



# **Seasonal Forecast for Summer Monsoon in Myanmar**

**Ms. Win Win Ohn**  
**Deputy Superintendent**

# Geographical Feature

- ☐ **Monsoon Country**
- ☐ **latitude 9° 28' N to 28° 31' N.**
- ☐ **longitude 92° 10' E to 101° 11' E**
- ☐ **area 678000 sq**
- ☐ **plateaus, mountains, plains, rivers and evergreen forests**
- ☐ **annual rainfall varies from about 600 mm in the central areas to 4000 mm in the coastal areas.**
- ☐ **comprises in the region of the Bay of Bengal**
- ☐ **vulnerable to storms almost every year**
- ☐ **the remnants of typhoons from the West Pacific and South China Sea**



## Elements and Contents of Long Range Forecasts

- ❖ **Rainfall anomaly** (-20% below -20% from mean, as below)  
(+20% above +20% from mean, as above)  
(within + or – 20% from mean, as normal)
- ❖ **Onset and withdrawal of southwest monsoon**
- ❖ **Monsoon intensity over Bay of Bengal**
- ❖ **Monsoon depression over Bay of Bengal**
- ❖ **Temperature anomaly**
- ❖ **Fog occurrence**
- ❖ **State of the rivers**

# **Requirements for the Long Range Forecasting Services in the Country**

- ❖ **Model for seasonal forecasting and application**
- ❖ **Facilities such as hard and software with trainings**
- ❖ **Job training and technology transfer in Regional Meteorological Centers.**

# Seasonal Forecasting in Myanmar

## Methods

- primarily an analogue method
- monthly surface isobaric maps and contour maps at standard pressure levels

## To issue a forecast

- the month prior to the month
- compared with that of the same month of previous years
- as year that resembles most of the conditions in the present mean is selected.

## **In addition**

- ECMWF products
- daily and mean monthly 500 hPa charts from JMA
- monsoon circulation index
- blocking high action
- positions of the Pacific anticyclone at 500 hPa
- intrusion of troughs from mid-latitudes
- position and intensity of Tropical Easterly Jet (TEJ)
- position and intensity of 200 hPa ridge
- 30-50 days low frequency modes

## Many other Synoptic, Statistical & Climatological Methods

- ❑ The break-down of the westerly component of Monbui, India wind at 200 and 500 hPa levels to less than 50 kts (and continued to prevail for 7 days) is related to the date of onset of the Southwest monsoon at Yangon allowing for a time lag of  $(34 \pm 5)$  days.
- ❑ The mean May trough position at  $15^{\circ}\text{N}$  over the Bay of Bengal at 500 hPa is related to the rainfall in Yangon Division. If the trough position at latitude  $15^{\circ}\text{N}$  is west of longitude  $87.5^{\circ}\text{E}$ , the rainfall during the month of June, July and August will be above normal.
- ❑ The frequency of storms that form in the Bay of Bengal during the months of April, May and June are position related to the seasonal rainfall in Myanmar.

# Type Forecast Issued by DMH



Kind of forecast	Issued Time	Period of validity	Remark
Decadal	On the 8 <sup>th</sup> , 18 <sup>th</sup> , 28 <sup>th</sup> of each month	10 days	Nation wide
Monthly	On the 28 <sup>th</sup> of each month	1 month	Nation wide
Pre-monsoon	On the last decade of April	2 month	Nation wide
Mid-monsoon	On the last decade of June	2 month	Nation wide
Post-monsoon	On the last decade of August	2 month	Nation wide
Seasonal	On the last decade of April	6 month	Nation wide

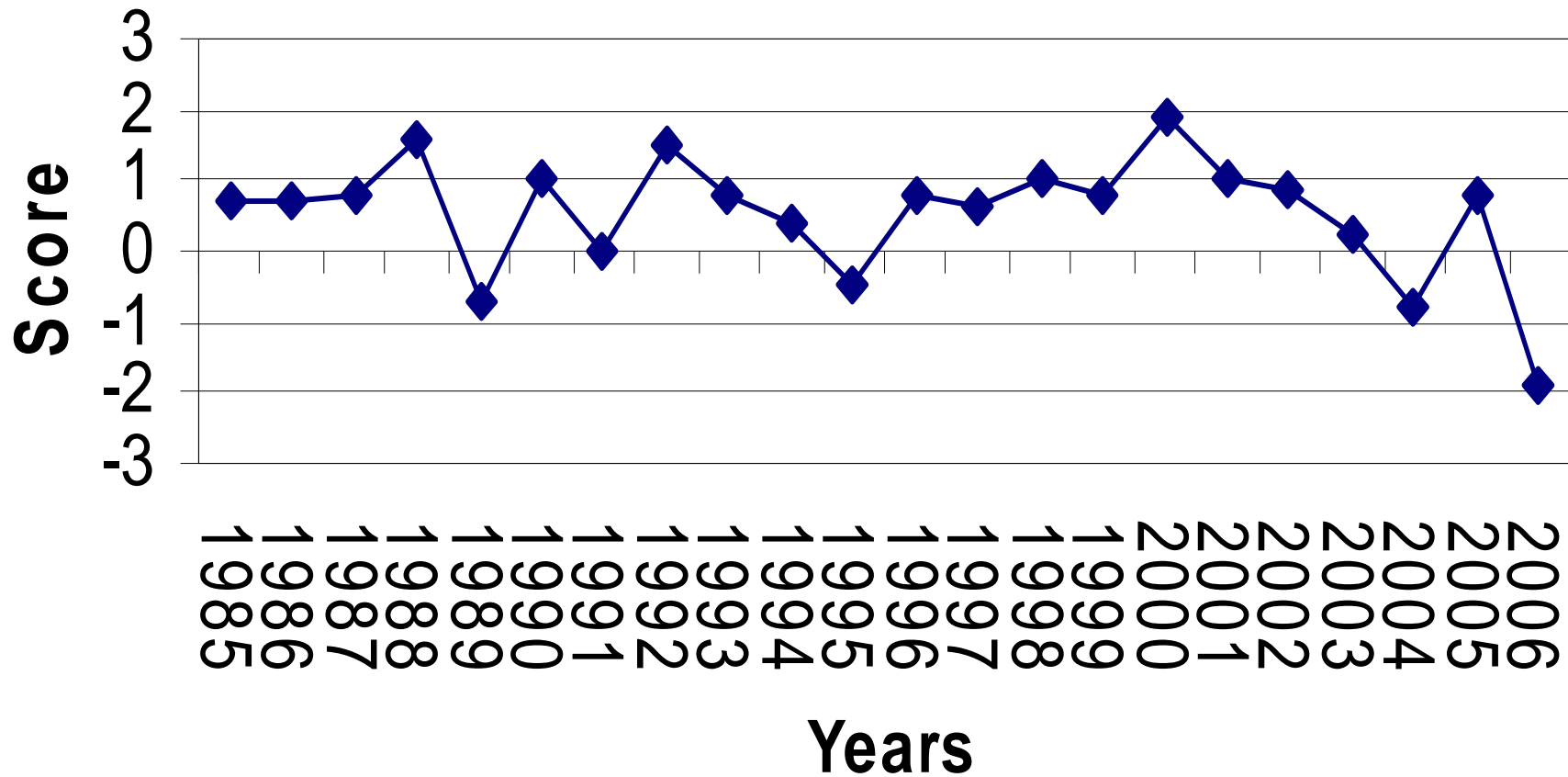


## Table of weighted numerical value for verification

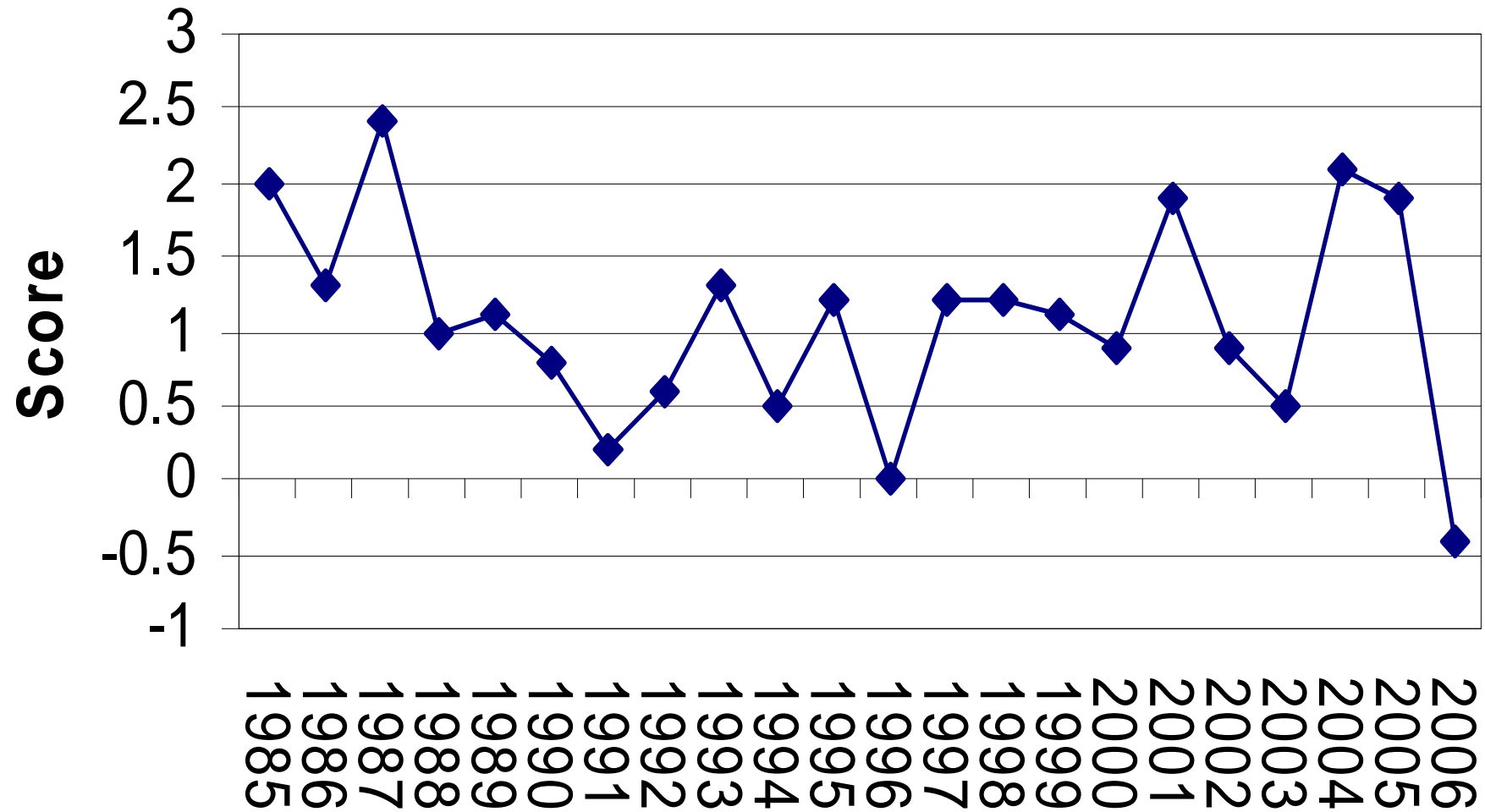
\Observed Forecast\ A	A	N	B	T
A	+4	+2	-4	+2
N	-2	+4	+2	+4
B	-4	-2	+4	-2
T	-2	+4	+2	+4

- Skill score for Monsoon Period Rainfall Obtained by the Percentage Criteria Method
- Grade for the Skill Score
- $>-2$  Poor
- 0 Fair
- $>+2$  Good

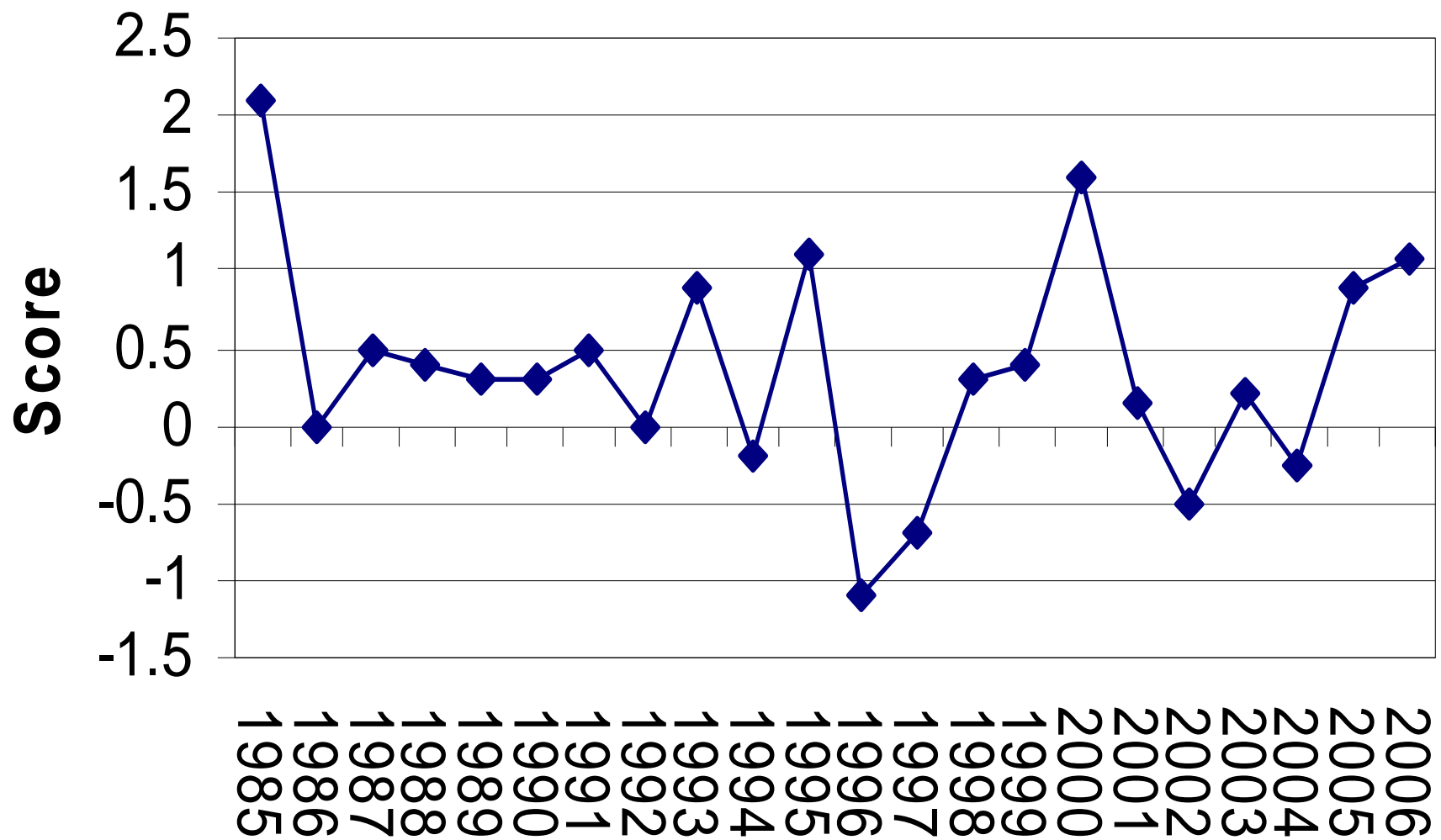
# Skill Score for Pre Monsoon period Rainfall obtained by the Percentage Criteria Method



## Skill score for Peak Monsoon period Rainfall obtained by the Percentage Criteria Method



## Skill Score for Late Monsoon Period Rainfall obtained by the Percentage Criteria Method



## Skill Score For Decadal And Seasonal Rainfall Forecast By Percentage Criteria

Year	June	July	August	September	Seasonal		
					Early	Peak	Late
1985	0.9	-1.0	0.8	+1.8	0.7	2.0	2.1
	0.2	-1.5	0.9	-1.3			
	-1.2	-0.4	-0.2	0.2			
1986	0.8	0.0	0.2	0.3	0.7	1.3	0.0
	0.9	0.7	0.8	0.1			
	+1.0	0.9	0.3	-0.3			
1987	0.8	-0.8	-1.7	2.1	+0.8	+2.4	+0.5
	0.9	-1.0	0.2	0.3			
	-1.0	-1.1	0.0	0.8			
1988	0.2	0.0	0.4	-0.4	+1.6	+1.0	0.4
	0.0	1.0	-1.5	*			
	0.4	0.7	-0.8	*			
1989	0.0	0.0	1.5	-0.6	-0.7	1.1	0.3
	1.4	1.1	0.2	0.4			
	-1.4	-0.6	-1.2	0.2			
1990	+0.9	0.0	+1.2	-0.4	+1.0	+0.8	0.3
	+1.1	-0.5	+0.8	+0.4			
	-1.0	-0.6	+0.2	+0.1			
1991	-0.53	+0.5	-0.2	-1.2	0	+0.2	0.5
	+0.11	+0.2	+0.3	-1.0			
	-0.67	+0.3	+0.2	+0.3			

Year	June	July	August	September	Seasonal		
					Early	Peak	Late
1992	-2.1	+0.6	+0.8	-0.6	1.5	0.6	0.0
	-0.5	-0.3	+0.1	+1.3			
	+0.4	+0.4	+0.6	-0.2			
1993	*	+0.1	*	+0.2	0.8	1.3	0.9
	*	-1.6	*	+0.2			
	*	+1.2	*	+0.1			
1994	+0.1	+0.2	*	*	0.4	*	*
	+1.6	+0.3	*	*			
	+1.0	+0.3	*	*			
1995	*	+0.1	+1.6	+1.4	-0.5	1.2	*
	*	+0.1	-0.1	+0.2			
	*	*	-0.3	+0.4			
1996	-1.5	+0.4	-0.5	-2.8	0.8	0.0	-1.1
	+1.5	-1.5	+0.5	-0.5			
	-0.9	-1.9	+1.8	-0.3			
1997	+0.2	-0.2	+0.1	-0.05	0.6	1.2	-0.7
	-0.2	+0.08	*	+2.0			
	-0.1	+0.05	-0.08	-0.03			
1998	+2.2	+0.4	+0.1	+0.1	+1.0	+1.2	+0.3
	+1.5	+0.1	+0.7	-0.1			
	-0.5	+0.1	+0.4	0			

Years	June	July	August	September	Seasonal		
					Early	Peak	Late
1999	+0.8	+0.8	0	-0.5	+0.8	+1.1	+0.4
	-0.4	+0.4	+0.2	+0.3			
	-0.5	+0.1	+1.1	0			
2000	-0.4	+0.4	-1.8	-0.3	+1.9	+0.9	+1.6
	0.0	-0.3	-0.3	-0.8			
	+0.9	+0.7	+0.9	+0.2			
2001	*	-0.4	-0.2	-0.3	+1.06	+1.9	+0.13
	+1.3	-0.8	-0.5	-0.2			
	-1.4	*	-1.1	-0.5			
2002	+1.8	-1.2	+0.4	-1.6	+0.9	+0.9	-0.5
	-1.2	-1.8	+0.5	-0.4			
	-0.4	*	+1.5	-0.8			
2003	+0.8	-0.5	-1.0	+0.4	+0.26	+0.5	+0.2
	+0.1	-0.3	-1.6	+0.5			
	-0.3	-0.8	+1.2	+0.8			

REMARK :

( \* ) Is data not Available



## Verification Of Onset And Withdrawl Date Of South West Monsoon Over Myanmar

Year	Onset at Southern			Onset at Northern			Withdrawl from Northern			Withdrawl from Southern		
	F/C	Obs		F/C	Obs		F/C	Obs		F/C	Obs	
1985	II May	16 May	*	III May	29 May	*	-	2 Oct		II Oct	20 Oct	*
1986	II May	17 May	*	III May	8 May	+8	-	29 Sep	-	I Oct	9 Oct	*
1987	III May	1 Jun	+1	II Jun	9 Jun	-1	-	2 Oct	-	I Oct	14 Oct	+4
1988	II May	15 May	*	III May	31 May	*	-	8 Oct	-	II Oct	21 Oct	+1
1989	III May	23 May	*	III May	31 May	*	-	22 Sep	-	I Oct	7 Oct	*
1990	II May	23 May	*	I Jun	12 Jun	+2	-	25 Sep	-	I Oct	7 Oct	*
1991	III May	31 May	*	I Jun	6 Jun	*	-	9 Sep	-	III Sep	27 Sep	*
1992	III May	17 May	-3	II Jun	16 Jun	*	III Sep	20 Sep	*	I Oct	I Oct	*
1993	III May	26 May	*	II Jun	13 Jun	*	III Sep	19 Sep	-1	I Oct	II Oct	+1
1994	I Jun	29 May	-2	II Jun	9 Jun	-2	III Sep	20 Sep	*	I Oct	2 Oct	*
1995	III May	16 May	-5	I Jun	6 Jun	*	III Sep	II Sep	-9	I Oct	2 Oct	*
1996	III May	24 May	*	I Jun	2 Jun	*	II Sep	8 Sep	*	I Oct	2 Oct	*
1997	III May	5 Jun	+5	I Jun	9 Jun	*	II Sep	10 Sep	-1	I Oct	28 Sep	-3
1998	I Jun	31 May	-1	II Jun	4 Jun	7	II Sep	9 Sep	-2	III Sep	24 Sep	*
1999	III May	16 May	-4	III May	26 May	*	II Sep	12 Sep	*	III Sep	30 Sep	*
2000	III May	15 May	-5	III May	24 May	*	I Sep	10 Sep	*	III Sep	21 Sep	*
2001	III May	23 May	*	I Jun	4 Jun	*	III Sep	16 Sep	-5	I Oct	1 Oct	*
2002	III May	29 May	*	II Jun	II Jun	+1	II Sep	4 Sep	-6	III Sep	29 Sep	*
2003	III May	20 May	-1	I Jun	10 Jun	*	I Sep	7 Sep	*	III Sep	24 Sep	*

REMARK : \* Is Forecasted and Observe Dates are Identical, (-) Is DATA NOT AVAILABLE

**Verification of the seasonal forecast** were carried out by using **the percentage criteria**. For the forecast of late monsoon gives poor result when compared to those for early and peak monsoon periods.

- **Verification of the decadal forecast** for all the months are bad.
- **The accuracy for monthly forecast** were between mostly fair and good level.
- **The forecast and observe date of monsoon onset and withdrawl results** were revealed in table (3). It can be evidently seen, out of 18 years forecast, 10 were correct for the monsoon onset of Southern Myanmar area (55% ), 13 were correct for the monsoon onset of Northern Myanmar area (72%). 15 were correct for withdrawl of monsoon for the whole country (87%).

According to above mentioned analogue results, an attempt should be made to have a dynamic model for a decad or a month.

## **Status and problems of application of long-range forecast to users**

Long-range and seasonal forecasts are used to serve the needed information in various end user; i.e is agriculture, water resources, environment, health, disaster, mitigation and transportation etc..

However, problems concerning the seasonal forecasting service include, forecast reliability, incomprehensible technical term. Needed the education and training for the forecaster to improve their skill in relation with increasing program of the country of the seasonal outlook in the each country and also needed improvement of understanding of the users to know and use the long-range forecast information for many sectors.

## **Future Programmes of the Seasonal Forecasting Service including Research and Development**

- NMC at DMH is trying its best to upgrade the seasonal forecasting system through international cooperation.
- NMC at DMH is trying to predict the long-range forecast of Myanmar by using the long range products from global producing centers such as ECMWF, IRI, JMA etc..
- Development of forecasting facilities at NMC endeavours to increase the interaction among NMCs and broaden the knowledge and capabilities of NMCs.
- Invitation of expertise and technology from the international / Regional Organization to further enhance national development.

**Thank You**