

# **Seasonal and sub-seasonal Prediction of Rainfall and Temperature for Vietnam and application for agriculture**

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# FORECASTS PROCEDURE at NCHMF

Collect data

Data Analysis

Forecasting methods :  
statistic and dynamic models

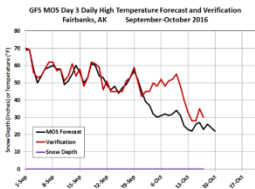
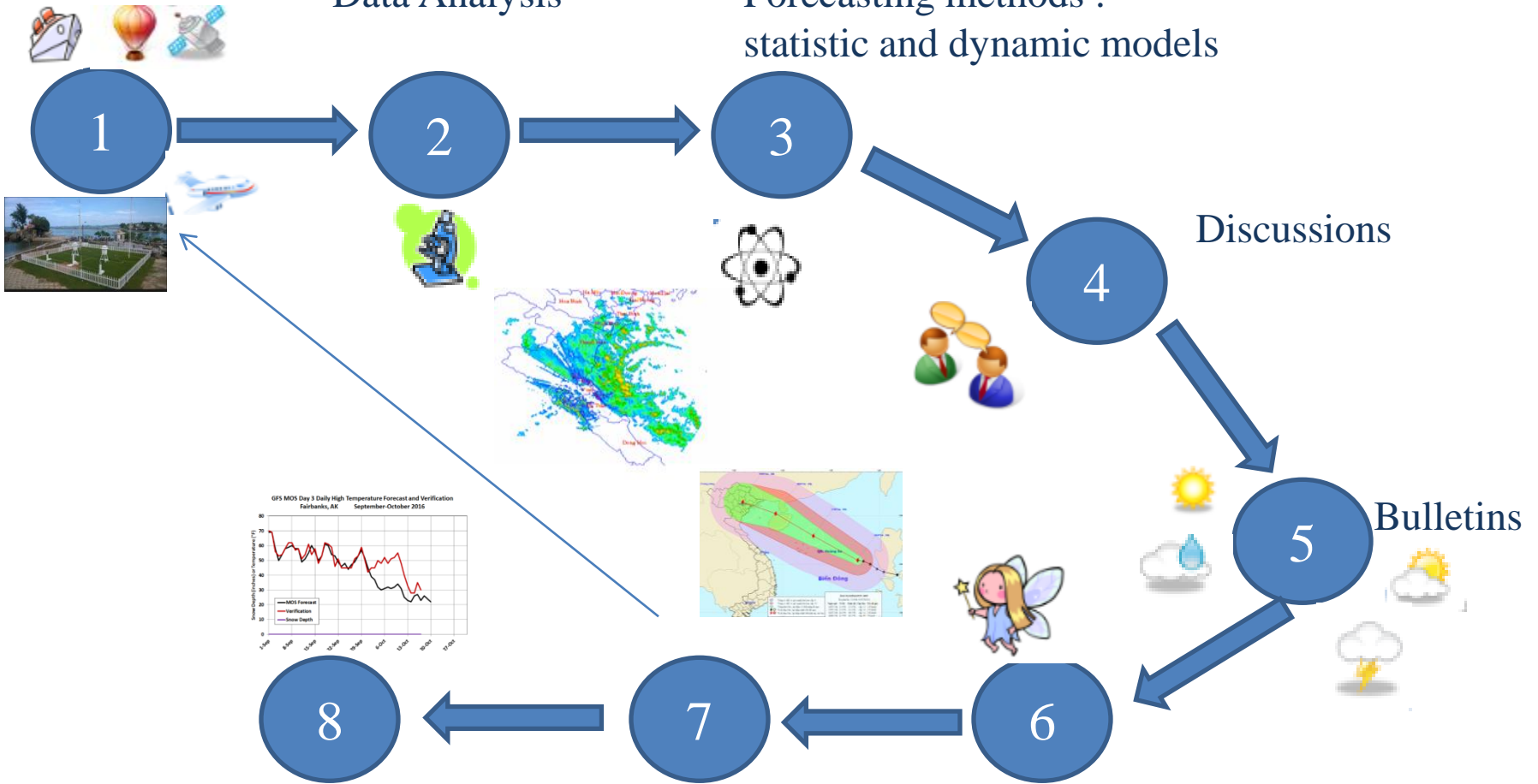
Discussions

Bulletins

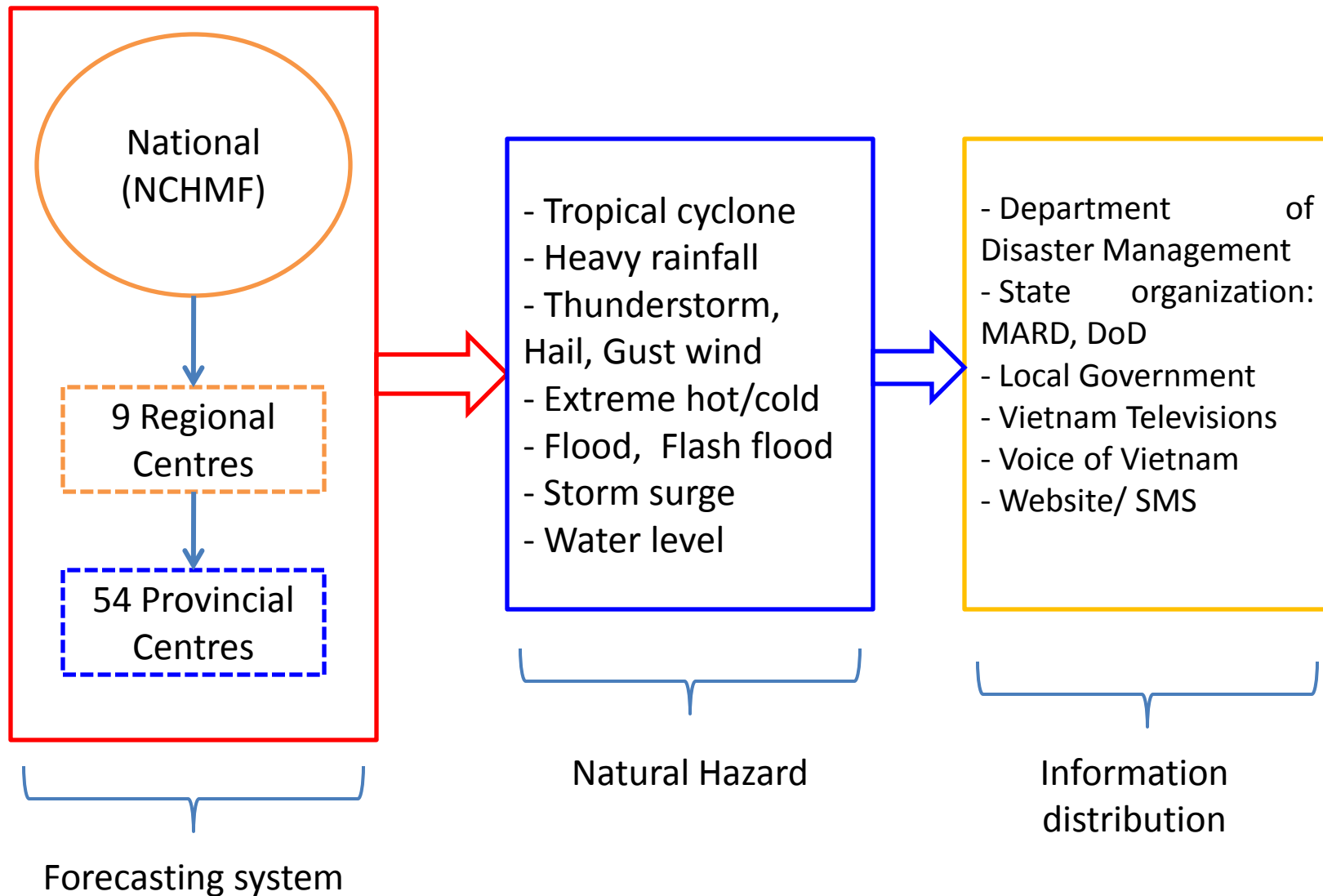
Disseminations

Evaluation of forecast  
performance

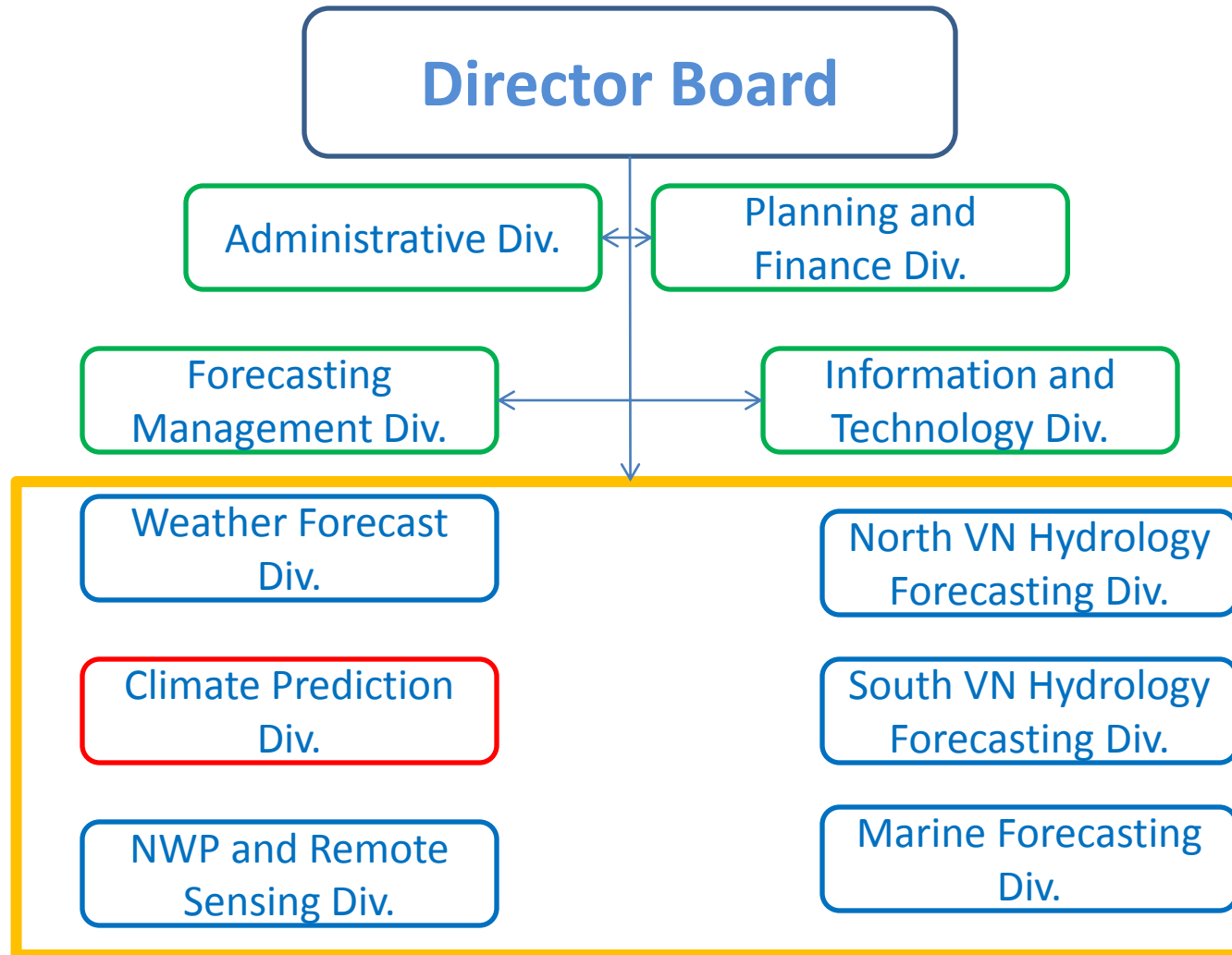
Extra bulletins



# Forecasting and Information Distribution System of Vietnam Hydro-Meteorological Services



# NCHMF Structure



# Some application of climate information in agriculture



Ready

- 1 year prediction
- Seasonal prediction
- + Monthly rainfall/anomaly
- + Monthly mean temperature



Set

- Monthly prediction
- + Weekly rainfall/anomaly
- + Mean, Min, Max temperature
- + Sunshine duration
- + Expected severe weather conditions



Go

- 10-day weather forecast
- + Total rainfall
- + Mean, Min, Max temperature
- + Sunshine duration
- + Humidity
- + Severe weather conditions: heavy rain, very hot, very cold, dry spell, flood...

# Climate prediction for Agriculture in Vietnam

- Providing climate information for Department of Plant Protection, MARD
  - Monthly weather review
  - Annual weather review
  - Monthly weather observation (countrywide)
  - 7-day weather forecast
  - Climatological characteristics

of climate variable: rainfall, temperature, humidity, sunshine duration

- Climate prediction: 2 times/year
- Meteorology related natural disasters such as: tropical cyclone, heavy rain, flood, storm surge...

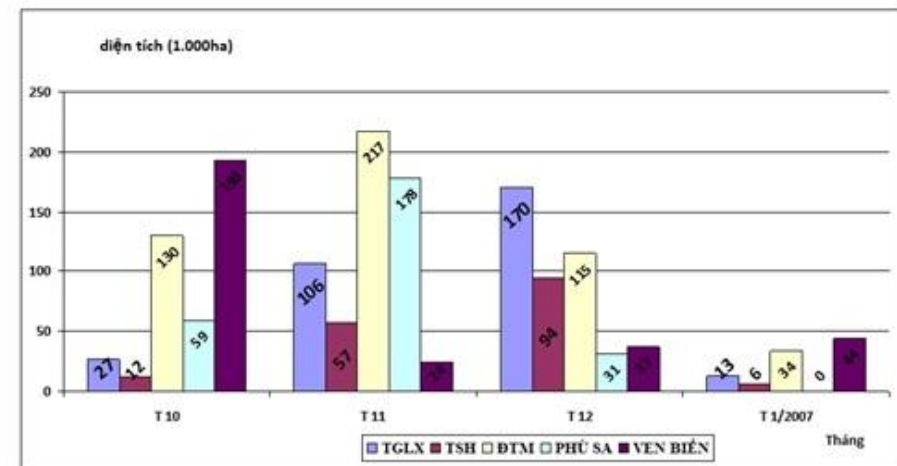
<b>BẢN TIN DỰ BÁO THỜI TIẾT VÀ CẤP CẢNH BÁO CHÁY RỪNG</b>																				
<b>(từ ngày 06/8- 12/8/2017)</b>																				
Khu vực	Ngày 06/8				Ngày 07/8				Ngày 08/8				Ngày 09/8				Ngày 10/8			
	Nhiệt cao nhất (°C)	Độ ẩm %	Nắng/Mưa	Cấp cảnh báo cháy rừng	Nhiệt cao nhất (°C)	Độ ẩm %	Nắng/Mưa	Cấp cảnh báo cháy rừng	Nhiệt cao nhất (°C)	Độ ẩm %	Nắng/Mưa	Cấp cảnh báo cháy rừng	Nhiệt cao nhất (°C)	Độ ẩm %	Nắng/Mưa	Cấp cảnh báo cháy rừng	Nhiệt cao nhất (°C)	Độ ẩm %	Nắng/Mưa	Cấp cảnh báo cháy rừng
<b>Tây Bắc</b>																				
Điện Biên	29	91	Mưa		30	89	Mưa		31	87	Nắng		31	88	Mưa		30	91	Mưa	
Lai Châu	29	96	Mưa		32	89	Mưa		32	90	Mưa		30	93	Mưa		32	91	Mưa	
Sơn La	28	89	Mưa		29	83	Nắng		29	82	Nắng		28	86	Mưa		28	91	Mưa	
Yên Bái	32	85	Mưa		34	84	Nắng		36	81	Nắng		36	82	Nắng		34	84	Nắng	
Hòa Bình	33	86	Mưa		36	78	Nắng		36	74	Nắng		36	75	Nắng		33	83	Nắng	
<b>Đông Bắc</b>																				
Phú Thọ	33	87	Mưa		35	81	Nắng		36	71	Nắng		34	78	Nắng		34	84	Nắng	
Lào Cai	34	89	Mưa		35	76	Mưa		37	73	Nắng		34	75	Mưa		35	81	Nắng	
Hà Giang	34	89	Mưa		36	83	Mưa		37	85	Mưa		35	87	Mưa		36	87	Mưa	
<b>Tuyên Quang</b>																				
Cao Bằng	32	85	Mưa		33	83	Nắng		34	83	Nắng		34	85	Mưa		33	86	Nắng	
Bắc Kạn	32	88	Mưa		34	84	Mưa		34	84	Nắng		32	91	Mưa		32	90	Mưa	
Bắc Kạn	31	93	Mưa		32	87	Mưa		33	85	Mưa		31	88	Mưa		31	93	Mưa	

# Climate prediction for Agriculture in Vietnam

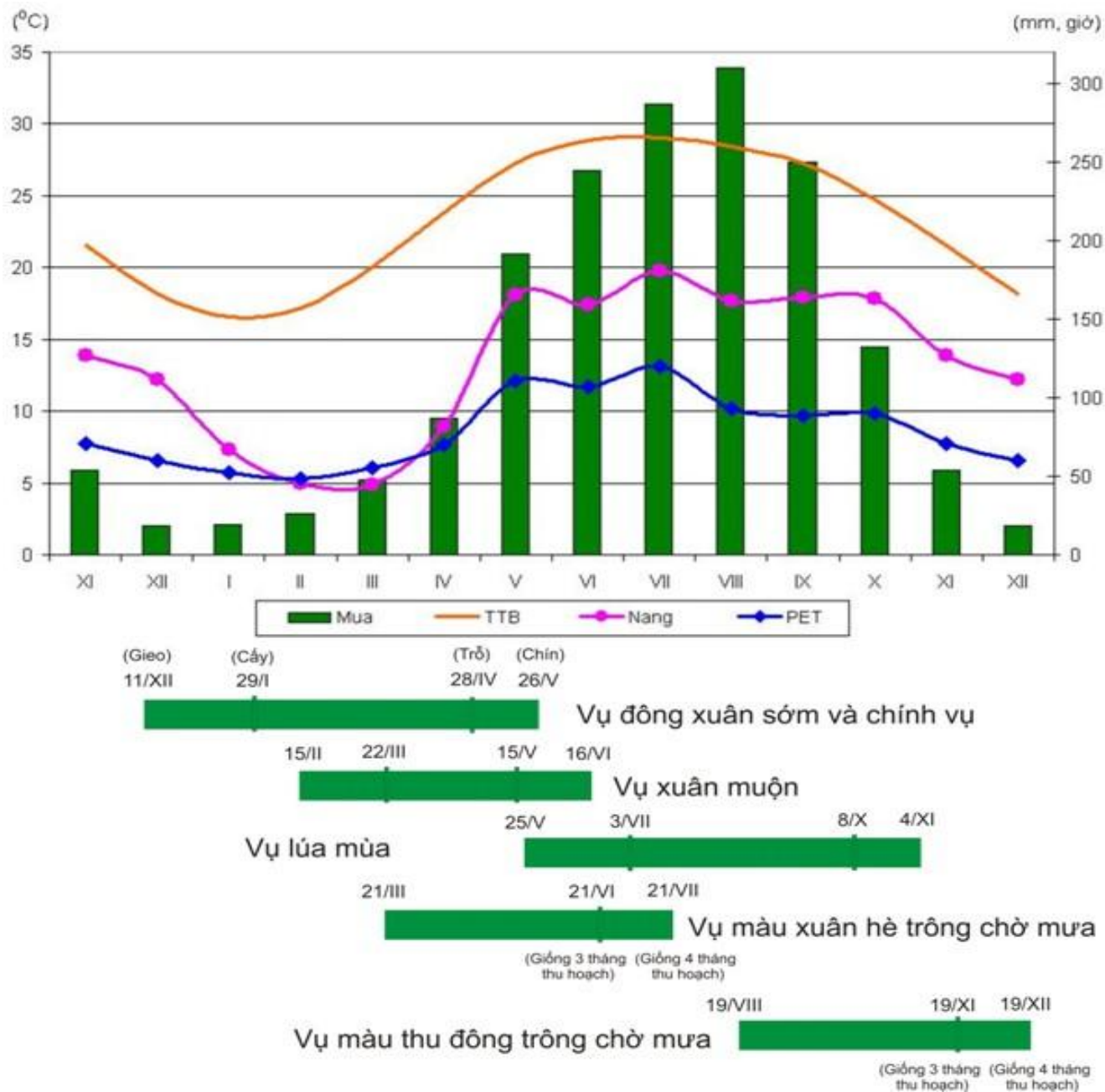
- Supporting decision makers at DPP and DFP
  - Plant quarantine treatment
  - Food safety management
  - Plant protection for national, regional and provincial levels
  - Crop planting and harvesting schedule
  - Climate change adaptation plan
  - Forest pest control
  - Forest fire control
  - Forest diseases control



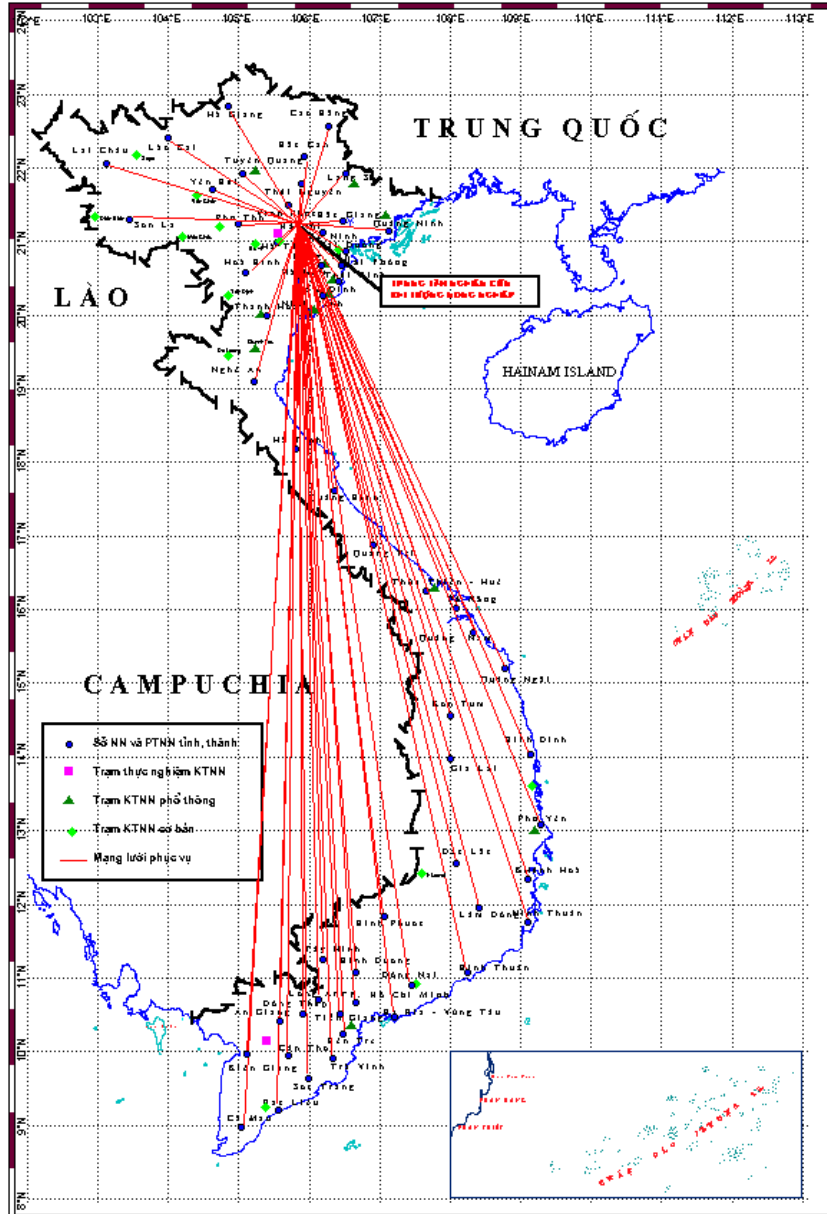
BIỂU ĐỒ XUỐNG GIÓNG LÚA VỤ ĐÔNG XUÂN 2016-2017 THEO VÙNG SINH THÁI



# Crop structure and timing based on climatology information



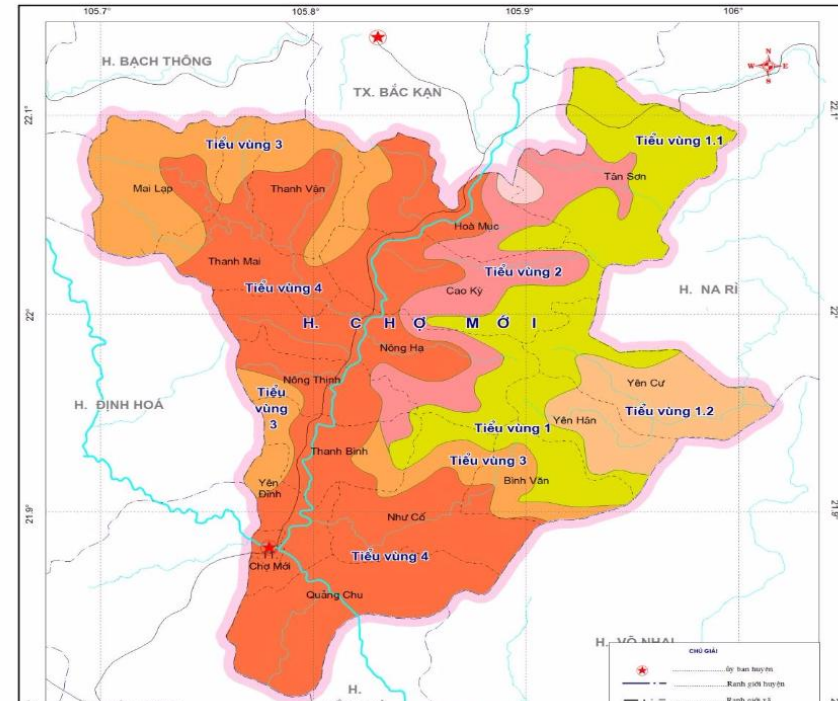
# MẠNG LƯỚI QUAN TRẮC PHỤC VỤ KHÍ TƯỢNG NÔNG NGHIỆP



# Project: HOW TO USE AGRO-CLIMATE INFORMATION IN THE DEVELOPMENT OF CROP BASED CLIMATE RESILIENT LIVELIHOODS

The key findings of the study suggest the process to identify CCRL options include: (1) analyzing climate resources in the targeted locality (2) Identify the appropriate crop structure based on that climate resources (3) Analyzing the climate change impact to that crop structure (4) Identify specific crops which adapt to local condition and climate (5) Identify potential adjustment of the technical skills to enhance adaptive capacity to climate change and risks

SƠ ĐỒ PHÂN VÙNG KHÍ TƯỢNG NÔNG NGHIỆP HUYỆN CHỢ MỚI



Vùng	Ký hiệu tiểu vùng	Tiểu vùng	Tổng nhiệt (oC)	Tb (oC)	TminTb (oC)	Lượng mưa (mm)	Khả năng gieo trồng
"T1" Vùng nóng ít	Tiểu vùng 1.1	"T1A11": Nóng ít, có mùa mưa và mùa khô	< 7000	< 20	0 - 2	< 1500	Một vụ lúa nương, các cây công nghiệp chịu lạnh, cây được liệu, rau giống... cần có hệ thống tưới tiêu và hồ chứa nước cỡ nhỏ
	Tiểu vùng 1.2	"T1A12": Nóng vừa, có mùa mưa và mùa khô	7000 - 7500	20 - 21	2 - 3	< 1500	Hai vụ lúa ngắn ngày hoặc 1 vụ lúa mùa, rau màu vụ đông xuân, ngô, khoai, đậu tương, thuốc lá, cây ăn quả, cây công nghiệp chịu lạnh, cần có hệ thống tưới tiêu, hồ chứa nước tầm trung
"T2" Vùng nóng vừa	Tiểu vùng 2	"T2A1": Nóng vừa, có mùa mưa và mùa khô	7500 - 8000	21 - 22	2 - 4	1500 - 2000	
	Tiểu vùng 3	"T2A2": Nóng vừa, có mùa mưa và mùa khô vừa					
"T2" Vùng nóng	Tiểu vùng 4	"T3A2": Vùng nóng, có mùa mưa và mùa khô vừa	> 8000	> 22	4 - 6	1500 - 2000	Hai vụ lúa và một vụ màu (khoai tây, khoai lang, rau màu vụ đông xuân chịu lạnh...). cây công nghiệp nhiệt đới. Cần có hệ thống nước cỡ lớn.

# Procedure to integrate Climate and Agriculture information

Step 1

- **Define sub-regioned climate conditions**

Step 2

- **Defining plant structure for the local climate condition**

Step 3

- **Analysing the impact of climate change to plant structure in future**

Step 4

- **Defining local plant that suitable for changing climate**

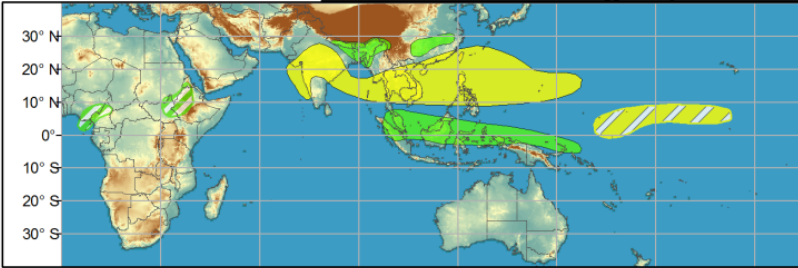
Step 5

- **Proposing solution for livelihoods and agriculture**

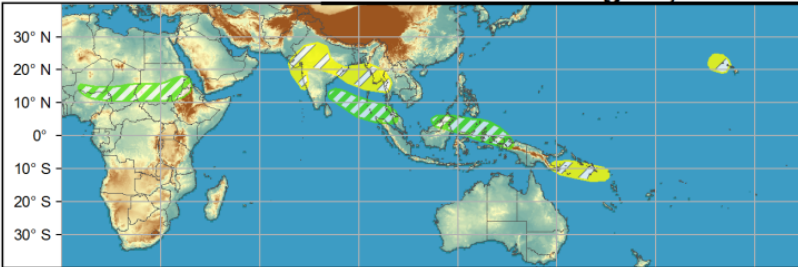
# Seasonal Outlook for Vietnam



# Global Tropics Hazards and Benefits Outlook - Week 1 - Valid: Aug 09, 2017 - A



# Week 2 - Valid: Aug 16, 2017 - A



### Confidence

High Moderate

- Tropical Cyclone Formation** ■ ▨ Development of a tropical cyclone (tropical depression or tropical storm)
- Above-average rainfall** ■ ▨ Weekly total rainfall in the upper third of the long-term (1979-2003) distribution
- Below-average rainfall** ■ ▨ Weekly total rainfall in the lower third of the long-term (1979-2003) distribution
- Above-normal temperatures** ■ ▨ 7-day mean temperatures in the upper third of the long-term (1979-2003) distribution
- Below-normal temperatures** ■ ▨ 7-day mean temperatures in the lower third of the long-term (1979-2003) distribution

Product is updated once per week, except from 6/1 - 11/30 for the region from 120E to 0 integrated over a 7-day period for US interests only. Consult your local responsible for more information.



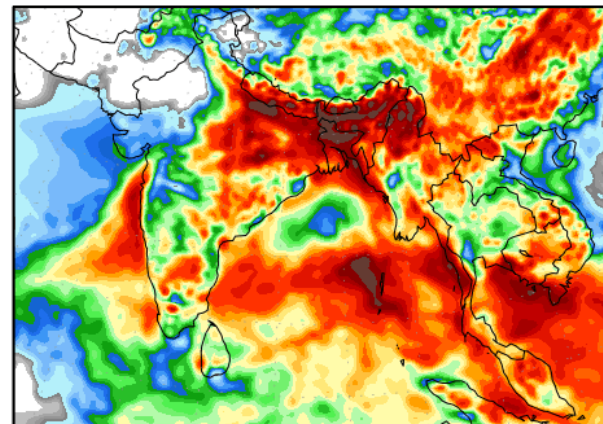
## Precipitation Forecasts

Precipitation (mm) during the period:

Thu, 10 AUG 2017 at 12Z

-to-

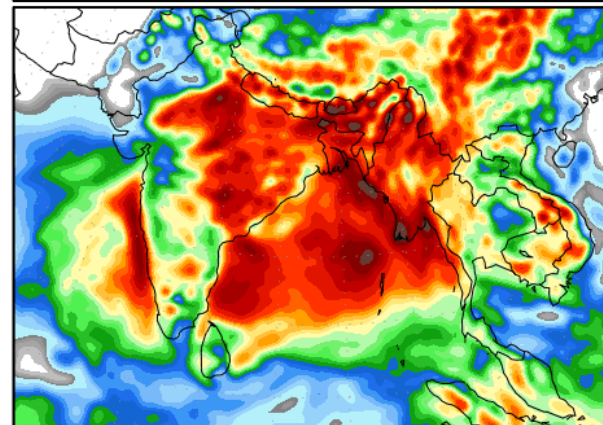
Fri, 18 AUG 2017 at 12Z



Fri, 18 AUG 2017 at 12Z

-to-

Sat, 26 AUG 2017 at 12Z

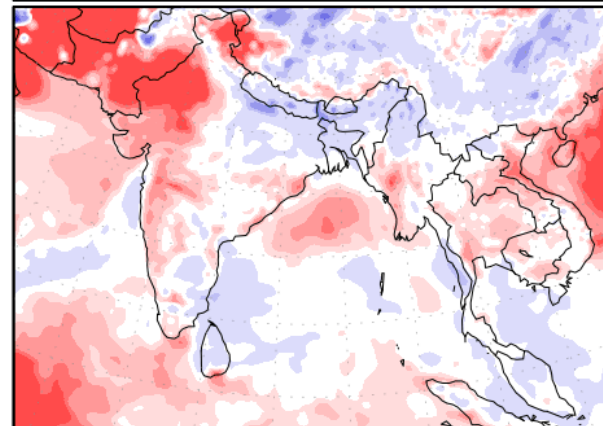
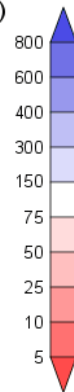


Precipitation (% of normal) during the first period:

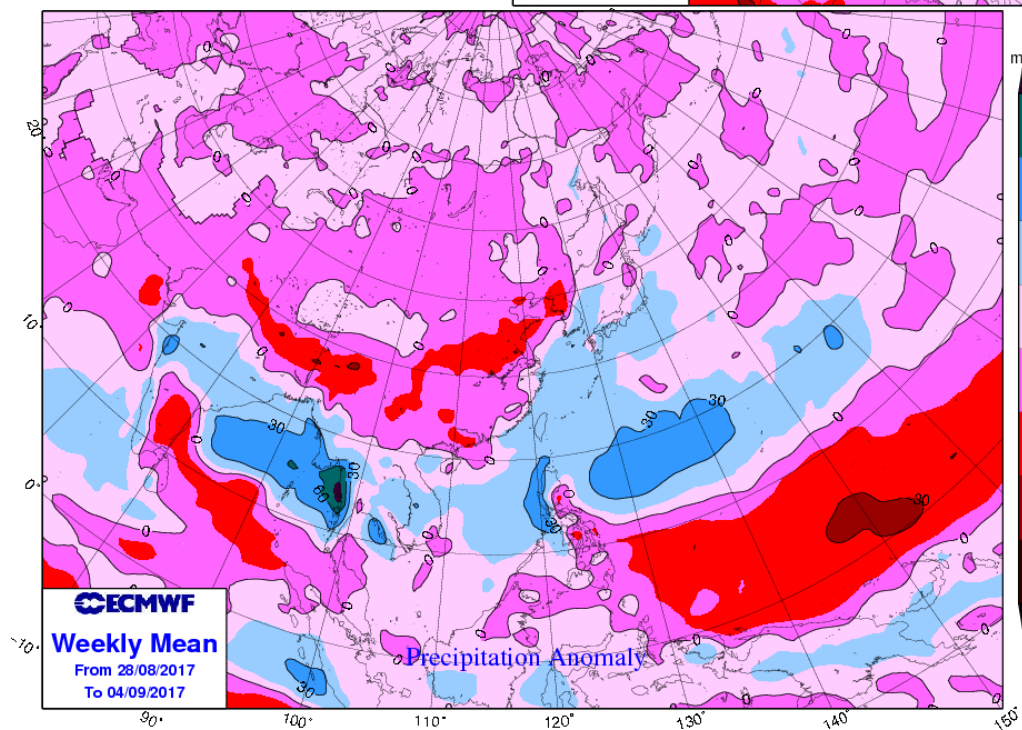
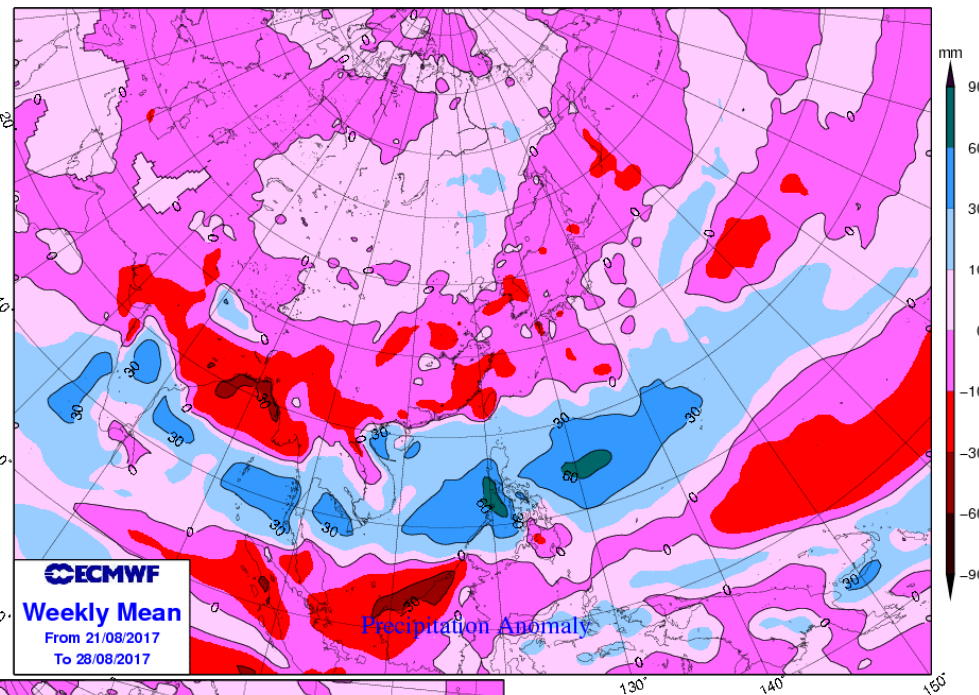
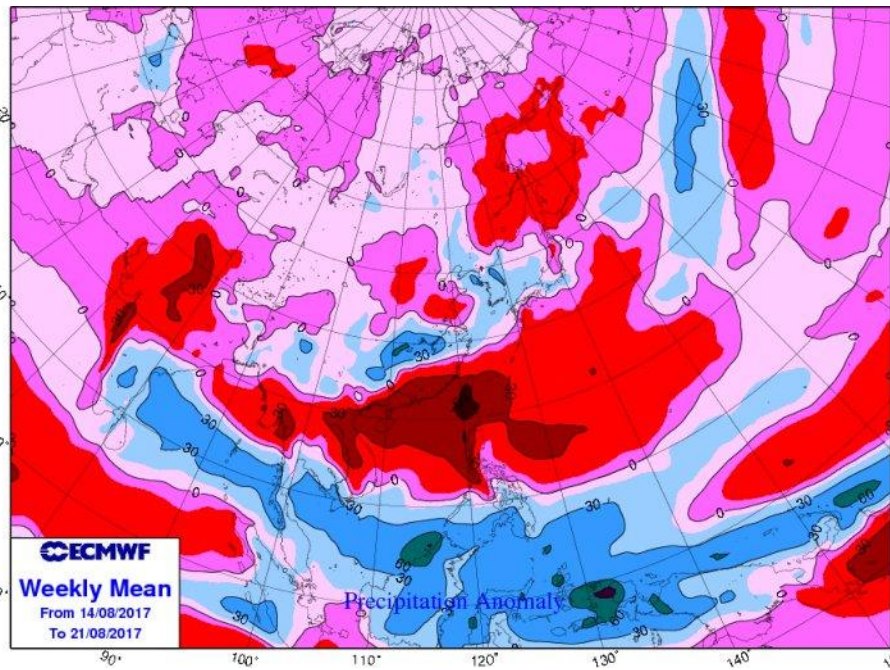
Thu, 10 AUG 2017 at 12Z

-to-

Fri, 18 AUG 2017 at 12Z



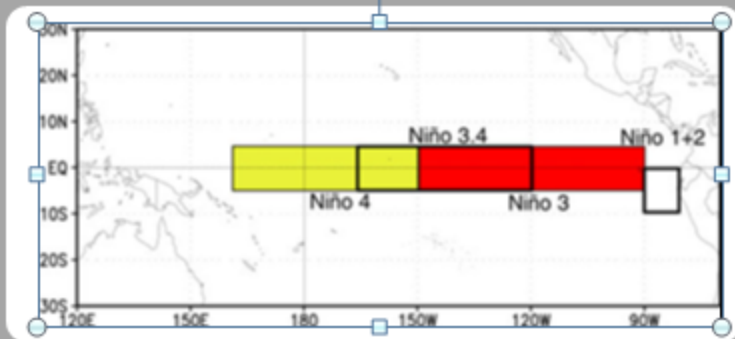
Precipitation forecasts from the National Centers for Environmental Prediction. Normal rainfall derived from Xie-Arkin (CMAP) Monthly Climatology for 1979-2003. Forecast Initialization Time: 12Z10AUG2017



# ENSO OBSERVATION

The latest weekly SST departures are:

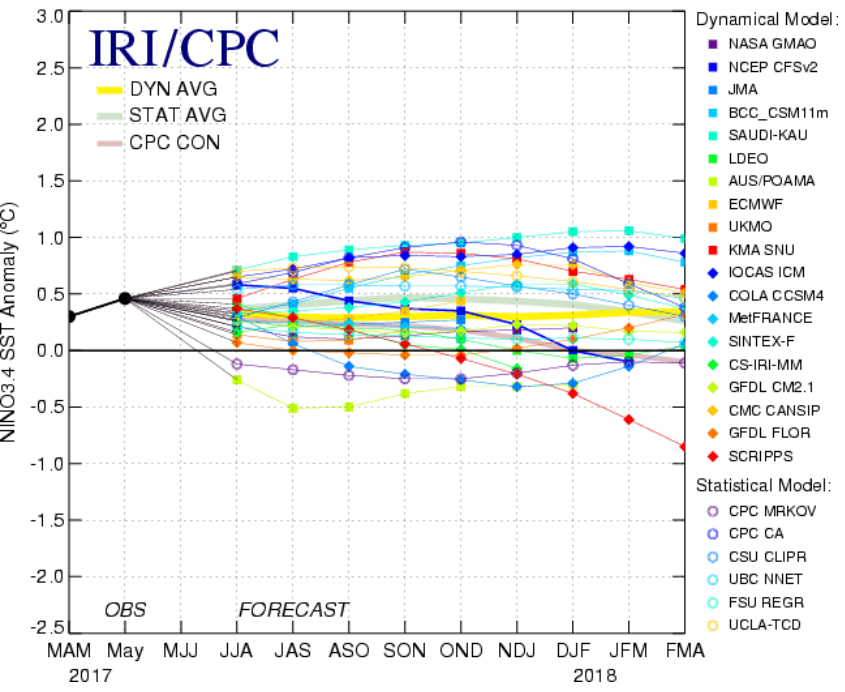
Niño 4            0.2°C  
Niño 3.4        0.2°C  
Niño 3            0.1°C  
Niño 1+2        -0.1°C



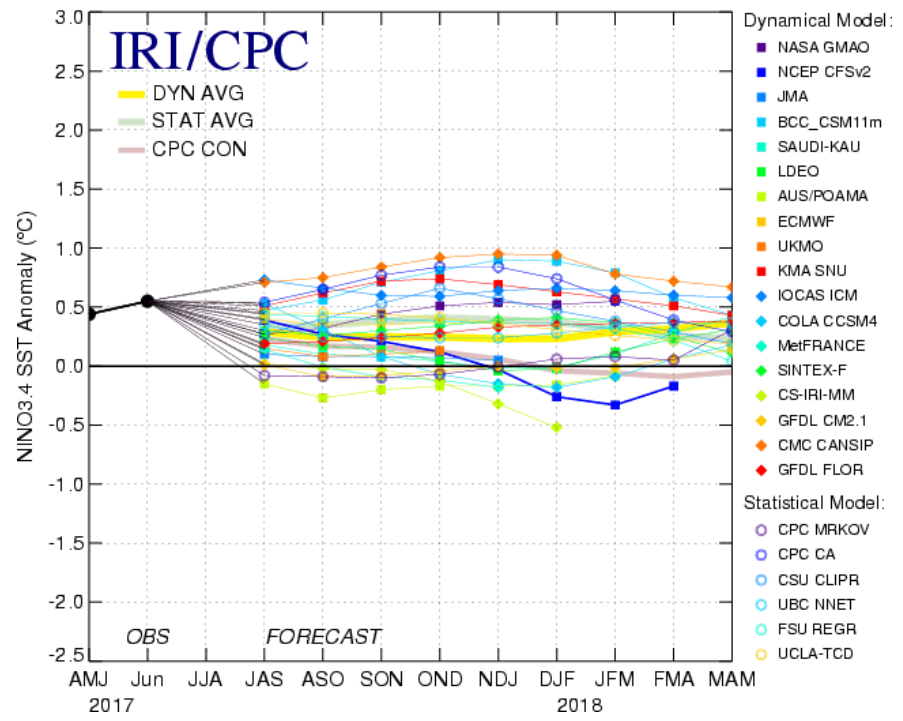
	to 9/7/2017	to 16/7/2017	to 23/7/2017	to 30/7/2017
NINO3	+0.4 °C	+0.4 °C	+0.3 °C	+0.3 °C
NINO3.4	+0.6 °C	+0.5 °C	+0.4 °C	+0.2 °C
NINO4	+0.6 °C	+0.5 °C	+0.4 °C	+0.4 °C

# ENSO

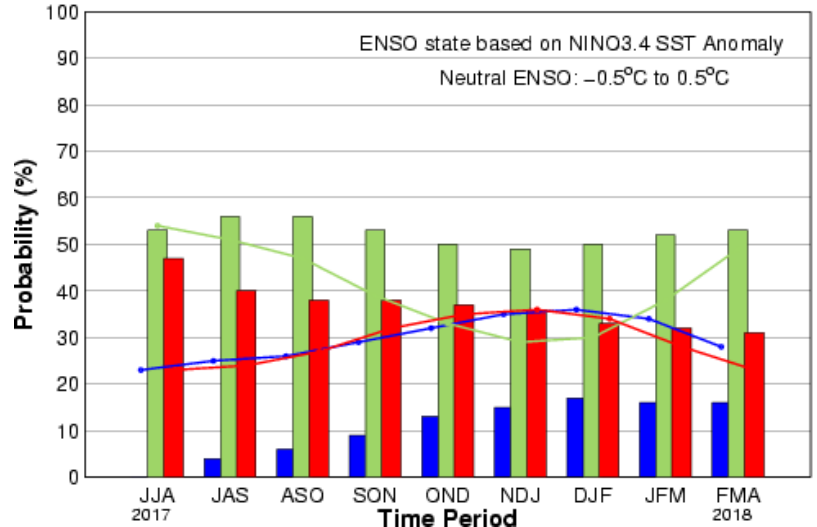
Mid-Jun 2017 Plume of Model ENSO Predictions



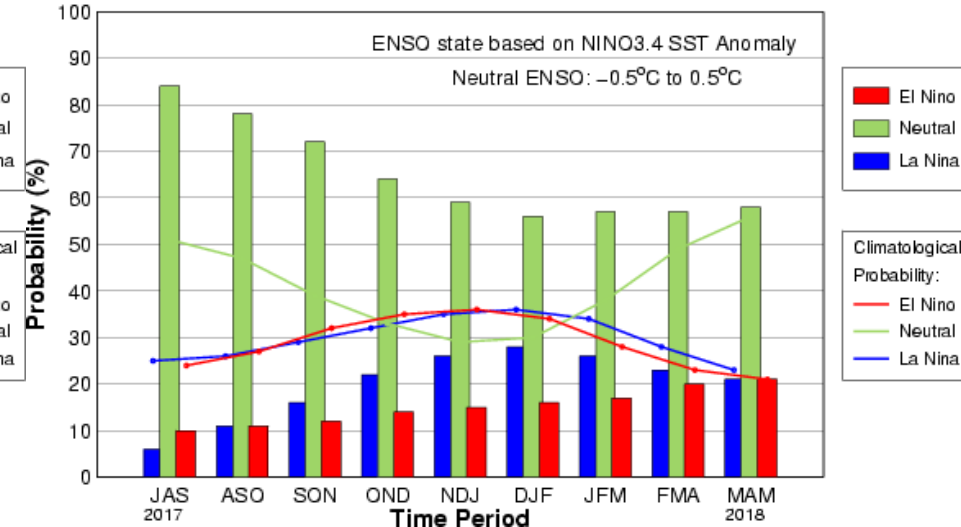
Mid-Jul 2017 Plume of Model ENSO Predictions



Early-Jul CPC/IRI Official Probabilistic ENSO Forecast



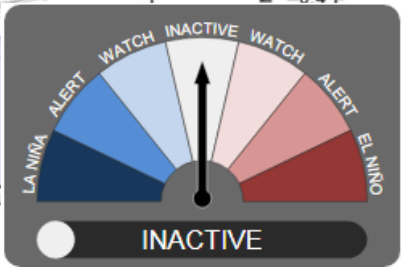
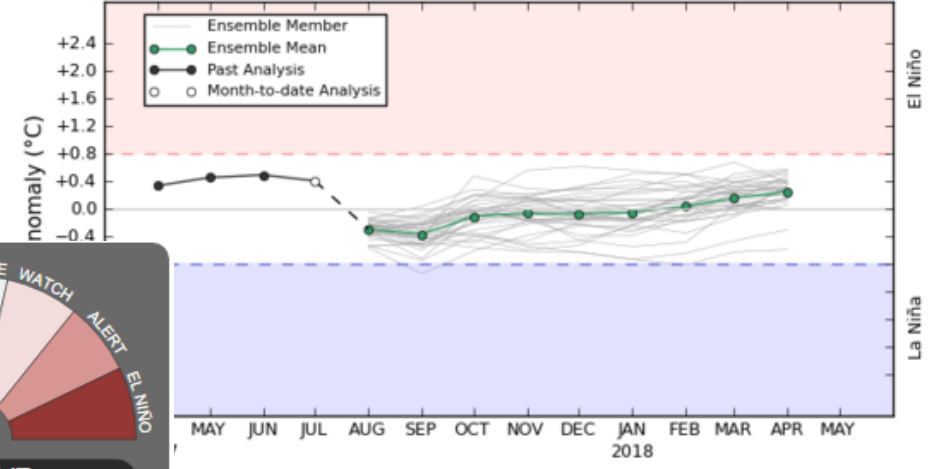
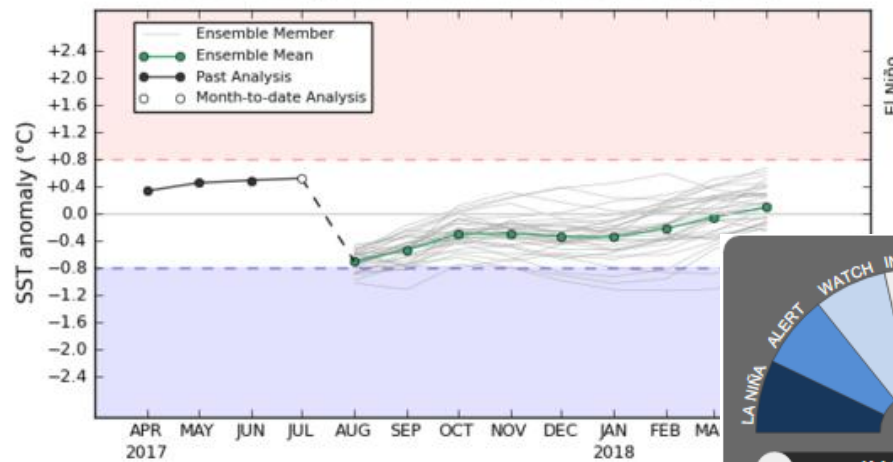
Early-Aug CPC/IRI Official Probabilistic ENSO Forecast



# ENSO

POAMA monthly mean NINO34 - Forecast Start: 16 JUL 2017

POAMA monthly mean NINO34 - Forecast Start: 30 JUL 2017



Last Updated: **10 August 2017**

( Next update will be on 11 September 2017 )

- **ENSO-neutral conditions persisted in July.**
- **It is likely (60%) that ENSO-neutral conditions will persist until boreal winter.**

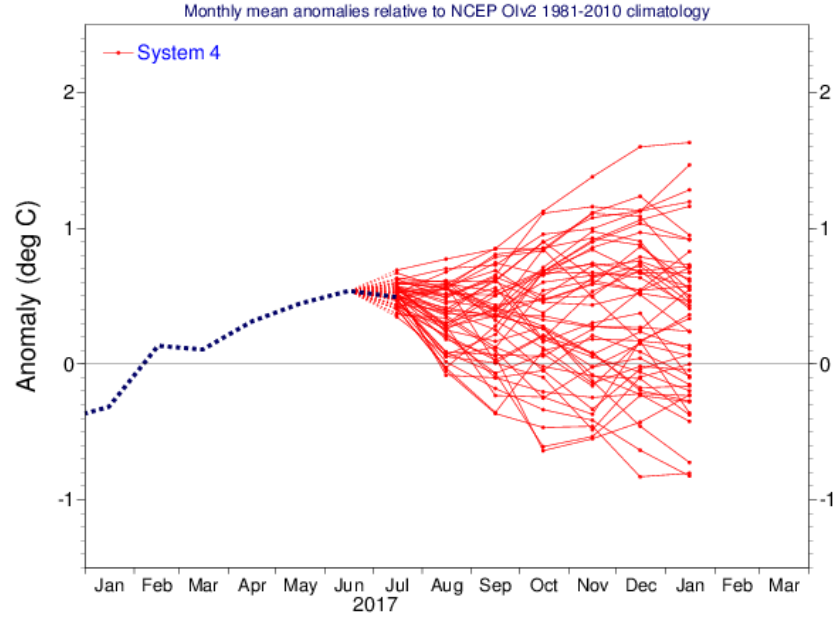
YEAR	MONTH	mean period	El Niño (%)	ENSO neutral (%)	La Niña (%)
2017	MAY	MAR2017-JUL2017	0	100	0
	JUN	APR2017-AUG2017	0	100	0
	JUL	MAY2017-SEP2017	0	100	0
	AUG	JUN2017-OCT2017	10	80	10
	SEP	JUL2017-NOV2017	10	80	10
	OCT	AUG2017-DEC2017	20	60	20
	NOV	SEP2017-JAN2018	20	60	20

YEAR	MONTH	mean period	El Niño (%)	ENSO neutral (%)	La Niña (%)
2017	JUN	APR2017-AUG2017	0	100	0
	JUL	MAY2017-SEP2017	0	100	0
	AUG	JUN2017-OCT2017	10	80	10
	SEP	JUL2017-NOV2017	10	70	20
	OCT	AUG2017-DEC2017	10	60	30
	NOV	SEP2017-JAN2018	10	60	30
	DEC	OCT2017-FEB2018	10	60	30

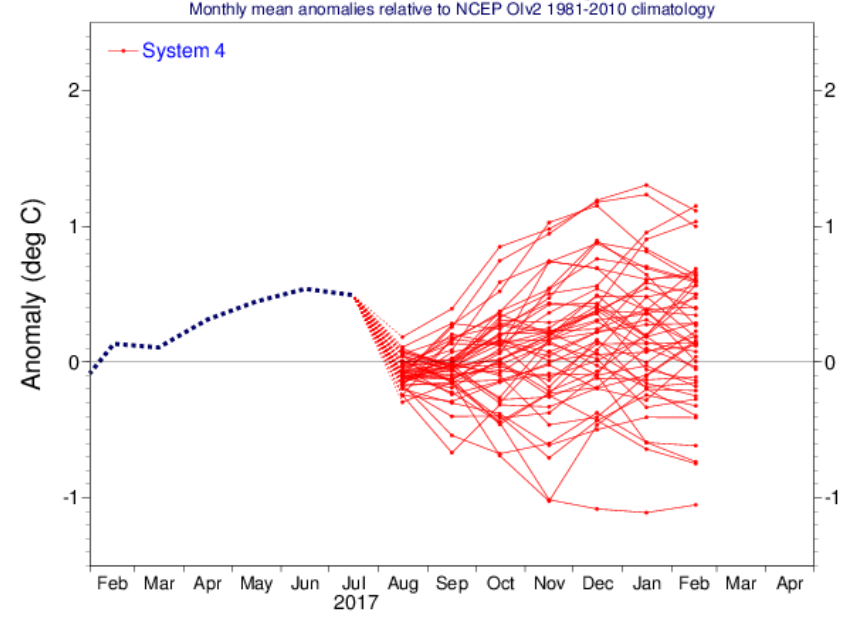
■ El Niño   ■ ENSO neutral   ■ La Niña

# ENSO

NINO3.4 SST anomaly plume  
ECMWF forecast from 1 Jul 2017



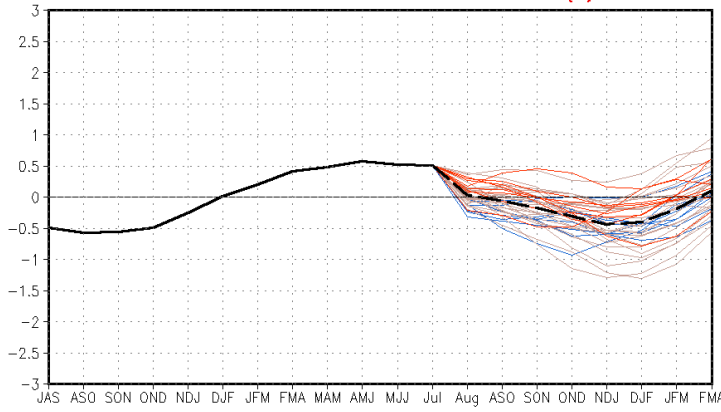
NINO3.4 SST anomaly plume  
ECMWF forecast from 1 Aug 2017








 NWS/NCEP/CPC  
Last update: Tue Jul 10 2017  
Initial conditions: 8Jul2017-17Jul2017

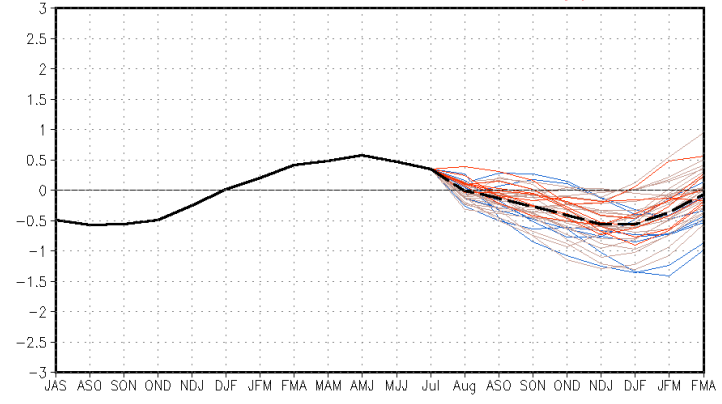
  NWS/NCEP/CPC  
Last update: Thu Aug 10 2017  
Initial conditions: 11Jul2017-20Jul2017






CFSv2 forecast Nino3.4 SST anomalies (K)



-  Latest 8 forecast members
-  Earliest 8 forecast members
-  Other forecast members
-  Forecast ensemble mean
-  NCDC daily analysis

CFSv2 forecast Nino3.4 SST anomalies (K)

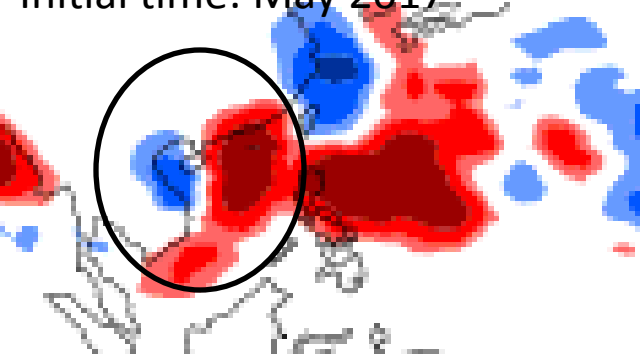


-  Latest 8 forecast members
-  Earliest 8 forecast members
-  Other forecast members
-  Forecast ensemble mean
-  NCDC daily analysis

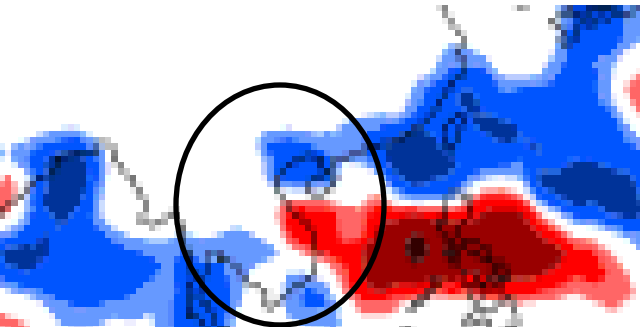
# Tropical cyclone prediction

## Seasonal TC density guidance from ECMWF

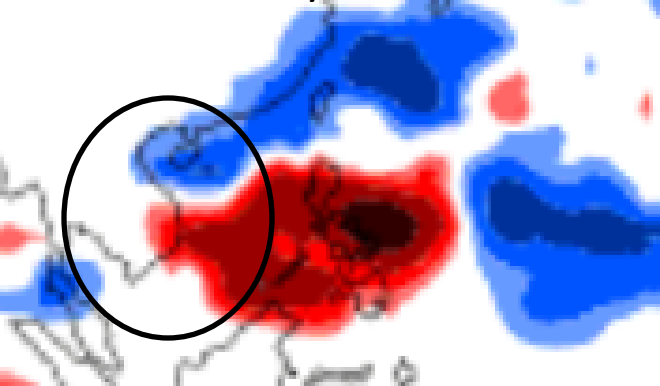
Initial time: May 2017



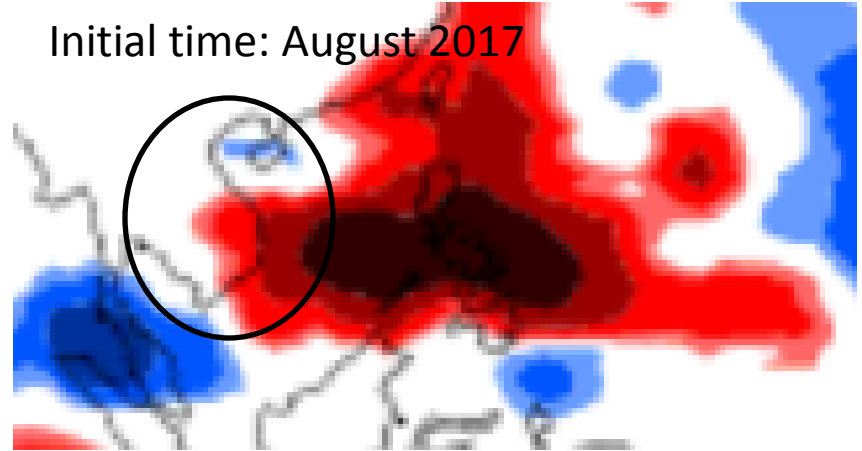
Initial time: June 2017



Initial time: July 2017



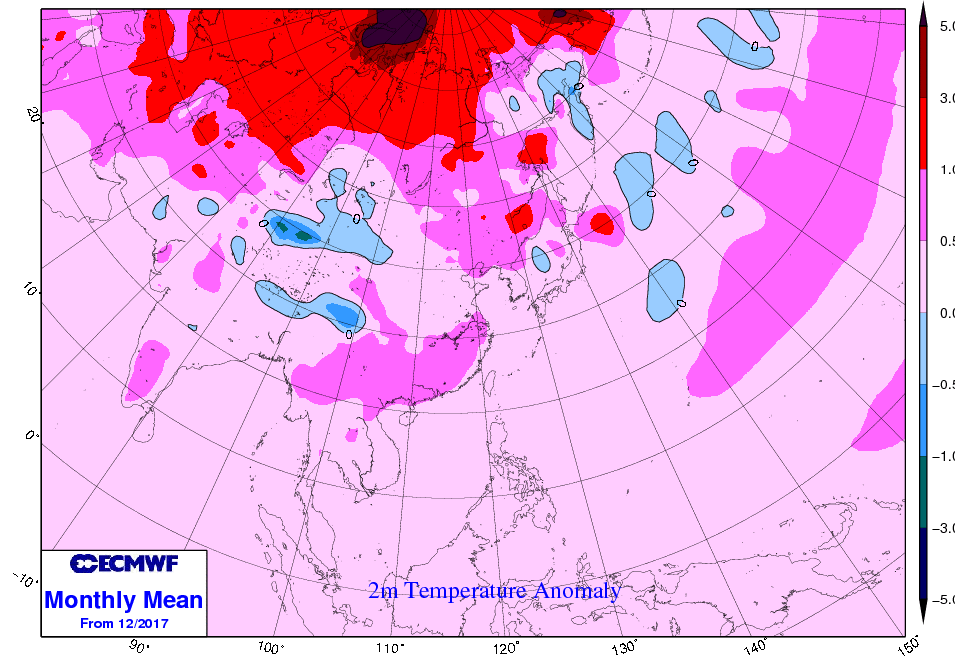
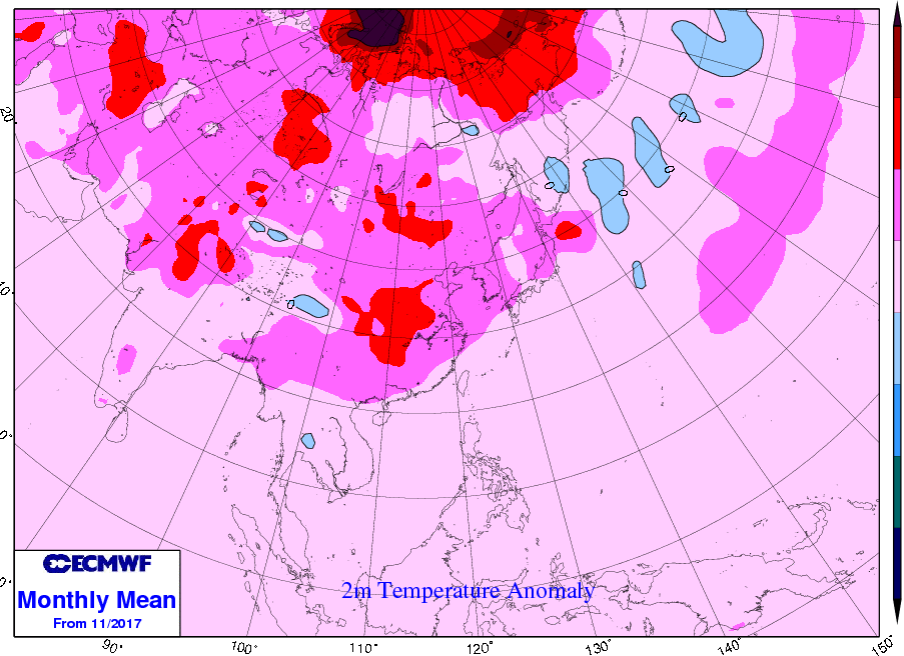
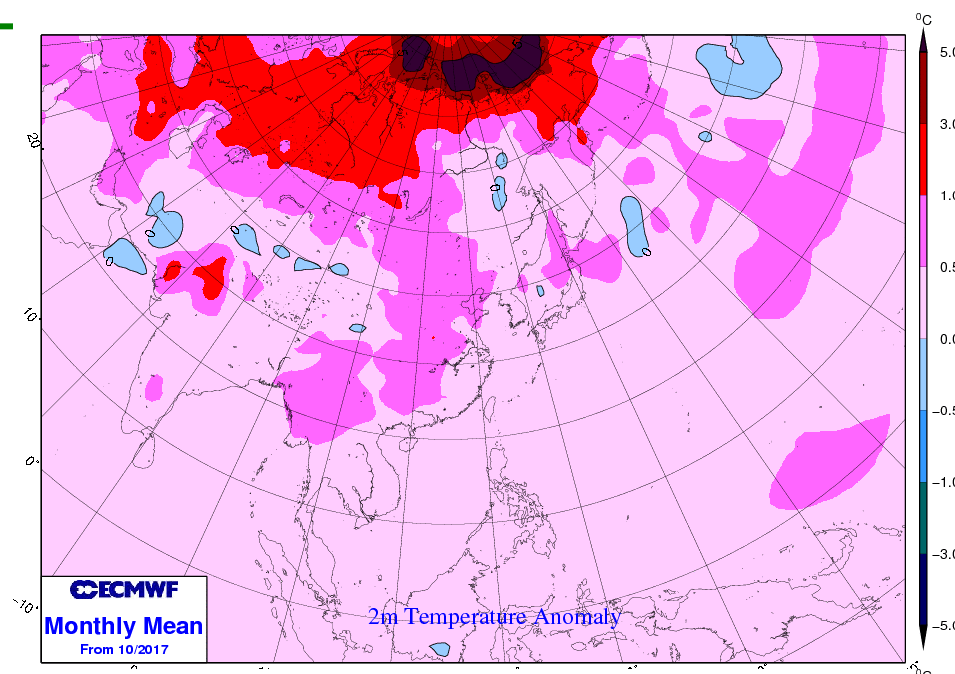
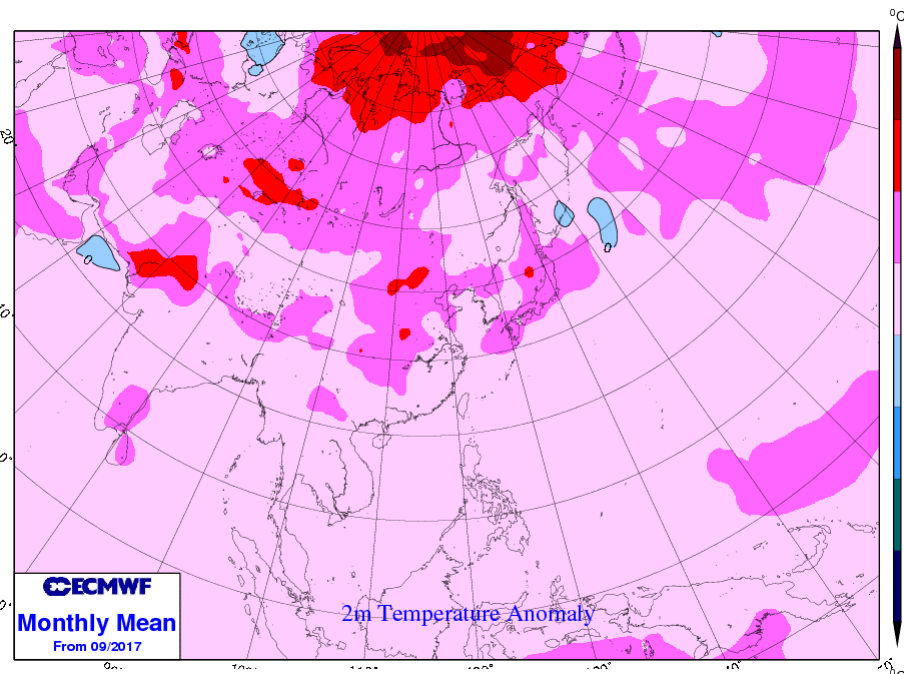
Initial time: August 2017



More tropical cyclones is expected in Bien Dong (South China Sea), higher density of tropical cyclone is in the southern part.

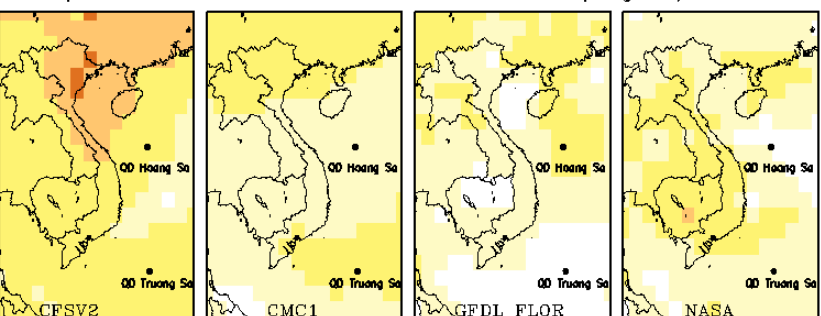
More landfalling TC by the end of the season, more likely to landfall in Central part of Vietnam.

# Temperature anomaly (ECMWF)

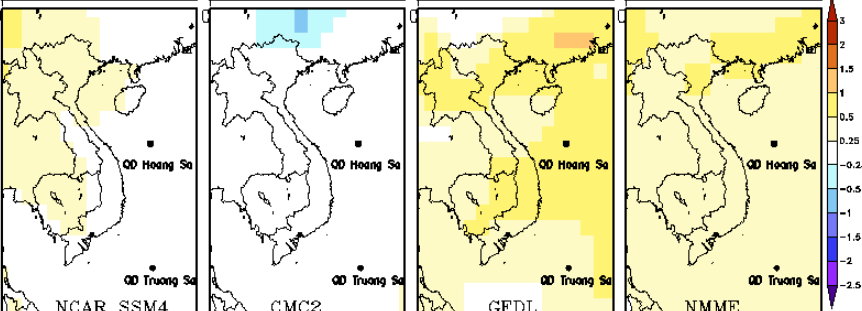
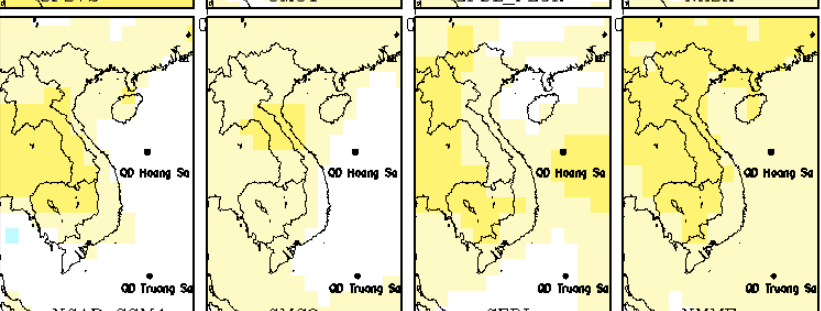
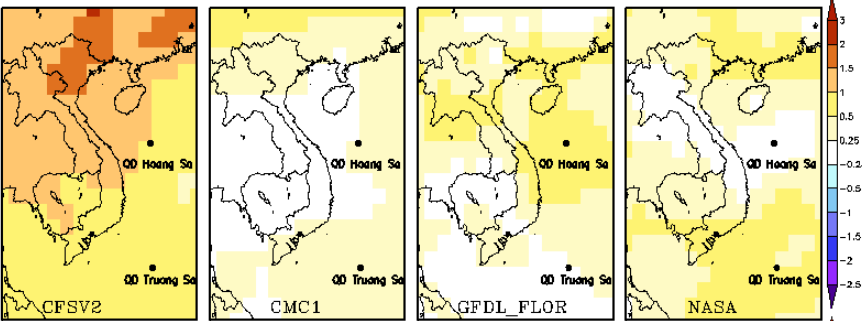


# Temperature anomaly (CPC-NCEP)

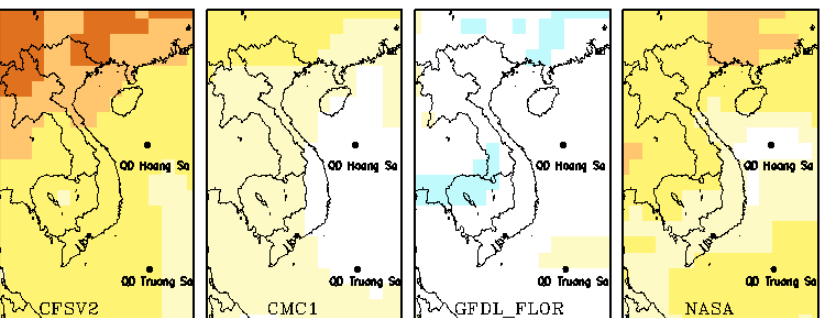
Temperature 2m Anomalies 00Z01SEP2017(Degree)



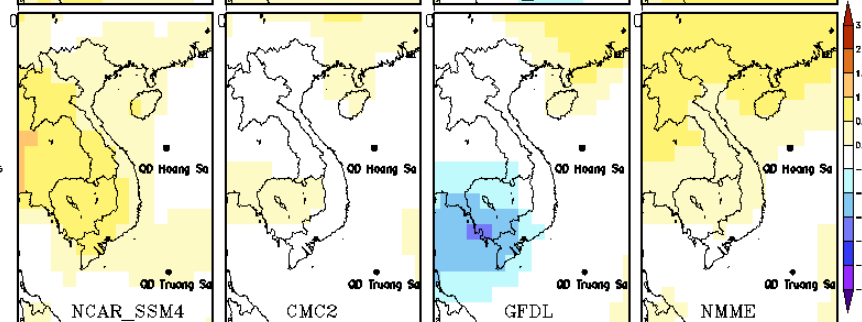
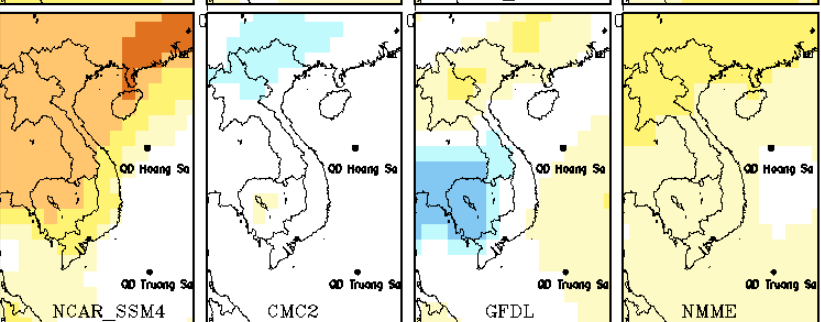
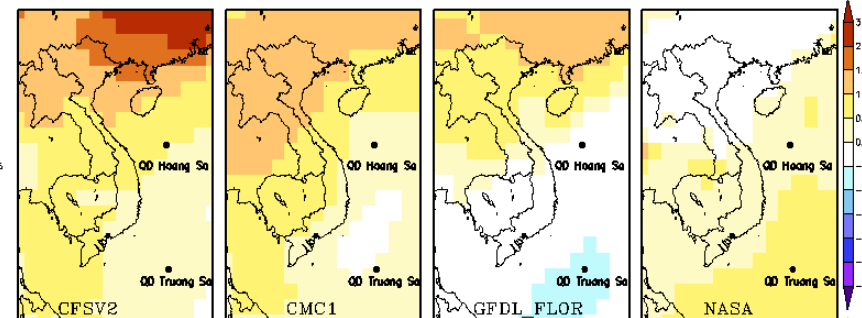
Temperature 2m Anomalies 00Z01OCT2017(Degree)



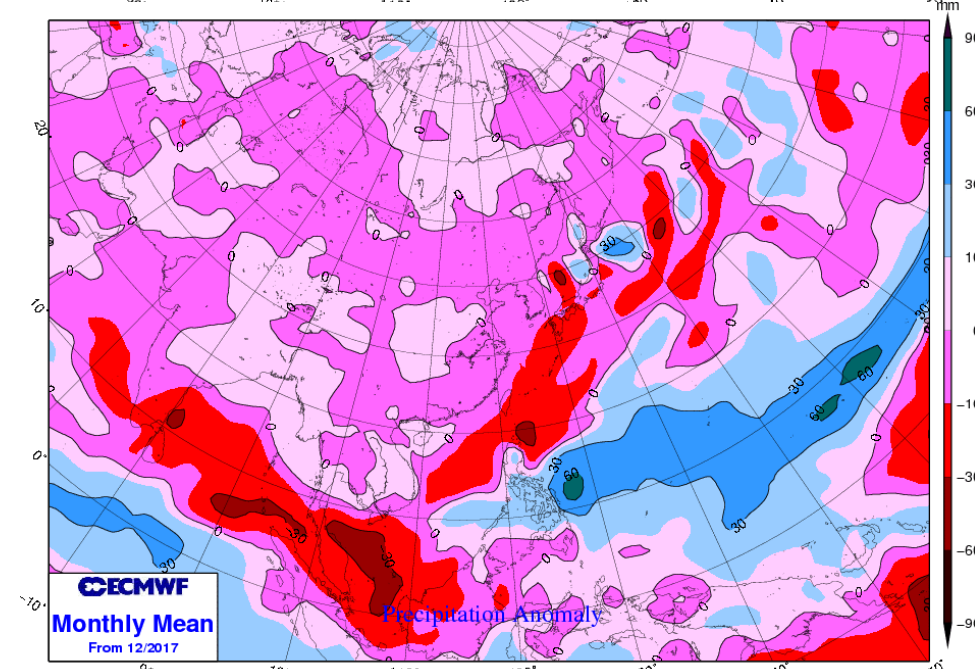
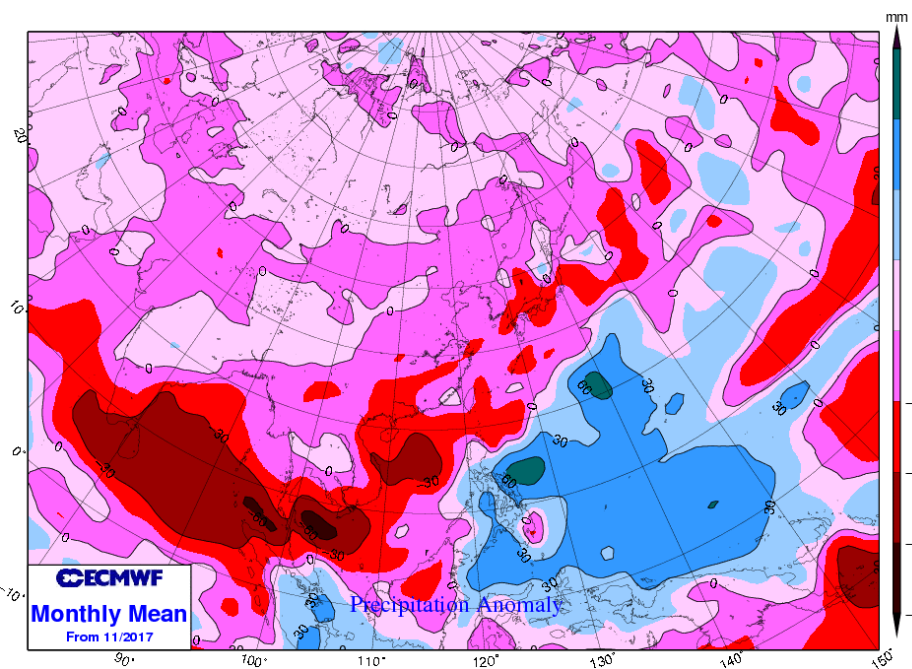
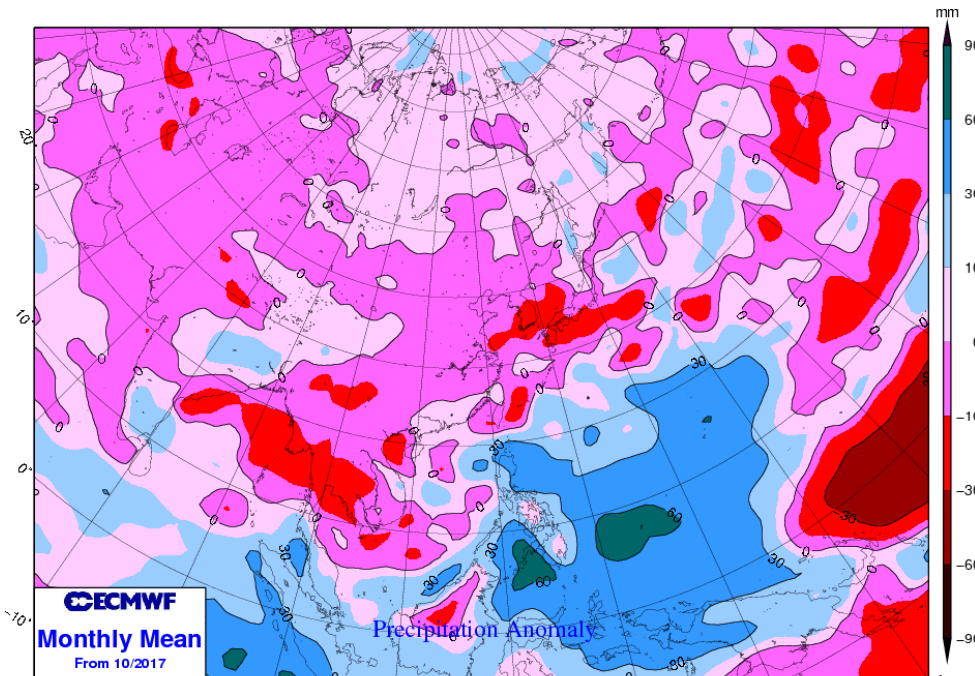
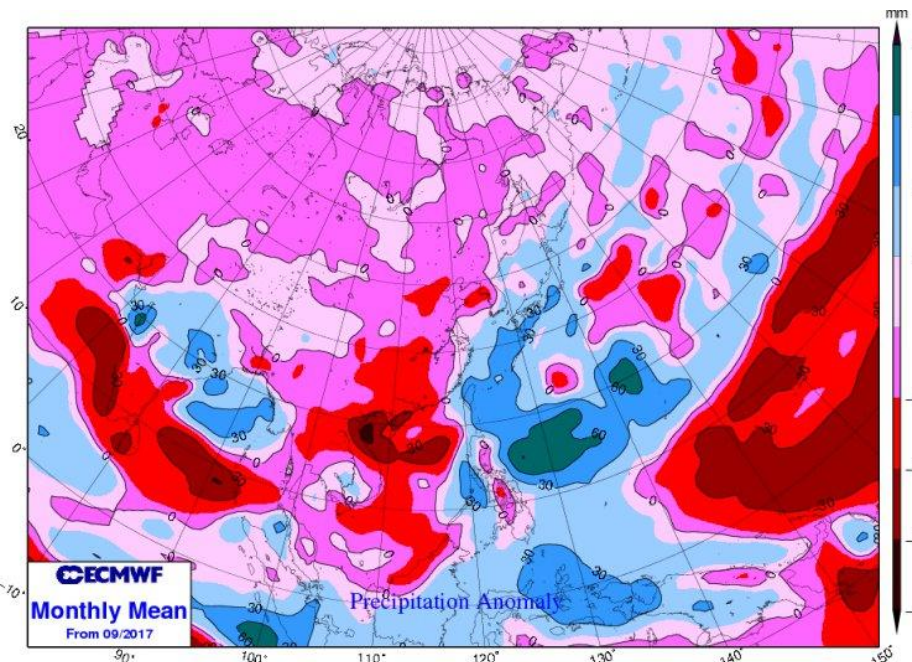
Temperature 2m Anomalies 00Z01NOV2017(Degree)



Temperature 2m Anomalies 00Z01DEC2017(Degree)

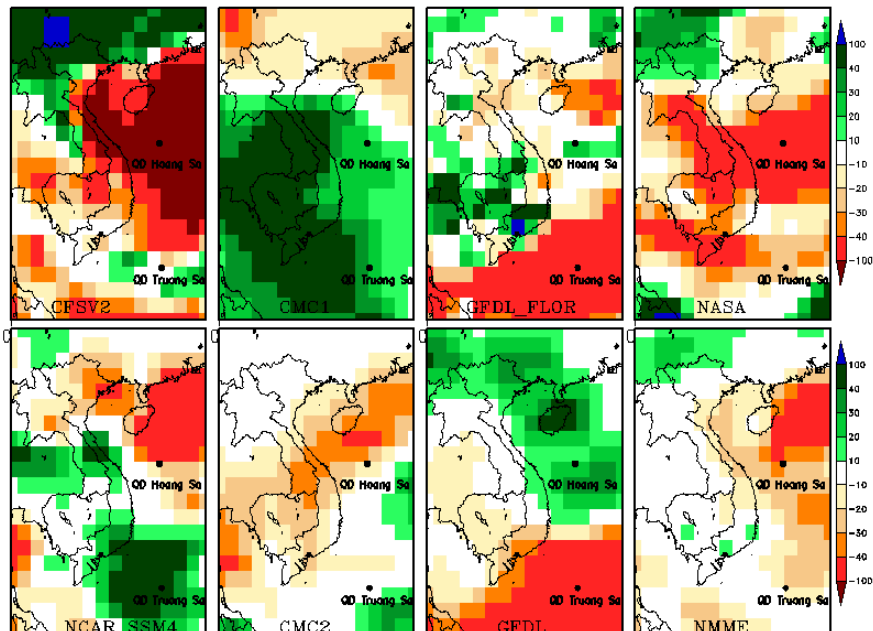


# Rainfall anomaly (ECMWF)

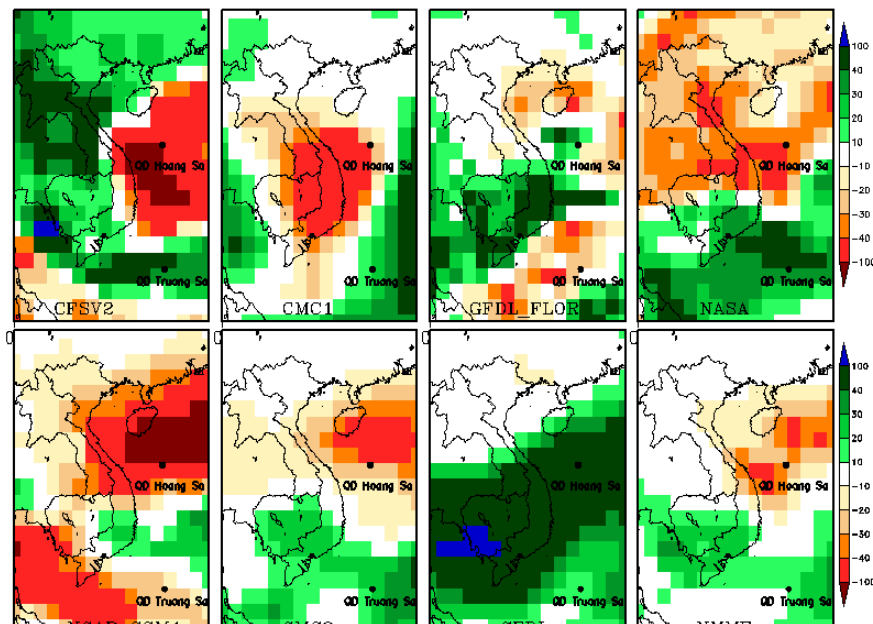


# Rainfall anomaly (CPC – NCEP)

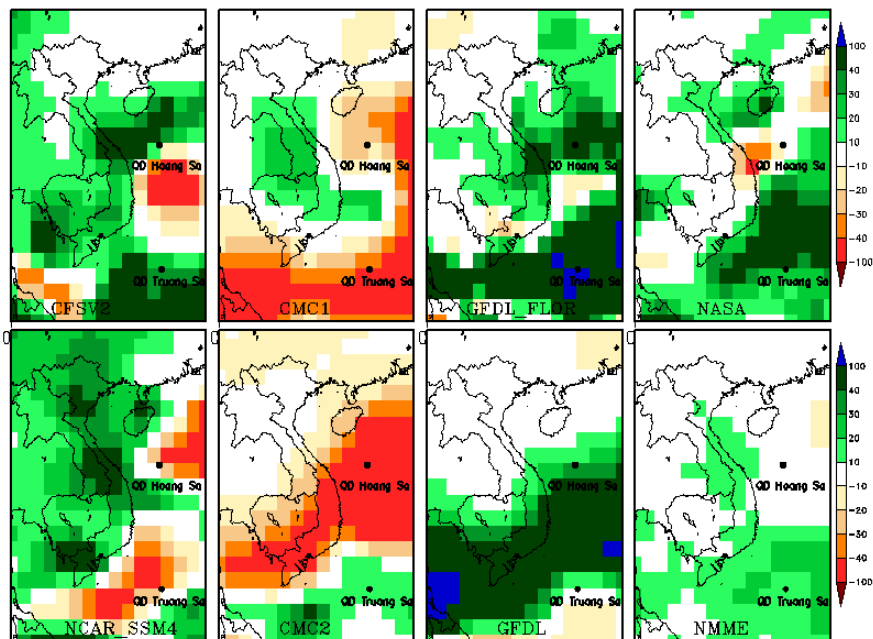
Precipitation Anomalies 00Z01SEP2017(mm)



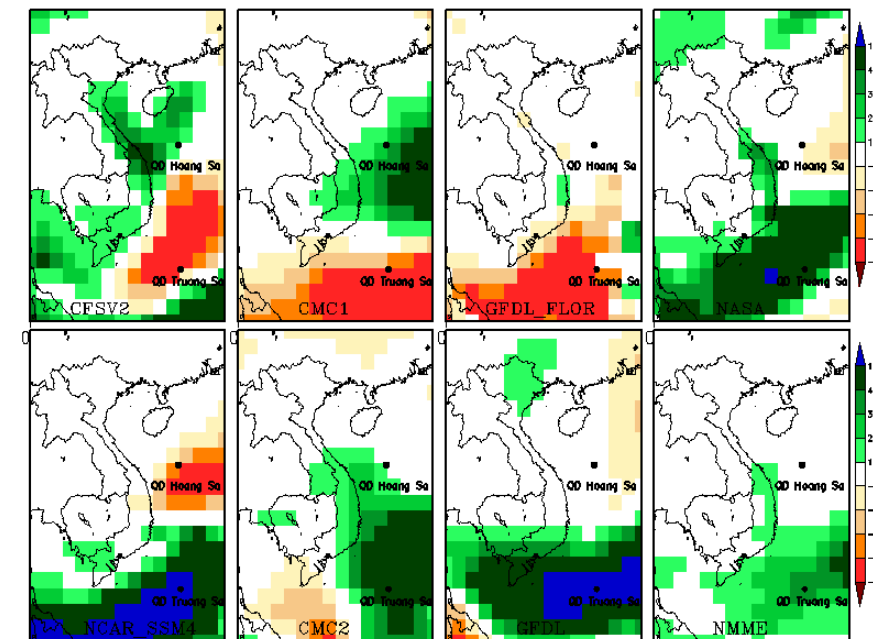
Precipitation Anomalies 00Z01OCT2017(mm)



Precipitation Anomalies 00Z01NOV2017(mm)



Precipitation Anomalies 00Z01DEC2017(mm)



# Seasonal Outlook for Vietnam

- **ENSO-neutral** is more than 60% chance by the end of 2017
- More tropical cyclones is expected in southern part of Bien Dong (South China Sea). Two to three of them may make landfall.
- September to December temperature are expected to be **above normal** in the North and **near normal** in the Central and South provinces
- Rainfall outlook:
  - North: September: **normal**, Oct-Dec: **below normal**
  - Central: **below normal**, except October is likely **above normal**
  - South: Sep-Oct: **above normal**, Nov-Dec: **below normal**

Thank you for attention!