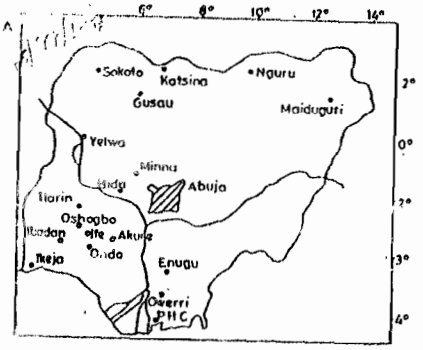

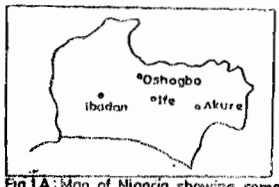

Fig 1A: Map of Nigeria showing some weather stations including the study locations

Fig 1B: Western Nigeria showing the study location.

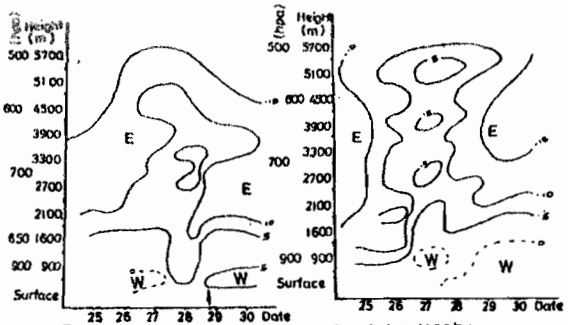

Fig 2: (at 0600 Z)

Fig 3: (at 1200Z)

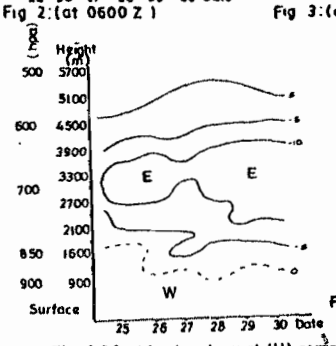

Fig 4 (At 1800Z)

Figs 2,3 & 4: Analysed zonal (U) components for Ibadan at 0600 Z, 1200Z, 1800Z
Phase II experiment: 25/5/93 - 30/5/93

change in depth of the westerlies from 900 hPa on the 29th (1200Z observation) at Ile-Ife to about 970 hPa on the 30th. Also at Ibadan (1200Z) of 29th westerlies suddenly changed from 900 hPa to surface.

Zonal wind profile observed at the passage of squall lines B at Oshogbo, Ibadan and Ile-Ife 2/10/91.

At 0000Z on the 1st of October 1991, the observation of the zonal wind profile at Oshogbo showed the predominance of the westerlies at the lower levels of the atmosphere.

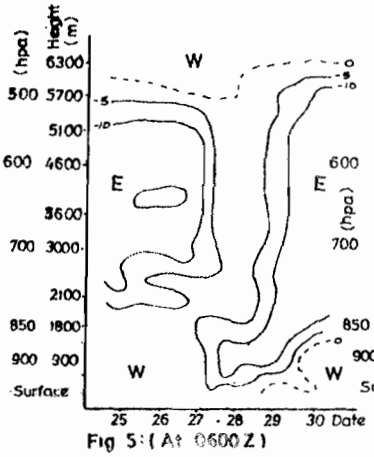

Fig 5: (At 0600Z)

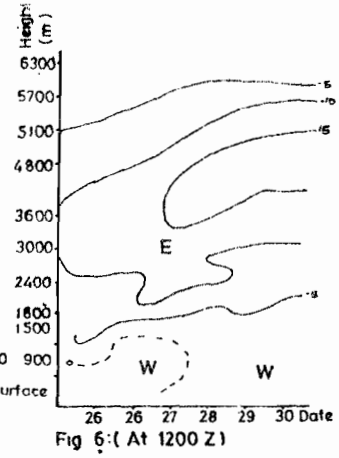

Fig 6: (At 1200Z)

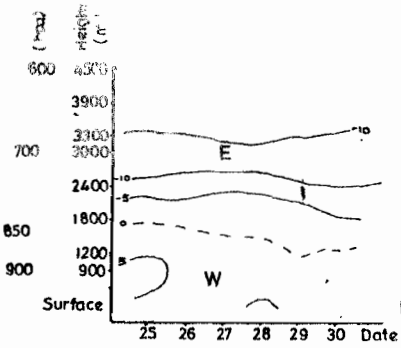

Fig 7 (At 1800Z)

Figs 5,6 & 7: Analysed Zonal (U) components for Akure at 0600 Z, 1200 Z, 1800Z
Phase II Experiment 25/5/93-30/5/93

At Ibadan, although observations were scanty, the westerlies also predominated at the lower level while at Ile-Ife there were incursions of the easterlies at the lower levels cutting the westerlies into two parts (fig 2,4,6).

By 1200Z, 1st of October 1991, the westerlies premominated at the lower levels from surface to 900 hPa at Oshogbo. The incursion of the easterlies to the lower level was still present at Ibadan while at Ile-Ife the westerlies predominated (fig 5,7). On the 2nd of October from 0000Z observations, the westerlies predominated at Oshogbo and Ibadan. At Ile-Ife the incursion of the easterlies that the easterlies predominated the lower levels at Oshogbo (Fig. 2, 3) while Ibadan and Ile-Ife had westerlies (Fig 4-7) but with some signals at Ile-Ife of incursion of easterlies into the lower atmosphere. By 1200Z of 28th Sept, the westerlies predominated at all the three stations. The westerlies were from surface to 850 hPa at Oshogbo, and surface to 900 hPa both at Ibadan and Ile-Ife.

The 0000Z observations on 29th September at Oshogbo and Ile-Ife showed incursion of the easterlies from the upper levels during the passage of squall lines A. There was no observations at Ibadan for that time.

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ON MEAN STATE OF THE ATMOSPHERE AT THE END OF RAINY SEASON IN SOUTHWEST NIGERIA DURING THE MOSOSCALE EXPERIMENT I FROM 28TH SEPTEMBER-9TH OCTOBER, 1991

J. O. OLALEYE

(Received 3 November 1999; Revision Accepted 1 August 2000)

ABSTRACT

For a long time upper air data in Nigeria had been fragmentary. Poor operational upper air network had therefore been responsible for the poor products users get from the forecast office.

This paper describes the wind information obtained during a specially designed meteorological experiment tagged "Mesoscale Experiment I" to monitor the pattern of wind flow at low-levels during the occurrence of squall lines systems at the end of rainy season in three locations in Southwest Nigeria from 28th Sept/9th Oct 1991. Analysis of both the zonal and meridional wind components showed that both the incursion of the upper easterlies to the lower westerlies and the incursion of the northerlies to the southerlies were favourable for bad weather. The winds were found to be generally weak southerlies at the end of the rainy season.

Keywords: Incursion, Rainy, Squall lines.

INTRODUCTION

Daily variation of weather and the seasonal variation of climate are better explained using the behaviour of airflows or upper air network in Nigeria had for a long time been responsible for poor weather forecasts (Adefolalu, 1974).

A major attempt to take stock of the state of atmospheric condition in West Africa was during GATE in 1974 (Adedokun, 1979). At that time several observations were made on the sea to study the synoptic scale West Affrican Monsoon affected by the major wind flow pattern. The mesoscale experiment I (28/9 - 9/10/91) was the first detailed attempt in Nigeria to document the wind structure during the occurrence of squall lines through a planned meteorological experiment in three stations in southwest Nigeria Real time data were used in their raw form, observations were made through carefully designed experiments and all the phenomena were studies in greater details.

DATA

was used in sounding the atmosphere simultaneously at three stations. The three stations where the experiment was carried out are located within Southwest Nigeria. Observations were made at these three stations simultaneously at 0000Z, 0600Z, 1200Z and 1800Z respectively. They were Ibadan (07° 22'N, 03° 34'E), Oshogbo (07° 41'N, 04° 29'E) and Ile-Ife (07° 29'E, 04° 35'E) Fig1.

Data collected from the experiment were used for this work. They are available at both the Federal Ministry of Aviation, Department of Meteorological Services, Lagos and the Federal University of Technology, Department of Meteorology, Akure.

ANALYSIS AND DISCUSSION

The wind data were plotted as shown in fig(2-7) for the zonal components and fig(8-13) for the meridional components. During the period of the experiment three squall lines A,B,C were observed on the 28th September, 2nd of October and 7th October respectvely at Oshogbo, Ibadan and Ile-Ife with the following profiles.

Zonal wind profile observed before, during and after the passage of squall lines A through Oshogbo, Ibadan and Ile-Ife 29/9/91.

From the plots of the zonal components,it was observed at 0600Z of 28th September, before the passage of the squall lines

By 1200Z of 29th, the surface to about 850 hPa was predominated with the westerlies at Oshogbo and Ile-Ife while at Ibadan there was a complete incursion of the easterlies to the surface (fig 3,5,7). Of note also was the

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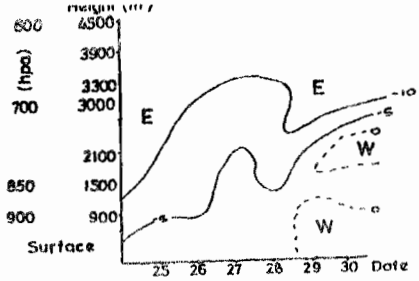

Fig 8 : (At 1200 Z)

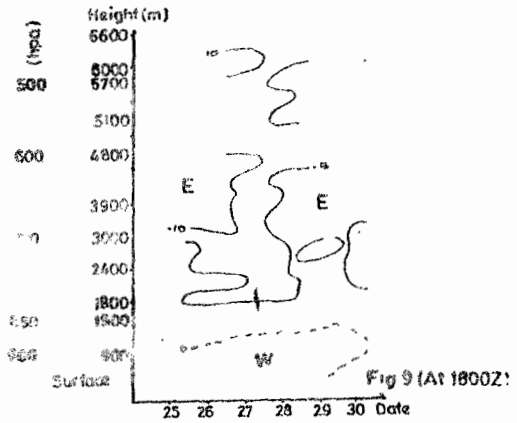

Fig 9 (At 1800Z)

Figs 8 & 9 : Analysed zonal(U) components for Oshogbo at 1200 Z , 1800Z
Phase II experiment : 25/5/93 - 30/5/93

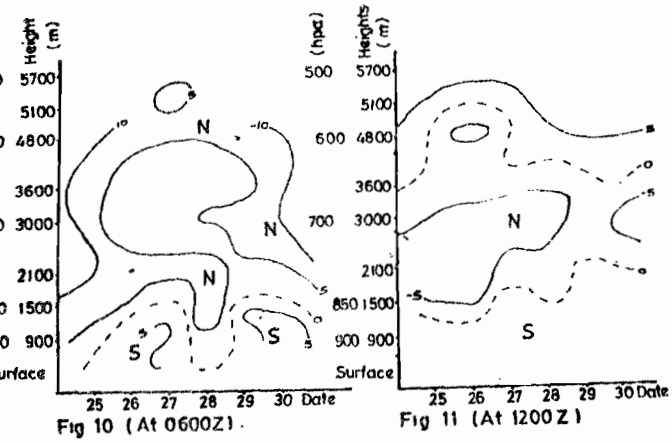

Fig 10 (At 0600Z).

Fig 11 (At 1200 Z)

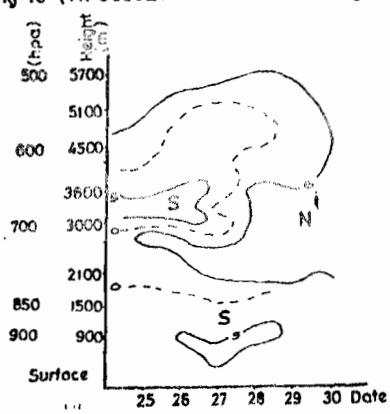

Fig 12 (1800Z)

Figs 10, 11 & 12 : Analysed Meridional (V) components for Ibadan at 0600 Z , 1200Z , 1800Z
Phase II Experiment 25/5/93 - 30/5/93

to the lower westerlies continued cutting the lower westerlies into 2 parts (fig 2,4,6).

By 1200Z, observations of 2nd October, the westerlies predominated in all the three stations with the moisture depth at 900 hPa at Oshogbo, at 1000 hPa at Ibadan and at about 970 hPa at Ile-Ife.

Zonal wind profile observed during the passage squall lines C through Oshogbo, Ibadan Ile-Ife (7/10/91).

At the passage of squall C, the situation at 0000Z 7/10/91 was almost similar to the situation at the massage of squall B. At Oshogbo 0000Z, the westerlies predominated the lower atmosphere. The situation was the same at Ibadan 0000Z observations with a faint signature of the easterlies at the lower levels. At Ile-Ife 0000Z, the signature the easterlies at the lower levels was still present.

At 1200Z of 7th October, the westerlies predominated the lower levels of the atmosphere at Oshogbo with some patches of the easterlies on the 6th. At Ibadan, there were some signature of the easterlies at the lower level while at Ile-Ife the westerlies predominated the lower atmosphere.

Meridional wind profile before, during and after the passage of squall lines A through Oshogbo, Ibadan and Ile-Ife 29/9/91.

From the plots of the meridional components at 0000Z of 28th Sept during passage of squall line A at Ibadan and Ile-Ife there were some pockets of the northerlies at the lower levels(fig 10,12). However at Oshogbo(fig 8) the northerlies, although present, were at 980 hPa level at 0000Z. By 1200Z of 28th Sept, the northerlies had moved to 870 hPa at Oshogbo (fig. 9). Southerlies were at 910 hPa at Ibadan (fig 11) and the northerlies at 970 hPa at Ile-Ife fig (13). On the 29th at the passage of squall lines A, the northerlies had not changed position much at both 0000Z and 1200Z. However on the 30th, after the passage of squall line A, there were changes in the moisture depth.

Meridional wind profile before, during and after the passage of squall line B through Oshogbo, Ibadan and Ile-Ife2/10/91.

The profile of the meridional wind at the passage of squall line at 0000Z of 2nd Oct 1991 at all the three stations showed that the southerlies were predominant at the lower levels. By 1200Z of 2nd October, the southerlies predominated at low levels at Oshogbo up to 850 hpa level. At Ile-Ife there were incursion of the northerlies into the lower levels.

The meridional wind profile at the passage of squall line C was similar to that of the passage of squall lines B.

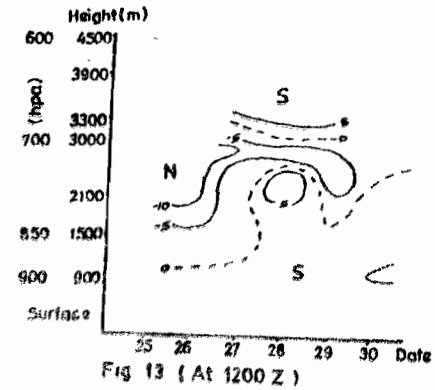

Fig 13 (At 1200 Z)

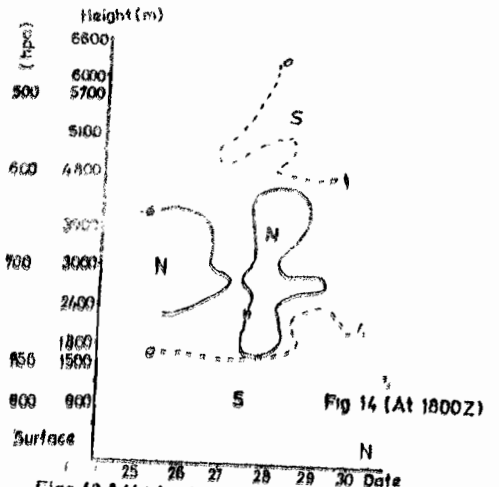

Fig 14 (At 1800Z)

Figs 13 & 14 : Analysed meridional (V) components for Oshogbo at 1200 Z , 1800Z
Phase II experiment 25/5/93 -30/5/93

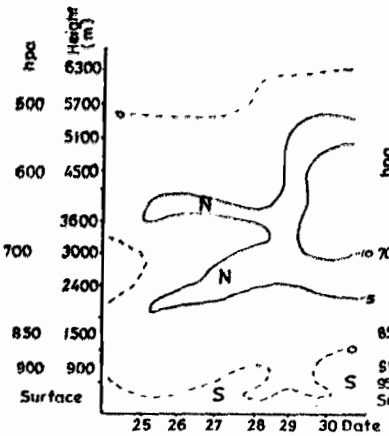

Fig 15 : (At 0000Z)

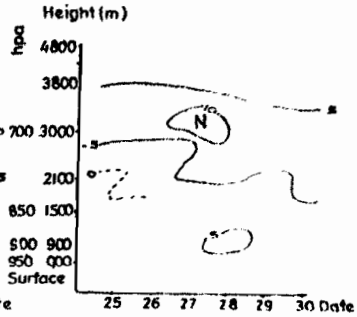

Fig 16:(At 1200 Z)

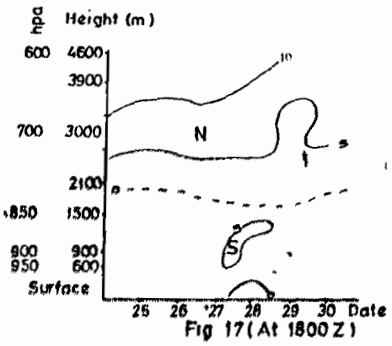

Fig 17 (At 1800 Z)

Figs 15,16 & 17 : Analysed meridional (V) components for Akure at 0000 Z , 1200Z , 1800Z
Phase II Experiment 25/5/93 - 30/5/93

RESULT AND CONCLUSION

The analysis showed that the incursion of the upper easterlies to the lower westerlies and the incursion of the northerlies to the lower southerlies were both favourable for bad weather development (Olaleye, 1995, 1998). The squall lines observed is a follow up event of upper easterly incursion to lower levels. The winds generally were mainly weak southerlies at the period of the experiment, which coincided with the end of the rainy season.

There were several limitations to the experiment being the first of its kind on the continental Nigeria. Some of these were the use of pilot balloon using optical methods. The effect of this was that high altitudes could not be reached. Besides only the wind speed and direction were measured.

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