문서번호 APCC-출장-17-1164(2017-10-11)

결재	연구원	팀장	부서장	원장
	10/10 김가영	10/10 이우섭	10/11 유진호	10/11 정홍상
협조				

TRAVEL REPORT FORM
출장보고서

I. **Reporter** 보고자

Department 소속	Position 직위(직급)	Name 성명	Travel Date 날짜	Note 비고
기후예측본부 기후예측팀	연구원	김가영	2017/9/25-27	

II. **Major Activities** 주요업무 수행내용

1. Main Contents and Activities 주요내용 및 활동

가. 개요

○ 참가 회의명 : Eleventh Session of South Asian Climate Outlook Forum (SASCOF-11)
- SASCOF는 WMO가 공식적으로 후원하는 Reginal Climate Outlook Forum (RCOF) 중 하나로, 남아시아 지역의 기후 전망을 위한 회의임.
- 이번 SASCOF는 WMO 장기예보 선도센터, Tokyo Climate Center, 남아시아 지역의 National Meteorological Services (NMSs) 등이 참석하여 이 지역 Northeast monsoon 시기의 기후 전망에 대한 전문가들의 의견을 공유하고 계절예측 end-user 와의 의견을 교환함.

○ 일시 : 2017년 9월 25-27일 (3일간)

○ 장소 : Hotel Jen, Male, Maldives

나. 주요 업무 수행 사항

○ SASCOF 지역(Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan, Sri Lanka)의 2017년 Northeast Monsoon Season(10-12월)의 기온 및 강수 전망에 대한 여러 기관 (각 SASCOF 회원국, WMO 장기예보 선도센터, JMA)의 예보 결과를 공유하고, 계절 예측의 활용에 대한 토의를 진행함.

○ WMO 장기예보 선도센터 소개 및 남아시아 지역의 2017 북동 몬순 시기 전망 (붙임 2)
· 발표제목: Seasonal Climate Outlook for the 2017 Northeast Monsoon Season from WMO LC-LRFMME
· 발표내용: WMO 장기예보 선도센터 소개 및 선도센터 MME 자료를 이용한 2017년 NDJ 기온, 강수 전망

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

○ ENSO 상태

· El Nino/Soutern Oscillation (ENSO)는 northeast monsoon의 강수와 기온의 경년변동에 영향을 미치는 중요한 요인 중 하나이다. 현재의 cool neutral ENSO 상태가 이후에는 cool neutral ENSO 또는 border line La Nina가 될 것으로 전망되었다.

○ IOD 상태

· 남아시아에 영향을 미치는 다른 요인인 Indian Ocean Dipole (IOD)는 현재까지 중립 상태이고, Northeast Monsoon 기간 동안에도 여전히 중립 상태를 보일 것으로 예측되었다.

○ Consensus Outlook

· 2017년 Northeast monsoon 시기 동안 대부분의 남아시아 지역의 강수량은 평년과 비슷할 것으로 전망되었다. 인도의 남동 지역, 스리랑카 북부, 북동 일부 지역은 평년보다 많은 양의 강수가 올 것으로 예상되나, 남아시아의 남동 일부 지역, 벵골만에 인접한 일부 지역에서는 평년보다 강수량이 많을 것으로 전망된다.

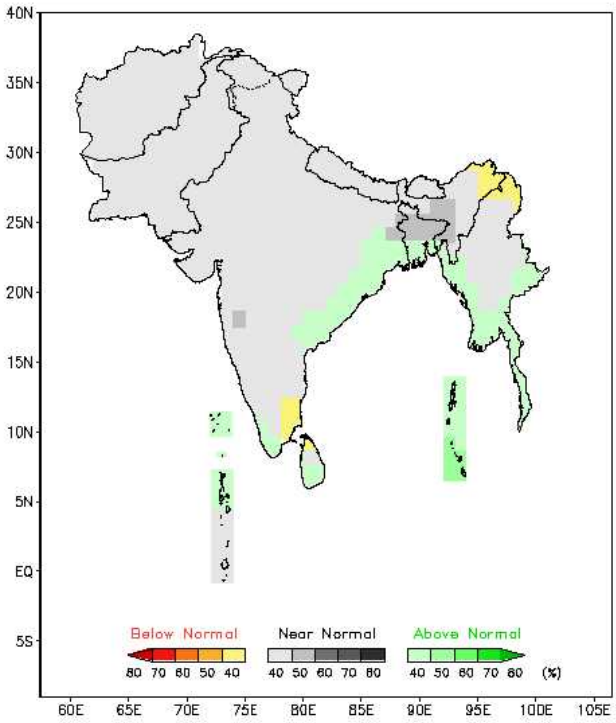


Fig. 1. Consensus outlook for the 2017 OND season rainfall over South Asia.

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

○ 발표자료 (붙임4)

2. Suggestions and Remarks 건의사항

This project was undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :

Environment Canada | Environnement Canada

Eleventh Session of
South Asian Climate Outlook Forum (SASCOF-11)

Winter Season 2017

Hotel Jen, Malé, Maldives, 25-27 September 2017

Background:

The World Meteorological Organization (WMO) has been supporting South Asian nations in conducting the South Asian Seasonal Climate Outlook Forum (SASCOF) since 2010. The objective of the forum is to prepare consensus seasonal climate information on regional scale that provides a consistent basis for preparing national level outlooks. Such platforms also serve to interact with user sector to understand and enhance the use of climate information as envisaged by Global Framework for Climate Services (GFCS).

Rainfall and temperatures during the months from October to February are of crucial importance to key sectors like agriculture, water, energy and health in the South Asian Region. Winter SASCOF's were started in 2015 keeping in view of the importance of winter seasonal climate to these key user sectors.

Event:

Maldives Meteorological Department (MMD) is hosting the 11th winter session of the South Asian Climate Outlook Forum (SASCOF-11) during 25-27 September 2017 in Male, Maldives. WMO and the Regional Integrated Multi-hazard Early-warning System for Asia and Africa (RIMES) will be supporting SASCOF-11 through funds available from the Government of Canada. SASCOF-11 will produce a consensus climate outlook for the winter season for South Asia.

Participation:

All South Asia NMHSs, invited national and international experts, development partners, WMO, UN ESCAP and RIMES. Experts from GPCs, RCCs and other leading agencies as per their availability.

Outcome:

SASCOF 11 will prepare a climate outlook for the 2017 winter season. NMHSs from SASCOF member countries Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka, as well as several regional and global experts will jointly prepare this consensus outlook. The meeting shall also review requirements of the user sectors and difficulties faced during translation of the seasonal climate information.

Agenda

Day 1 pre-conference session for preparation of consensus forecast

<table>
<tr><th colspan="3">Monday, 25 September 2017</th></tr>
<tr><td colspan="3"></td></tr>
<tr><td>09:00 - 09:30</td><td colspan="2">Registration</td></tr>
<tr><td>09:30 - 10:00</td><td colspan="2">• Opening Remarks
Mr. Abdulla Wahid, Director General Meteorology, MMS
• Remarks by RIMES
Dr. G. Srinivasan, RIMES
• Remarks
Dr. Pai, IMD, RCC, Pune
• Introduction by all participants</td></tr>
<tr><td>10:00 - 10:30</td><td colspan="2">Coffee Break & Group Photo</td></tr>
<tr><td colspan="3">Review of global/regional indicators of winter climate over south Asia</td></tr>
<tr><td>10:30 – 11:00</td><td colspan="2">Review of the winter SASCOFs
Dr. Pai, IMD, RCC, Pune</td></tr>
<tr><td rowspan="2">11:00 - 12:00</td><td colspan="2">As a part of preparation of first draft of consensus forecast outlook for 2017 Winter monsoon season (OND), presentations by experts from South Asia and invited experts on prevailing global anomaly patterns relevant to the 2017 Winter monsoon season and forecast outlook over the region for the season.

Chair: Ali Shareef, Deputy Director General Meteorology, MMS</td></tr>
<tr><td>Afghanistan (Mr. Mohammad Nasim Muradi)
Bangladesh
Bhutan
India (Dr. D.S. Pai)
Maldives (Mr. Hussain Waheed)
Myanmar
Nepal (Mr. Shiva Prasad Nepal)
Pakistan (Mr. Zubair Ahmed Siddiqui)
Sri Lanka (Mr. A. G. M.M. Wimalasuriya)</td><td><u>Inputs from GPCs:</u>
Tokyo Climate Centre, JMA, Japan (Mr. Takuya Komori)
LC-LRFMME, KMA, Korea (Ms. Gayoung Kim)</td></tr>
<tr><td>12:00 – 13:00</td><td colspan="2">Lunch</td></tr>
<tr><td>13:00 – 14:00</td><td colspan="2">Chair: Dr. Zahid, Deputy Director General Climatology, MMS
Continue with remaining Country Presentations/GPCs</td></tr>
<tr><td>14:00- 15:30</td><td colspan="2">Continuation of the discussion and preparation of the first draft of consensus outlook for the 2017 winter monsoon season rainfall over South Asia</td></tr>
<tr><td>15:30 – 16:00</td><td colspan="2">Coffee Break</td></tr>
<tr><td>16:00 - 17:30</td><td colspan="2">Visit to Hulhumale</td></tr>
<tr><td colspan="3">Session ends</td></tr>
</table>

Tuesday, 26 September 2017	
09:30 – 10:30	Opening Session of the SASCOF 11 • Recitation of the holy Quran by Mohammed Shafiu, MMS • Welcome Address Mr. Ibrahim Nizam, Senior Policy Executive, MEE • Remarks, Mr. Ali Shareef, Focal-point for RIMES Secretariat • Inaugural Address Hon. Mr. Abdullahi Majeed State Minister and Permanent Representative of Maldives with WMO • Vote of thanks Dr. Zahid, Deputy Director General Climatology, MMS
10:30 – 11:00	***Group Photograph & Coffee Break***
2017 winter monsoon season (Oct, Nov, Dec): Country Perspectives *Chair: Hon. Mr. Abdullahi Majeed, State Minister*	
11:00 – 11:20	Introduction to the SASCOF process & Highlights of 2016-17 Winter season over the region vis-à-vis SASCOF-9 climate outlook Dr. Pai, IMD, RCC, Pune, India
11:20 - 11:40	Current status of the global and regional drivers of winter climate over South Asia Prof. Yuri, BoM, Australia (to be presented remotely)
11:40 – 12:30	Afghanistan (Mr. Mohammad Nasim Muradi) Bangladesh Bhutan India (Dr. D.S. Pai) Maldives (Ms. Azeema Ahmed) Myanmar Nepal (Mr. Shiva Prasad Nepal) Pakistan (Mr. Zubair Ahmed Siddiqui) Sri Lanka (Mr. A. G. M.M. Wimalasuriya)
12:30 – 13:30	***Lunch***
13:30 – 15:00	Country presentations – continued from previous session Winter Seasonal Climate monitoring products & outlook for the 2017 winter monsoon season Tokyo Climate Centre, JMA, Japan (Mr. Takuya Komori) LC-LRFMME, KMA, Korea (Ms. Gayoung Kim)
15:00 – 15:30	Q & A and Discussion & other global / regional inputs
15:30 – 16:00	***Coffee Break***
	Discussion Moderators: Ali Shareef, DDGM & Dr. Zahid, DDGC, MMS
16:00 - 16:30	Open discussion on the available indicators and Consensus Outlook
16:30 – 17:30	Recommendation and Suggestions for Future regarding seasonal climate outlook and related climate information products from users
Session ends	

Wednesday, 27 September 2017	
Using Climate Outlook Information for sectoral planning ***Chairs: Dr. Pai, IMD, RCC, Pune and Dr. G. Srinivasan, RIMES***	
09:00-09:30	Recap and release of consensus forecast for the 2017 winter monsoon season *by the Chairs of the Session*
09:30- 10:00	Presentation by Maldives NDMC
10:00 – 10:30	***Coffee Break***
10:30 – 10:45	Presentation by UN ESCAP representative Ms. *Kareff Limocon Rafisura*
10:45 - 11:00	Presentation by World Bank representative from Sri Lanka *Ms. Priyanka Dissanayake and Mr. Suranga Kahandawa*
11:00 -12:30	Breakout Group Discussions: User's Sector climate information requirements and Experience Sharing by Maldives user's sectors representatives *NDMC, Costal Guard, Police, Ministry of Fisheries and Agriculture, Ministry of Environment and Energy, Health Protection Agency, Maldivian Red Crescent*
12:30 – 13:00	Presentations by breakout groups
13:00 – 14:00	***Lunch***
14:00 – 15:30	Open discussion on opportunities and challenges over the use of seasonal climate predictions in various sectors of Maldives /Wrap-up and Recommendations *Chair: Hon. Mr. Abdullahi Majeed, State Minister*
15:30 – 16:00	Coffee Break
16:00 – 17:30	Finalization of recommendations and Closing remarks by host institution MMS
Close of the event	

WMO Lead Centre for
Long-Range Forecast Multi-Model Ensemble

Seasonal Climate Outlook for the 2017 Northeast Monsoon Season from WMO LC-LRFMME

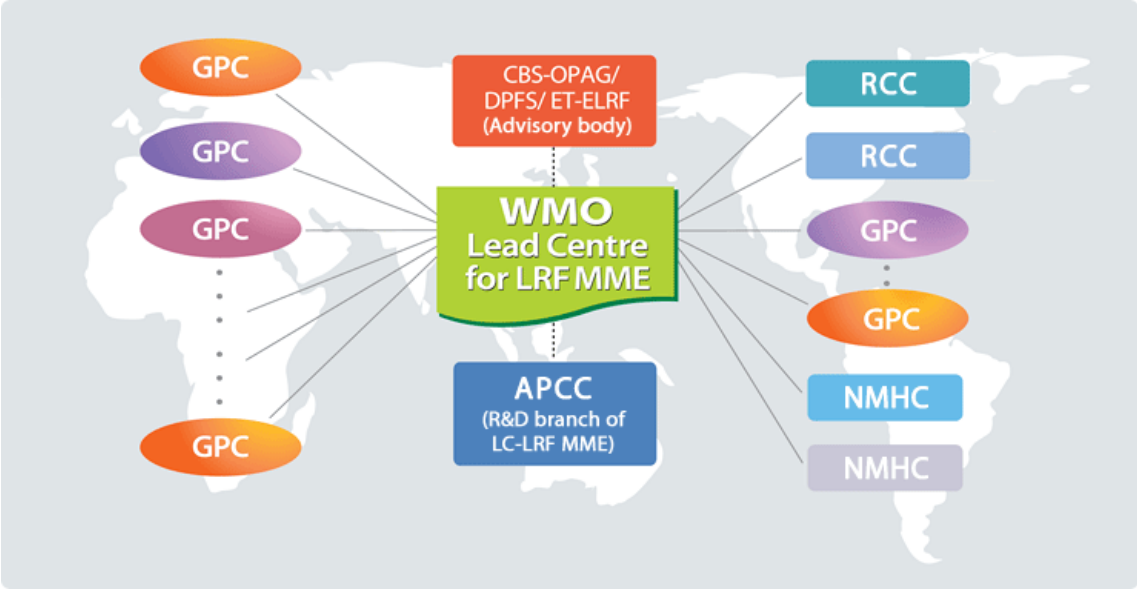
Gayoung Kim and WMO LC-LRFMME team

Eleventh Session of the South Asian Climate Outlook Forum (SASCOF-11)
25-27 September 2017
Male, Maldives

Outline

WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble (WMO LC-LRFMME)

What is WMO LC-LRFMME?



- Long-Rrange Forecast (seasonal forecast) model outputs are not fully used due to different standards.
- It would be quite useful if all GPCs share their outputs with all regions.
- To use outputs more widely and effectively, we need linkage between GPCs and users.
- WMO LC produces MME data by using GPCs' products

➔ If many GPCs' products are combined by Lead Centre for LRF MME, seasonal and long-range prediction

1. can show significant improvement
2. contribute to disaster prevention and mitigation
3. contribute to socio-economic plan taking into account variable climatic conditions by fully using GPCs' products

WMO Global Producing Centres (13 GPCs)

- Beijing: China Meteorological Administration (CMA)/ Beijing Climate Center (BCC)
- CPTEC: Center for Weather Forecasting and Climate Research/ National Institute for Space Research (INPE)
- ECMWF: European Centre for Medium-Range Weather Forecasts
- Exeter: Met Office, United Kingdom
- Melbourne: Bureau of Meteorology (BoM), Australia
- Montreal: Meteorological Service of Canada (MSC)
- Offenbach: Deutscher Wetterdienst
- Moscow: Hydrometeorological Centre of Russia
- Pretoria: South African Weather Services (SAWS)
- Seoul: Korea Meteorological Administration (KMA)
- Tokyo: Japan Meteorological Agency (JMA)/ Tokyo Climate Center (TCC)
- Toulouse: Meteo-France
- Washington: Climate Prediction Center (CPC), National Oceanic and Atmospheric Administration, United States of America

Goals of WMO LC-LRFMME

Providing a conduit for sharing the model data

Developing a well-calibrated MME system for

- Mitigating the adverse impact of unfavorable climate conditions

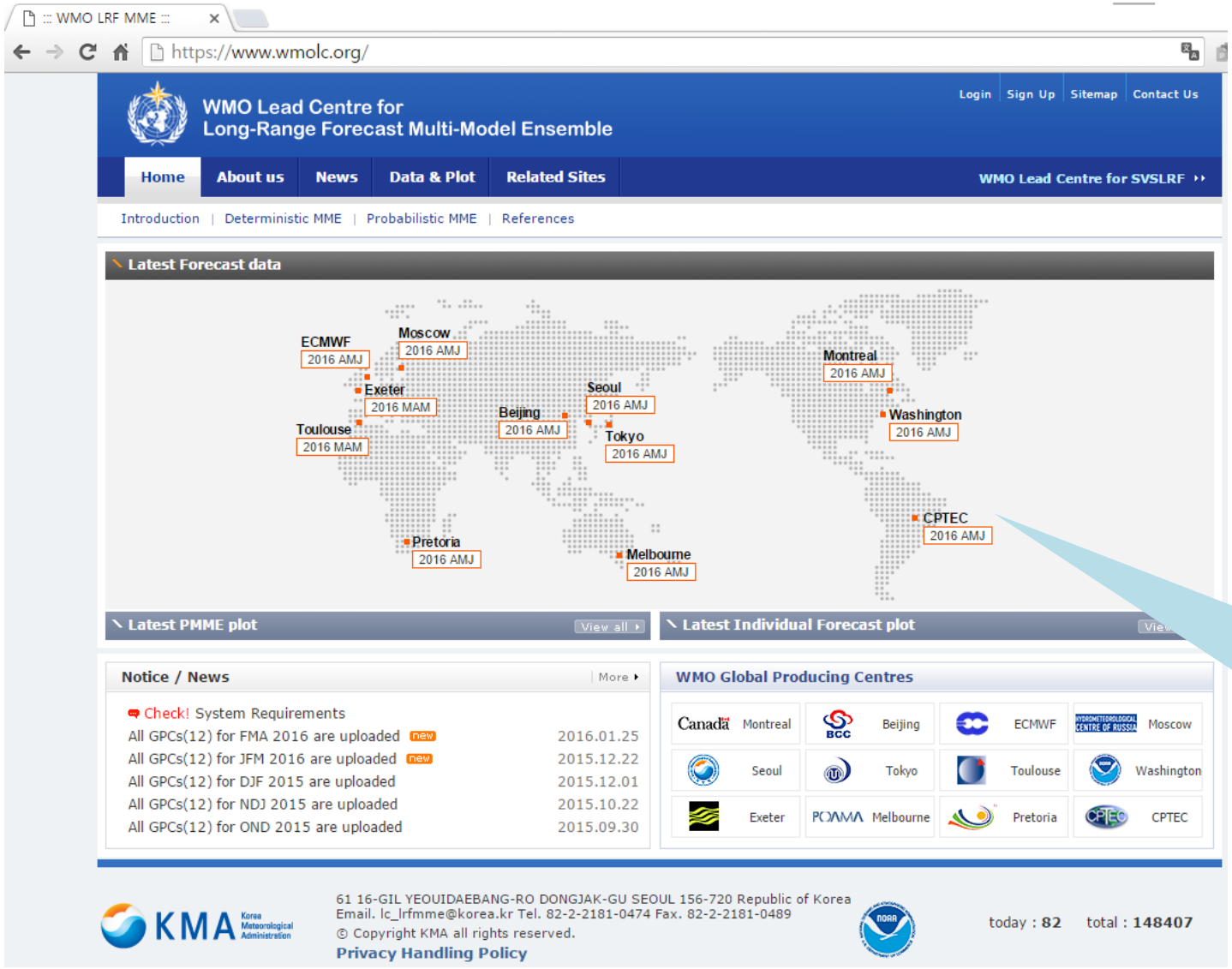
- Maximizing the benefit from favorable conditions

Providing high-quality climate prediction products

Developing advanced climate prediction technology

WMO LC-LRFMME Website

❖ URL: https://www.wmolc.org

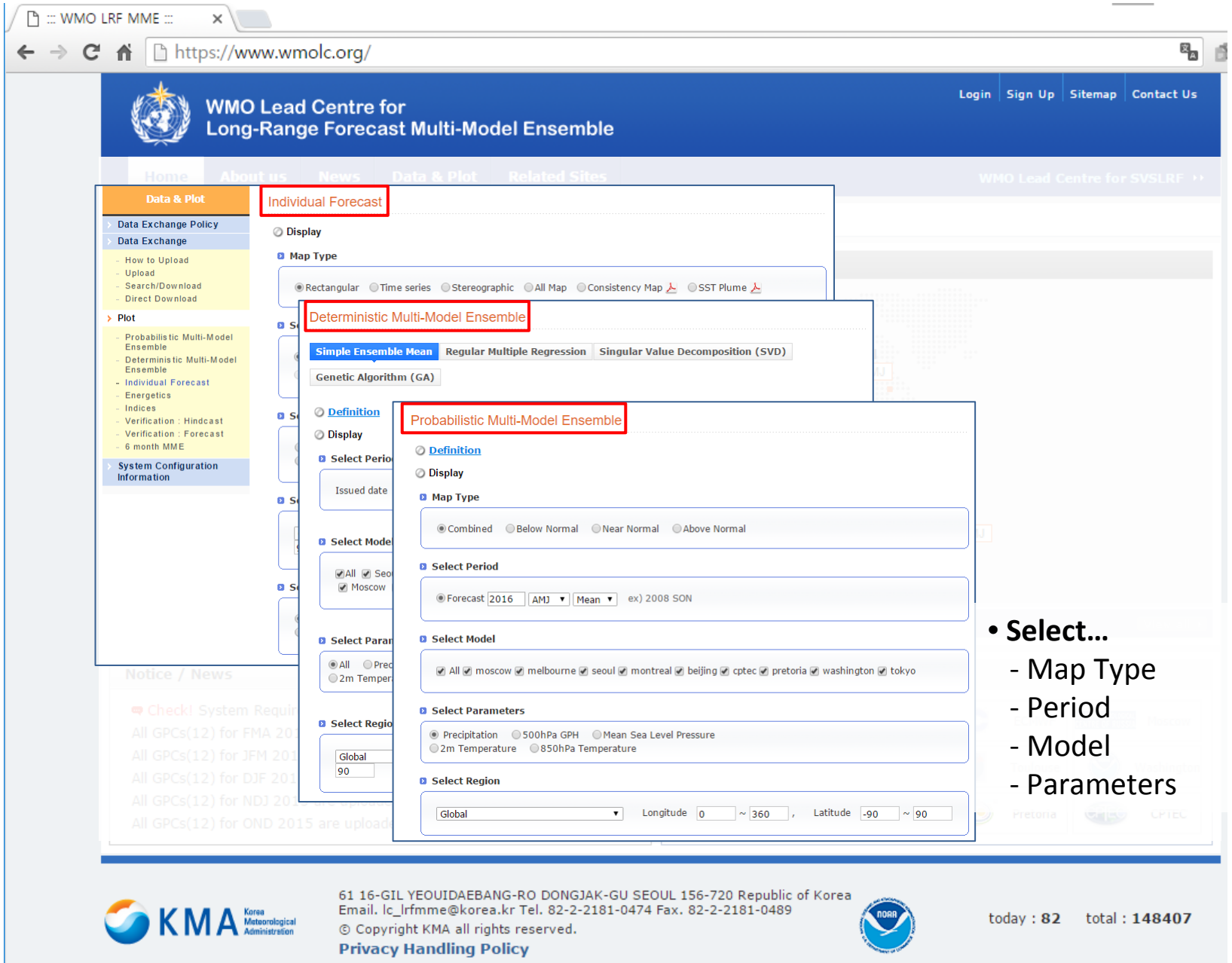


Membership Levels & Accessibility

- **Level A** (GPCs)
  - Upload & download digital data (limited)
  - Download image plots
- **Level B** (NMHSs, RCCs)
  - Download digital data (limited) & image plots
- **Level C** (Others)
  - Image plots

As of 1st October 2014, access to ***the site is limited*** to Global Producing Centres (GPCs), Regional Climate Centres (RCCs), National Meteorological and Hydrological Services (NMHSs) and bodies coordinating Regional Climate Outlook Forums (RCOFs)

Products of WMO LC-LRFMME



- **Select…**
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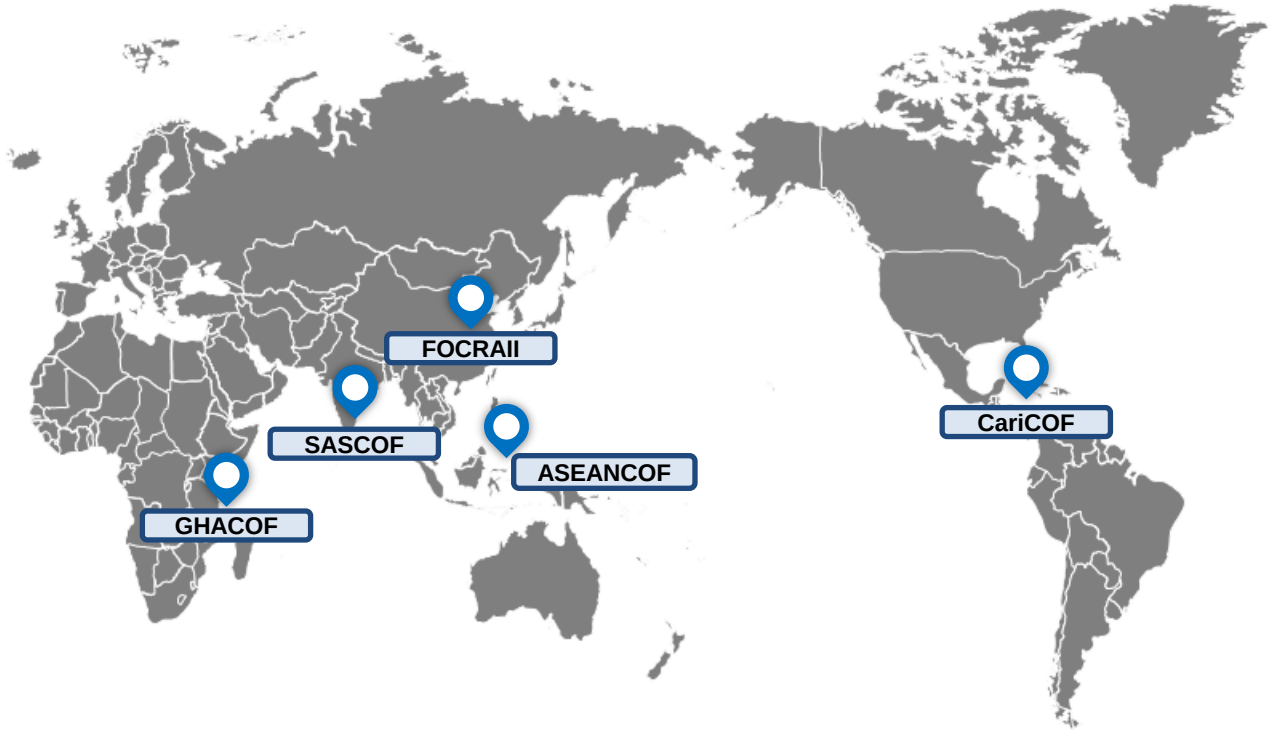
  - Period
  - Model
  - Parameters

Activities of WMO LC-LRFMME

❖ Support for Regional Climate Outlook Forums



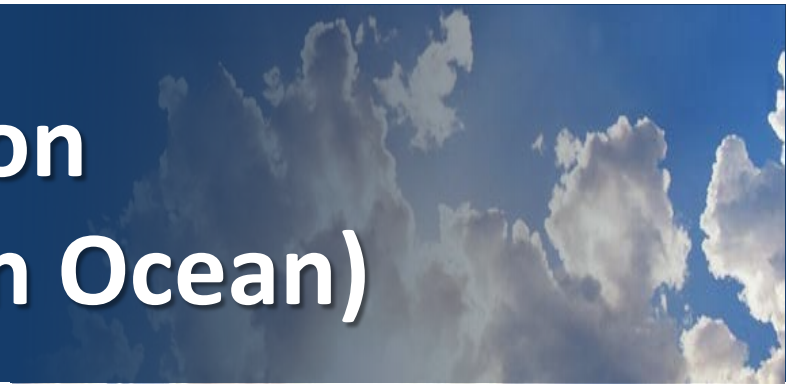
In 2016,

SASCOF-8	4/25-26 (Colombo, Sri Lanka)
GHACOF43	5/30-31 (Naivasha, Kenya)
SASCOF-9	9/27-28 (Nay Pyi Taw, Myanmar)
ASEANCOF-7	11/14-18 (Manila, Philippines)
CariCOF	12/1-3 (St. George's, Grenada)

❖ Support for Global Seasonal Climate Update (GSCU)

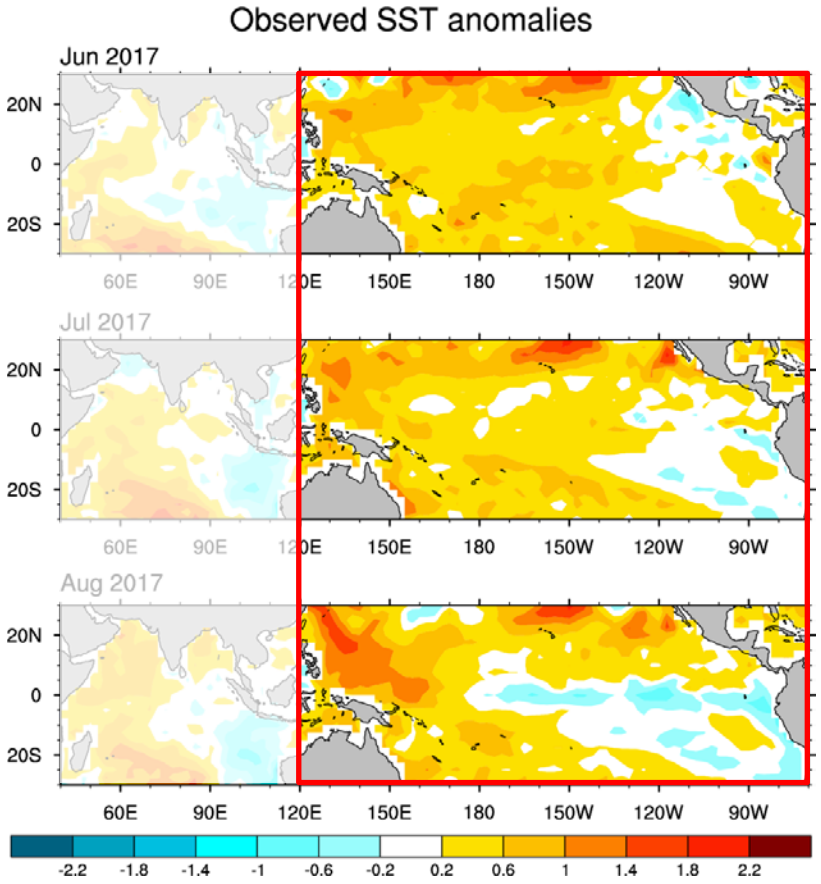
- A new Initiative for Consensus-Based Real Time Monitoring and Prediction of Seasonal Climate of the World
- To provide the world community with an expert consensus on the state of the global climate with an outlook for the upcoming season along with information on robustness of the available forecast signals.
- To strengthen international collaboration and information flow between global, regional and national level operational climate monitoring and prediction centres
- For use by RCCs, RCOFs and NMHSs for assistance in preparation of regional and national climate Updates

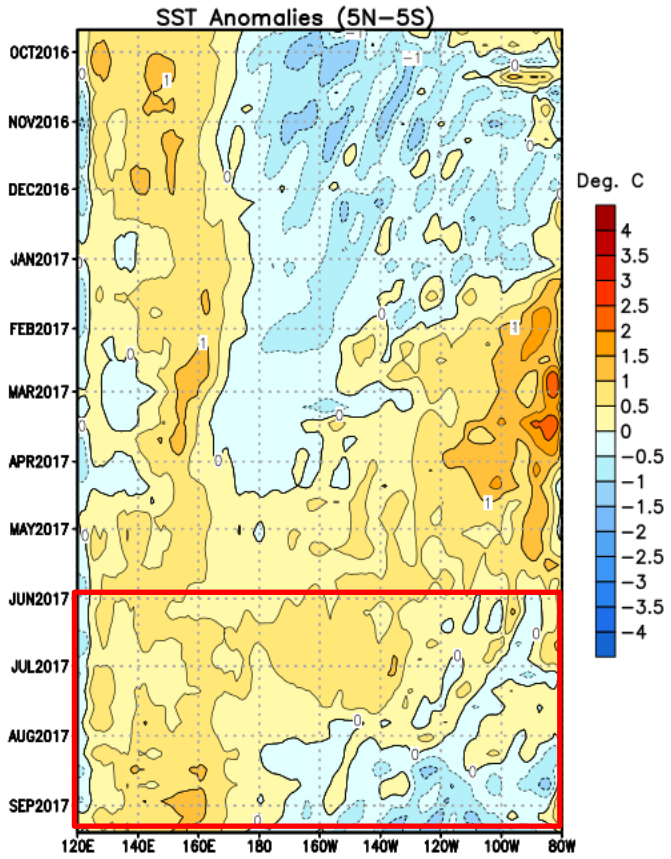
Current Oceanic Condition
(Tropical Pacific Ocean & Indian Ocean)



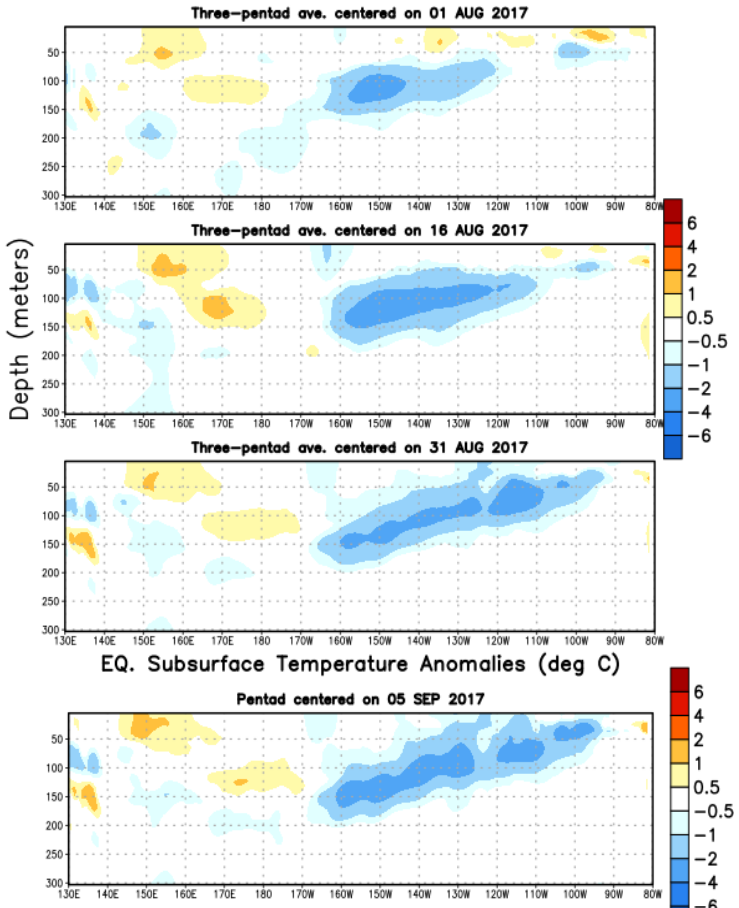
Recent Evolution of Equatorial Pacific Ocean SST

- Warm SST anomalies were evident until July, but above-average temperatures dissipated across the central and eastern Pacific.
- In the recent week, cold SSTs expanded most of the eastern Pacific.
- In the last two months, negative subsurface temperature anomalies have expanded across the Pacific Ocean. Recently, the strongest negative anomalies lie between 170ºW-90ºW and extend to the surface.





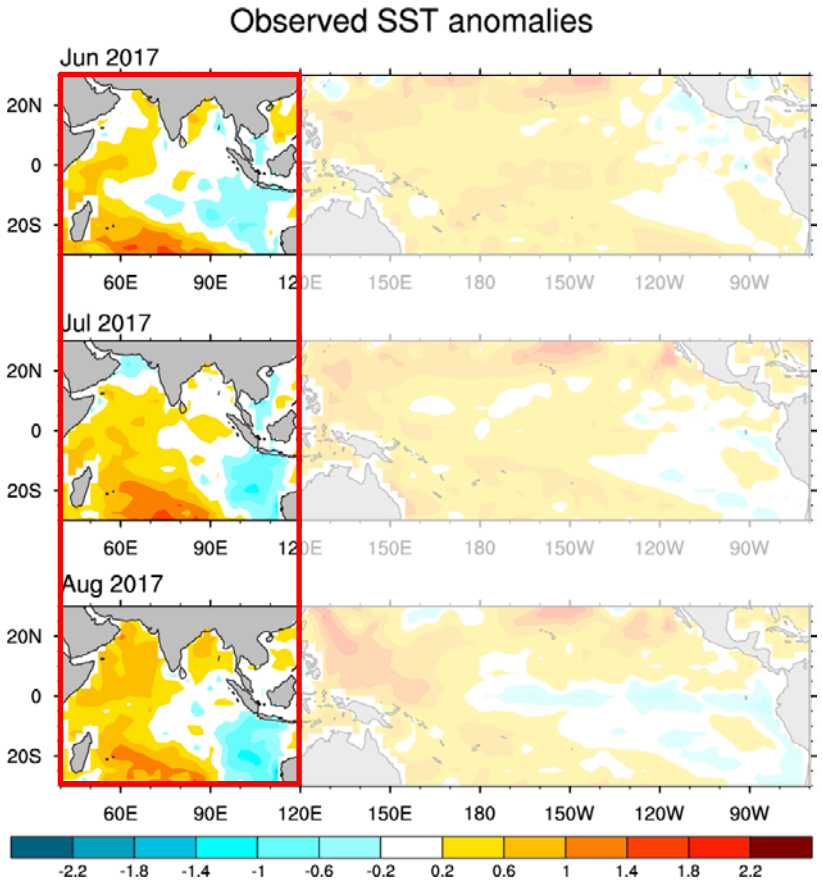
courtesy of NCEP/CPC (issued on 18 Sept.)

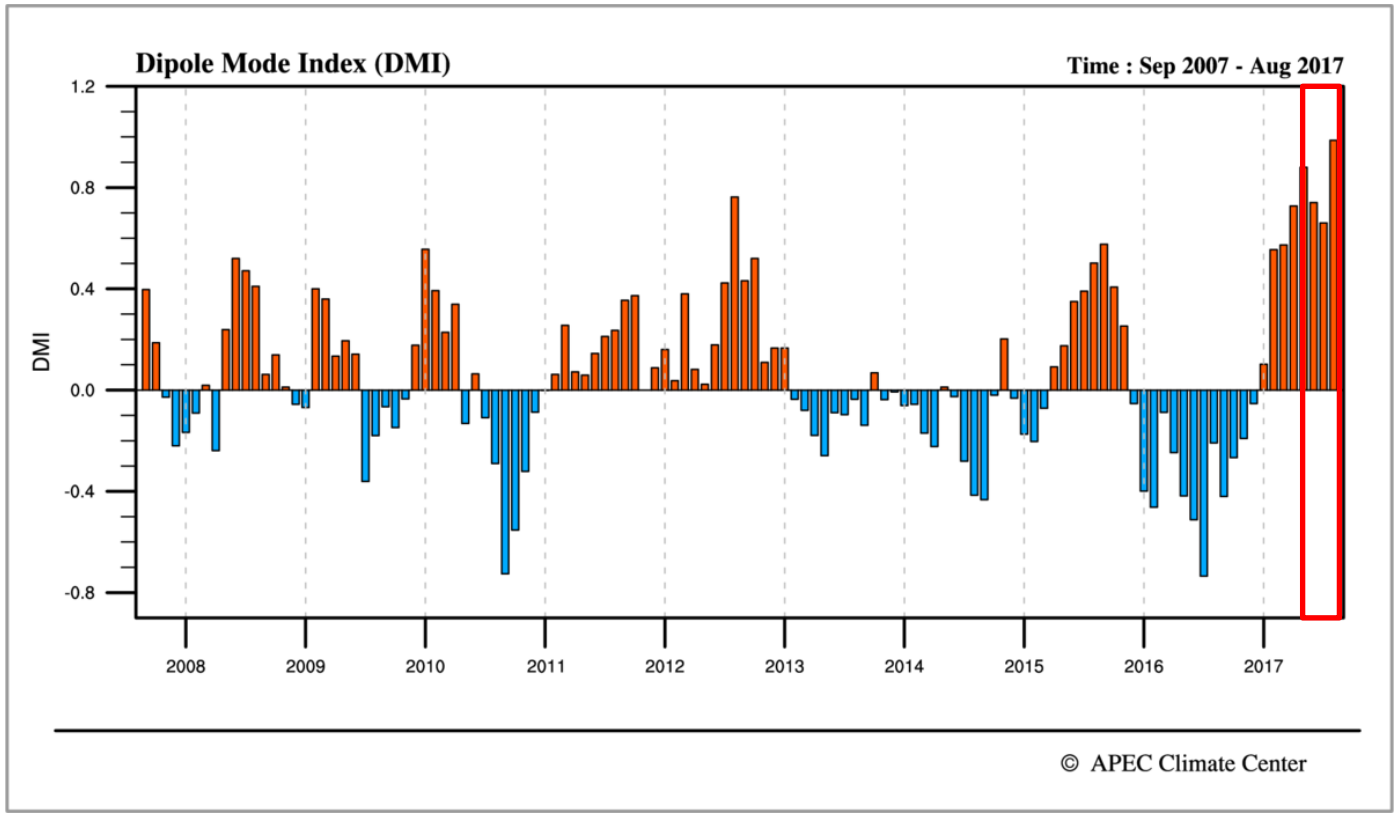


courtesy of NCEP/CPC (issued on 18 Sept.)

Recent Evolution of Indian Ocean SST

- SST anomalies were positive in the western and negative in the eastern Indian Ocean during last 3 months.
- The Indian Ocean Dipole (IOD) index is becoming positively stronger, recently.





courtesy of APEC Climate Center

Seasonal Outlook: Winter 2017/18

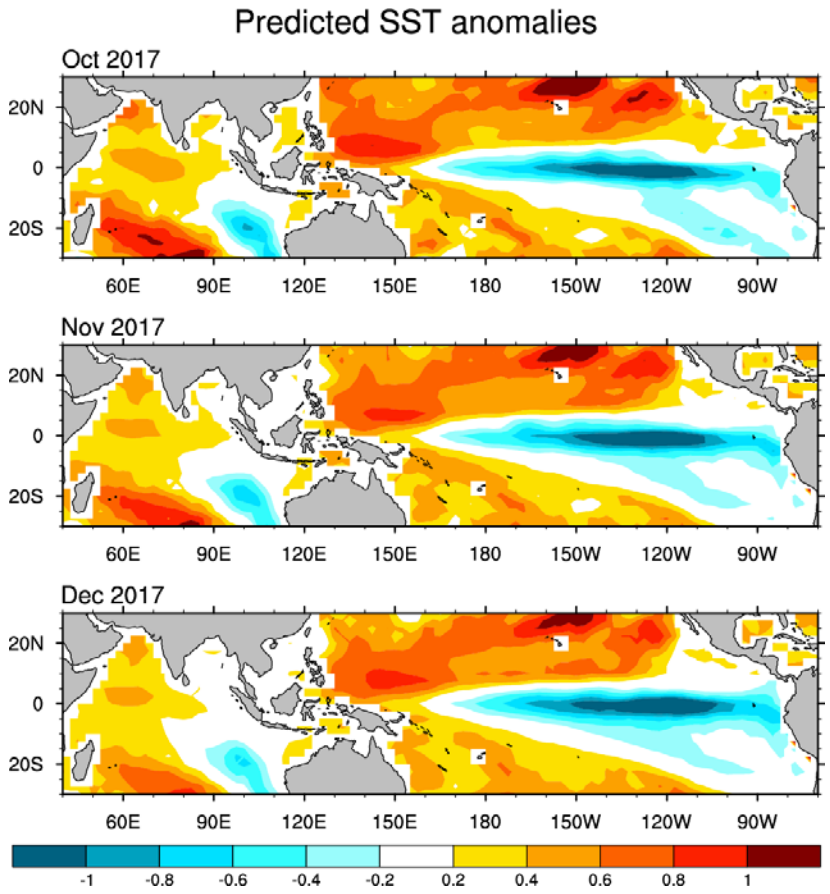
Participating GPCs for Winter 2017/18 Prediction

GPC	Beijing	CPTEC	ECMWF	Exeter	Melbourne	Montreal	Moscow	Offenbach	Seoul	Tokyo	Washington
Institute	BCC	CPTEC	ECMWF	UKMO	BoM	MSC	HMC	DWD	KMA	TCC	NCEP
Hindcast period	1991-2010	1979-2010	1981-2010	1993-2015	1980-2011	1981-2010	1981-2010	1981-2010	1991-2009	1979-2010	1981-2010

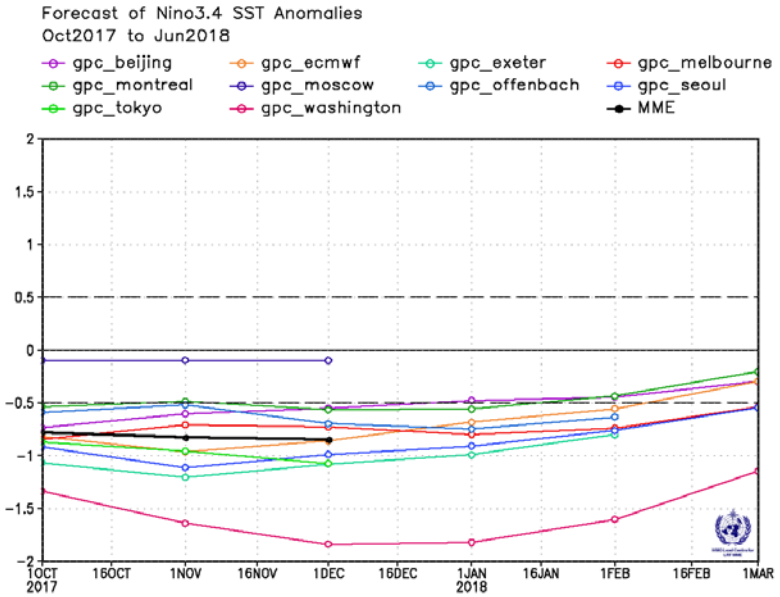
			2017					2018	
Initial Month	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
Sep			**OND**					

- Variable : 2m temperature, precipitation, mean sea level pressure, 850hPa temperature, 500hPa GPH, sea surface temperature (if available)
- New GPC, GPC-Offenbach, is included.

ENSO and IOD Prediction

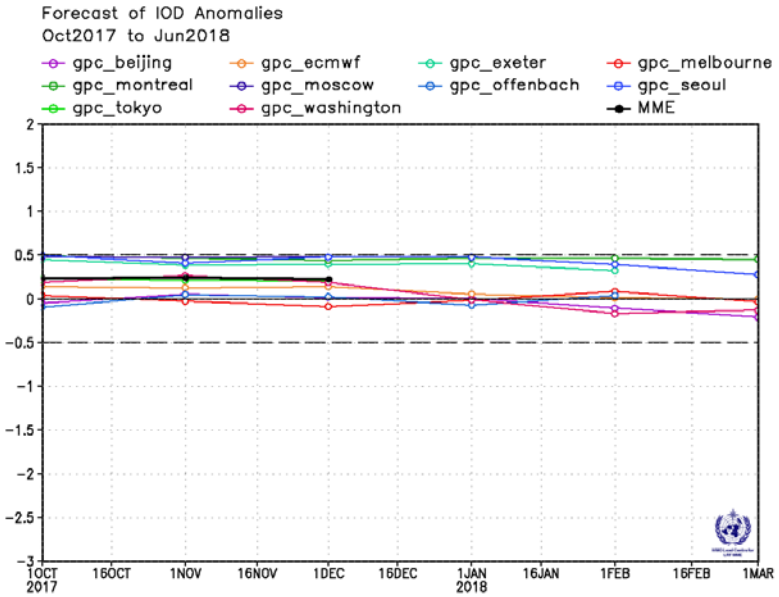


❖ ENSO



- A tongue of negative SST anomalies in the equatorial Pacific is predicted.
- Slightly positive SST anomalies expected to surround this cold tongue and span the tropical Pacific.
- Negative Nino 3.4 index is predicted.

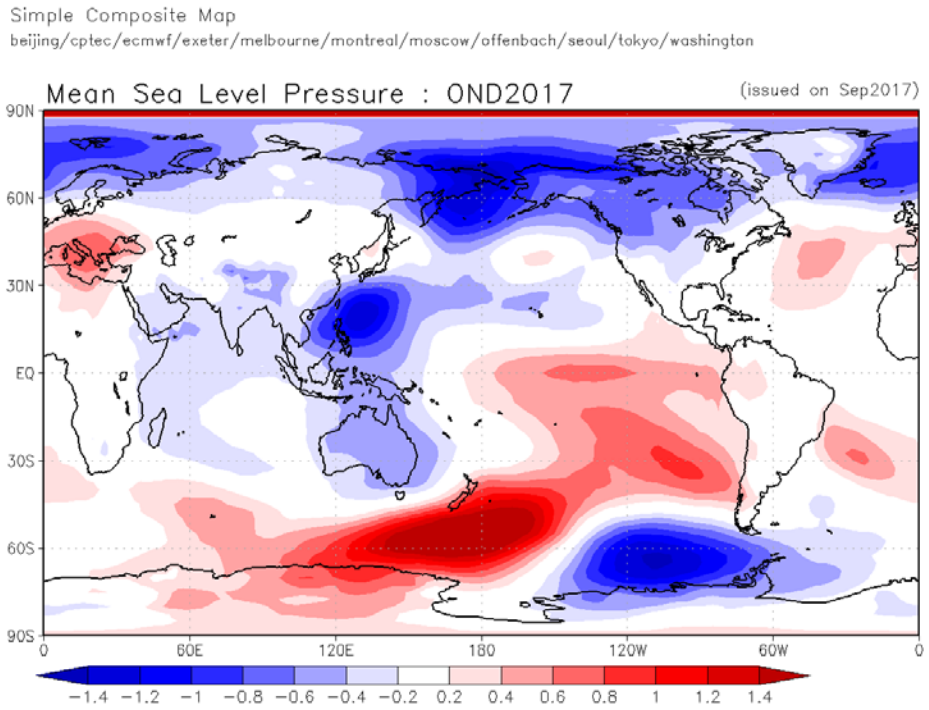
❖ IOD



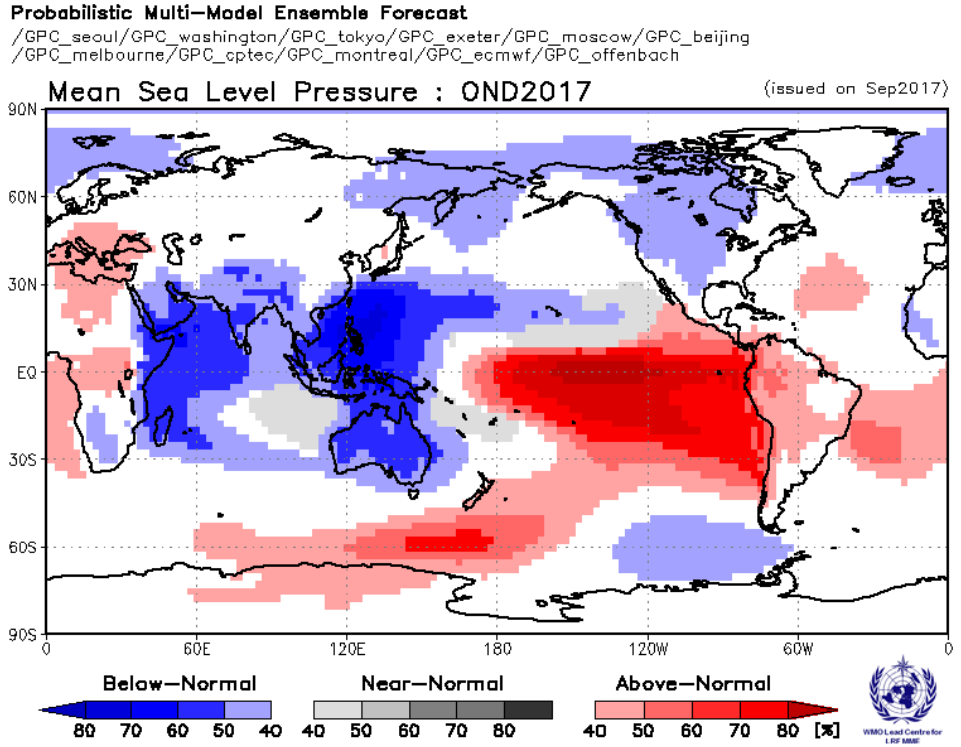
- The gradient of SST anomalies across western-eastern Indian Ocean will be remained, however the magnitude of gradient is decreasing.
- Weak positive IOD is expected.

MME: Sea level pressure for OND 2017

Deterministic MME

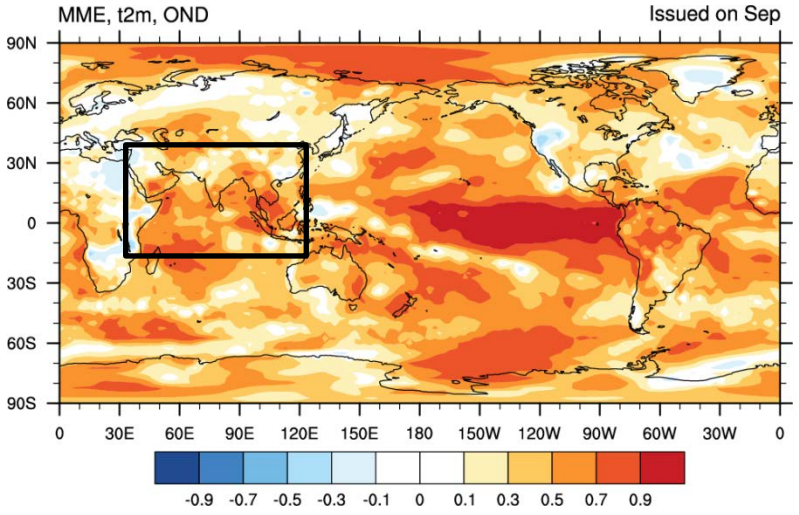


Probabilistic MME



- Positive and negative SLP anomalies is located in eastern and western Pacific Ocean.
- Relative low pressure surrounds western Indian Ocean.
- Negative ENSO- and positive IOD-related pattern is domenant during OND 2017 and it is agreed by more than 50% models.

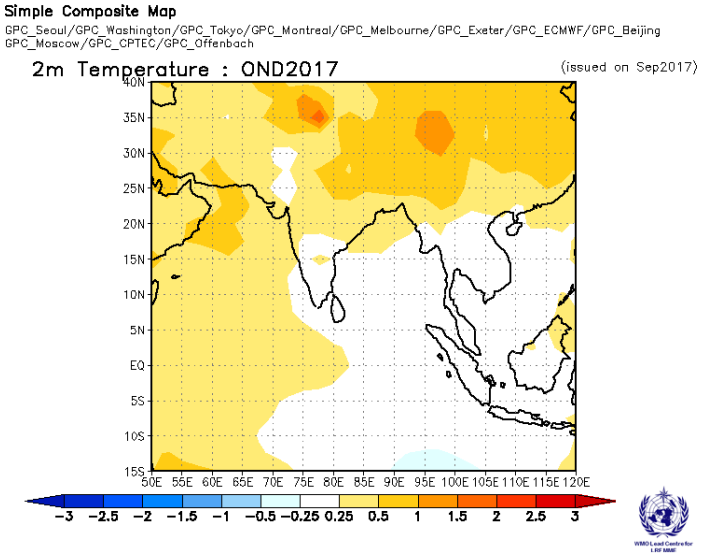
MME: 2m temperature for OND 2017



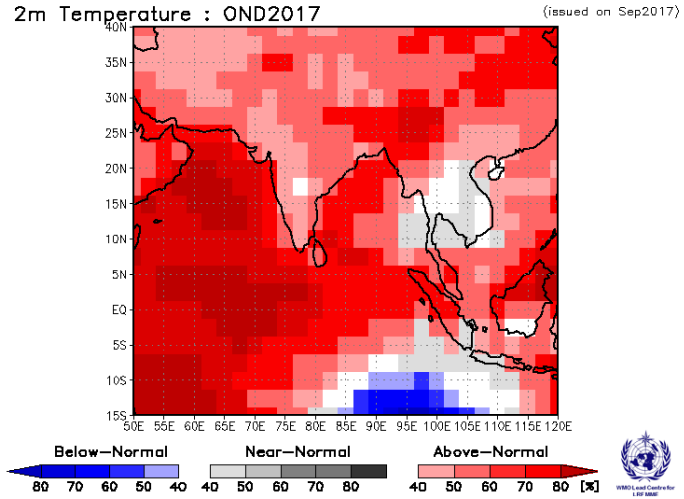
- The MME prediction skills of 2m temperature for OND season are quite good compared with those of other regions (correlation and ROC scores for above/below normal categories).

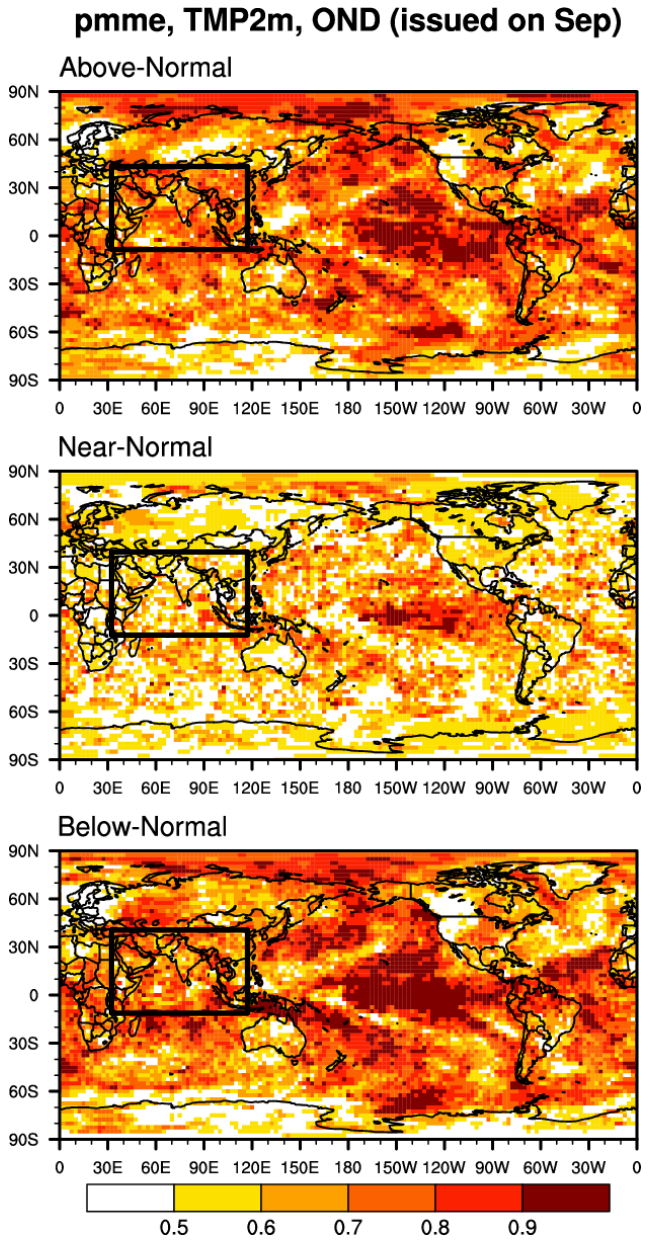
- Most parts of India, Sri Lanka, Maldives, Bangladesh, some parts of Myanmar are expected to be above-normal condition.
- Most parts of Thailand, Vietnam are expected to be near-normal condition (or equal-chance).

Deterministic MME

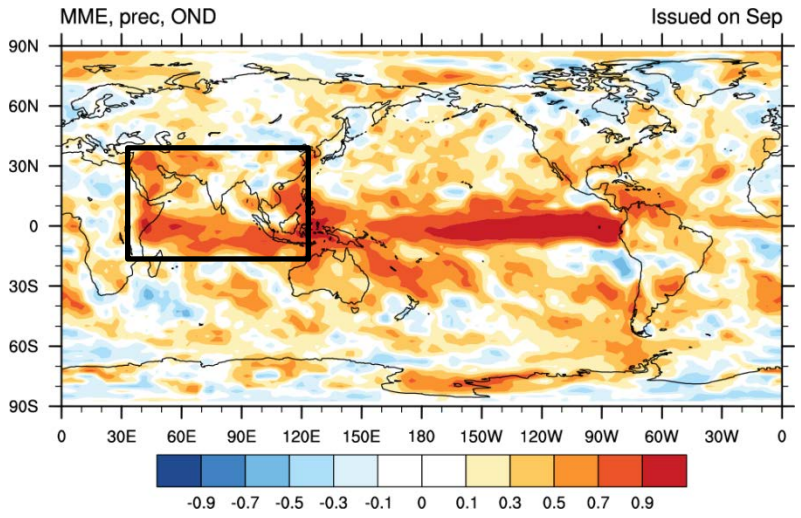


Probabilistic MME





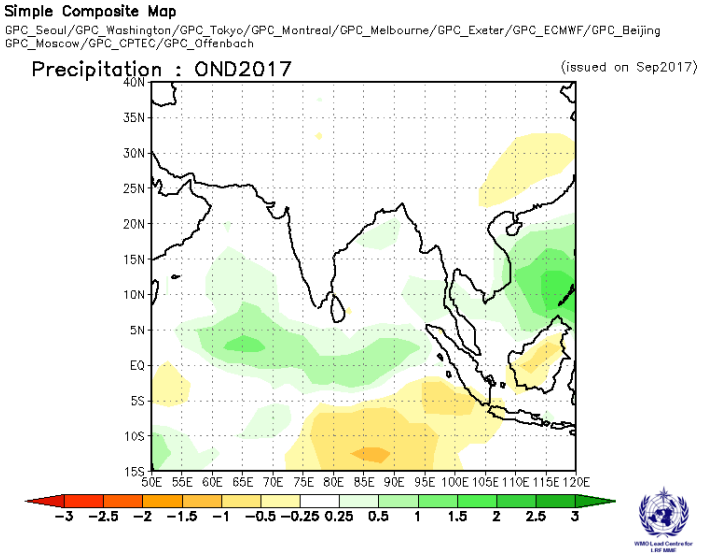
MME: Precipitation for OND 2017



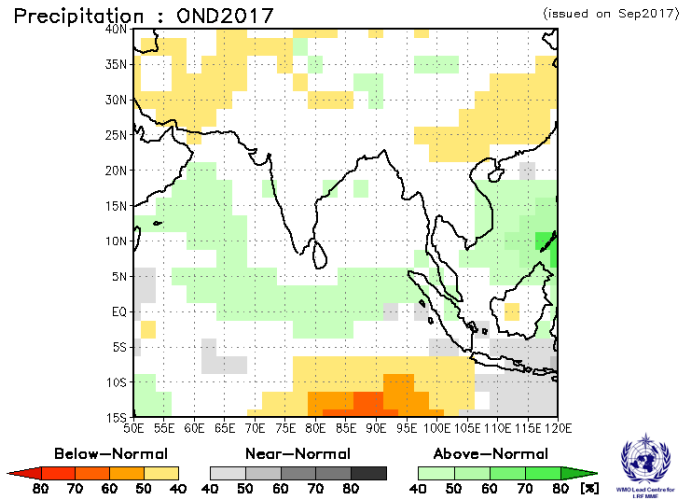
- The MME prediction skills of precipitation for OND season are also quite good compared with those of other regions (correlation and ROC scores for above/below normal categories).

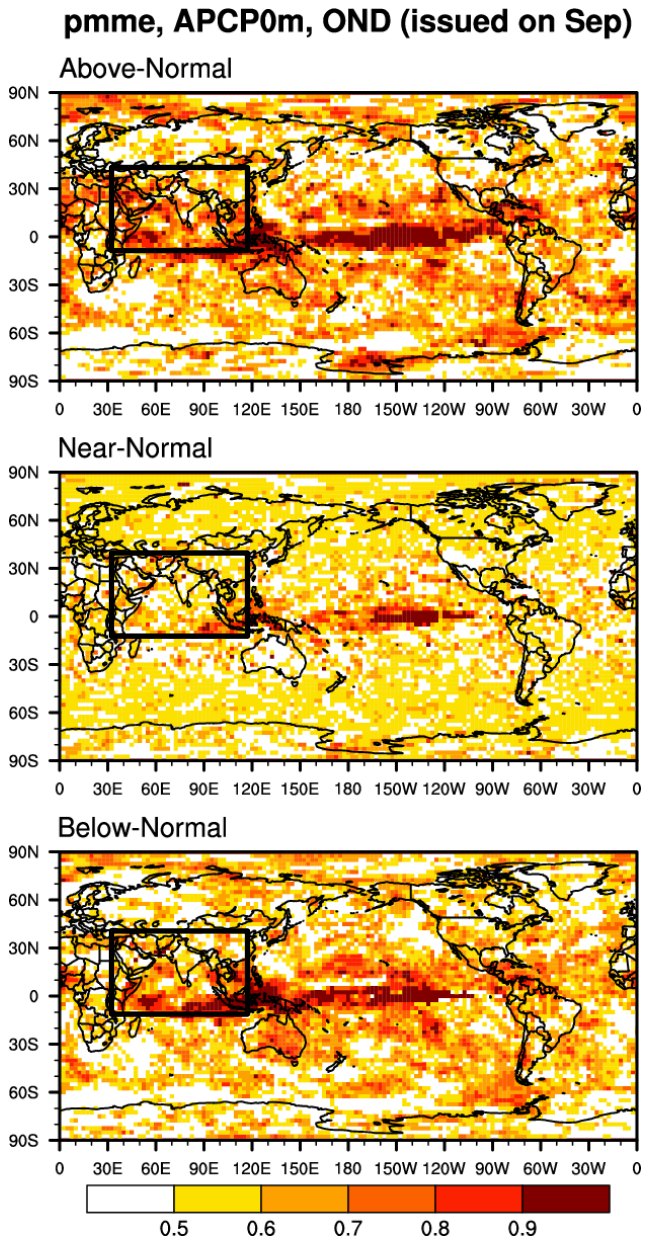
- Most regions are near-normal (equal-change) condition.
- Southern parts of Maldives are expected above-normal precipitation during OND 2017.

❖ Deterministic MME



❖ Probabilistic MME





Summary for OND 2017

- **Ocean**
  - **ENSO prediction**
    - **Neutral to negative ENSO (>-0.5 ˚C)** is expected during OND 2017
  - **IOD prediction**
    - **Neutral to weak positive condition** through OND 2017
- **Atmosphere : Warm and Slightly Wet during OND 2017**
  - **2m Temperature**
    - **warmer-than-normal** conditions over Most parts of India, Sri Lanka, Maldives, Bangladesh, some parts of Myanmar
  - **Precipitation**
    - **Near-normal** condition over most parts of South Asian region, but **below-than-normal** condition over Pakistan, **above-normal** conditions over some parts of Maldives


thank you
danke
gracias
merci
obrigado
teşekkür ederim
go raibh maith agat
ngiyabonga
謝謝
спасибо
dziękuję
bedankt
sukriya
kop khun krap
mochchakkeram
arigatô
dakujem
grazie
terima kasih
감사합니다
ありがとう
мерси
tapadh leat
dank je

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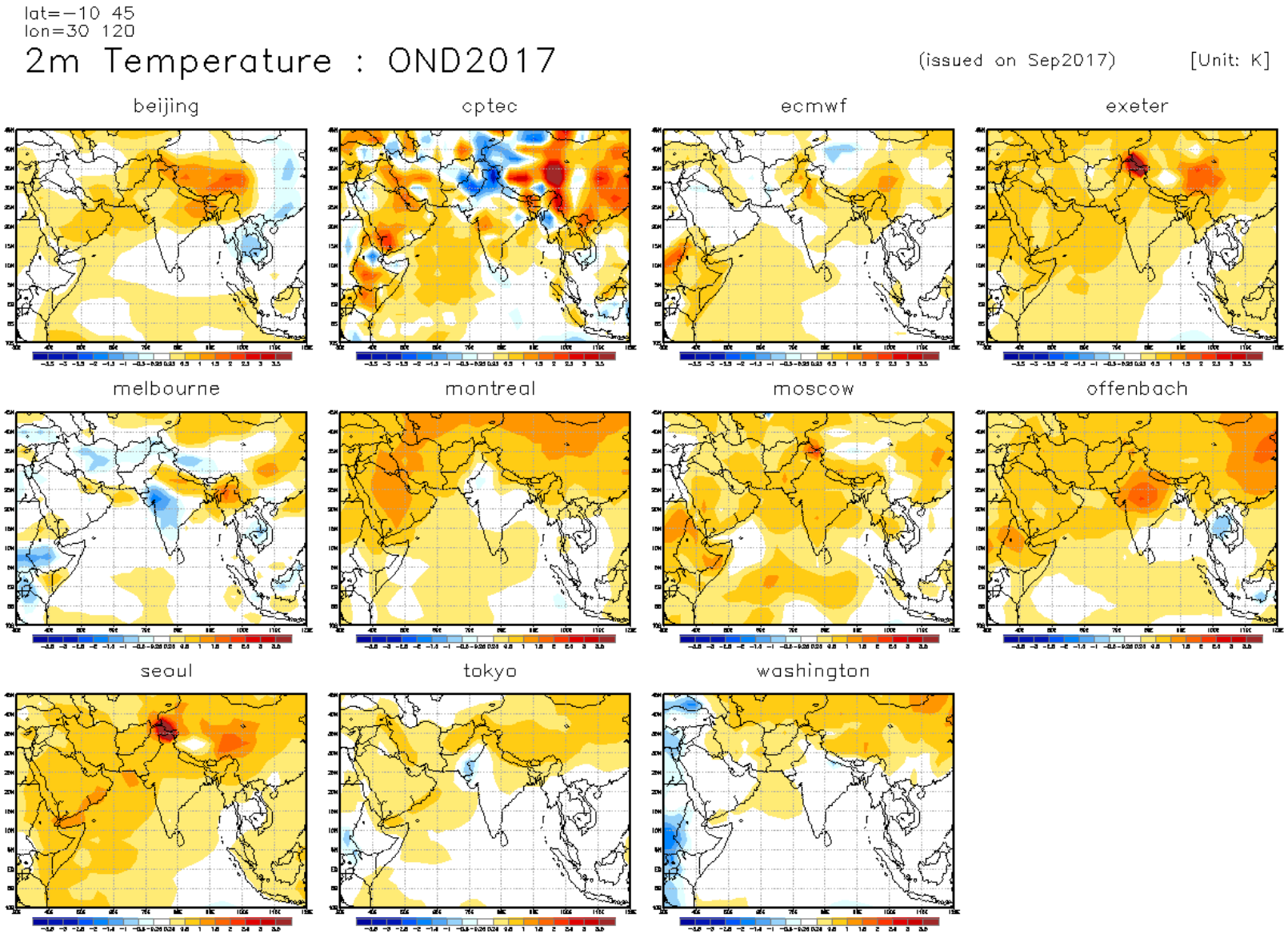
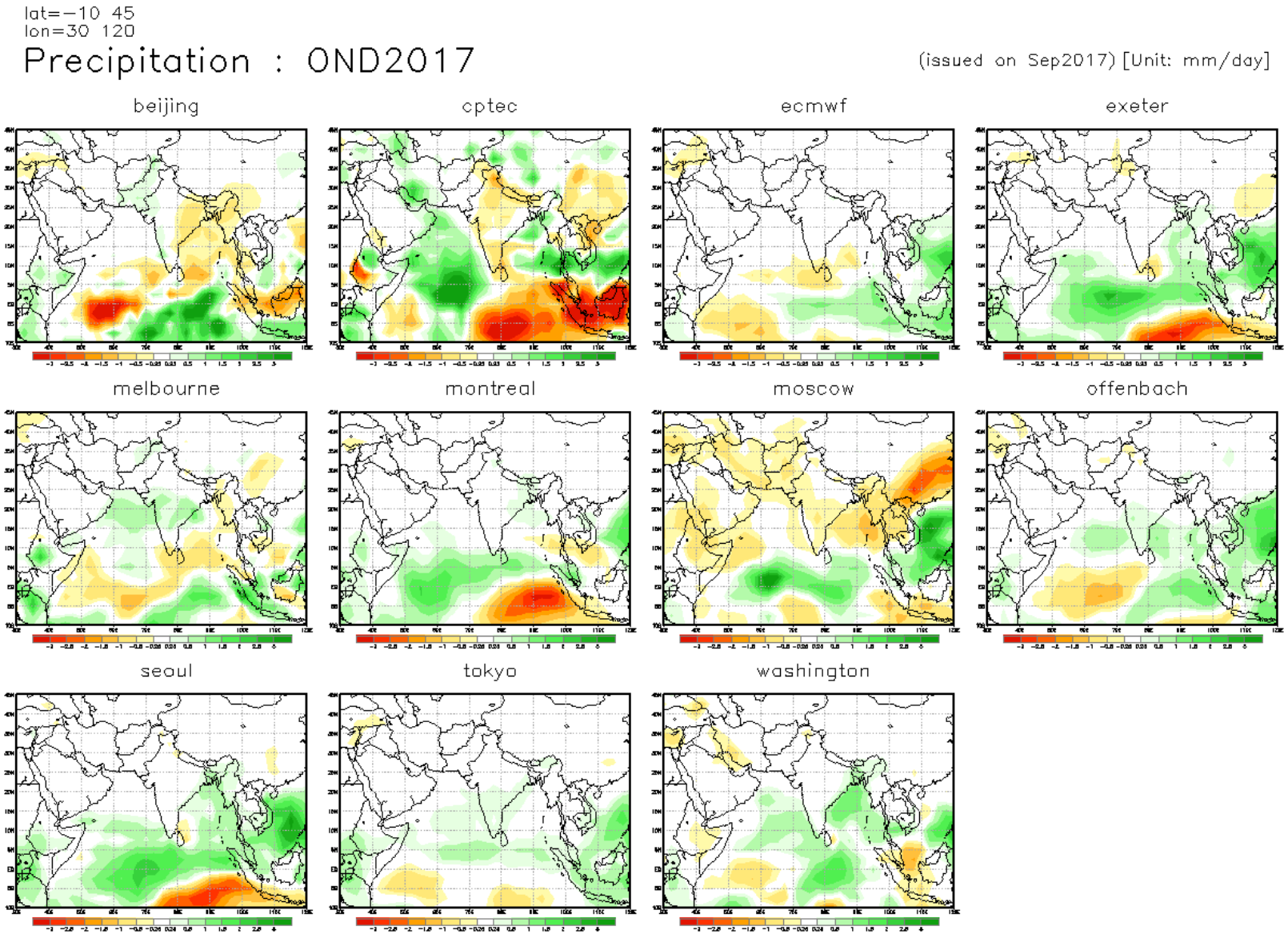
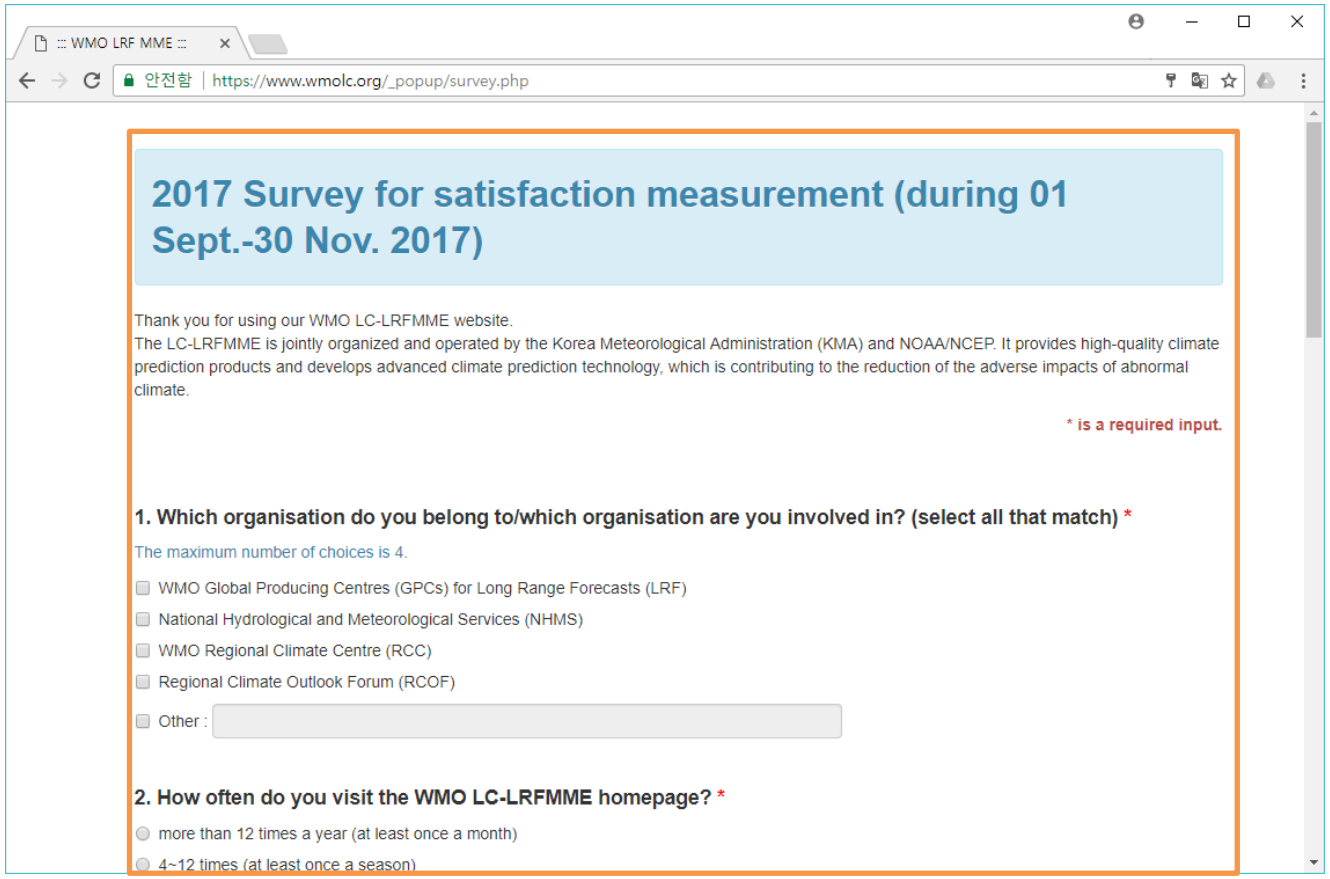
Individual forecast: 2m temperature for OND 2017



Individual forecast: Precipitation for OND 2017



Survey for Satisfaction Measurement via Website



- **Why?**
  To diagnose the current status of WMO LC-LRFMME and provide better services to the website user
- **When?**
  1st September – 30th November 2017
- **To whom?**
  All website registered members

This project was undertaken with the financial support of:
Ce projet a été réalisé avec l'appui financier de :
Environment Canada Environnement Canada

Eleventh Session of

South Asian Climate Outlook Forum (SASCOF-11)

Malé, Maldives, 25-27 September 2017

Consensus Statement on the Forecast for the 2017 October to December (OND) Season Rainfall and Temperatures over South Asia

Summary

Below normal rainfall is most likely during the 2017 OND Season over some parts of SE Peninsular India, north Sri Lanka and some northeastern areas of the region. Above normal is most likely over southeastern part of the region and along the coastal areas adjacent to the north Bay of Bengal. Over remaining areas of the region including northwest and central areas that generally receive very little rain during the season, rainfall is most likely to be Normal.

Normal to slightly above normal temperatures are likely during the 2017 OND Season over most parts of the region.

Currently cool neutral ENSO conditions prevail in the Pacific Ocean and these conditions are likely to continue and turn to border line/ weak La Nina conditions in the early next year. It is also recognized that during the 2017 OND season, in the absence of SST forcings from Pacific and Indian oceans, strong intra seasonal features will have larger influence on the climate variability over the region leading to increased uncertainty in predictions of seasonally averaged rainfall and temperature patterns.

The consensus forecast outlook presented here has been developed through an expert assessment of the prevailing global climate conditions and forecasts from different climate models from around the world.

For more information and further updates on the northeast monsoon outlook on national scale, the respective National Meteorological and Hydrological Services (NMHSs) may be consulted.

A separate consensus statement for the winter season (December 2017 to February 2018) will be issued in November 2017.

Introduction:

During the season (October to December), many parts of South Asia receive significant amounts of rainfall which coincides with one of the major agricultural seasons of the region. The reestablishment of prevailing north easterly trade-wind regime over South Asia associated with the southward movement of the ITCZ ushers-in the so-called "Northeast Monsoon" (NEM), bringing rainfall to the southern parts of India, Sri Lanka and Maldives. In Sri Lanka, the October to November period is known as second Inter Monsoon (SIM) season. It has been recognized that there is moderate seasonal predictability for the Northeast Monsoon circulation over the region as the seasonal variability is strongly influenced by the slowly varying boundary forcings like sea surface temperatures. However, the predictability is also limited to some extent due to the high frequency atmospheric variability caused by the passage of the synoptic scale systems such as easterly waves, lows, depressions, cyclones etc. The seasonal predictability of the northeast monsoon over the region is also influenced by the Madden Julian Oscillation (MJO), which represents the major global scale intraseasonal variability pattern.

The current climate outlook was prepared during the eleventh session of the South Asian Climate Outlook Forum (SASCOF-11), which is also the third session devoted exclusively for the Northeast monsoon season. SASCOF-11 was held at Malé, Maldives, 25-27 September 2017. The forum meeting was attended by several experts from various South Asian countries such as Afghanistan, India, Maldives, Nepal and Sri Lanka. Experts from Bhutan and Myanmar though could not attend, send their forecast inputs to the forum. The forum was also attended by the experts from Japan Meteorological Agency (JMA), WMO Lead Center for Long-Range Forecast Multi-Model Ensemble (LC-LRFMME), Bureau of Meteorology (BoM), Australia and the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES). The Forum deliberated on various observed and emerging climatic features that are known to influence the climate of the region such as the El Niño-Southern Oscillation (ENSO) conditions over the equatorial Pacific, Indian Ocean Dipole (IOD) conditions over the Indian Ocean etc. The key features of these conditions are as follows.

ENSO Conditions over the Pacific Ocean

The El Niño/Southern Oscillation (ENSO) is one of the global scale climate phenomena that have significant influence on the year-to-year variability of the northeast monsoon rainfall as well as the surface temperatures over South Asia.

Warm ENSO neutral conditions prevailed from mid-March to end of July with SSTs over east-central tropical Pacific reaching close to El Niño threshold during mid-June to mid-July turned to cool ENSO neutral conditions in the latter half of August. Currently, cool ENSO neutral conditions continue. The atmospheric conditions over the Pacific also reflect patterns consistent with the observed changes in the oceanic conditions. Latest forecasts from global models indicate cool ENSO neutral conditions are most likely to continue through the OND season and turn to border line/ weak La Niña conditions during late this year or early next year.

Conditions over the Indian Ocean

In addition to ENSO conditions over Pacific, other factors such as the Indian Ocean Sea Surface Temperatures (SSTs) have also some influence on Indian monsoon. Over Indian Ocean, currently neutral Indian Ocean Dipole (IOD) conditions are prevailing. Latest forecasts from global models forecast indicate IOD neutral conditions to continue during the northeast monsoon season.

Consensus Outlook for the 2017 OND Season Rainfall over South Asia:

A consensus outlook for the OND season rainfall over South Asia has been prepared based on the expert assessment of prevailing large-scale global climate indicators mentioned above and experimental as well as operational long-range forecasts based on statistical and dynamical models generated by various operational and research centres of the world including WMO Regional Climate Centers (RCCs) and Global producing centers of LRF (GPCs).

There is unanimity among the experts that the prevailing cool ENSO neutral conditions in the equatorial Pacific and IOD neutral conditions in equatorial Pacific are likely to persist through the OND season and possibly turn into a border line/ weak La Nina conditions later this year. It is recognized that El Niño and La Niña are not the only factors that drive global climate patterns, and that the strength of ENSO does not automatically correspond to the strength of its effects. It is also recognized that in the absence any large

scale SST forcing from Pacific and Indian Oceans, there is significant uncertainty in prediction of climate of the region due to the high frequency atmospheric variability generally observed in the region.

The outlook for the 2017 northeast monsoon season (OND) rainfall over South Asia is shown in **Fig.1**. The figure illustrates the most likely tercile category[1] as well as its probability for each of the 1° latitude x 1° longitude spatial grid boxes over the region. The box-wise tercile probabilities were derived by synthesis of the available information and expert assessment. It was derived from an initial set of gridded objective forecasts and modified through a consensus building discussion of climate experts.

The outlook suggests that below normal rainfall is most likely during the 2017 OND Season over some areas of SE Peninsular India, north Sri Lanka and some northeastern areas of the region. However, above normal is most likely over some southeastern areas of the region and the coastal areas adjacent to north Bay of Bengal. Over remaining areas of the region that includes the northwest and central areas of the region which generally receive very little rain during the season, normal rainfall is most likely.

Normal to slightly above normal temperatures are most likely during the 2017 OND Season over most parts of the region.

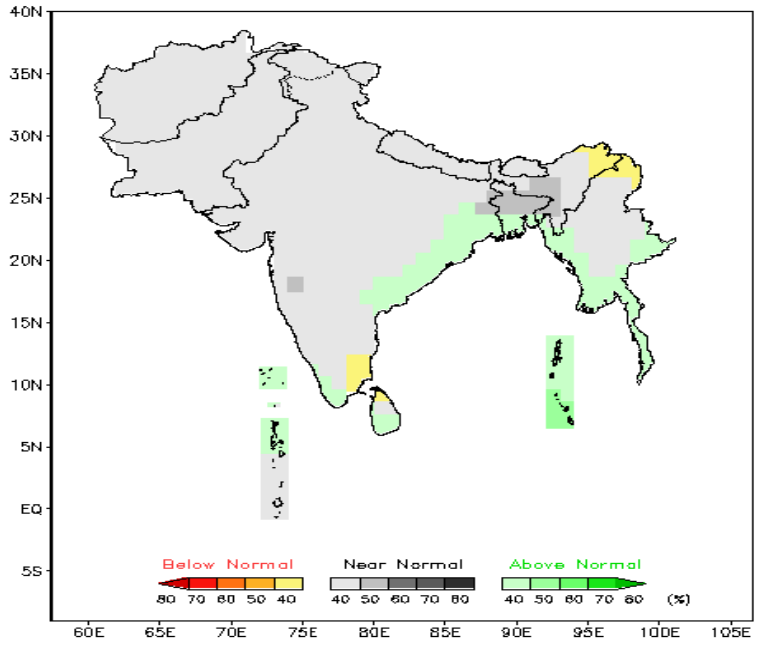


Fig.1. Consensus outlook for the 2017 OND season rainfall over South Asia.

[1]Tercile categories have equal climatological probabilities, of 33.33% each.

Verification of the Consensus Forecast for the 2016 NE Monsoon Season Rainfall

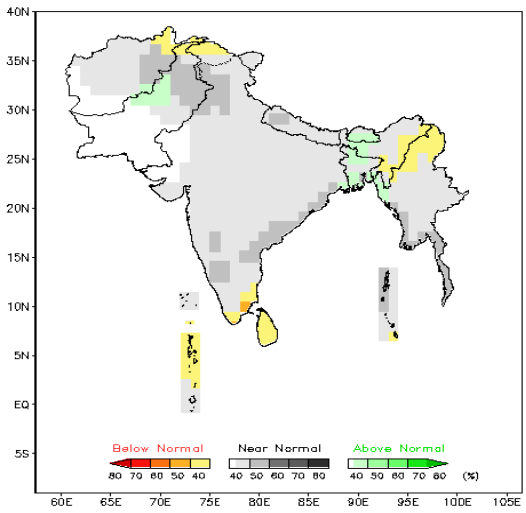


Fig.2. Consensus forecast map of the 2016 Northeast monsoon Rainfall over South Asia.

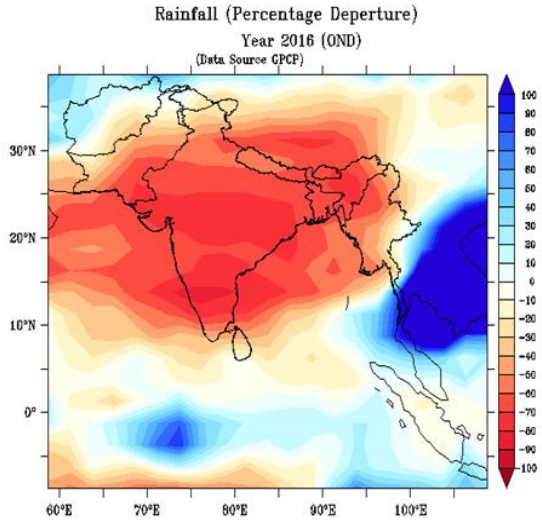


Fig.3. The observed rainfall anomaly (percentage departure) during the 2016 Northeast Monsoon Season over South Asia.

The consensus outlook map (**Fig.2**) for the northeast monsoon season (October to December) of 2016, developed in the ninth session of the South Asian Climate Outlook Forum (SASCOF-9) had indicated above normal rainfall over northwestern parts of Pakistan and some northeastern parts of the region, below normal rainfall over some areas of north and eastern parts of the region and normal rainfall over rest of the region. The observed rainfall anomaly map (**Fig.3**) shows below normal rainfall over most parts of the region except over southern parts of Myanmar & Maldives, where the season rainfall was normal to above normal. However, it is to be noted that the large below normal observed rainfall areas included climatologically significant rainfall areas of southeast Peninsular India, Sri Lanka and northern Maldives as indicated in the consensus forecast outlook.
