INDEX.LY

파일을 선택하여 직접 다운로드 가능

[실습]
- 자료 Type : Forecast
- 기관 : BOM
- Model : ACCESS-S2
- 자료 기간: 2023년 6월 자료 전체

Request Select to request as download job.
Create script Select to download script using wget.

자료 요청 후 Job 생성

3
Jobs
Job ID: 64a264a020dd750006fe8f41
Member

4
Processing My Jobs CLIK A

5
All Queued Running Failed Complete

Job type	Submission date	End date	Status
BSISO	2023-07-03 15:03:12	2023-07-03 15:03:19	Download

6
64a264a020dd750....zip

7
64a264a020dd750006fe8f41.zip

이름	압축 크기	원본 크기
FCST_BOM_ACCESS-S2_2023_20230601_BOMC_BSISO.20d.INDEX.LY	12,512	51,074
FCST_BOM_ACCESS-S2_2023_20230602_BOMC_BSISO.20d.INDEX.LY	12,477	51,074
FCST_BOM_ACCESS-S2_2023_20230603_BOMC_BSISO.20d.INDEX.LY	12,445	51,074
FCST_BOM_ACCESS-S2_2023_20230604_BOMC_BSISO.20d.INDEX.LY	12,382	51,074
FCST_BOM_ACCESS-S2_2023_20230605_BOMC_BSISO.20d.INDEX.LY	12,323	51,074
FCST_BOM_ACCESS-S2_2023_20230606_BOMC_BSISO.20d.INDEX.LY	12,317	51,074
FCST_BOM_ACCESS-S2_2023_20230607_BOMC_BSISO.20d.INDEX.LY	12,247	51,074
FCST_BOM_ACCESS-S2_2023_20230608_BOMC_BSISO.20d.INDEX.LY	12,327	51,074
FCST_BOM_ACCESS-S2_2023_20230609_BOMC_BSISO.20d.INDEX.LY	12,278	51,074

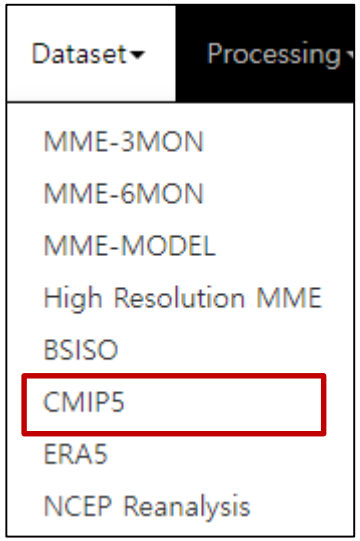
| Clipped CMIP5 – Overview

CMIP5

- Coupled Model Intercomparison Project
- 기후변화 시나리오

국가(주)별 분할

- 분할 별로 Code가 부여되어 있음
- 주 분할 국가: 미국, 캐나다, 러시아, 중국



Overview | Download

Clipped CMIP5 Data

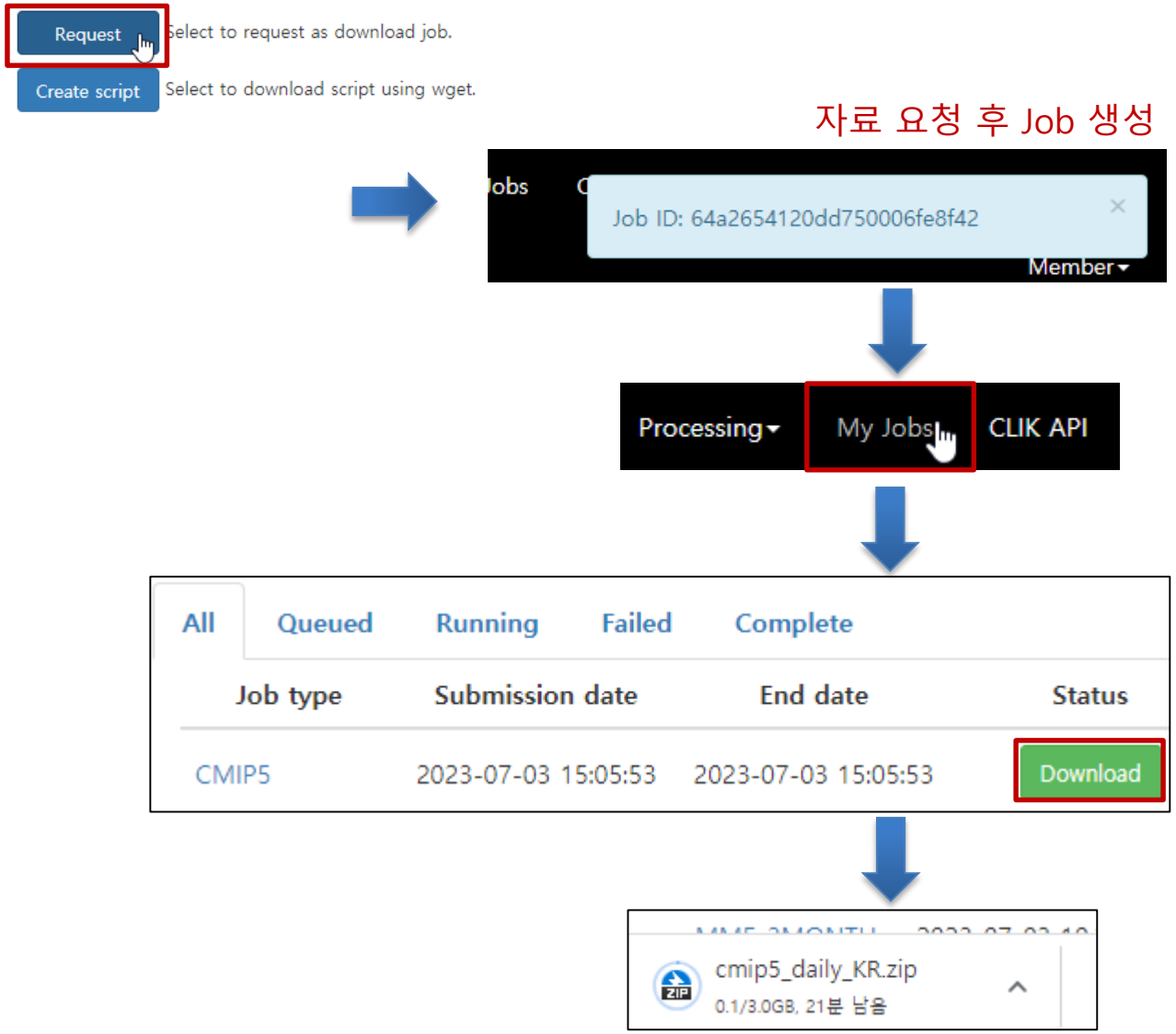
The climate change scenario data provided on this website was generated in a manner to ensure user convenience when carrying out climate change impact assessments in the field of application. The data was obtained through the Earth System Grid Federation (ESGF) data portal (https://esgf-node.llnl.gov/projects/cmip5/). This data was originally generated through phase five of the Coupled Model Intercomparison Project (CMIP5) and is a collection of coordinated global-scale multi-model data. Table 1 indicates the national-level data that is currently available. This national-level data was clipped from the aforementioned global-scale multi-model data using the NetCDF Operation (NCO) library.

Table 1. Available national-level data based on clipped CMIP5 climate change scenario data.

Name	Code	xmin	ymin	xmax	ymax
Afghanistan	AF	60.48	29.38	74.88	38.48
Aland	AX	19.29	59.83	21.13	60.66
Albania	AL	19.28	39.64	21.06	42.66
Algeria	DZ	-8.67	18.96	11.98	37.09
American Samoa	AS	-171.09	-14.38	-169.42	-11.05
Andorra	AD	1.42	42.44	1.78	42.66
Angola	AO	11.68	-18.04	24.08	-4.38
Anguilla	AI	-63.43	18.17	-62.93	18.61
Antarctica	AQ	0.00	-90.00	360.00	-60.00
Antigua and Barbuda	AG	-62.35	16.93	-61.66	17.73
Argentina	AR	-73.58	-55.06	-53.59	-21.78
Armenia	AM	43.45	38.83	46.63	41.30
Aruba	AW	-70.06	12.41	-69.87	12.63

Clipped CMIP5 – Download

CODE	NATION	NATION CODE	STATE	STATE CODE
SK	Slovakia	SK		
SI	Slovenia	SI		
SB	Solomon Islands	SB		
SO	Somalia	SO		
ZA	South Africa	ZA		
GS	South Georgia and the South Sandwich Isla	GS		
KR	South Korea	KR		
ES	Spain	ES		
LK	Sri Lanka	LK		
SD	Sudan	SD		
SR	Suriname	SR		
SJ	Svalbard and Jan Mayen	SJ		
SZ	Swaziland	SZ		



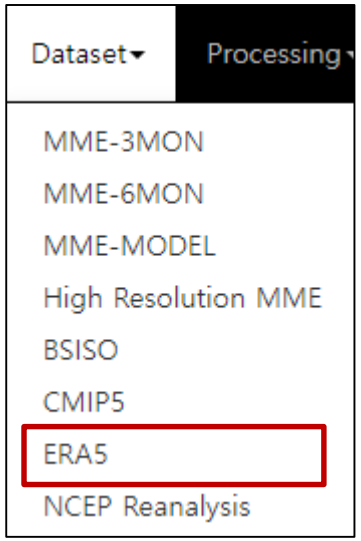
| ERA5 – Overview

ERA5

- The fifth generation of ECMWF reanalysis
- ERA-Interim 대체
- Copernicus 제공

제공 자료

- Multi-level (Pressure level) : Monthly, Daily (6-hourly)
- Single-level (Surface level): Monthly, Daily (6-hourly), Hourly



Overview | Download

ECMWF ERA5

Description

General Info

- ERA5 is the fifth generation of ECMWF reanalysis for the global climate and weather for the past 4 to 7 decades. Currently, data is available from 1979. The ERA5 reanalysis will be completed by 2020, by when the dataset will cover the period from 1950 to present. ERA5 replaces the ERA-Interim reanalysis.
- ERA5 was produced using 4D-Var data assimilation in CY41R2 of ECMWF's Integrated Forecast System (IFS), with 137 hybrid sigma/pressure levels in the vertical, with the top level at 0.01 hPa. ERA5 includes information about uncertainties for all variables at reduced spatial and temporal resolution.
- Data has been regridded to a regular lat-lon grid of 0.25 degrees for the reanalysis and 0.5 degrees for the uncertainty estimate (0.5 and 1 degree respectively for ocean waves). Vertical resolution is 37 pressure levels from surface to 1 hPa.

Data Contributors

- ECMWF

Related Resource

- Copernicus Climate Change Service Climate Data Store (CDS)

Data Details

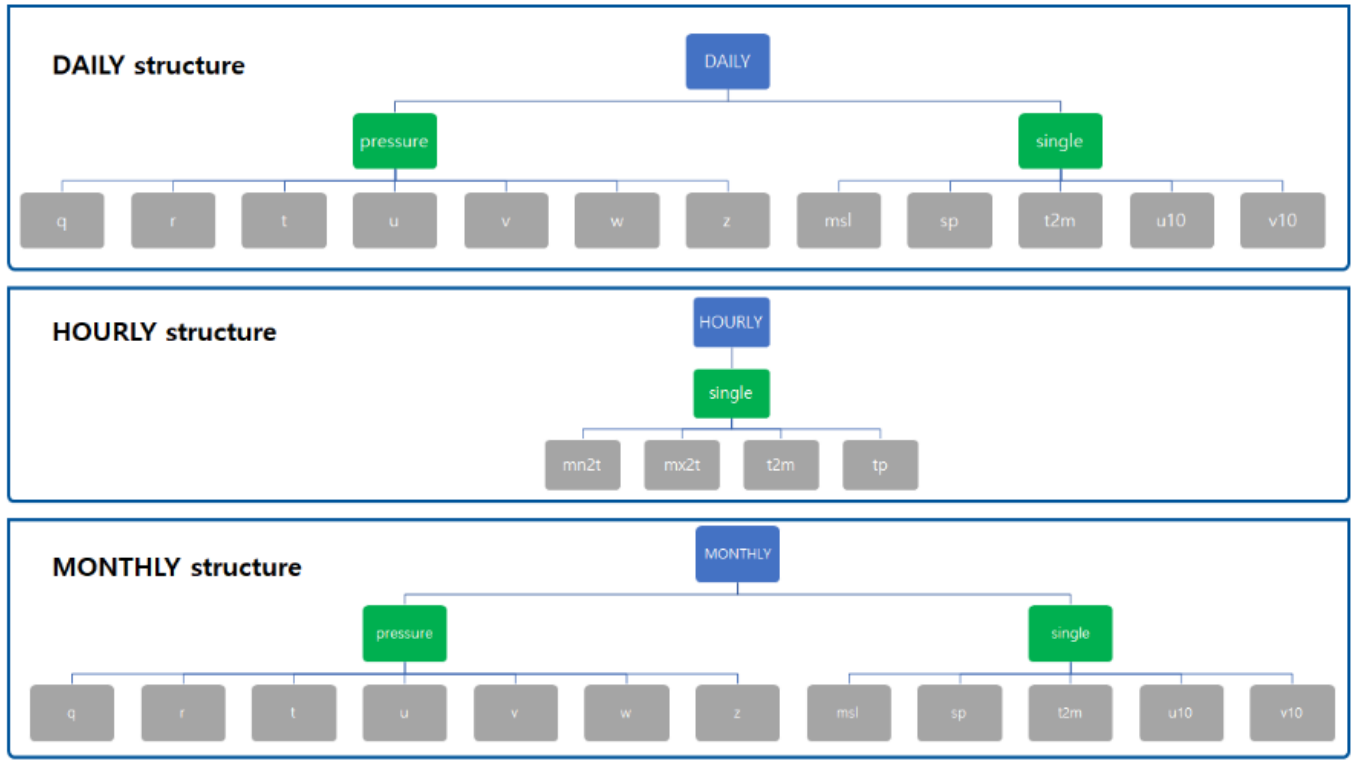
1. Daily

- **Pressure level**

Spatial resolution	0.25 X 0.25 (degree)

| ERA5 – Download

ERA5 자료 폴더 구조



Data structure | Wget download | CLIK API Download

```
url: https://download.apcc21.org/ERA5/[timestep]/[level]/[variable name]/[file name]
             timestep: DAILY, MONTHLY, HOURLY
             level: pressure, single
             file name: [variable name]_YYYYMM.nc (DAILY, HOURLY),
                        [variable name]_YYYY.nc   (MONTHLY)
```

Sample:

```
wget https://download.apcc21.org/ERA5/DAILY/pressure/r/r_202012.nc
wget https://download.apcc21.org/ERA5/DAILY/single/t2m/t2m_202012.nc
wget https://download.apcc21.org/ERA5/HOURLY/single/tp/tp_202012.nc
wget https://download.apcc21.org/ERA5/MONTHLY/pressure/u/u_2021.nc
wget https://download.apcc21.org/ERA5/MONTHLY/single/sp/sp_2021.nc
```

Timestep	파일명 형식
DAILY	*variable_yyyymm.nc*
HOURLY	*variable_yyyymm.nc*
MONTHLY	*variable_yyyy.nc*

[실습]

- 자료 : ERA5
- Timestep : Monthly
- Level : surface
- Variable : t2m
- 기간 : 2023년

wget (--no-check-certificate) https://download.apcc21.org/*ERA5*/*timestep*/*level*/*variable*/*filename*

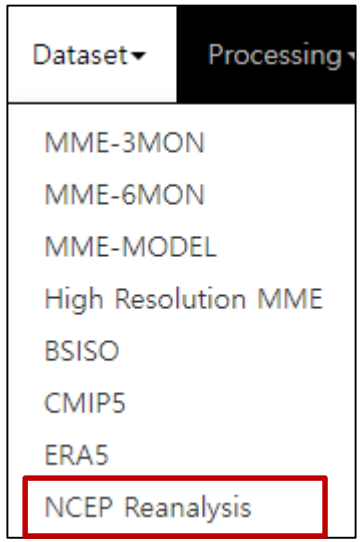
| NCEP Reanalysis – Overview

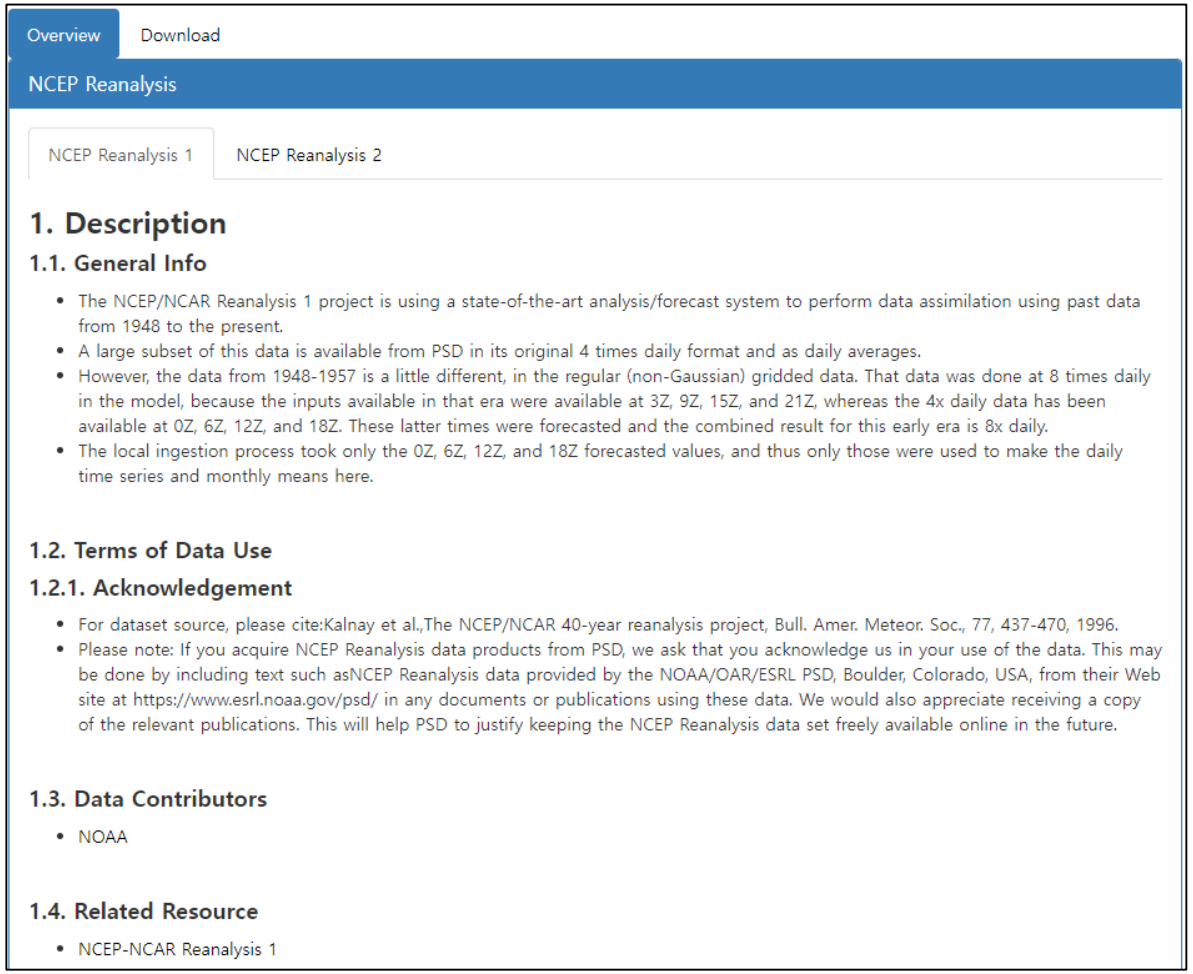
NCEP Reanalysis 1

- NCEP/NCAR Reanalysis 1
- NOAA Physical Sciences Laboratory 제공
- 제공 level: 17 Pressure level, 28 Sigma level, Surface level 등
- Timestep: Daily, Monthly

NCEP Reanalysis 2

- NCEP/DOE Reanalysis II
- NOAA Physical Sciences Laboratory 제공
- 제공 level: Pressure level, Sigma level, Single level등
- Timestep: Daily, Monthly





| NCEP Reanalysis 1 – Download

[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
```

[NCEP Reanalysis 1] MONTHLY

```
url: https://download.apcc21.org/NCEP1/[timestep]/[level]/[file name]
            timestep: MONTHLY
            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, sl
            file name: [variable name].mon.mean.nc
```

Sample:

```
wget https://download.apcc21.org/NCEP1/MONTHLY/other_gauss/dswrf.ntat.mon.mean.nc
wget https://download.apcc21.org/NCEP1/MONTHLY/pressure/air.mon.mean.nc
wget https://download.apcc21.org/NCEP1/MONTHLY/surface/pres.sfc.mon.mean.nc
wget https://download.apcc21.org/NCEP1/MONTHLY/surface_gauss/air.2m.mon.mean.nc
```

Timestep	파일명 형식
DAILY	*Variable.yyyy.nc (pressure, surface)* *Variable.gauss.yyyy.nc (other_gauss, surface gauss)*
MONTHLY	*Variable.mon.mean.nc*

[실습]
- 자료 : NCEP1
- Timestep : Monthly
- Level : surface
- Variable : slp

wget (--no-check-certificate) https://download.apcc21.org/*NCEP1*/*DAILY*/*level*/*variable*/*filename*
wget (--no-check-certificate) https://download.apcc21.org/*NCEP1*/*MONTHLY*/*level*/*filename*

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| NCEP2 Reanalysis 2 – Download

[NCEP Reanalysis 2] DAILY

```
url: https://download.apcc21.org/NCEP2/[timestep]/[level]/[variable name]/[file name]
             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, sh
                            pressure      -> air, hgt, omega, rhum, uwnd, vwnd
                            surface       -> mslp, pres.sfc
             file name: [variable name].gauss.YYYY.nc (gaussian_grid),
                        [variable name].YYYY.nc   (pressure, surface)
```

Sample:

```
wget https://download.apcc21.org/NCEP2/DAILY/gaussian_grid/air.2m/air.2m.gauss.2022.nc
wget https://download.apcc21.org/NCEP2/DAILY/pressure/air/air.2022.nc
wget https://download.apcc21.org/NCEP2/DAILY/surface/pres.sfc/pres.sfc.2022.nc
```

[NCEP Reanalysis 2] MONTHLY

```
url: https://download.apcc21.org/NCEP2/[timestep]/[level]/[file name]
             timestep: MONTHLY
             level: gaussian_grid, pressure, surface
             variable name: gaussian_grid -> air.2m, dlwrf.sfc, dswrf.ntat, dswrf.sfc, lhtfl.sfc, prate.sfc, pres.sfc, sh
                            pressure      -> air, hgt, omega, rhum, uwnd, vwnd
                            surface       -> mslp, pres.sfc
             file name: [variable name].mon.mean.nc
```

Sample:

```
wget https://download.apcc21.org/NCEP2/MONTHLY/gaussian_grid/air.2m.mon.mean.nc
wget https://download.apcc21.org/NCEP2/MONTHLY/pressure/air.mon.mean.nc
wget https://download.apcc21.org/NCEP2/MONTHLY/surface/pres.sfc.mon.mean.nc
```

Timestep	파일명 형식
DAILY	*Variable.yyyy.nc (pressure, surface)* *Variable.gauss.yyyy.nc (gaussian_grid)*
MONTHLY	*Variable.mon.mean.nc*

[실습]
- 자료 : NCEP2
- Timestep : Monthly
- Level : surface
- Variable : mslp

wget (--no-check-certificate) https://download.apcc21.org/*NCEP2*/*DAILY*/*level*/*variable*/*filename*
wget (--no-check-certificate) https://download.apcc21.org/*NCEP2*/*MONTHLY*/*level*/*filename*

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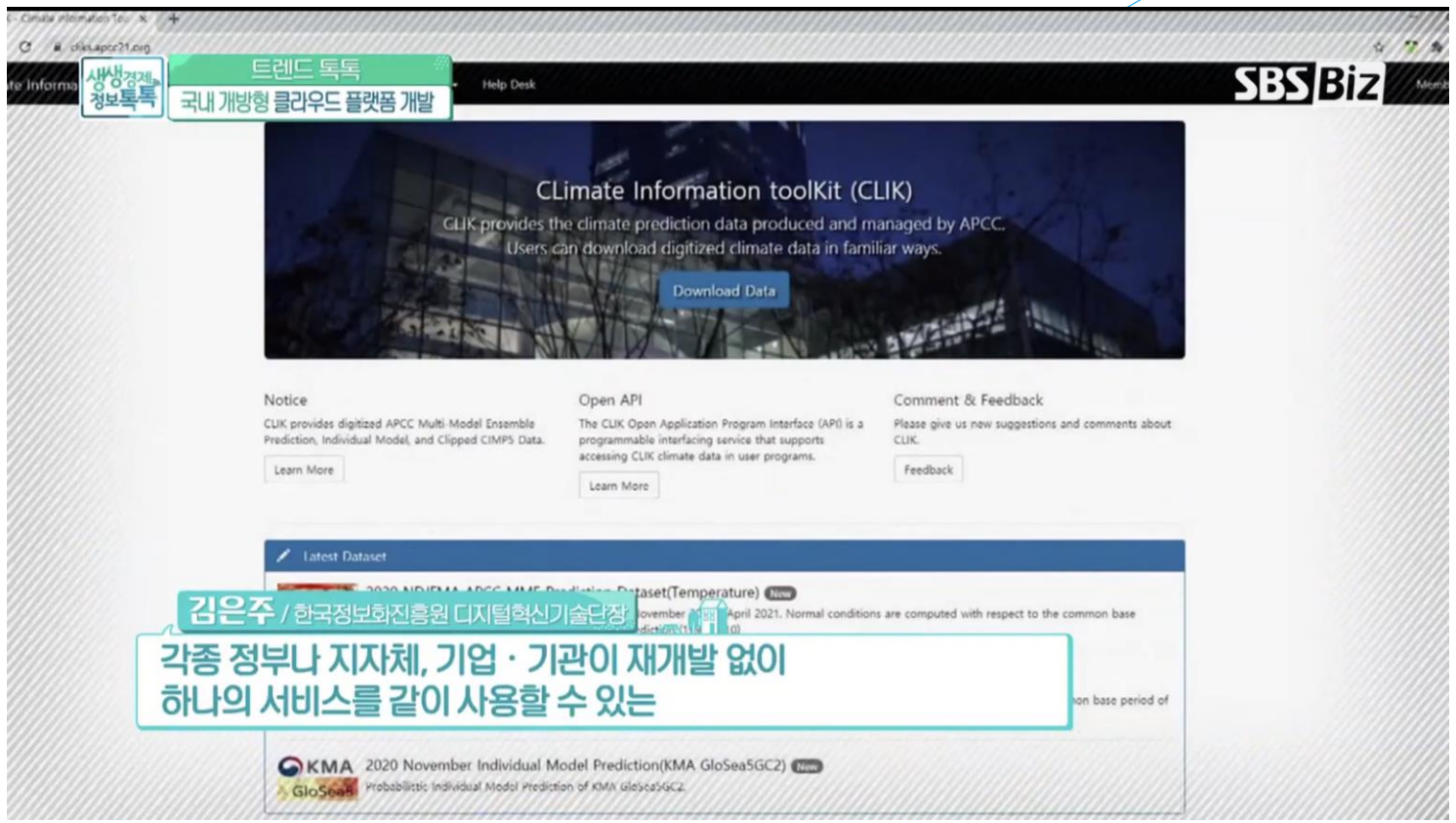
Thank You !!



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