

TRAVEL REPORT FORM

출장보고서

결 재	사원	원장		
	06/13	06/13		
협 조	강보라	정홍상		

I. Reporter 보고자

Department 소속	Position 직위(직급)	Name 성명	Travel Date 날짜	Note 비고
소장실	소장	정홍상	2016.5.23.~26.	

II. Major Activities 주요업무 수행내용

1. Main Contents and Activities 주요내용 및 활동

- 1) APEC Research Center for Typhoon and Society(ACTS) 주관 2016 APEC Typhoon Symposium(APTS) 및 ACTS Steering Committee 참석
- 2) 일시 : 2016년 5월 24일 ~ 5월 26일
- 3) 장소 : GIS NTU Convention Center, Chinese Taipei
- 4) 주요 업무 및 수행 사항
 - APEC Typhoon Symposium 내 Member Economies Experience Sharing(By Invitation) 세션에서 “Forecasting and Application Studies on Extreme Climate Events in APCC”를 주제로 발표함.
 - ACTS Steering Committee(SC) 회의 참석
 - 심포지엄에 참석한 Climate Change 관련 전문가들과의 의견공유

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

- 1) 심포지엄을 통해 ACTS의 연구 활동들을 들음으로써 향후 태풍에 관한 APCC의 연구 방향을 설정하는데 다양한 방안들을 습득함.
- 2) 발표를 통해 APCC의 연구 활동 및 경험들을 소개함으로써 센터의 위상을 높임.
- 3) 학회의 다양한 분야 세션에 참석함으로써 새로운 연구분야의 발전 방안을 모색함.
- 4) ACTS Steering Committee(SC)에 참석하여 ACTS의 운영발전방안들을 함께 모색함.

III. References 참고사항

(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

1. Presented and Collected Materials 주요 수집자료

2. Suggestions and Remarks 건의사항



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Chinese Taipei
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Email: contact@aptec-acts.org

Hong-Sang Jung
Director
APEC Climate Center
Korea

25 April 2016

Dear Dr. Jung,

Warm Greetings from the APEC Research Center for Typhoon and Society (ACTS)!

Firstly, we would like to congratulate you for becoming the new director of the APEC Climate Center. Furthermore, it is our great pleasure to announce that 2016 APEC Typhoon Symposium (APTS) will be held in Taipei from May 24th to 26th. The theme of 2016 APTS is "Recent Development of Typhoon and Flood Forecasting Techniques and Applications". In addition, the Steering Committee (SC) meeting will be held on May 25th at the Taiwan Typhoon and Flood Research Institute, National Applied Research Laboratories (TTFRI, NARLabs) in Taipei, tentative program enclosed.

The **2016 APTS** is aiming to demonstrate recent advancements in typhoon and flood forecasting as well as performing the evaluation and application of forecasting services. We are pleased and honored to invite you to participate in this event.

We would like to invite you to be a member of the ACTS Steering Committee (SC) and join the ACTS Steering Committee Meeting. The ACTS SC members will meet once a year and provide recommendation to the ACTS. Your term will begin from May 25, 2016. Your valuable experiences and contribution will be beneficial to all APEC Member Economies.

The travel funding will be provided by the ACTS upon your arrival, including one round-trip economy-class ticket to Taipei, accommodation and meals for the duration of the symposium. Should you have any further question, please feel free to contact Ms. Lily Chu at contact@aptec-acts.org. We look forward to meeting you at the 2016 APTS in Taipei!

Sincerely yours,

Dr. Ching Yen Tsay
Chairman of the ACTS Steering Committee

2016 APEC Typhoon Symposium – Recent Development of Typhoon and Flood Forecasting Techniques and Applications

I. Date: May 24-26, 2016 (Tuesday-Thursday)

II. Venue: GIS NTU Convention Center

III. Program (tentative)

Time	24 May (Tue.)		
08:30~09:00	Registration		
09:00~09:30	Opening Remark Room: The Forum		
09:30~10:00	Group Photo / Coffee Break		
10:00~12:00	Keynote Speech I Room: The Forum		
12:00~13:20	Lunch Room: The Forum		
13:20~14:40	Met Session 1 Room: The Forum	Hydro Session 1 – Disaster Simulation, Prevention and Mitigation: Flood Room: Socrates	Socio-Economic Session 1 - Evaluation of Typhoon and Flood Forecasting Services Room: Plato
14:40~15:00	Coffee Break		
15:00~16:20	Met Session 2 Room: The Forum	Hydro Session 2 – Disaster Simulation, Prevention and Mitigation: Landslide Room: Socrates	Socio-Economic Session 2- Application of Typhoon and Flood Forecasting Services Room: Plato
16:20~16:30	Coffee Break		
16:30~18:00	Poster Competition Room: Locke and Archimedes		
18:30-	Banquet (By Invitation)		

Time	25 May (Wed.)
08:30~09:00	Registration
09:00~11:00	Keynote Speech II Room: The Forum
11:00~11:20	Coffee Break
11:20~11:35	Student Poster Awards Room: The Forum
11:35~12:00	Concluding Session & Closing Remarks Room: The Forum
12:00~13:00	Lunch Room: The Forum
13:00~15:45	Member Economies Experience Sharing (By Invitation) Each presentation: 15 minutes Room: Locke
16:30~18:00	Steering Committee Meeting
18:30~20:00	Banquet (Steering Committee)
Time	26 May (Thur.)
09:00~17:00	Field Study (By Invitation)
18:00 -	Farewell Banquet

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Time	24 May (Tue.)
08:30~09:00	Registration
09:00~09:30	Opening Remark Room: The Forum
09:00~09:30	Ching-Yen Tsay, APEC Research Center for Typhoon and Society, Chinese Taipei Wei-Fuu Yang, Ministry of Economic Affairs, Chinese Taipei Rowena Cristina L. Guevara, Department of Science and Technology, The Philippines Ching-Hua Lo (TBC), National Applied Research Laboratory, Chinese Taipei
09:30~10:00	Group Photo / Coffee Break
10:00~12:00	Keynote Speech I Room: The Forum
10:00~10:40	Natural Disaster Prevention in Taiwan: Research and Applications Tai-Jen Chen, National Taiwan University, Chinese Taipei
10:40~11:20	Flood Control Strategy and Smart Disaster Prevention Ruey-Der Wang, Water Resources Agency, Chinese Taipei
11:20~12:00	Who is Failing Whom? The Disaster Risk Relationship between Science and Practice Jane Rovins, , Massey University, New Zealand
12:00~13:20	Lunch Room: The Forum

13:20~14:40	Met Session 1 Advanced Technologies in Typhoon Observation and Forecast Chair: Johnny Chan Room: The Forum	Hydro Session 1 Disaster Simulation, Prevention and Mitigation: Flood Chair: Tsun-Hua Yang Room: Socrates	Socio-Economic Session 1 Evaluation of Typhoon and Flood Forecasting Services Chair: Ching-Cheng Chang Room: Plato
13:20~13:40	Advanced Typhoon Observation and Forecasts with New Technologies such as HIMAWARI-8 and High-resolution Global Models Yoshiaki Takeuchi JMA, Japan	Operational Flood Forecasting at the European and Global Scales with EFAS and GloFAS Calum Baugh ECMWF, UK	Impacts of Flood on Rice Market in the Mekong Delta Region in Vietnam Jun Furuya JIRCAS, Japan
13:40~14:00	Dynamical-statistical Seasonal Prediction for Western North Pacific Typhoons Based on APCC MME Ok-Yeon Kim APCC, Korea	Hydrological Data Application for Flood Early Warning for Urban Communities in Thailand Thada Sukhapunphan RID, Thailand	Taiwanese's Weather Information Services and Applications in Agriculture: Economic Evaluation and Recent Development Hen-I Lin CIER, Chinese Taipei
14:00~14:20	Ensemble Typhoon Wind Speed Forecast Jing-Shan Hong CWB, Chinese Taipei	Variable Parameter Unsteady Flow Model for the Han River Kyung-Soo Jun Sungkyunkwan Univ., Korea	Willingness-to-pay for Mobile Phone Short-message Warning Service for Typhoons in Vietnam Thanh Cong Nguyen National Economics Univ., Viet Nam
14:20~14:40	Introduction of the Experiment on Typhoon Intensity Change in Coastal Area (EXOTICCA) Xiaotu Lei CMA, China	David Gochis, NCAR, USA	The Cost and Benefit Analysis for Ensemble Typhoon Track Forecast Ya-Pin Lyu ACTS, Chinese Taipei
14:40~15:00	Coffee Break		

15:00~16:40	Met Session 2 Study and Prediction of Typhoon and Heavy Rainfall Characteristics Chair: Yoshiaki Takeuchi Room: The Forum	Hydro Session 2 Disaster Simulation, Prevention and Mitigation: Landslide Chair: Kwan Tun Lee Room: Socrates	Socio-Economic Session 2 Application of Typhoon and Flood Forecasting Services Chair: Shu-Ling Chen Room: Plato
15:00~15:20	Change in Ocean Subsurface Environment to Suppress Tropical Cyclone Intensification under Global Warming I-I Lin NTU, Chinese Taipei	A Multi-hazards Simulator Supporting Warning and Evacuation System for Sediment Disasters Masaharu Fujita Kyoto Univ., Japan	Reducing the Social Cost of Federal Crop Insurance: A Role for US Government Hedging with Weather Derivatives Wonho Chung Pusan Nat. Univ., Korea
15:20~15:40	Study on the the Heavy Rainfall Event over Vietnam Central Highland by WRF Model Mai Van Khiem IMHEN, Viet Nam	Use of Past Typhoon Data for Landslide Modeling and Mapping Kang-Tsung Chang NTU, Chinese Taipei	Aftermath of Typhoon Ondoy (Ketsana) towards Climate Resilience and Green Growth of Metro Manila, Philippines Maria Victoria Espaldon UP Los Banos, the Philippines
15:40~16:00	Assessment of Storm Surge on the Middle Coast of Vietnam Nguyen Ba Thuy NCHMF, Viet Nam	Landslide Trends under Extreme Climate Event Chyi-Tyi Lee NCU, Chinese Taipei	The Loss Surveying and Analysis of Taipei and New Taipei City after Typhoon Soudelor Hsin-Chi Li NCDR, Chinese Taipei
16:00~16:20	More Accurate 6-Hour Rainfall Forecasting with Radar Data Assimilation Chih-Chien Tsai TTFRI, Chinese Taipei	Practical Management of Debris-flow-prone Torrents in Taiwan Hsiao-Yuan Yin SWCB, Chinese Taipei	Communicating the Risks Associated with Weather Hazards Denna Geppi NOAA, USA
16:20~16:40		Rainfall Forecasts Combining with Shallow Landslide Model for Real-time Warning System Jui-Yi Ho ACTS, Chinese Taipei	

16:20~16:50	Coffee Break
16:20~18:15	Poster Competition Room: Locke and Archimedes
18:30~20:30	Banquet – Living One (By Invitation)
Time	25 May (Wed.)
08:30~09:00	Registration
09:00~11:00	Keynote Speech II Room: The Forum
09:00~09:40	Dynamical Seasonal Prediction of Landfalling Tropical Cyclone Activity in East Asia Johnny Chung Leung Chan , City University of Hong Kong, Hong Kong
09:40~10:20	Climate Change and Asian Cooperation Gyewoon Choi , K-Water, Korea
10:20~11:00	Tropical Storms: Changes and Trends Wolfgang Karl Härdle , Humboldt-Universität zu Berlin, Germany
11:00~11:20	Coffee Break
11:20~11:35	Student Poster Awards Chair: Kwan Tun Lee Room: The Forum
11:35~12:00	Concluding Session & Closing Remarks Chair: Yu-Chieng Liou (TBC) Room: The Forum
12:00~13:00	Lunch Room: The Forum

13:00~15:15	Member Economies Experience Sharing (By Invitation) Each presentation: 15 minutes Chair: Cynthia Celebre, Tien-Chiang Yeh Room: Locke
13:00~13:15	A New Look on the Protection against Floods and Measurements to Mitigate it – Case of Debris Flows and Floods in the North of Chile in March, 2015 Romina Aranda, Ministry of Public Work, Chile
13:15~13:30	Verification of WRF Model for Rainfall Prediction in Indonesia Miming Saepudin, Meteorological, Climatological, and Geophysical Agency, Indonesia
13:30~13:45	TBD Hong-Sang Jung, APEC Climate Center, Korea
13:45~14:00	Tropical Cyclone Severe Wind Risk Analysis for GMMA Thelma Cinco, Philippine Atmospheric, Geophysical and Astronomical Services Administration, The Philippines
14:00~14:15	Coffee Break
14:15~14:30	Seasonal Climate Forecasting in the Philippines – An Early Warning Tool Edna Juanillo, Philippine Atmospheric, Geophysical and Astronomical Services Administration, The Philippines
14:30~14:45	Recent Development for Typhoon Forecast Technique in CWB Kuo-Chen Lu, Central Weather Bureau, Chinese Taipei
14:45~15:00	Tropical Cyclones in Thailand Sugunyanee Yavinchan, Thai Meteorological Agency, Thailand
15:00~15:15	Improved Global Tropical Cyclone Forecasts from NOAA: Lessons Learned and Path Forward Sergio Abarca, National Oceanic and Atmospheric Administration, USA
15:15~15:30	Lesson Learned in Disaster Risk Management in Viet Nam Duong Hong Son, Institute of Meteorology, Hydrology and Climate Change, Viet Nam
15:30~15:45	Muhammad Affindi Haji Sabli (TBC) , Brunei Darussalam Meteorological Department, Brunei Darussalam
16:30~18:00	ACTS Steering Committee Meeting
18:30~20:00	Banquet (Steering Committee)

Time	26 May (Thur.)
09:00~17:00	Field Study (By Invitation)
18:00 -	Farewell Banquet (By Invitation)

**2016 APEC Typhoon Symposium – Recent Development of Typhoon and Flood
Forecasting Techniques and Applications, 24th -26th May, 2016**

Forecasting and Application Studies on Extreme Climate Events in APCC

**Hong-Sang Jung
APEC Climate Center**





Contents

I. Introduction

- ✓ APEC Climate Center (APCC)
- ✓ APCC Mission
- ✓ Structure of APCC

II. Climate Prediction

- ✓ Seamless Prediction for Climate Service
- ✓ S2S Climate Information
- ✓ APCC MME Seasonal Prediction
- ✓ APCC Subseasonal Prediction

III. Application Studies

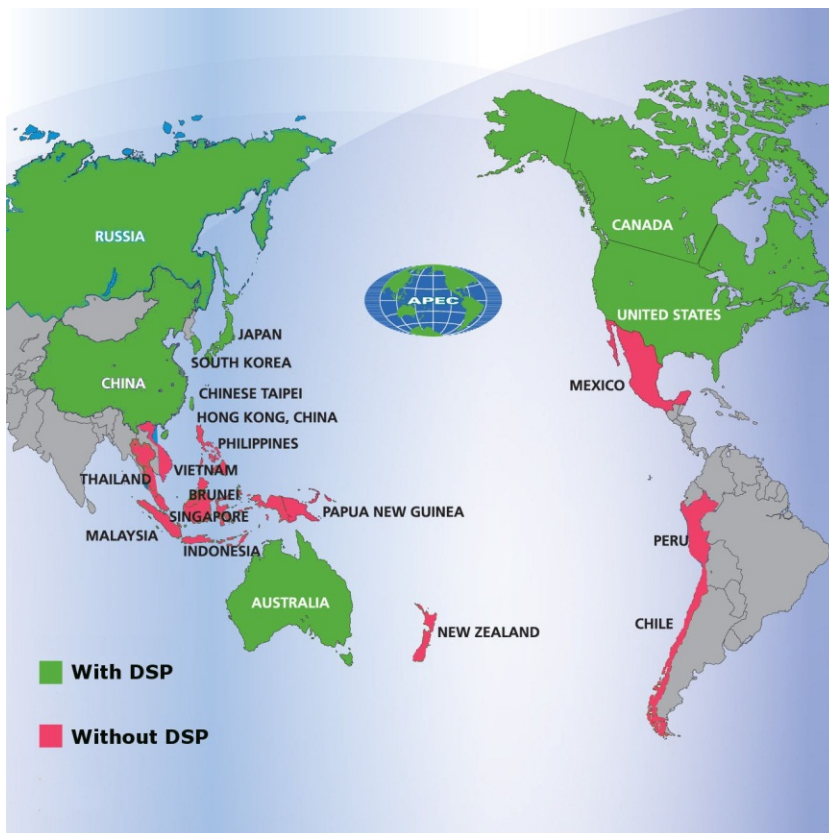
- ✓ Drought Monitoring using Remote Sensing
- ✓ Long-range Flood Risk Forecast
- ✓ Seasonal Tropical Cyclones Activity
- ✓ Summer Heat Wave & Winter Monsoon

IV. International Cooperation

- ✓ Bilateral Collaborative Projects
- ✓ Capacity Building

APEC Climate Center (APCC)

- Established in 2005 with the endorsement of APEC member economies



- Headquarter located in Busan, Republic of Korea



Introduction

APCC Mission

The mission of APCC is to enhance socio-economic prosperity in the APEC region by utilizing up-to-date scientific knowledge on climate through:



Climate Prediction

APCC produces value-added, reliable, and timely climate prediction information and provides it to the APEC region countries.



Application Studies

APCC leads developing interdisciplinary research and application techniques at the climate-environment-society nexus.



Climate Info. Services

APCC serves as a key climate database center to distribute climate data, prediction information, and related tools.



Capacity Building

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

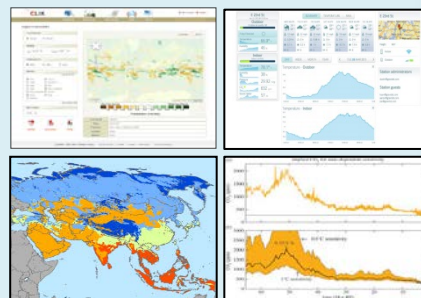
- 3 & 6 month forecast
- ENSO, IOD forecast
- S2S BSISO forecast
- Downscaled climate change scenarios



- APCC-CRIEPI Project
- APCC-NCDR Project
- APCC-CARDI Project
- APCC-IRI Project
- APN Project
- Tonga Project
- ROK-PIF Project
- ROK-ASEAN Project



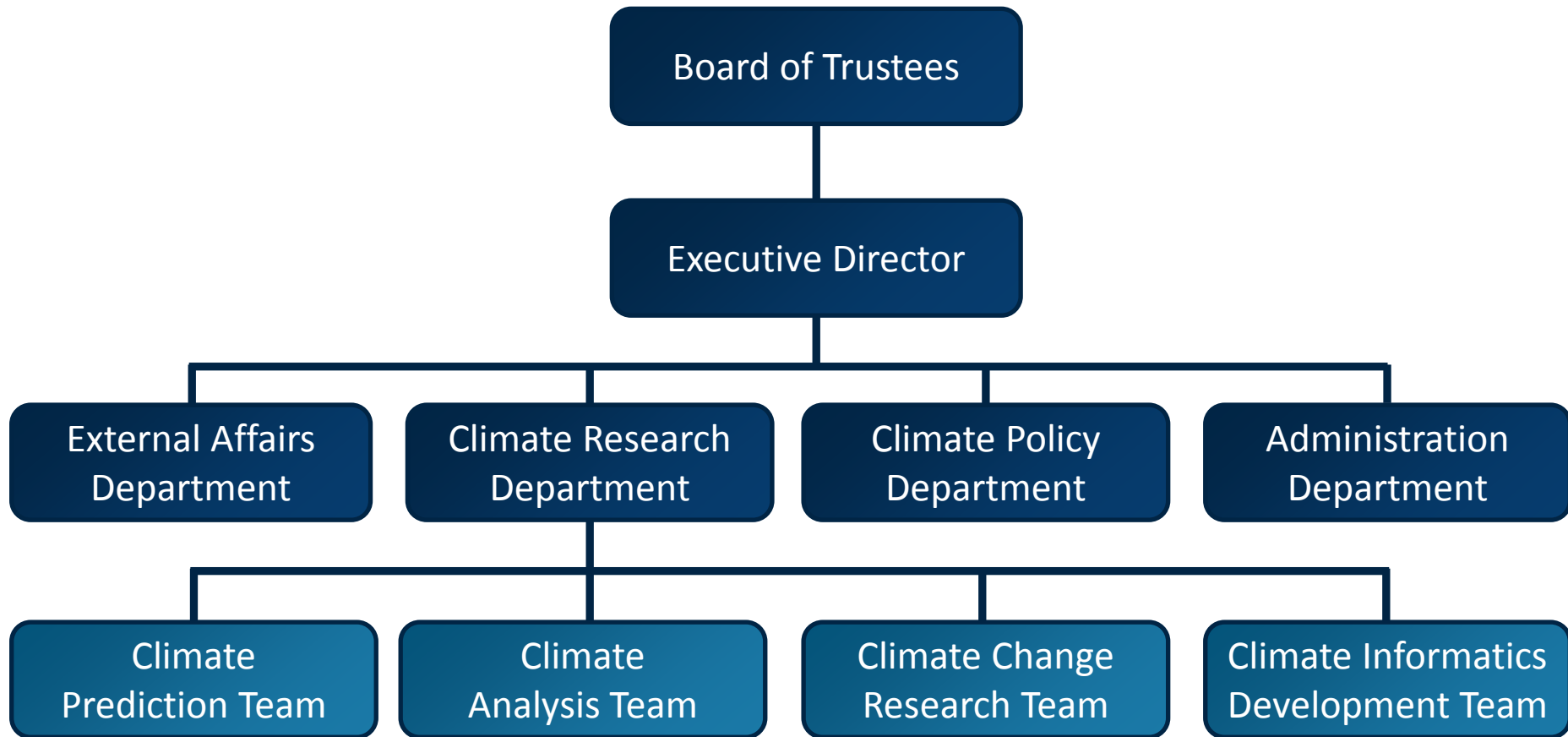
- Climate information tool kit (CLIK)
- ADSS
- TRACE
- Open API



- APEC Climate Symposium
- APCC Training programs
- Young Scientists Support Program

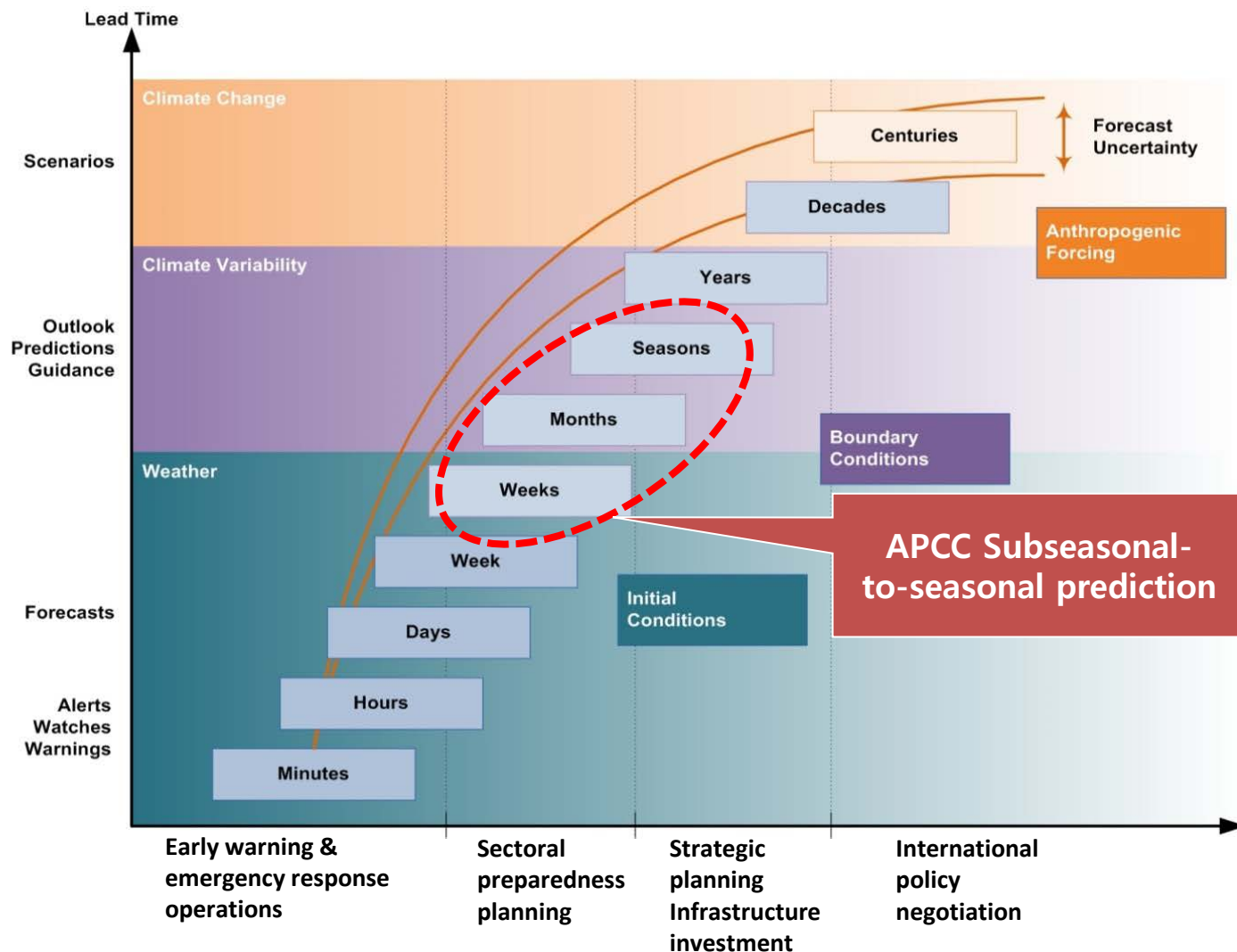


Structure of APCC



※ 78 Staffs, 70 % researchers

Seamless Prediction for Climate Service



Source: WMO DRR Programme based on adaptation of a figure from the WMO Strategic Plan (2012-2015)

Climate Prediction

S2S Climate Information

Ready

Set

Go

Range of uncertainty in forecast

Long-term forecast

- Seasonal to 1 year
- ENSO, IOD, PDO, AO, etc
- Preparedness such as Prepositioning & resource planning

Medium-term forecast

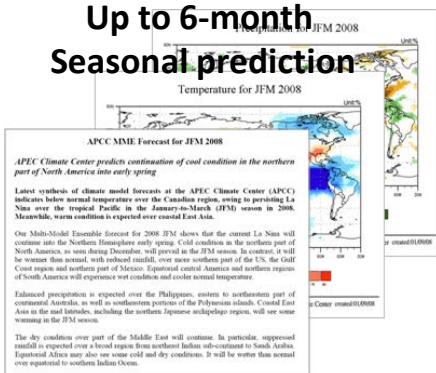
- Sub-seasonal
- BSISO, MJO, etc
- Updating contingency plans & warning communities

Short-term forecast

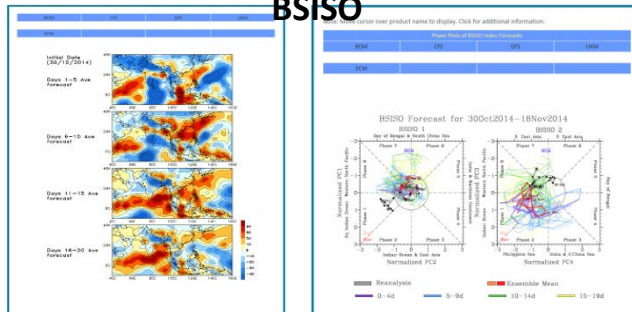
- Day to sub-daily
- Weather forecast, radar, satellite, etc
- Making emergency actions (e.g. evacuation)

APEC Climate Center's seamless climate forecast service

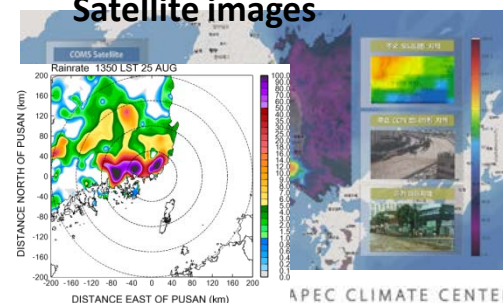
Up to 6-month Seasonal prediction



Subseasonal forecast (2 weeks – a month) BSISO



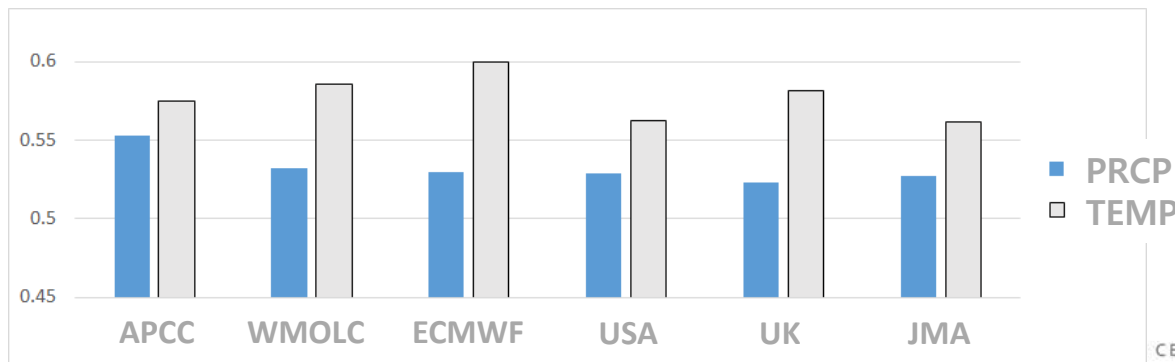
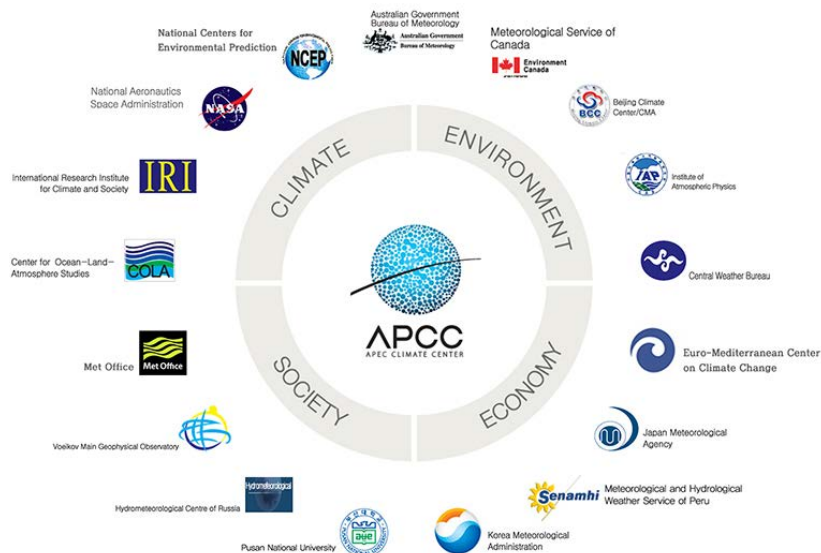
Short-term forecast Satellite images



APCC MME Seasonal Prediction

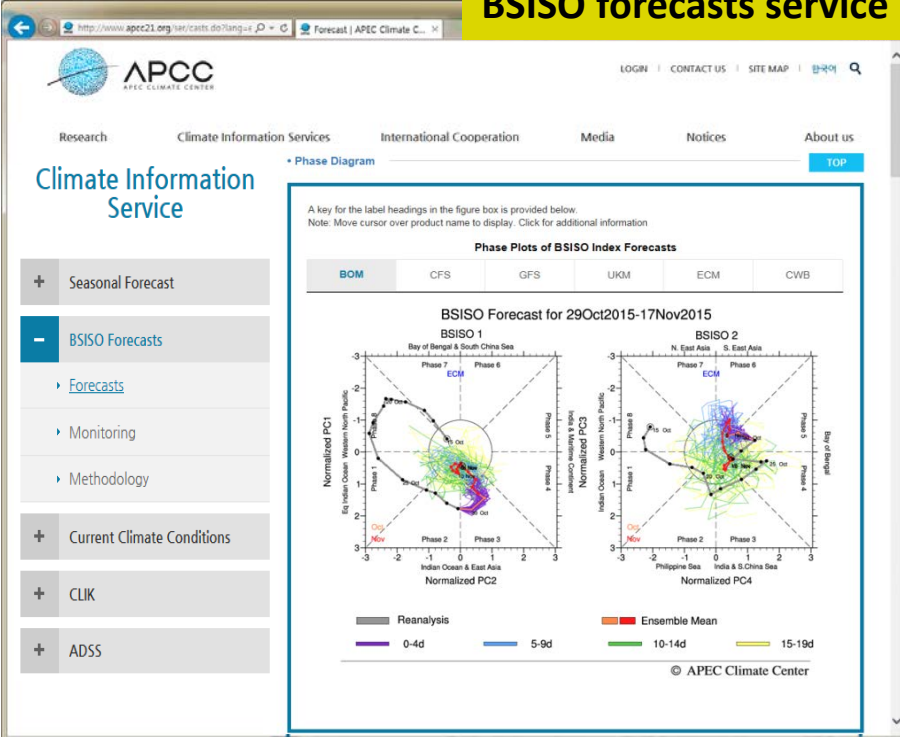
The biggest collection in the world

Country	Institution
USA	NCEP
	NASA
	IRI
	COLA
Japan	JMA
Australia	BoM
China	BCC
Taiwan	CWB
Russia	HMC
	MGO
Canada	MSC
Korea	APCC
	KMA
	PNU
UK	UKMO
Italy	CMCC
Peru	Senamhi



<Globally-averaged ROC Score over recent 4 years>

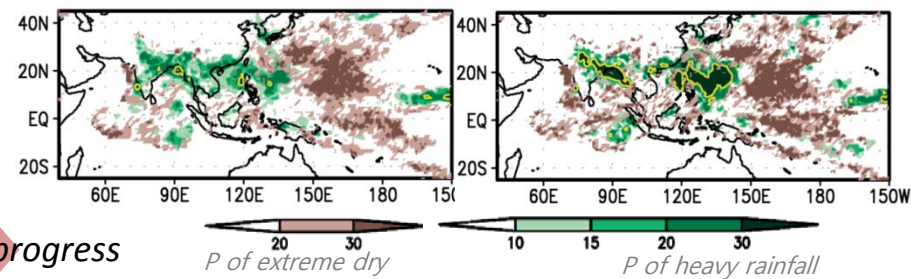
BSISO forecasts service



Probability forecast of extreme rainfall by BSISO forecasts

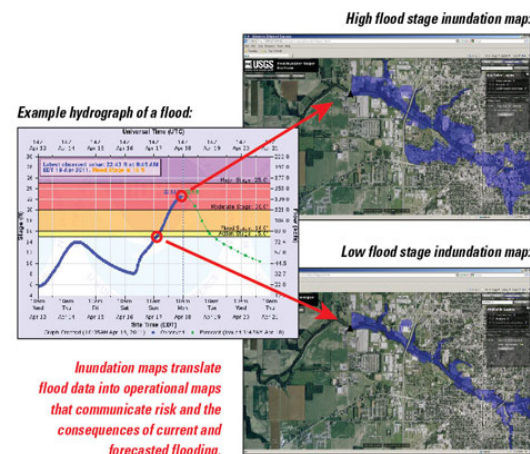
Week-1 forecast

Week-2 forecast



In progress

Future work



Inundation maps translate flood data into operational maps that communicate risk and the consequences of current and forecasted flooding.

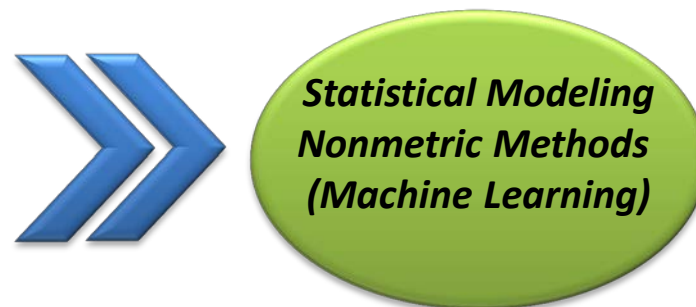
Flood Inundation Mapping

Country	Institution	model
Australia	BOM	POAMA 2.4 multi-week model
USA	NCEP	Climate Forecast System
		Global Forecast System
EU	ECMWF	Ensemble prediction system
UK	UKMO	Ensemble Prediction System
Taiwan	CWB	NWP MRF model

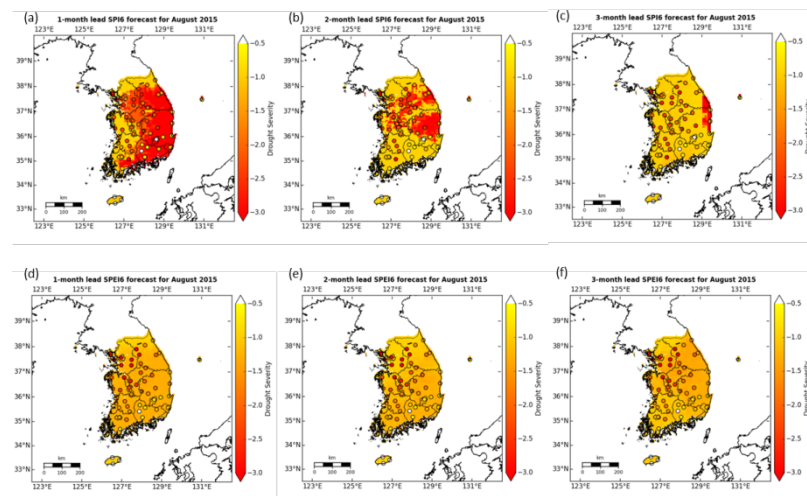
Drought Monitoring using Remote Sensing

- Developing drought monitoring and forecasting methodologies using remote sensing and machine learning techniques for ungauged areas

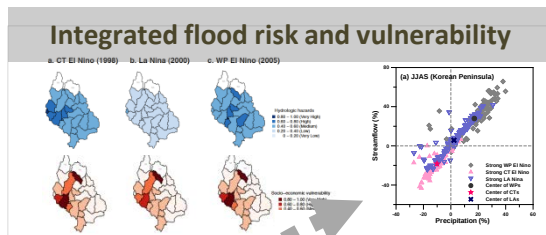
*Remotely sensed hydrometeorological variables
(w/ in-situ as well as long-range forecast data)*



*Current and future
drought conditions*



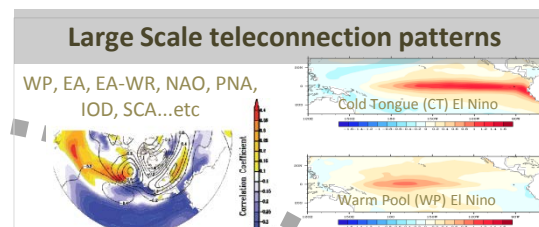
Long-range Flood Risk Forecast



Atmospheric

<Global Scale Environment>

- Air Circulation patterns
- ENSO/IOD Conditions (SST)
- Tropical cyclone Activity(TC)
- CMIP5 GCMs Scenarios Data
- APCC MME Prediction



Hydroclimate

<Regional Scale Variability>

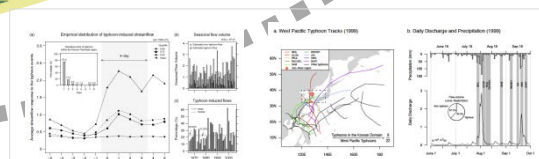
- Long-term and Seasonal Variability
- Linear and Non-linear Correlation using Mutual Information(MI)
- Trend Analysis and Significant Test
- Frequency analysis(Non-stationary)
- Typhoon Induced Extremes

Teleconnection Based Long-range Flood Risk Prediction System

<Watershed impacts>

- Hydrologic Variability
- Rainfall-runoff Modeling
- Long-term discharge/Streamflow
- Flood and drought Analysis
- Statistic Forecasting(ARMA, SVM...)

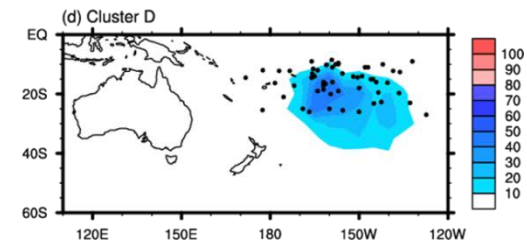
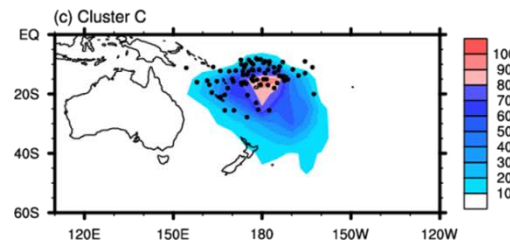
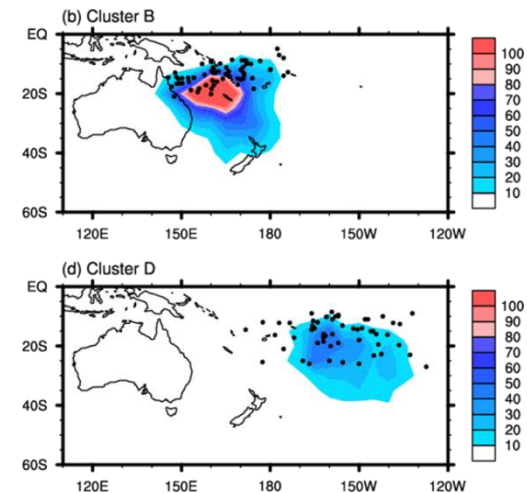
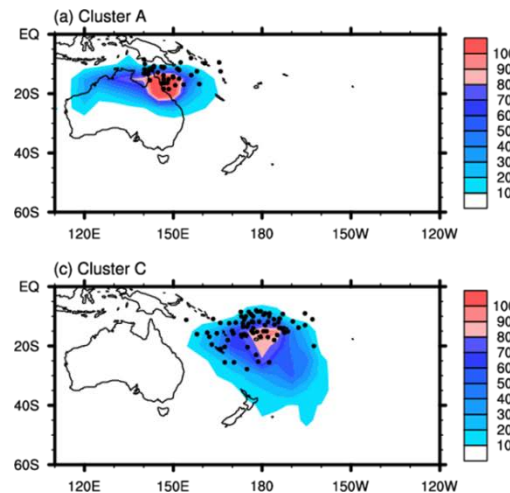
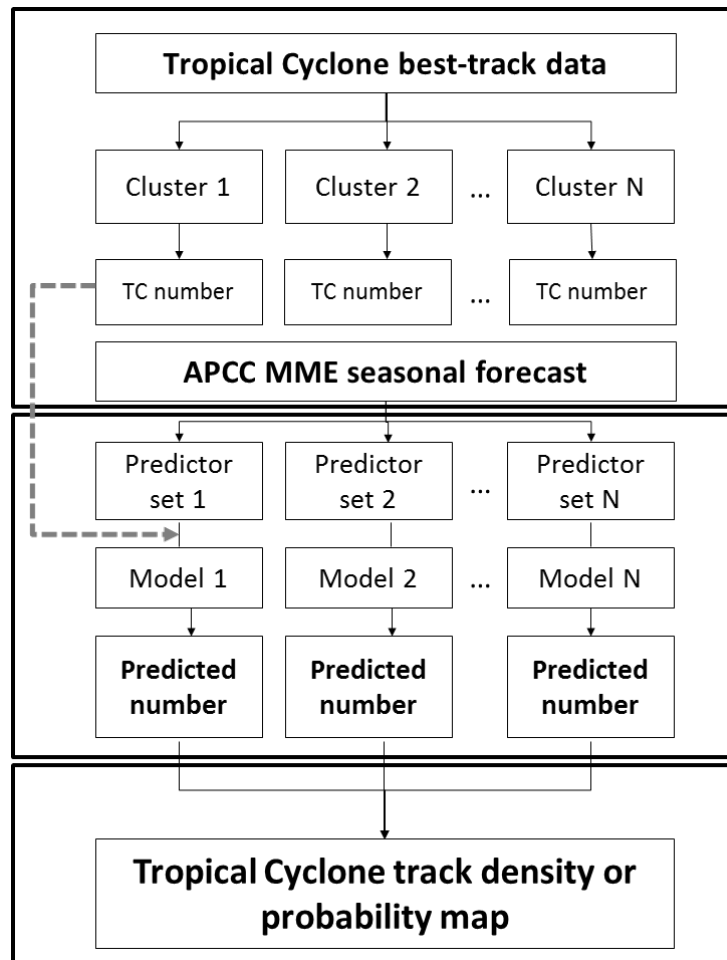
Land Surface



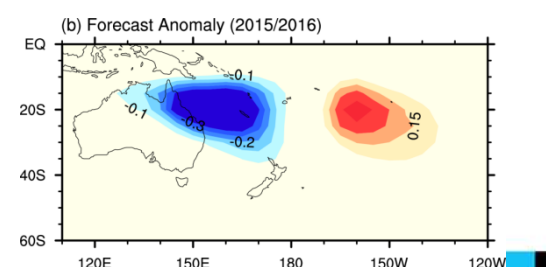
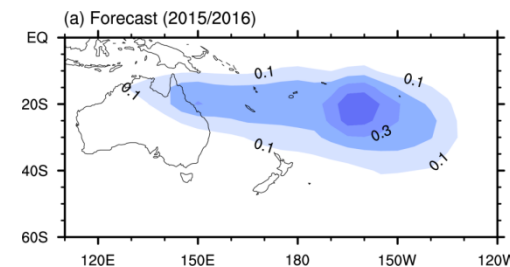
Hydro-climate, TC activity and its local impacts

Seasonal Tropical Cyclones Activity

- Track based seasonal prediction for the South Pacific tropical cyclone activity by using APCC multi-model ensemble prediction



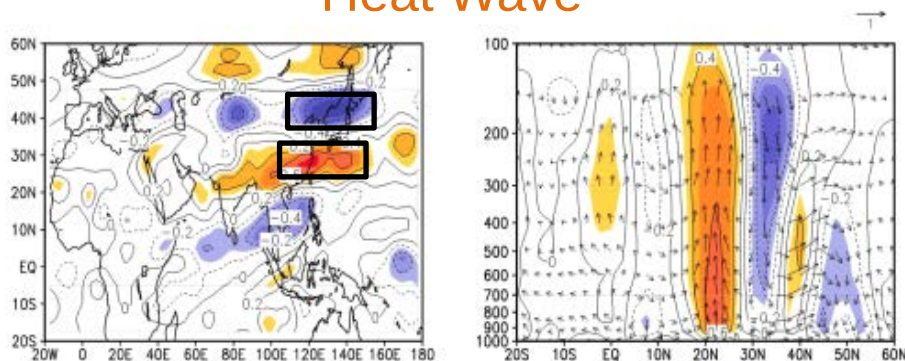
2015/16 seasonal TCs track density forecast



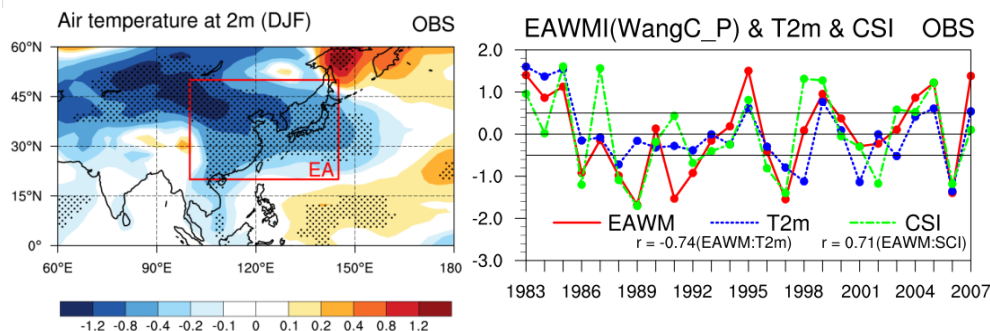
Summer Heat Wave & Winter Monsoon

Analysis on Dynamical Mechanism

Heat Wave

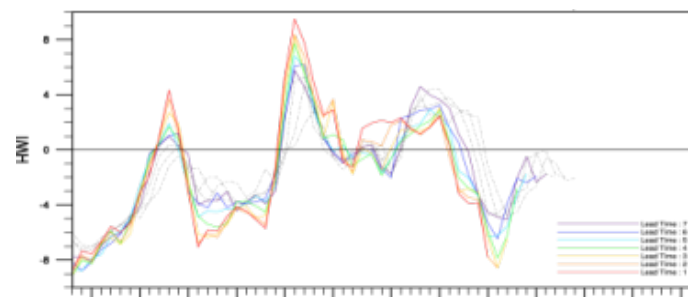


Winter Monsoon

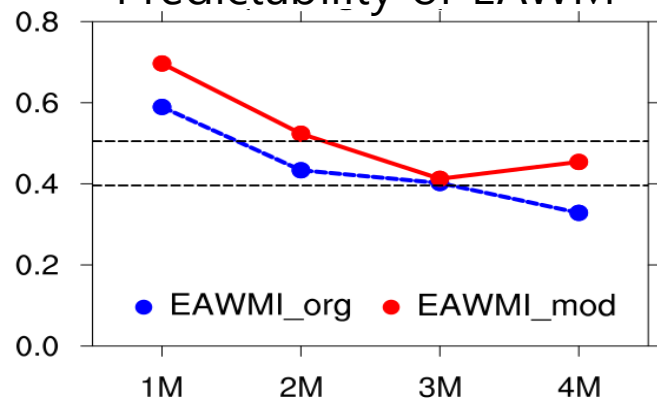


Predictability Assessment

Real-time Forecast



Predictability of EAWM



Bilateral Collaborative Projects

➤ APCC-Pacific Island Countries (PICs) Project

- **ROK-PIF project**

- “Nationally Tailored Climate Prediction Information for Climate Change Capacity Building of Pacific Islands”

- **Tonga project :**

- (1) Improving agricultural productivity in Tonga through ensuring data availability and enhancing agro-meteorological services
- (2) Improved austral winter seasonal forecast and tropical cyclone sub-seasonal to seasonal outlooks in Kingdom of Tonga through APCC MME seasonal prediction
- (3) Development of smart groundwater management system in the Kingdom of Tonga

➤ ROK-ASEAN project

- “ASEAN Science-based Disaster Management Platform”

- It aims to promote the involvement of science in policy development and policymakers in the research process for disaster management and risk reduction in the ASEAN region



International Cooperation

Capacity Building

➤ APEC Climate Symposium (APCS)

- Annual event held since 2005
- Highlights state-of-the-art climate prediction techniques as well as the application of climate information for social welfare and economic prosperity



➤ Young Scientists Support Program (YSSP)

- APCC supports outstanding young scientists from developing countries as visiting scientists for 3 months
- The visiting scientists conduct research on themes such as climate science and climate applications to relevant sectors



➤ APCC Training programs

- APCC has hosted various training program since 2011
- The participants from over 25 developing countries attended to build capacities by learning about various topics regarding with climate science and applications



THANK YOU!

