CLIMATE IMPACT ASSESSMENT

for
Philippine Agriculture
(Rice and Corn)

Impact Assessment and Applications Section (IAAS)
Climatology and Agrometeorology Division (CAD)
Philippine Atmospheric, Geophysical and Astronomical Services Administration **(PAGASA)**
Department of Science and Technology

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P R E F A C E

The Impact Assessment and Applications Section (IAAS) of Climatology and Agrometeorology Division (CAD) regularly issue this monthly/bulletin which will provide users such as food security managers, economic policy makers, agricultural statisticians and agricultural extension officials with qualitative information on the current and potential effects of climate and weather variability on rainfed crops, particularly rice and corn. This bulletin, entitled "Climate Impact Assessment for Agriculture in the Philippines", represents a method for converting meteorological data into economic information that can be used as supplement to information from other available sources.

For example, an agricultural statistician or economist involved in crop production and yield forecast problems can combine the assessment with analysis from area survey results, reports on the occurrence of pests and diseases, farmers' reports and other data sources.

The impact assessments are based on agroclimatic indices derived from historical rainfall data recorded for the period 1951 to the present. The indices, expressed in raw values percent of normals and percentile ranks, together with real time meteorological data (monthly rainfall, in percent of normal), percent of normal cumulative rainfall, as well as the occurrence of significant event such as typhoons, floods and droughts are the tools used in the assessment of crop performance. Crop reports from PAGASA field stations are also helpful.

The narrative impact assessment included in the bulletin depicts the regional performance of upland, 1st lowland and 2nd lowland palay; and dry and wet season corn crops, depending on the period or the season. Tabulated values of normal rainfall and generalized monsoon and yield moisture indices are provided for ready reference. Spatial analysis of rainfall, percent of normal rainfall and the generalized monsoon indices in percentile ranks are also presented on maps to help users visualize any unusual weather occurring during the period. The generalized monsoon indices in particular, are drought indicators; hence, the tables (see Appendices) together with the threshold values can be used in assessing drought impact, if there are any. It also helps assess any probable crop failure.

It is hoped therefore that this bulletin would help provide the decision-makers, planners and economist with timely and reliable early warning/information on climatic impact including the potential for subsistence food shortfalls, thereby enabling them to plan alternate cropping, if possible, food assistance strategies/mitigation measures to reduce the adverse impact of climate and eventually improve disaster preparedness.

Impact assessment for other principal crops such as sugarcane and coconut, for energy and for water resources management, are from time to time will be included in the forthcoming issues of this bulletin.

The IAAS of CAD will appreciate suggestions/comments from end-users and interested parties for the improvement of this bulletin.

Definition of Terms

The Generalized Monsoon Index (GMI) helps determine the performance of the rains during the season and serves as a good indicator of potential irrigation supplies. It is a tool used to assess rainfed crops.

The GMI for the southwest monsoon (GMIsw) in an area during June to September is defined as follows:

$$GMIsw = W_6P_6 + W_7P_7 + W_8P_8 + W_9P_9$$

The GMI for the northeast monsoon (GMIne) in an area during October to January is defined as:

$$GMIne = W_{10}P_{10} + W_{11}P_{11} + W_{12}P_{12} + W_1P_1$$

where:

W = weight coefficient of monthly rainfall for the season;

P = rainfall amount in the i^{th} month (i = 1 for January, 2 = for February, etc.)

The Yield Moisture Index (YMI) is a simple index that helps the users assess agroclimatic crop conditions during the crop season. The YMI for a particular crop is defined as follows:

$$YMI = \sum_{i}^{n} [P_i K_i]$$

where:

i = crop stage (1 = planting/transplanting, 2 = vegetative, 3 = flowering, 4 = maturity, etc.)
n = total no. of crop stages;
P = rainfall during the i^{th} crop stage; and
K = appropriate crop coefficient for the i^{th} crop stage.

Tentatively, the threshold values of categories of indices for interpretation being adopted for both **YMI and GMI** are as follows:

Percentile Rank	Interpretation
> 80	Potential for flood damage
41 - 80	Near normal to above- normal crop condition
21 - 40	Moderate drought impact with reduced yield
11 - 20	Drought impact with major yield losses
< 10	Severe drought impact with crop failure and potential food shortages

AGROCLIMATIC / CROP ASSESSMENT FOR OCTOBER 2020

OVERVIEW

Harvesting of late-planted lowland 1st palay and late-planted upland 1st palay is ongoing in some parts of the country. Good to normal yield is expected in CAR, Nueva Ecija, Aurora, Baler, Casiguran, Infanta, Tayabas, Romblon, Cuyo, Coron, San Jose, Legaspi, Catanduanes, Catarman, Catbalogan, Tacloban, Zamboanga del Norte, Bukidnon, El Salvador, Davao, Surigao del Norte, and Surigao del Sur. Meanwhile, below normal yield is possible in Zambales, Dumaguete, Tagbilaran, Pto. Princesa, Calapan and Zamboanga del Sur since crops suffered from moisture stress during the critical stage of growth and development.

The vegetating lowland 1st palay planted in July is faring well in CAR, Bataan, Nueva Ecija, Tayabas, Coron, Cuyo, Romblon, San Jose, Panay Island, Mactan, Catbalogan, Tacloban, El Salvador, Malaybalay, and ARMM. Meanwhile, palay crops in Zambales, Batangas, Calapan, Dumaguete, Tagbilaran, Pto. Princesa, Dumaguete and Zamboanga del Sur suffered moisture stress due to insufficient rainfall.

The weather systems that affected the country during the month were the Southwest Monsoon (SW), inter-tropical convergence zone (ITCZ), low pressure areas (LPAs), localized thunderstorms, easterlies, and the passage of five (5) tropical cyclones (TCs) named Tropical Storm (TS) “Nika” (NANGKA), October 11-12; Tropical Depression (TD) “Ofel”, October 13-16; Typhoon (TY) “Pepito” (SAUDEL), October 19-22; TY “Quinta” (MOLAVE), October 23-27 and Super Typhoon (STY) “Rolly” (GONI), October 29-November 3. Among the five TCs, only TS Nika did not make landfall but it enhanced the southwest monsoon. The other four TCs made multiple landfalls and brought heavy to intense rainfall that caused floods and landslides over Regions II, III, NCR, CALABARZON, MIMAROPA, Bicol Region, Regions VI, VII, VIII, XI and Cordillera Administrative Region (CAR), resulting to severe damages to infrastructure, agriculture and a number of casualties according to the National Disaster Risk Reduction and Management Council (NDRRMC) situational reports.

REGION I (Ilocos Region)

Harvesting of late-planted, upland 1st palay is ongoing in the region. Below normal yield is expected because of water logging brought by tropical cyclones that hit the region. In Ilocos Norte, below normal yield is expected due to the shortage of rainfall during the critical stage of growth. For the same reason, major yields loss is also possible in Pangasinan.

CAR (Cordillera Autonomous Region)

Harvesting of late-planted upland 1st palay is ongoing across the region; good to normal yield may be expected because of adequate moisture experienced by the crops throughout its growing season. Likewise, the vegetating lowland 1st palay as continued to experience good crops condition because of sufficient moisture available during the month.

REGION II (Cagayan Valley)

The vegetating lowland 1st palay planted in July suffered from moisture stress due to insufficient rainfall in Tuguegarao and Batanes.

REGION III (Central Luzon)

Harvesting of July-planted, lowland 1st palay is ongoing in Nueva Ecija and Aurora provinces, where good to normal yield is expected because crops were in good condition during the entire growing season. Meanwhile in Zambales, below normal yield is anticipated due to insufficient rainfall during the critical stage of growth and development.

REGION IV-A (CALABARZON)

Harvesting of late-planted lowland 1st palay in Infanta and late-planted upland 1st palay in Tayabas is on-going; good to normal yield is anticipated because crops were in good condition from planting to maturity. The vegetating lowland 1st palay planted last July in Tayabas are faring well because of sufficient rainfall received during the month.

REGION IV-B (MIMAROPA)

Harvesting of delay-planted upland 1st palay in most parts of the region is ongoing; good to normal yield is anticipated because crops experienced good crops condition from planting to maturity except in Calapan and Pto. Princesa. However, due to the effect of tropical cyclones, the mature plants that were not harvested earlier may have been damaged.

REGION V (Bicol Region)

Harvesting of delay-planted lowland 1st palay in most parts of the region is ongoing: good to normal yield is anticipated because crops continued to experience good crops condition from planting to maturity. However, due to the effect of tropical cyclones, the mature plants that were not harvested earlier may have been damaged.

REGION VI (Western Visayas)

Harvesting of delay-planted upland 1st palay is ongoing; good to normal yield is anticipated this season. The insufficient rainfall during the month may slightly affect the vegetating lowland 1st palay.

REGION VII (Central Visayas)

The ample amount of rainfall received in Cebu keeps the vegetating, lowland 1st palay planted last July in good shape. However, in Dumaguete and Tagbilaran, below normal yield is expected due to the insufficient rainfall.

REGION VIII (Eastern Visayas)

Harvesting of delay-planted lowland 1st palay across the region and the delay-planted upland 1st palay in Catbalogan and Tacloban is ongoing; good to normal yield is expected because crops were in good condition from planting to maturity. However, due to the effect of tropical cyclones, the mature plants that were not harvested earlier may have been damaged.

REGION IX (Zamboanga Peninsula)

Harvesting of delay-planted upland 1st palay in ongoing; good to normal yield is expected in Zamboanga del Norte because crops were in good condition from planting to maturity, on the other hand in Zamboanga del Sur, below normal yield is anticipated because crops experienced moisture deficiency during the critical stage of growth.

REGION X (Northern Mindanao)

Harvesting of July-planted, lowland 1st palay is ongoing in the province of Bukidnon; good to normal yield is anticipated this season due to sufficient rainfall during the periods of planting to maturity. Meanwhile, there may be no palay harvests in Misamis Oriental due to insufficient rainfall.

REGION XI (Davao Region)

Harvesting of delay-planted upland 1st palay is ongoing across the region; good to normal yield is expected because crops were in good condition throughout the growing period.

REGION XII (SOCCSKSARGEN)

Rice planting is hindered by the persistent lack of rainfall.

REGION XIII (CARAGA Region)

Harvesting of delay-planted lowland 1st palay is ongoing across the region. Good to normal yield is expected because of sufficient rainfall during the critical stage of growth and development.

ARMM
(Autonomous Region of Muslim Mindanao)

Harvesting of delay-planted lowland 1st palay is ongoing across the region. Good to normal yield is expected because of sufficient rainfall during the critical stage of growth and development.

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Table 1.0 GENERALIZED NORTHEAST MONSOON INDICES
In Millimeters and Percentile Rank (October 2020 to January 2021)

STATIONS	*OCTOBER*		*NOVEMBER*		*DECEMBER*		*JANUARY*	
	GMI	%RANK	GMI	%RANK	GMI	%RANK	GMI	*%RANK*
CAR (Cordillera Autonomous Reg.)								
Baguio	195	59						
Region I (Ilocos Reg.)								
Dagupan	137	63						
Vigan	65	59						
Laoag	31	37						
Region II (Cagayan Valley)								
Aparri	164	88						
Basco	100	51						
Tuguegarao	168	80						
Region III (Central Luzon)								
Iba	379	93						
Munoz	206	93						
Baler	226	93						
Casiguran	231	93						
Region IV-A (CALABARZON)								
Ambulong	226	90						
Infanta	199	80						
Tayabas	369	98						
Region IV-B (MIMAROPA)								
Calapan	332	98						
Cuyo	415	95						
Puerto Princesa	77	63						
Romblon	232	95						
San Jose	351	93						
Region V (Bicol Reg.)								
Daet	210	98						
Legaspi	175	98						
Masbate	110	93						
Virac Synop	198	90						
Region VI (Western Visayas)								
Roxas	203	98						
Region VII (Central Visayas)								
Mactan	91	80						
Dumaguete	54	61						
Dauis	71	80						
Region VIII (Eastern Visayas)								
Catarman	132	98						
Catbalogan	180	95						
Tacloban	47	61						
Region IX (Western Mindanao)								
Dipolog	111	83						
Zamboanga	103	71						
Region X (Northern Mindanao)								
El Salvador	109	98						
Malaybalay	115	51						
Region XI (Davao Reg.)								
Davao	90	83						
Region XII (SOCSARGEN)								
General Santos	28	54						
Region XIII (CARAGA)								
Surigao	52	90						
Hinatuan	30	41						
ARMM (Autonomous reg. of Muslim Mindanao)								
Cotabato	74	39						

Table 2.0 **CUMULATIVE YIELD MOISTURE INDICES FOR LOWLAND FIRST PALAY in Millimeters and Percentile Rank (July-October 2020)**

STATIONS	*JULY*		*AUGUST*		SEPTEMBER		OCTOBER	
	YMI	%RANK	YMI	%RANK	YMI	%RANK	YMI	%RANK
CAR (Cordillera Administrative Reg.)								
Baguio	294	22	626	5	862	2	1130	2
Region I (Ilocos Reg.)								
Dagupan	255	29	646	12	1027	14	1219	14
Laoag	269	46	583	10	648	2	694	2
Vigan	229	32	457	7	584	5	676	5
Region II (Cagayan Valley)								
Basco	95	20	374	27	464	12	761	12
Tuguegarao	145	51	321	41	447	21	845	48
Region III (Central Luzon)								
Iba	339	15	836	5	1067	2	1589	7
Munoz	185	22	513	24	817	14	1218	62
Region IV-A (CALABARZON)								
Ambulong	217	39	381	20	490	5	947	31
Tayabas	190	37	465	71	759	62	1926	98
Region IV-B (MIMAROPA)								
Calapan	363	88	480	73	664	64	1259	86
Cuyo	362	54	713	59	1014	48	1694	86
P. Princesa	146	66	211	15	407	19	1087	98
Romblon	279	66	619	85	1132	93	1763	95
San Jose	306	32	586	15	1052	29	1627	64
Region V (Bicol Reg.)								
Masbate	53	2	201	12	415	17	831	62
Region VI (Western Visayas)								
Roxas	385	90	687	93	960	90	1467	95
Region VII (Central Visayas)								
Cebu	239	76	618	100	781	93	1061	98
Dumaguete	209	95	292	80	392	67	558	74
Dauis	79	24	201	54	286	26	527	60
Region VIII (Eastern Visayas)								
Catbalogan	266	66	422	59	625	36	1283	86
Tacloban	130	44	358	76	634	83	881	83
Region IX (Zamboanga Peninsula)								
Zamboanga	105	39	197	34	350	36	578	43
Region X (Northern Mindanao)								
El Salvador	240	80	497	88	577	38	850	69
Malaybalay	280	59	748	90	1030	81	1303	69
Region XII (SOCCSKSARGEN)								
General Santos	51	27	148	37	187	19	280	24
ARMM (Autonomous reg. of Muslim Mindanao)								
Cotabato	193	49	407	41	630	29	811	31

TABLE 3.0 DECADAL AND CUMULATIVE DECADAL RAINFALL

For the month of OCTOBER 2020

[actual values (in mm) and percent of normal]

	REGION	*DECADE*	*ACTUAL OCT*	*% Normal of Actual*	*CUMULATIVE JAN.-OCT*	*% Normal Cumulative*
R01	Ilocos Region	28	38.3	45	1322.3	56
		29	101.6	137	1423.9	58
		30	73.1	83	1497.1	59
CAR	CAR	28	62.9	65	1238.0	60
		29	116.5	121	1354.5	63
		30	129.8	110	1484.3	65
R02	Cagayan Valley	28	124.2	109	1474.9	84
		29	243.2	179	1718.2	91
		30	199.8	125	1917.9	93
R03	Central Luzon	28	113.2	115	1612.0	74
		29	216.7	266	1828.8	81
		30	147.3	113	1976.1	83
R04-A	CALABARZON	28	269.5	210	1650.9	92
		29	251.7	199	1902.6	99
		30	241.5	137	2144.2	102
R04-B	MIMAROPA	28	126.2	131	1290.2	85
		29	127.2	179	1417.3	89
		30	190.4	221	1607.7	96
NCR	NCR	28	109.1	103	1430.4	74
		29	187.5	199	1617.9	80
		30	113.4	107	1731.3	81
R05	Bicol Region	28	169.1	150	1571.1	88
		29	285.6	254	1856.7	98
		30	305.5	203	2162.2	105
R06	Western Visayas	28	130.4	131	1541.4	103
		29	166.6	207	1708.0	108
		30	164.2	194	1872.2	112
R07	Central Visayas	28	87.5	124	1228.4	111
		29	82.3	137	1310.8	112
		30	134.7	209	1445.4	117
R08	Eastern Visayas	28	140.7	169	1929.6	108
		29	117.4	143	2047.0	110
		30	252.4	241	2299.4	117
R09	Zamboanga Peninsula	28	56.2	67	1210.7	93
		29	129.3	178	1340.1	98
		30	135.1	146	1475.2	101
R10	Northern Mindanao	28	103.1	110	1541.2	94
		29	93.8	121	1635.0	96
		30	107.5	141	1742.4	97
R11	Davao Region	28	85.3	136	1538.4	94
		29	58.1	103	1596.5	94
		30	95.4	138	1691.9	96
R12	SOCCSKSARGEN	28	32.9	67	937.4	81
		29	68.1	129	1005.6	83
		30	55.8	91	1061.3	84
	CARAGA	28	83.8	102	2208.6	99
		29	91.5	122	2300.1	100
		30	152.2	180	2452.3	103
	ARMM	28	44.5	68	1102.2	89
		29	78.5	131	1180.6	90
		30	65.3	98	1245.9	91

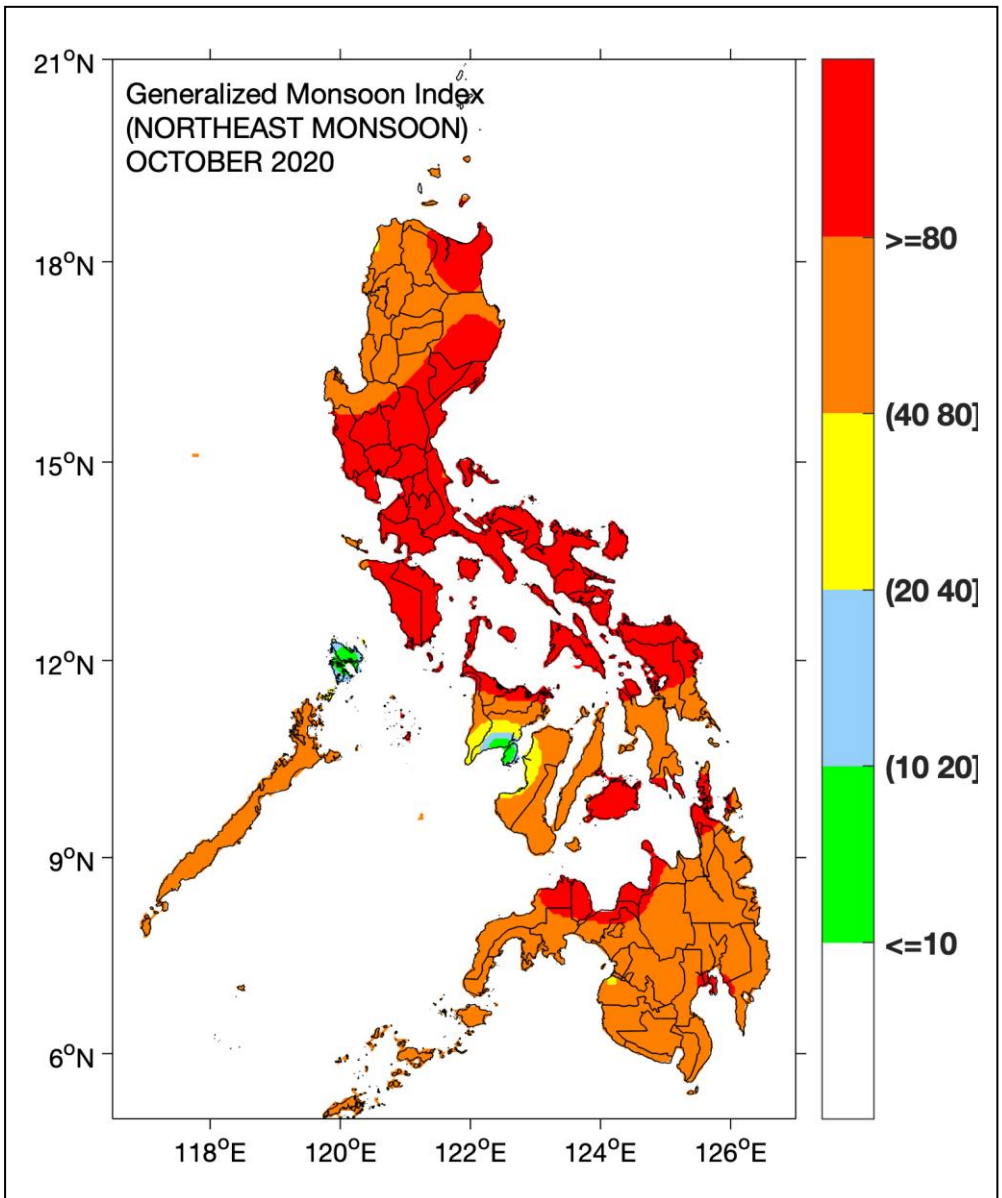


FIG. 1.0 **Spatial Analysis of GENERALIZED NORTHEAST MONSOON INDEX**
Ending OCTOBER 2020 in Percentile Rank

FIG. 2.0 **ACTUAL CUMULATIVE RAINFALL DURING THE PASSAGE OF TROPICAL CYCLONE IN THE PHIL. FOR THE MONTH OF OCTOBER 2020**

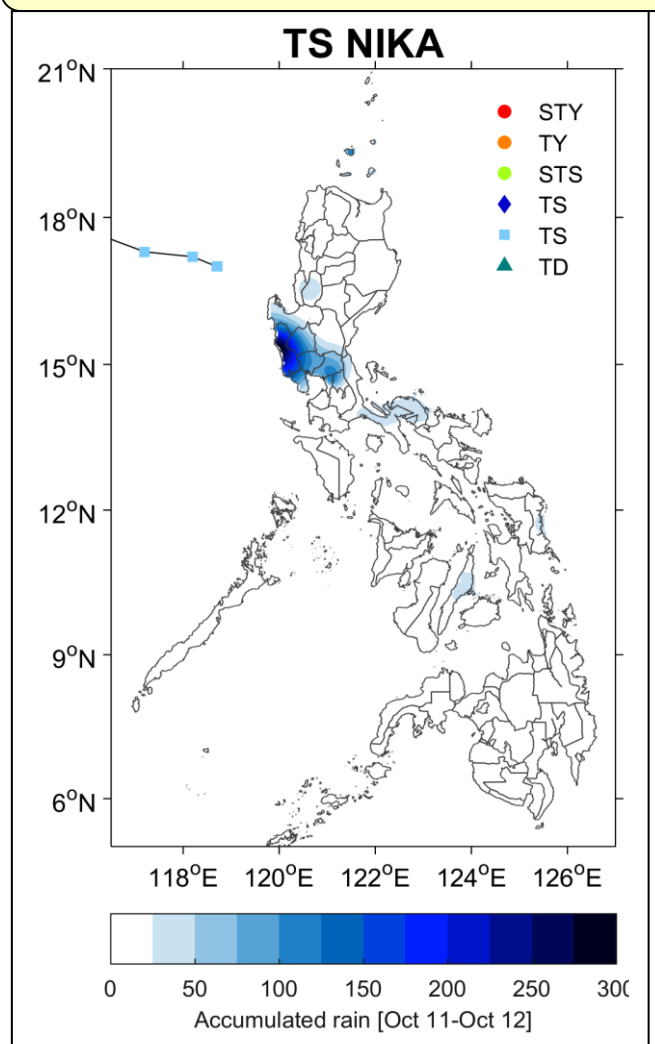


Fig. 2.1. Actual Cumulative Rainfall during the Passage of Tropical Storm (TS) "NIKA" (Oct 11-12, 2020)

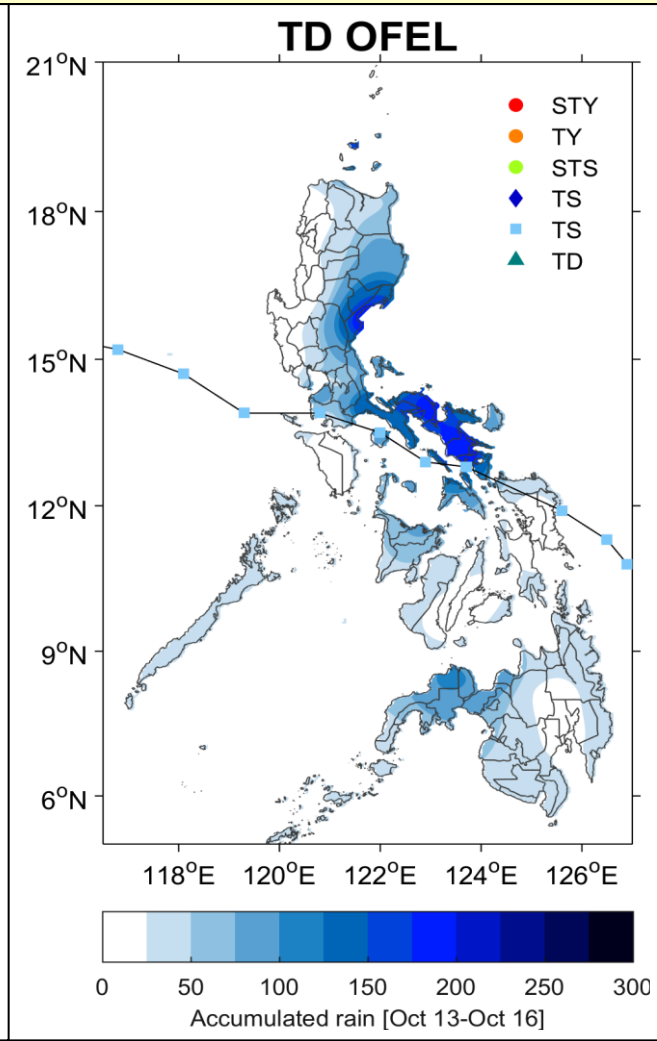


Fig. 2.2. Actual Cumulative Rainfall during the Passage of Tropical Depression (TD) "OFEL" (Oct 13-16, 2020)

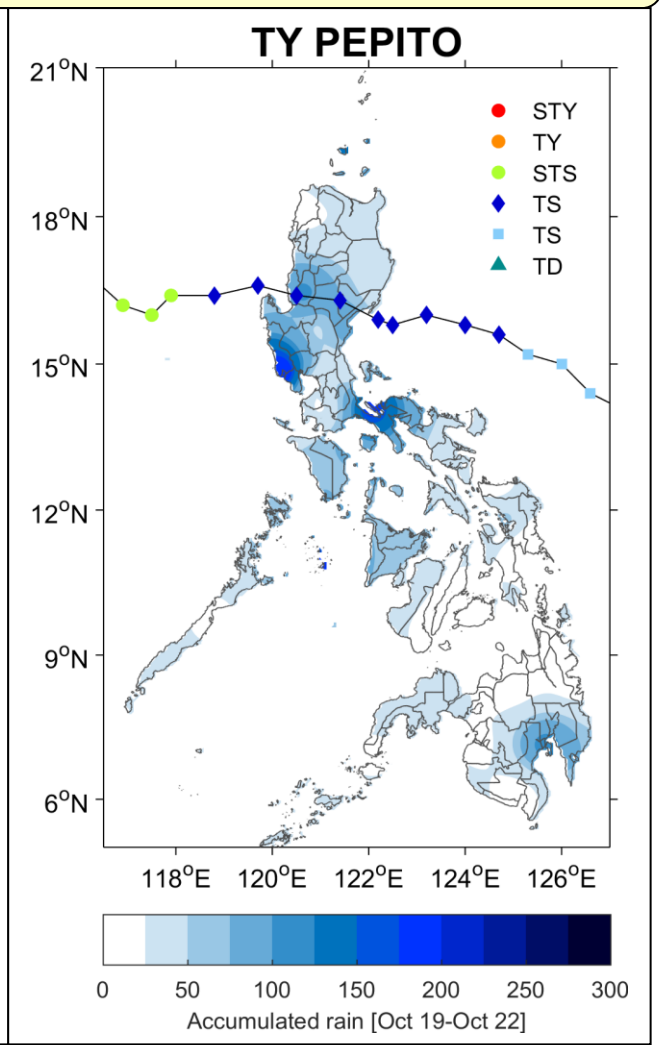


Fig. 2.3. Actual Cumulative Rainfall during the Passage of Typhoon (TY) "PEPITO" (Oct 19-22, 2020)

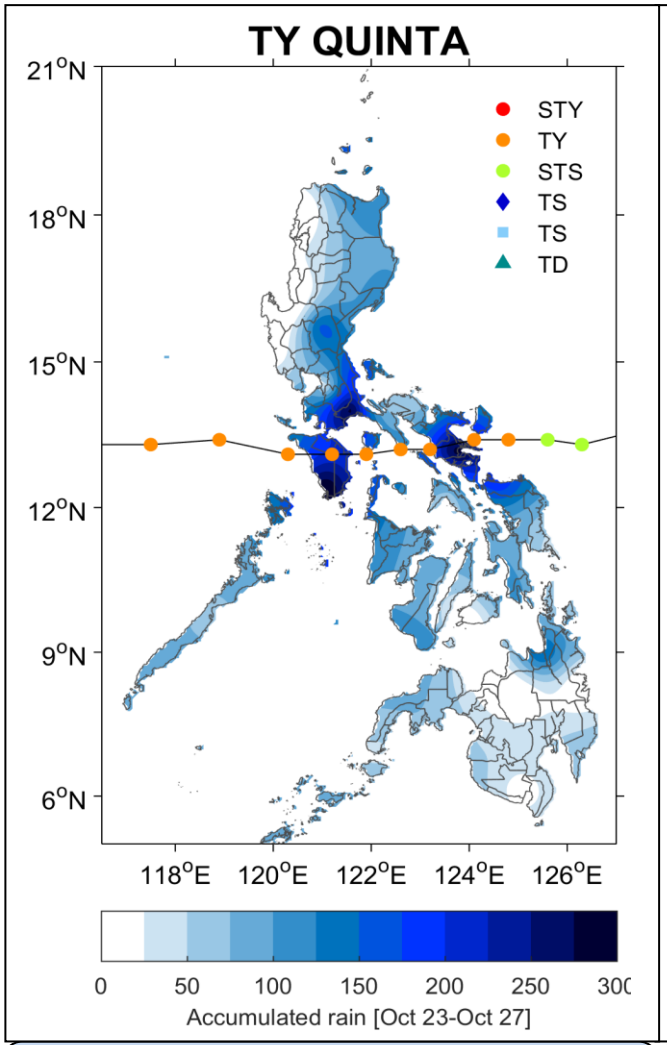


Fig. 2.4. Actual Cumulative Rainfall during the Passage of Typhoon (TY) "QUINTA" (Oct 23-27, 2020)

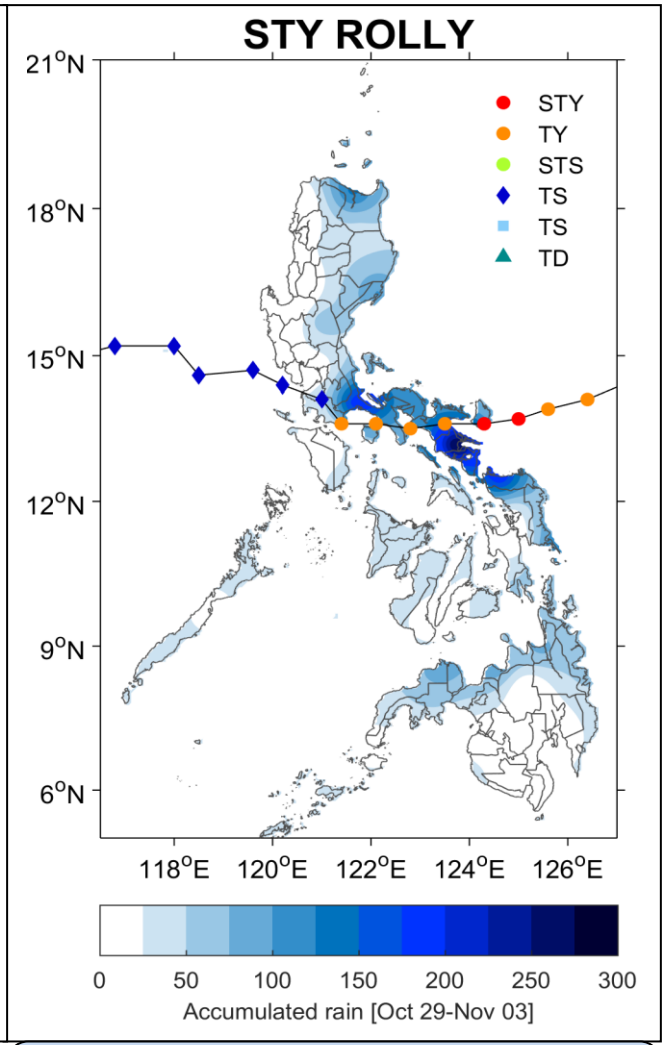
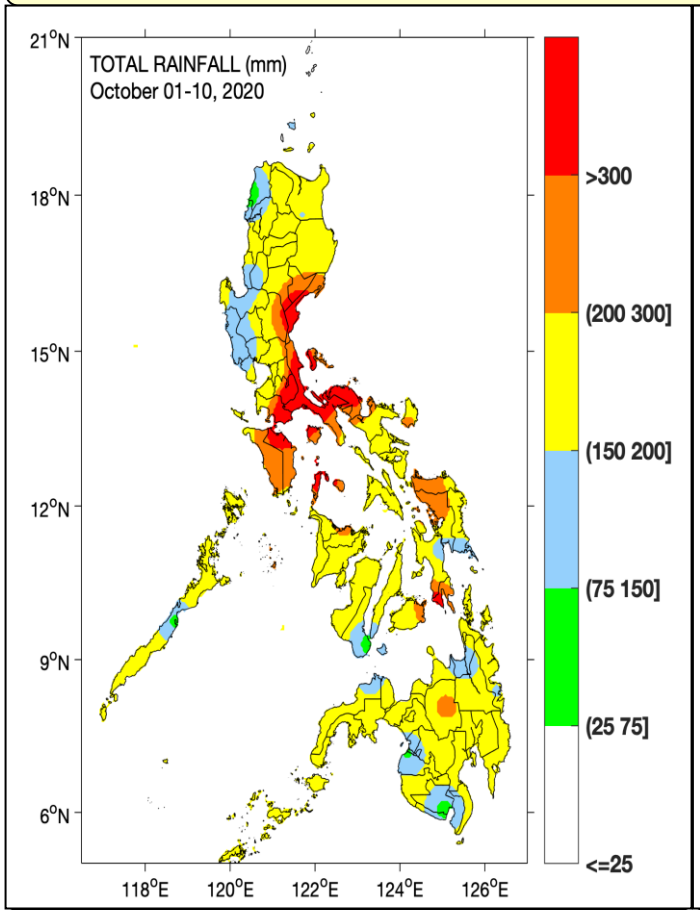
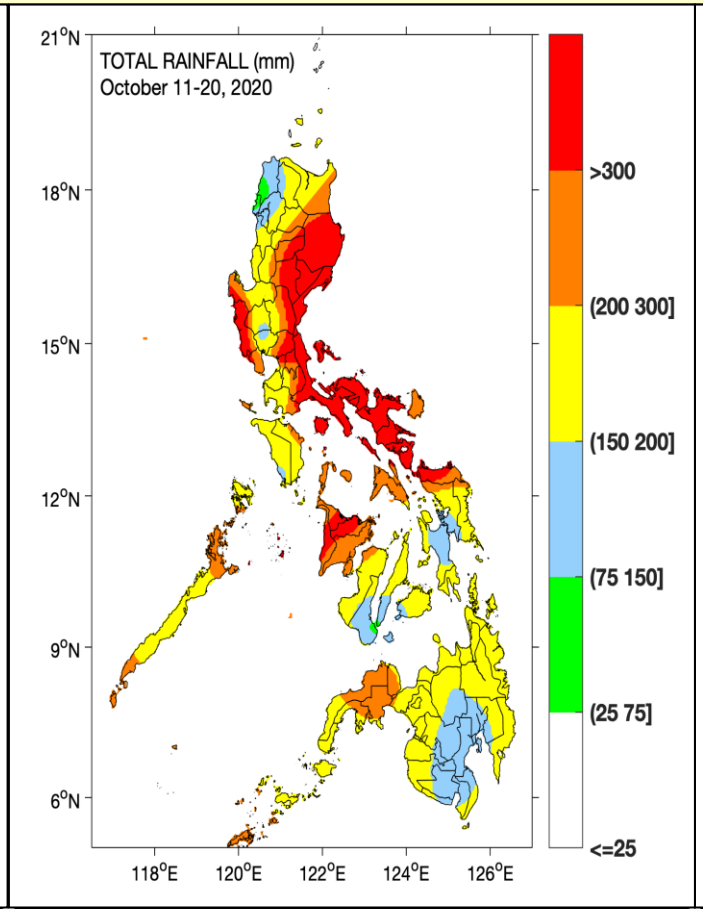


Fig. 2.3. Actual Cumulative Rainfall during the Passage of Typhoon (STY) "ROLLY" (Oct 29 to Nov. 3, 2020)

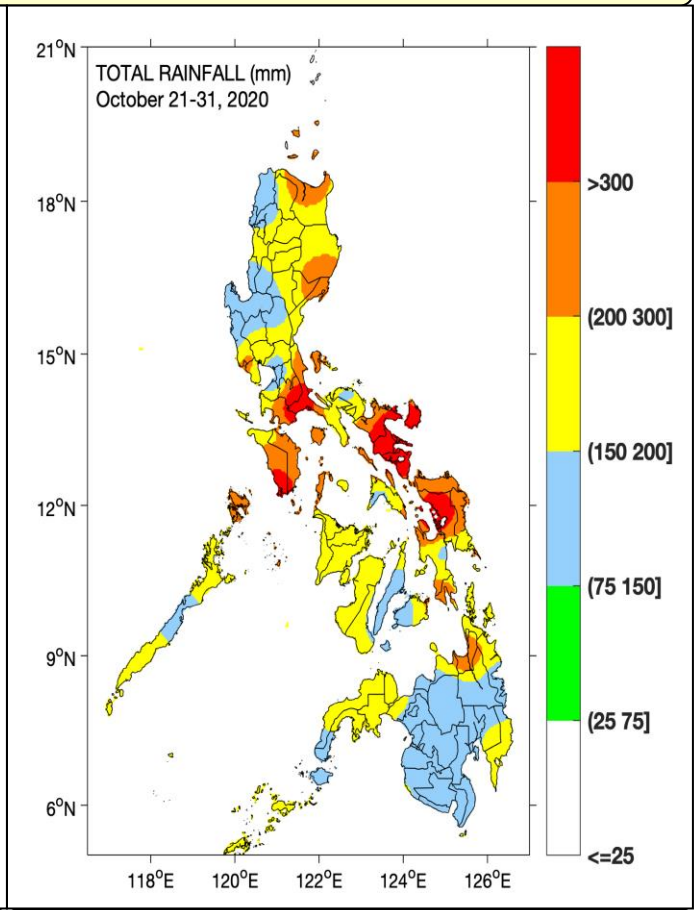
FIG 3.0 **TEN DAYS ACTUAL RAINFALL DISTRIBUTION IN THE PHILIPPINES for the month of OCTOBER 2020**



A. Decade 1 - OCTOBER 01-10, 2020

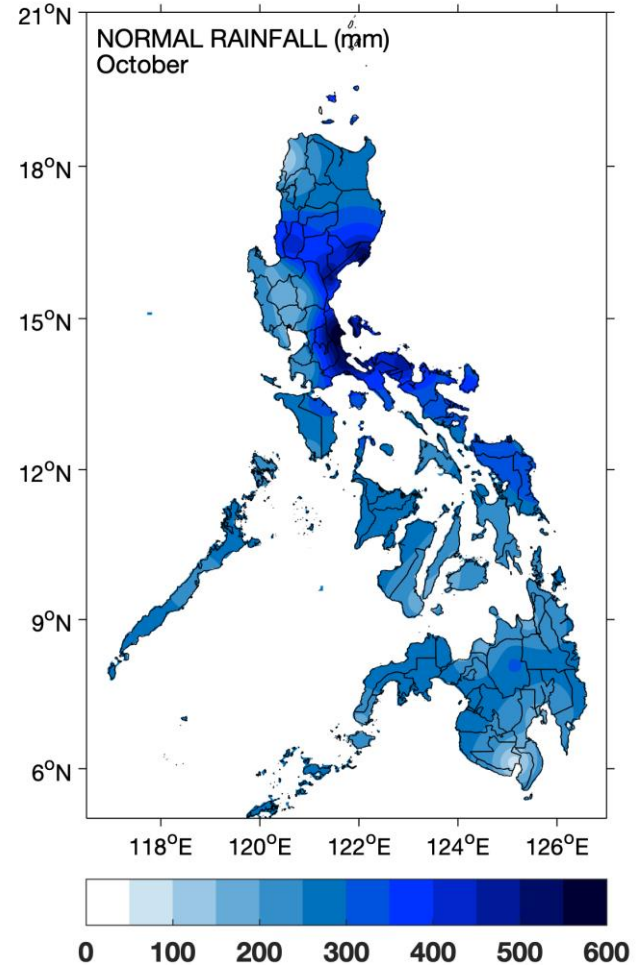


A. Decade 2 - OCTOBER 11-20, 2020

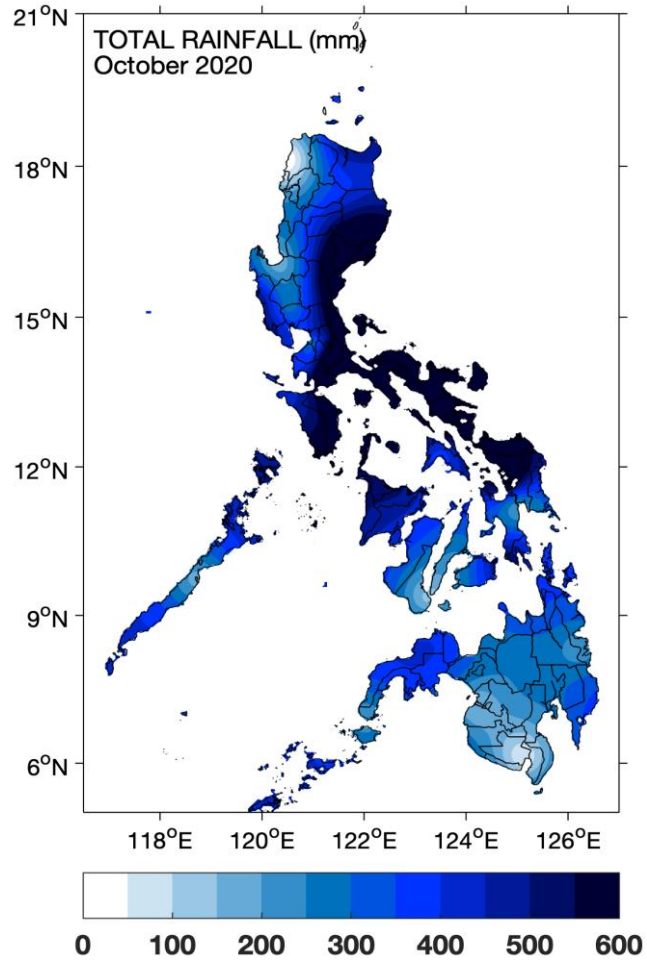


A. Decade 3 - OCTOBER 21-31, 2020

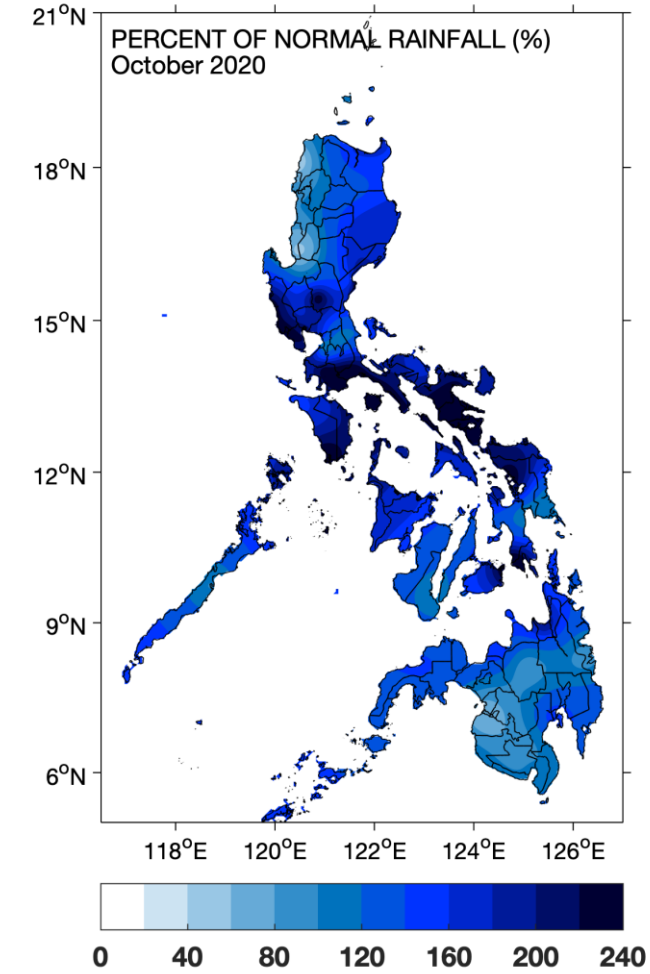
FIG. 4.0 **RAINFALL IN THE PHILIPPINES for the month of OCTOBER 2020**



A. Normal Rainfall (mm)



B. Actual Rainfall (mm)



C. Percent of Normal Rainfall (%)

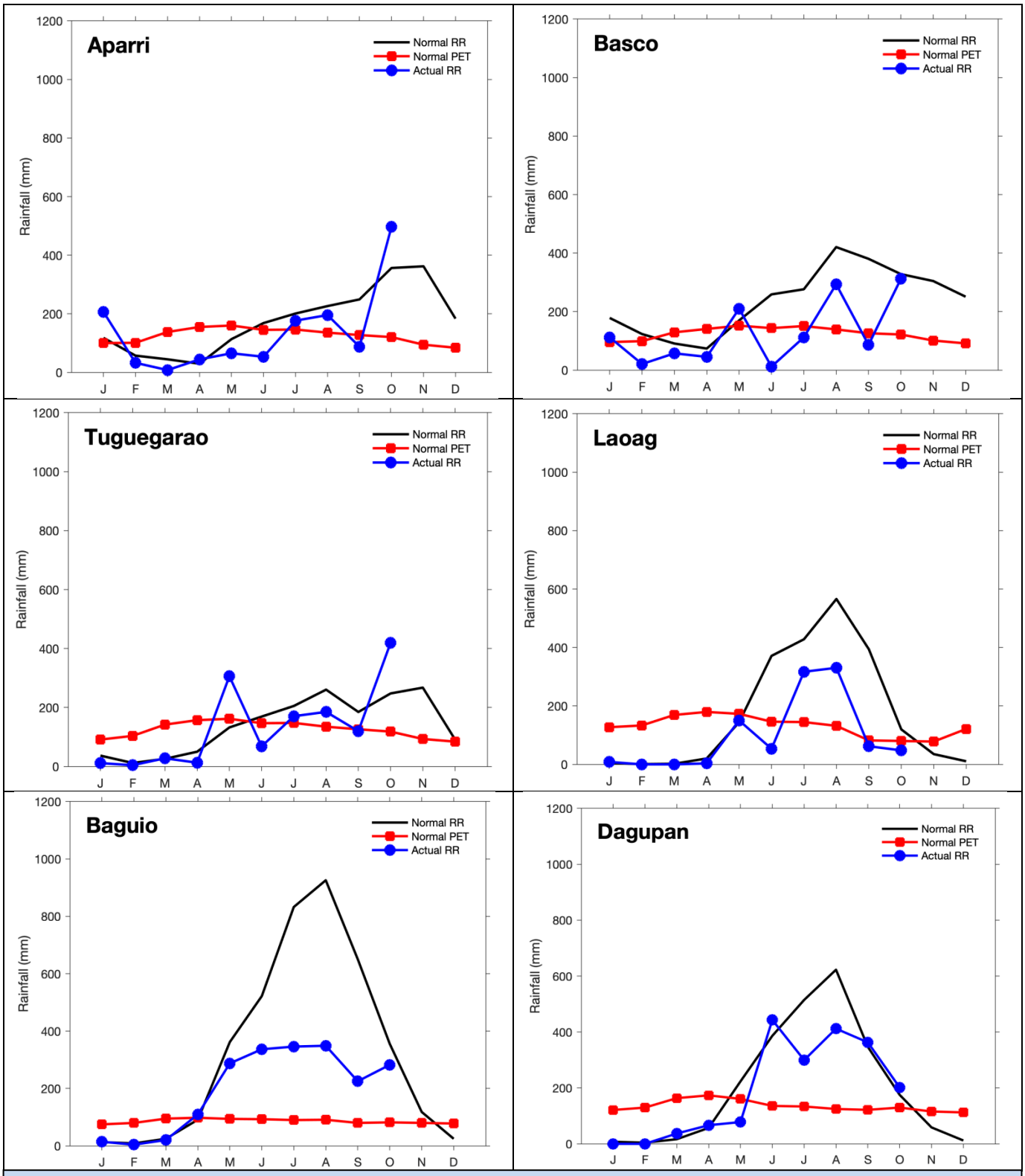


Fig. 5.0 **Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Laoag, Basco, Baguio, Aparri, Dagupan, and Tuguegarao.**

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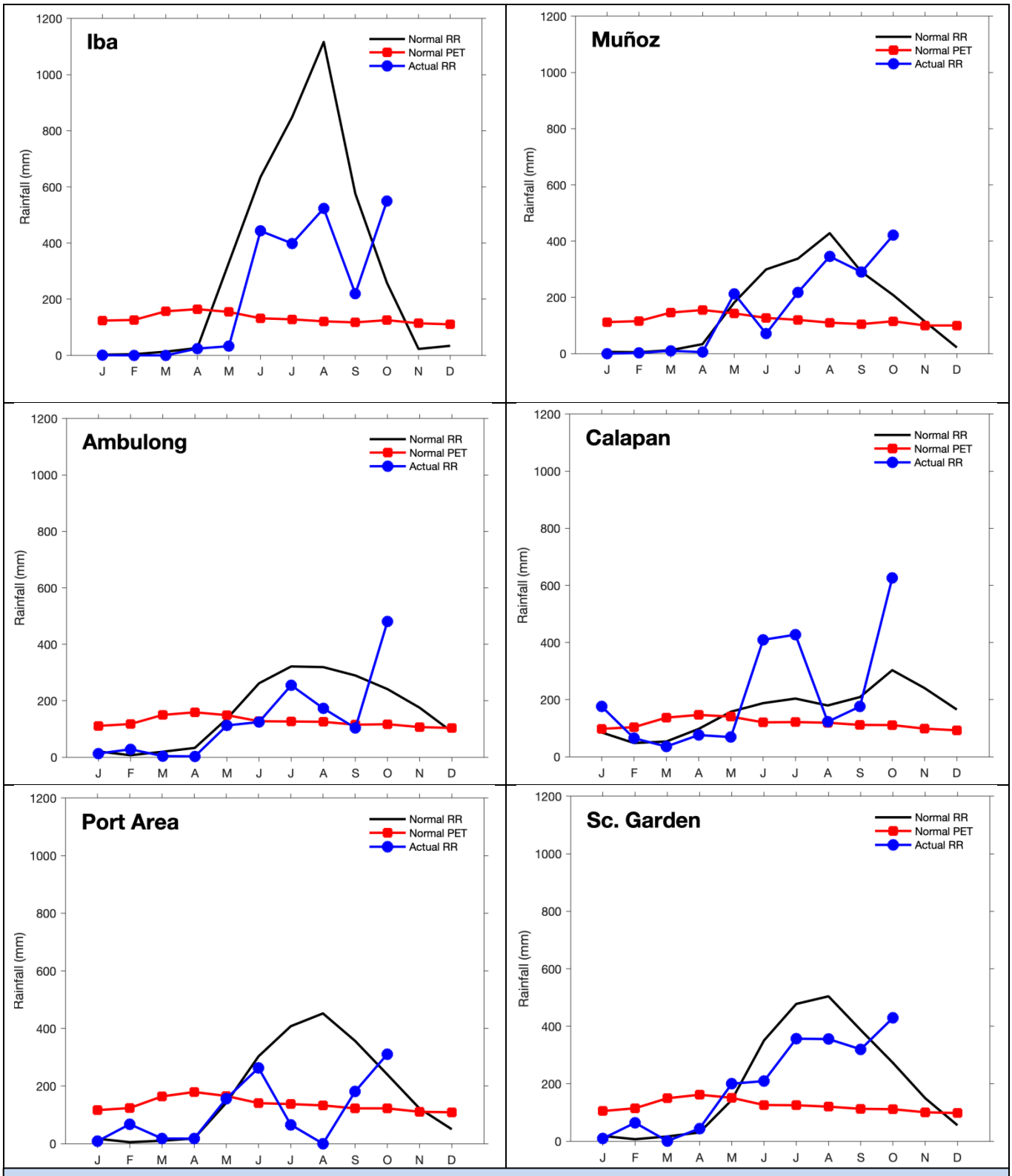

Fig 5a. **Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Iba, Ambulong, Muñoz, Port Area, Calapan, and Science Garden.**

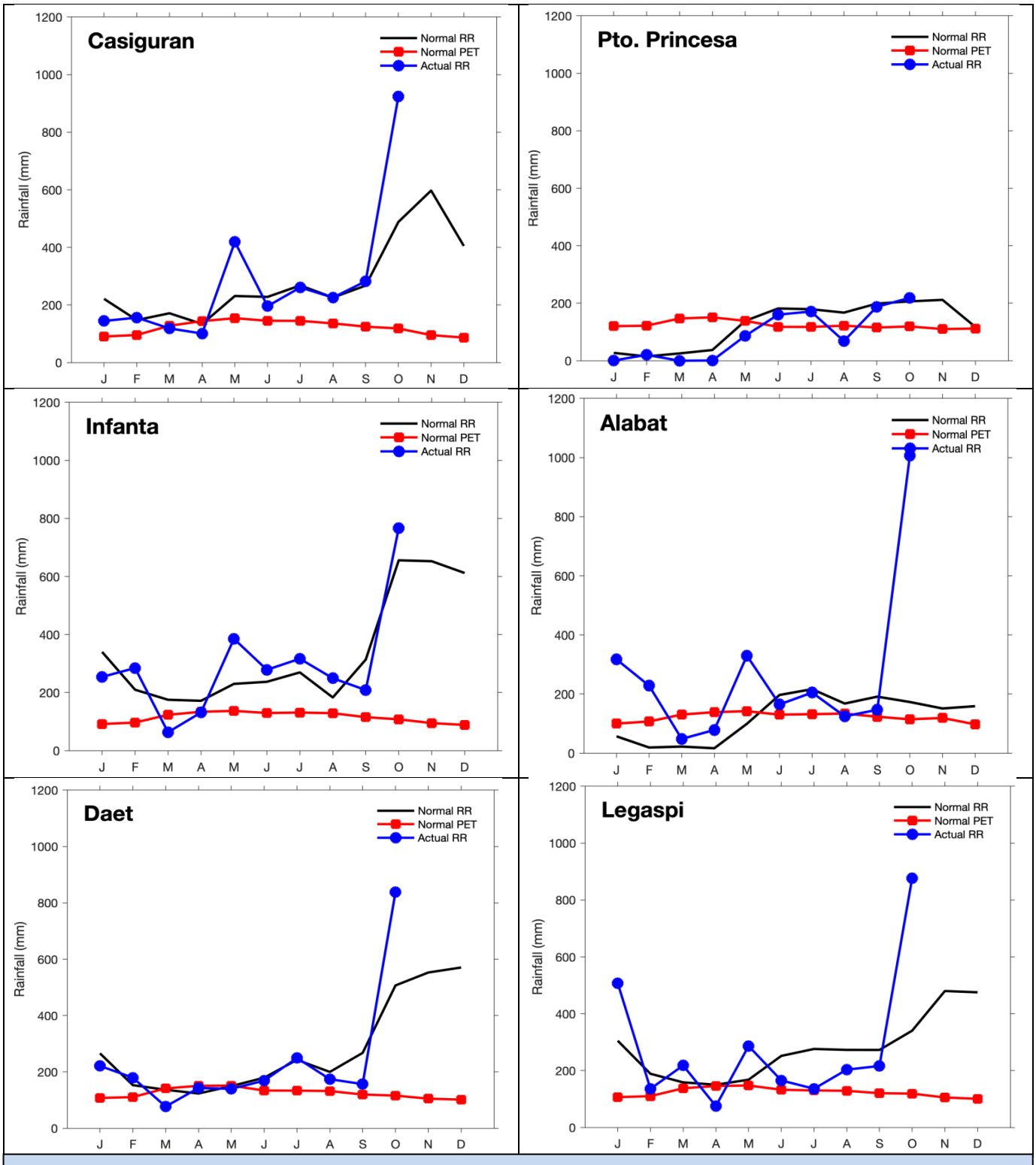

Fig. 5b. **Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Daet, Casiguran, Infanta, Legaspi, Alabat and Puerto Princesa.**

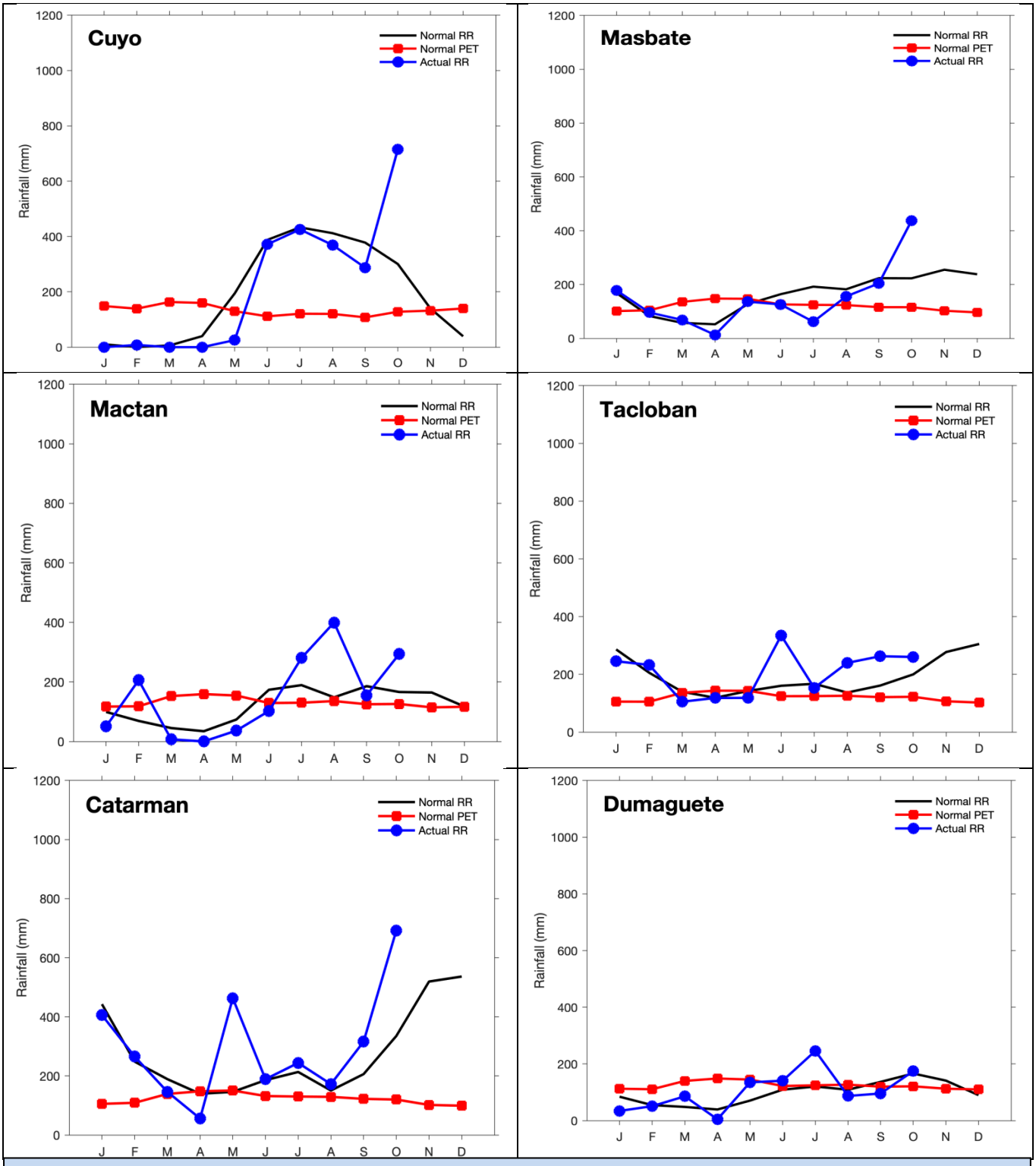

Fig. 5c. **Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Cuyo, Masbate, Mactan, Tacloban, Catarman and Dumaguete.**

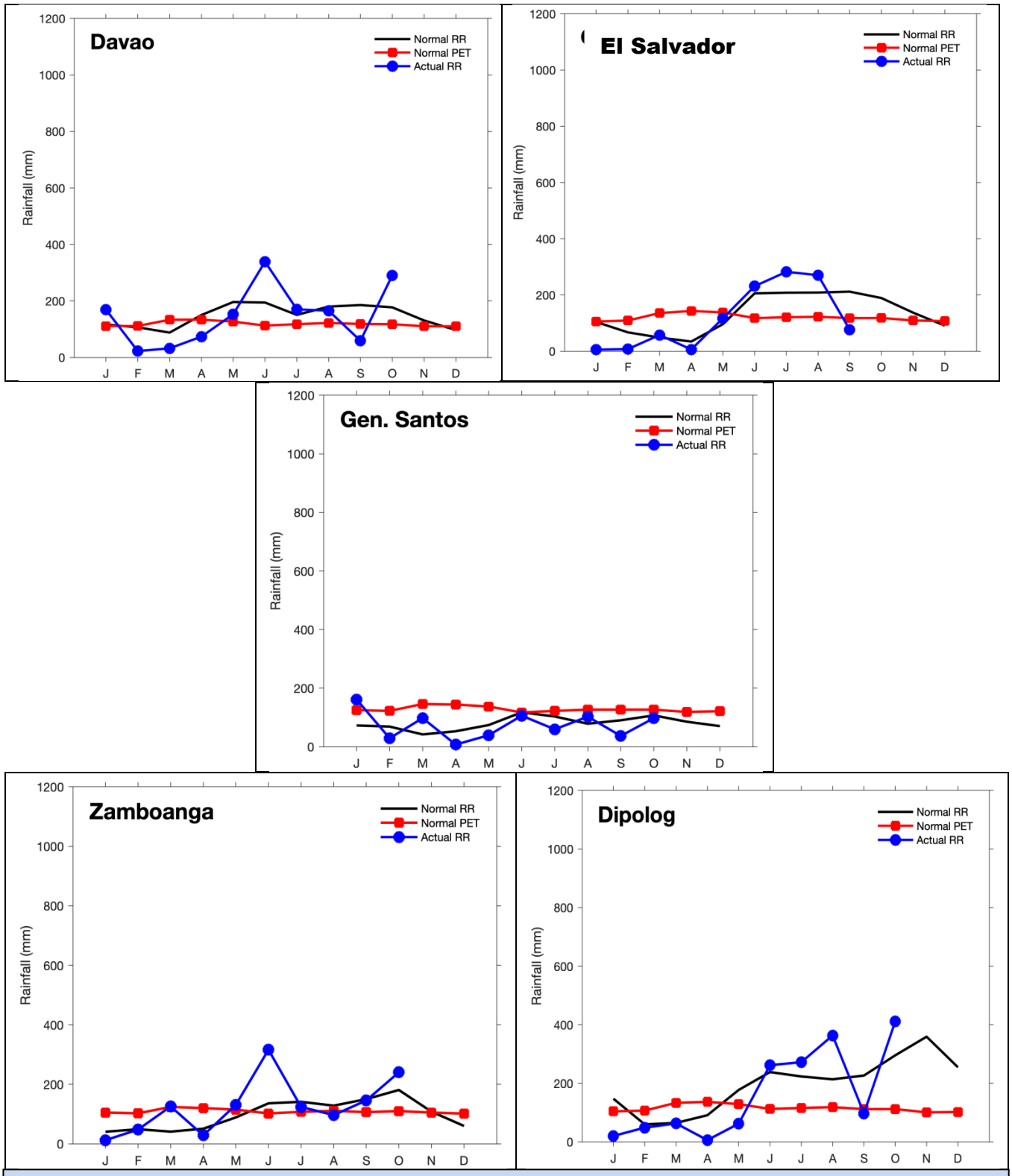

Fig 5d. **Comparison of normal rainfall and potential evapotranspiration with the actual monthly rainfall at Davao, General Santos, Zamboanga, El Salvador, and Dipolog.**