

# TRAVEL REPORT FORM

## 출장보고서

|        |              |              |              |                 |
|--------|--------------|--------------|--------------|-----------------|
| 결<br>재 | 선임연구<br>원    | 팀장           | 부서장          | 부서장             |
|        | 04/01<br>이현록 | 04/02<br>조재필 | 04/02<br>유진호 | 대결 04/02<br>유진호 |
| 협<br>조 |              |              |              |                 |
|        |              |              |              |                 |

### I. Travel Overview 출장개요

#### 1. Traveler(s) 출장자

| Department 소속 | Position 직위(직급) | Name 성명 | Note 비고 |
|---------------|-----------------|---------|---------|
| 기후사업본부        | 선임연구원           | 이현록     |         |

#### 2. Travel Period 출장기간

2018. 03. 19 ~ 2018. 03. 25

#### 3. Occasion and destination 행사 및 출장지

Workshop on SMART Informatics for Sustainability, 방콕, 태국

### II. Major Activities 주요업무 수행내용

#### 1. Main Contents and Activities 주요내용 및 활동

- 태국 과기부 산하 연구소인 HAI (Hydro and Agro Informatics Institute)에서 주관하여 개최한 Workshop on SMART Informatics for Sustainability 국제 워크숍에 APCC의 발표를 요청.
- 발표는 Session 1 : Global Experiences on Informatics Synergy towards Sustainability에서 'Climate Informatics, Tools and Technologies'라는 주제로 Keynote 15분 발표.
- 해당 워크숍 참석 및 발표를 통해 APCC에 대한 소개와 연구성과 홍보를 위해 출장을 수행함.



## 2. Relevance to APEC Climate Center's Activities 결론 및 소감

- WMO에서 기후서비스를 정의하고 있는 ‘사용자 요구 중심의 맞춤형 기후 정보 제공’이라는 관점에서 APCC의 대표적 기후정보서비스인 CLIK에 대한 소개와 해당 기후정보서비스의 Sustainability 향상을 위한 센터의 노력에 대해 Keynote에서 발표함.
- 해당 발표를 통해 APCC의 기후예측기술, 기후정보서비스에 대한 우수성을 알림과 동시에 해당 기후서비스를 통해 인프라가 취약한 개도국 등에 훈련 및 교육, 기술 이전 등 APCC 지원 프로그램의 우수성을 알림.
- 해당 워크숍에 참석한 ASEAN 지역 NMHS에서의 주요관심사는 IT 기술을 활용한 홍수, 가뭄 등에 대한 Monitoring, Forecast, Disaster risk reduction 등이었으며, APCC의 계절예측정보를 어떻게 가져올 수 있고 활용할 수 있는지에 대한 관심이 많았음.
- 해당 워크숍에서 중점적으로 논의된 IT 관련 기술개발은 주로 고품질의 조기경보, 정보의 연속성 및 신뢰성 확보, 센서 기술 등을 활용하여 수집된 데이터 처리 등이었으며 해당 기술개발은 최종적으로 ASEAN 9개국과 국제기구 사이에서의 정보 공유 및 통합을 통해 과학과 정책간의 갭을 줄여 ASEAN의 미래 지속가능성을 높여가고자 함.
- 이번 출장을 통해 해당 워크숍의 주요 참석대상인 ASEAN 지역에서 APCC에 대한 인지도 향상이 되었다 판단되며, 특히 AHC(ASEAN Hydroinformatics and Climate Data Center)와는 APCC의 계절예측 및 계절내예측자료의 공유 및 상호교류를 통해 APCC가 ASEAN 지역에서 영향력을 높힐 수 있는 기회가 될 수 있을 것으로 판단됨.

## 3. Suggestions and Remarks 건의사항

### III. References (Presented and Collected Materials) 주요 수집자료

(with attachment of any information or report in case of attendance of conferences, workshops and meetings) 학술대회, 워크숍, 회의 등 참석 시 관련 정보 및 문서 첨부

- 해당 워크숍 발표자료 모음



# Towards Sustainable Climate Information Services

21 March 2018



Hyunrok Lee (Team Leader)  
[tank@apcc21.org](mailto:tank@apcc21.org)

Information Service Team  
Climate Prediction Department  
APEC Climate Center

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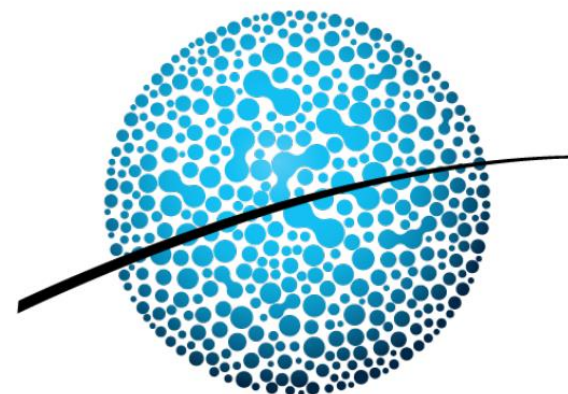
APCC

I. APEC Climate Center

II. APCC Climate Information Products and Services

III. CLimate Information toolKit(CLIK)

IV. Towards Sustainable Climate Information Services



**APCC**  
APEC CLIMATE CENTER



# Mission of APCC

APCC

- To enhance **the socio-economic well-being of member economies** by utilizing up-to-date scientific knowledge and applying innovative climate prediction techniques through



## Climate Prediction

APCC produces value-added, reliable, and real-time climate prediction information and provides the APEC region with it.



## Interdisciplinary Research

APCC leads in the development of interdisciplinary research and application techniques at the climate-environment-society nexus.



## Climate Information Services

APCC strives to be a key climate database center to distribute climate data, information products, and related tools.



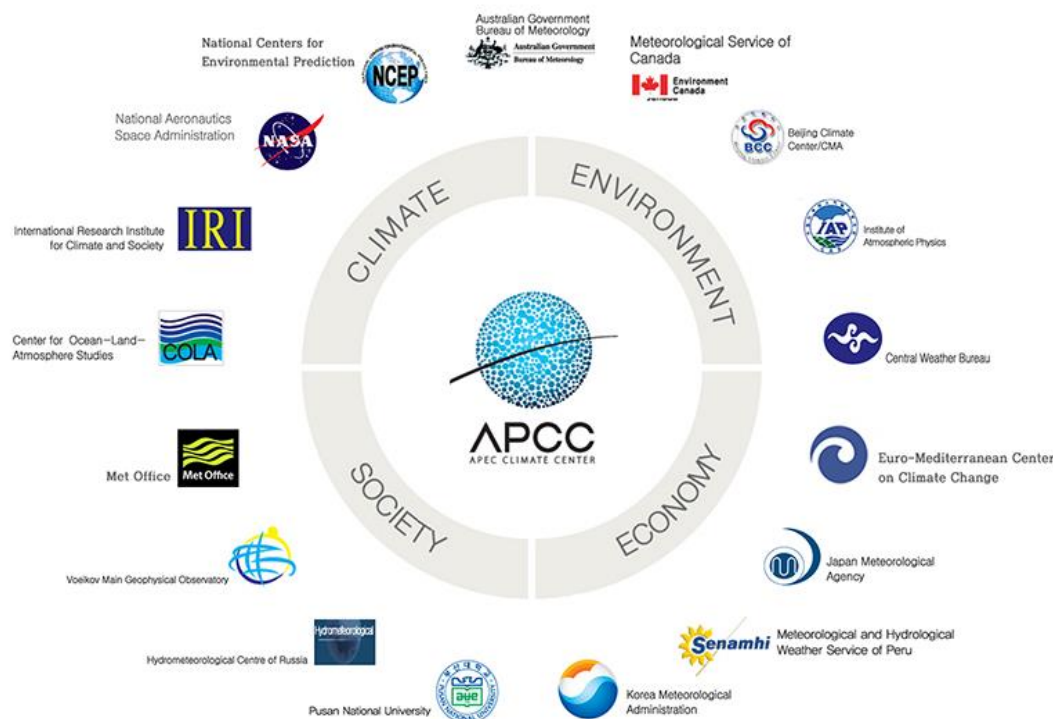
## International Cooperation

APCC guides developing countries from the APEC region toward building their own capacity to produce reliable climate prediction information.

# Climate Prediction

APCC

- The APEC Climate Center **collects climate forecast information** from 17 leading climate forecasting centers and institutes in 11 countries.
- These forecasts are **combined using the multi-model ensemble (MME)** scheme and the high quality climate forecast information is disseminated to APEC member economies and Pacific Islands through APCC's website.

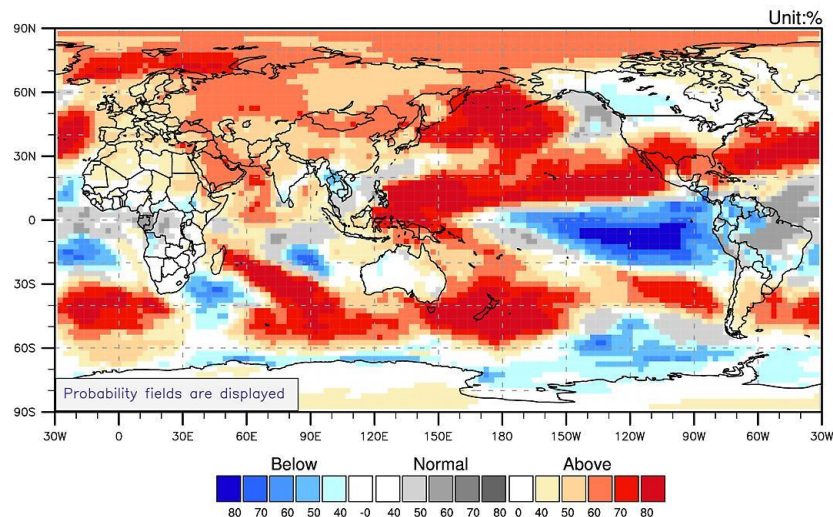


# Climate Prediction

- **MME forecast products include:**

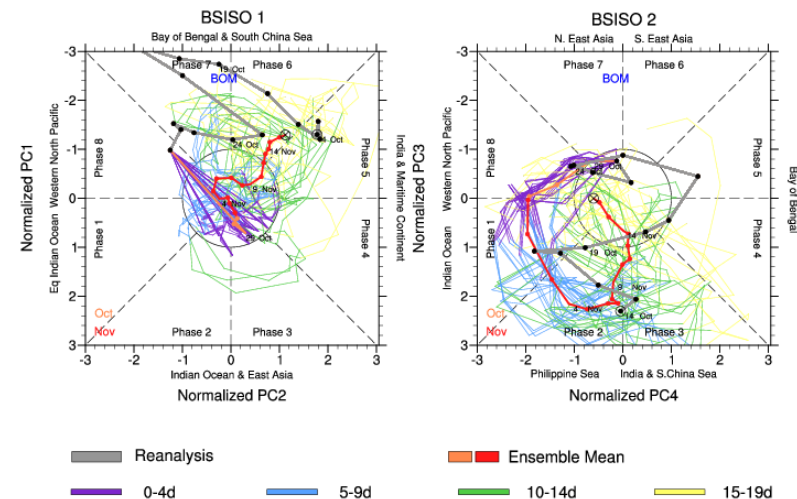
- Monthly 3-month and 6-month lead climate prediction information based on multi-model ensemble system
- BSISO Forecast: Scaling up from seasonal to intraseasonal forecasting

Temperature at 2m for March-May 2018



© APEC Climate Center

BSISO Forecast for 29Oct2017-17Nov2017



© APEC Climate Center

# Climate Information Services



LOGIN | CONTACT US | SITE MAP | 한국어

Research

Climate Information Services

International Cooperation

Media

Notices

About us



## CLIMATE INFORMATION SERVICES



Seasonal  
Forecast



BSISO  
Forecast



Climate  
Monitoring



CLIK



Data  
Service



CLIPs

### FORECASTS



### NOTICE



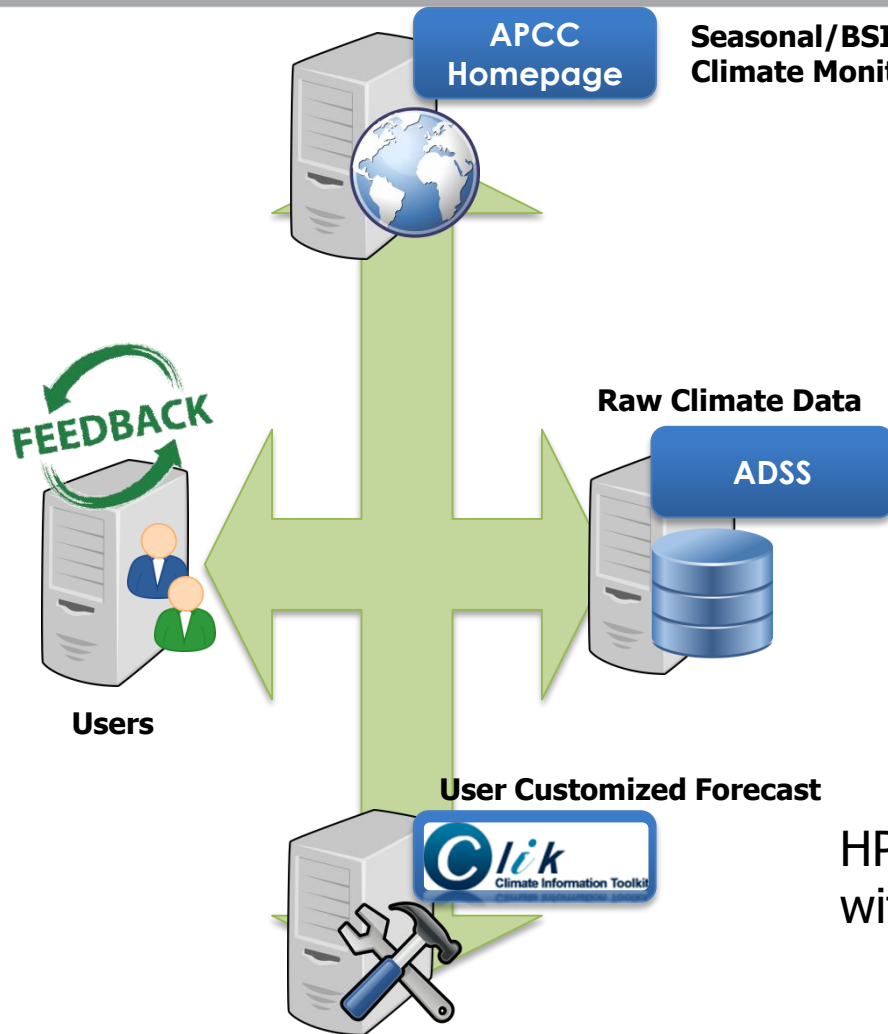
| APCC News | Employment                            | APCC Seminars |
|-----------|---------------------------------------|---------------|
| Notice    | The APEC Climate Center Received t... | 02.28         |
| Notice    | APCC Climate Center Signed an MO...   | 02.23         |

### P.R.



# Climate Information Service Architecture

APCC



HPC (High Performance Computing)  
with Mass Climate Data Storage @ APCC

*3.47GHz \* 1,260 Cores*  
*3 Peta Bytes (3,000 Tera Bytes) Storage*

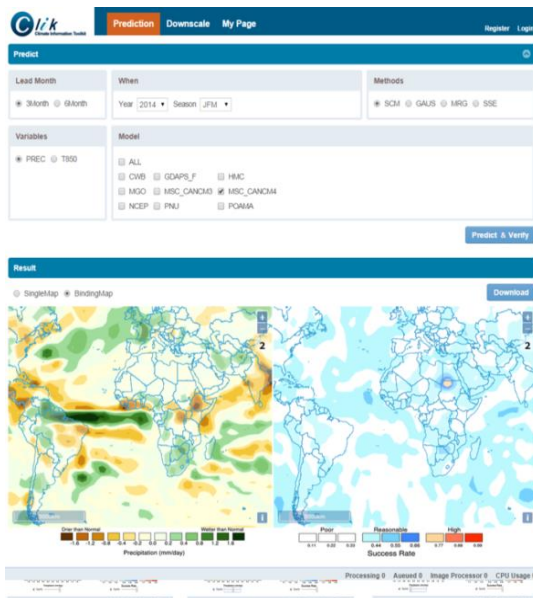
# CLIK Overview

<http://clik.apcc21.org>

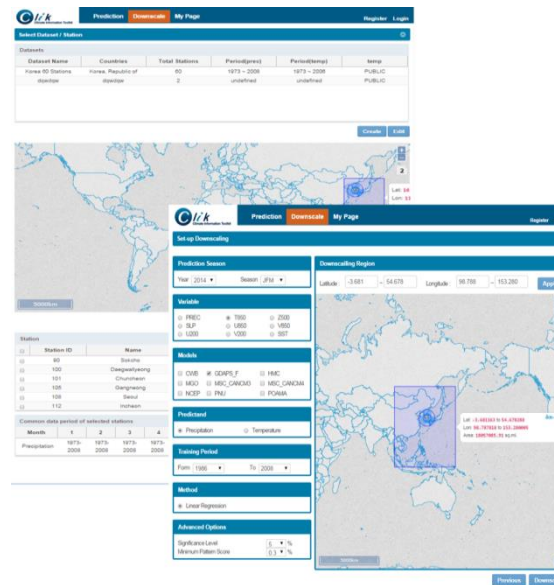
## ✓ CLimate Information toolKit (CLIK) :



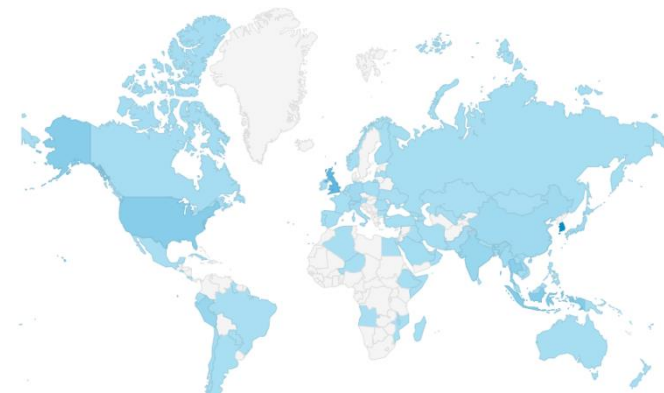
- [Online] Web based Climate Prediction Toolkit
- [Customized] Produce customized Prediction/Verification to freely select climate models, variables, areas, and analysis techniques
- [MME] Produce the state-of-art Multi-Model Ensemble climate prediction
- [Lightweight] Precomputation, Optimizing map & image size



MME Prediction



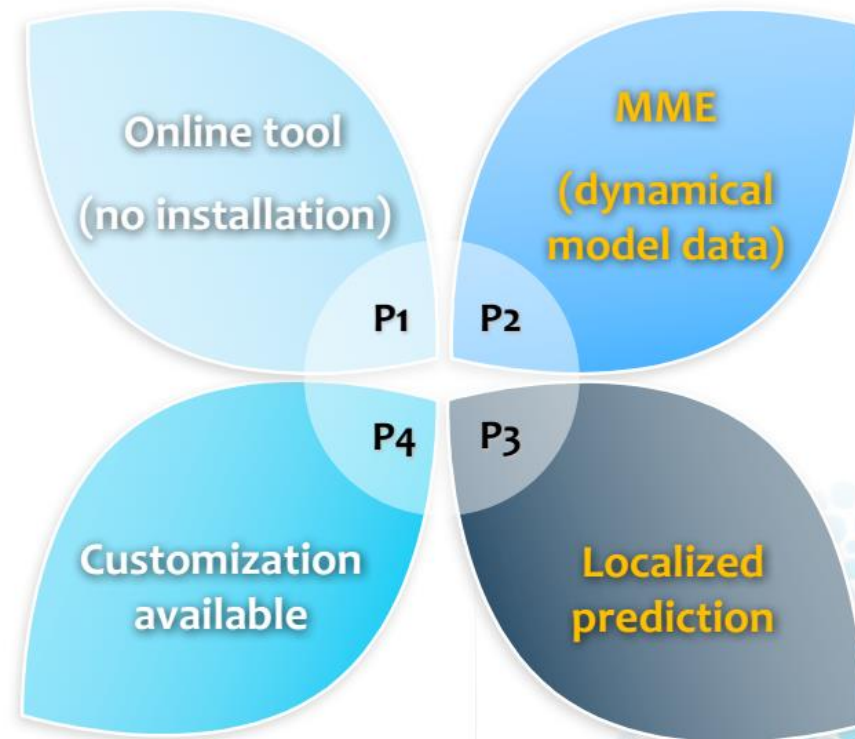
Downscale



Countries using CLIK  
(16 Mar. 2016~ 16 Mar. 2018)

# Target Users

- Target users are, but are **not limited to NMHS staffs** of developing countries having basic understanding of climate and meteorology.
- **CLIK was designed and developed based on the analysis of potential users**
  1. Limitation of manpower and computing resources
  2. Desire for utilizing **dynamical forecast data**
  3. Direct benefit on **regional community**
  4. Thirsty for Capacity building: Interests in learning science and technology and high satisfaction from participating in the model developing process



# Utility (CLIK MME Prediction Use case)

## [Water]

Groundwater Modeling and  
Decision support system

Nationally tailored information on  
seasonal climate prediction and  
improve climate services.

## [Disaster Risk Reduction]

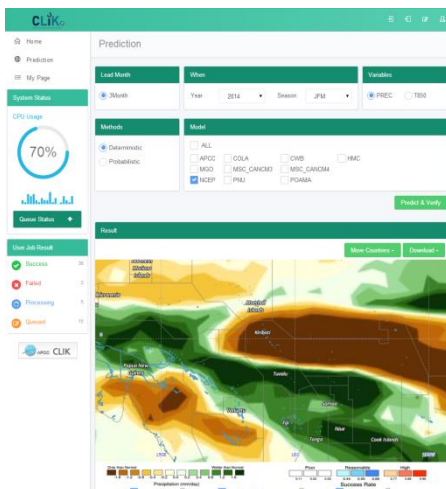
PICs capacity building & Helping  
Adaptation

## [Agriculture and Food Security]

APCC-Tonga Agricultural decision  
support system

## [Health]

APCC-PNU Hospital  
Heat wave & fever

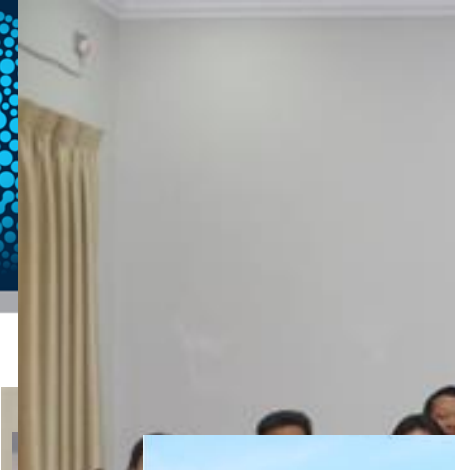




# End of development of CLIK

APCC

- Through the development of sector-specific forecast techniques tailored to target regions and countries, APCC will service customized climate change information and support technology development on sectoral climate risk management.
- **OK, our work is done successfully. Now the user will use it.**
  - 1. Let's go on vacation.
  - 2. Let's develop yet another climate service.



- 



# CLIK for Pacific

(Pacific Islands Climate Advanced Seasonal Outlook)

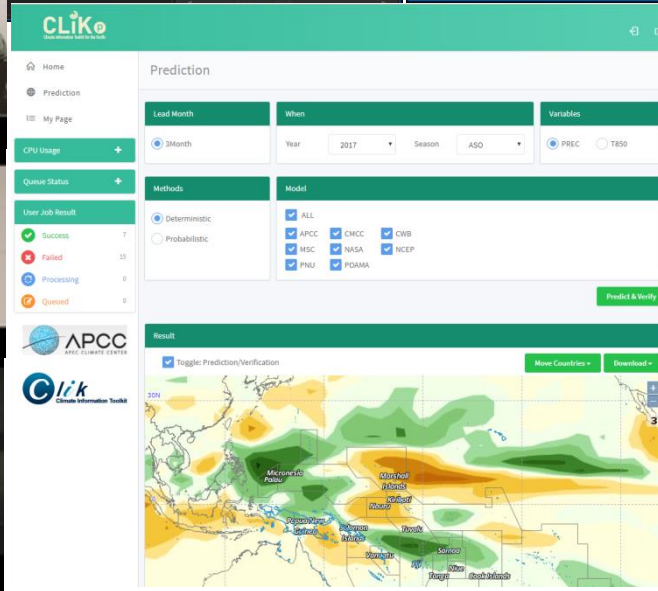
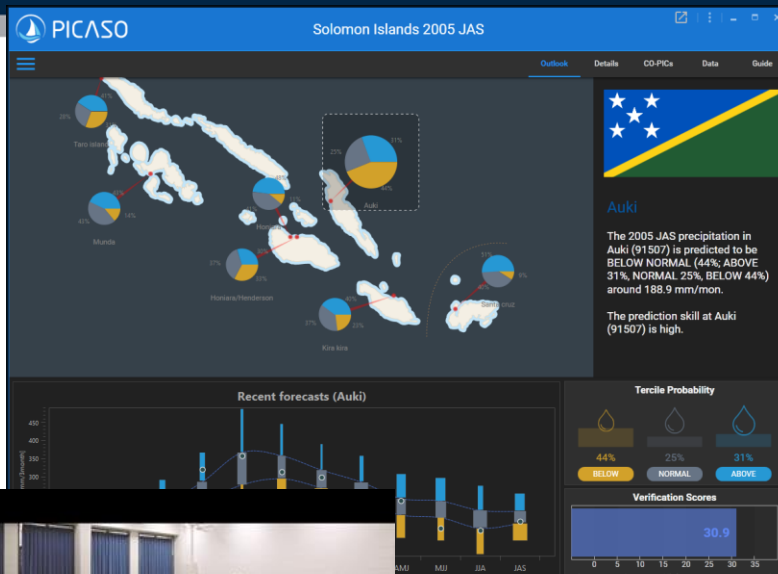
APCC

- Republic of Korea-Pacific Islands Climate Prediction Project (ROK-PI CLIPS)

|                                                      |                                                                                                                                                                           |                                                                                     |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Implementing Agencies</b>                         | APEC Climate Center (APCC)<br>Secretariat of the Pacific Regional Environment Program (SPREP)                                                                             |                                                                                     |
| <b>Implementing Countries</b>                        | Cook Islands<br>Federated States of Micronesia<br>Fiji<br>Kiribati<br>Republic of the Marshall Islands<br>Nauru<br>Niue                                                   | Palau<br>Papua New Guinea<br>Samoa<br>Solomon Islands<br>Tonga<br>Tuvalu<br>Vanuatu |
| <b>CLIKP</b>                                         | CLIKP is a web-based dynamical multi-model ensemble (MME) seasonal prediction tool optimized to the Pacific Island region                                                 |                                                                                     |
| <b>PICASO</b>                                        | PICASO is a PC-based seasonal prediction software tailored for the Pacific Island region                                                                                  |                                                                                     |
| <b>Application Guideline/Country-Based Handbooks</b> | Application Guideline and the Country-Based Handbooks are a guideline to understand the local climate drivers and to interpret the tailored dynamical climate predictions |                                                                                     |
| <b>Capacity Building</b>                             | Capacity building increased the ability of Pacific Island climate officers to generate high quality climate forecast information for their respective countries           |                                                                                     |

# CLIK for Pacific

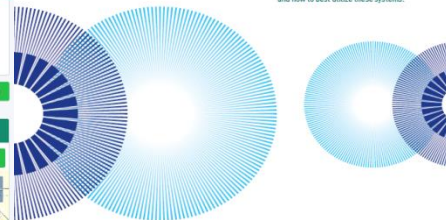
(Pacific Islands Climate Advanced Seasonal Outlook)



[https://youtu.be/TYI-IOk\\_YQ](https://youtu.be/TYI-IOk_YQ)

## Application Guideline

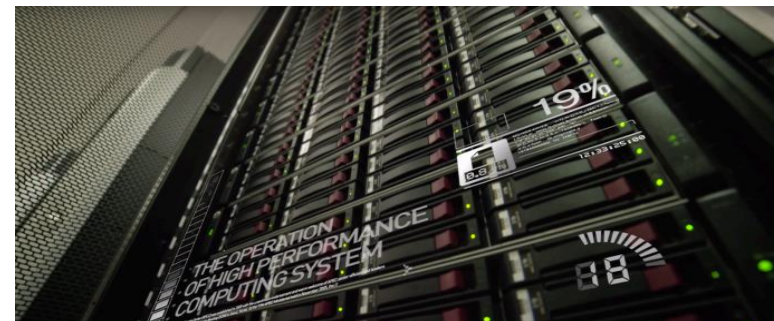
Explaining the scientific background of developing the Climate Information Toolkit for the Pacific (CLiK) and the Pacific Island Countries Advanced Seasonal Outlook (PICASO) and how to best utilize these systems.



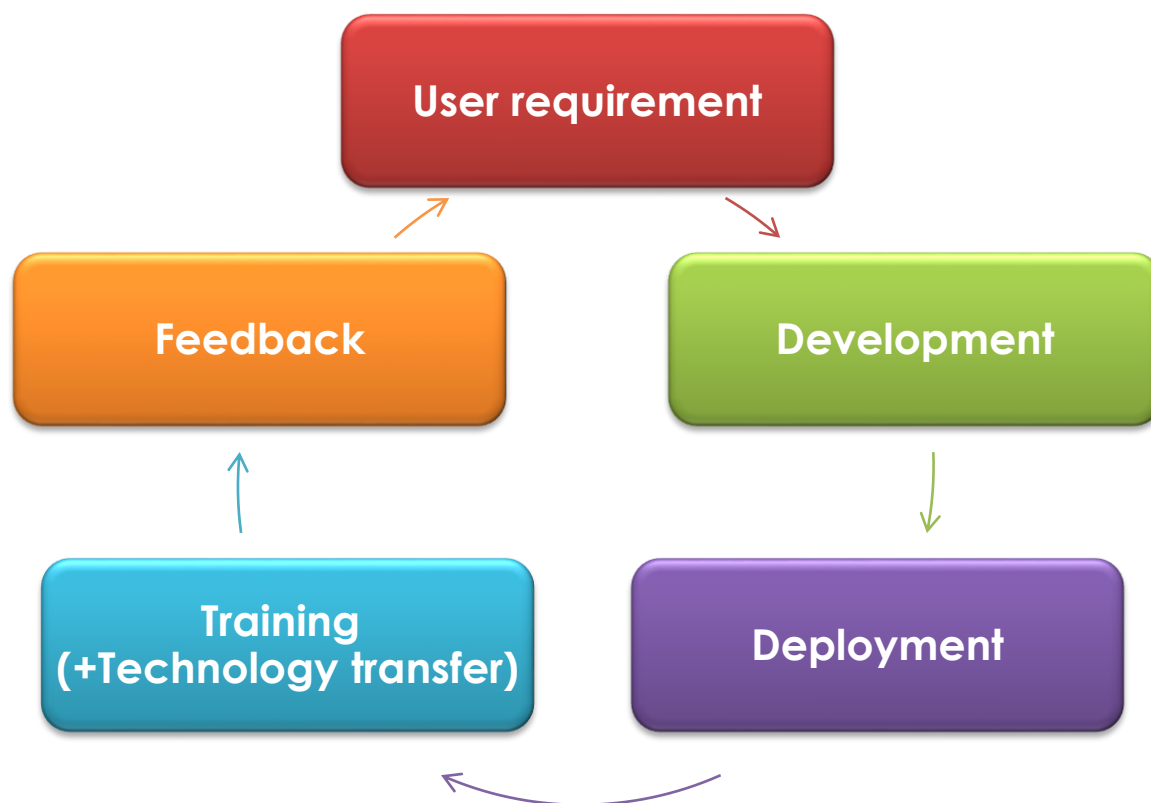
# Future Directions of CLIK

## ✓ Tailored, Customized “Information” for **YOU**

- **[Method]**
  - Provide additional methods on MME prediction and verification feature
  - Enhance computing mechanism through in-house HPC
- **[Localization]**
  - Develop and Improve region-specific statistical downscaling prediction
- **[Supporting program]**
  - Improve technical transfer methods
  - Enhance Training Workshop and Tutorial program
  - Continuously survey on user requirements
  - Enhancing CLIK based on user feedback



# Towards Sustainable Climate Information Services



For successful establishment of sustainable climate services, it is important **not to end with the one-off development** of the services, but to **make the climate service a living thing** through the continuous collection of user feedback



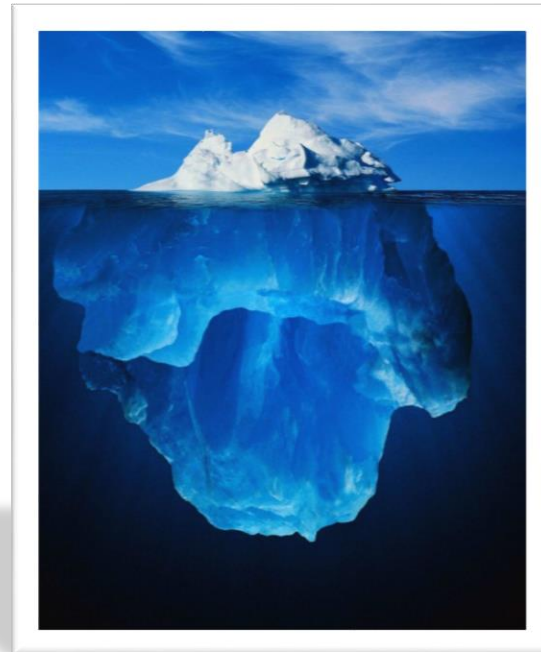
# Best Practice



- Movie Clip
  - About best practice of sustainable climate information services

# Thank You !!

APCC



**For question and feedback, please contact**

**[clik@apcc21.org](mailto:clik@apcc21.org)**

**[tank@apcc21.org](mailto:tank@apcc21.org)**

