

551.526.6:551.513.7:551.553.21:551.557(548.1)

## EL-NINO AND NE MONSOON RAINFALL OVER TAMIL NADU

1. The NE monsoon rainfall over Tamil Nadu during 1997 created an all time record which also happened to be one of intense El-Nino years where abnormal SST anomalies continued from the beginning of the year to the end, nourishing a speculation linking the two.

1.1. Normally Tamil Nadu gets rainfall in this season due to the weather systems like tropical cyclones, depressions, North-South trough activity and coastal convergence to mention a few. During this year, the general wind flow in the lower levels was predominantly easterly with strong westerlies aloft. This situation generated a strong vertical wind shear in this region which is an inhibitive factor for

cyclone genesis. Only the significant strong easterly waves are associated with the excessive rainfall over Tamil Nadu.

2. An attempt is made in this study to related the rainfall activity with the El-Nino intensity. For this purpose, the past 97 years (1901-97) rainfall data *i.e.*, departures from normal over Tamil Nadu were examined with respect to concurrent El-Nino events and the result is given in graphical form (Fig. 1). From the figure it is seen that on more than 80% of the El-Nino years Tamil Nadu has recorded above normal rainfall (17 out of 22 El-Nino years) and even in the remaining 20% of the cases rainfall recorded was well within the departmentally accepted normal range of  $\pm 19\%$ . The significant example of this deviation is the year 1982 when the NE monsoon rainfall did not show direct relationship like 1997. This may be due to other external forcings such as lack of phase-locking between El-Nino and increasing rainfall epoch as reported in the SW monsoon rainfall pattern over the

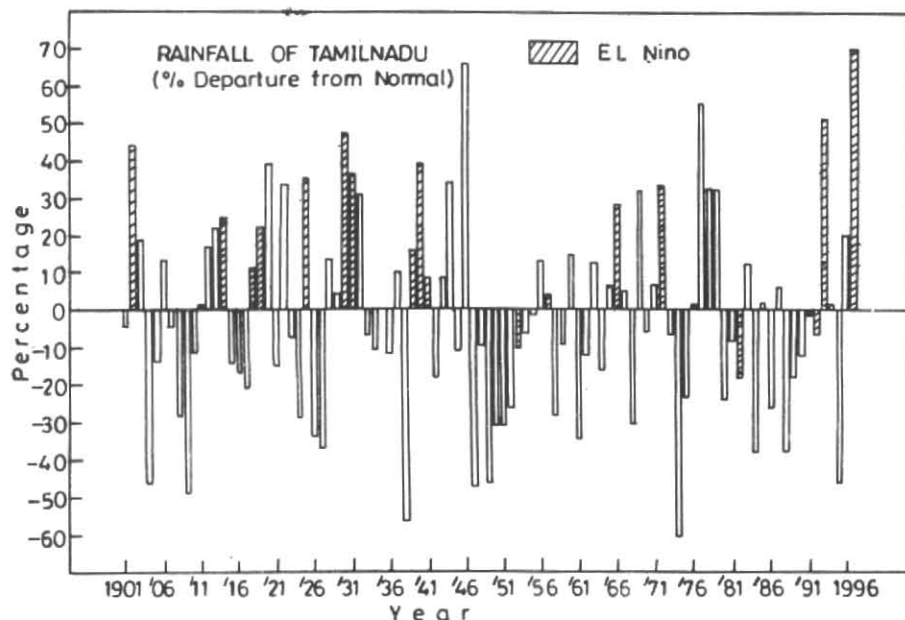


Fig. 1. Rainfall of Tamil Nadu percentage departure from normal

**TABLE 1**  
Table showing % rainfall departure and SST anomaly (1978-97)

Year	% Departure from normal	SST anomaly Nino 3-4 region (5°N - 5°S, 170°W - 120°W)
1978	33	0.0
1979	32	1.0
1980	-24	-0.1
1981	-8	-0.5
1982	-18	1.4
1983	12	0.0
1984	-38	-0.8
1985	2	-0.3
1986	-26	0.5
1987	6	0.6
1988	-38	-1.4
1989	-18	-0.4
1990	-12	0.2
1991	-1	0.1
1992	-6	0.4
1993	52	0.4
1994	1	0.4
1995	46	0.0
1996	20	0.2
1997	70	2.5

country by Kriplani and Kulkarni (1997). This perhaps requires elaborate rainfall analysis of Tamil Nadu which is not within the scope of this study. But still even on this occasion the rainfall departure is seen to be within the normal.

2.1. To statistically evaluate the relationship between El-Nino and rainfall, correlation coefficient has been worked out based on the last 20 years annual SST anomaly data over the Nino 3-4 region for the period 1978 to 1997. The data as available is obtained from the monthly climate diagnostics bulletins. While doing so the maximum SST anomalies recorded during the period upto August of each year only are considered, *vis-a-vis* rainfall departures for

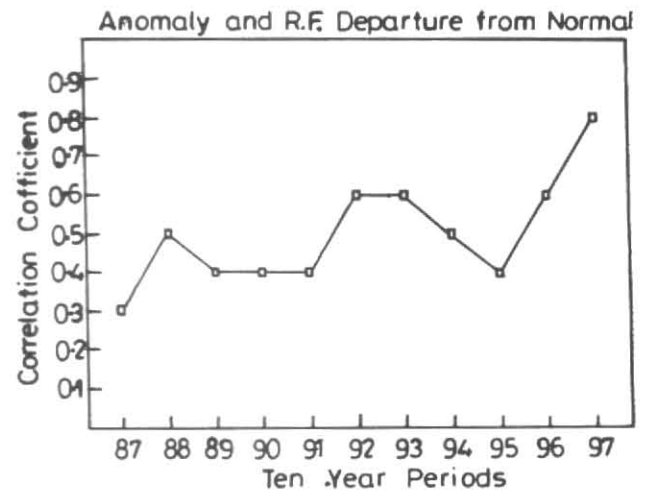


Fig. 2. Diagram showing running C.C.'s Bet.SST anomaly and R/F departure from normal

these 20 years (Table 1). The C.C. works out to 0.66, which is significant at 1% level indicating a direct relationship between El-Nino and NE monsoon rainfall over Tamil Nadu.

2.2. To test the stability of this relationship, a ten year running C.C. is also worked out for the same period (1978-1997) and is presented in Fig. 2. It is seen that the El-Nino and rainfall relationship is always positively correlated and ranges from 0.3 to 0.8. It is thus seen that the relationship appears to be quite stable, implying that El-Nino could be considered as a forcing factor for NE monsoon rainfall over Tamil Nadu.

#### Reference

- Kriplani, R.H. and Kulkarni A., 1997, "Rainfall variabilities over South East Asia connection with Indian Monsoon and ENSO Extremes", New perspective, *Int. Jour. Climat*, **17**, 1155-1168.

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