



2021 APCC 기후정보서비스 사용자 워크숍

APCC 기후서비스 플랫폼 소개 및 활용

예측운영과

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학습목표

APCC 기후서비스 플랫폼을 이해하고 회원 가입을 통한 플랫폼 서비스 사용 준비 완료

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| 플랫폼

플랫폼 정의

| 응용프로그램(Application) 혹은 서비스(Service)를 실행하는데 사용되는 하드웨어 및 소프트웨어 환경



| 기후서비스

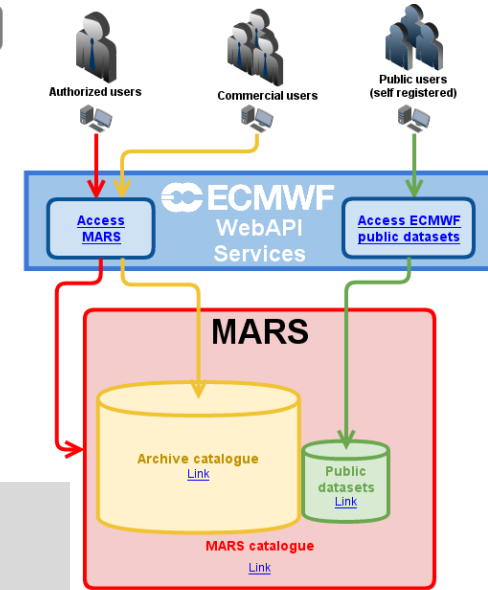
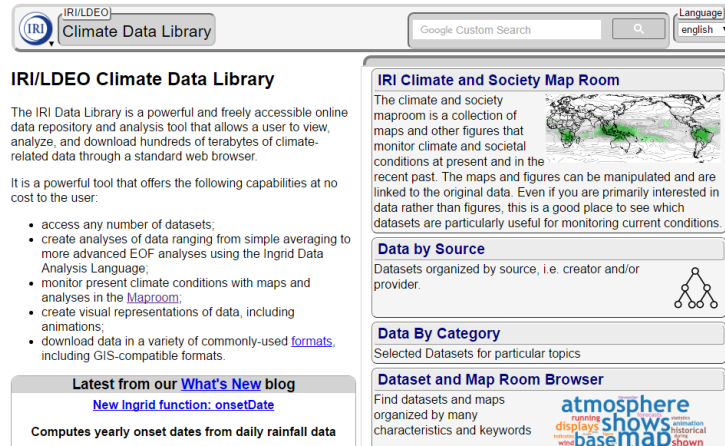
기후서비스 정의

| 개인 혹은 기관의 의사결정을 도와주기 위한 기후정보의 제공

| 기후서비스 플랫폼

기후서비스 플랫폼 정의

| 기후서비스(Climate Service)를 실행하는데 사용되는 하드웨어 및 소프트웨어 환경



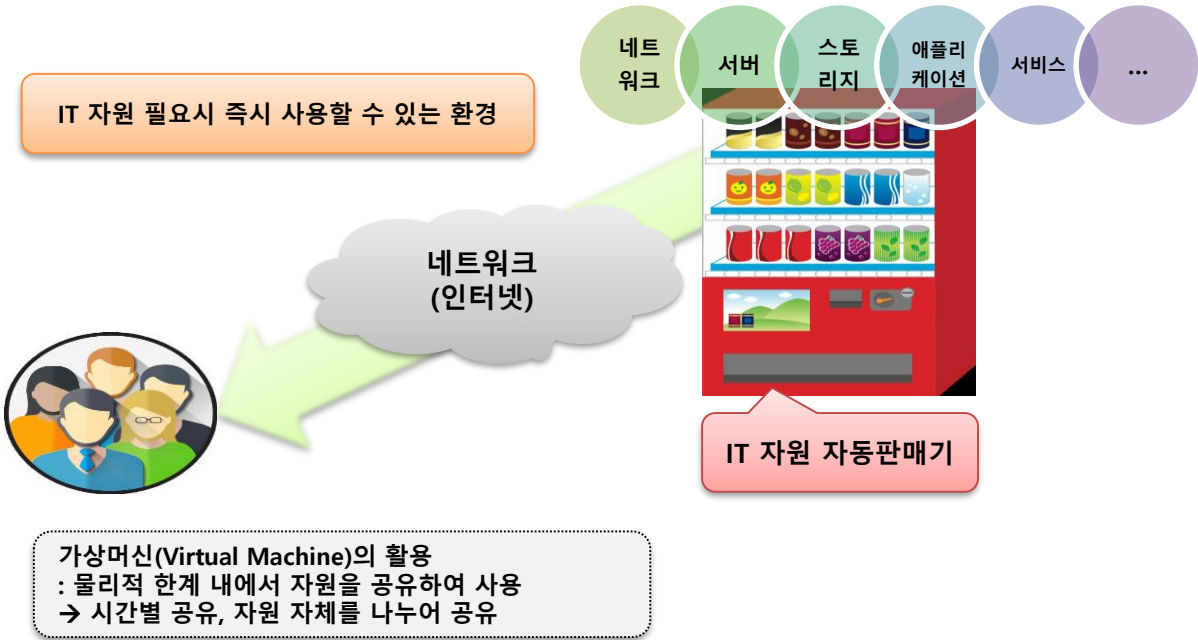
기후서비스 개발 과정부터 기능 재사용 고려 필요
 라이브러리 및 모듈의 재사용 → 생태계 구축
서비스간의 mesh up을 위한 효과적이고 일관된 방법 필요
 기후예측, 수자원, 농업, 보건
개발생산성 향상을 위한 정형화된 가이드라인 필요
 집약 시스템(Monolithic system)의 한계 극복 필요

Climate services provide climate information in a way that assists decision making by individuals and organizations. Such services require appropriate engagement along with an effective access mechanism and must respond to user needs.

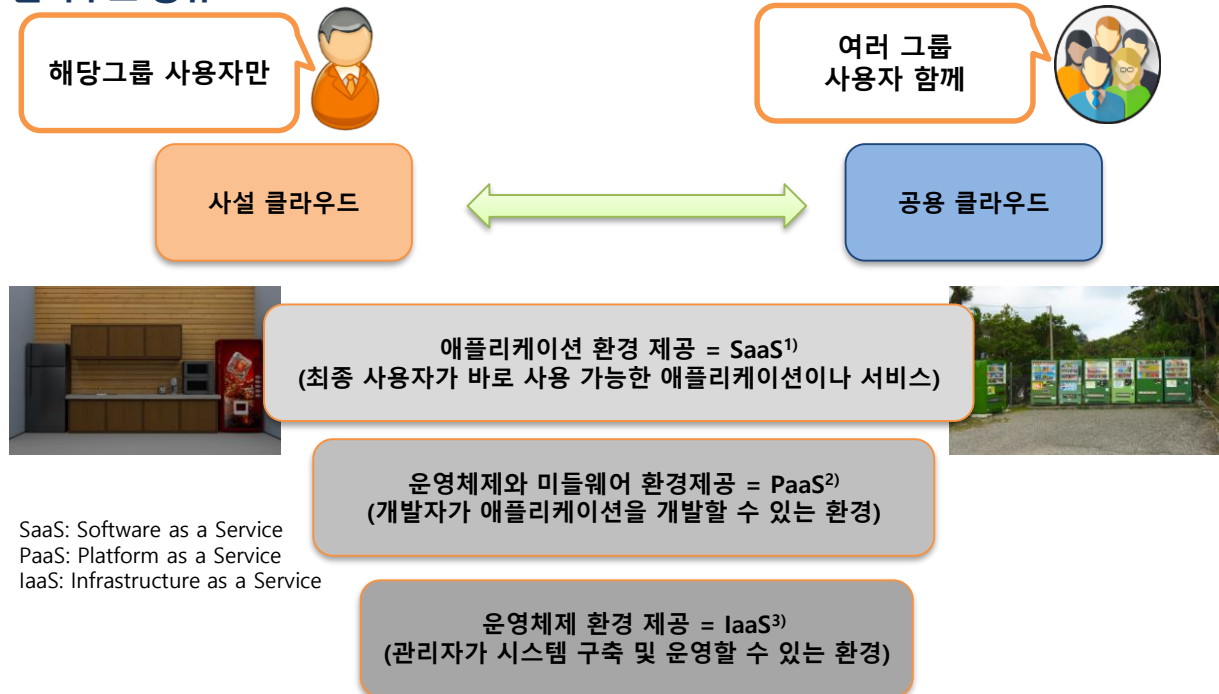
Such services involve high-quality data from national and international databases on temperature, rainfall, wind, soil moisture and ocean conditions, as well as maps, risk and vulnerability analyses, assessments, and long-term projections and scenarios. Depending on the user's needs, these data and information products may be combined with non-meteorological data, such as agricultural production, health trends, population distributions in high-risk areas, road and infrastructure maps for the delivery of goods, and other socio-economic variables.

https://www.wmo.int/gfcs/what_are_climate_weather_services

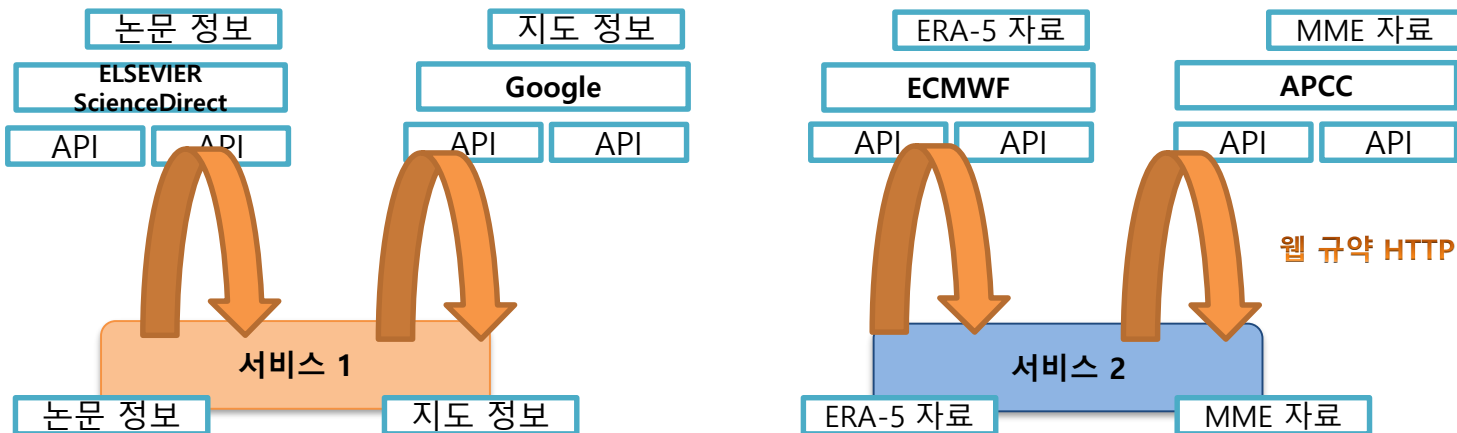
| 클라우드 컴퓨팅



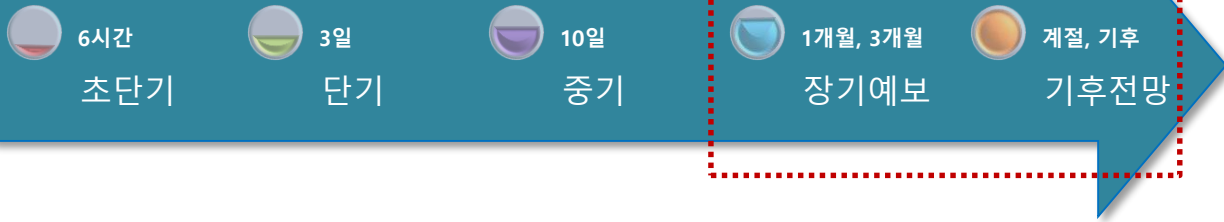
| 클라우드 종류



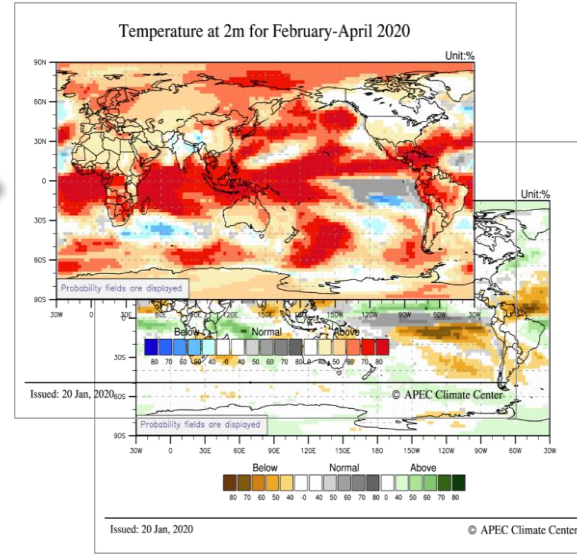
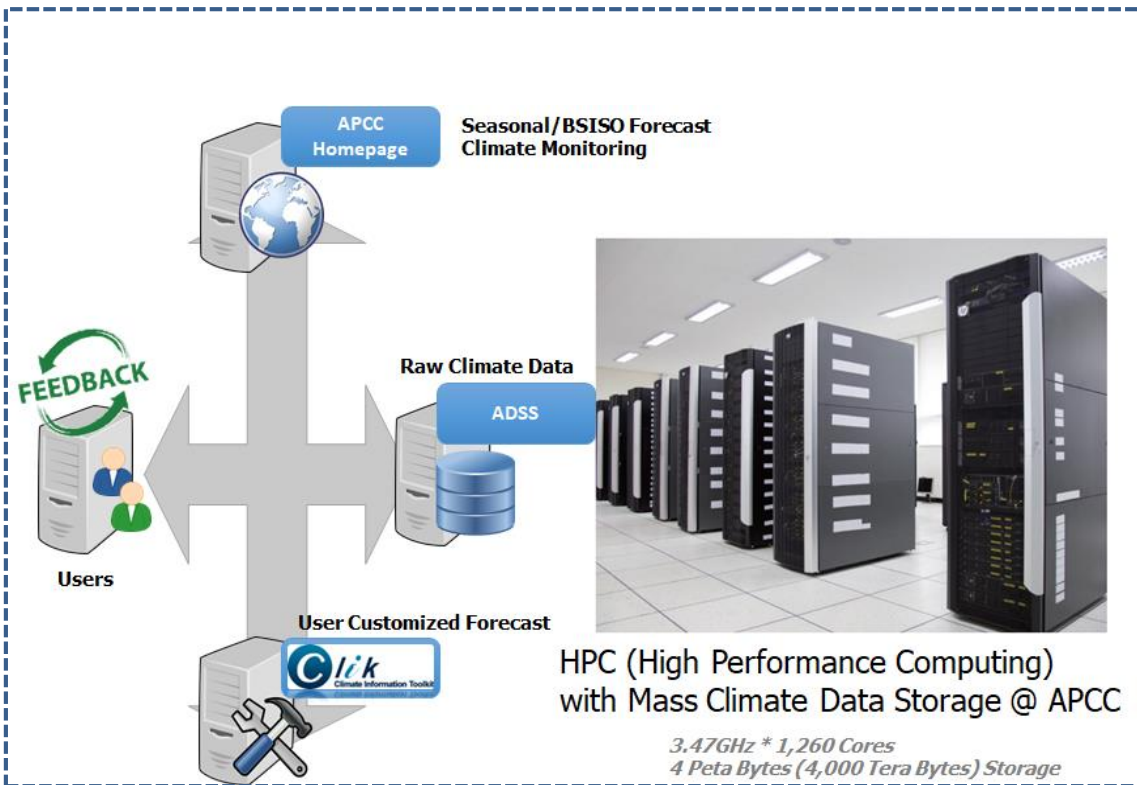
| API (Application Programming Interface, 응용 프로그래밍 인터페이스)



| APCC 기후예측



| APCC 기후정보 시스템 구조



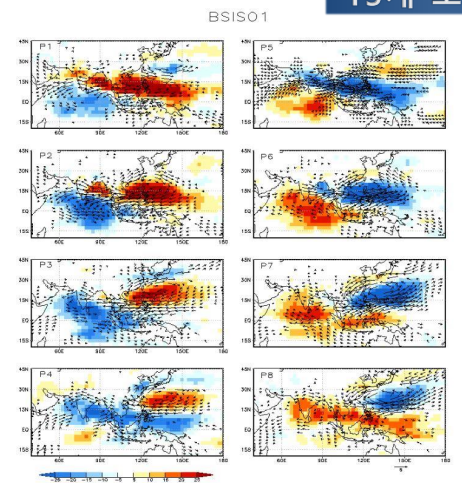
각 국의 고비용 기후예측정보들의 실시간 수집, 분석

다중모델앙상블 (Multi-Model Ensemble) 기법 활용하여 기후예측정보 생산

아태지역 이상기후 대응을 위한 기후예측정보 공유 및 생산 서비스

다양한 모델 결과의 통합, 재해석을 통한 예측성능 개선 및 불확실성 진단

예측정보 개선 및 활용성 강화를 위한 연구개발 및 온라인 서비스



| APCC 기후정보서비스 (기후정보 제공)

APCC에서 생산/수집/가공된 기후자료를 사용자가 보다 효과적으로 활용할 수 있도록 다양한 기후정보서비스를 운영 중

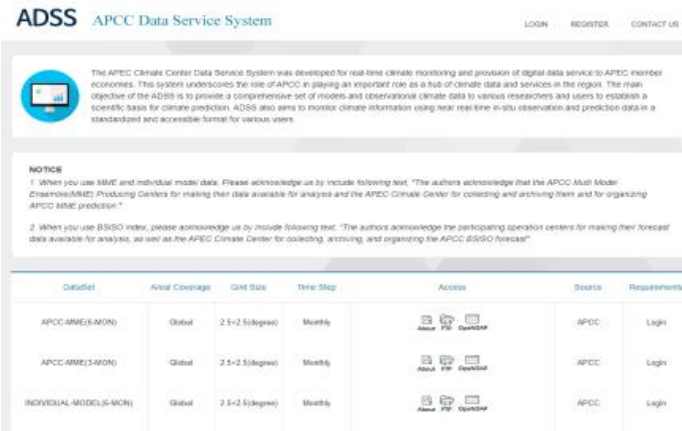


<http://www.apcc21.org>

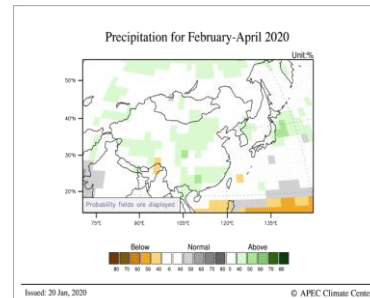
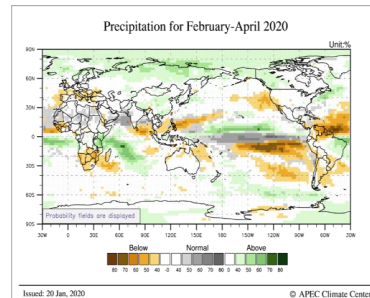
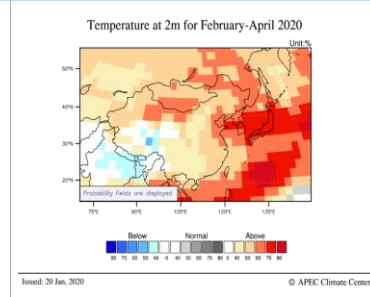
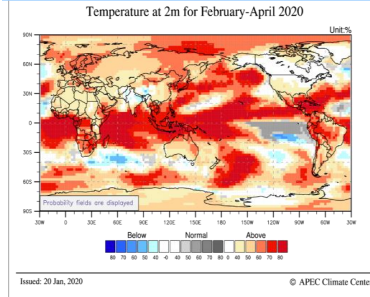
CLIMATE INFORMATION SERVICES



기후예측정보 제공: 홈페이지



기후예측자료 제공: ADSS



3개월, 6개월 기후예측

BSISO1

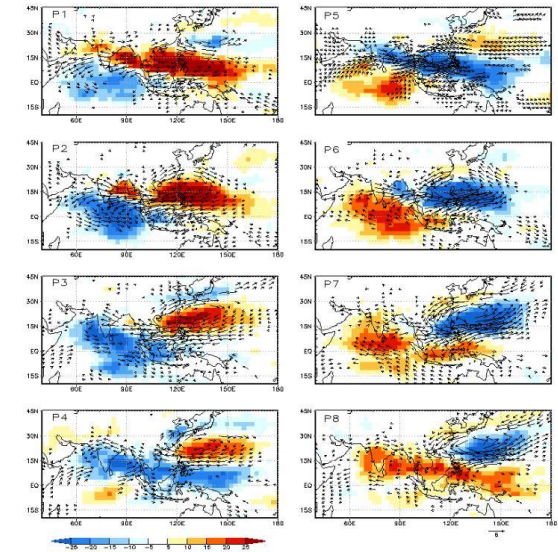


그림 1. BSISO1의 8가지 위상에 따른 상향장파복사와 850hPa 바람 편향의 재구성장

하계기간 내 아시아지역 기후변동 예측

ADSS (APCC Data Service System)

<http://adss.apcc21.org>

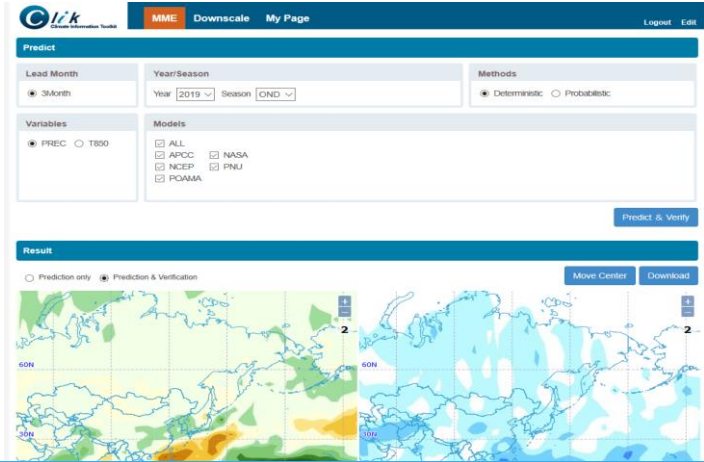
| APCC에서 생산/수집/가공된 기후정보를 디지털 형식으로 다운로드 받을 수 있습니다.

| Web FTP, OPeNDAP을 이용한 다운로드

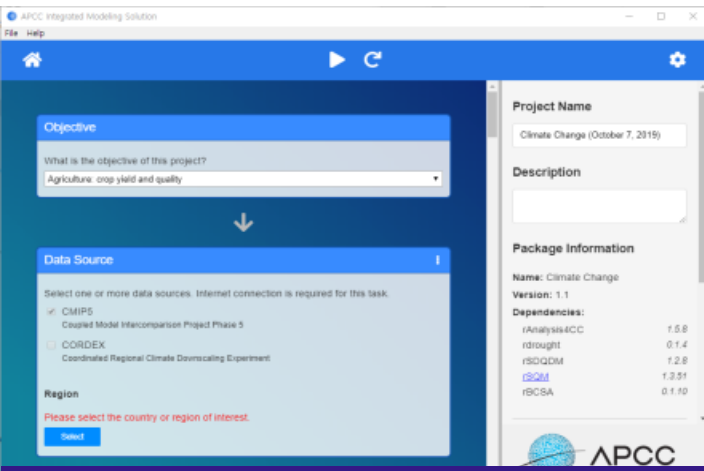
| 2020년 12월까지 운영 후 서비스 업데이트 종료 / 2021년 6월 Server Shutdown

| 플랫폼 기반 기후자료서비스로 대체

| APCC 기후정보서비스 (기후정보 생산/제공)



기후예측정보 생산 제공: CLIK

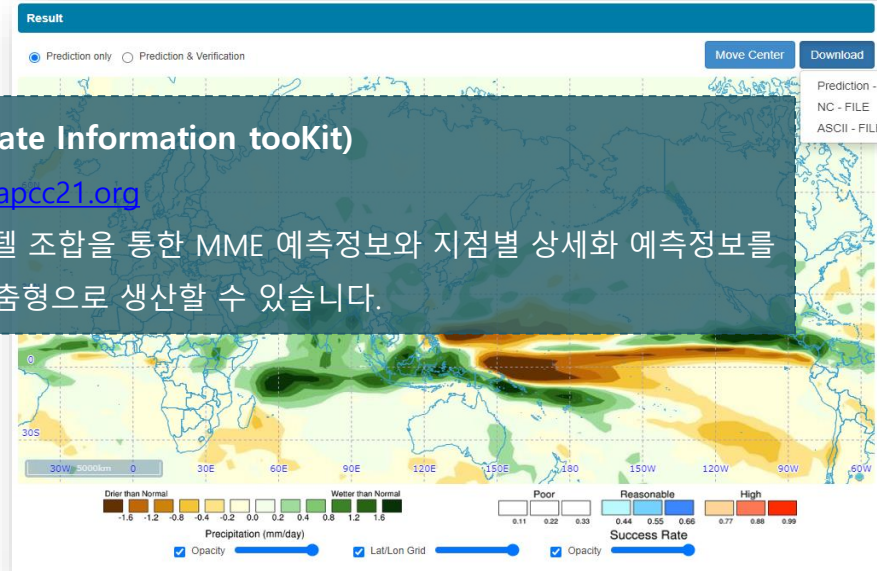


통계적 상세화 정보 제공: AIMS

CLIK (Climate Information tooKit)

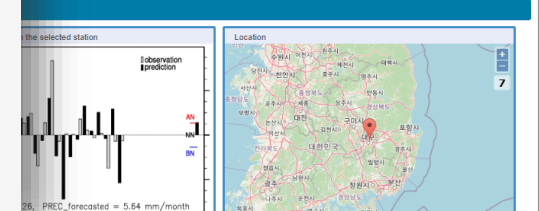
<http://clik.apcc21.org>

| 다양한 모델 조합을 통한 MME 예측정보와 지점별 상세화 예측정보를 사용자 맞춤형으로 생산할 수 있습니다.



Job Description	test
PREDICTOR	
TRAINING PERIOD	1983 - 2007
VARIABLE	SST
MODELS	APCC MSC NASA NCEP FNU POAMA
REGION	Lat: -25 ~ 15 Lon: 180 ~ 300
	5%
	0.3

Name	Data period for PREC	Data period for TEMP	Correlation
Daegu	1973/1 ~ 2006/5	1973/1 ~ 2006/12	0.257583



AIMS (APCC Integrated Modeling Solution)

<http://aims.apcc21.org>

Variogram of Precipitation

| 계절예측 및 기후변화 시나리오에 대한 통계적 상세화/평가 정보를 생산할 수 있습니다.

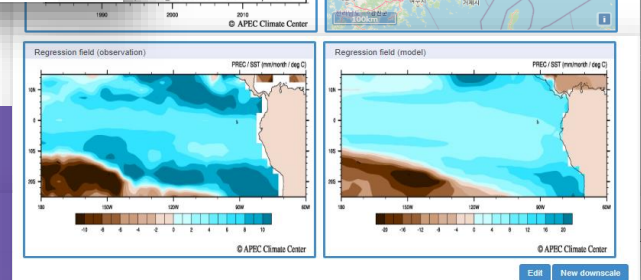
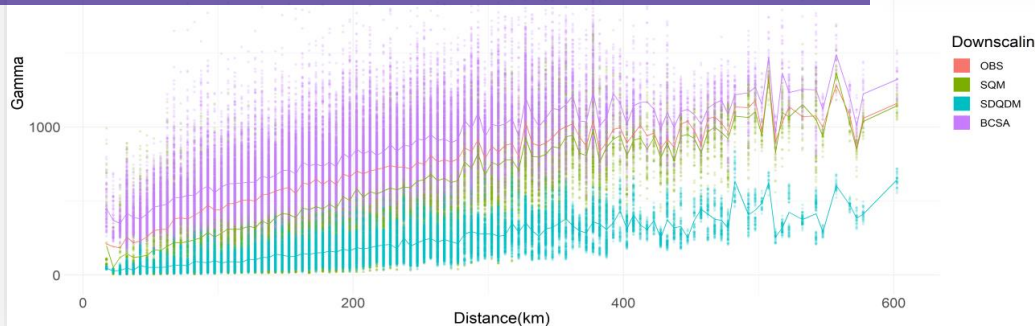


Table of rcp45	SQM S1	SDQDM S1	BCSA S1	SQM S2	SDQDM S2	BCSA S2	SQM S3	SDQDM S3	BCSA S3
Summary	Min: 15.3	-17.88	10.76	30.2	-47.96	-1.06	18.77	-40.12	8.24
	1st Qu: 48.06	8.44	33.33	62.83	-1.06	44.06	75.31	-6.94	43.76
	Median: 69.36	14.82	60.18	93.7	16.7	66.06	110.2	7.79	60.26
	Mean: 75.91	19.23	54.56	101.15	12.12	70.16	116.48	8.27	77.29
	3rd Qu: 89.34	34.09	71.73	115.16	30.95	89.12	150.3	19.04	106.41
	Max: 189.3	66.47	149.44	230.28	48.84	241.17	249.38	82.03	189.42

Table of rcp85	SQM S1	SDQDM S1	BCSA S1	SQM S2	SDQDM S2	BCSA S2	SQM S3	SDQDM S3	BCSA S3
Summary	Min: -14.88	-14	-26.61	0.76	-21.56	-19.17	13.9	-31.09	-6.09
	1st Qu: 26.66	0.42	20.13	65.96	0.88	38.48	107.69	19.68	76.04
	Median: 64.53	19.73	43.96	107.66	16.32	60.96	166.02	39.79	106.86
	Mean: 66.07	18.59	46.51	116.0	11.6	59.89	180.01	46.26	123.34
	3rd Qu: 97.45	34.22	66.54	159.32	41.45	112.96	247.57	73.26	145.93
	Max: 176.88	62.46	123.84	310.08	70.78	238.7	324.74	131.92	379.14

| APCC 기후정보서비스 (기후정보 처리/제공)

Objectives
Climate and climate application data not only have numerous file formats, but also require enormous time and resources to process. Researcher and policy makers need user-friendly file formats and data extraction services to conveniently utilize climate data. The average user tends to have difficulty dealing with climate data because a single climate data set includes time information, geographical information, and various factor values. Due to these various factors, expertise in data extraction is required. Therefore, the APCC Climate Center (APCC) Climate Information in Application Team has developed the Climate Information Processing System (CLIPs), which enables the average user to conveniently extract the specific data necessary for their research.

Results
APCC CLIPs provides functions that empower researchers that are unfamiliar with processing mass data, to effortlessly extract necessary data for specific regions including climate index and time-scale information. This service helps researchers reduce time spent on data processing and renders it unnecessary to budget for high-end hardware and software. This service is expected to be widely used in Korea as well as developing countries that lack appropriate IT infrastructures.

Material
1.49 million climate change scenarios, climate forecast MVD data, climate change scenarios, NOAA station observation data and JAXA satellite data all from 1980 to 2025, are collected and available on CLIPs. The collected data were formatted with NetCDF, CSV, HDF, TXT, and various different formats relative to the characteristics of each dataset and institution.
To provide standardized data, all the data are reformatted with NetCDF (widely used in climate research) and the numerous attributes and units of the data have been converted into standardized units. Additionally, the team has built the database with the extracted temperature, precipitation, wind data and global climate factors.
In order to process large amounts of climate data, the system has two distinct functions, CLIST (Climate data Standardization Toolset) and CLIPs (Climate Information Processing system) that collect and standardize data, then makes the data available to users. CLIST transforms various file formats into standardized file formats while CLIPs enables users to search for specific locations or values with the installed application on their PCs. Then the combination of these two systems conveys the search results to the users. Finally, for those users residing in those place that lack high speed internet infrastructure, APCC has applied compression technology to CLIPs so that they can easily access this service.

CLIPs (Climate Information Processing System)

<http://clips.apcc21.org>

| 사용자가 설정한 지역, 변수, 기간에 대해 필요한 자료만 추출할 수 있습니다.

CLIPs Server Desktop(Only CLIPs files allowed)

Coordinate
 51.0000
 115.0000 Global 145.0000
 23.0000

Data Information
 Dataset: CMIP5-DAILY
 Model: RCP85
 Time Period: Daily
 Start Date: 2000-01-01 09:00:00
 End Date: 2205-11-13 09:00:00
 Parameter: lat_bnds, lat_bounds, lon_bnds, lon_bounds, ...

Format Conversion
 Output File: NetCDF

Parameters Select Parameters
 All
 latbnds latbounds lonbnds lonbounds pr
 rhs rsds sfcWind tasmax tasmin
 timebnds

- Select an area by dragging mouse.
 - Resize or move the selected area.

변수, 지역 추출 자료 제공: CLIPs

OpenWPS

WHAT WPS SERVICES TUTORIAL APPLICATION

What is OpenWPS ?
 OpenWPS is a climate-data-specific service using OGC (Open geospatial consortium) WPS (web processing service) that is an international standard in spatial information field. Users can use OpenWPS using three operations that are GetCapabilities, DescribeProcess, and Execute on any environment (e.g. graphical user interface program, server system, web service, etc.) more easily and conveniently.

WPS Services
 You point your WPS client to <http://openwps.apcc21.org/ncp>
 sources: NetCDF, CSV, HDF, TXT, ...
 OpenWPS.CV_VisualizeNonSeries
 returns map-based plot image based on the inputs Doc

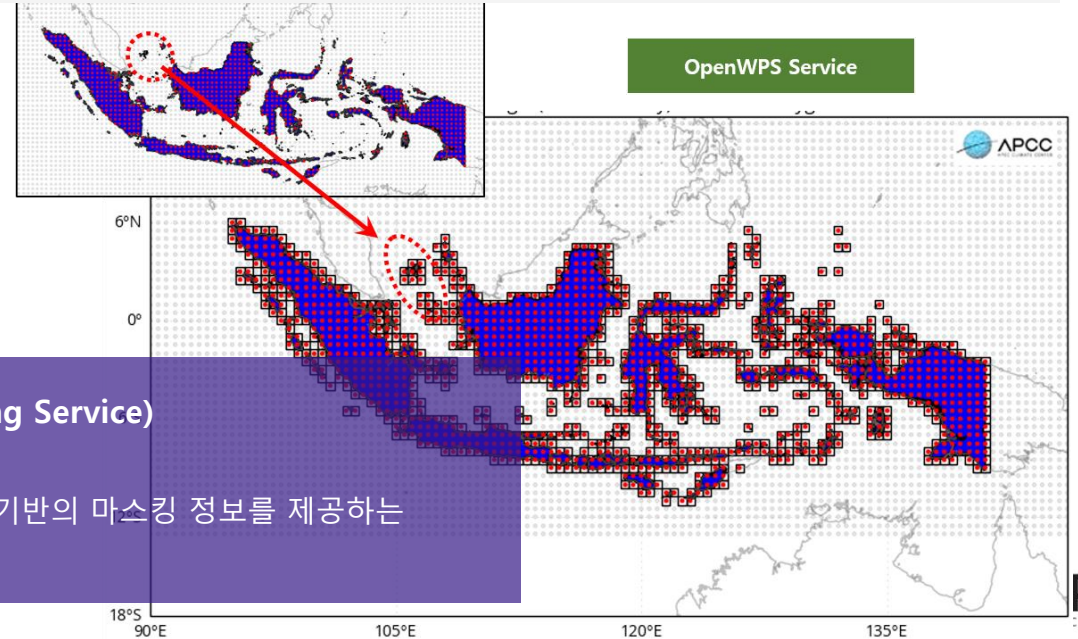
Input Parameter	Description	Data Type
inputData	climate data for visualization in geoscientific format	application/json
plotOptions	Plot options for visualization	application/json

지역 마스크 정보 제공: OpenWPS

OpenWPS (Open Web Processing Service)

<http://openwps.apcc21.org>

| 정밀한 자료추출을 위한 지리정보 기반의 마스크 정보를 제공하는 서비스입니다.

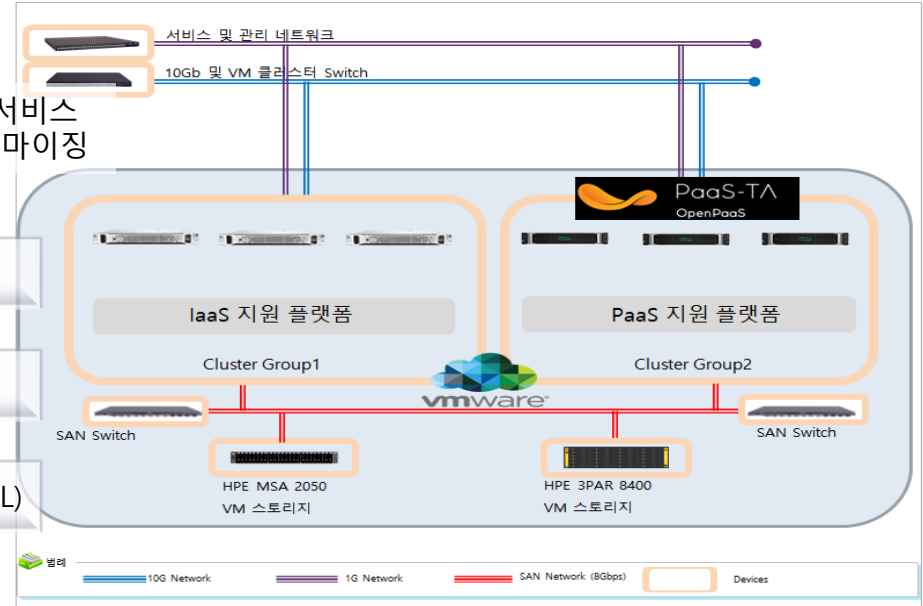


| APCC 기후정보서비스 현안과제



| 클라우드 플랫폼 기술 기반 기후서비스 구축

APCC IaaS : Vmware사의 vSphere를 이용한 인프라 서비스
 APCC PaaS : NIA(한국정보화진흥원) PaaS-TA 커스터마이징



기존 서비스의 안정적 운영

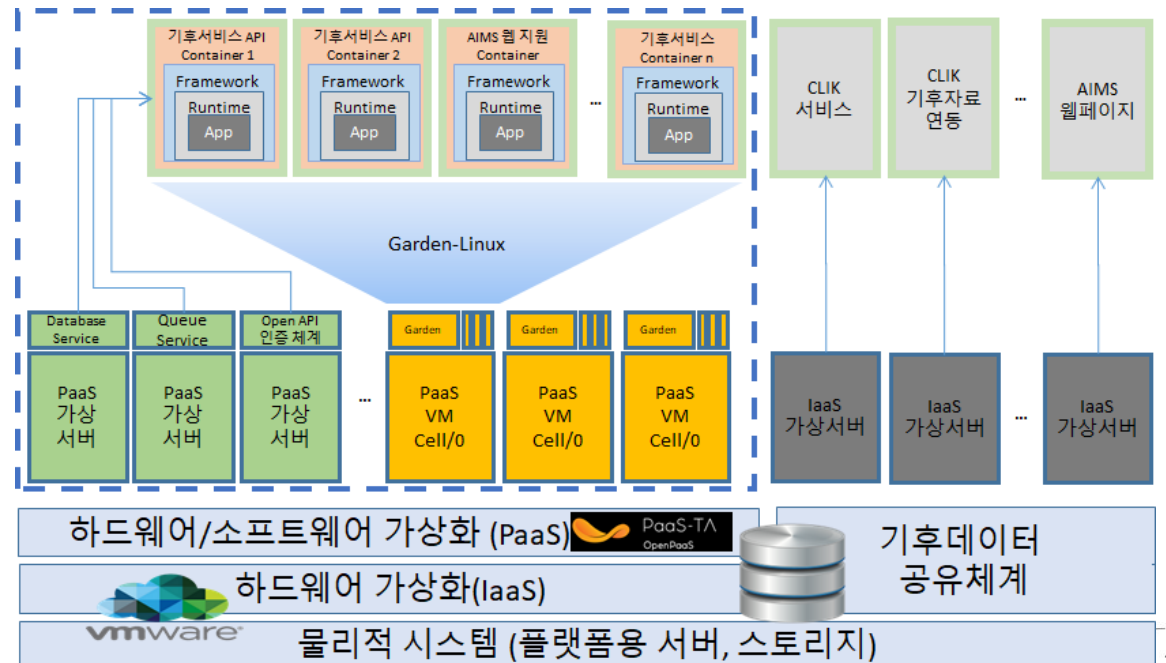
- 전통적인 서버환경
- 시스템 자원 배분 불균형, 시스템 노후화 대책 필요

일관된 기후서비스 체계 구축 필요

- 다양한 프레임워크, 프로그래밍 언어 사용
- 전주기에 걸친 효율적인 설계, 개발, 배포 필요

예산 절감 요구

- 각 서비스 수요에 적절히 대응할 수 있는 자원관리
- 개발서버, 운영서버 등 많은 수요대응



| 사용자 요구 대응 기후서비스 플랫폼 구축

플랫폼 기술 활용 및 기후정보서비스 통합을 통한 APCC 기후정보서비스 확대 및 기술 확산 강화



| 활용성

- 기존 APCC 기후정보서비스 제공 프로세스의 개선을 위한 기후서비스 플랫폼을 구축함. 특히 기후정보서비스 개발 및 통합에 있어 **중복 개발**되는 부분에 대한 **원가 및 노동력 절감** 가능한 기술임
- 기후예측/검증 및 자료(처리) 서비스 플랫폼 구축은 오픈 소스를 기반으로 있으며, 구축된 결과도 **Open API**를 통해 **외부로 공개**되어 활용할 수 있음

| 성과의 우수성

- APCC의 기후자료를 중심으로 **생산/처리/제공**되는 단계를 플랫폼 기술을 접목하여 **통합**
- **Open API** 기술 및 **표준화된 플랫폼** 개발 환경을 통한 유연한 기후정보서비스 운영 및 관리체계 구축
- 다양한 기후정보서비스를 플랫폼 내로 **단계적 통합**하여 기후자료를 **제공-예측-검증-처리**하는 **원스톱 기후정보서비스** 기반 마련
- 기후서비스 플랫폼을 통해 현업 및 연구부문 정보공유 및 **협업체계 강화**

APCC 기후서비스 플랫폼 사용자 가입

플랫폼 홈페이지 접속

• <https://cliks.apcc21.org>

회원 가입 페이지로 이동

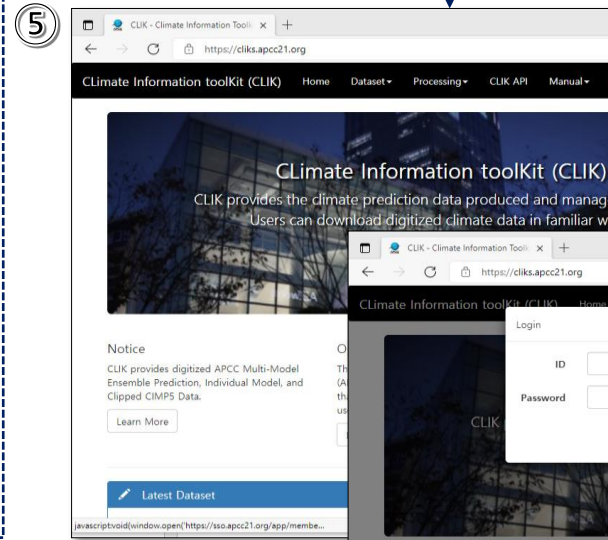
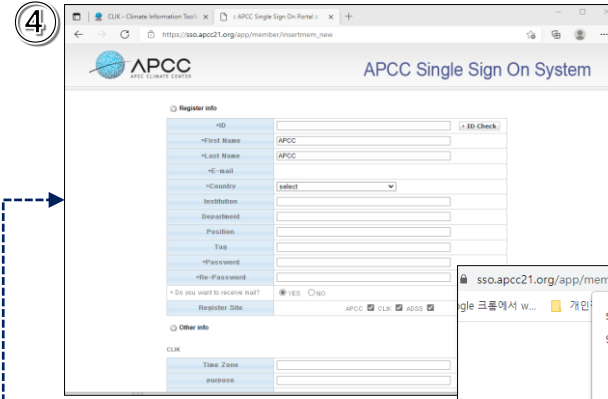
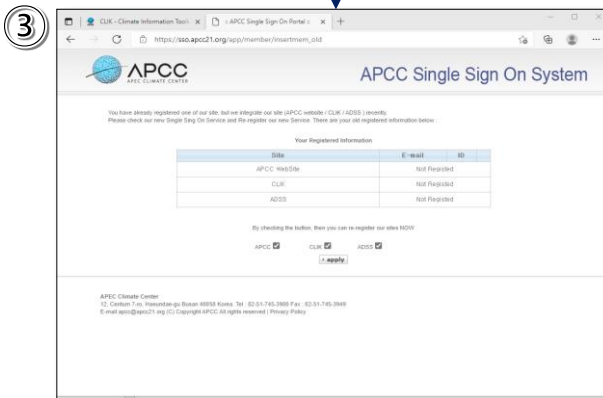
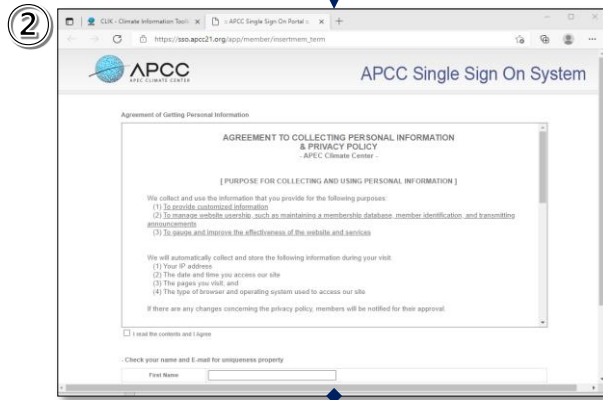
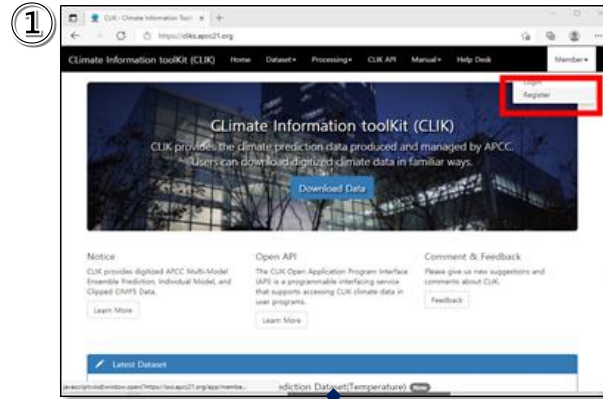
APCC Single Sign On System 이동 완료

• 이름, e-mail 주소를 통한 가입 여부 확인 및 가입

이메일 인증

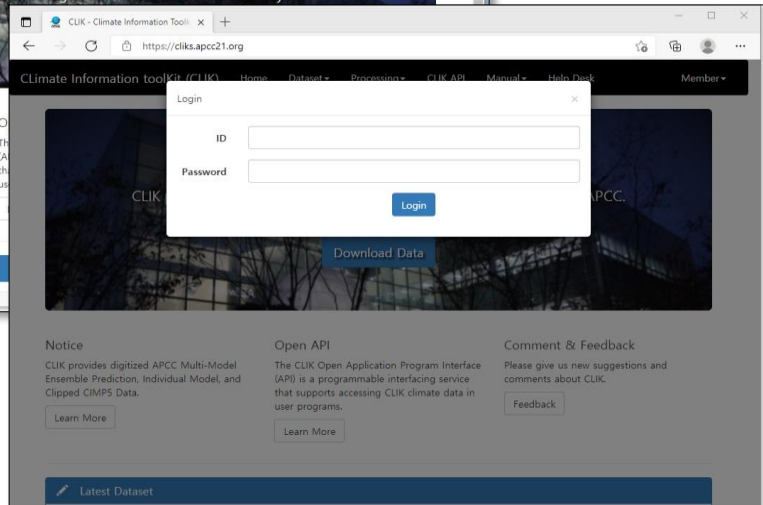
• 본인 e-mail 내 인증메일 확인

로그인



[실습]
회원 가입 및 로그인

sso.apcc21.org/app/member/loginpage?message=1
sso.apcc21.org 내용:
Sign up is complete. Please authorize your e-mail
확인



Contents

학습목표

APCC 기후서비스 플랫폼을 통해 자료를 다운로드 받을 수 있다.

1 APCC 기후서비스 플랫폼 소개

- | 기후서비스 플랫폼 소개
- | 회원가입

2 APCC 기후서비스 플랫폼 활용 I

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- | MME Model 다운로드 서비스
- | BSISO 다운로드 서비스
- | Clipped CMIP5 다운로드 서비스
- | wget 다운로드 이용 방법

3 APCC 기후서비스 플랫폼 활용 II

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- | CLIK API 사용을 위한 환경 설정
- | CLIK API 기본 구조
- | MME, MME Model 다운로드 실행
- | ERA5 다운로드 실행
- | Clipping 실행

MME – Overview

APCC 계절예측

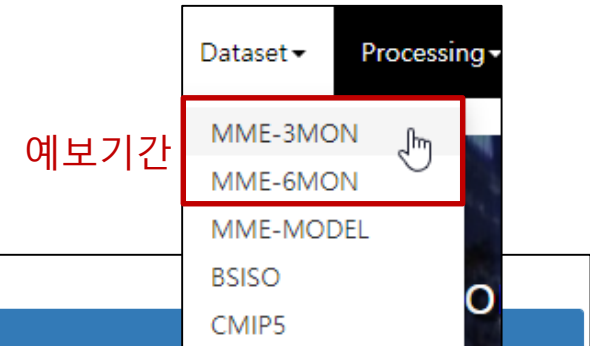
- APEC 회원국 기상청 및 연구 기관으로 부터 수집된 전 지구 예측 모델의 300개 이상의 앙상블 자료를 종합
- 다중 모델 앙상블(Multi-Model Ensemble, MME) 기법 적용
- 3개월, 6개월 예측자료 제공
- Forecast(기후예측), Hindcast(과거 기후 재현)
- Monthly mean/Seasonal mean 구분 제공

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)



Overview Download

APCC MME: Multi-Model Ensemble Forecast

The APCC seasonal forecast is based on multi-model ensemble (MME) prediction system and disseminated to APEC member economics around 20th of every month. Currently, 15 operational centers and research institutes from 11 countries around the world participate in the APCC MME operational prediction system by routinely providing their predictions in the form of ensembles of global forecast fields. The APCC's real-time operational forecasts are issued in both deterministic (based on ensemble mean) and probabilistic (based on full set of ensemble members) forms and more detailed description of the methods is as follows.

- 1. Deterministic MME Forecast**
The deterministic forecast is based on a simply average of bias-corrected ensemble means from each model with equal weight to create a multi-model forecast. The ensemble mean anomaly forecasts for each individual model is calculated by their own climatology from the hindcasts.
- 2. Probabilistic MME Forecast**
The probabilistic forecast is based on an uncalibrated MME with model weights being proportional to the square root of ensemble size, and a Gaussian fitting method for the estimation of the tercile-based categorical probabilities, that is, the probability of below-normal (BN), near-normal (NN), and above-normal (AN) categories with respect to climatology (Min et al. 2009). The procedure for the probabilistic forecast consists of following two steps.
 - **Estimate the individual model probabilities**
The upper and lower terciles are determined separately for each model using their mean and standard deviation of hindcasts. Then, the forecast probability for each category is estimated as a portion of the cumulative probability of their forecast sample associated with the category.

| MME - Download

MME 자료 Type 선택

MME 기법 선택

MME 변수 선택

자료 통계 기간 선택

Type

FORECAST HINDCAST

Method

GAUS SCM

Variable

prec slp sst t2m t850 z500

Period

Monthly mean Seasonal mean

Date 3개월 MME

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

Download last season

최근 시즌 자료(zip)

	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ	DJF
2015	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2016	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2017	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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2019	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2020	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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자료 년도, 시즌 선택

Date 6개월 MME

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

Download last season

최근 시즌 자료(zip)

	JFMAMJ	FMAMJJ	MAMJJA	AMJJAS	MJJASO	JJASON	JASOND	ASONDJ	SONDJF	ONDJFM	NDJFMA	DJFMAM
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2018	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2019	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2020	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2021	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

| MME - Download

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

자료 요청 후 Job 생성

Jobs C

Job ID: 60c9a42dd8b88a000dec9d0d

Processing ▾ **My Jobs** CLIK API

[실습]

- 예보기간 : 3개월
- 자료 Type : Forecast
- MME 기법 : GAUS
- 변수 : prec, slp
- 자료 통계 기간: Monthly mean
- 자료 기간: 2021년 전체

All	Queued	Running	Failed	Complete
Job type	Submission date	End date	Status	
MME_3MONTH	2021-06-16 16:11:41	2021-06-16 16:11:43	Download	

About CLIK Release Note Contact Us

ZIP 60c9a42dd8b88a0...zip

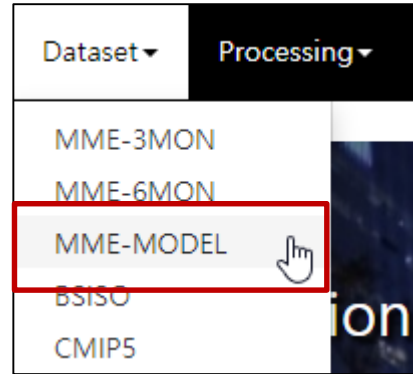
이름	압축 크기	원본 크기	파일 종류
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FORECAST_GAUS_FEB_2021_t2m.nc	430,289	507,156	NC 파일
FORECAST_GAUS_JAN_2021_t2m.nc	424,089	507,140	NC 파일
FORECAST_GAUS_JUN_2021_t2m.nc	427,085	507,164	NC 파일
FORECAST_GAUS_MAR_2021_t2m.nc	426,764	507,164	NC 파일
FORECAST_GAUS_MAY_2021_t2m.nc	426,101	507,164	NC 파일

| MME Model – 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	BCC_CSM1.1m
BoM	Australia	ACCESS-S1
CMCC	Italy	CMCC-SPS3
CWB	Chinese Taipei	TCWB1Tv1.1
HMC	Russia	SL-AV
KMA	Korea	GloSea5GC2
METFR	France	SYS7
MGO	Russia	MGOAM-2
MSC	Canada	CanSIPsv2
NASA	United States of America	GEOS-S2S-2.1
NCEP	United States of America	CFSv2

| MME Model – Download

자료 Type
선택

Type **FORECAST**

FORECAST HINDCAST

Institute

APCC BCC BOM CMCC CWB HMC KMA METFR MGO MSC NASA NCEP PNU UKMO

Model

CCSM3 SCOPS

Variable

prec slp sst t2m t850 u200 u850 v200 v850 z500

기관 선택

Model
선택

변수 선택

자료 년도, 시즌 선택

Date

* 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												<input type="checkbox"/>
2018	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2019	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2020	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2021	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					

자료 생산
년도 선택

Type **HINDCAST**

FORECAST HINDCAST

Year

2015 2016 2017 2018 2019 2020 2021

Institute

APCC BCC BOM CWB HMC KMA METFR MGO MSC NASA NCEP PNU UKMO

Model

SCOPS

Variable

prec slp sst t2m t850 u200 u850 v200 v850 z500

| MME Model – Download

Request Select to request as download job.

Create script Select to download script using wget.

All	Queued	Running	Failed	Complete
Job type	Submission date	End date	Status	
MODEL	2021-07-05 14:59:17	2021-07-05 14:59:36	Download	

Job ID: 60e29fb50b3845001094616b

About CLIK Release Note

60e29fb50b38450....zip
27.4/28.6MB, 0초 남음

Processing ▾ **My Jobs** CLIK API

이름	압축 크기	원본 크기	파일 종류
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FORECAST_APCC_SCOPS_FEB_2021_prec.nc	2,288,651	2,524,864	NC 파일
FORECAST_APCC_SCOPS_FEB_2021_t2m.nc	1,993,993	2,524,864	NC 파일
FORECAST_APCC_SCOPS_JAN_2021_prec.nc	2,290,478	2,524,860	NC 파일
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FORECAST_APCC_SCOPS_JUN_2021_t2m.nc	1,991,692	2,524,864	NC 파일
FORECAST_APCC_SCOPS_MAR_2021_prec.nc	2,288,400	2,524,860	NC 파일
FORECAST_APCC_SCOPS_MAR_2021_t2m.nc	1,990,521	2,524,864	NC 파일
FORECAST_APCC_SCOPS_MAY_2021_prec.nc	2,295,044	2,524,860	NC 파일
FORECAST_APCC_SCOPS_MAY_2021_t2m.nc	1,986,586	2,524,864	NC 파일

[실습]

- 자료 Type : Forecast
- 기관 : APCC
- Model : SCOPS
- 변수 : sst, t2m
- 자료 기간: 8월 자료 전체

| BSISO – Overview

여름철 계절내 진동 지수

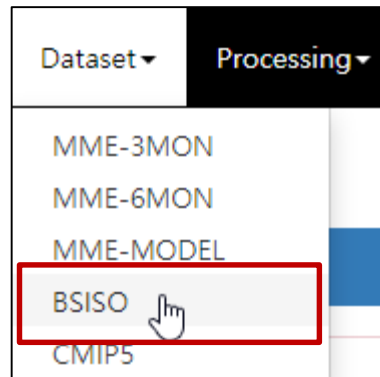
- Boreal Summer Intraseasonal Oscillation (BSISO)
- 5~10월 감시 및 예측정보 제공

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-S1
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

FORECAST MONITORING

기관 선택

Institute

BOM CWB ECMWF NCEP

Model
선택

Model

CFS GFS

기간 선택

Date

Year: Month: 05 06

파일 선택

ALL Initial date File (Ascii)

<input checked="" type="checkbox"/>	20210603	20210603_ECMC_BSISO.20d.INDEX.LY
<input checked="" type="checkbox"/>	20210607	20210607_ECMC_BSISO.20d.INDEX.LY
<input checked="" type="checkbox"/>	20210610	20210610_ECMC_BSISO.20d.INDEX.LY
<input checked="" type="checkbox"/>	20210614	20210614_ECMC_BSISO.20d.INDEX.LY
<input checked="" type="checkbox"/>	20210617	20210617_ECMC_BSISO.20d.INDEX.LY

20210617 20210617_ECMC_BSISO.20d.INDEX.LY

Download historical data

모델의 전체
자료 다운로드

파일을 선택하여 직
접 다운로드 가능

Select to request as download job.

Select to download script using wget.

[실습]

- 자료 Type : Forecast
- 기관 : NCEP
- Model : GFS
- 자료 기간: 2021년 5~6월 자료 전체

자료 요청 후 Job 생성

obs

Job ID: 60f130770b3845001094617b

Processing ▾ CLIK API

All	Queued	Running	Failed	Complete
Job type	Submission date	End date	Status	
BSISO	2021-07-16 16:08:39	2021-07-16 16:08:44	<input checked="" type="button" value="Download"/>	

이름	압축 크기	원본 크기
FCST_ECMWF_EPS_2021_20210603_ECMC_BSISO.20d.INDEX.LY	18,717	78,07
FCST_ECMWF_EPS_2021_20210607_ECMC_BSISO.20d.INDEX.LY	18,737	78,07
FCST_ECMWF_EPS_2021_20210610_ECMC_BSISO.20d.INDEX.LY	18,892	78,07
FCST_ECMWF_EPS_2021_20210614_ECMC_BSISO.20d.INDEX.LY	18,672	78,07
FCST_ECMWF_EPS_2021_20210617_ECMC_BSISO.20d.INDEX.LY	18,534	78,07

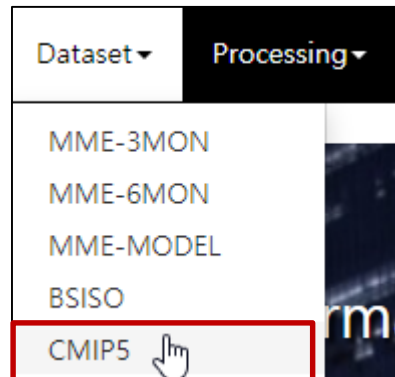
| Clipped CMIP5 – Overview

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
<input type="radio"/> SK	Slovakia	SK		
<input type="radio"/> SI	Slovenia	SI		
<input type="radio"/> SB	Solomon Islands	SB		
<input type="radio"/> SO	Somalia	SO		
<input type="radio"/> ZA	South Africa	ZA		
<input type="radio"/> GS	South Georgia and the South Sandwich Isla	GS		
<input checked="" type="radio"/> KR	South Korea	KR		
<input type="radio"/> ES	Spain	ES		
<input type="radio"/> LK	Sri Lanka	LK		
<input type="radio"/> SD	Sudan	SD		
<input type="radio"/> SR	Suriname	SR		
<input type="radio"/> SJ	Svalbard and Jan Mayen	SJ		
<input type="radio"/> SZ	Swaziland	SZ		

[실습]

- 지역 코드 : KR

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

자료 요청 후 Job 생성

CLIK API

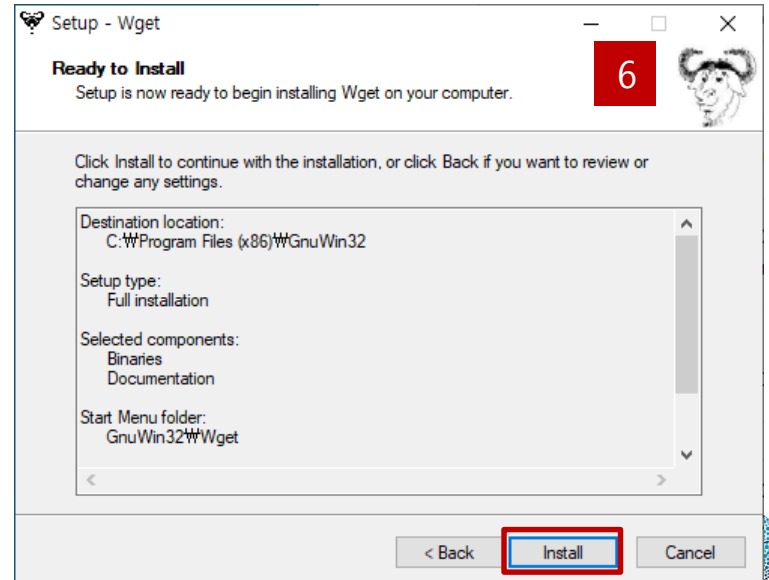
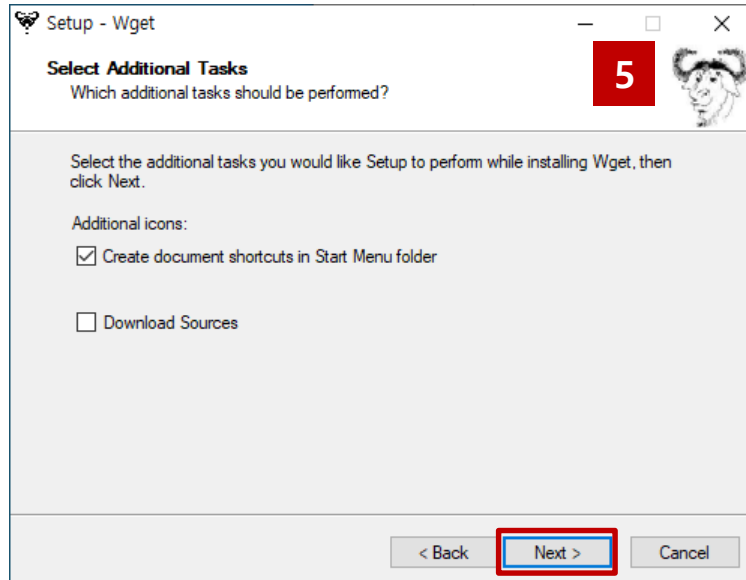
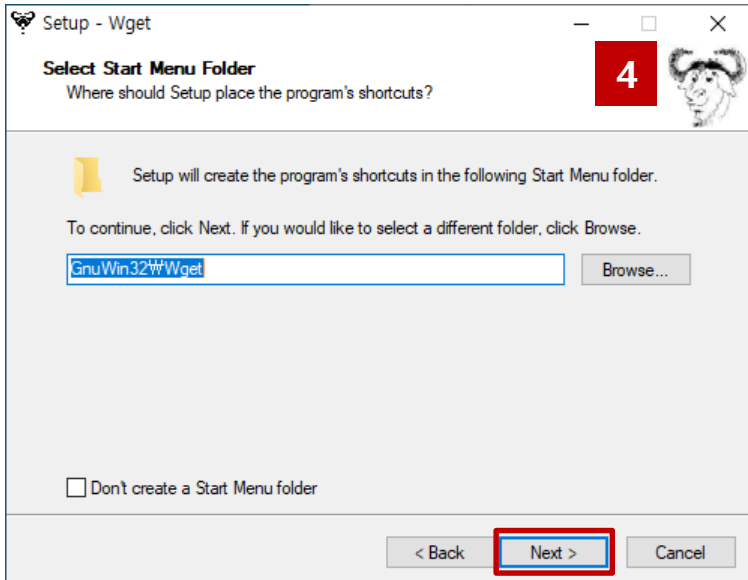
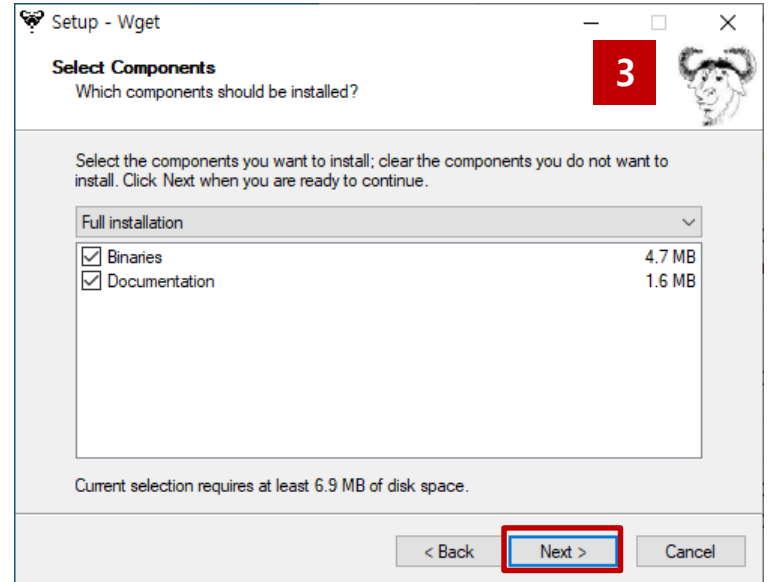
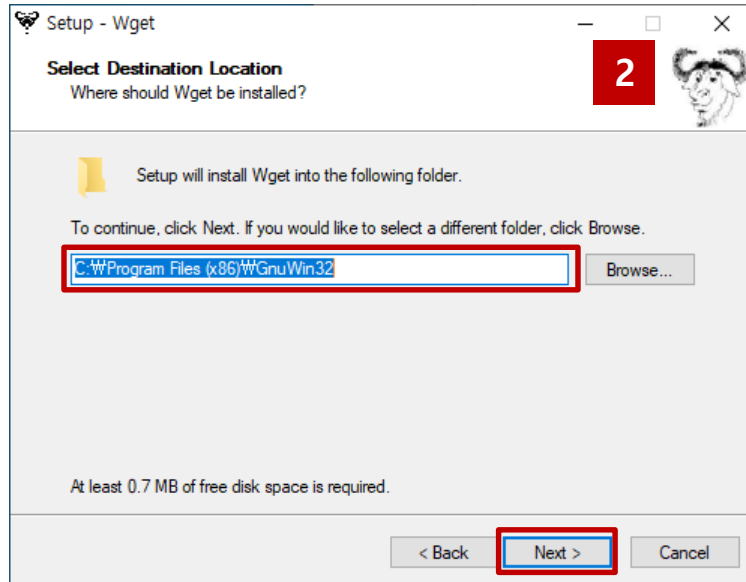
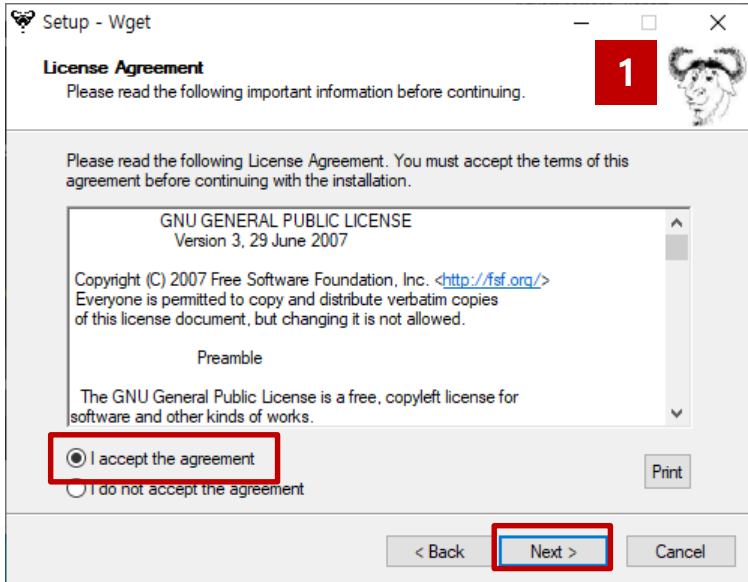
Job ID: 60f4d5200b3845001094617c

Processing ▾ **My Jobs** CLIK API

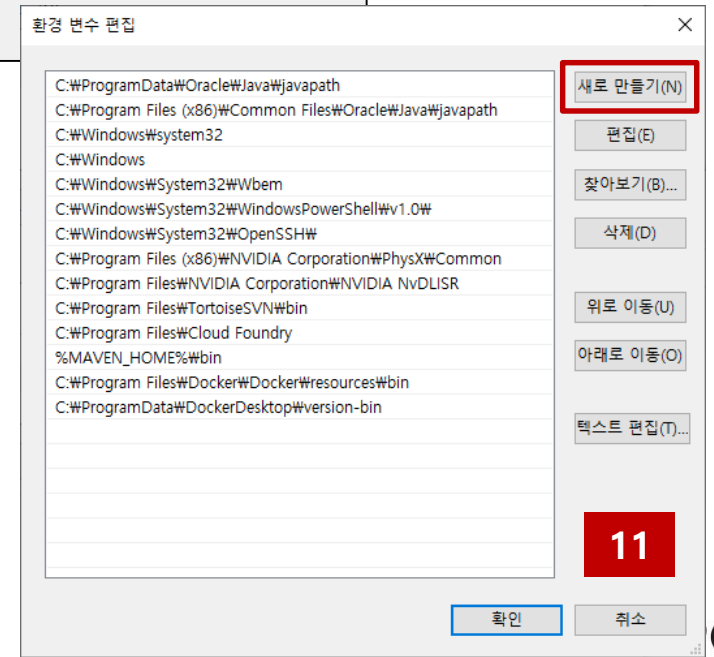
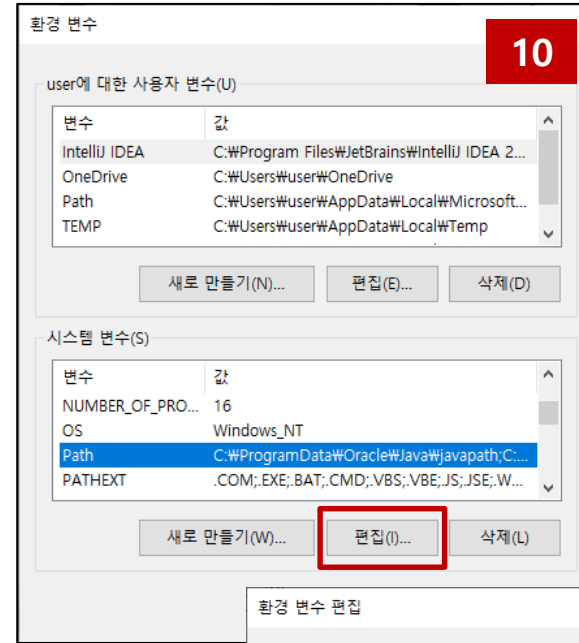
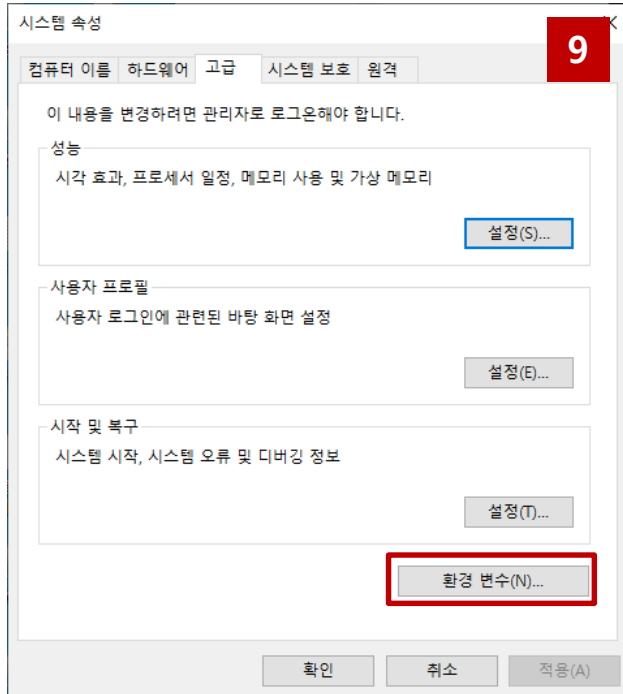
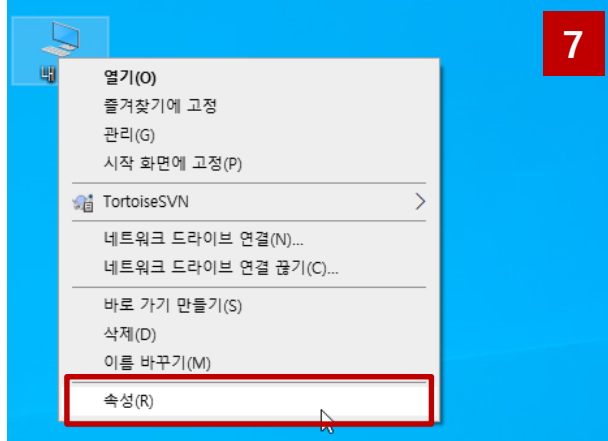
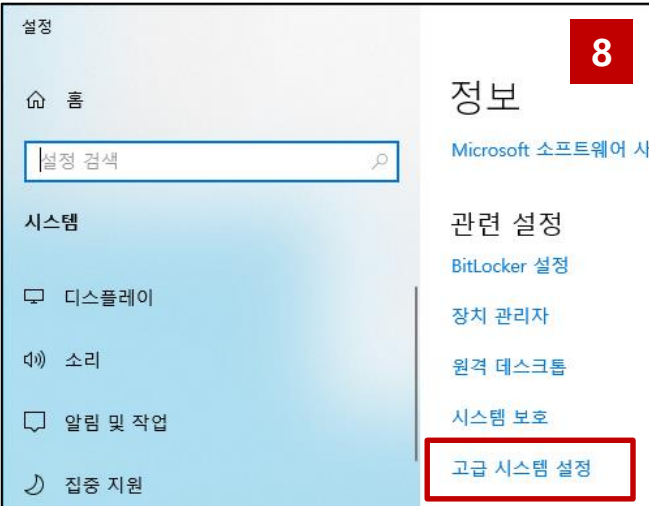
All	Queued	Running	Failed	Complete
Job type	Submission date	End date	Status	
CMIP5	2021-07-19 10:28:00	2021-07-19 10:28:01	Download	

ZIP cmip5_daily_KR.zip
 0.0/3.0GB, 1시간 남음

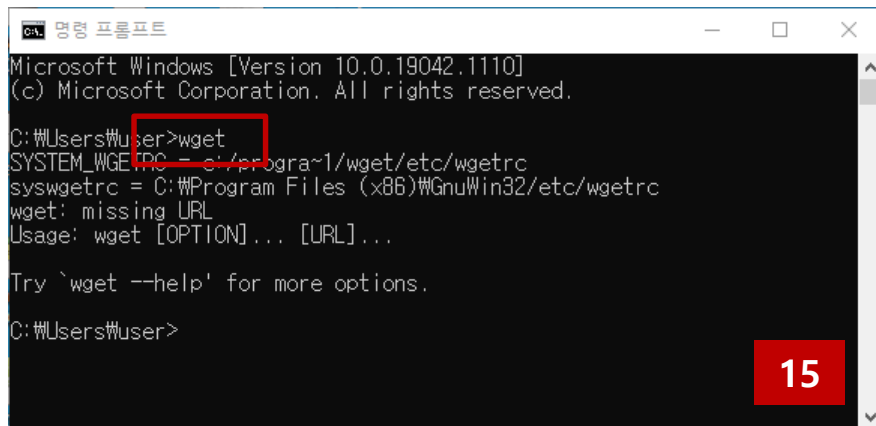
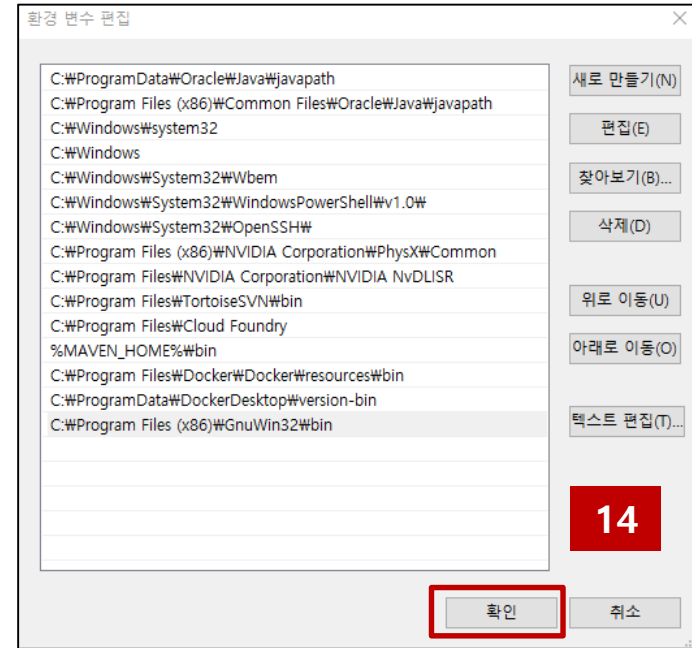
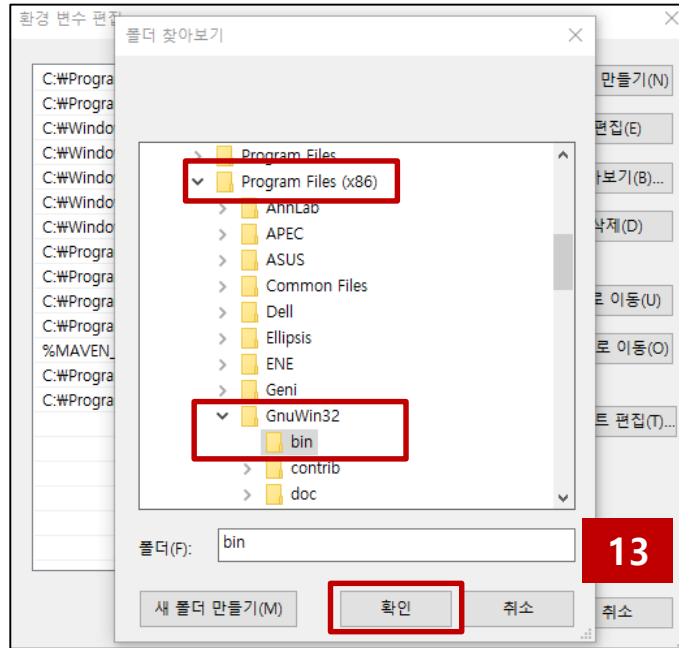
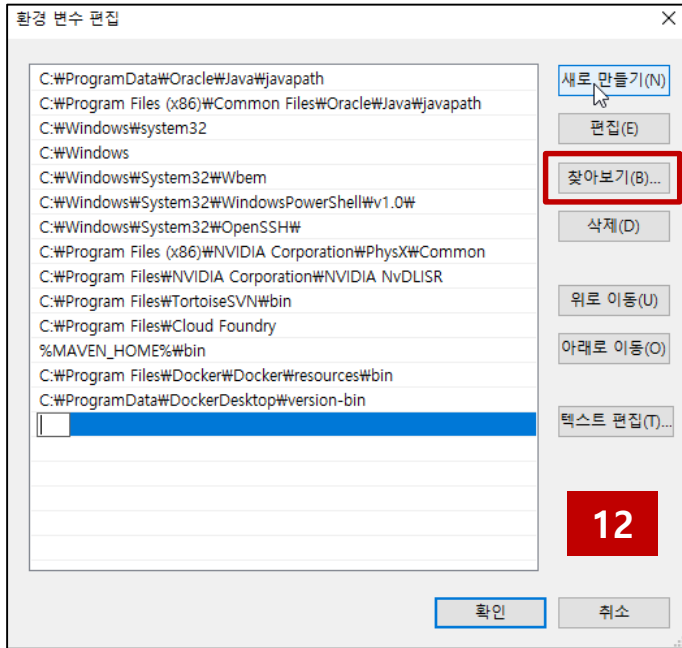
GnuWin wget 설치: wget-1.11.4-1-setup.exe



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



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



| 스크립트 다운로드 & 실행

모든 자료 다운로드 기능에서 이용 가능

- 자료 Request와 같은 방법으로 옵션 선택
- Create script 버튼 선택
- 리눅스용 스크립트 다운로드
- MME Model은 사용자 아이디, 패스워드 필요

3개월 MME

```

1  #!/bin/bash
2  #
3
4  # You can set verifying the certificate or not.
5  #certificate_option="--no-check-certificate"
6  certificate_option=""
7
8  #-----
9  # This script was written using bash.
10 # You can modify using the other shell(csh, ksh, windows command, and so on), other commands and options.
11 # If you want curl command, you can change command to 'curl' instead of 'wget'.
12 # But you need to change some options. Please check details at manuals of wget, curl.
13 #-----
14
15 echo `date +%F %T`" Now start to download."
16
17 #-----
18 # Each file of the same variable has the same file name.
19 # So please set(change) the folder to save file, or set file path to use '-O' option
20 #-----
21
22
23 wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JAN/2021/prec.nc -O 3-MON_FORECAST_SCM_JAN_2021_prec.nc
24 wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JAN/2021/slp.nc -O 3-MON_FORECAST_SCM_JAN_2021_slp.nc
25 wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JAN/2021/sst.nc -O 3-MON_FORECAST_SCM_JAN_2021_sst.nc
26 wget ${certificate_option} https://download.apcc21.org/MME/3-MON/FORECAST/SCM/FEB/2021/prec.nc -O 3-MON_FORECAST_SCM_FEB_2021_prec.nc

```

인증서 검증 여부

다운로드 파일명 지정

```

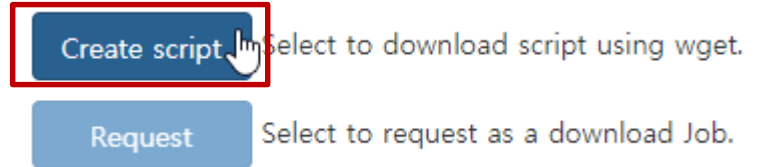
12 #-----
13 # Personal setting
14 #-----
15
16 # chane to your user id
17 userid="userid"
18 # change to your password
19 password="password"
20 # cookie file path(You can change to the other file.)
21 cookie_path="apcc_cookies"
22 # option to save cookies. If you want to save cookies, don't use the cookie_option.
23 #cookie_option=""
24 cookie_option="--load-cookies ${cookie_path} --save-cookies ${cookie_path} --keep-session-cookies "
25
26 # You can set verifying the certificate or not.
27 #certificate_option="--no-check-certificate"
28 certificate_option=""
29
30 echo `date +%F %T`" Now start to download."
31
32 #-----
33 # Each file of the same variable has the same file name.
34 # So please set(change) the folder to save file, or set file path to use '-O' option
35 #-----
36
37 wget ${cookie_option} --user=${userid} --password=${password} ${certificate_option} https://sdownload.apcc21.org/MODEL/FORECAST/KMA
38 wget ${cookie_option} --user=${userid} --password=${password} ${certificate_option} https://sdownload.apcc21.org/MODEL/FORECAST/KMA

```

아이디, 패스워드 설정

MME Model

쿠키 저장 여부



| Windows 환경 실행

셸 파일을 Windows 배치 파일로 변경

- Windows용 문법으로 변경
- 파일 확장명은 "bat" 로 하여 저장
- Windows cmd에서 실행

[실습]

- 자료 : MME
- 예보기간 : 3개월
- 자료 Type : Forecast
- MME 기법 : SCM
- 변수 : prec, slp
- 자료 통계 기간: Monthly mean
- 자료 기간: 2021년 7월

```

1 @ECHO OFF
2 set certificate_option=--no-check-certificate
3
4 wget %certificate_option% https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JAN/2021/prec.nc -O 3-MON_FORECAST_SCM_JAN_2021_prec.nc
5 wget %certificate_option% https://download.apcc21.org/MME/3-MON/FORECAST/SCM/JAN/2021/slp.nc -O 3-MON_FORECAST_SCM_JAN_2021_slp.nc

```

```

1 @echo off
2
3 set userid=xxxxx
4 set password=xxxxxx
5 set cookie_path=d:\apcc.cookies
6 set cookie_option=--load-cookies %cookie_path% --save-cookies %cookie_path% --keep-session-cookies
7 set certificate_option=--no-check-certificate
8
9 wget %cookie_option% --user=%userid% --password=%password% %certificate_option% https://sdownload.apcc21.org/MODEL/FORECAST/KMA_GLO
10 wget %cookie_option% --user=%userid% --password=%password% %certificate_option% https://sdownload.apcc21.org/MODEL/FORECAST/KMA_GLO

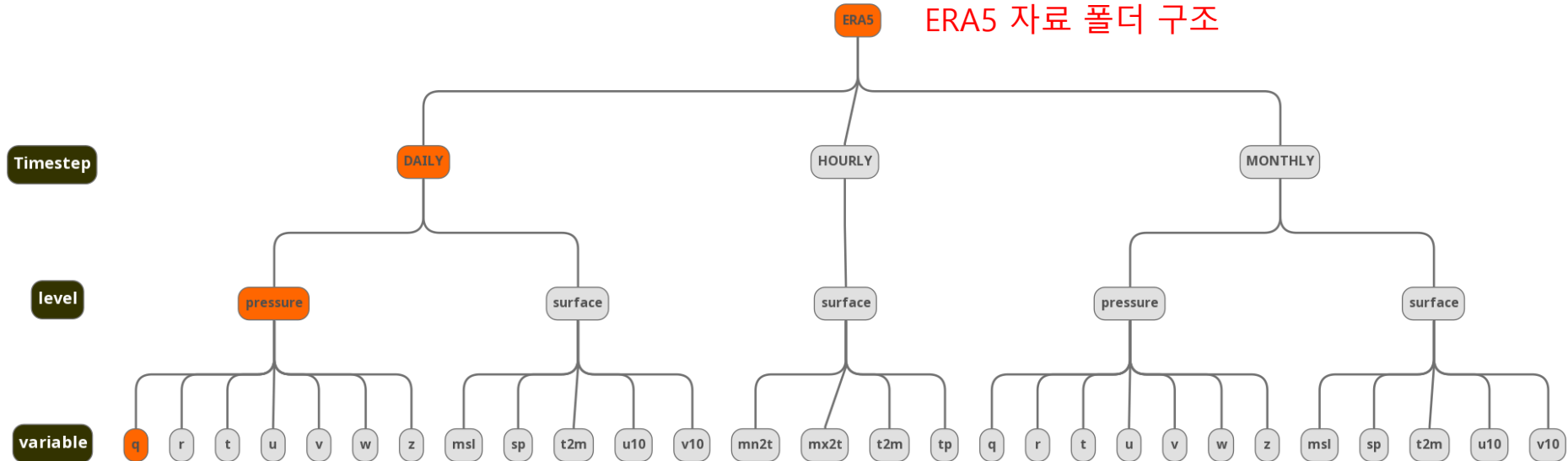
```

| 스크립트 다운로드 & 실행

모든 자료 다운로드 기능에서 이용 가능

- ERA5 재분석 자료 다운로드
- 스크립트 다운로드만 가능

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



ERA5 wget 스크립트 형식 : `wget --no-check-certificate https://URL/ERA5/timestep/level/variable/파일명형식`

`wget --no-check-certificate https://download.apcc21.org/ERA5/DAILY/pressure/q/q_202106.nc`

[예제]

- 자료 : ERA5
- Timestep : Daily
- Level : pressure
- Variable : q
- 기간 : 2021년 6월

```

[root@service01 sclow]#
[root@service01 sclow]# wget --no-check-certificate https://download.apcc21.org/ERA5/DAILY/pressure/q/q_202106.nc
--2021-10-29 15:00:48-- https://download.apcc21.org/ERA5/DAILY/pressure/q/q_202106.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: 9219581732 (8.6G) [application/x-netcdf]
Saving to: "q_202106.nc"

100%[=====>] 9,219,581,732 108M/s  in 87s

2021-10-29 15:02:15 (101 MB/s) - "q_202106.nc" saved [9219581732/9219581732]
  
```

wget 파일 다운로드 결과

[실습]

- 자료 : ERA5
- Timestep : Monthly
- Level : surface
- Variable : t2m
- 기간 : 2021년

Contents

학습목표

APCC 기후서비스 플랫폼을 통한 사용자 맞춤형 계절예측/검증 서비스를 사용할 수 있다.

1 APCC 기후서비스 플랫폼 소개

- | 기후서비스 플랫폼 소개
- | 회원가입

2 APCC 기후서비스 플랫폼 활용 I

- | MME 다운로드 서비스
- | MME Model 다운로드 서비스
- | BSISO 다운로드 서비스
- | Clipped CMIP5 다운로드 서비스
- | wget 다운로드 이용 방법

3 APCC 기후서비스 플랫폼 활용 II

- | 예측 (Prediction) 서비스
- | 검증 (Verification) 서비스
- | 추출 (Clipping) 서비스
- | 합성 (Composite) 서비스

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- | CLIK API 사용을 위한 환경 설정
- | CLIK API 기본 구조
- | MME, MME Model 다운로드 실행
- | ERA5 다운로드 실행
- | Clipping 실행

| Prediction – 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 보여하여 통합하는 방식
- 확률 값 범주: 평년보다 높을 확률, 평년과 비슷할 확률, 평년보다 낮을 확률
- Gaussian fitting method (GAUS)

Climate Information toolKit (CLIK)
Home Dataset Processing CLIK API Manual Help Desk
Member

Prediction

Notice : A new user-customized APCC seasonal prediction (MME) and verification services based on platform technology has been opened as beta service (Refer to current APCC CLIK service : <https://clik.apcc21.org>). Please leave your any questions and feedbacks about the new service to APCC Help Desk.

Lead Month

3-MON

Year / Season

2021 8

Methods

Deterministic Probabilistic

Models

ALL

APCC_SCOP5 BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5GC2 METFR_SYS8

MSC_CANSIPsv2 NASA_GEOS-S2S-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

Please login.

APCC Seasonal Forecasts

The APCC seasonal forecast is based on multi-model ensemble (MME) prediction system and disseminated to APEC member economics around 20th of every month. Currently, 15 operational centers and research institutes from 11 countries around the world participate in the APCC MME operational prediction system by routinely providing their predictions in the form of ensembles of global forecast fields. The APCC's real-time operational forecasts are issued in both deterministic (based on ensemble mean) and probabilistic (based on full set of ensemble members) forms.

Deterministic MME Forecast

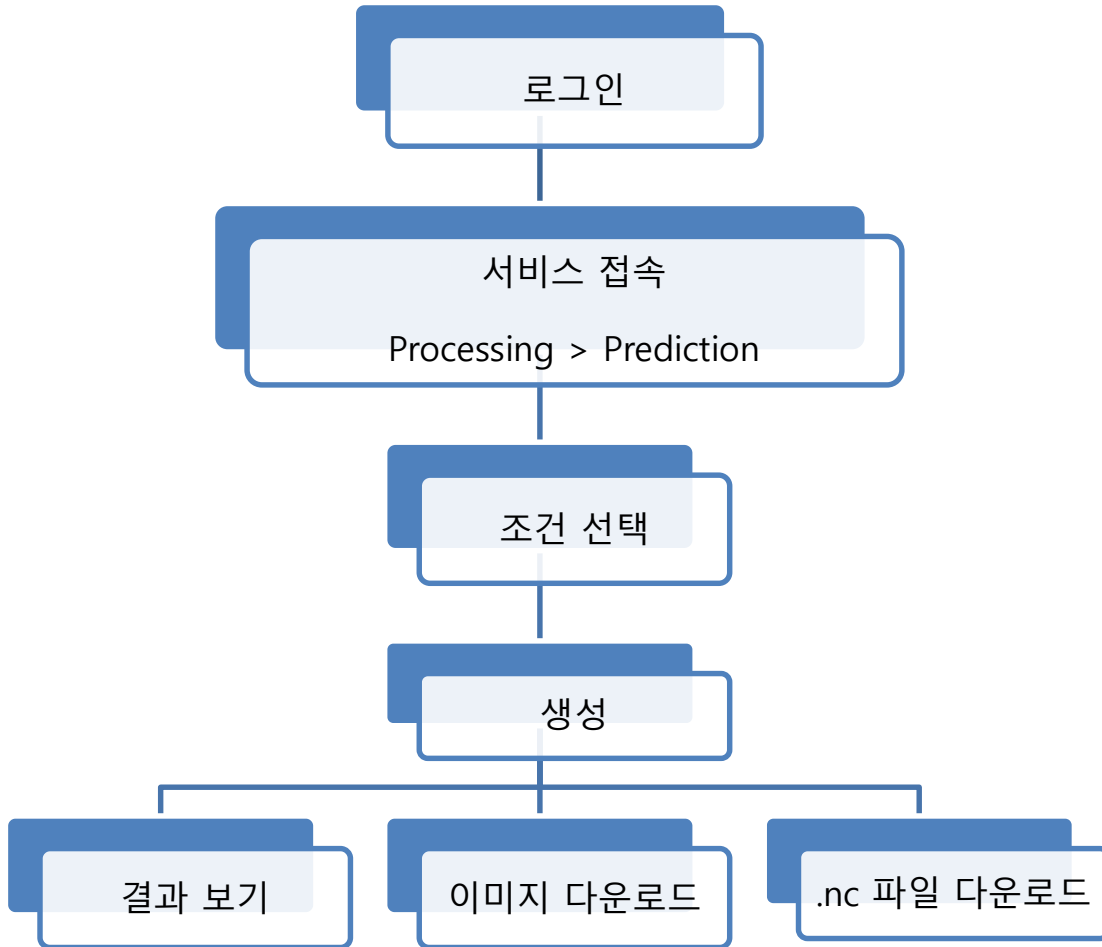
The deterministic forecast is based on a simply average of bias-corrected ensemble means from each model with equal weight to create a multi-model forecast. The ensemble mean anomaly forecasts for each individual model is calculated by their own climatology from the hindcasts.

Probabilistic MME Forecast

The probabilistic forecast is based on an uncalibrated MME with model weights being proportional to the square root of ensemble size, and a Gaussian fitting method for the estimation of the tercile-based categorical probabilities, that is, the probability of below-normal (BN), near-normal (NN), and above-normal (AN) categories with respect to climatology.

About CLIK
Release Note
Contact Us
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Cookies
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| Prediction 시작하기 - 1 (Prediction 페이지 접속)



CLimate Information toolKit (CLIK) Home Dataset Processing CLIK API Manual Help Desk Member

Prediction

Notice : A new user-customized APCC seasonal prediction (MME) and verification services based on platform technology has been opened as beta service (Refer to current APCC CLIK service : <https://clik.apcc21.org>). Please leave your any questions and feedbacks about the new service to APCC Help Desk.

Lead Month: 3-MON Year / Season: 2021 8 Methods: Deterministic Probabilistic

Models:

- ALL
- APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5GC2 METFR_SYS8
- MSC_CANSIPsv2 NASA_GEOS-S2S-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

Predict

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APCC Seasonal Forecasts

The APCC seasonal forecast is based on multi-model ensemble (MME) prediction system and disseminated to APEC member economics around 20th of every month. Currently, 15 operational centers and research institutes from 11 countries around the world participate in the APCC MME operational prediction system by routinely providing their predictions in the form of ensembles of global forecast fields. The APCC's real-time operational forecasts are issued in both deterministic (based on ensemble mean) and probabilistic (based on full set of ensemble members) forms.

Deterministic MME Forecast

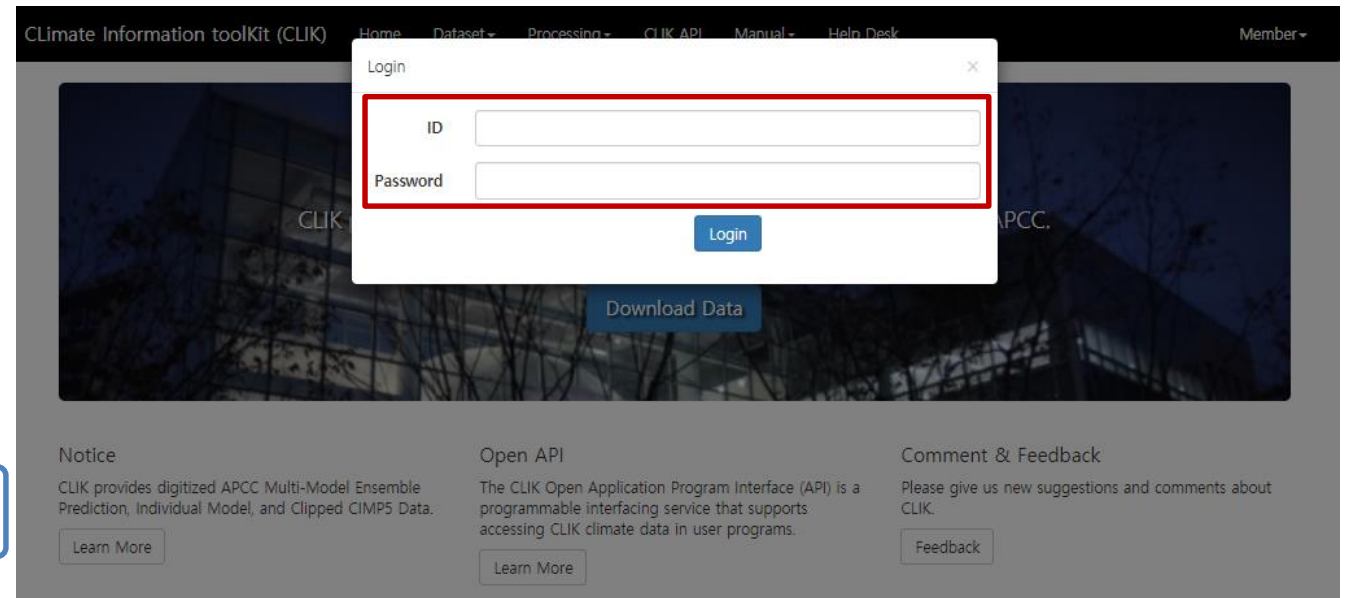
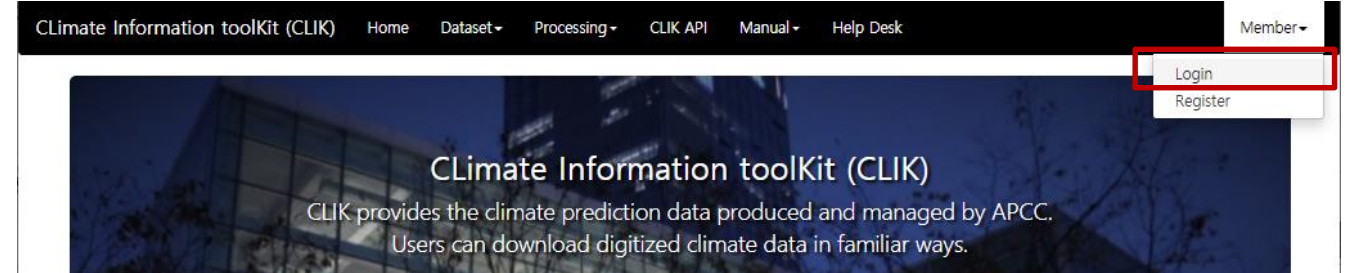
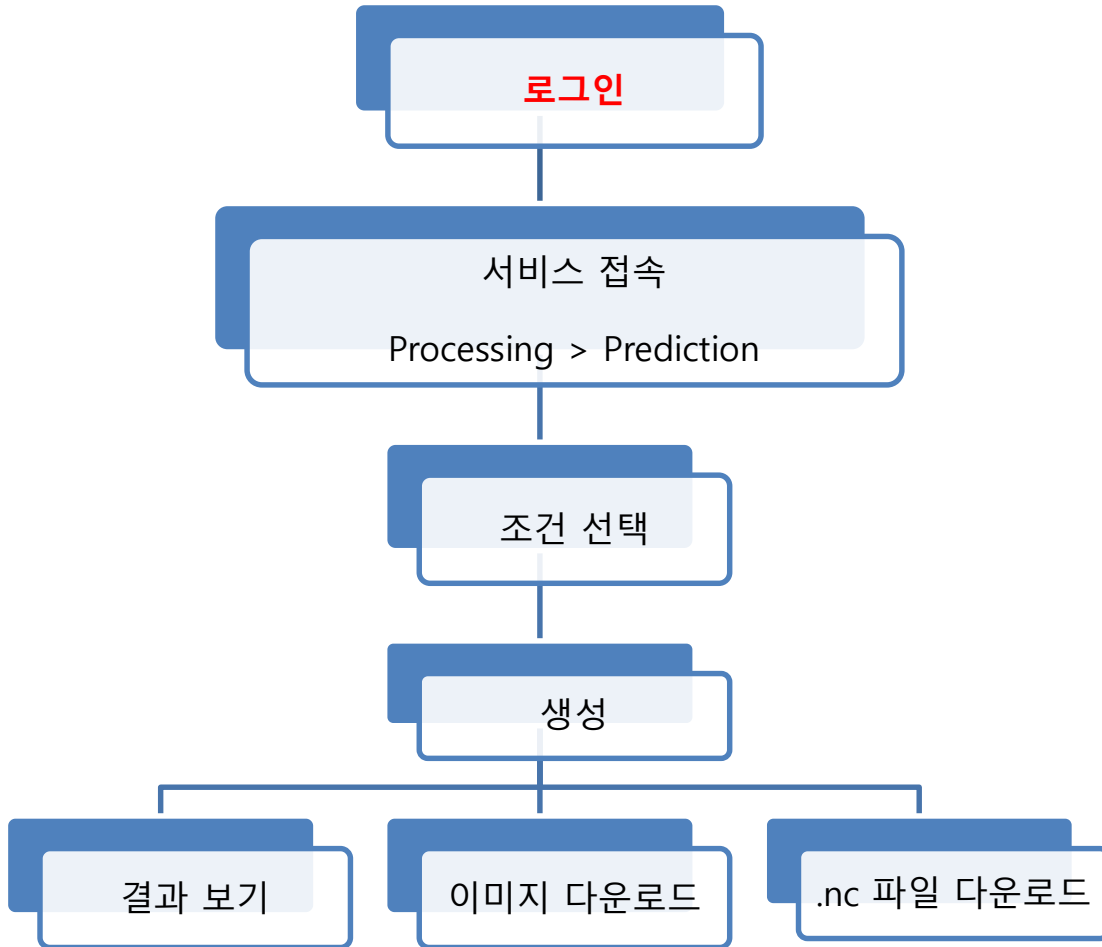
The deterministic forecast is based on a simply average of bias-corrected ensemble means from each model with equal weight to create a multi-model forecast. The ensemble mean anomaly forecasts for each individual model is calculated by their own climatology from the hindcasts.

Probabilistic MME Forecast

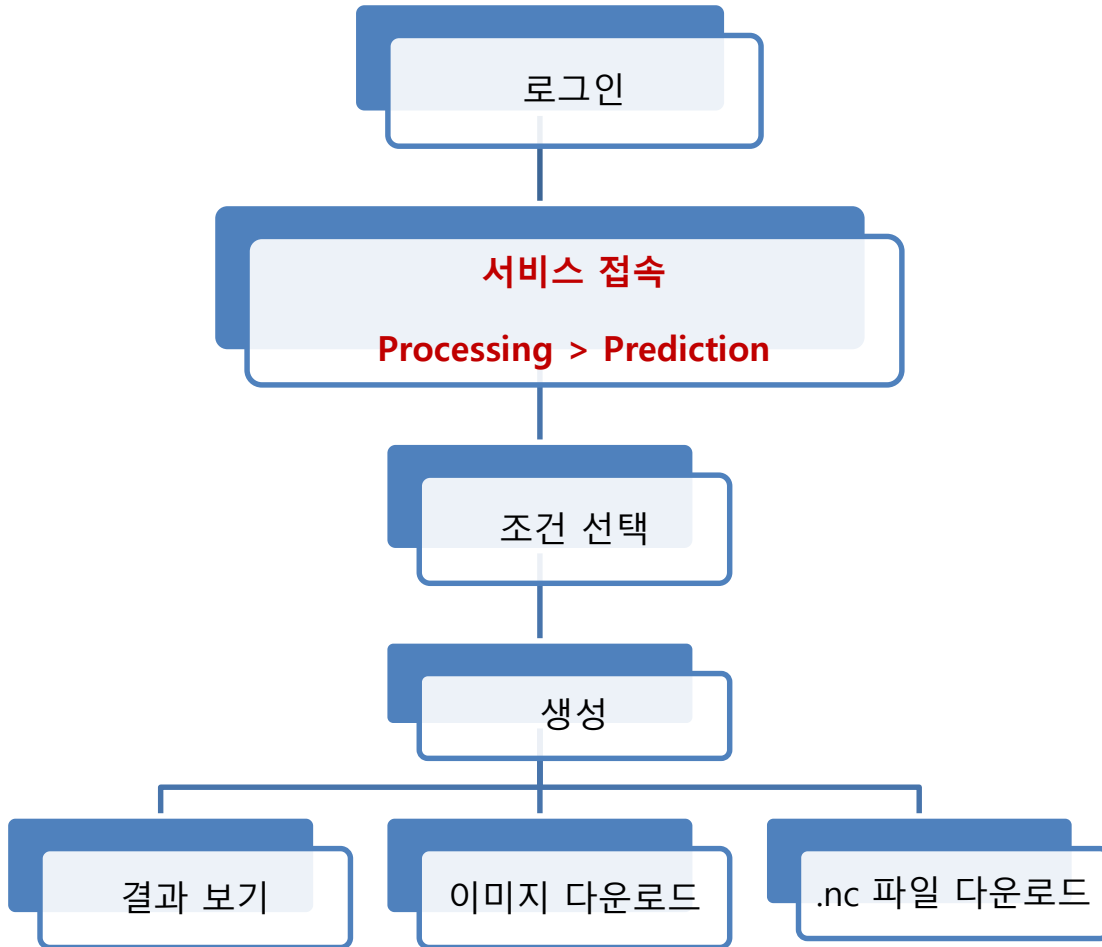
The probabilistic forecast is based on an uncalibrated MME with model weights being proportional to the square root of ensemble size, and a Gaussian fitting method for the estimation of the tercile-based categorical probabilities, that is, the probability of below-normal (BN), near-normal (NN), and above-normal (AN) categories with respect to climatology.

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| Prediction 시작하기 - 2 (로그인)



| Prediction 시작하기 - 3 (Prediction 페이지 접속)



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Prediction

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Lead Month: 3-MON Year / Season: 2021 8 Methods: Deterministic Probabilistic

Models:

- ALL
- APCC_SCOPS
- BCC_CSM1.1M
- BOM_ACCESS-S1
- CWB_TCWB1Tv1.1
- HMC_SL-AV
- KMA_GLOSEA5G2
- METFR_SYS8
- MSC_CANSIPsv2
- NASA_GEOS-S2S-2.1
- NCEP_CFSv2
- PNU_CGCMv2.0
- UKMO_GLOSEA6

Predict

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APCC Seasonal Forecasts

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Deterministic MME Forecast

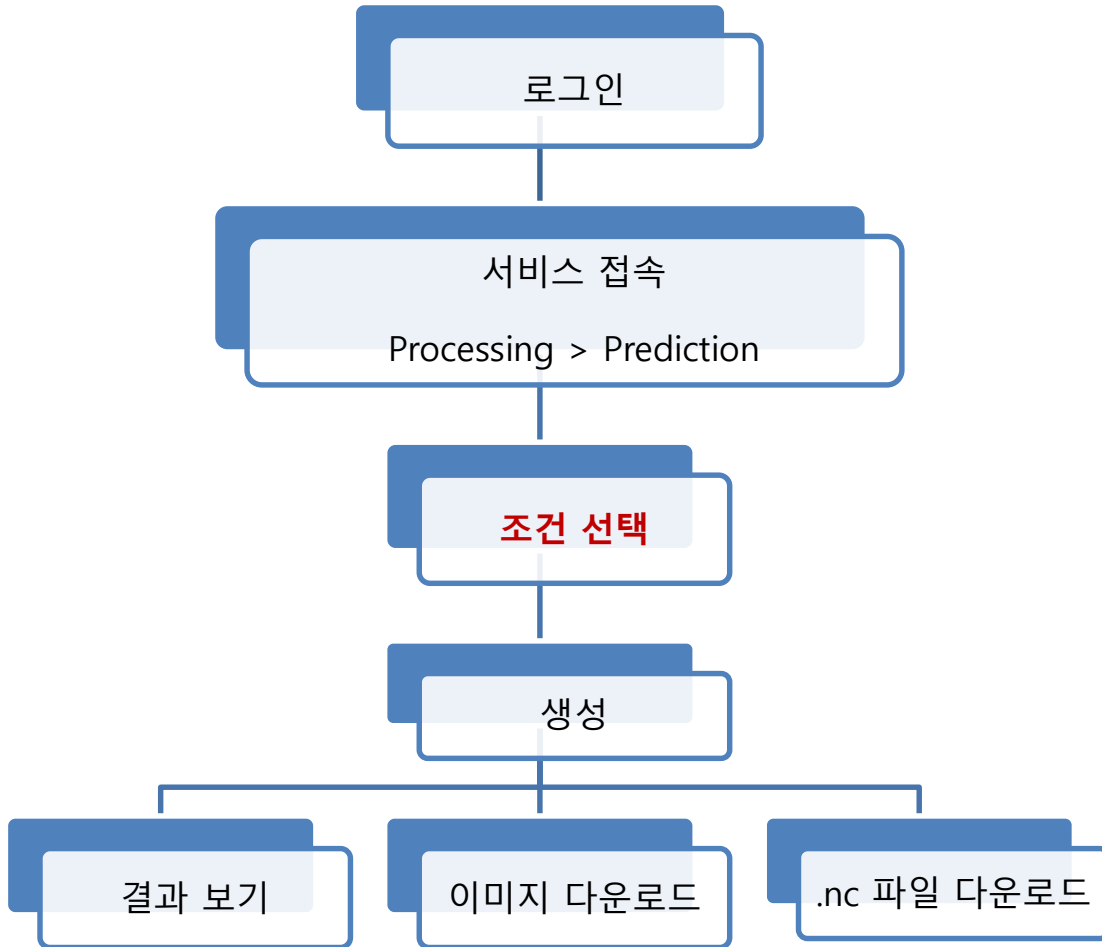
The deterministic forecast is based on a simply average of bias-corrected ensemble means from each model with equal weight to create a multi-model forecast. The ensemble mean anomaly forecasts for each individual model is calculated by their own climatology from the hindcasts.

Probabilistic MME Forecast

The probabilistic forecast is based on an uncalibrated MME with model weights being proportional to the square root of ensemble size, and a Gaussian fitting method for the estimation of the tercile-based categorical probabilities, that is, the probability of below-normal (BN), near-normal (NN), and above-normal (AN) categories with respect to climatology.

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| Prediction 시작하기 - 4 (조건 선택)



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Prediction

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Lead Month: 3-MON Year / Season: 2021 8 Methods: Deterministic Probabilistic

원하는 기간 선택 **Method 선택**

Models: **원하는 모델을 선택**

ALL APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5GC2 METFR_SYS8 MSC_CANSIPsv2 NASA_GEOS-S2S-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

Predict

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APCC Seasonal Forecasts

The APCC seasonal forecast is based on multi-model ensemble (MME) prediction system and disseminated to APEC member economics around 20th of every month. Currently, 15 operational centers and research institutes from 11 countries around the world participate in the APCC MME operational prediction system by routinely providing their predictions in the form of ensembles of global forecast fields. The APCC's real-time operational forecasts are issued in both deterministic (based on ensemble mean) and probabilistic (based on full set of ensemble members) forms.

Deterministic MME Forecast

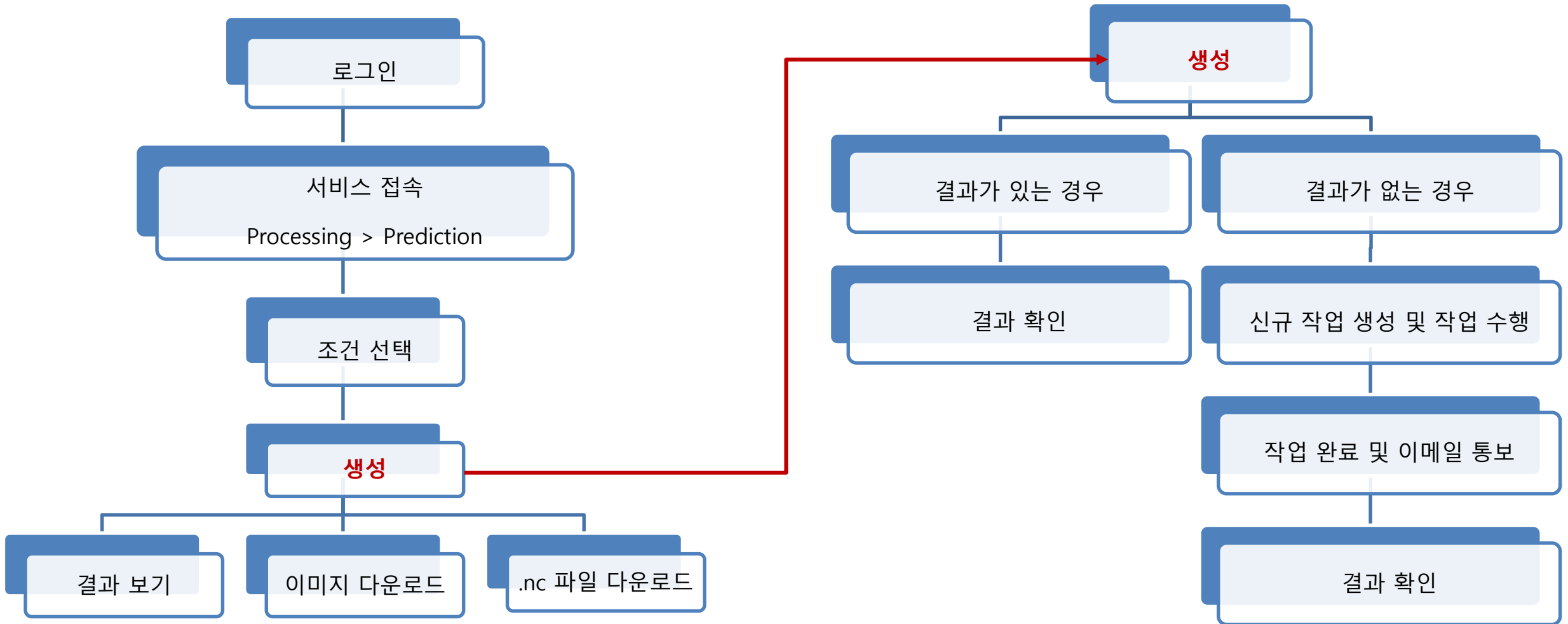
The deterministic forecast is based on a simply average of bias-corrected ensemble means from each model with equal weight to create a multi-model forecast. The ensemble mean anomaly forecasts for each individual model is calculated by their own climatology from the hindcasts.

Probabilistic MME Forecast

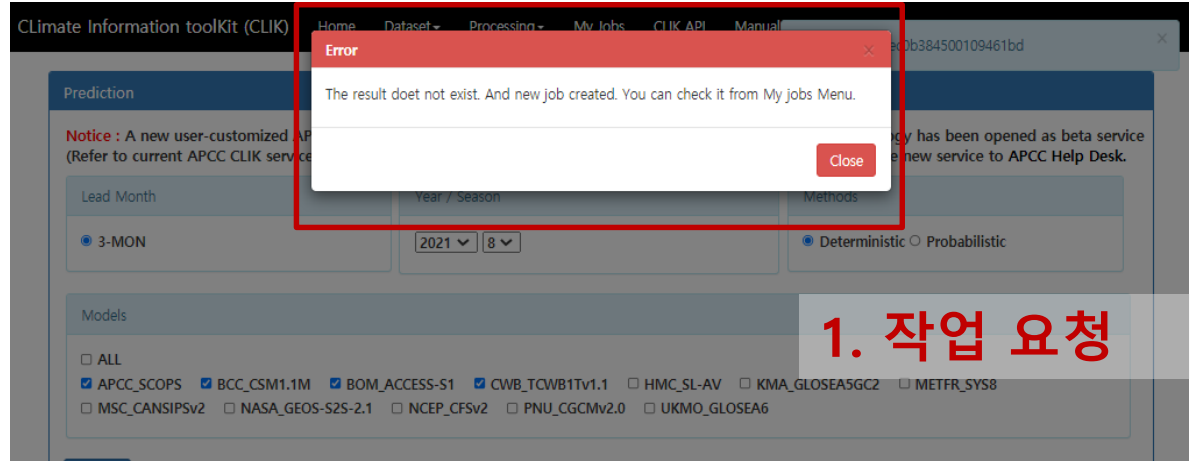
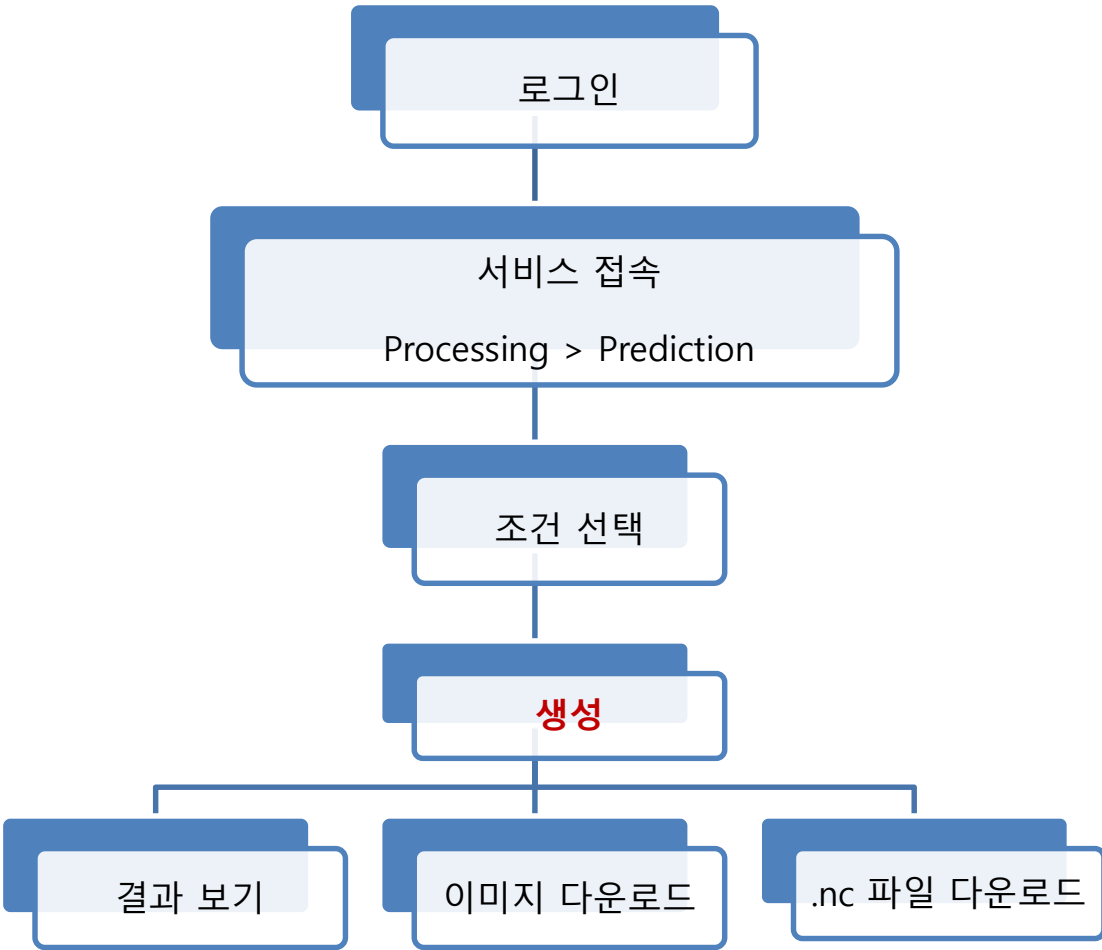
The probabilistic forecast is based on an uncalibrated MME with model weights being proportional to the square root of ensemble size, and a Gaussian fitting method for the estimation of the tercile-based categorical probabilities, that is, the probability of below-normal (BN), near-normal (NN), and above-normal (AN) categories with respect to climatology.

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| Prediction 시작하기 - 5 (생성 과정)



| Prediction 시작하기 - 6 (동일한 결과가 없는 경우)



1. 작업 요청

2 생성 작업 확인

Job type	Submission date	End date	Status
Prediction	2021-08-13 15:49:16		Running
Prediction	2021-08-13 15:46:17	2021-08-13 15:47:59	Download View
Prediction	2021-08-13 15:44:22	2021-08-13 15:45:57	Failed
Prediction	2021-08-13 14:58:31	2021-08-13 15:00:13	Failed

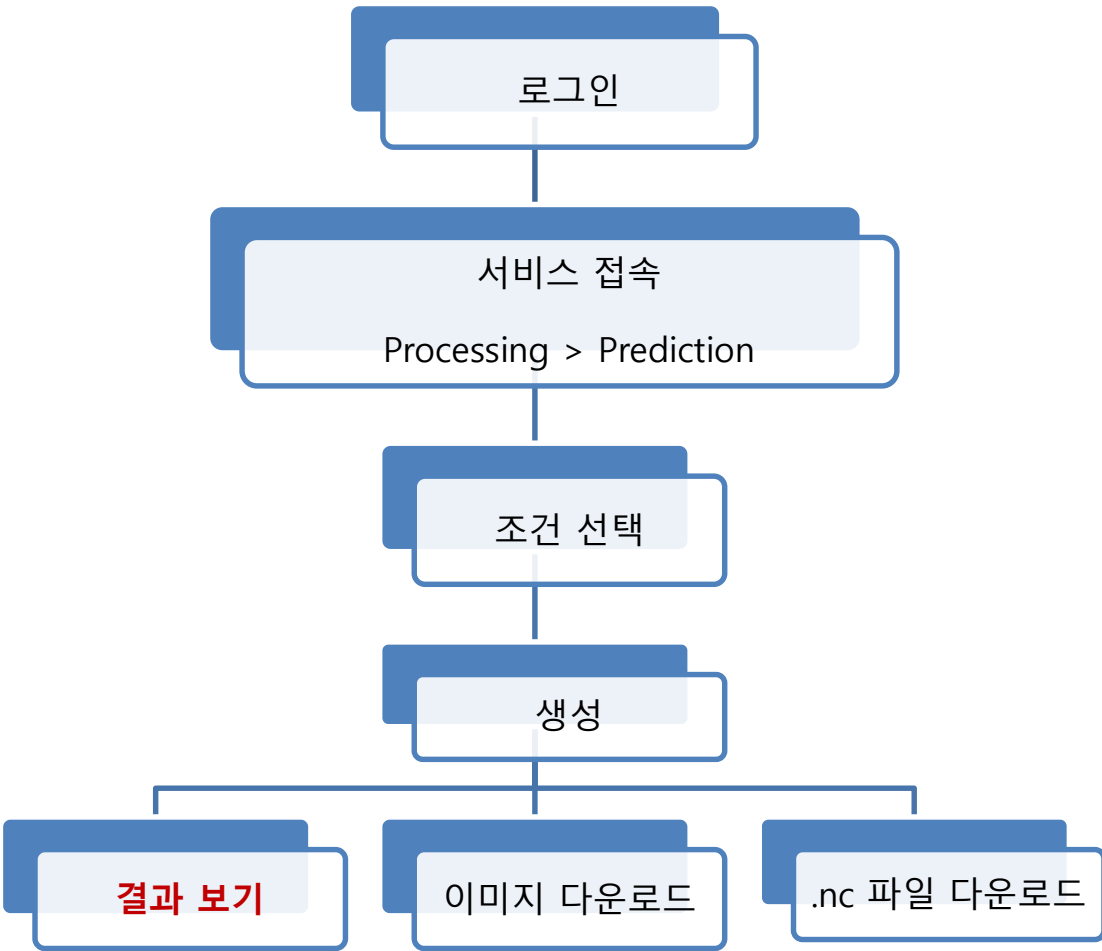
제목 : Notification of job status (APCC) ☆
 보낸사람 : APCC <support@apcc21.org>
 받는사람 : '김상철' <sclow@apcc21.org>
 Your job (611615ec0b384500109461bd) was completed. Please check the [My Jobs] of the homepage, and download results.
 If you have any question, please use APCC Help desk.
 APCC Homepage: <https://www.apcc21.org>
 CLIks Homepage: <https://cliks.apcc21.org>

4. 다운로드 / 결과확인

Job type	Submission date	End date	Status
Prediction	2021-08-13 15:49:16	2021-08-13 15:51:01	Download View
Prediction	2021-08-13 15:46:17	2021-08-13 15:47:59	Download View
Prediction	2021-08-13 15:44:22	2021-08-13 15:45:57	Failed
Prediction	2021-08-13 14:58:31	2021-08-13 15:00:13	Failed

3 생성 작업 완료 메일

| Prediction 시작하기 - 7 (동일한 결과가 있는 경우)



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Prediction

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Lead Month: 3-MON Year / Season: 2021 / 8 Methods: Deterministic Probabilistic

Models:

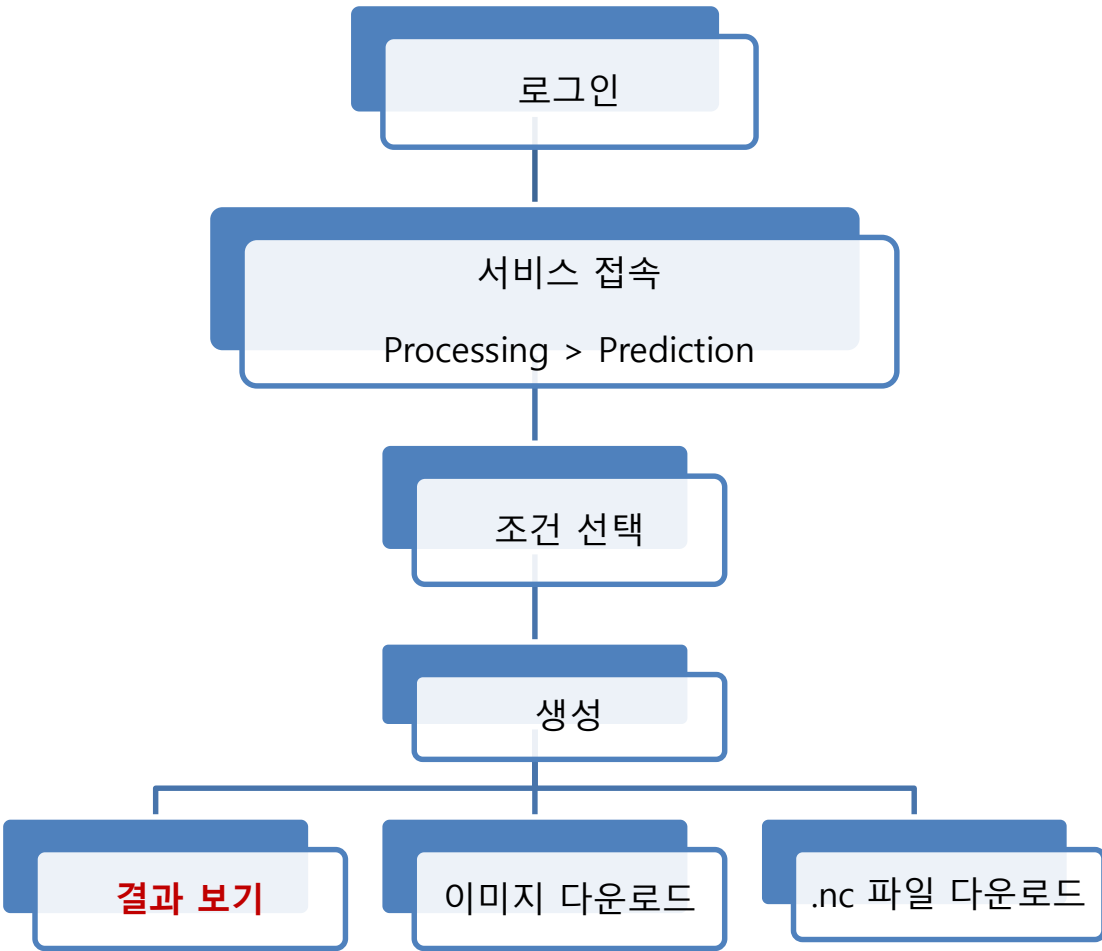
- ALL
- APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5G2 METFR_SYS8
- MSC_CANSIPV2 NASA_GEOS-S2S-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

Predict Download (.png) Download (.nc)

PREC (Precipitation) SLP (Sea Level Pressure) SST (Sea Surface Temperature)

T2M (Temperature at 2m) T850 (Temperature at 850hPa) Z500 (Geopotential Height at 500hPa)

| Prediction 시작하기 - 8 (결과 이미지 클릭)



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Prediction

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Lead Month: 3-MON Year / Season: 2021

Models:

- ALL
- APCC_SCOPS
- BCC_CSM1.1M
- BOM_ACCESS-S1
- MSC_CANSIPV2
- NASA_GEOS-S2S-2.1
- NCEP_CFSv2

Predict

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PREC (Precipitation) SLP (Sea Level Pressure)

원본 사이즈

Precipitation for August-October 2021

Unit:mm/day

Issued: 20 Jul, 2021 © APEC Climate Center

T2M (Temperature at 2m)

T850 (Temperature at 850hPa)

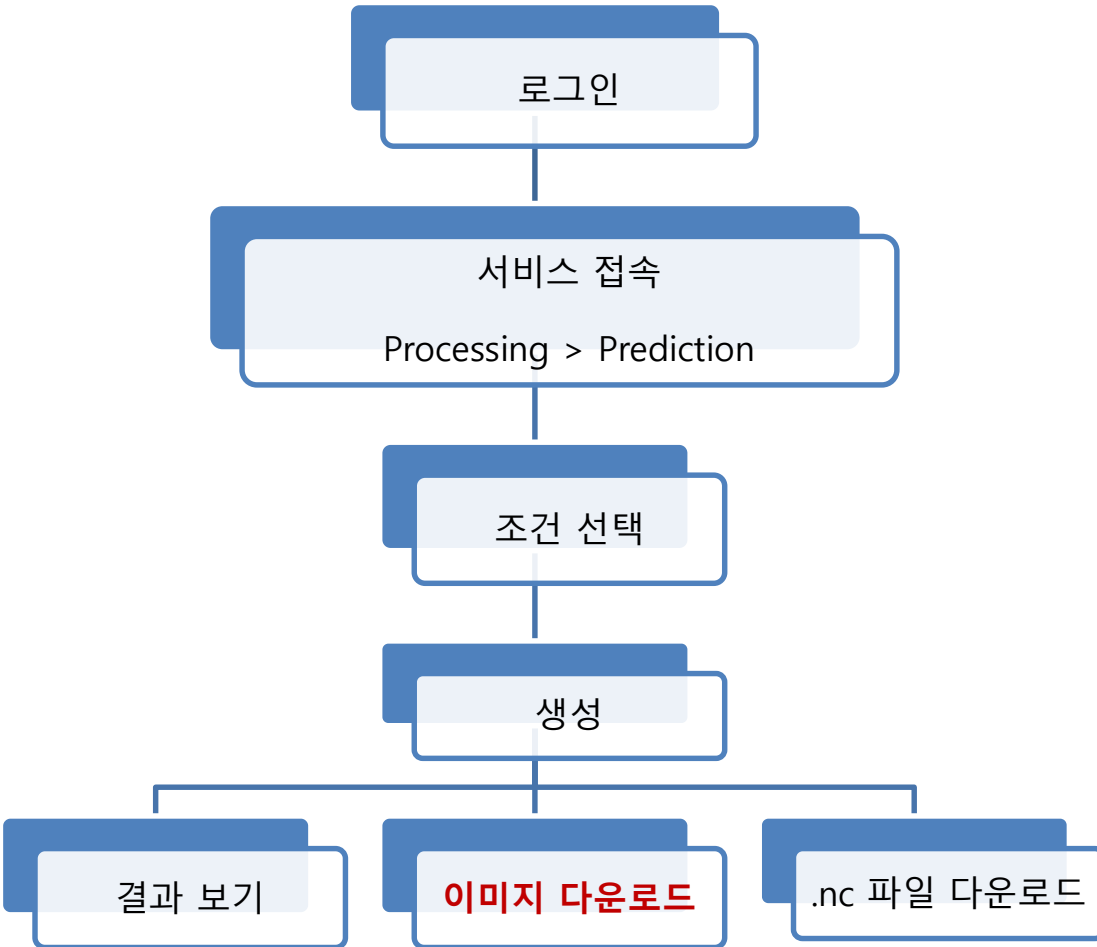
Z500 (Geopotential Height at 500hPa)

Temperature at 2m for August-October 2021

Temperature at 850hPa for August-October 2021

Geopotential height at 500hPa for August-October 2021

| Prediction 시작하기 - 9 (이미지 다운로드)



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Prediction

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Lead Month: 3-MON Year / Season: Method: 0d86d3d8-7964-44b9-81a0-15762f22...

Models: ALL APCC_SCOPS BCC_CSM1.1M BOM... MSC_CANSIPSV2 NASA_GEOS...

Predict

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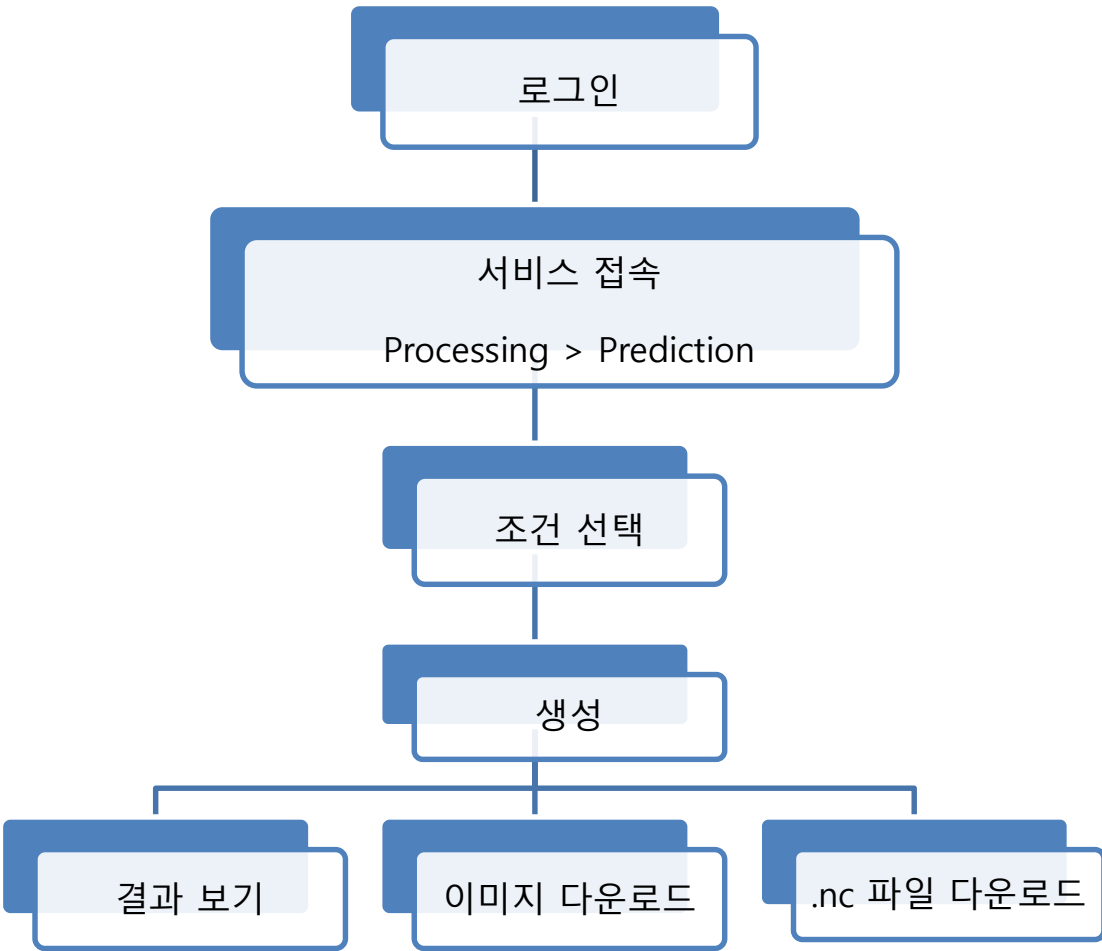
이미지 다운로드

이름	유형
3-MON_FORECAST_SCM_MME_OUT_FIG_SEASONAL_prec	PNG 파일
3-MON_FORECAST_SCM_MME_OUT_FIG_SEASONAL_slp	PNG 파일
3-MON_FORECAST_SCM_MME_OUT_FIG_SEASONAL_sst	PNG 파일
3-MON_FORECAST_SCM_MME_OUT_FIG_SEASONAL_t2m	PNG 파일
3-MON_FORECAST_SCM_MME_OUT_FIG_SEASONAL_t850	PNG 파일
3-MON_FORECAST_SCM_MME_OUT_FIG_SEASONAL_z500	PNG 파일

PREC (Precipitation) SLP (Sea Level Pressure) SST (Sea Surface Temperature)

T2M (Temperature at 2m) T850 (Temperature at 850hPa) Z500 (Geopotential Height at 500hPa)

| Prediction 시작하기 - 10 (nc 파일 다운로드)



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Prediction

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Lead Month: 3-MON Year / Season: [Blank] Methods: [Blank]

다운... > 7aa5bca1-b9a8-4b07-8f66-02517c0ae... 7aa5bca1-b9a8-4b07

Models:

- ALL
- APCC_SCOPS
- BCC_CSM1.1M
- BOM_ACC
- MSC_CANSIPsv2
- NASA_GEOS-S2S-2.1

Predict Download (.png) **Download (.nc)**

.nc 파일 다운로드 (Red arrow pointing to Download (.nc) button)

이름	유형
3-MON_FORECAST_SCM_MME_OUT_DATA_SEASONAL_prec.nc	NC 파일
3-MON_FORECAST_SCM_MME_OUT_DATA_SEASONAL_slp.nc	NC 파일
3-MON_FORECAST_SCM_MME_OUT_DATA_SEASONAL_sst.nc	NC 파일
3-MON_FORECAST_SCM_MME_OUT_DATA_SEASONAL_t2m.nc	NC 파일
3-MON_FORECAST_SCM_MME_OUT_DATA_SEASONAL_t850.nc	NC 파일
3-MON_FORECAST_SCM_MME_OUT_DATA_SEASONAL_z500.nc	NC 파일

PREC (Precipitation) SLP (Sea Level Pressure) SST (Sea Surface Temperature)

T2M (Temperature at 2m) T850 (Temperature at 850hPa) Z500 (Geopotential Height at 500hPa)

| Verification – Overview

APCC 기후예측 검증

- 다중 모델 앙상블(Multi-Model Ensemble, MME) 기법에 기반
- 결정론적(Deterministic) 및 확률론적(Probability) 계절예측정보
- 3개월, 6개월 전망 제공
- 다양한 검증 기법을 통하여 예측정보의 계절적 특성 및 예측성에 대한 검증 정보도 제시

성공률 (Success Rate, SR)

- 시도 횟수 중 성공의 비율 또는 백분율
 - ~ 0.33 : Poor skill region
 - 0.33 ~ 0.66 : Reasonable skill region
 - 0.66 ~ : High skill region

이상상관계수 (Anomaly Correlation Coefficient, ACC)

- 특정 시간에 대한 기후평년값 대비 예측 편차값(Anomaly)이 관측과 공간적으로 얼마나 유사한지 평가하는 척도
- 기후평년값은 장기간 일별, 순별, 월별, 년별로 평균한 값을 의미하며, 세계 기상기구(WMO)에서는 30년 기간을 권고
- ACC는 최하 -1.0부터 최대 +1.0의 값의 범위로 +1.0에 가까울수록 관측과 공간분포의 유사성이 크다고 할 수 있음

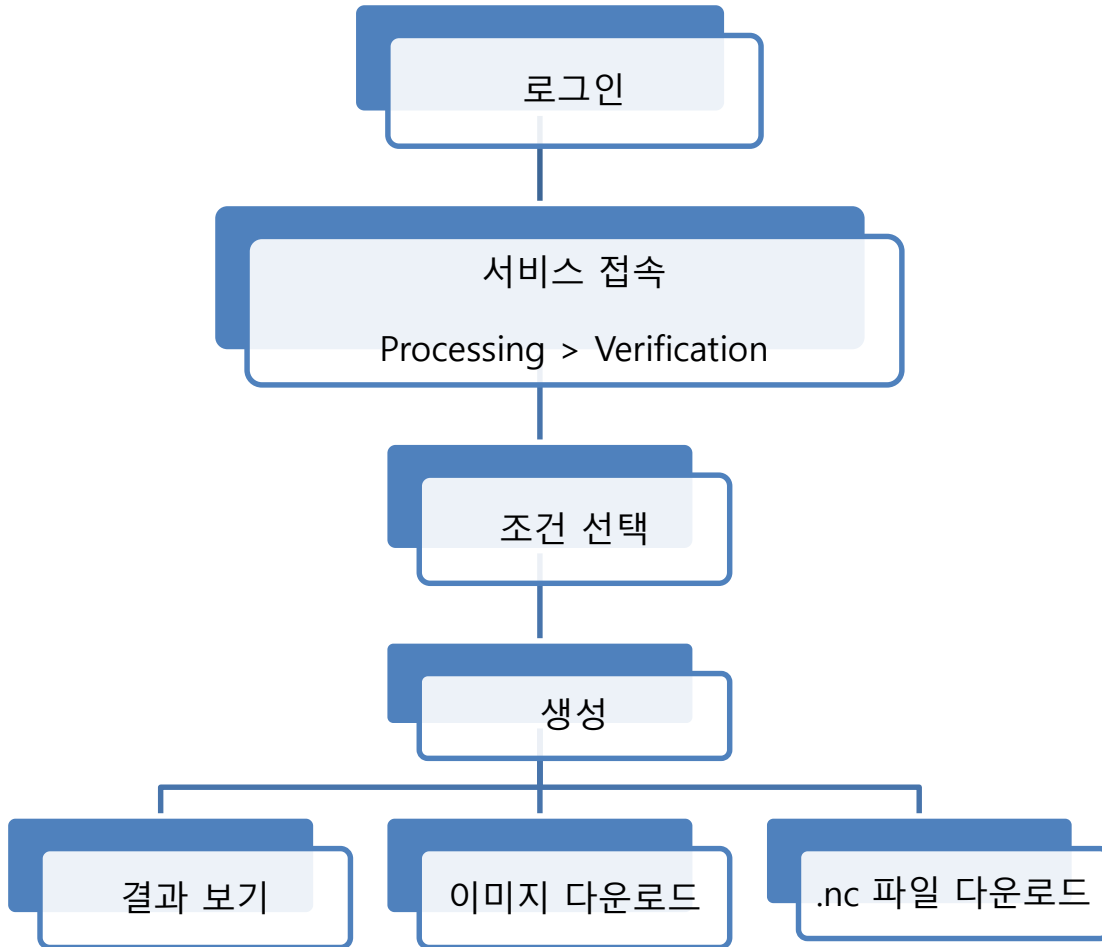
HSS (Heidke Skill Score)

- 확률론적 계절예측의 카테고리에 대하여 정확히 예측된 값과 적중된 값(횟수)을 구분하여 평가하는 척도
- HSS는 100에 가까울수록 완벽한 예측을 나타내고, -50에 가까울수록 오적중 예측임을 의미

ROC (Relative Operating Characteristics) Curve

- ROC는 확률론적 계절예측의 카테고리에 대하여 관측 대비 적중률 (Hit Rate, HR) 과 오적중률(False-Alarm Rate, FAR)을 비교 평가하는 척도
- ROC는 0과 1의 값의 범위를 가지며 곡선의 완만한 정도가 45° (ROC가 0.5 이하)와 가까울수록 예측력이 없다고 평가할 수 있으며, 곡선의 굴곡이 클수록 (ROC가 1에 가까울수록) 예측력이 높다가 평가할 수 있음

| Verification 시작하기 - 1 (Verification 페이지 접속)



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Verification

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Lead Month: 3-MON Year / Month: 2021 / 8 Skills: Success Rate ACC HSS ROC Curve

Variable: prec slp sst t2m t850 z500

Models: ALL APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5GC2 METFR_SYS8 MSC_CANSIPsv2 NASA_GEOS-S2S-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

Verify Download (.png) Download (.nc) Please login.

Success Rate(SR)
SR is the fraction or percentage of success among a number of attempts. CLIK provides a simple success rate as the DMME verification score.

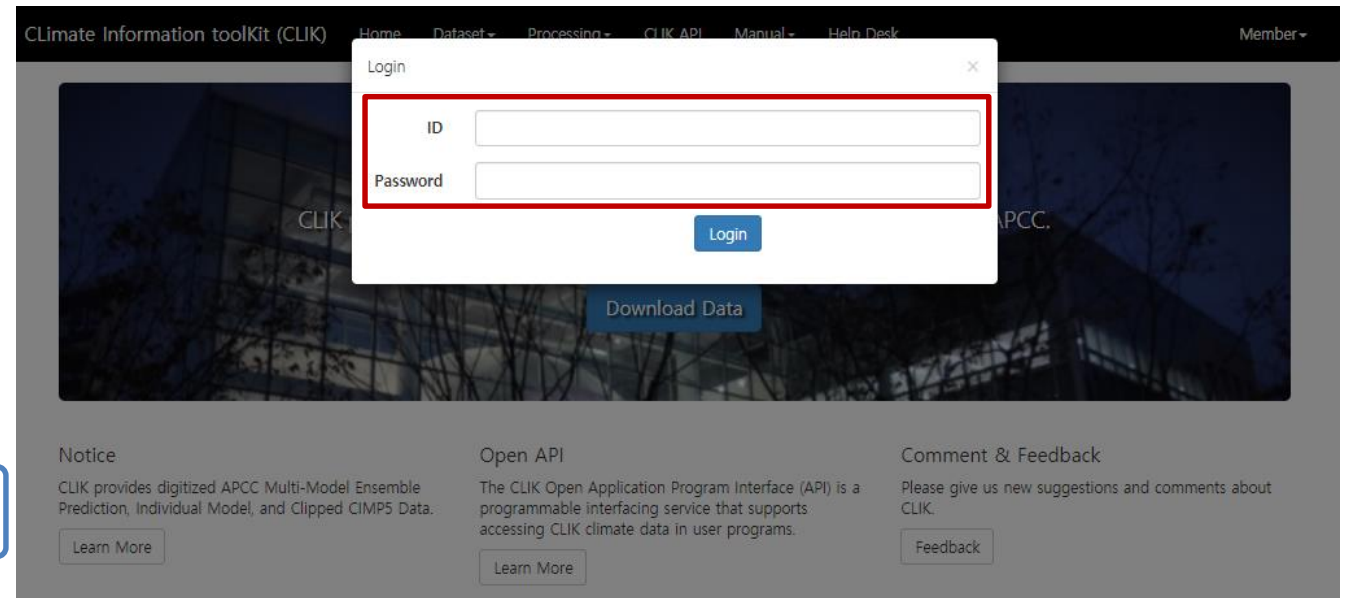
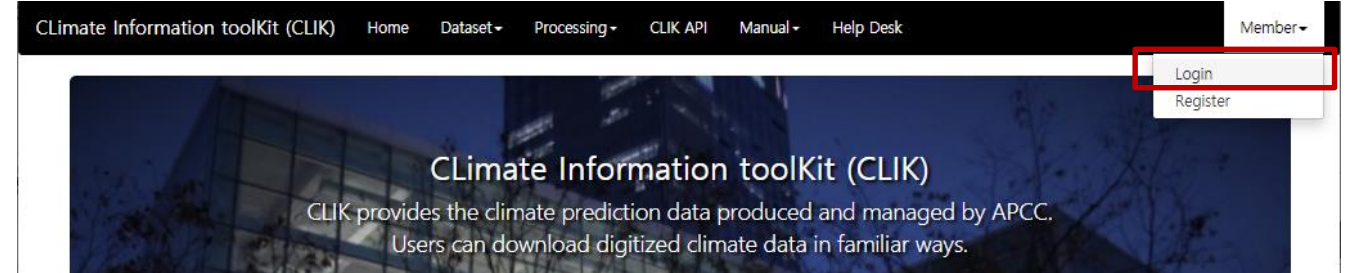
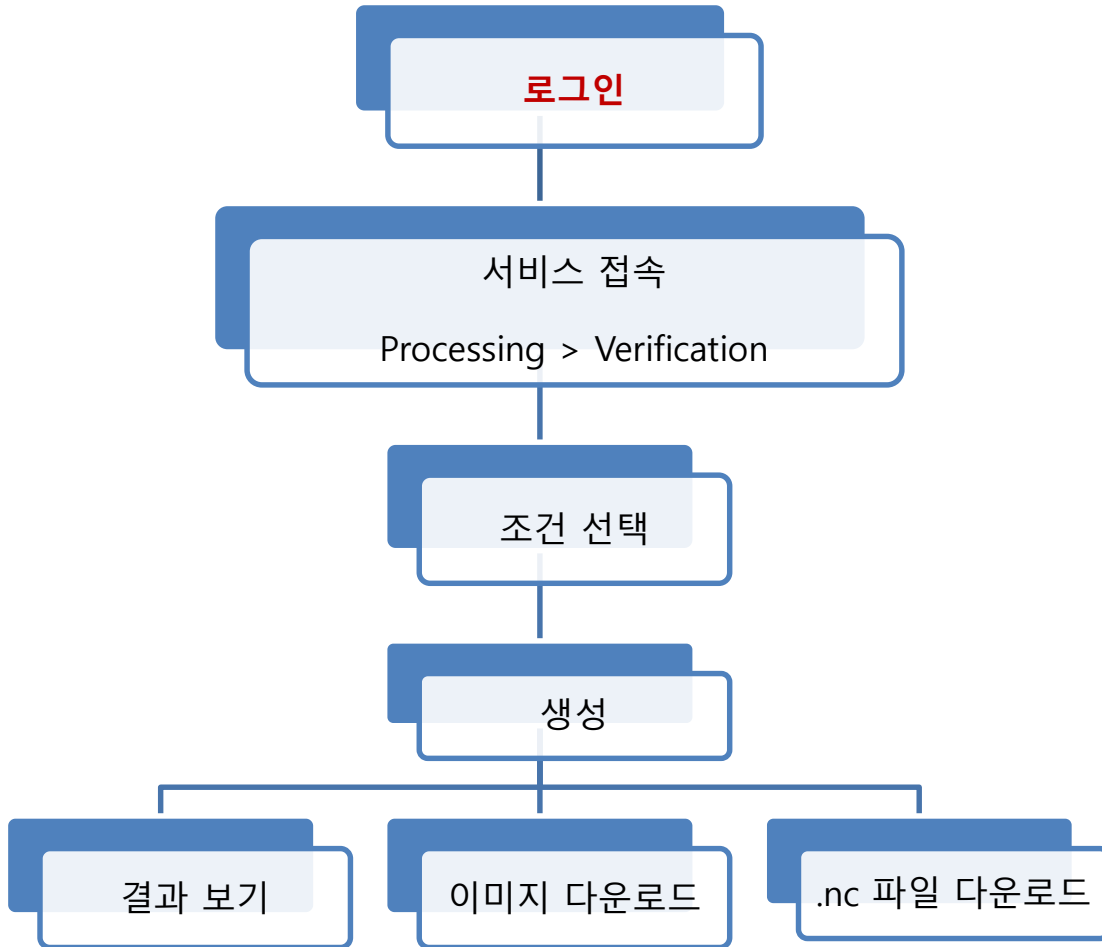
- ~ 0.33 : Poor skill region
- 0.33 ~ 0.66 : Reasonable skill region
- 0.66 ~ : High skill region

Anomaly Correlation Coefficient(ACC)
ACC is one of the most widely used measures in the verification of spatial fields and is the correlation between anomalies of forecasts and those of verifying values with the reference values, such as climatological values.

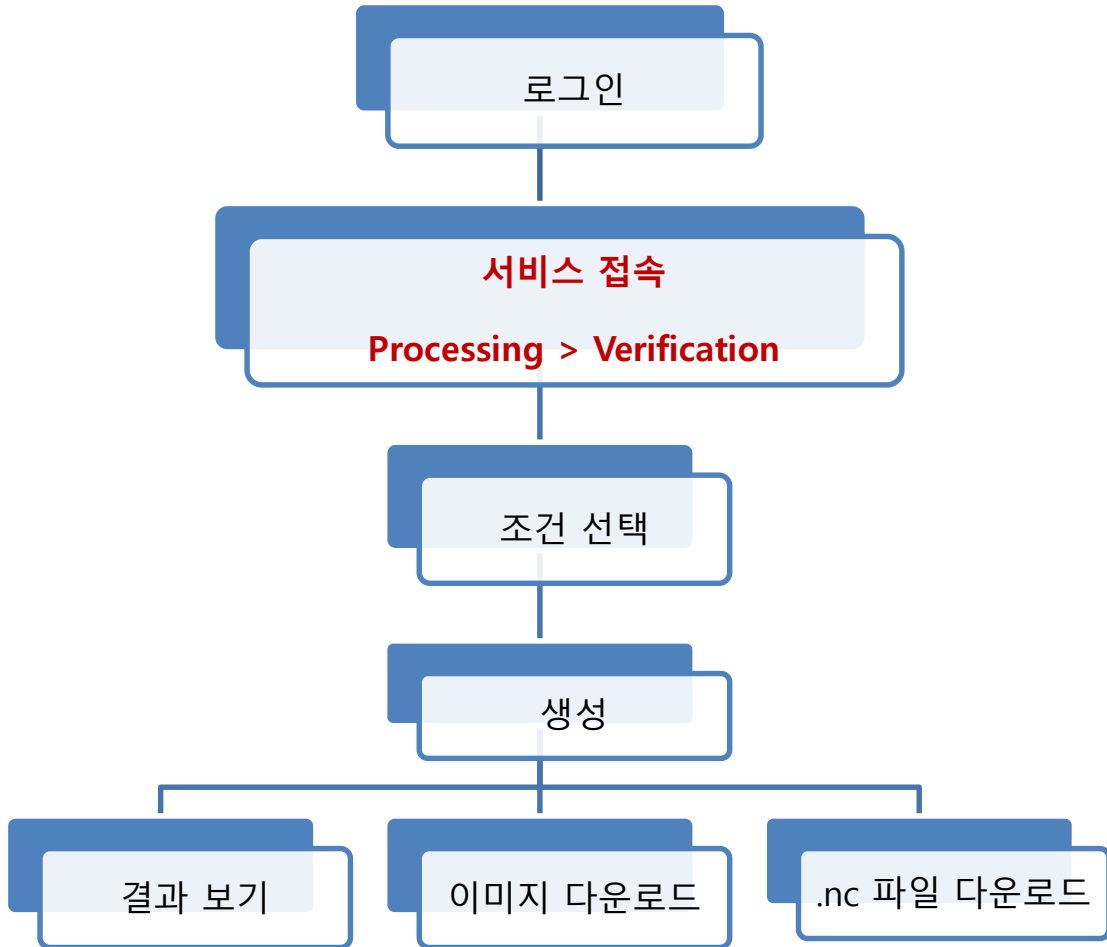
Heidke Skill Score(HSS)
HSS is commonly used skill score for the verification of categorical probabilistic forecast. Measuring the fractional improvement of the forecast over random forecast.

Relative Operating Characteristic(ROC) Curve

| Verification 시작하기 - 2 (로그인)



| Verification 시작하기 - 3 (Verification 페이지 접속)



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Verification

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Lead Month: 3-MON

Year / Month: 2021 / 8

Skills: Success Rate ACC HSS ROC Curve

Variable: prec slp sst t2m t850 z500

Models: ALL APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5GC2 METFR_SYS8 MSC_CANSIPsv2 NASA_GEOS-S2S-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

Verify

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Success Rate(SR)
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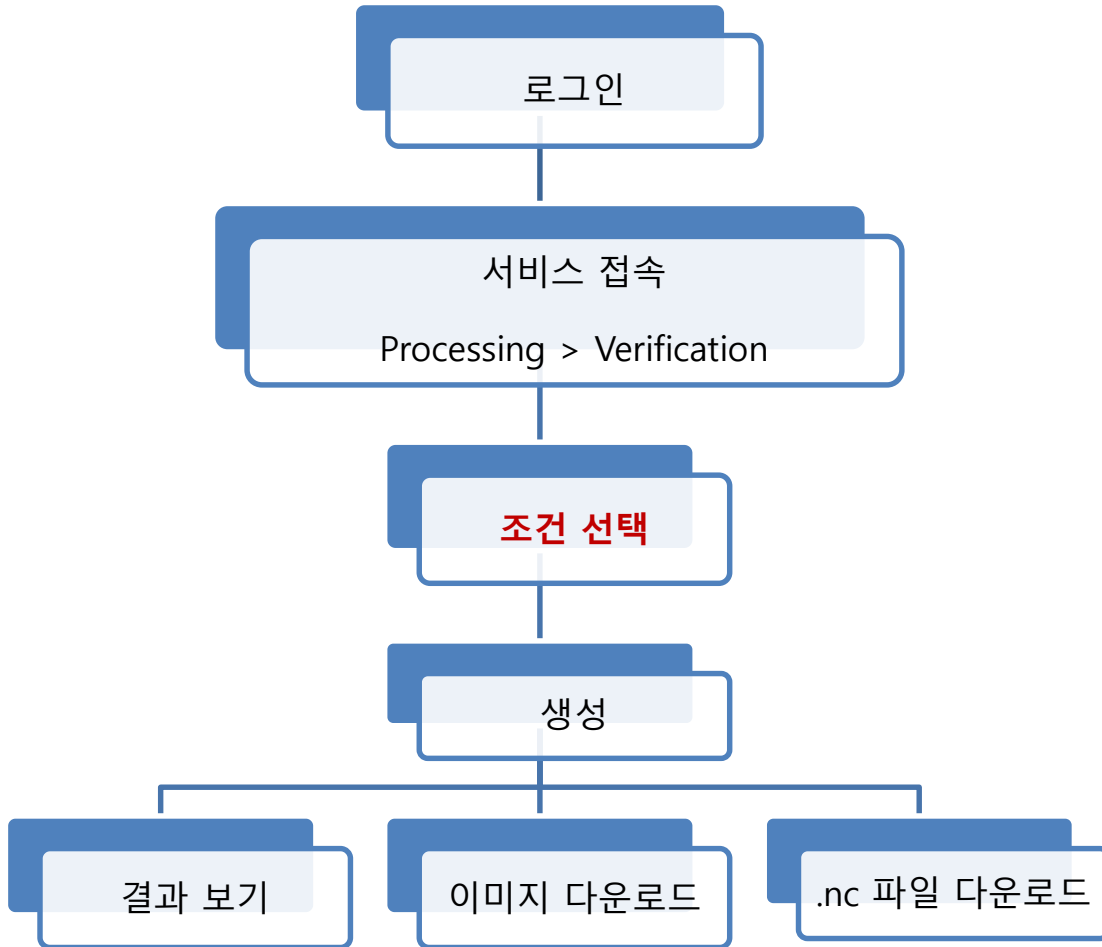
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Anomaly Correlation Coefficient(ACC)
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Heidke Skill Score(HSS)
HSS is commonly used skill score for the verification of categorical probabilistic forecast. Measuring the fractional improvement of the forecast over random forecast.

Relative Operating Characteristics(ROC) Curve

| Verification 시작하기 - 4 (조건 선택)



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Verification

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Lead Month: 3-MON (원하는 기간 선택) | Year / Month: 2021 / 8 | Skills: Success Rate ACC HSS ROC Curve (Skills 선택)

Variable: 원하는 변수를 선택 (prec slp sst t2m t850 z500)

Models: 원하는 모델을 선택 (ALL APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5GC2 METFR_SYS8 MSC_CANSIPsv2 NASA_GEOS-S2S-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6)

Verify

Download (.png) Download (.nc)

Success Rate(SR)
SR is the fraction or percentage of success among a number of attempts. CLIK provides a simple success rate as the DMME verification score.

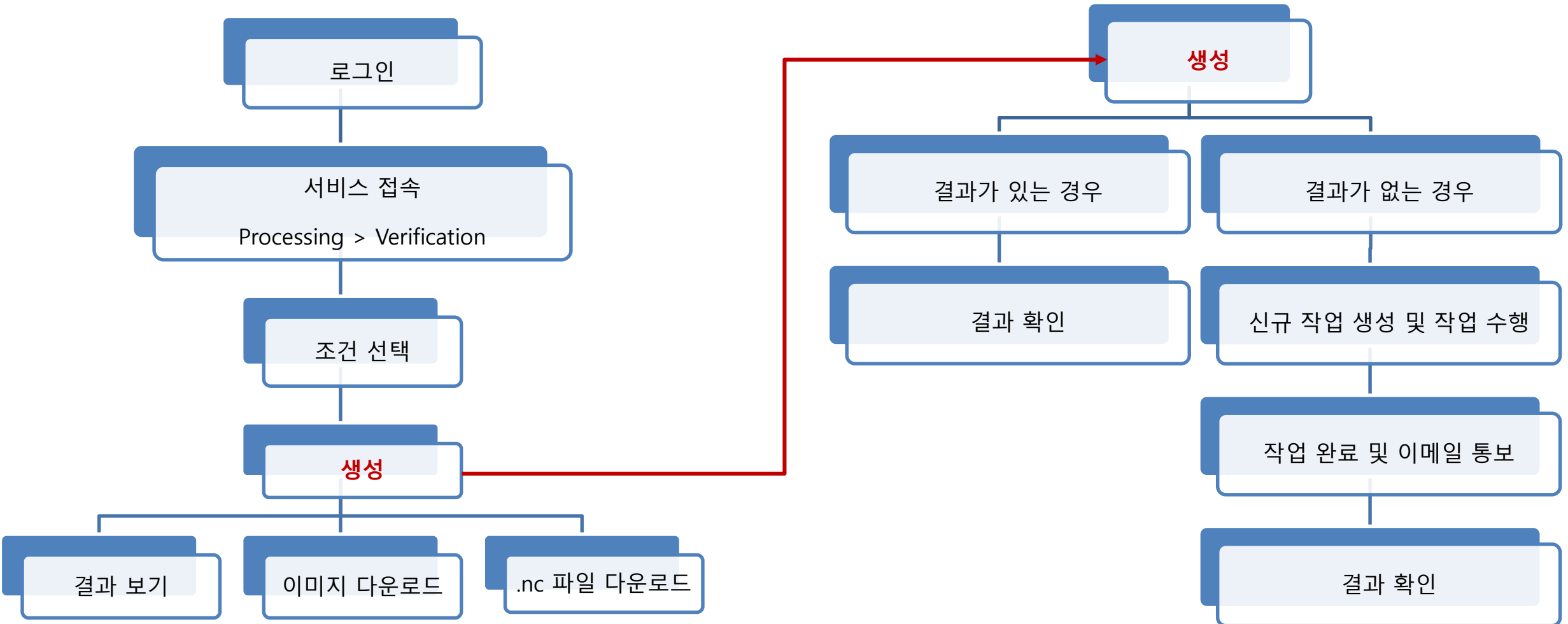
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- 0.33 ~ 0.66 : Reasonable skill region
- 0.66 ~ : High skill region

Anomaly Correlation Coefficient(ACC)
ACC is one of the most widely used measures in the verification of spatial fields and is the correlation between anomalies of forecasts and those of verifying values with the reference values, such as climatological values.

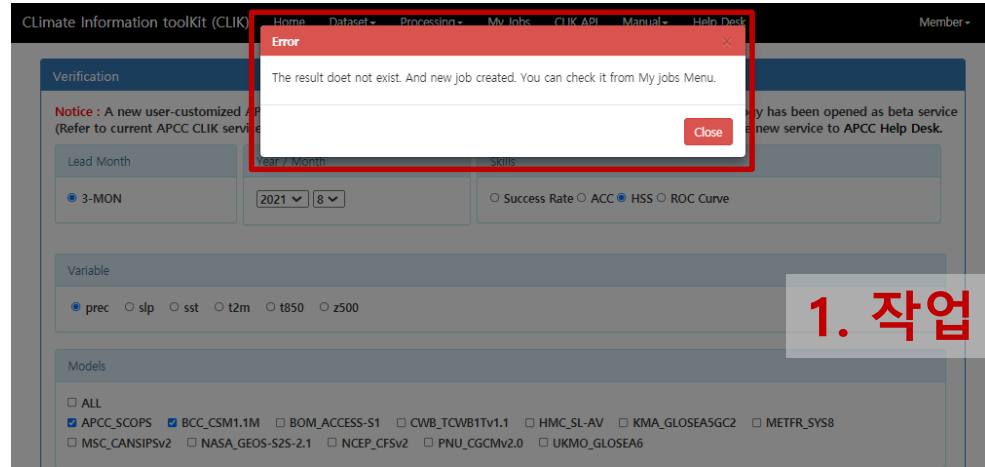
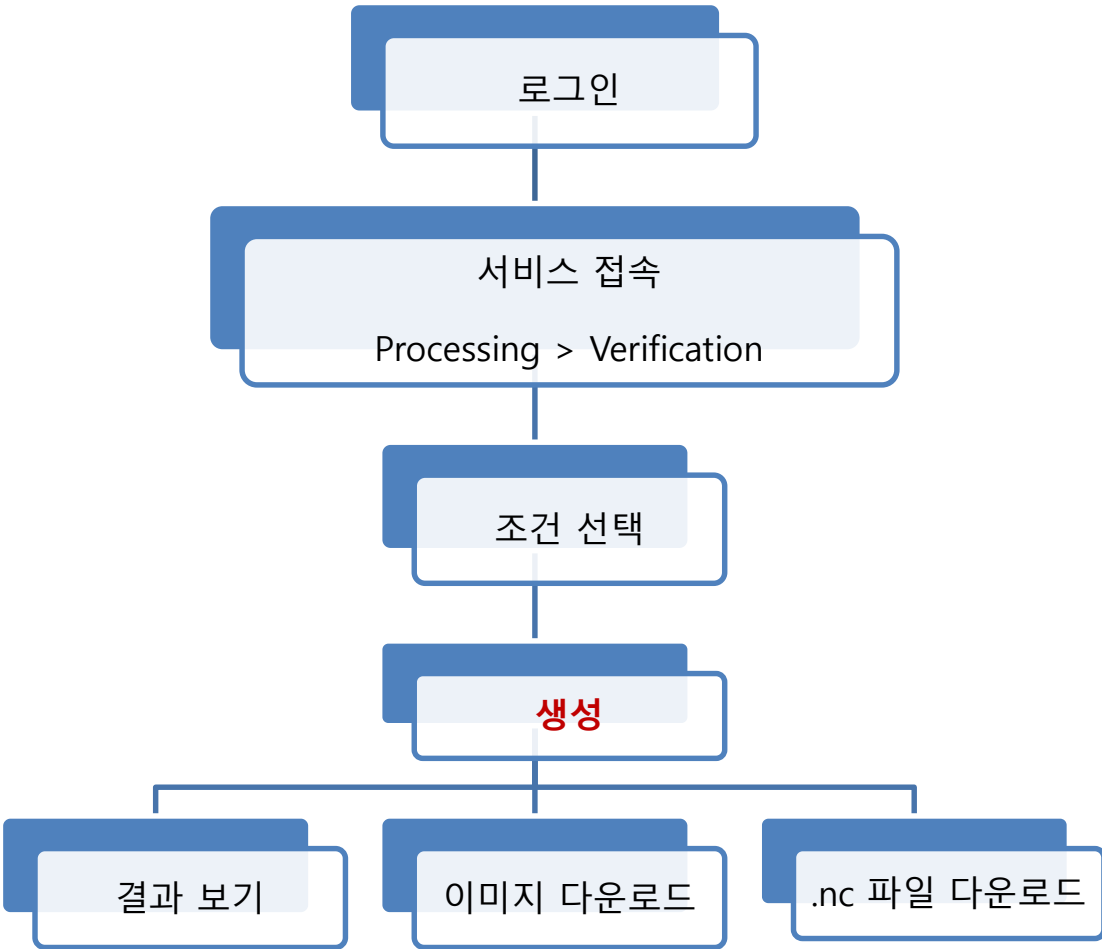
Heidke Skill Score(HSS)
HSS is commonly used skill score for the verification of categorical probabilistic forecast. Measuring the fractional improvement of the forecast over random forecast.

Relative Operating Characteristics(ROC) Curve

| Verification 시작하기 - 5 (생성 과정)



| Verification 시작하기 - 6 (동일한 결과가 없는 경우)



1. 작업 요청

2 생성 작업 확인

Job type	Submission date	End date	Status
Verification	2021-08-18 17:03:03		Running
Verification	2021-08-18 14:53:48	2021-08-18 14:53:49	Failed
Verification	2021-08-18 14:51:36	2021-08-18 14:53:22	Download View
Verification	2021-08-18 13:28:05	2021-08-18 13:29:51	Download View

제목 : Notification of job status (APCC) ☆
 보낸사람 : APCC <support@apcc21.org>
 받는사람 : '김상철' <scslow@apcc21.org>

Your job (611cbeb70b384500109461c3) was completed. Please check the [My Jobs] of the homepage, and download results.

If you have any question, please use [APCC Help desk](#).

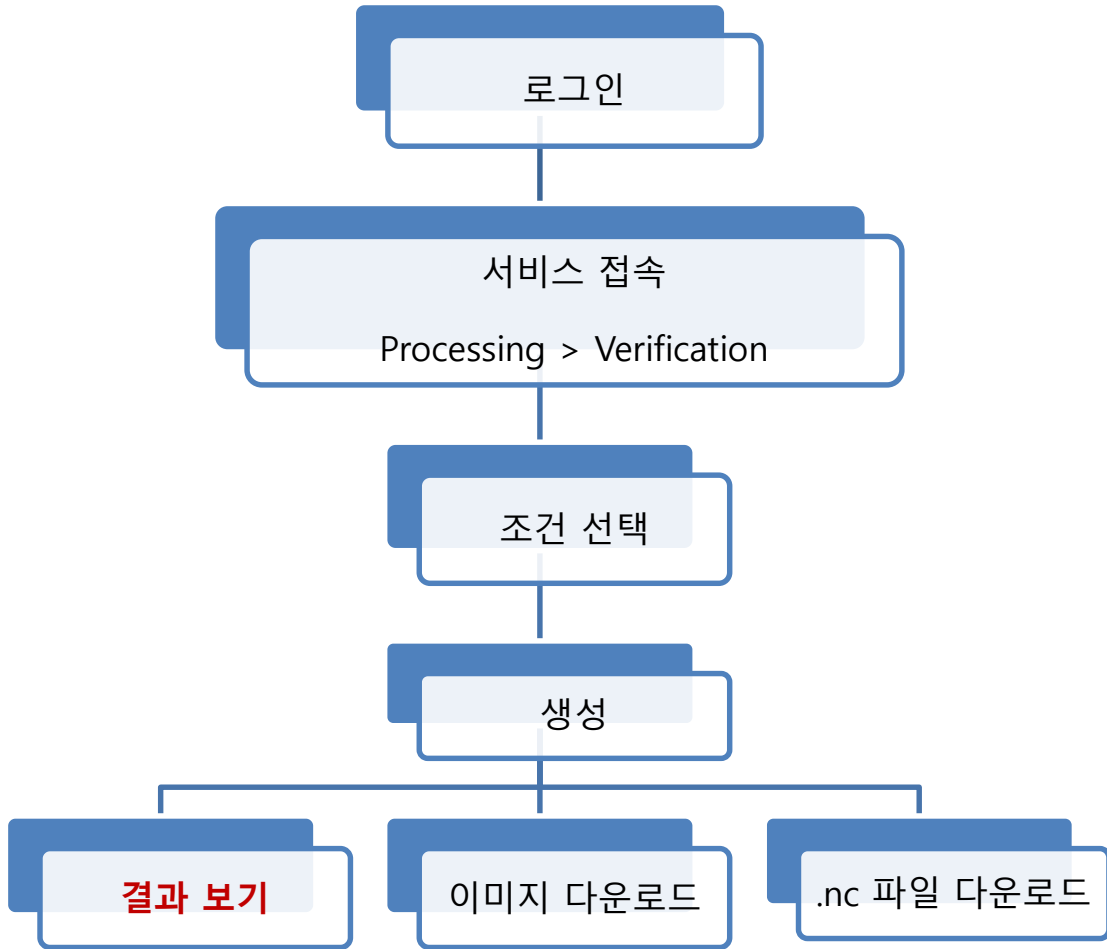
=====
 APCC Homepage: <https://www.apcc21.org>
 CLIKs Homepage: <https://cliks.apcc21.org>
 =====

3 생성 작업 완료 메일

4. 다운로드 / 결과확인

Job type	Submission date	End date	Status
Verification	2021-08-18 17:03:03	2021-08-18 17:09:26	Download View
Verification	2021-08-18 14:53:48	2021-08-18 14:53:49	Failed
Verification	2021-08-18 14:51:36	2021-08-18 14:53:22	Download View

| Verification 시작하기 - 7 (동일한 결과가 있는 경우)



CLimate Information toolKit (CLIK) Home Dataset Processing My Jobs CLIK API Manual Help Desk Member

Verification

Notice : A new user-customized APCC seasonal prediction (MME) and verification services based on platform technology has been opened as beta service (Refer to current APCC CLIK service : <https://clik.apcc21.org>). Please leave your any questions and feedbacks about the new service to APCC Help Desk.

Lead Month: 3-MON

Year / Month: 2021 / 8

Skills: Success Rate ACC HSS ROC Curve

Variable: prec slp sst t2m t850 z500

Models: ALL APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CWB_TCWB1Tv1.1 HMC_SL-AV KMA_GLOSEA5GC2 METFR_SYS8 MSC_CANSIPsv2 NASA_GEOS-S25-2.1 NCEP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

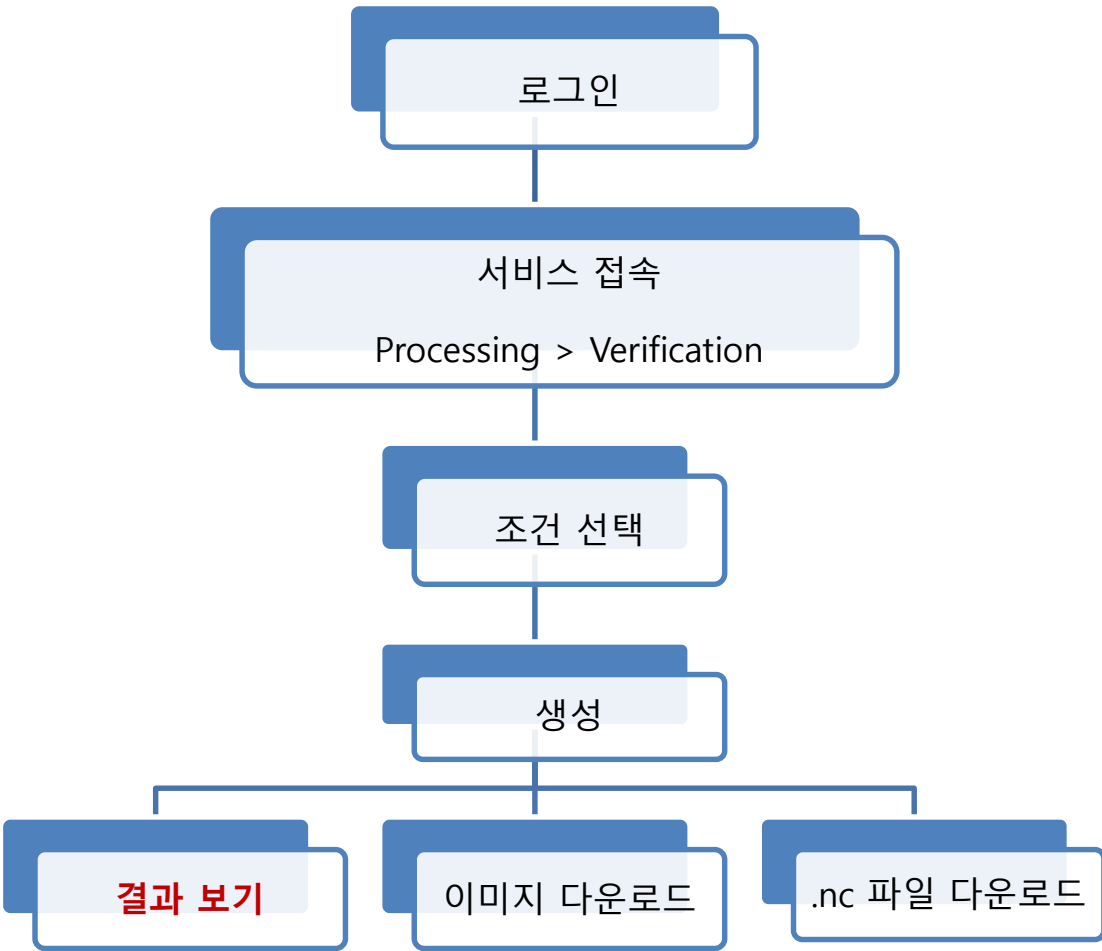
Verify

Download (.png) Download (.nc)

PREC (Precipitation)

Heidke Skill Score : PREC, ASO (1991-2013)

| Verification 시작하기 - 8 (결과 이미지 클릭)



CLimate Information toolKit (CLIK) Home Dataset Processing My Jobs CLIK API Manual Help Desk Member

Verification

Notice : A new user-customized APCC seasonal prediction (M...
(Refer to current APCC CLIK service : <https://clik.apcc21.org>).

Lead Month: 3-MON Year / Month: 2021 / 8

Variable: prec slp sst t2m t850 z500

Models: ALL APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 MSC_CANSIPsv2 NASA_GEOS-S2S-2.1 NCEP_CFSv2

Verify Download (.png) Download (.nc)

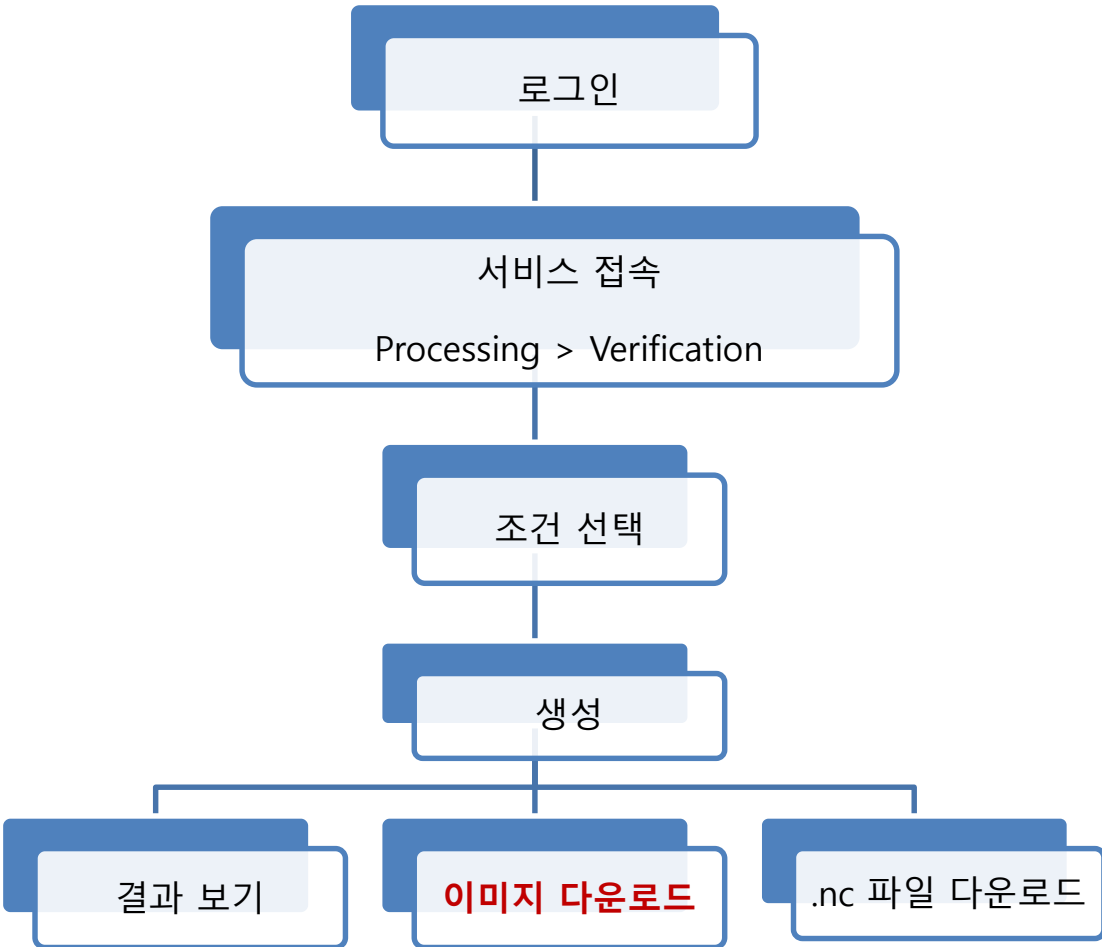
원본 사이즈

Heidke Skill Score : PREC, ASO (1991-2013)

PREC (Precipitation)

Heidke Skill Score : PREC, ASO (1991-2013)

| Verification 시작하기 - 9 (이미지 다운로드)



CLimate Information toolKit (CLIK) Home Dataset Processing My Jobs CLIK API Manual Help Desk Member

Verification

Notice : A new user-customized APCC seasonal prediction (MME) and verification services based on platform technology has been opened as beta service (Refer to current APCC CLIK service : <https://clik.apcc21.org>). Please leave your any questions and feedbacks about the new service to APCC Help Desk.

Lead Month: 3-MON Year / Month: 2021 / 8 Skills: Success Rate ACC HSS ROC Curve

Variable: prec slp sst t2m t850 9b0113f0-d410-4286-ac83-aaa058ce7a91 9b0113f0-d410-4286-ac83-a...

Models: ALL APCC_SCOPS BCC_CSM1.1M BOM_ACCESS-S1 CMBB_ICVVB11V1.1 FIMC_3L-AV KMA_GLOSEA5G2 METFR_SYS8 MSC_CANSIPsv2 NASA_GEOS-5 NCTP_CFSv2 PNU_CGCMv2.0 UKMO_GLOSEA6

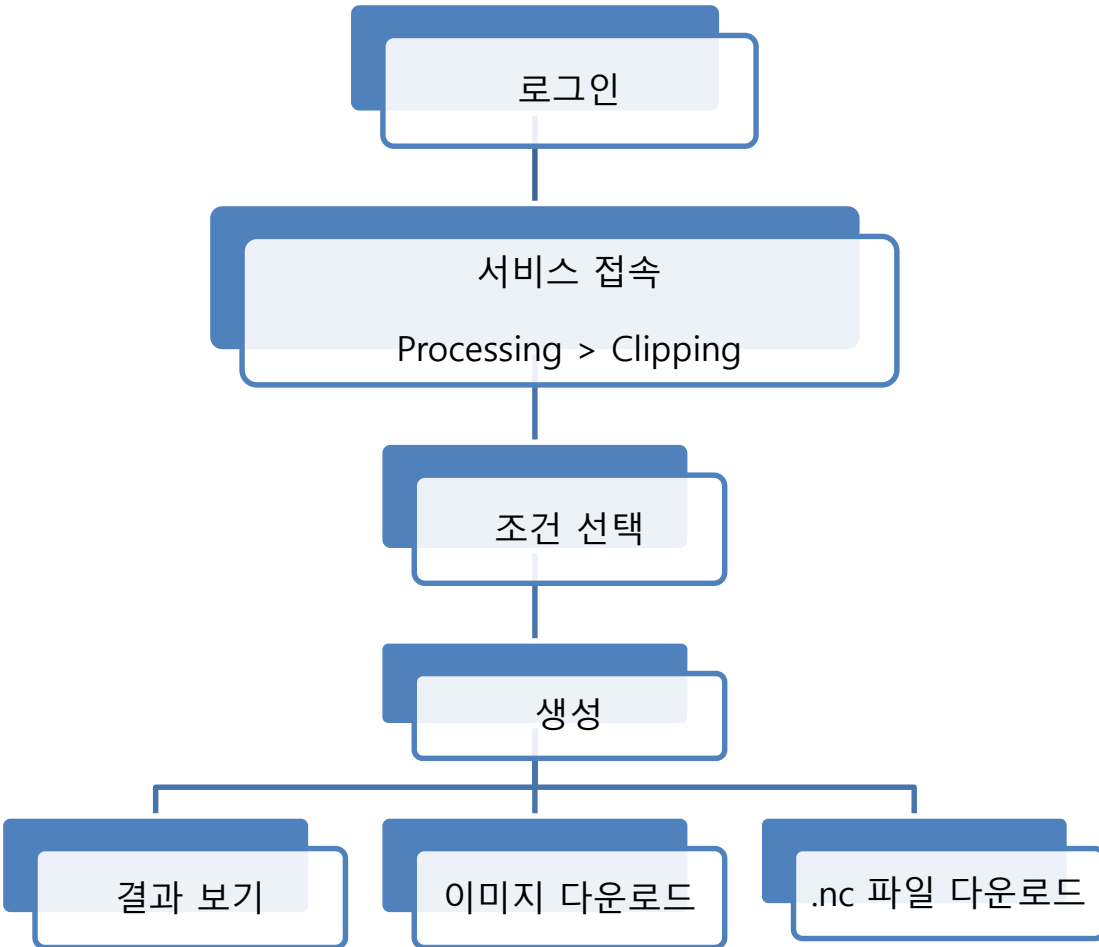
Verify Download (.png) Download (.nc)

PREC (Precipitation)

Heidke Skill Score : PREC, ASO (1991-2013)

APCC APEC CLIMATE CENTER

| Clipping 시작하기 - 1 (Clipping 페이지 접속)



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

MME Individual Model
 Variable: Precipitation
 Leadtime: 3Month
 Method: Deterministic_Monthly
 Issued: 2021 / 01

Coordinate: 0 90 360
 Mean
 Anomaly
 Climatology Period: ~

Region: Global

Data Plot

Monthly Precipitation (2020/12) Monthly Precipitation (2021/01) Monthly Precipitation (2021/02)

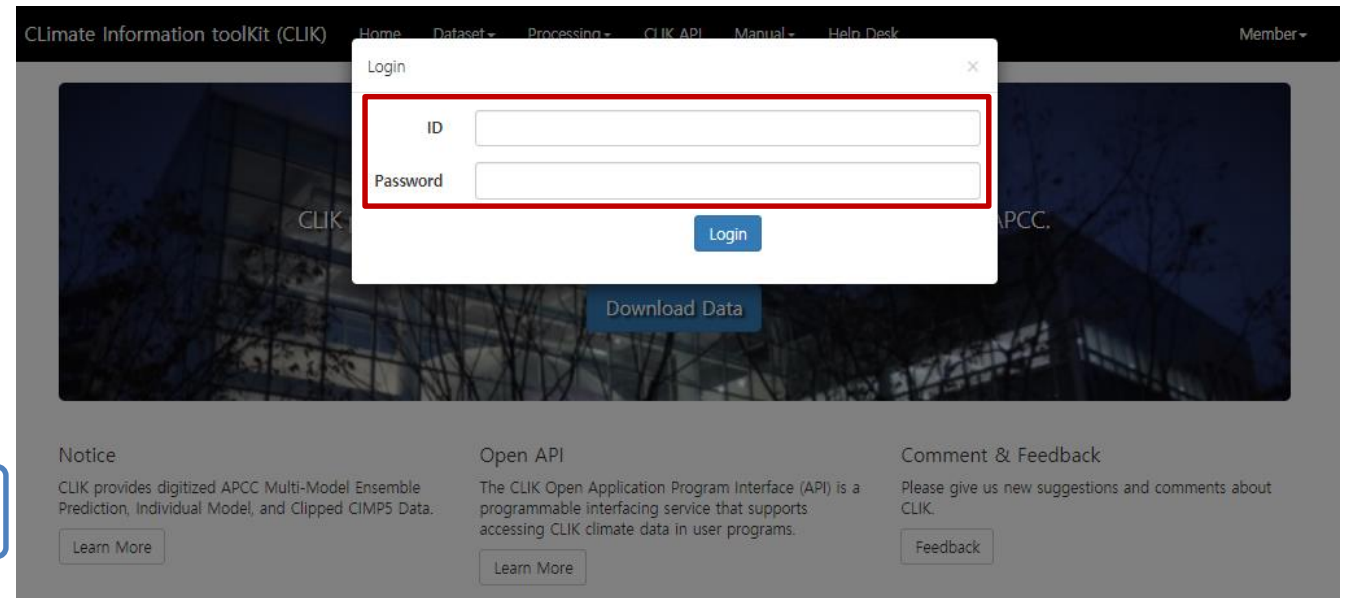
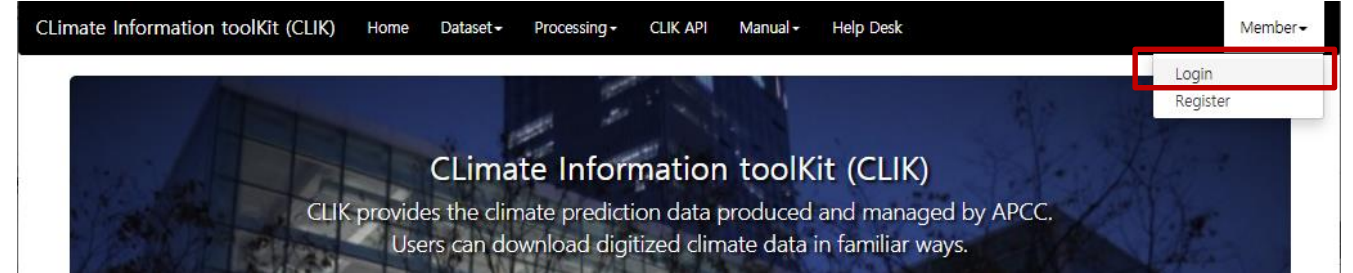
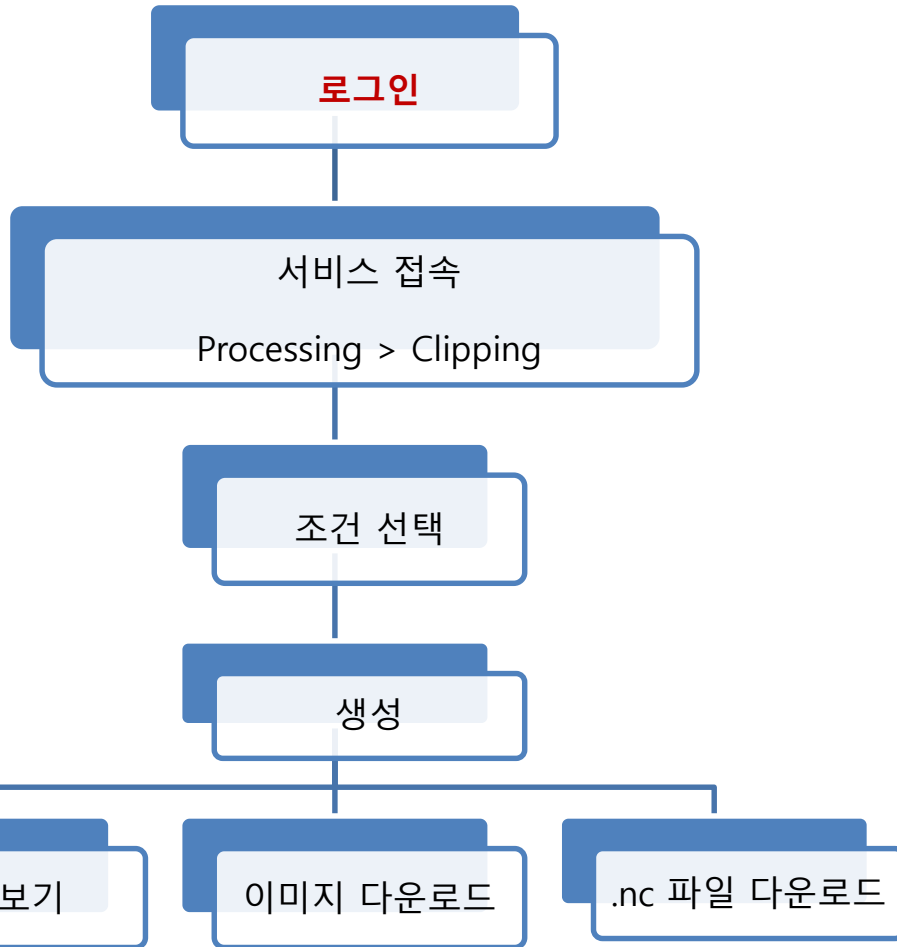
Data Clipping (rectangle)

Forecast Hindcast: ~ Output file format: NetCDF(.nc)

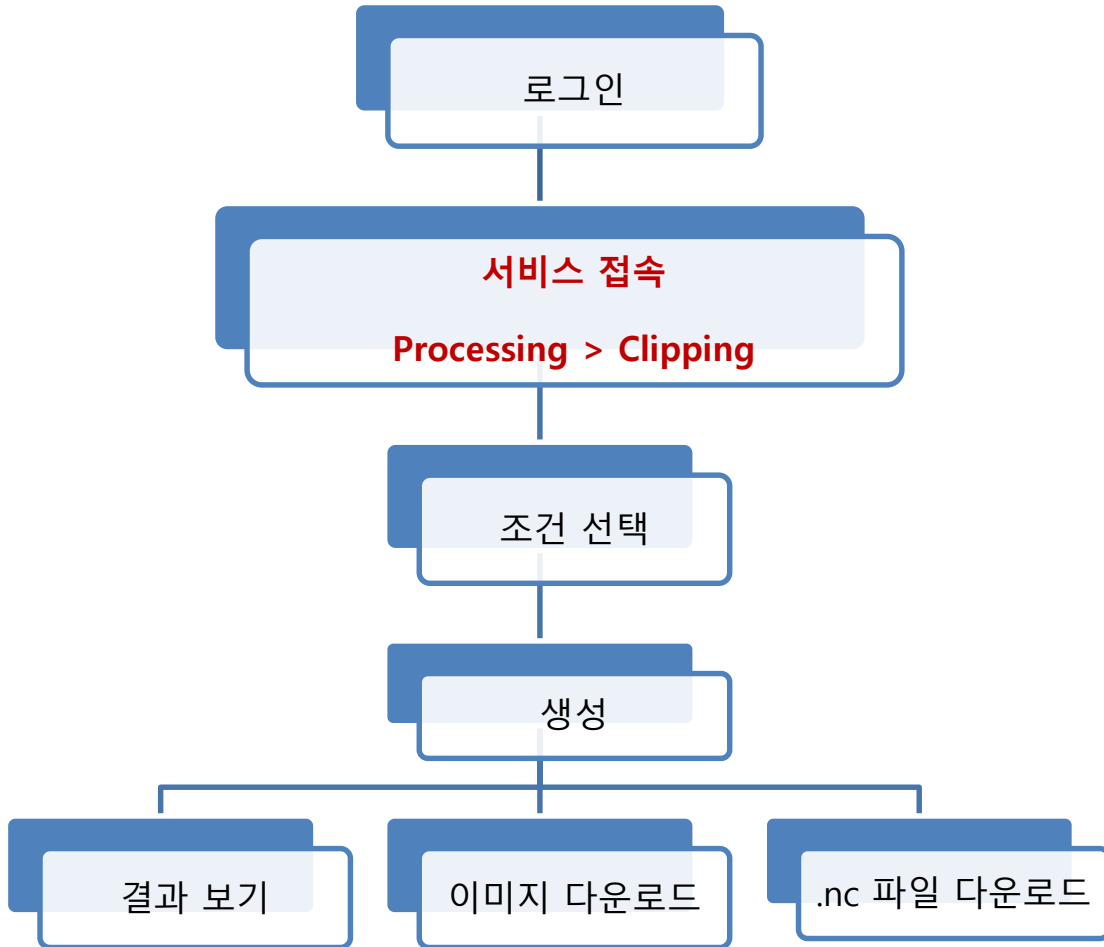
Run for data clipping

<https://cliks.apcc21.org>

| Clipping 시작하기 - 2 (로그인)



| Clipping 시작하기 - 3 (Clipping 페이지 접속)



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

MME Individual Model
 Variable: Precipitation
 Leadtime: 3Month
 Method: Deterministic_Monthly
 Issued: 2021 / 01

Coordinate: 90, 0, -90, 360
 Region: Global
 Mean
 Anomaly
 Climatology Period: ~

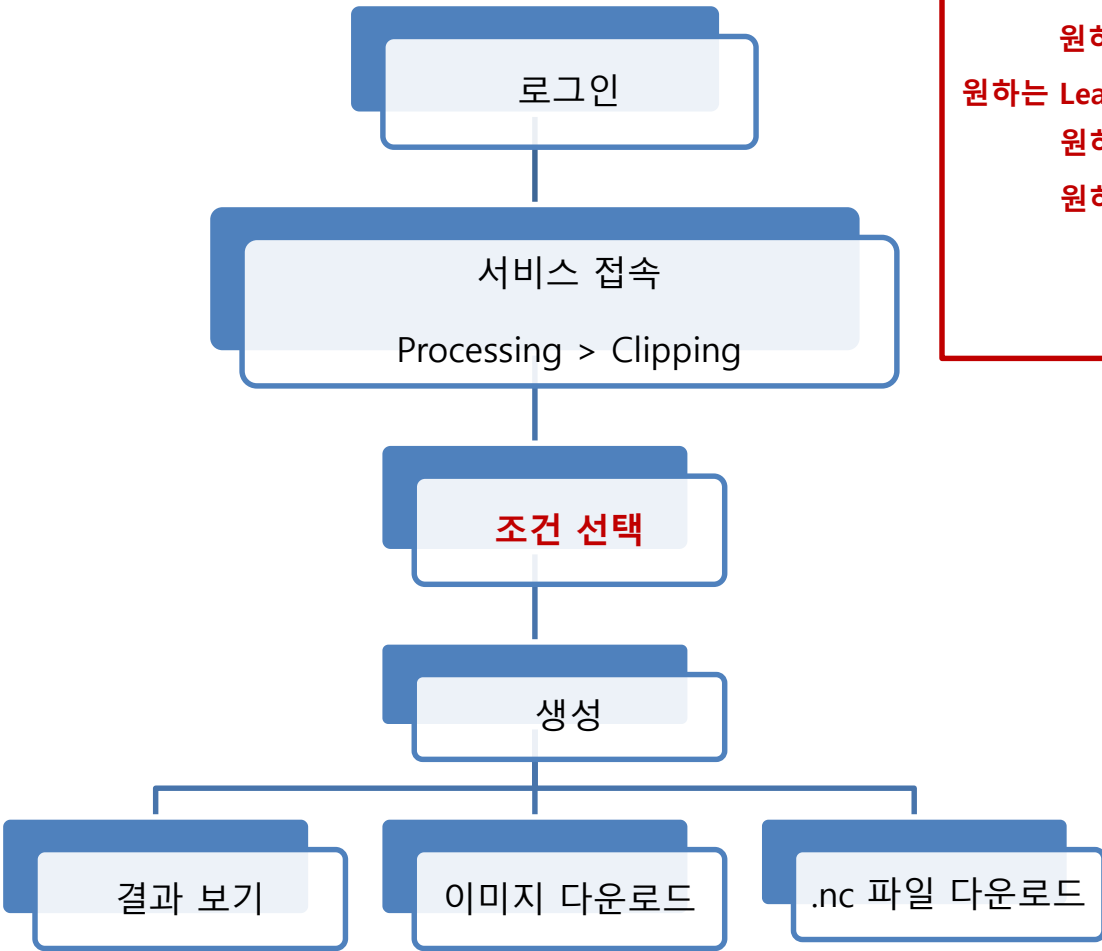
Data Plot

Data Clipping (rectangle)

Forecast Hindcast: ~
 Output file format: NetCDF(.nc)
 Run for data clipping

<https://cliks.apcc21.org>

Clipping 시작하기 - 4 (조건 선택)



원하는 변수 선택
원하는 LeadMonth 선택
원하는 모델 선택
원하는 기간 선택

원하는 추출 좌표/지역 선택

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

MME Individual Model

Variable: Precipitation

Leadtime: 3Month

Method: Deterministic_Monthly

Issued: 2021 / 01

Coordinate: Mean Anomaly

Region: Global

Climatology Period: ~

Data Plot

Monthly Precipitation (2020/12)

Monthly Precipitation (2021/01)

Monthly Precipitation (2021/02)

Data Clipping (rectangle)

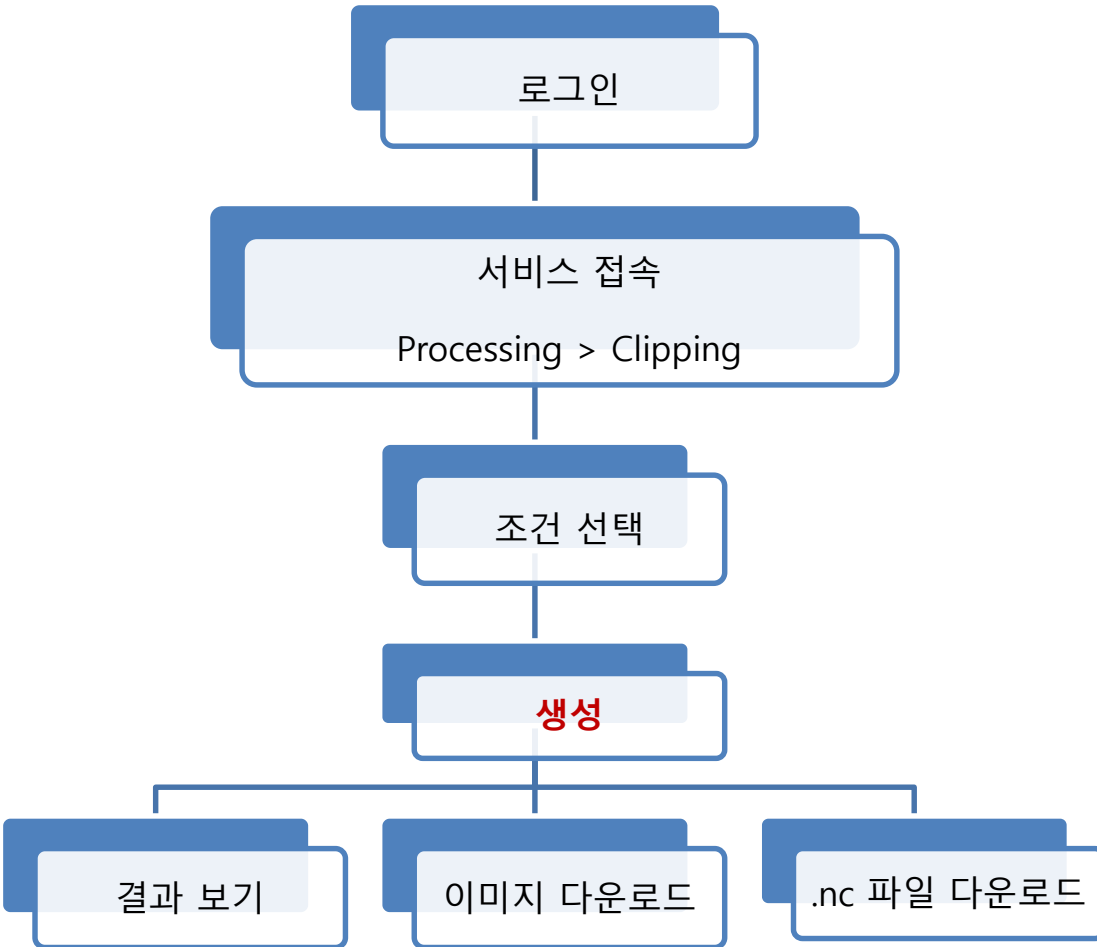
Forecast Hindcast: ~

Output file format: NetCDF(nc)

Run for data clipping

<https://cliks.apcc21.org>

| Clipping 시작하기 - 5 (결과 파일 생성)



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

MME Individual Model
 Variable: Precipitation
 Leadtime: 3Month
 Method: Deterministic_Monthly
 Issued: 2021 / 01

Coordinate: 0 90 360
 -90
 Mean
 Anomaly
 Climatology Period: ~

Region: Global

Data Plot

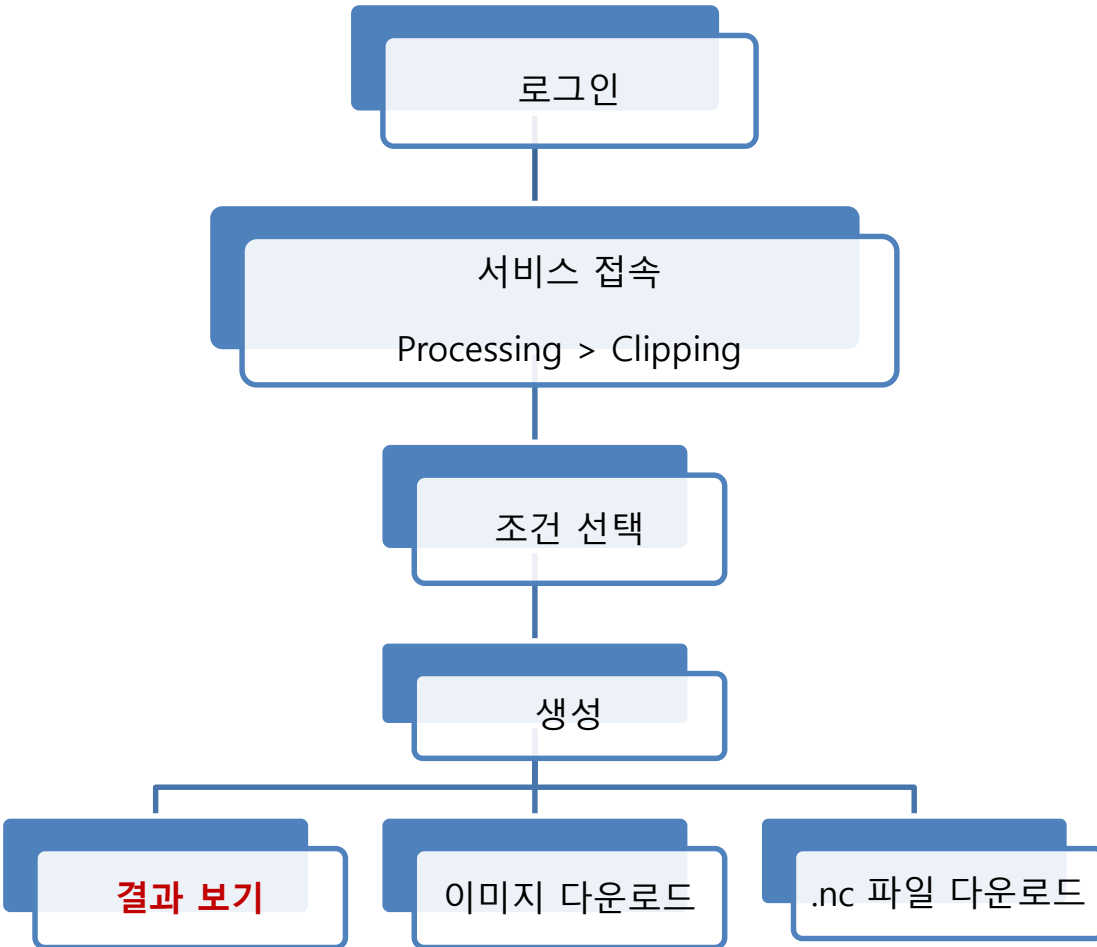
Monthly Precipitation (2020/12)
 Monthly Precipitation (2021/01)
 Monthly Precipitation (2021/02)

Data Clipping (rectangle)

Forecast Hindcast: ~
 Output file format: NetCDF(.nc)
 Run for data clipping

<https://cliks.apcc21.org>

| Clipping 시작하기 - 6 (결과 보기)



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

MME Individual Model
 Variable: Precipitation
 Leadtime: 3Month
 Method: Deterministic_Monthly
 Issued: 2021 / 01

Coordinate: 0 90 360
 Mean
 Anomaly
 Climatology Period: ~

Region: Global

Data Plot

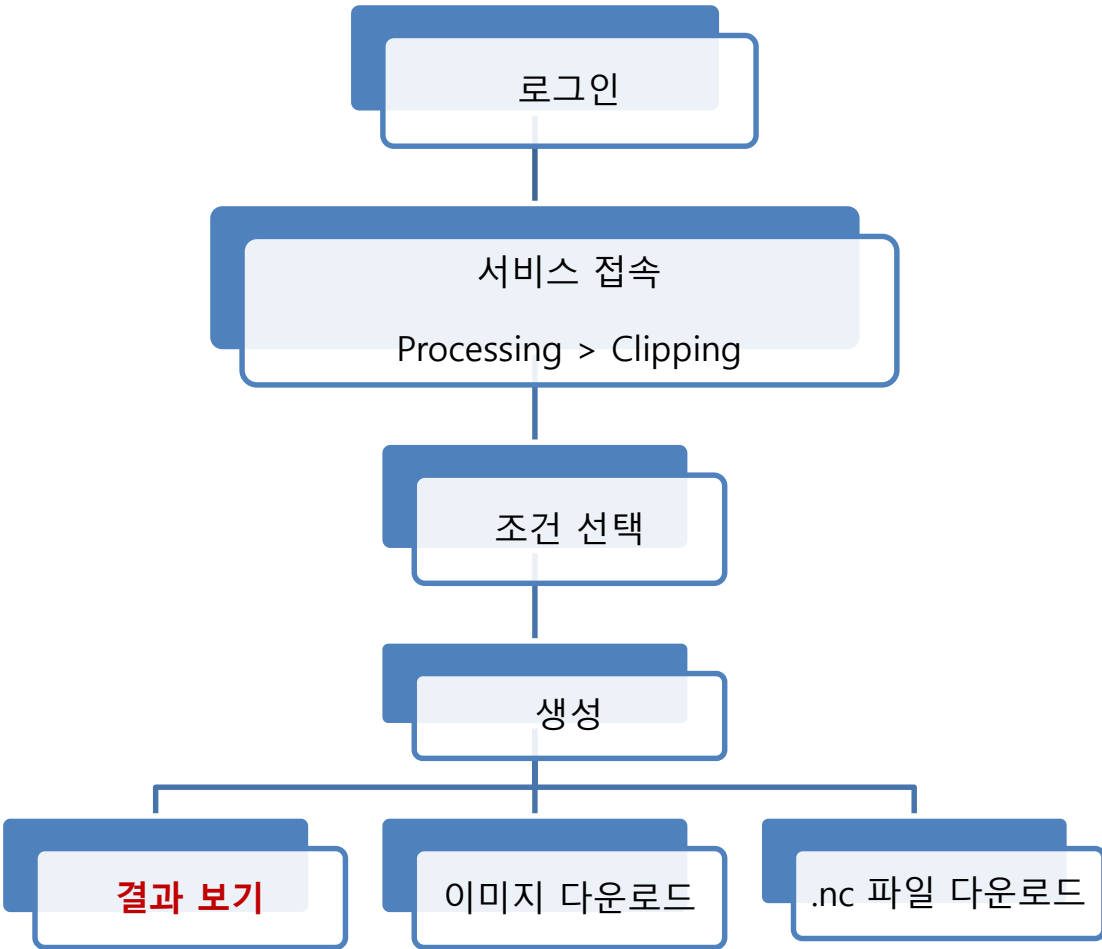
Data Clipping (rectangle)

Forecast Hindcast: ~
 Output file format: NetCDF(.nc)

Run for data clipping

<https://cliks.apcc21.org>

Clipping 시작하기 - 7 (결과 이미지 클릭)



Climate Information toolKit (CLIK) Home Dataset

Variable: Precipitation
Leadtime: 3Month
Method: Deterministic_Monthly
Issued: 2021 / 01

Monthly Precipitation (2020/12)
Base Period: 1991-2010
Anomaly
Unit: mm/day

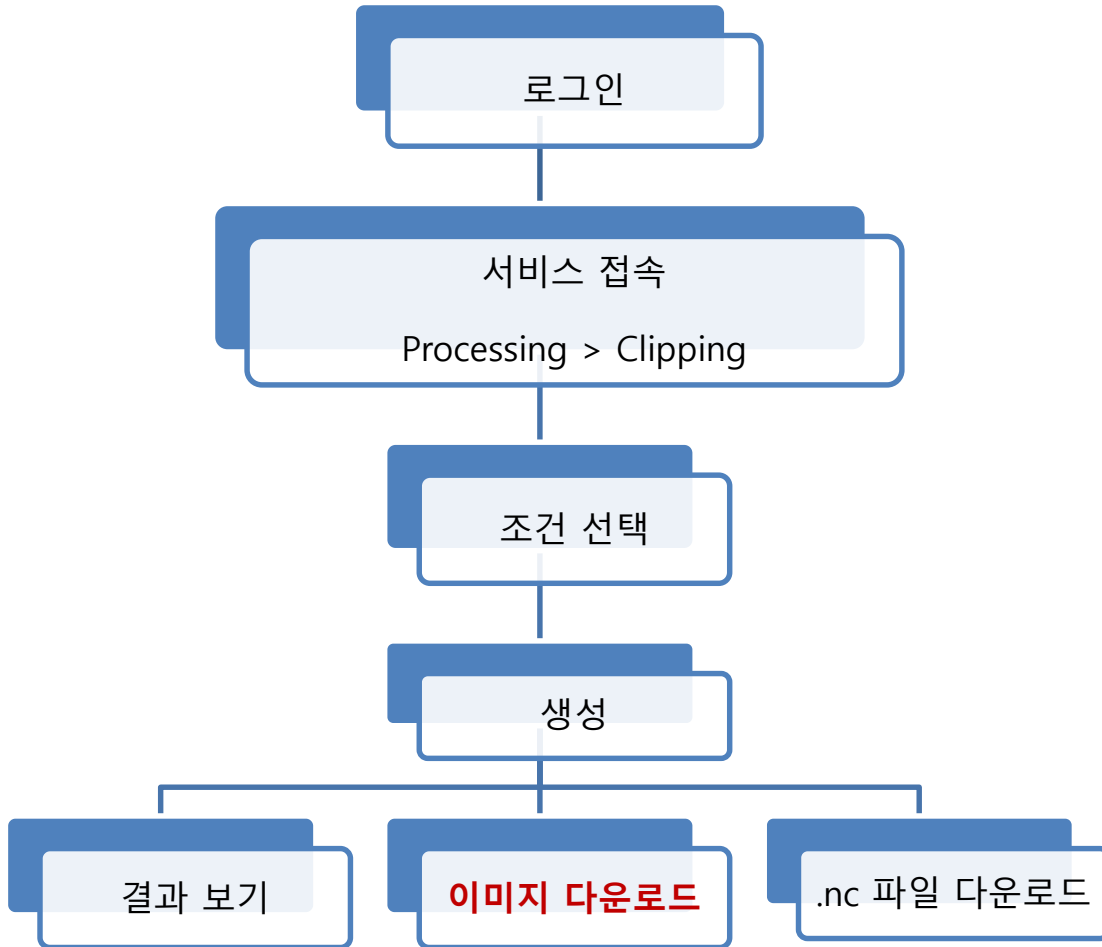
MME_MODELS : SCOPS.ACCESS-S1,TCWB1Tv1.1,MRI-CPS2,GLOSEA5GC2,CANSIPsv2,CFSv2,CGCMv2.0,GLOSEA5

Data Clipping (rectangle)
 Forecast Hindcast
Output file format: NetCDF(.nc)
Run for data clipping

일본 사이즈

https://cliks.apcc21.org

| Clipping 시작하기 - 8 (이미지 다운로드)



Climate Information toolKit (CLIK) Home Dataset

우클릭 후 이미지 저장

Monthly Precipitation (2020/12)

Base Period: 1991-2010 Anomaly

90°N 45°N 0° 45°S 90°S

0° 90°E 180° 90°W 0°

Unit: mm/day

MME_MODELS : SCOPS.ACCESS-S1,TCWB1Tv1.1,MRI-CPS2,GLOSEA5GC2,CANSIPsv2,CFSv2,CGCMv2.0,GLOSEA5

일본 사이즈

Data Clipping (rectangle)

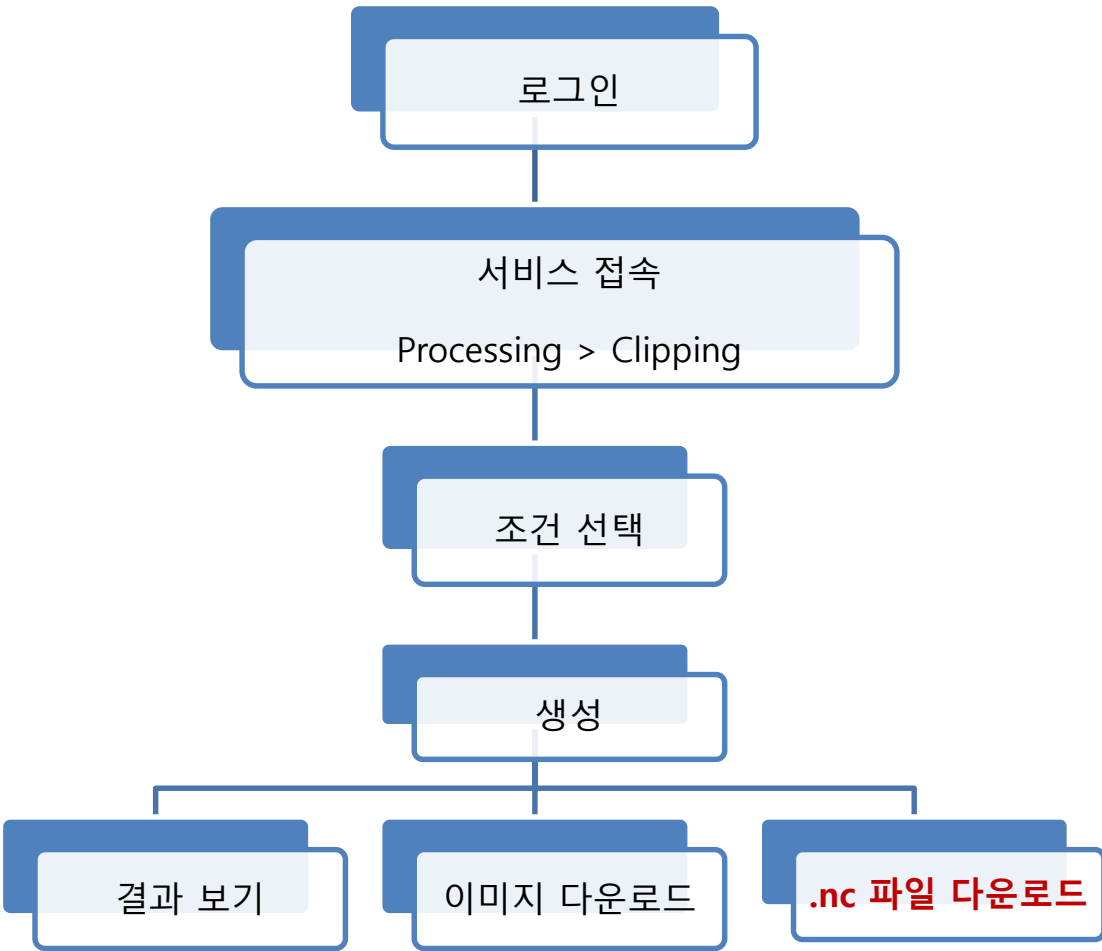
Forecast Hindcast: ~

Output file format: NetCDF(.nc)

Run for data clipping

https://cliks.apcc21.org

| Clipping 시작하기 - 9 (nc 파일 다운로드)



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

Variable: Precipitation
Leadtime: 3Month
Method: Deterministic_Monthly
Issued: 2021 / 01

Monthly Precipitation (2020:12)

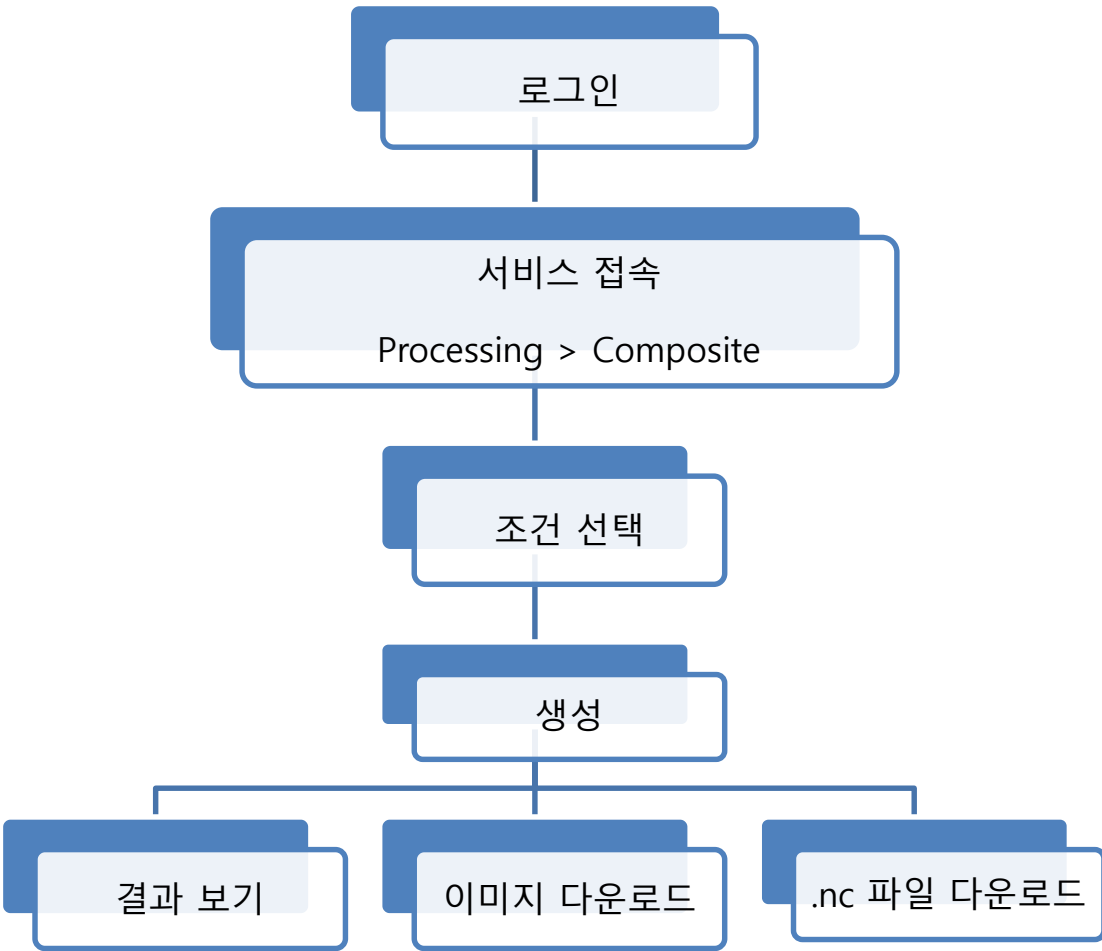
Data Clipping (rectangle)
 Forecast Hindcast: ~
 Output file format: NetCDF(nc)

Run for data clipping

.nc 파일 다운로드

https://cliks.apcc21.org

| Composite 시작하기 - 1 (Composite 페이지 접속)



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

FORECAST Multi Model Ensemble (Deterministic)

Variable: Precipitation Forecast length: MME 6Month

Target month: 01 02 03 04 05 06
 07 08 09 10 11 12

Target year: 2015 2016 2017 2018 2019 2020

Lead time: 01 02 03 04 05 06

Add Reset Unchecked All

Requirements	month	year	lead time	
<input type="checkbox"/>	01,03,05	2017,2018,2019		Delete All

Composite(Forecast)

Precipitation_Prediction (Composite Map)
Base Period: 1991-2010 Anomaly

OBSERVATION

Variable: Precipitation mean Anomaly: 1979 ~ 1979

Month: 01 02 03 04 05 06 07 08 09
 10 11 12

Years: 1979 1980 1981 1982 1983 1984 1985
 1986 1987 1988 1989 1990 1991 1992
 1993 1994 1995 1996 1997 1998 1999
 2000 2001 2002 2003 2004 2005 2006
 2007 2008 2009 2010 2011 2012 2013
 2014 2015 2016 2017 2018 2019 2020

Add Reset Unchecked All

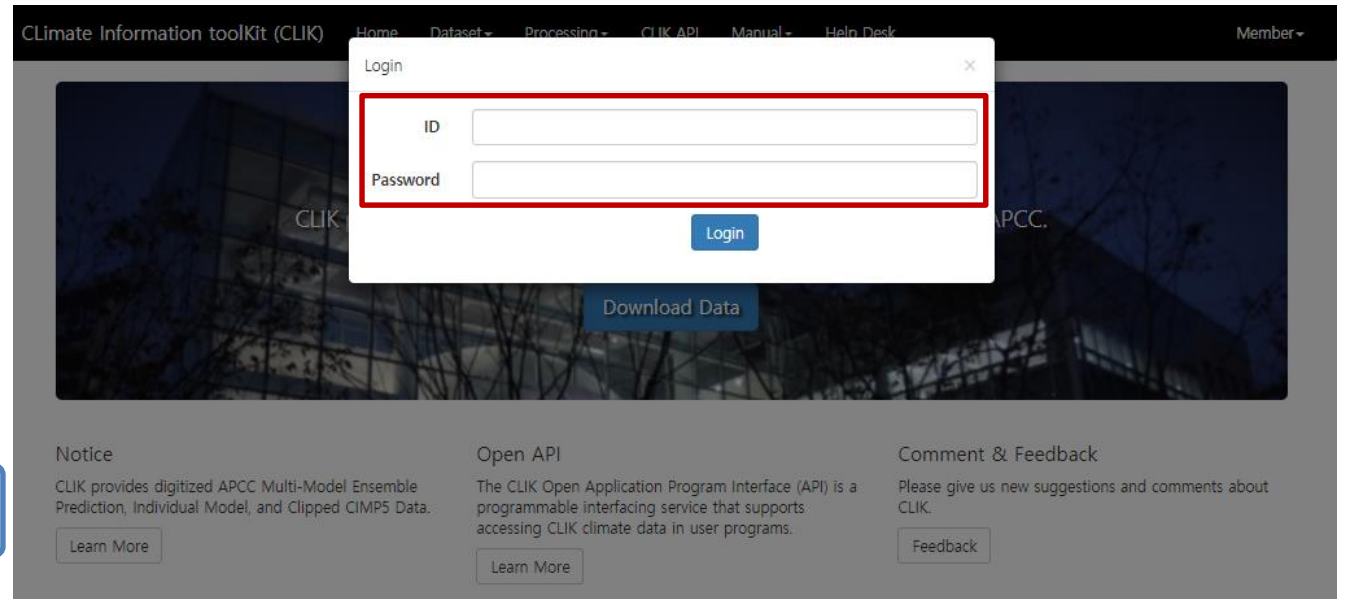
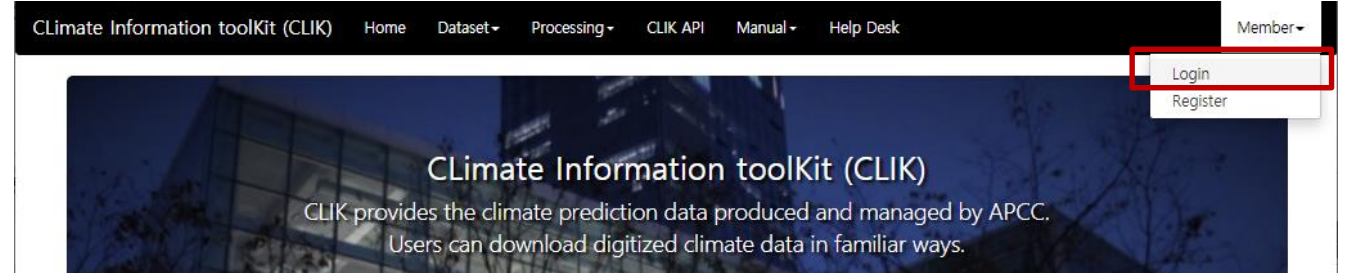
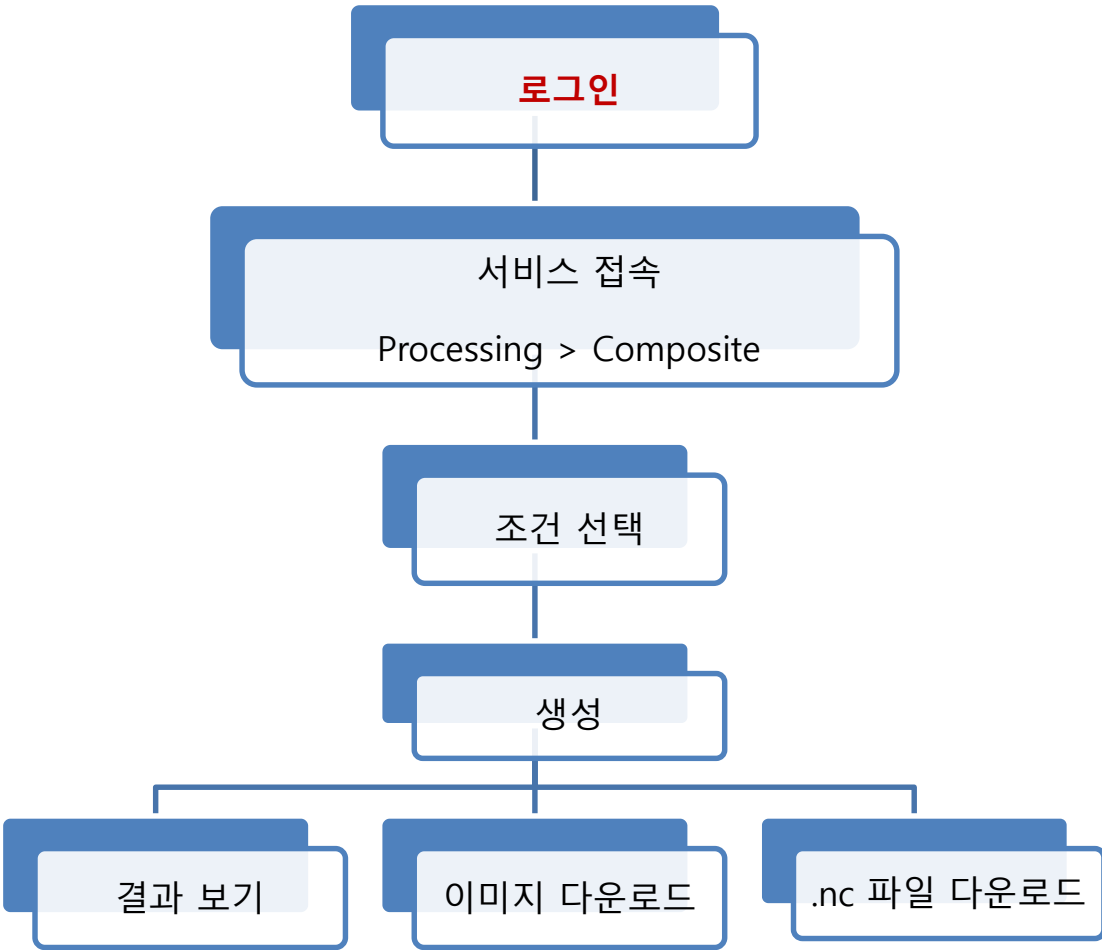
Requirements	Month	year	
<input type="checkbox"/>	01,03,05	2017,2018,2019	Delete All

Composite(Observation)

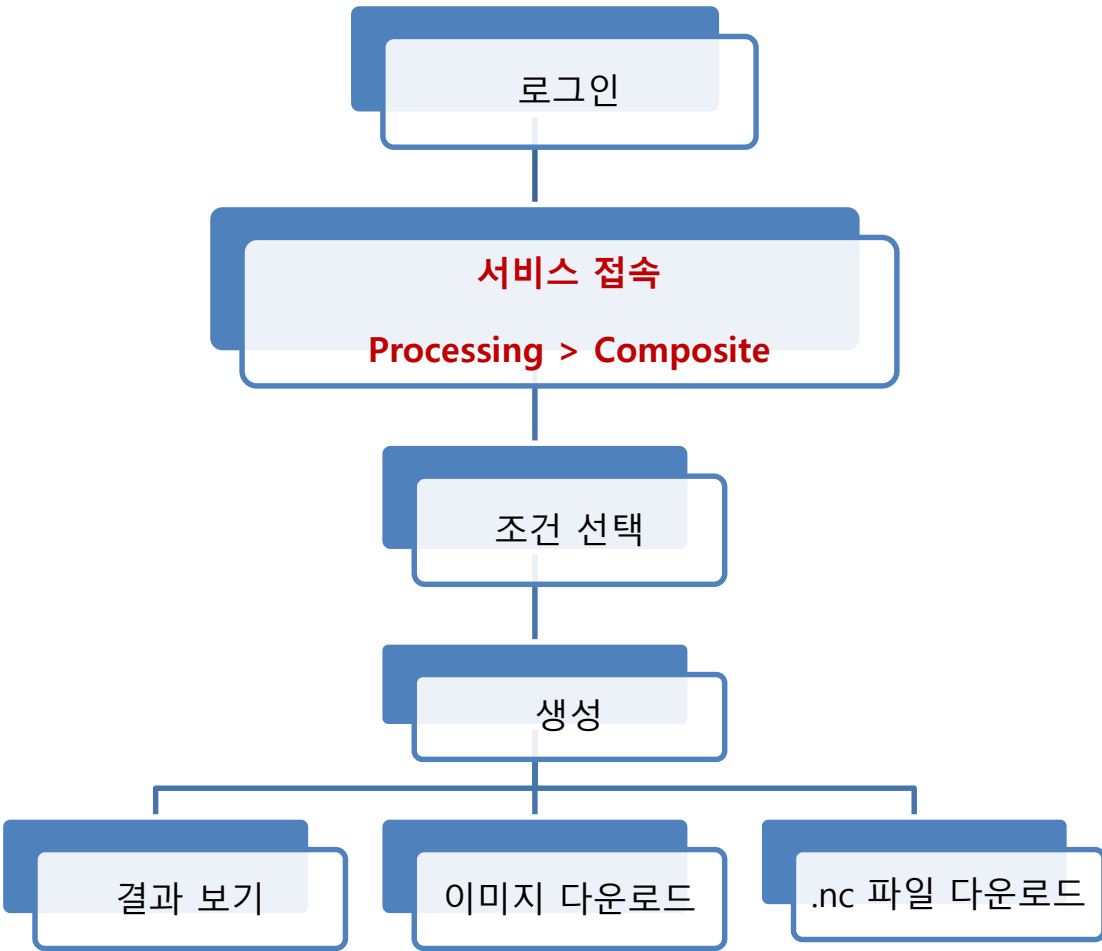
Precipitation_Observation (Composite Map)
Base Period: 1991-2010 Anomaly

<https://cliks.apcc21.org>

| Composite 시작하기 - 2 (로그인)



| Composite 시작하기 - 3 (Composite 페이지 접속)



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

FORECAST Multi Model Ensemble (Deterministic)

Variable: Precipitation Forecast length: MME 6Month

Target month: 01 02 03 04 05 06
 07 08 09 10 11 12

Target year: 2015 2016 2017 2018 2019 2020

Lead time: 01 02 03 04 05 06

Add Reset Uncheck All

Requirements	month	year	lead time	
<input type="checkbox"/>	01,03,05	2017,2018,2019		Delete All

Composite(Forecast)

Precipitation_Prediction (Composite Map)
Base Period: 1991-2010 Anomaly

OBSERVATION

Variable: Precipitation mean Anomaly: 1979 ~ 1979

Month: 01 02 03 04 05 06 07 08 09
 10 11 12

Years: 1979 1980 1981 1982 1983 1984 1985
 1986 1987 1988 1989 1990 1991 1992
 1993 1994 1995 1996 1997 1998 1999
 2000 2001 2002 2003 2004 2005 2006
 2007 2008 2009 2010 2011 2012 2013
 2014 2015 2016 2017 2018 2019 2020

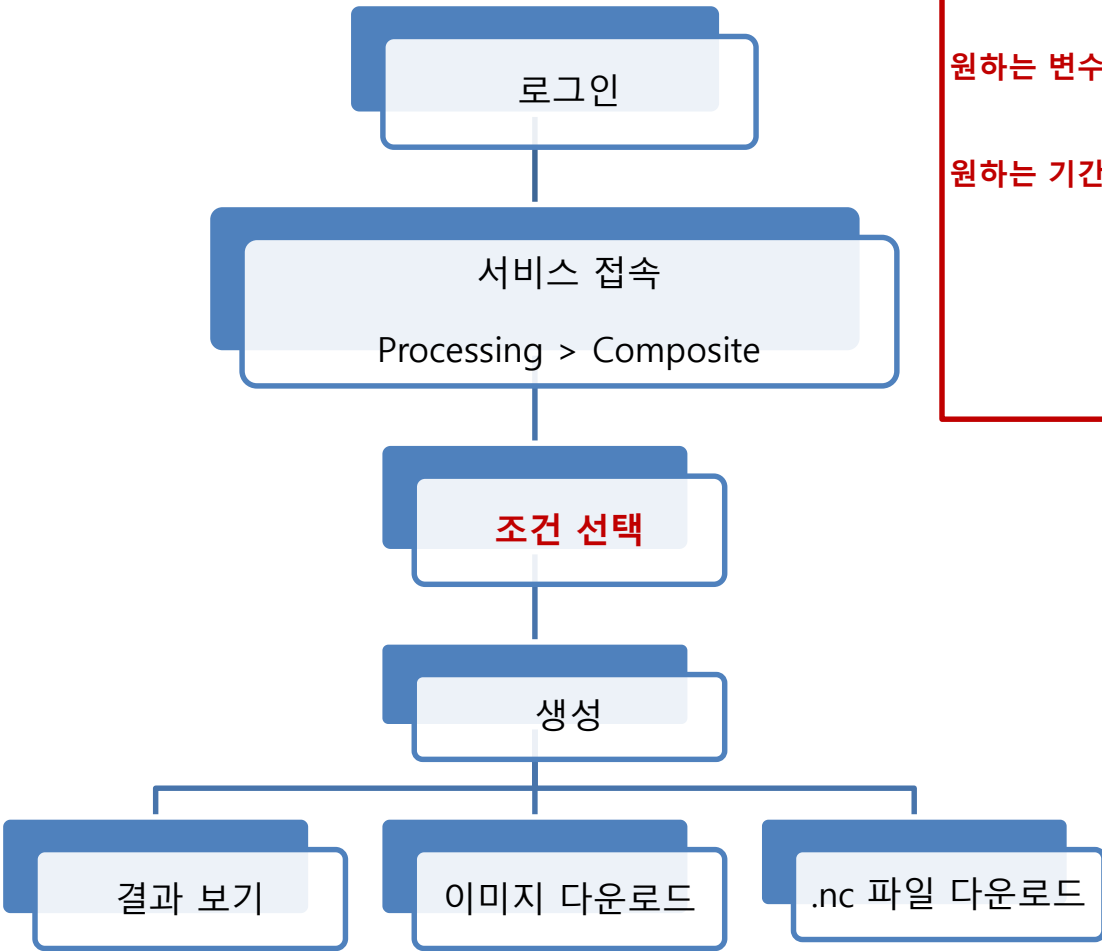
Add Reset Uncheck All

Requirements	Month	year	
<input type="checkbox"/>	01,03,05	2017,2018,2019	Delete All

Composite(Observation)

Precipitation_Observation (Composite Map)
Base Period: 1991-2010 Anomaly

| Composite 시작하기 - 4 (조건 선택)



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

FORECAST Multi Model Ensemble (Deterministic)

Variable: Precipitation Forecast length: MME 6Month

Target month: 01 02 03 04 05 06
 07 08 09 10 11 12

Target year: 2015 2016 2017 2018 2019 2020

Lead time: 01 02 03 04 05 06

Add Reset Uncheck All

month	year	lead time	
<input type="checkbox"/>			

Composite(Forecast)

OBSERVATION

Variable: Precipitation mean Anomaly

Month: 01 02 03 04 05 06 07 08 09
 10 11 12

Years: 1979 1980 1981 1982 1983 1984 1985
 1986 1987 1988 1989 1990 1991 1992
 1993 1994 1995 1996 1997 1998 1999
 2000 2001 2002 2003 2004 2005 2006
 2007 2008 2009 2010 2011 2012 2013
 2014 2015 2016 2017 2018 2019 2020

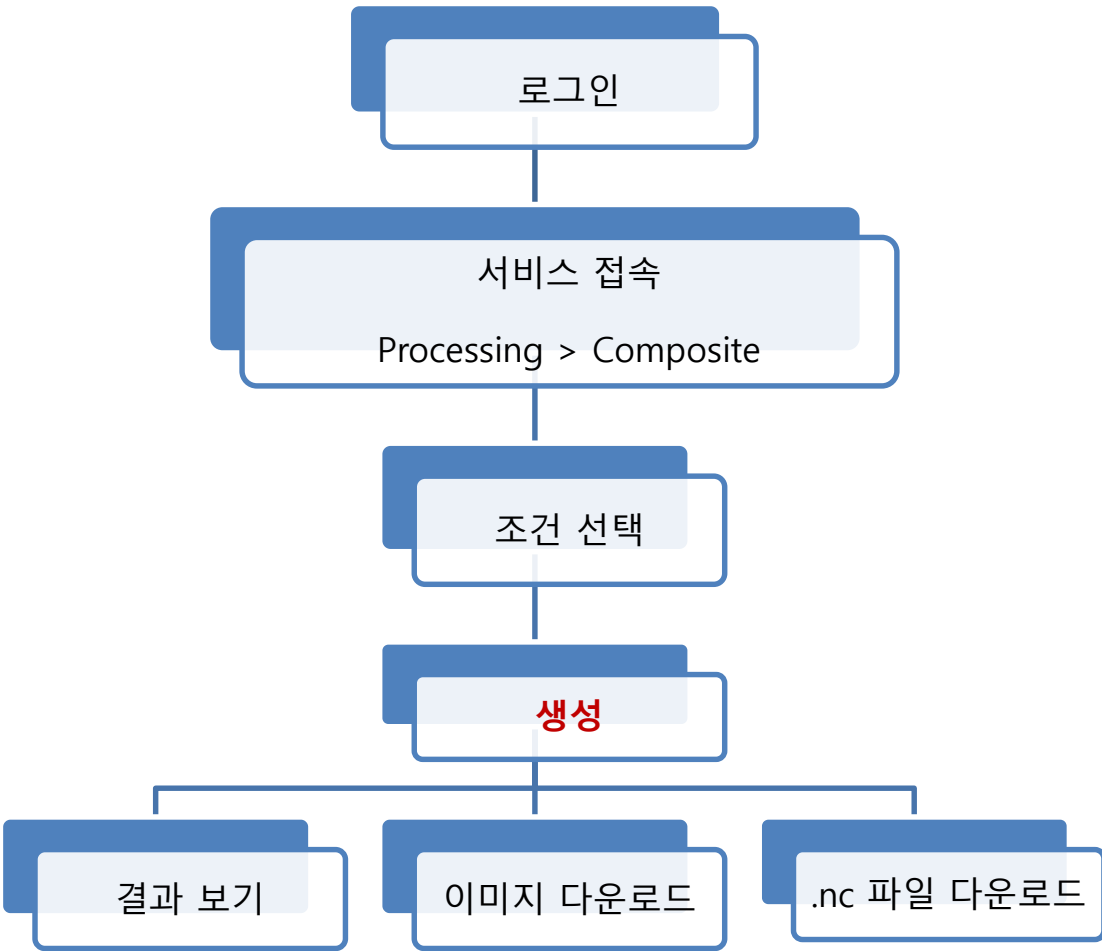
Add Reset Uncheck All

Month	year	
<input type="checkbox"/>	01,03,05	2017,2018,2019 del

Composite(Observation)

원하는 변수 선택 (Wanted variable selection) - 원하는 기간 선택 (Wanted time period selection)

| Composite 시작하기 - 5 (결과 파일 생성)



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

FORECAST Multi Model Ensemble (Deterministic)

Variable: Precipitation Forecast length: MME 6Month

Target month: 01 02 03 04 05 06
 07 08 09 10 11 12

Target year: 2015 2016 2017 2018 2019 2020

Lead time: 01 02 03 04 05 06

Add Reset Uncheck All

Requirements				Delete All
month	year	lead time		
<input checked="" type="checkbox"/>	01,02,07,08	2020	01,02,03	del

Composite(Forecast)

Precipitation_Prediction (Composite Map)

Base Period: 1991-2010 Anomaly

OBSERVATION

Variable: Precipitation mean Anomaly: 1979 ~ 1979

Month: 01 02 03 04 05 06 07 08 09
 10 11 12

Years: 1979 1980 1981 1982 1983 1984 1985
 1986 1987 1988 1989 1990 1991 1992
 1993 1994 1995 1996 1997 1998 1999
 2000 2001 2002 2003 2004 2005 2006
 2007 2008 2009 2010 2011 2012 2013
 2014 2015 2016 2017 2018 2019 2020

Add Reset Uncheck All

Requirements				Delete All
Month	year			
<input checked="" type="checkbox"/>	02,03,04	2018,2019,2020		del

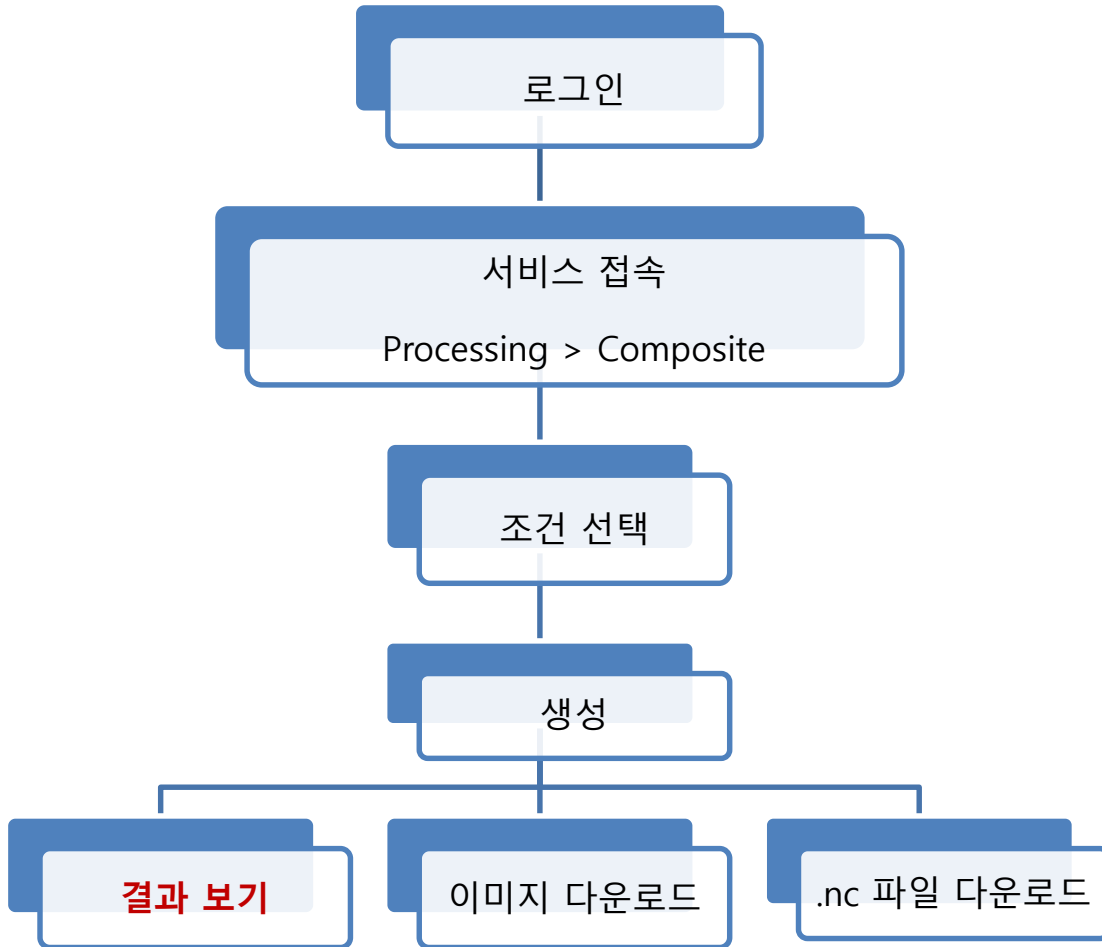
Composite(Observation)

Precipitation_Observation (Composite Map)

Base Period: 1991-2010 Anomaly

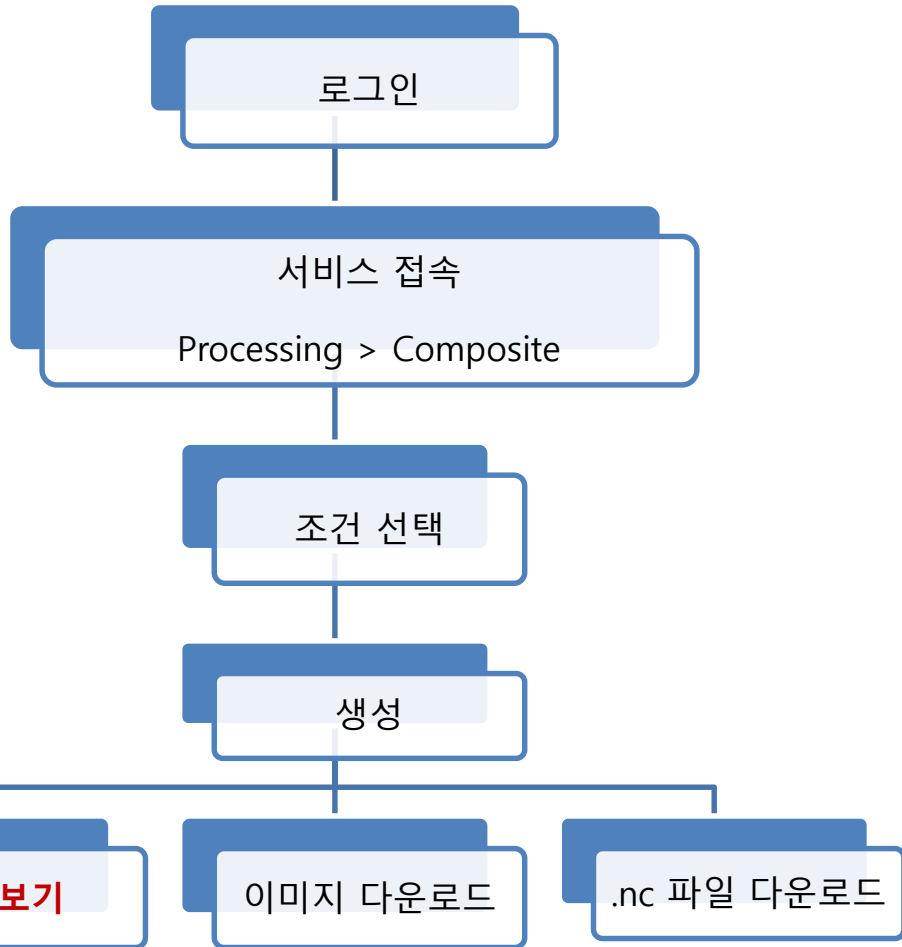
https://cliks.apcc21.org

| Composite 시작하기 - 6 (결과 보기)



The screenshot displays the APCC Composite service interface. At the top, there are input fields for dates and years. Below these are two main panels, each containing a global map of precipitation anomalies. The left panel is titled "Precipitation_Prediction (Composite Map)" and the right panel is titled "Precipitation_Observation (Composite Map)". Both maps show a color scale from -2 to 2 mm/day, with a base period of 1991-2010. The interface also includes buttons for downloading data in NetCDF(.nc), ASCII(.xls), and Image(.png) formats.

| Composite 시작하기 - 7 (결과 이미지 클릭)



Commercial/Forecast

01,02,07,08 2020 01,02,03

Precipitation_Prediction (Composite Map)

Base Period:1991-2010

unit: mm/day

일본 시간

APEC Climate Center

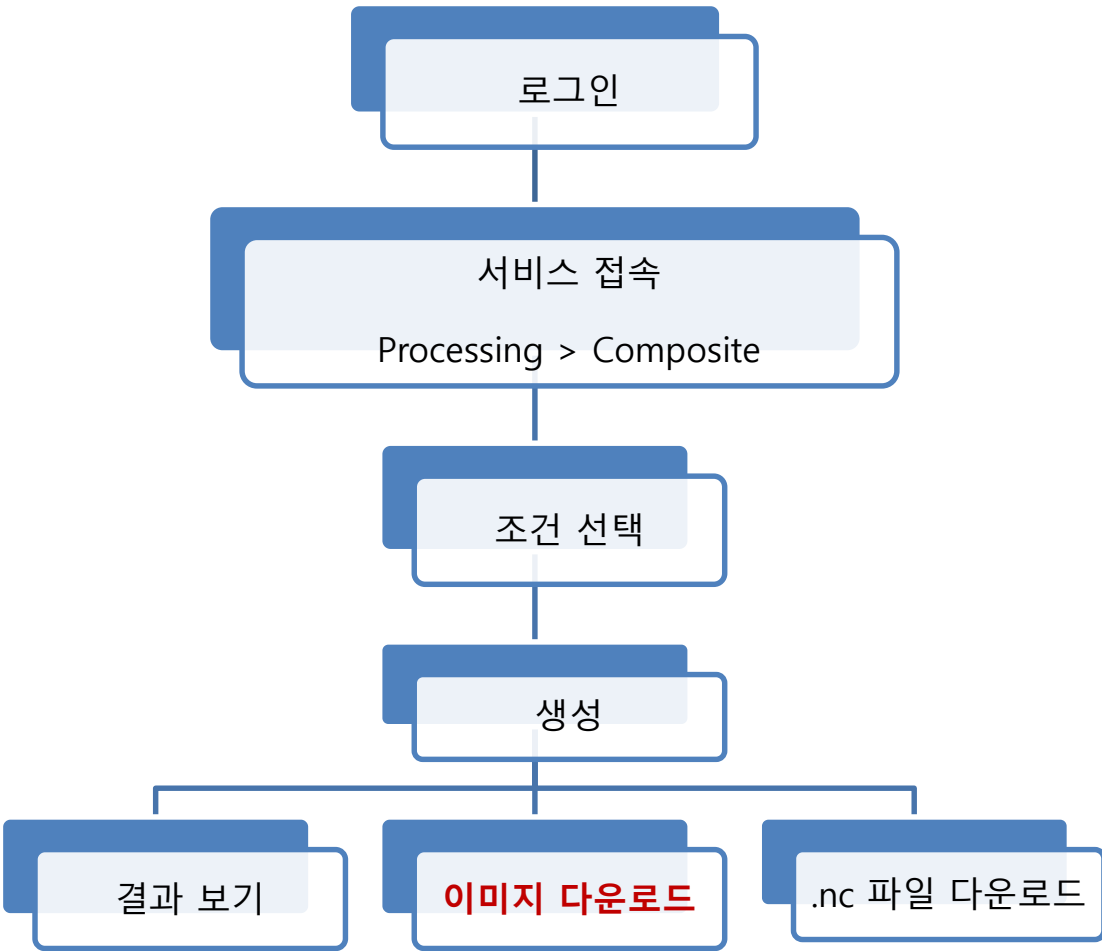
year:month:lead-[2020][10][01]_Anomaly

NetCDF(.nc) ASCII(.xls) Image(.png)

NetCDF(.nc) ASCII(.txt) Image(.png)

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| Composite 시작하기 - 8 (이미지 다운로드)



우클릭 후 이미지 저장

Precipitation_Prediction (Composite Map)

Base Period:1991-2010

unit: mm/day

APEC Climate Center

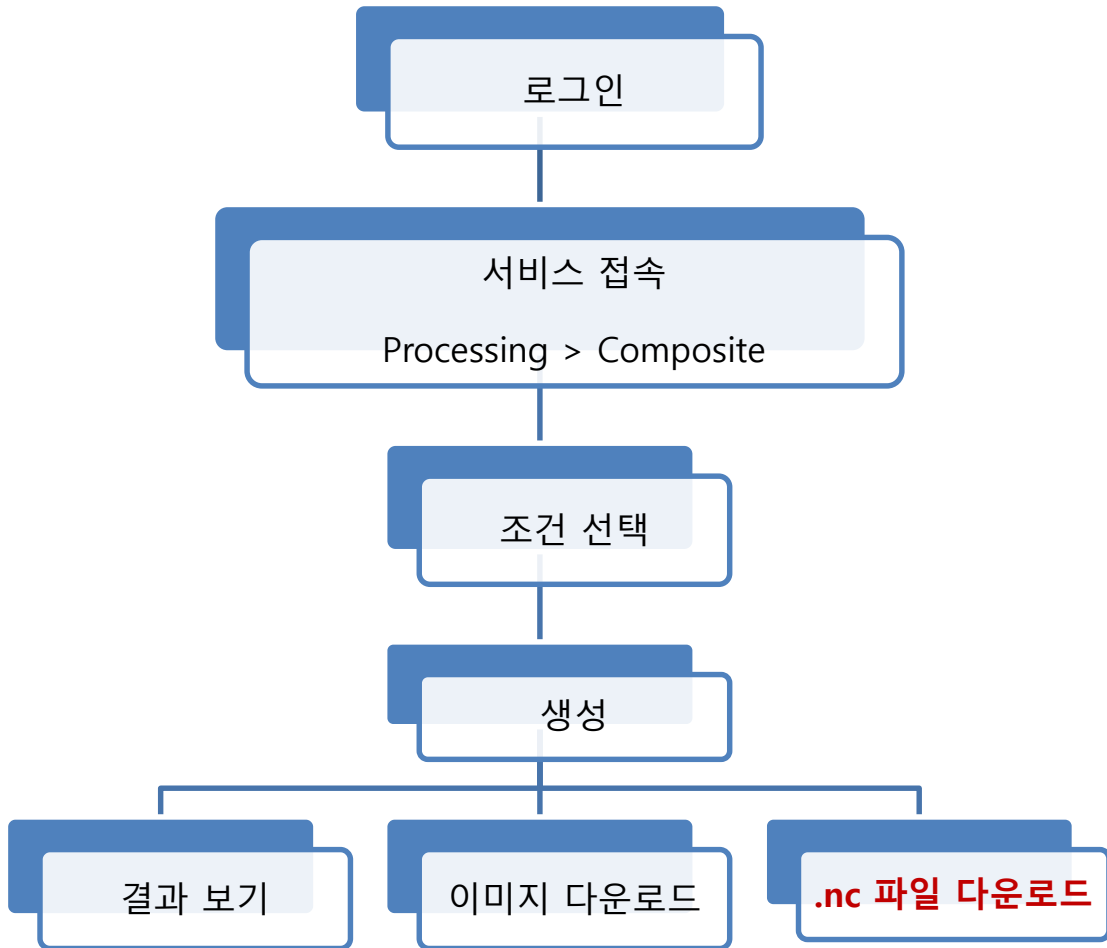
year:month:lead-[2020][10][01]_Anomaly

NetCDF(.nc) ASCII(.xls) Image(.png)

NetCDF(.nc) ASCII(.txt) Image(.png)

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| Composite 시작하기 - 9 (nc 파일 다운로드)



The screenshot displays the APCC Composite service interface. At the top, there are input fields for dates and years, with buttons for 'Composite(Forecast)' and 'Composite(Observation)'. Below these are two maps showing precipitation anomalies. A file explorer window is open over the forecast map, showing a file named 'composite_prec_6Month_[2020]_01,02,...' with a size of 47KB. A red arrow points to the 'NetCDF(.nc)' download button in the forecast panel, with the text '.nc 파일 다운로드' (Download .nc File).

Contents

학습목표

CLIK API를 이용하여 APCC 기후자료를 처리하고 다운로드 받을 수 있다.

1 APCC 기후서비스 플랫폼 소개

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- | 회원가입

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- | MME Model 다운로드 서비스
- | BSISO 다운로드 서비스
- | Clipped CMIP5 다운로드 서비스
- | wget 다운로드 이용 방법

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- | 예측 (Prediction) 서비스
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- | 추출 (Clipping) 서비스
- | 합성 (Composite) 서비스

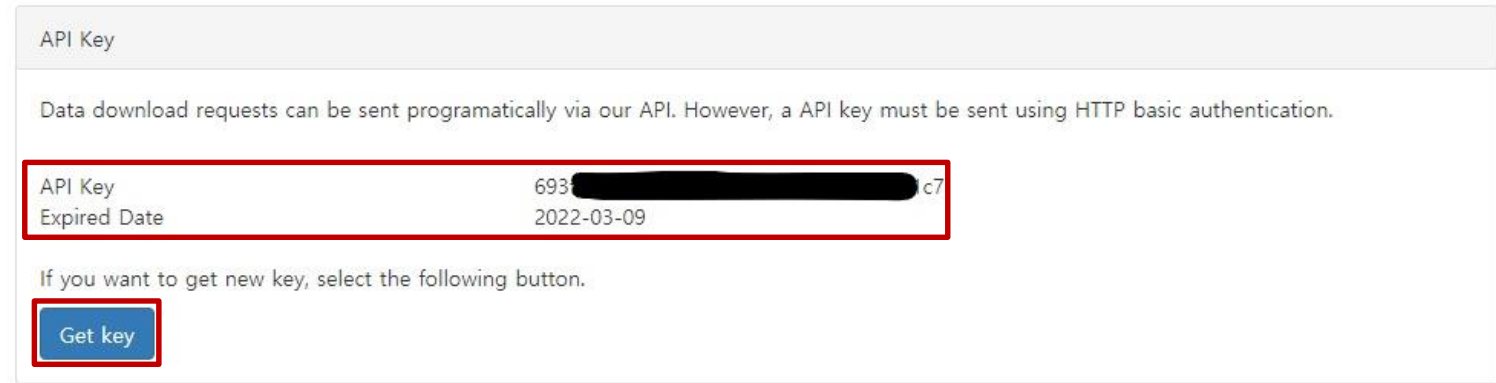
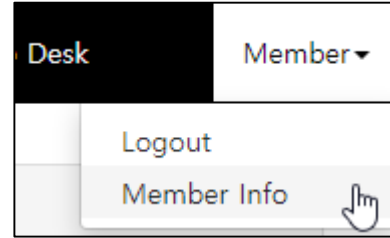
4 APCC 기후서비스 플랫폼 활용 III

- | CLIK API 사용을 위한 환경 설정
- | CLIK API 기본 구조
- | MME, MME Model 다운로드 실행
- | ERA5 다운로드 실행
- | Clipping 실행

| 사용자 API Key 발급 및 확인

Member Info 확인

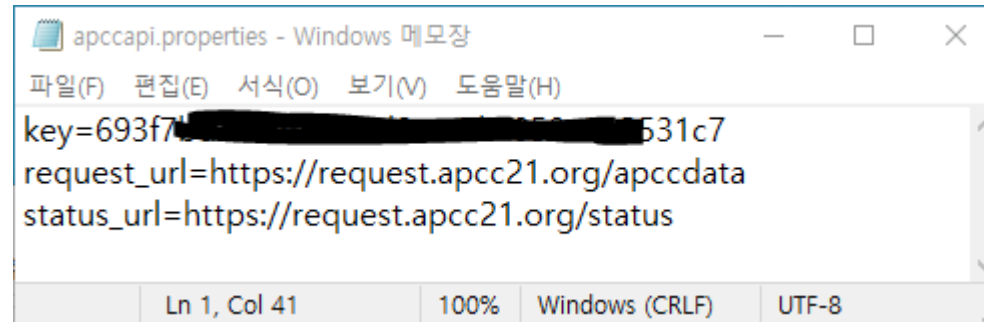
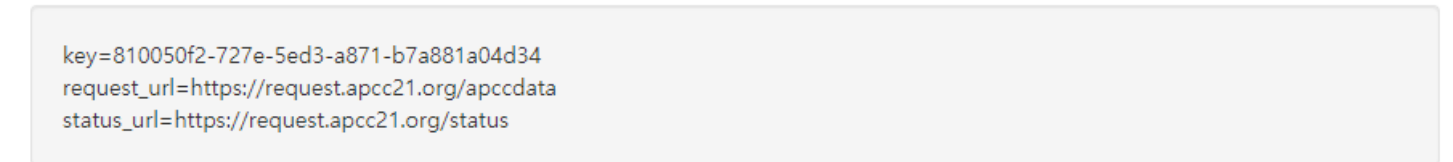
- Key가 발급되지 않은 경우 "Get Key" 를 선택하여 발급
- API Key 확인



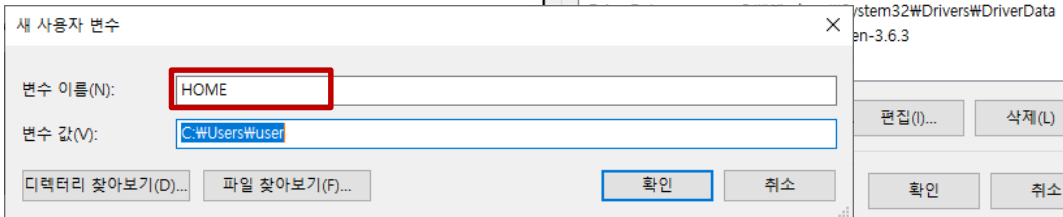
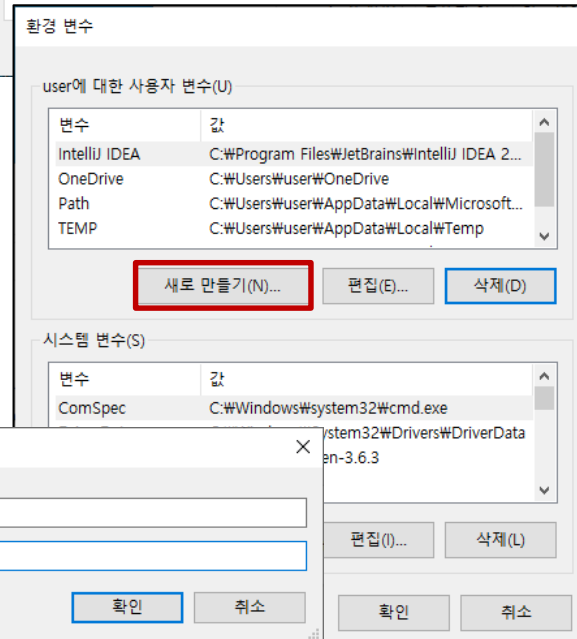
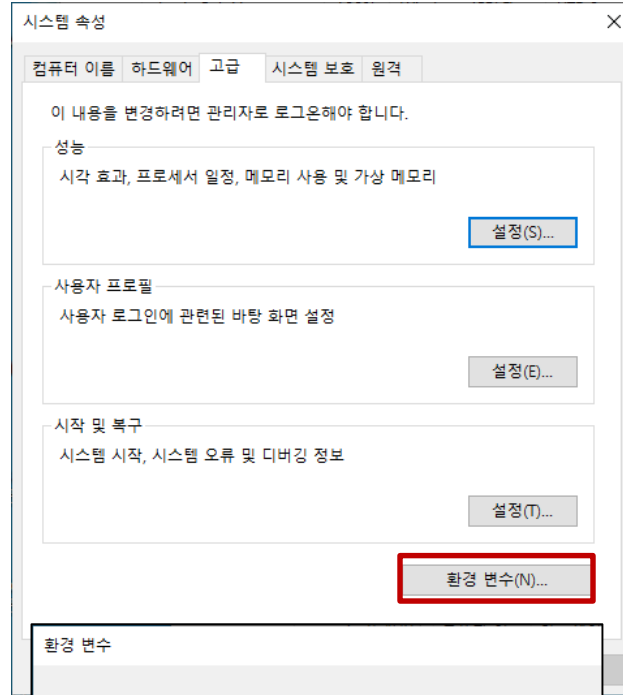
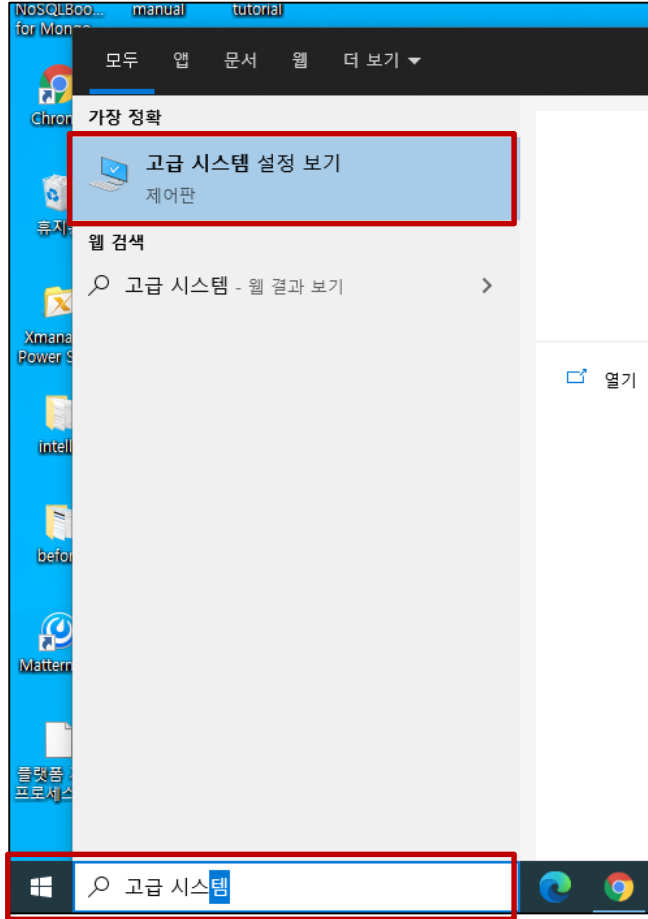
| 사용자 API Key 발급 및 확인

apccapi.properties 파일 만들기

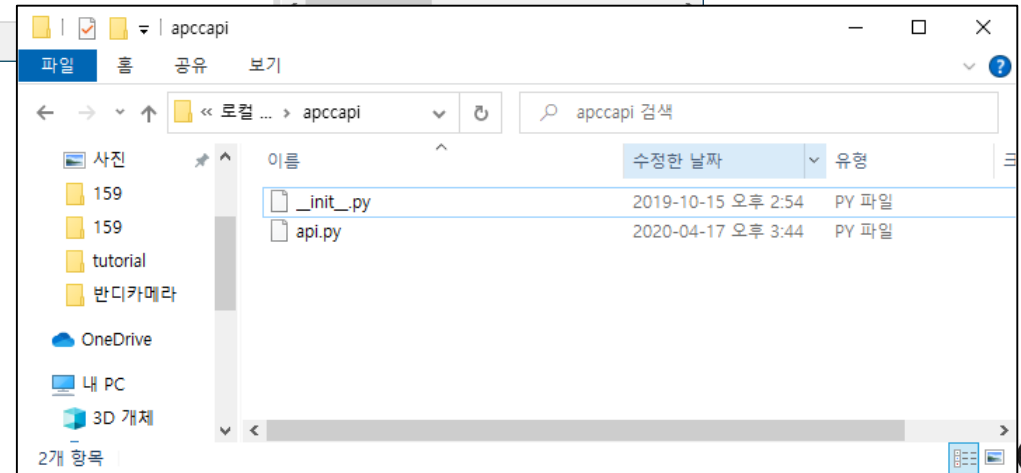
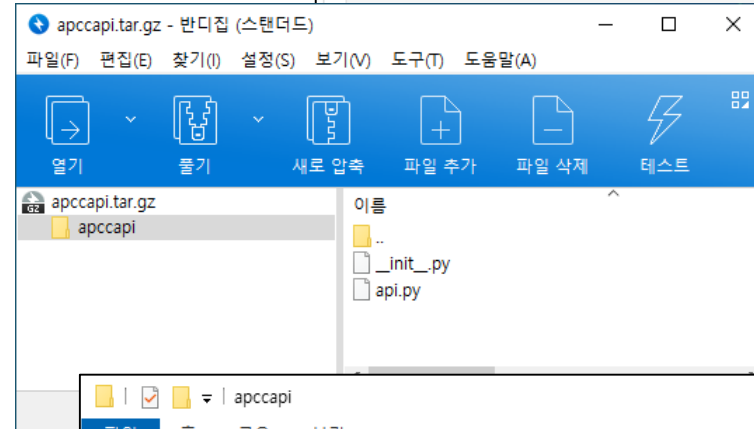
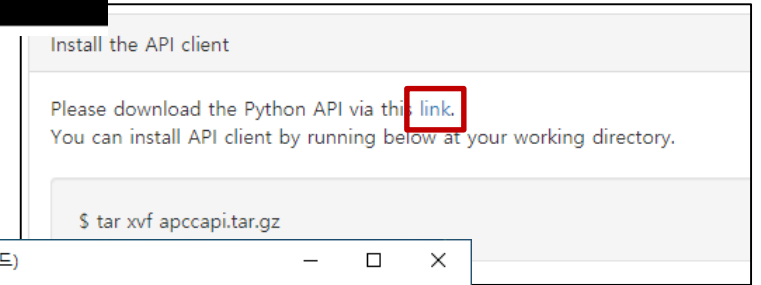
- CLIK API 메뉴 참고
- 파일 만들기 (폴더 위치 기억)



| Windows 환경 설정



| CLIK API 다운로드



CLIK API 기본 구조

```
import api as 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' # 저장할 파일명
)
```

사용자 선택 옵션

- jobtype**
- job의 종류 기입
 - MME: 3개월 및 6개월 MME
 - MODEL: 개별 모델
 - CMIP5: Clipped CMIP5

- dataset**
- 데이터 종류 기입
 - MME_3MONTH: 3개월 MME
 - MME_6MONTH: 6개월 MME
 - MODEL: 개별 모델
 - CMIP5: Clipped CMIP5

MME 자료 Type 선택

MME 기법 선택

MME 변수 선택

자료 통계 기간 선택

Type

FORECAST HINDCAST

Method

GAUS SCM

Variable

prec slp sst t2m t850 z500

Period

Monthly m

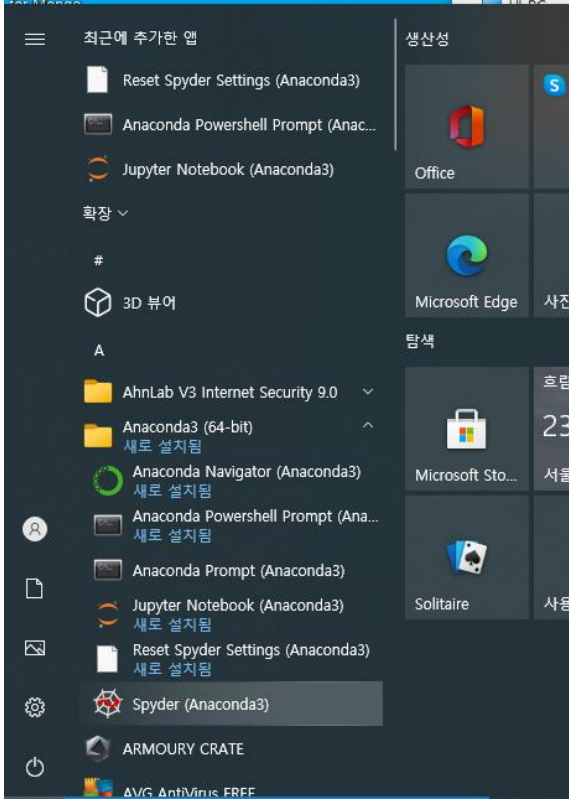
자료 년도, 시즌 선택

Date

* 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												<input type="checkbox"/>
2018	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2019	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2020	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2021	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

| Spider 실행



- [실습 1]
- 예보기간 : 3개월 MME
 - 자료 Type : Forecast
 - MME 기법 : GAUS
 - 변수 : prec, slp
 - 자료 통계 기간: Monthly mean
 - 자료 기간: 2021년 1~5월

| 파이썬 파일 작성 & 저장

```

1 import api as apccapi
2
3 c = apccapi.Client()
4 c.retrieve(
5     {
6         'jobtype': 'MME',
7         'dataset': 'MME_3MONTH',
8         'type': 'FORECAST',
9         'method': 'SCM',
10        'variable': ['prec', 't2m'],
11        'period': ['Monthly mean'],
12        'yearmonth': ['201909']
13    },
14    'mme3.zip'
15 )
    
```

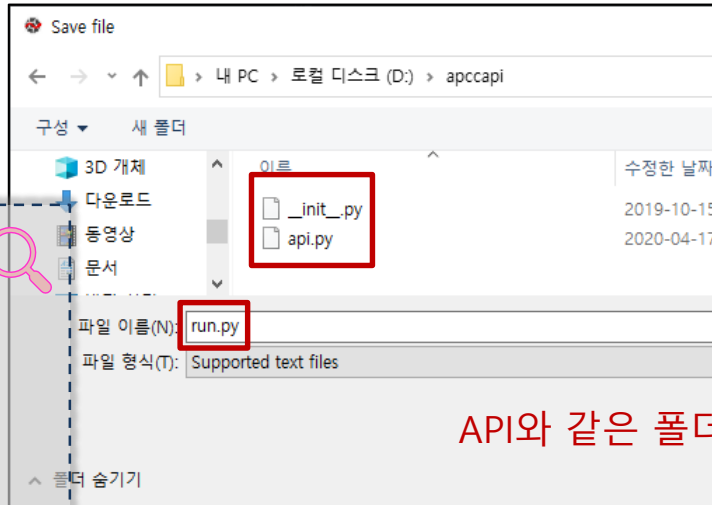
```

Python 3.8.8 (default, Apr 13 2021, 15:08:03) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 7.22.0 -- An enhanced Interactive Python.

In [1]: runfile('D:/apccapi/run.py', wdir='D:/apccapi')
[2021-08-18 10:54:23,710] [INFO] Hello jhshin77.
[2021-08-18 10:54:23,711] [INFO] Your job id is 611c684e0b384500109461bf
[2021-08-18 10:54:23,711] [INFO] Request is Queued
<Response [202]>
[2021-08-18 10:54:29,818] [INFO] Request is Complete
[2021-08-18 10:54:29,818] [INFO] Start to save file - mme3.zip
[2021-08-18 10:54:30,031] [INFO] Done

In [2]:
    
```



API와 같은 폴더에 저장

[실습 2]

- 자료 Type : Forecast
- 기관 : APCC
- Model : SCOPS
- 변수 : sst, t2m
- 자료 기간: 2021년 7~8월

이름	수정한 날짜	유형
pycache_	2021-08-18 오전 10:54	파일 폴더
init.py	2019-10-15 오후 2:54	PY 파일
api.py	2020-04-17 오후 3:44	PY 파일
zip mme3	2021-08-18 오전 10:54	압축(ZIP)
run.py	2021-08-18 오전 10:52	PY 파일

CLIPPING API 기본 구조

#Clipping API 실행을 위한 run.py 파일 구조

```
import api as clipsapi

c = clipsapi.Client()

request = {

}

target = "clips_output.png" # 저장할 파일명

c.clip(request, target)
```

사용자 선택 옵션

```
'lead_month': '3-MON',
'variable': 'prec',
'method': 'SCM',
'period': 'Monthly mean',
'iyear': '2017',
'imonth': '7',
'cosouth': '-50',
'conorth': '70',
'cowest': '100',
'coeast': '210'
```

- MME 변수 선택
- LeadTime 선택
- MME 기법 선택
- 자료 년도, 시즌 선택

추출할 위/경도 좌표 선택

MME Individual Model

Variable:

Leadtime:

Method:

Issued: /

Coordinate:

Region:

Data Plot

MME-Variable

- Precipitation
- Sea Level Pressure
- Sea Surface Temperature
- Temperature at 2m
- Temperature at 850hPa
- Geopotential Height at 500hPa

MME-Leadtime

- 3-MON
- 6-MON

MME-Method

- Deterministic_Monthly
- Deterministic_Seasonal
- Probabilistic_Monthly
- Probabilistic_Seasonal

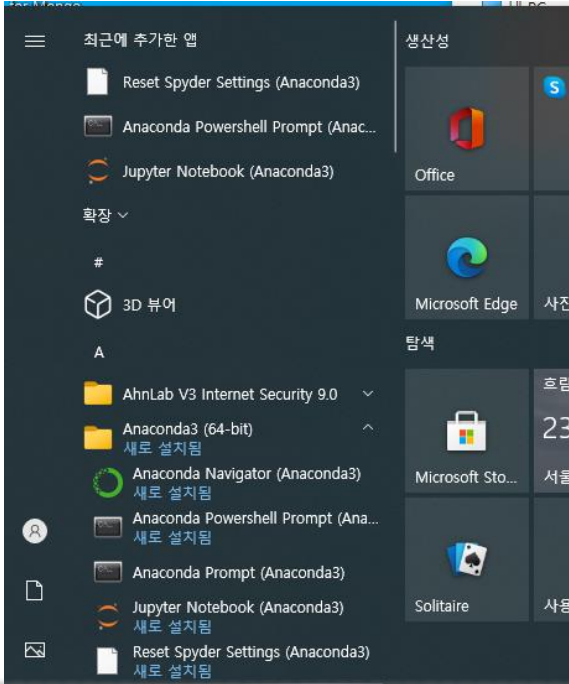
Individual Model-Variable

- Precipitation
- Sea Level Pressure
- Sea Surface Temperature
- Temperature at 200hPa
- Temperature at 2m
- Temperature at 300hPa
- Temperature at 500hPa
- Temperature at 850hPa
- Geopotential Height at 200hPa
- Geopotential Height at 500hPa
- Geopotential Height at 850hPa

Individual Model-Institute

- APCC
- BCC
- BOM
- CMCC
- CWB
- HMC
- KMA
- METFR
- MGO
- MSC
- NASA
- NCEP
- PNU
- UKMO

| Spyder 실행



| 파이썬 파일 작성 & 저장

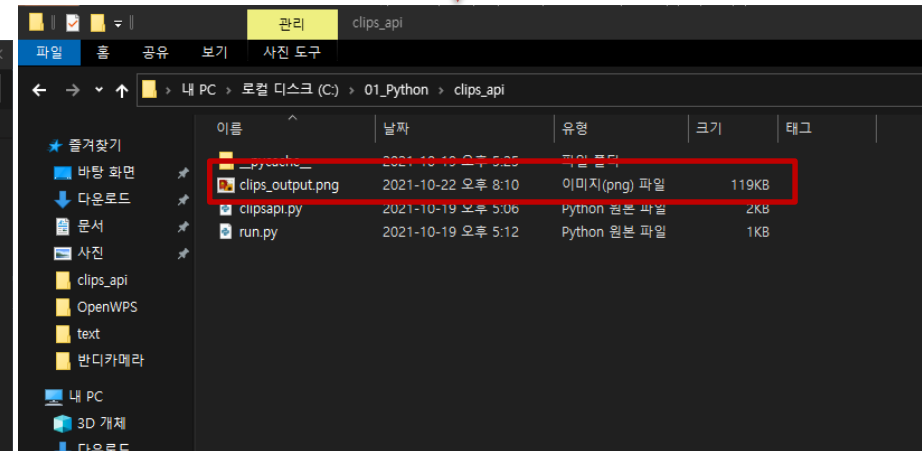
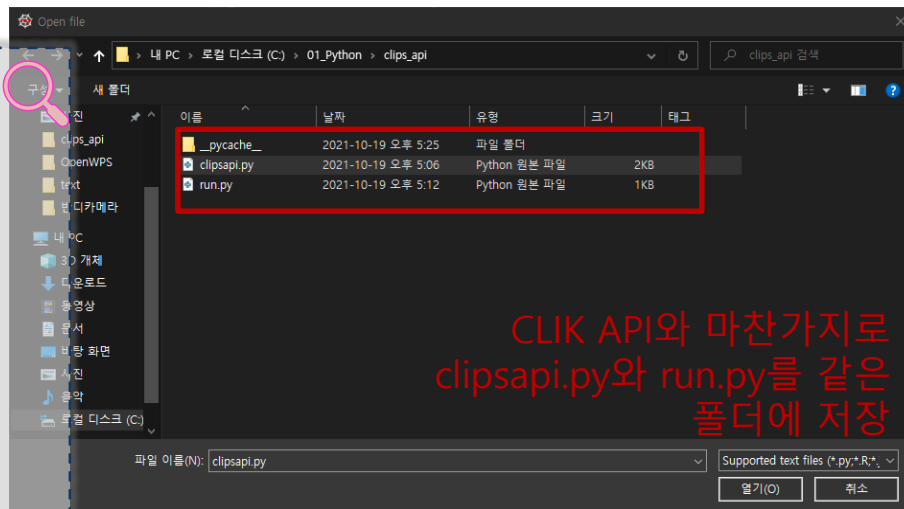
```
File Edit Search Source Run Debug Consoles Projects Tools View Help
C:\#01_Python\#clips_api\#run.py
temp.py x clipsapi.py x run.py x api.py x
1 import clipsapi
2 import json
3 import requests
4
5 c = clipsapi.Client()
6
7 request = {
8     'lead_month': '3-MON',
9     'variable': 'prec',
10    'method': 'SCM',
11    'period': 'Monthly mean',
12    'iyear': '2017',
13    'imonth': '7',
14    'cosouth': '-50',
15    'conorth': '70',
16    'cowest': '100',
17    'coeast': '210'
18 }
19 target = "clips_output.png"
20 c.clip(request, target)
```

```
Console 1/A x
In [4]: runfile('C:/01_Python/clips_api/run.py', wdir='C:/01_Python/clips_api')
Reloaded modules: clipsapi
Start to save file - clips_output.png

Model
Lead Month : 3-MON
Variable : prec
Method : SCM
Period : Monthly mean
Issued Year : 2017
Issued Month : 7

Coordinate
Min Latitude : -50
Max Latitude : 70
Min longitude : 100
Max longitude : 210

clips_output.png download compete!
In [5]:
```

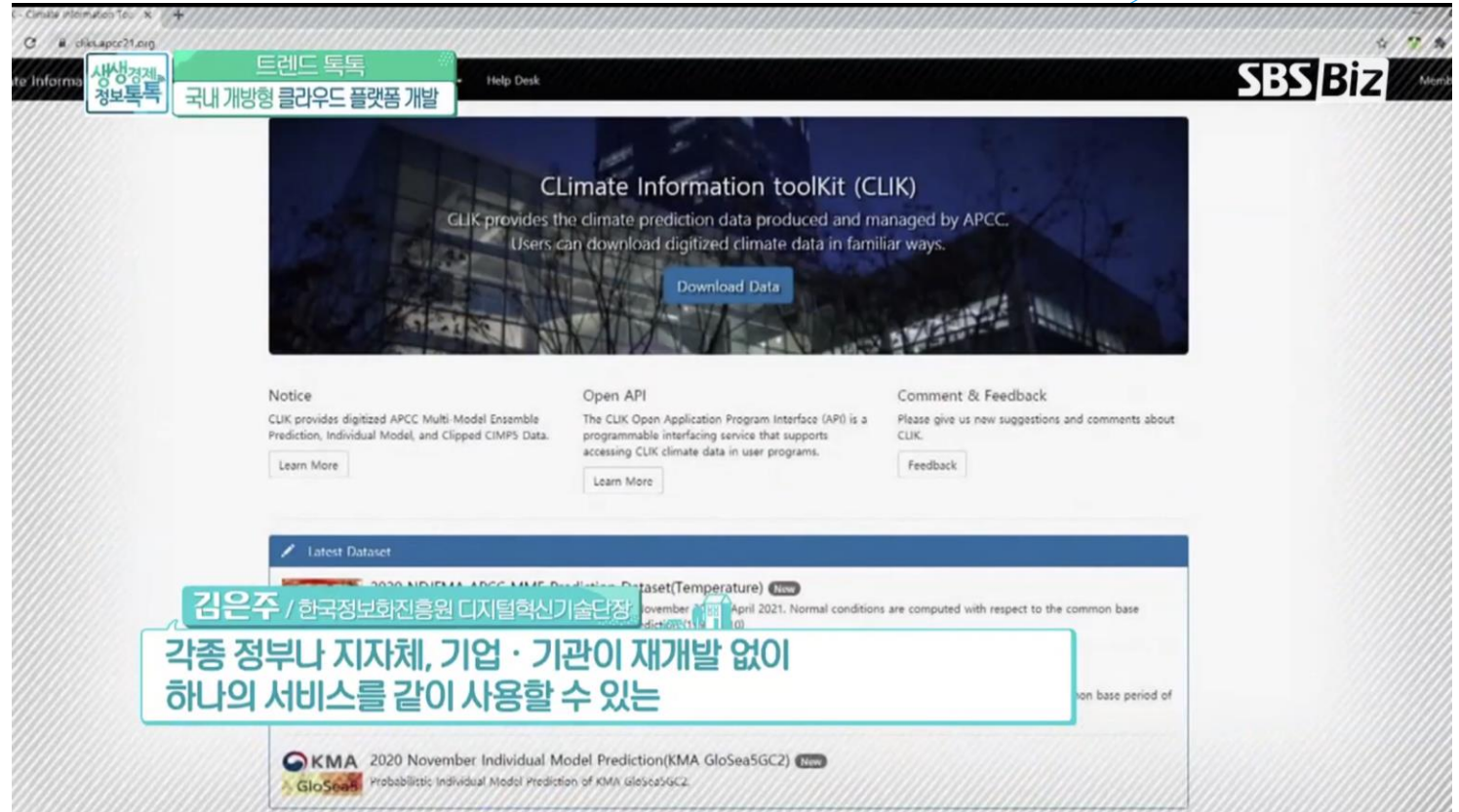


- [실습 1]
- 예보기간: 3개월 MME
- 자료 Type : Forecast
 - MME 기법 : SCM
 - 변수 : prec
 - 자료 통계 기간: Monthly mean
 - 자료 기간: 2017년 7월
 - 추출 위/경도 : -50, 70, 100, 210

CLIK API와 마찬가지로 clipsapi.py와 run.py를 같은 폴더에 저장



Thank You !!



@ SBS 생생경제 정보특독 492회 (2020.11.18 방영) 화면
<https://programs.sbs.co.kr/sbsbiz/cnbctalktalk/clip/56554/22000397345>

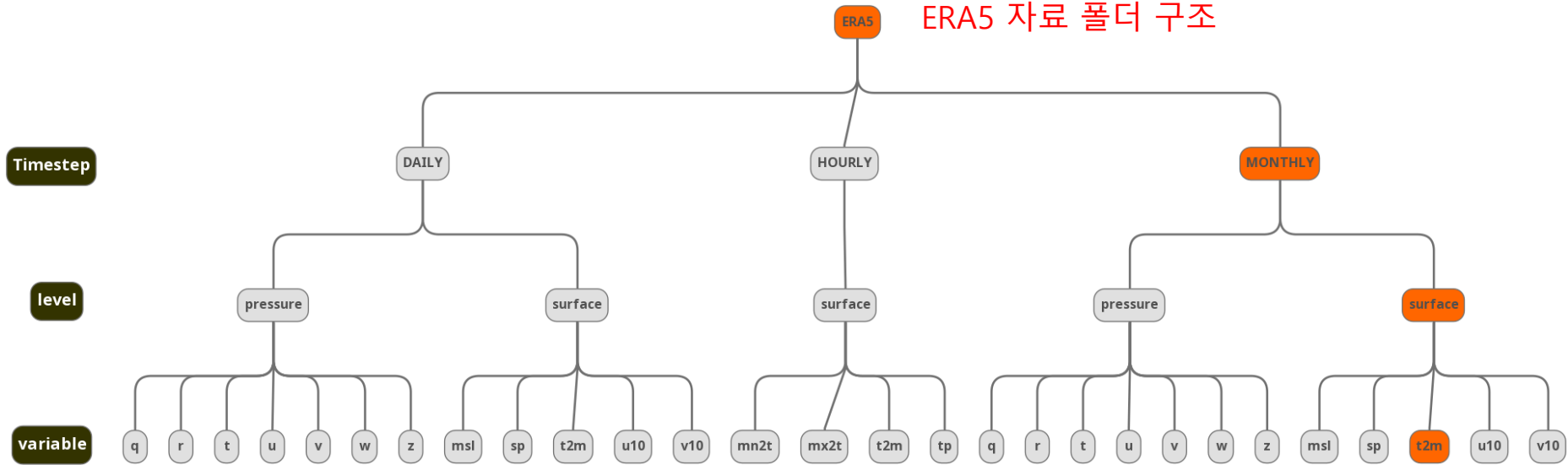


| 스크립트 다운로드 & 실행

모든 자료 다운로드 기능에서 이용 가능

- ERA5 재분석 자료 다운로드
- 스크립트 다운로드만 가능

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



ERA5 wget 스크립트 형식 : `wget --no-check-certificate https://URL/ERA5/timestep/level/variable/파일명형식`

`wget --no-check-certificate https://download.apcc21.org/ERA5/MONTHLY/surface/t2m/t2m_2021.nc`

[예제]

- 자료 : ERA5
- Timestep : Daily
- Level : pressure
- Variable : q
- 기간 : 2021년 6월

```
[root@service01 sclow]#
[root@service01 sclow]# wget --no-check-certificate https://download.apcc21.org/ERA5/MONTHLY/surface/t2m/t2m_2021.nc
--2021-11-03 17:13:14-- https://download.apcc21.org/ERA5/MONTHLY/surface/t2m/t2m_2021.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: 20774632 (20M) [application/x-netcdf]
Saving to: "t2m_2021.nc"

100%[=====] 20,774,632 59.9M/s in 0.3s

2021-11-03 17:13:14 (59.9 MB/s) - "t2m_2021.nc" saved [20774632/20774632]
```

[실습]

- 자료 : ERA5
- Timestep : Monthly
- Level : surface
- Variable : t2m
- 기간 : 2021년

wget 실습 파일 다운로드 결과

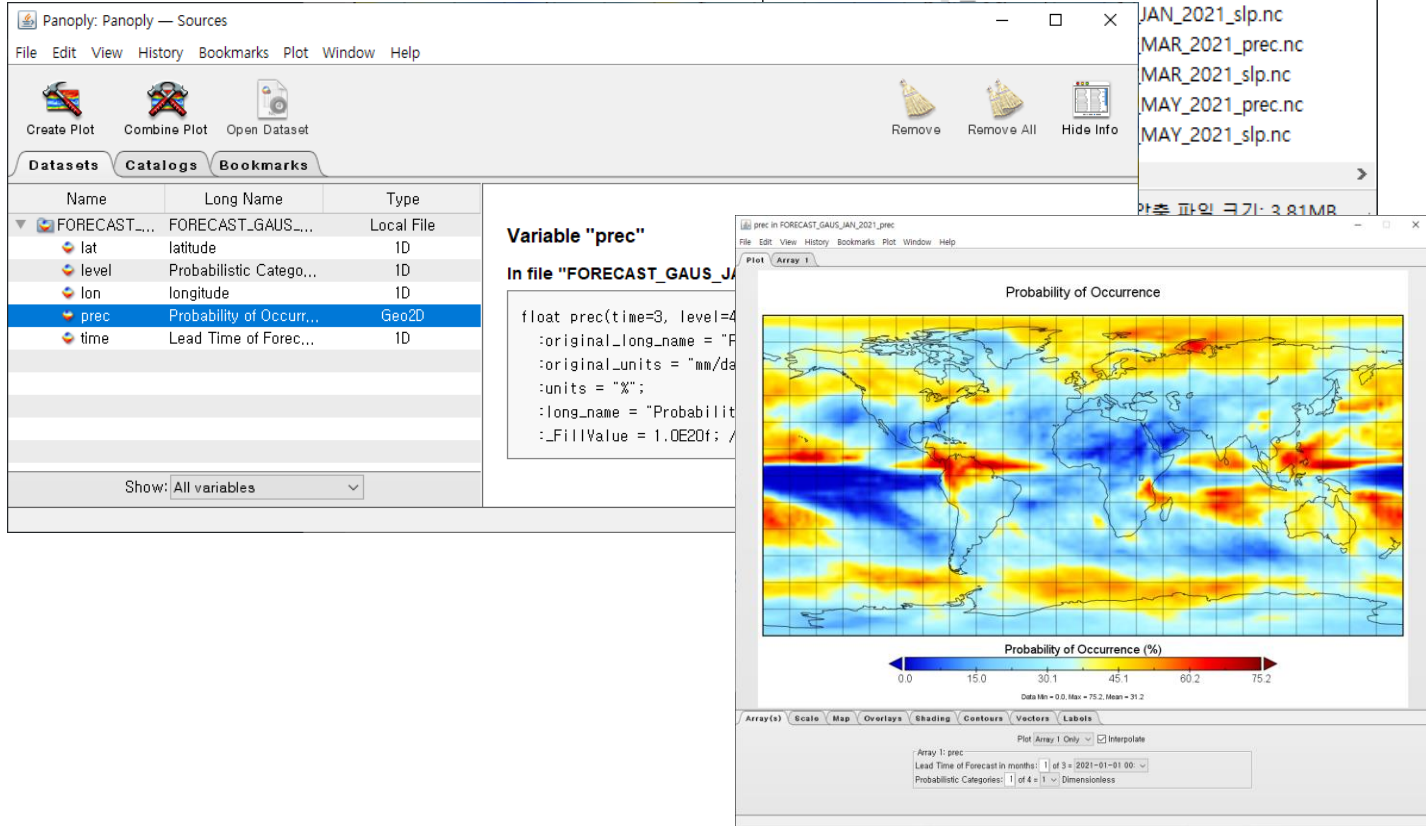
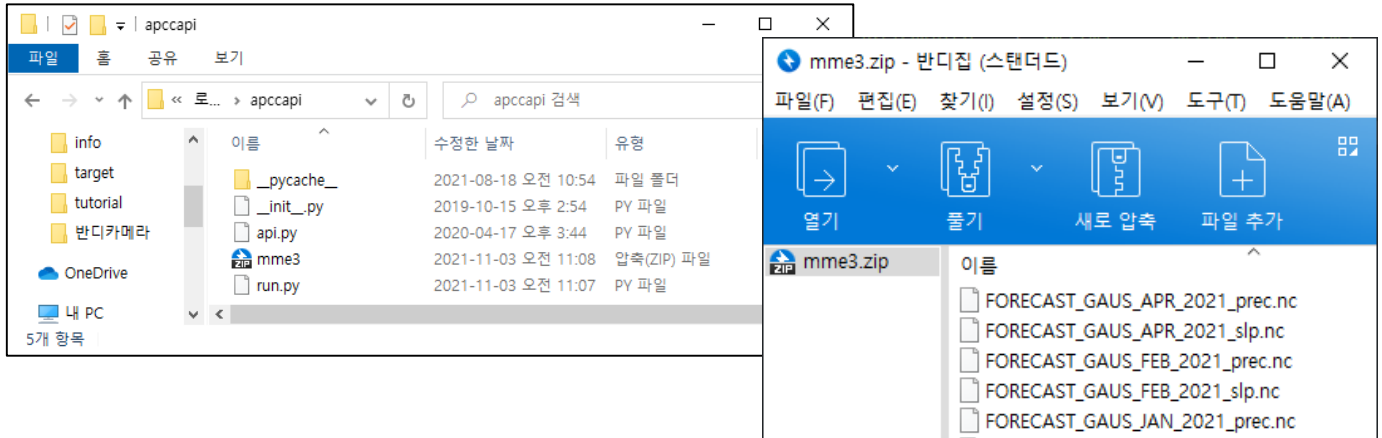
4. APCC 기후서비스 플랫폼 활용 III | MME, MME Model 다운로드 실행 결과

MME 다운로드

- 예보기간 : 3개월 MME
- 자료 Type : Forecast
- MME 기법 : GAUS
- 변수 : prec, slp
- 자료 통계 기간: Monthly mean
- 자료 기간: 2021년 1~5월

```

D:\apccapi\run.py
run.py x
1 import api as apccapi
2
3 c = apccapi.Client()
4 c.retrieve(
5     {
6         'jobtype': 'MME',
7         'dataset': 'MME_3MONTH',
8         'type': 'FORECAST',
9         'method': 'GAUS',
10        'variable': ['prec', 'slp'],
11        'period': ['Monthly mean'],
12        'yearmonth': ['202101', '202102', '202103', '202104', '202105']
13    },
14    'mme3.zip'
15 )
    
```



```

Console 1/A x
Python 3.8.8 (default, Apr 13 2021, 15:08:03) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 7.22.0 -- An enhanced Interactive Python.

In [1]: runfile('D:/apccapi/run.py', wdir='D:/apccapi')
[2021-11-03 11:08:28,698] [INFO] Hello jhshin77.
[2021-11-03 11:08:28,699] [INFO] Your job id is 6181ef1c56ccae000d0b0a50
[2021-11-03 11:08:28,699] [INFO] Request is Queued
<Response [202]>
[2021-11-03 11:08:34,480] [INFO] Request is Running
[2021-11-03 11:08:37,500] [INFO] Request is Complete
[2021-11-03 11:08:37,500] [INFO] Start to save file - mme3.zip
[2021-11-03 11:08:38,729] [INFO] Done
    
```

4. APCC 기후서비스 플랫폼 활용 III | MME, MME Model 다운로드 실행 결과



MODEL 다운로드

- 자료 Type : Forecast
- 기관 : APCC
- Model : SCOPS
- 변수 : sst, t2m
- 자료 기간: 2021년 7~8월

```

D:\#apccapi#run.py
run.py x
1 import api as apccapi
2
3 c = apccapi.Client()
4 c.retrieve(
5     {
6         'jobtype': 'MODEL',
7         'dataset': 'MODEL',
8         'type': 'FORECAST',
9         'institute': 'APCC',
10        'model': 'SCOPS',
11        'variable': ['sst', 't2m'],
12        'yearmonth': ['202107', '202108']
13    },
14    'model.zip'
15 )
    
```



```

Console I/A x
In [3]: runfile('D:/apccapi/run.py', wdir='D:/apccapi')
Reloaded modules: api
[2021-11-03 14:02:22,044] [INFO] Hello jhshin77.
[2021-11-03 14:02:22,044] [INFO] Your job id is 618217dd56ccae000d0b0a52
[2021-11-03 14:02:22,044] [INFO] Request is Queued
<Response [202]>
[2021-11-03 14:02:25,090] [INFO] Request is Running
[2021-11-03 14:02:31,230] [INFO] Request is Complete
[2021-11-03 14:02:31,230] [INFO] Start to save file - model.zip
[2021-11-03 14:02:33,791] [INFO] Done
    
```

