

TRAVEL REPORT FORM

출장보고서

결 재	부서장	원장		
	09/27	10/11		
협 조	김형진	정홍상		

I. Reporter 보고자

Department 소속	Position 직위(직급)	Name 성명	Travel Date 날짜	Note 비고
응용사업본부	응용사업본부장	김형진	2017.9.20-23	

II. Major Activities 주요업무 수행내용

1. Main Contents and Activities 주요내용 및 활동

- 제11차 APEC 고위급 재난관리 포럼(11th Senior Disaster Management Officials Forum within Asia-Pacific Economic Cooperation 2017)에 정부대표단으로 참석, 발표(첨부 파일 참조) 및 토론 수행
- 본 회의에서 제안된 합동 권고문(첨부 파일 참조) 검토

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

- (발표 주요 내용) ‘뉴 노멀(New Normal) 시대의 효과적인 지역간 긴급 대응 지원을 위한 선진 기술 협력과 혁신 강화’라는 주제로 회원국이 정책 사례 발표와 논의를 진행하였음
- 재난 관련 정보를 적시에 효율적으로 제공하기 위해 다양한 정보통신기술의 개발 및 활용이 강조되었으며, 대만, 일본 등은 자국의 사례를 소개하였음
- 아국은 자연재해 악영향 제한을 위한 기후예측기술에 관해 발표하였으며, 대만 NCDR 관계자, 태국 ADPC 관계자 등과 연구 결과 활용을 위한 협력 가능성을 논의하였음
- 러시아 대표단은 자연재해 뿐 아니라 전반적인 재난/재해 관리를 위한 세계 협력 네트워크(Global Crisis Management Centers Network Initiative) 추진 현황을 소개하였음
- 개최국 민간 건설기업에서 자연 재해 및 기후변화 대응을 위한 PPP(Public-Private Partnership) 사례를 소개하였음
- UNICEF 베트남 지부 관계자는 아동중심의 재난재해 저감 정책 사례를 소개하였으며, 주요 공여국인 일본과 함께 우리나라를 포함한 몇몇 공여국에 사의를 표하였음
- (합동 권고문) 본 회의에서 승인된 11개 조항의 합동 권고문은 CSOM과 AMM에 제출될 예정인 바, 아국의 EPWG 담당 부처는 합동 권고문의 내용을 숙지하여 관련 회의에 대비할 필요가 있음
- (Public-Private Partnership) 베트남 민간 건설기업이 자연 재해와 기후변화에 대응하기 위해 정부 예산으로 수행하는 토목 사업을 소개한 후, 중국 대표단은 선진 토목 기술을 보유하고 있는 회원국 민간 기업도 향후에 사례 발표 등에 참가할 수 있도록 고려해 줄 것을 제안하였음
- 명목상으로는 회원국 간에 선진 기술과 정보를 공유하자는 취지이나 실질적으로는 자국 기업이 개도국 토목 공사에 참여할 수 있는 기회를 모색하는 것으로 판단되며, 따라서 이러한 기회가 실제로 주어진다면 아국도 민간 기업의 참여를 고려할 필요가 있음

○ (차년도 EPWG 회의 잠정 안건 및 일정) 아국의 EPWG 담당 부처는 파푸아뉴기니 대표단이 제시한 차년도 EPWG 회의 잠정 안건과 일정을 숙지하여 관련 회의에 대비할 필요가 있음

※ 첨부파일(제11차 APEC고위급재난관리포럼결과) 참조

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



11th Senior Disaster Management Officials' Forum

Vinh city, Nghe An Province, Vietnam, September, 21 - 22 , 2017

Development and Application of Climate Prediction Technology to Limit Adverse Impact of Natural Disaster

Hyung-Jin Kim

Head of Climate Application Department, APEC Climate Center

(In collaboration with Woo-Seop Lee, Hyun-Ju Lee)

Contents

I. The “New Normal” and temperature extremes

- ✓ The “New Normal” is being created in a changing climate
- ✓ Impact of temperature extremes

II. Heat wave in Korea and early warning system

- ✓ Observational mechanism
- ✓ Seasonal predictability
- ✓ Short-term and medium-range predictability
- ✓ Early warning system with seamless climate information
- ✓ Advantage of early warning system

III. Toward inter-regional collaboration

- ✓ APCC's efforts in the region
- ✓ Major activities during recent years

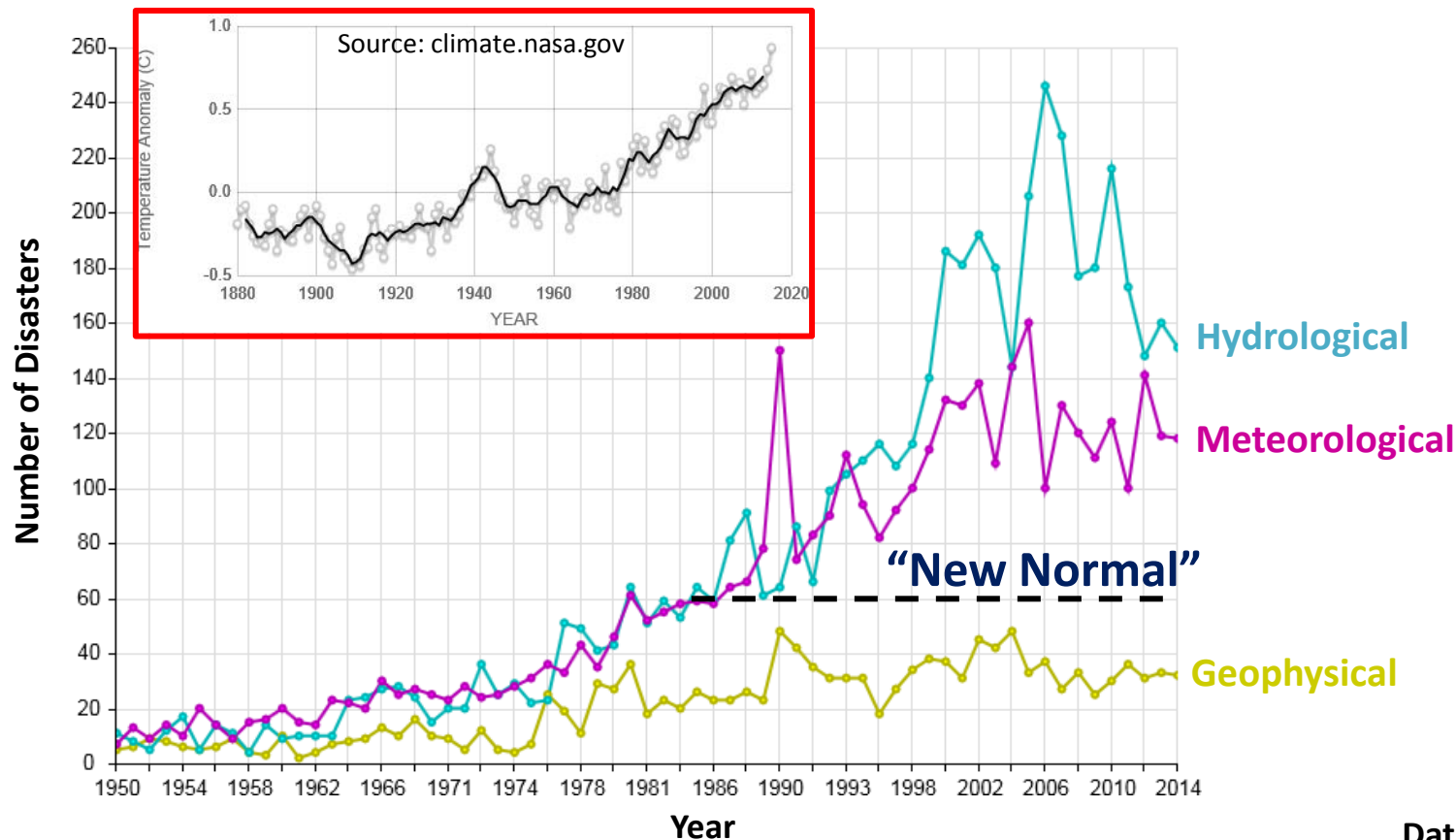
11th Senior Disaster Management Officials' Forum

Development and Application of Climate Prediction Technology
to Limit Adverse Impact of Natural Disaster

The “New Normal” is being created in a changing climate

Since 1980, hydro-meteorological disasters have greatly been increased.

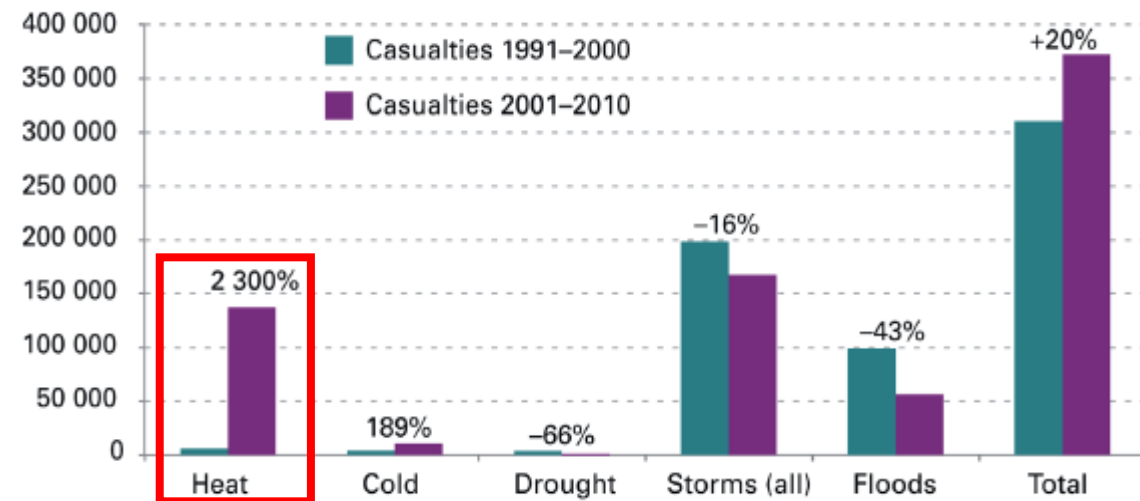
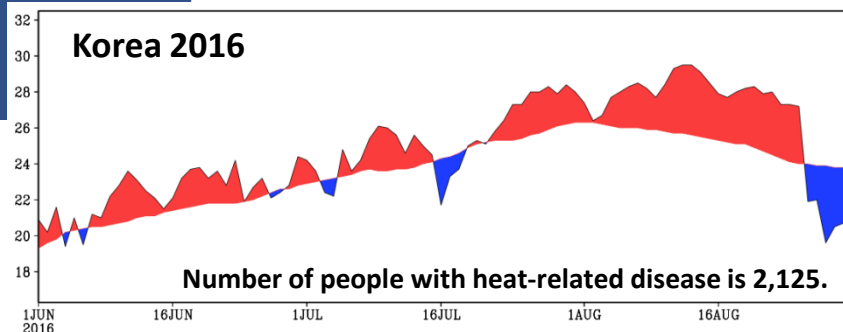
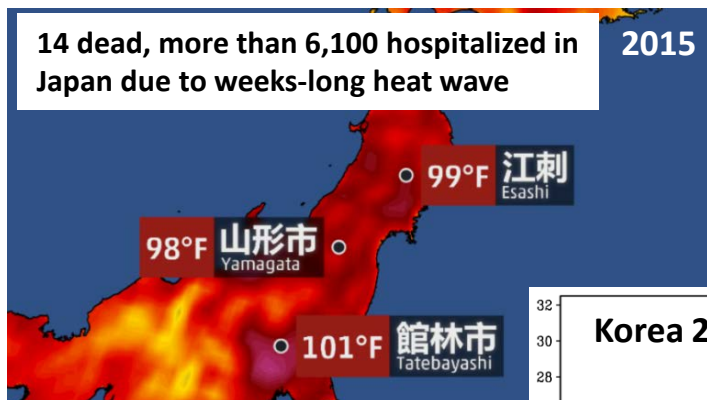
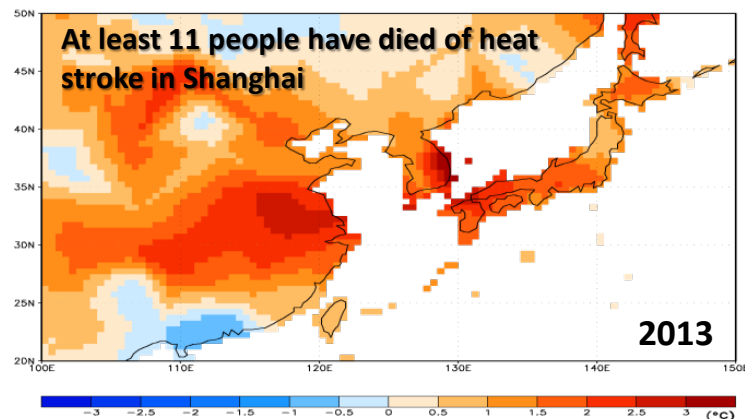
- Intensified extreme events in the form of rising temperatures, changing precipitation patterns, and sea storms have contributed to huge economic damages (IPCC 2013)



11th Senior Disaster Management Officials' Forum

Development and Application of Climate Prediction Technology
to Limit Adverse Impact of Natural Disaster

Impact of temperature extremes



- The casualties due to various extreme weather events during 1991-2000 (green) and 2001-2010 (purple). The percentage above the bars indicate the change in losses during 2001-2010 compared to 1991-2000. (WMO, 2013).

- What I want to demonstrate here is...
 - We developed an early warning system consisting of seamless forecasts and action plan.
 - The proposed framework will pave the way for the utilization of science and technology to face new normal of natural disasters.

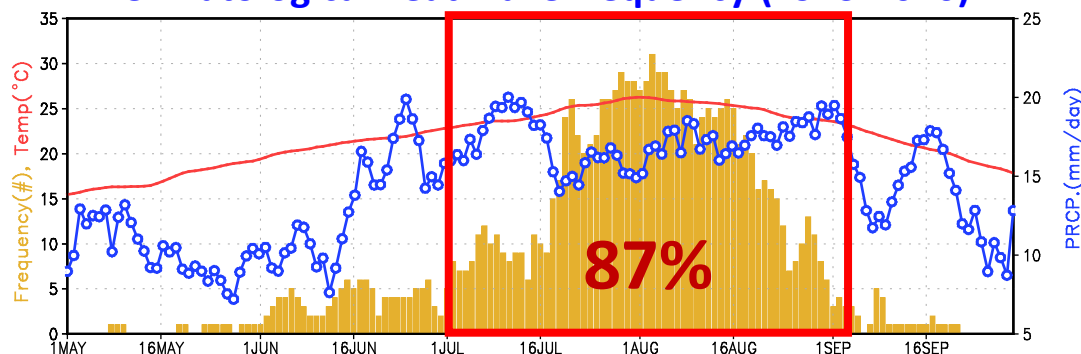
Heat wave in Korea and early warning system : Observational mechanism

➤ Definition of heat wave in Korea

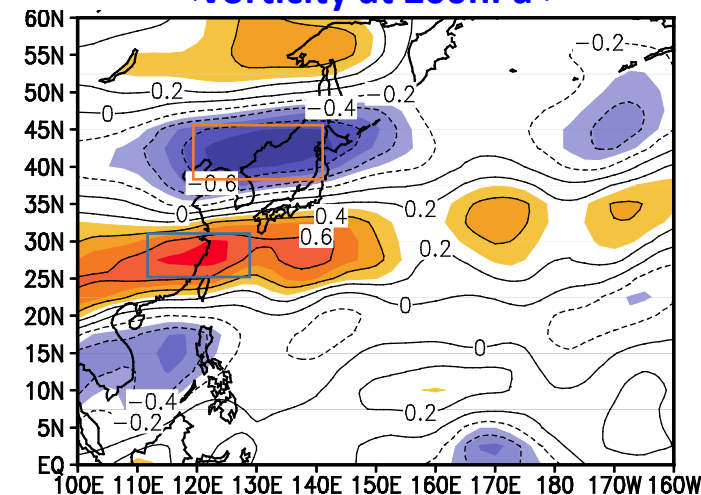
- At least two consecutive days with daily maximum temperature exceeding 33C.
- The majority occurs during July-August.

➤ Large-scale circulation pattern (or indicator) associated with heat wave

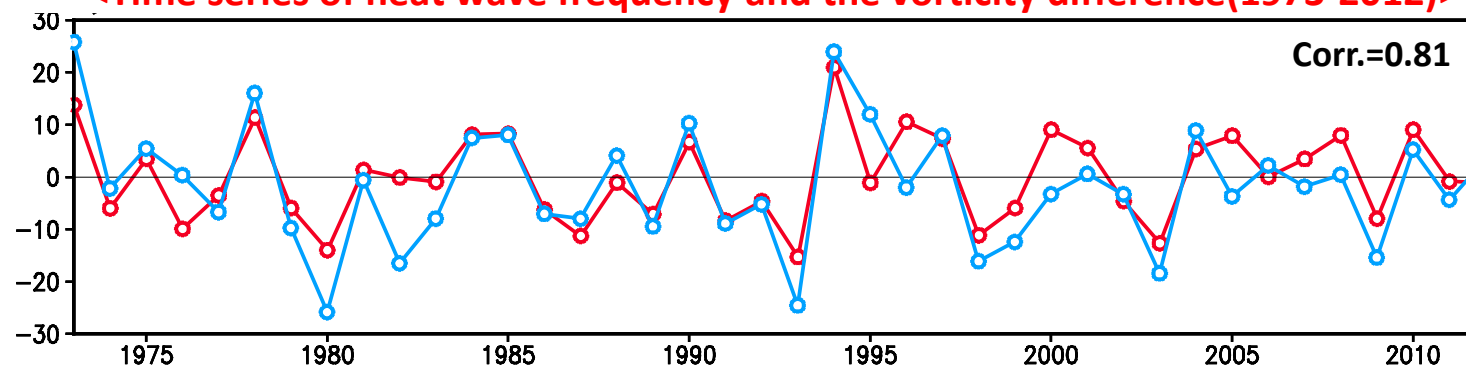
< Climatological heat wave frequency (1973-2016)>



<Vorticity at 200hPa>



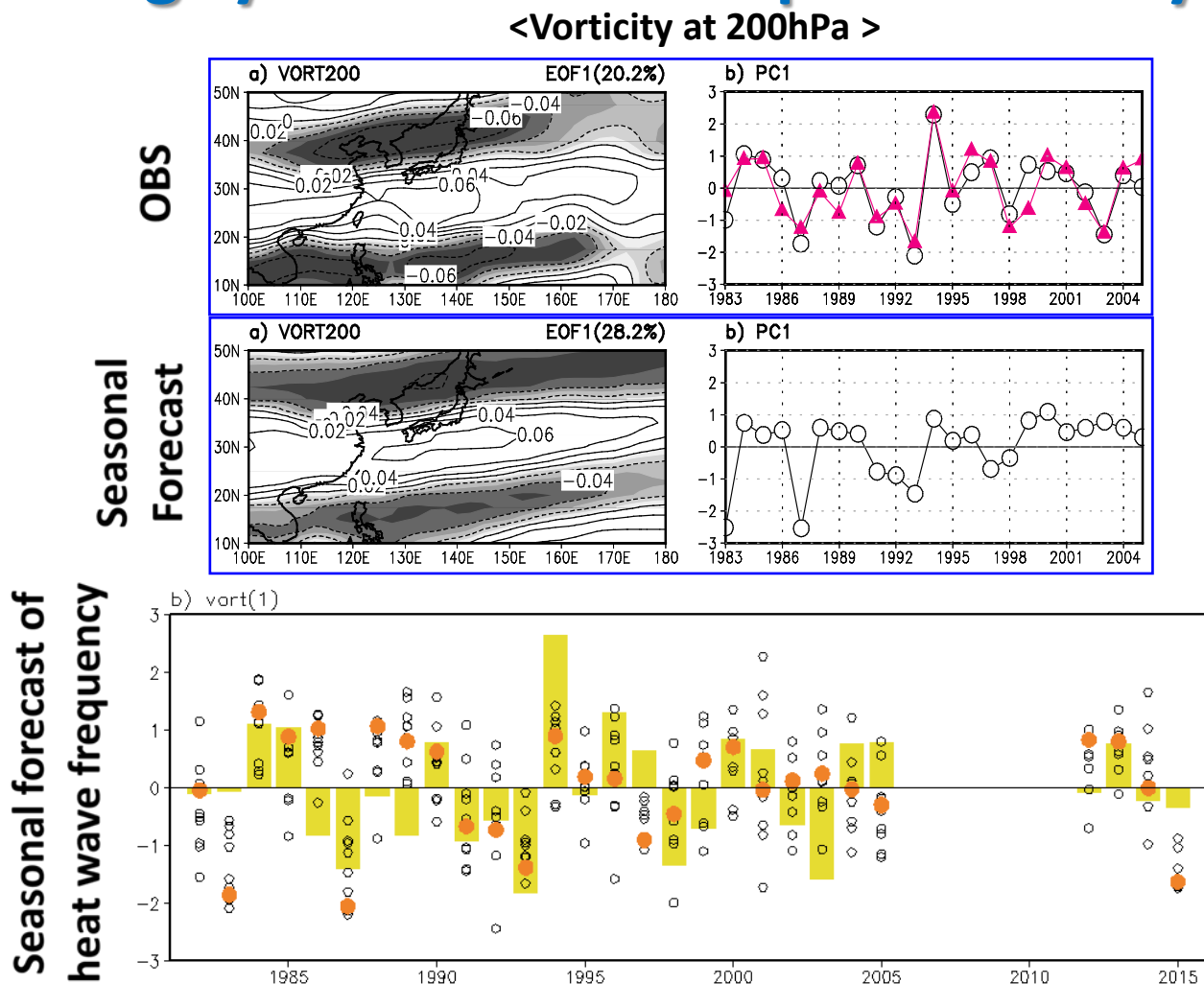
<Time series of heat wave frequency and the vorticity difference(1973-2012)>



Heat wave in Korea and early warning system : Seasonal predictability

APCC Multi-model Ensemble Seasonal Prediction System

Name/ Economy	Ensemble (H/F)
CWB/ Chinese Taipei	10/10
HMC/ Russia	10/10
JMA/ Japan	5/51
MSC_CanCM3/ Canada	10/10
MSC_CanCM4/ Canada	10/10
NASA/ U.S.A.	9(10)/9(10)
NCEP/ U.S.A.	15/15
PNU/ Korea	10(3)/10(3)
POAMA/ Australia	30/30



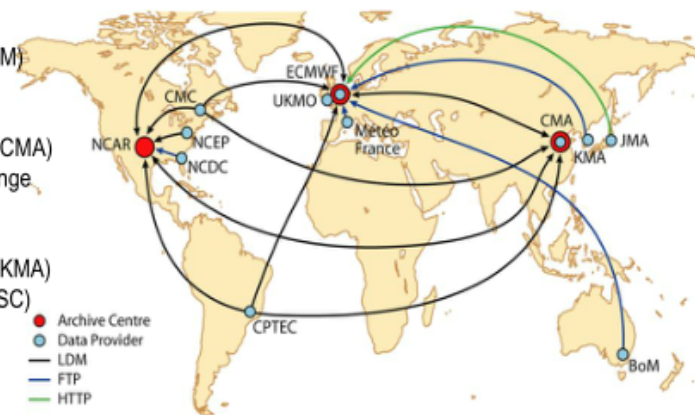
➤ Define heat wave index(HWI) as upper-level vorticity difference

Heat wave in Korea and early warning system : Short-term & medium-range predictability

➤ TIGGE: The THORPEX (The Observing system Research and Predictability EXperiment) Interactive Grand Global Ensemble

The operational forecasting centres supplying daily global forecasts are:

- Australian Bureau of Meteorology (BoM)
- Brazilian Centro de Previsao de Tempo e Estudos Climatico (CPTEC)
- China Meteorological Administration (CMA)
- The European Centre for Medium-Range Weather Forecasts (ECMWF)
- Japan Meteorological Agency (JMA)
- Korea Meteorological Administration (KMA)
- Meteorological Service of Canada (MSC)
- Météo-France (MF)
- UK Met Office (UKMO)
- US National Centers for Environmental Prediction (NCEP)



Data flow that builds the TIGGE Archives

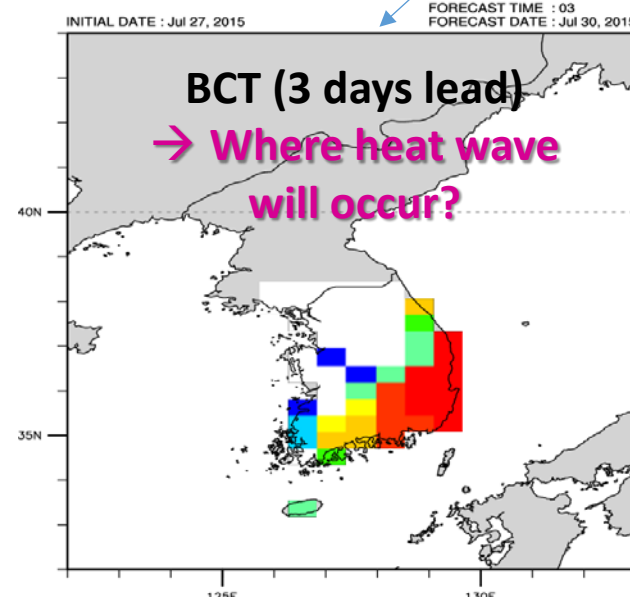
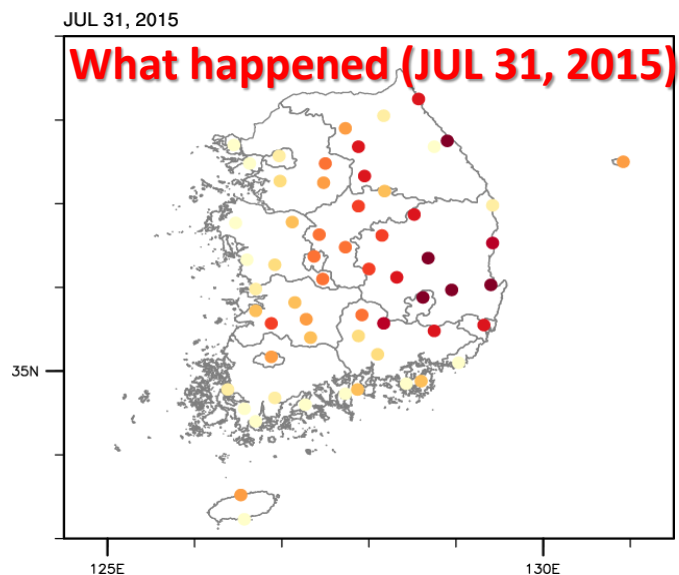
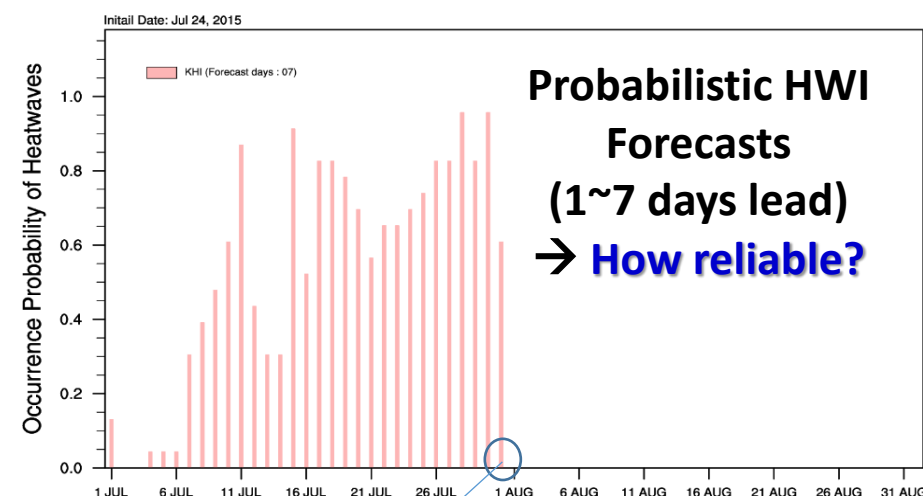
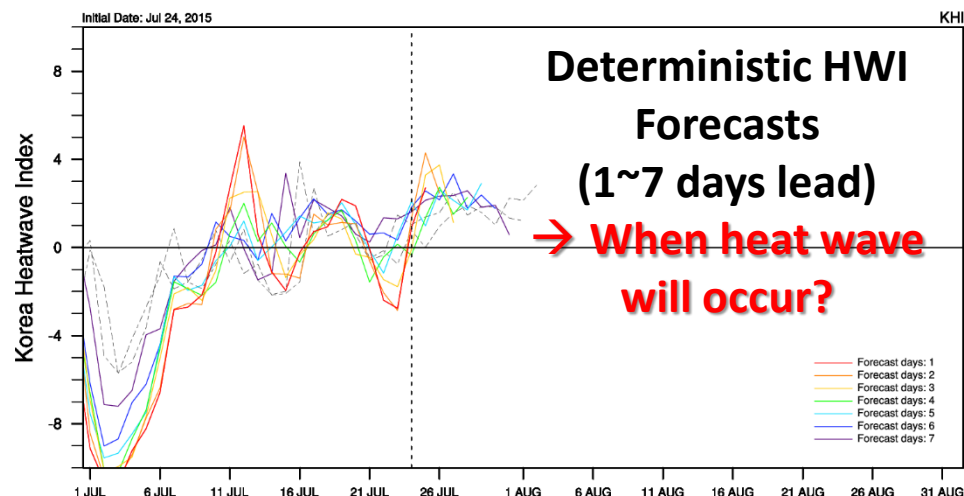
Country	Center	Members	Length	Initial Perturbation	Resolution
USA	NCEP	20	15 days (384hours)	Ensemble Transform with Rescaling	T126v (100km)
Canada	CMC	20	15 days (384hours)	Ensemble Kalman Filter	TL213 (60km)
Korea	KMA	23	10 days (288hours)	Ensemble Transform Kalman Filter	N512 (25km)
UK	UKMO	11	7 days (174hours)	Ensemble Transform Kalman Filter	N400L70 (40km)
Europe	ECMWF	50	10 days	Singular Vectors	TL639L91 (30km)

Access is normally provided with a 48-hour delay after the initial time of the forecast.

11th Senior Disaster Management Officials' Forum

Development and Application of Climate Prediction Technology
to Limit Adverse Impact of Natural Disaster

Heat wave in Korea and early warning system : Short-term & medium-range predictability



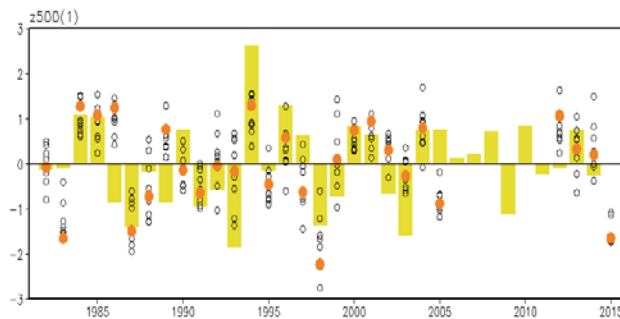
11th Senior Disaster Management Officials' Forum

Development and Application of Climate Prediction Technology
to Limit Adverse Impact of Natural Disaster

Heat wave in Korea and early warning system : Early warning system with seamless climate information

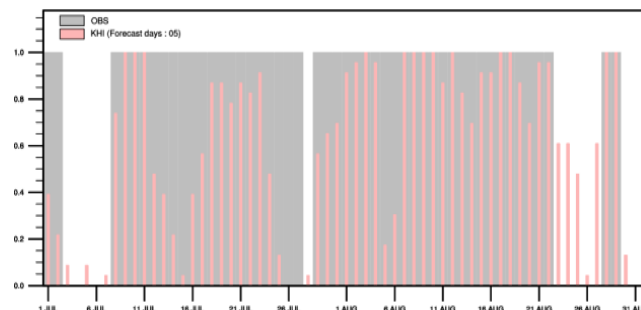
Ready

Seasonal outlook
(month or season, APCC MME)



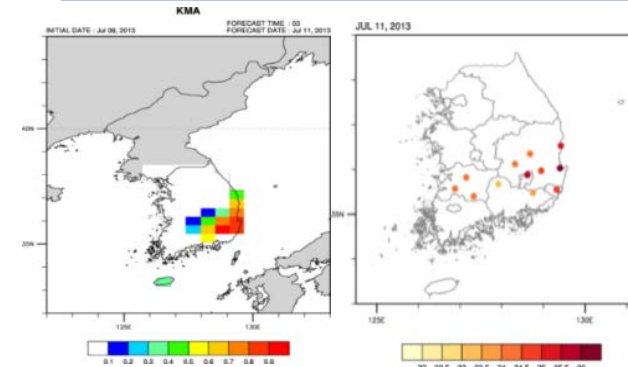
Set

Medium-range forecast
(10 days, TIGGE)



Go!

Short-term forecast
(3 days, NMS weather forecast)



Above-normal frequency of
heat waves

- Monitoring, and proactive plan for heat waves.
- General advice to public health authorities & monitors hospital needs (water supply, ventilation, storage tanks)

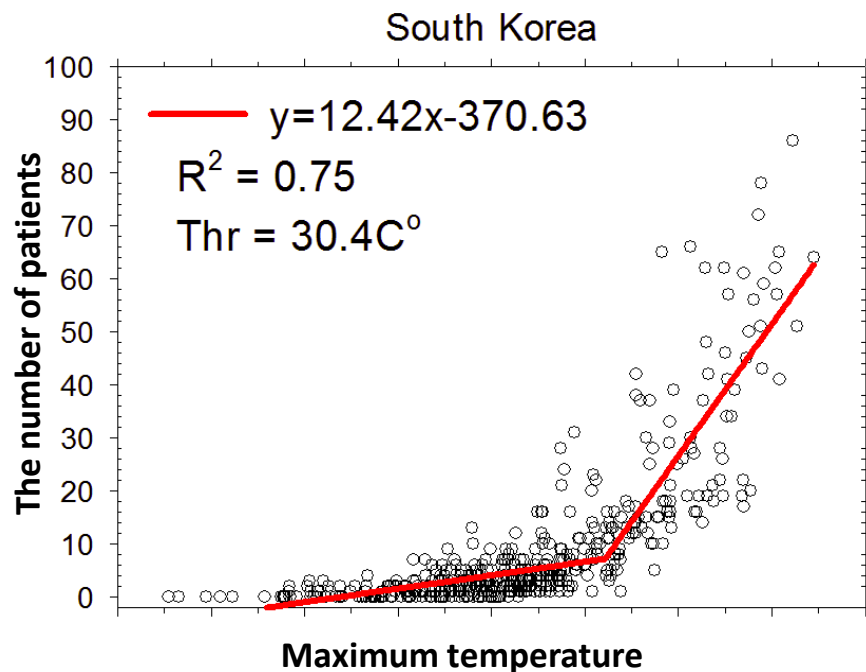
Heat wave is expected
to begin next week

- Site specific actions
- Lists of at risk (AR) individuals,
- Checks with regional services.

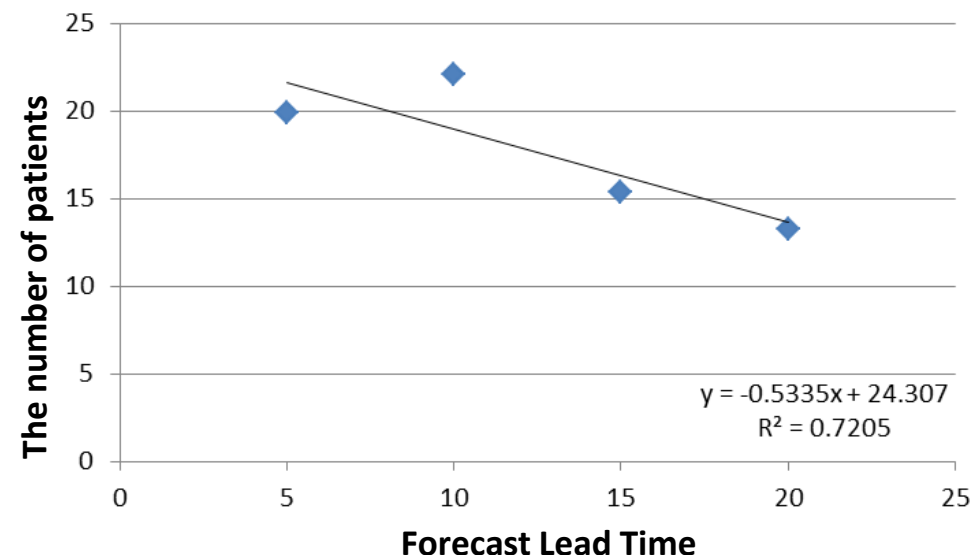
Spatial information
of heat wave

- Activation of emergency protocols in care and retirement homes and in hospitals (postpone non emergency surgery, discharge planning, staff rotation restrictions, increased hospital beds).

Heat wave in Korea and early warning system : Advantage of early warning system



Heat related illness increases sharply when maximum temperature exceeds a certain threshold.



Heat related illness decreases as a function of forecast lead time.

11th Senior Disaster Management Officials' Forum

Development and Application of Climate Prediction Technology
to Limit Adverse Impact of Natural Disaster

Toward inter-regional collaboration : APCC's efforts in the region

APCC aims to contribute to economic growth in the APEC region and support the protection of lives and property, the reduction of economic losses, and enhance economic opportunities.

 Climate Prediction	 Interdisciplinary Research	 International Cooperation	 Climate Info. Services
APCC produces value-added, reliable, and real-time climate prediction information and provides the APEC region with it.	APCC leads in the development of interdisciplinary research and application techniques at the climate-environment-society nexus.	APCC guides developing countries from the APEC region toward building their own capacity to produce reliable climate prediction information.	APCC strives to be a key climate database center to distribute climate data, information products, and related tools.
• Climate forecast - 3 & 6 month forecast - ENSO, IOD forecast - S2S BSISO forecast - Downscaled climate change scenarios	• Supporting sector-wise decision making (e.g., water, agriculture, disaster risk reduction, health)	• APEC Climate Symposium • APCC Training programs • Young Scientists Support Program	• Climate information tool kit (CLIK) • ADSS • TRACE • Open API



Reliable
Prediction

Localization

Application
Technology

Services

Knowledge
-based
Decision
Making

11th Senior Disaster Management Officials' Forum

Development and Application of Climate Prediction Technology
to Limit Adverse Impact of Natural Disaster

Toward inter-regional collaboration : Major activities during recent years

➤ Climate Science

: El Nino Report

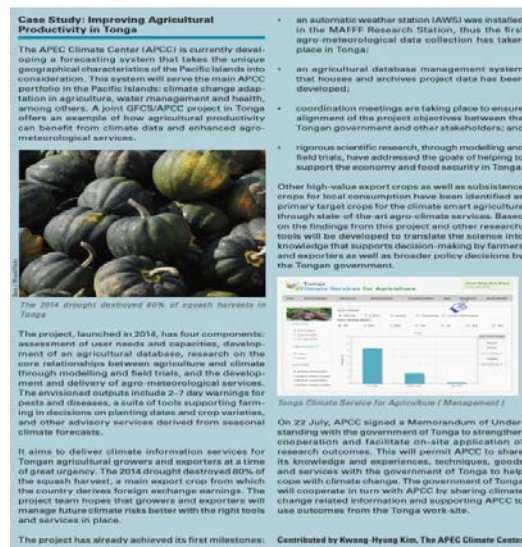
(APCC, UNDP, UNESCAP, UNOCHA, '17)



➤ Sectoral Application

: Tonga Agro-Met Services

(WB & WMO Bulletin, '15)



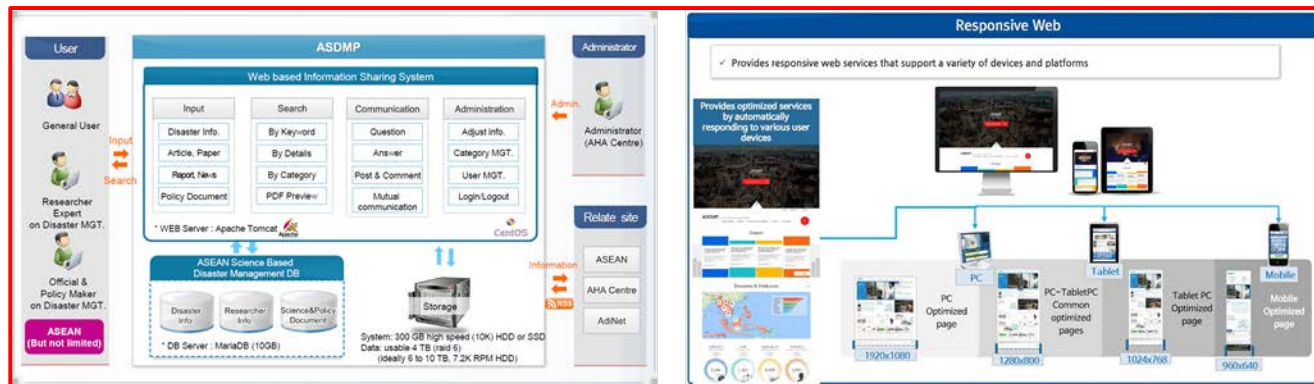
➤ Climate Change Adaptation

: Climate Information Services in

Vanuatu(GCF Project #35,
6 institutions, '17~'20)



➤ Disaster Risk Management : ASEAN Science-based Disaster Management Platform(APCC, ASEAN, AHA Center, '15~'17)



11th Senior Disaster Management Officials' Forum

Vinh city, Nghe An Province, Vietnam, September, 21 - 22 , 2017

Thank you for attention!