

## SEASONAL RAINFALL PREDICTION 2011



NIMET providing weather and climate information for informed decisions on socio economy and safety ...

## FOREWORD

Extreme and unusual weather events, resulting in loss of life and property, and disruption of socio-economic activities, are being experienced all over the world. The increasing frequency and intensity of these events constitute a major challenge to socio-economic development, particularly in developing countries. Nigeria is not immune to this global phenomenon. Timely weather and climate information are therefore vital tools for planning in key sectors of the economy that are sensitive to weather.

The negative impacts of extreme and unusual weather on vital sectors of the economy are many and varied. In the **aviation sector**, severe weather conditions lead to flight delays and cancellations, resulting in disruption of business activities. In Nigeria, the rainy season is characterized by thunderstorms, strong winds, line squalls and turbulence, especially at the onset and cessation phases of the season. **Agriculture** in Nigeria is predominantly rain-fed. Consequently farmers suffer tremendous crop failure whenever there are significant changes in rainfall pattern. Quite often, their traditional methods of determining when to commence farming fail on account of **uncertainties brought about by climate change**. Dam managers face challenge of ensuring optimum performance of **hydrological stations** as a result of water shortage or surplus following drought or above normal rainfall. Increasing risk of flooding, soil erosion, drought, etc. In various parts of the country are **disaster risks** which disaster managers have to deal with. The outbreak and spread of some diseases such as cerebrospinal meningitis, malaria, and respiratory tract infections are affected by weather conditions. This is of interest to the **health sector**.

The Nigerian Meteorological Agency's **Seasonal Rainfall Prediction (SRP)** is designed to provide the necessary early warning and advisories in response to the need for adaptation to, and mitigation of, these negative impacts. Its timely and effective dissemination, as well as wide coverage of implications for key socio-economic sectors has always been the Agency's priority. There is no doubt that this climate information tool, if well utilized will go a long way towards supporting sustainable development in various sectors, and as such contribute significantly to the realization of the nation's Vision 20:2010.

The 2011 edition of SRP is a remarkable improvement on previous ones as it has incorporated the relevant comments and feedbacks from stakeholders on the 2009 and 2010 predictions. It also features a more detailed section on socio-economic implication of the predicted rainfall pattern. This is the outcome of a joint review of SRP with some key stakeholders; namely the agriculture, water resources, hydrology, health and power sectors.

I therefore recommend NIMET's **Seasonal Rainfall Prediction** to all to all stakeholders in various sector of the economy and the general public for planning as well as decision making, and the general public for their safety and well-being.

**Mrs. Fidelia Akuabata Njeze**  
**Hon. Minister of Aviation**

## EXECUTIVE SUMMARY

The Nigerian Meteorological Agency (NIMET) has prepared the 2011 edition of its Seasonal Rainfall Prediction (SRP), in fulfillment of its mandate towards ensuring effective monitoring of the nation's climate and subsequent provision of the necessary weather advisories and early warnings to planners, decision-makers and operators of the various rainfall-sensitive socio-economic sectors. This is also in response to the demand of the general public and stakeholders following the outstanding contributions of the previous editions to improve socio-economic activities in the country. This timely preparation of the SRP is to enhance preparedness against climate risks and hazards associated with the respective sectors.

As in previous editions, the prediction was based on the strong tele-connection between El Nino/ Southern Oscillations (ENSO) and the rain-bearing systems over Nigeria. However, while the 2010 Seasonal Rainfall Prediction was predicated on the El Nino phase of the ENSO phenomenon that of 2011 is based on the transition from this El Nino phase to the cold phase otherwise known as La Nina. This phase usually implies more rainfall than normal, interspersed with dry spells for the country.

Moderate to strong La Nina conditions have been observed since mid-August 2010. There is approximately 98% probability of maintaining this condition (i.e. cold phase) through the December-February 2011 season, decreasing to 50% by April-June 2011 season and further to slightly more than the climatological probability of 25% by the July-September 2011 season. Given this scenario, the 2011 rainfall in Nigeria is likely to be under the influence of La Nina phase through September 2011.

The 2011 Rainfall Prediction also utilized a region-specific crop model of maize, and millet in the calculation of crop-specific onset, cessation and length of growing season. Historical daily weather data from about 8-La Nina years at 38-stations spatially distributed over Nigeria were used for these analyses.

In all, 2011 is expected to be generally an early onset, delayed cessation resulting in normal (southern parts) to longer than normal (northern parts) rainfall year. Onset dates between late February (in the southernmost part of the country) and last week of June (in the northernmost part) are predicted with an early onset of about two (2) weeks over a large part of the country. A near normal annual rainfall in the south - to above normal annual rainfall amount in the north is also predicted; varying from 300 to 1100mm in the Northern half of the country and from 1200 to 2700mm in the south.

The forecast cessation period based on a daily analysis of soil water balance calculated using appropriate crop model that has a threshold of 50% available water content of the root zone at maturity is predicted to be between October and November over the country, which is later than normal except in the central part of the country. The

predicted length of rainy season will vary from 90-270days, with a large part of the country experiencing longer than normal rainy season.

In addition to the usual information on rainfall, the 2011 SRP contains temperature forecast for January – April. The nights (minimum) and days (maximum) temperature are expected to be generally colder than normal. Both parameters would be colder than normal in February implying that the harmattan may be more pronounced thus leading to cold conditions during the period. This pattern is likely to continue through March and April.

The implication of the prediction for some key socio-economic sectors was also considered. The Agricultural Sector is likely to witness a good season of agricultural yields and adequate fodder (provided that the forecast recommendations are put into practice). It is believed that the expected longer than normal length of the rainy season and annual rainfall amount would be adequate to support high quantity and quality of meat and milk production. For the savannah region, rainfall would be substantial enough to give high agricultural yields of crops while the predicted adequate rainfall over the south would be sufficient for a good yield of both cereal and root crops. The storage problem faced by some tuber farmers in 2009 is likely to get worse as a result of the expected longer length of growing season. Farmers are advised to harvest when crops are matured and process for value addition when storage conditions are not favourable.

For the Hydrological and Water Resources Sector, this implies water surplus and increase in stream-flows which will affect the dam storages for municipal water supply, hydropower generation and irrigation; particularly, over the northeast. Hence, development and regular maintenance of Dams for Dry Season Irrigation and water supply should be accorded high priority. However, episodic flooding and erosion in the coastal zone and river catchment area may be inevitable and as such adequate publicity is highly recommended in order to reduce damages and risk of losses of life and property, especially in areas prone to river bank overflows.

In the Coastal and Maritime sector, the prospect of having a high fish production in the country may be brighter by the expected normal rainfall. The possibility of rainstorms and gustiness may exacerbate the prospect of coastal flooding and erosion which may result in landslide and loss of lives and properties. Hence, sensitization of relevant SEMA's and NEMA to ensure adequate emergency preparedness for associated risks is advised.

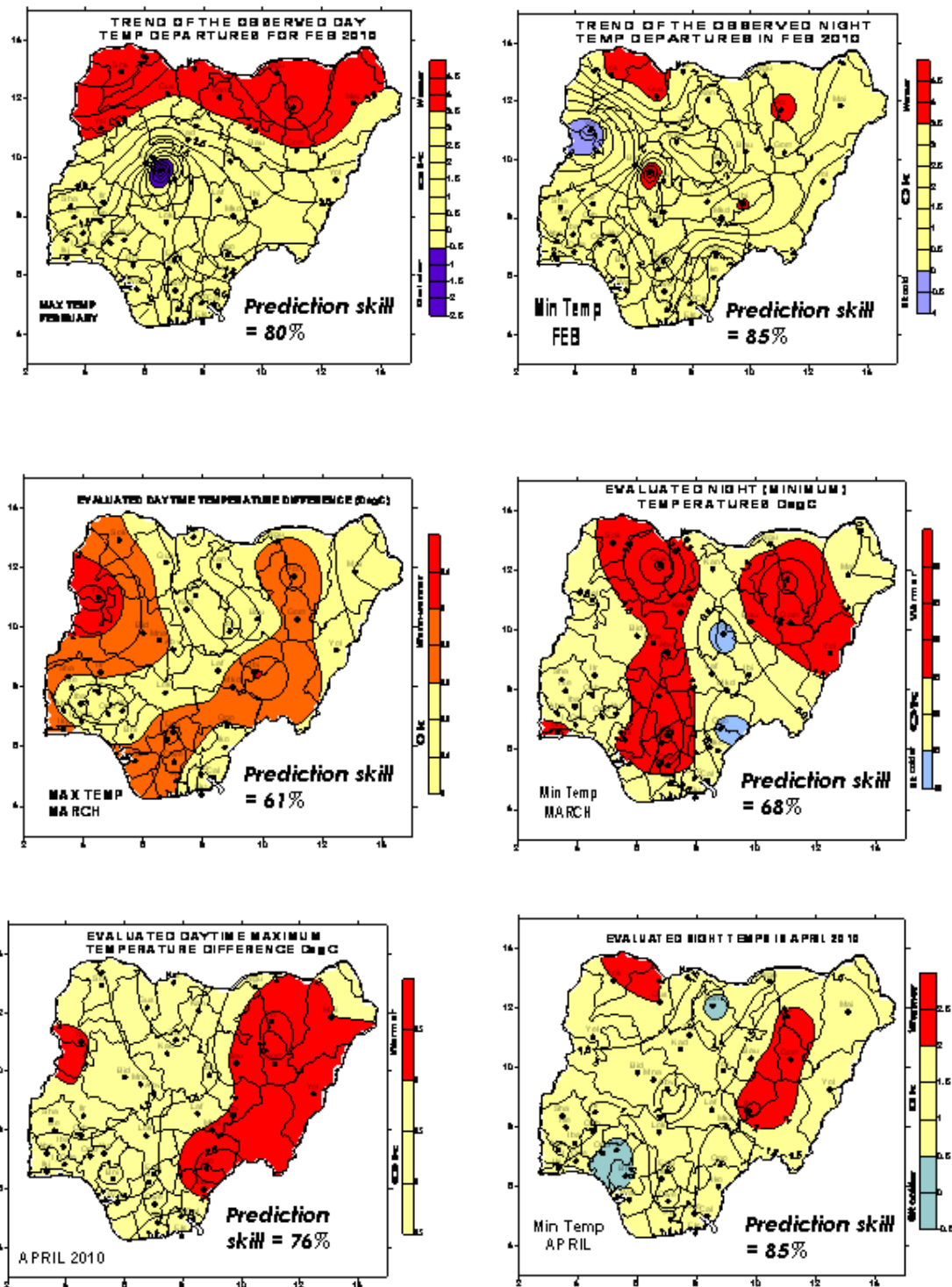
The Health Sector is likely to witness less incidence of meningitis during the month of February as a result of the predicted low temperatures. Also, relevant authorities should provide adequate drainage of excess water to curb water stagnation that serves

as breeding places for mosquitoes and water borne diseases which would lead to improvement in health conditions of Nigerians.

In order to provide the necessary support to citizens in the event of a favorable forecast, Government is advised to among others;

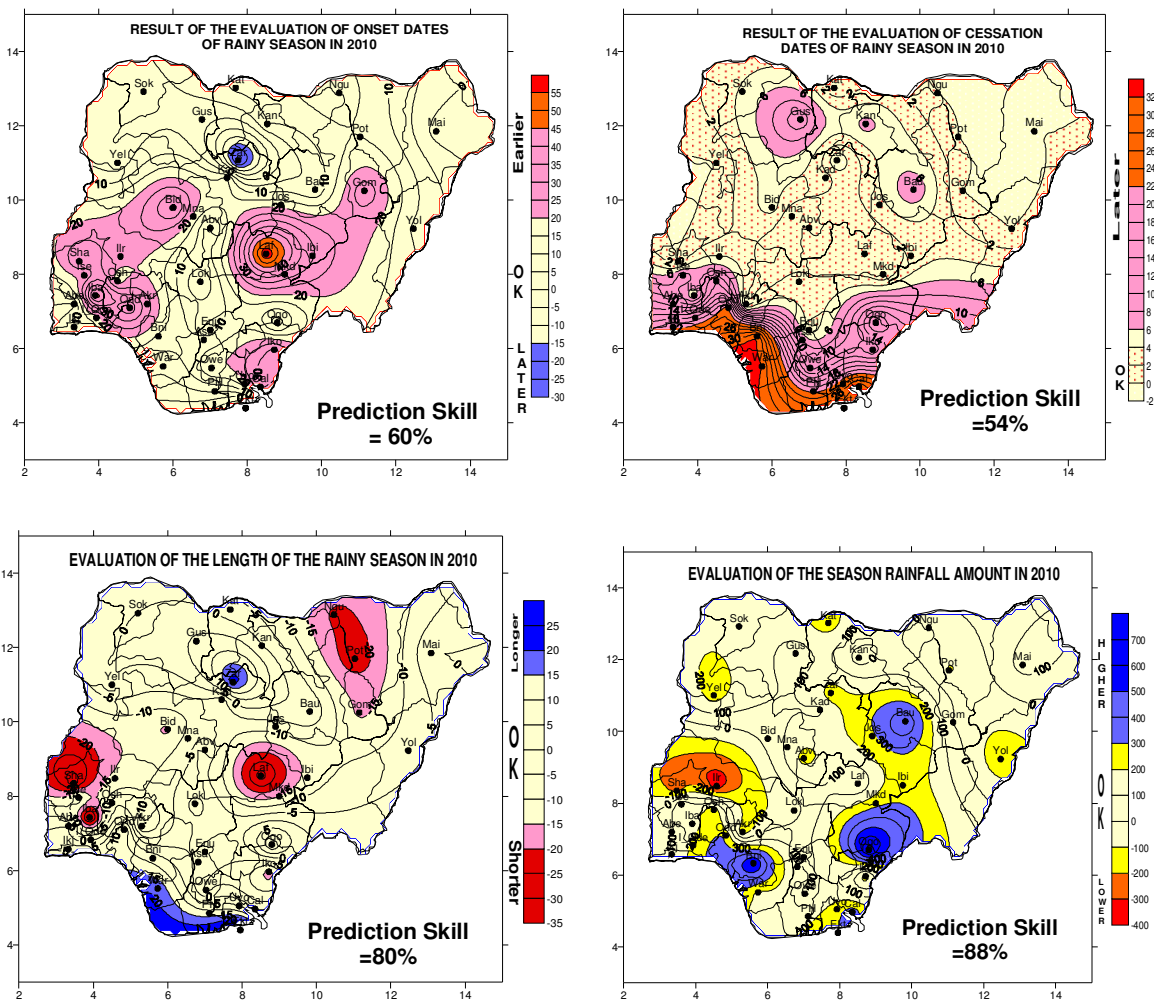
- a) Provide credit facilities to the farmers,
- b) Create a viable environment for the farmers to market excess production as a result of lower than normal risk,
- c) Reinforce the ability to stock-up Federal and States' Grain Reserves facilities in the event of food surplus following the predicted good yields,
- d) Encourage an innovative Livestock feed production by harvesting and adopting biotechnological preservation of fodder for reducing communal clashes between farmers and cattle rearers,
- e) Provide improved high yielding seeds and seedlings for farmers
- f) Provide fertilizer and educate farmers on how to apply it correctly
- g) Encourage irrigation to supplement the water shortage

## REVIEW OF THE 2010 SEASONAL RAINFALL PREDICTION DAY & NIGHT TEMPERATURES



Figs 1a – f: Evaluation of the dry season (Feb – Apr) day and night temperatures in 2010. Reasonably good skill was achieved in the dry season conditions predicted last year

## ONSET, CESSATION, LENGTH OF THE RAINY SEASON & ANNUAL RAINFALL EVALUATION



Figs 1g – j: Predictions agreed with actual condition reasonably well (as shown by yellow-coloured areas in each case)

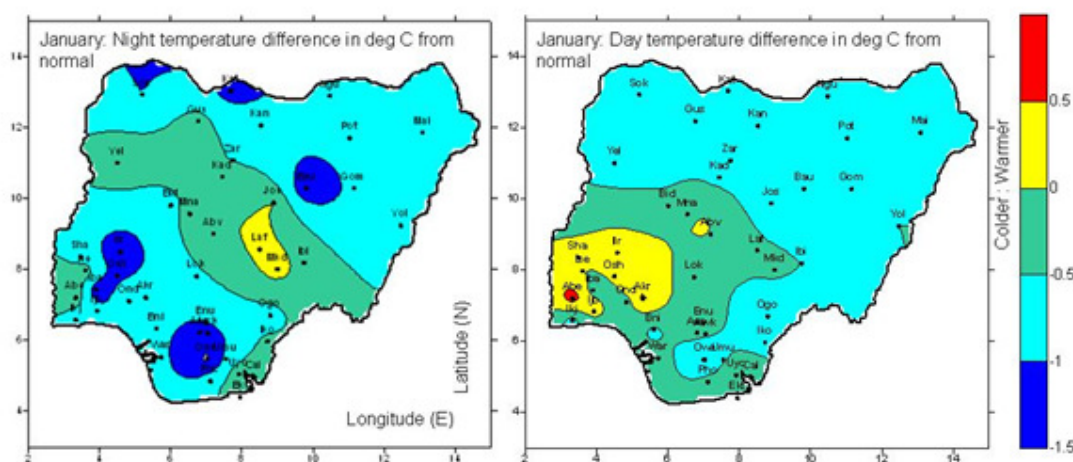


## 1.0 FORECAST FOR THE HARMATTAN & HOT SEASON: JANUARY – APRIL 2011

### 1.1 DAILY MINIMUM & MAXIMUM TEMPERATURE DEPARTURES FROM NORMAL

#### 1.1.1 January 2011

In January 2011, the forecast suggests that minimum temperature (night) and maximum temperature (day) would be colder than normal over large part of the country (1a & 1b). The only exceptions are parts of southwest where day temperatures are expected to be warmer than normal by up to 0.5 degree Celsius. This suggests that livestock which normally resides outside should be protected from cold night temperatures.

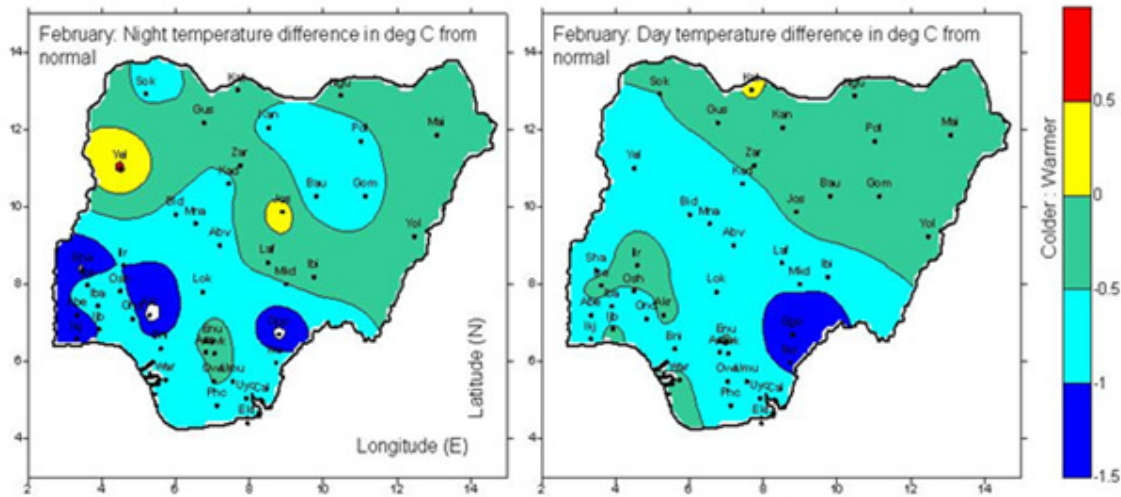


*Figs 2a & b: Night and day temperature departures in January respectively*

#### 1.1.2. February 2011.

In 2011, both night and day temperatures over a large part of the country are also expected to be colder than normal in February. This suggests that the harmattan is likely to be well-pronounced in February in agreement with the expected colder than normal conditions in the country. This situation may hinder the development of conditions favourable for the outbreak of heat-induced ailments such as - measles and meningitis. This condition may also increase the chances of outbreak of dust haze especially in the northern states.

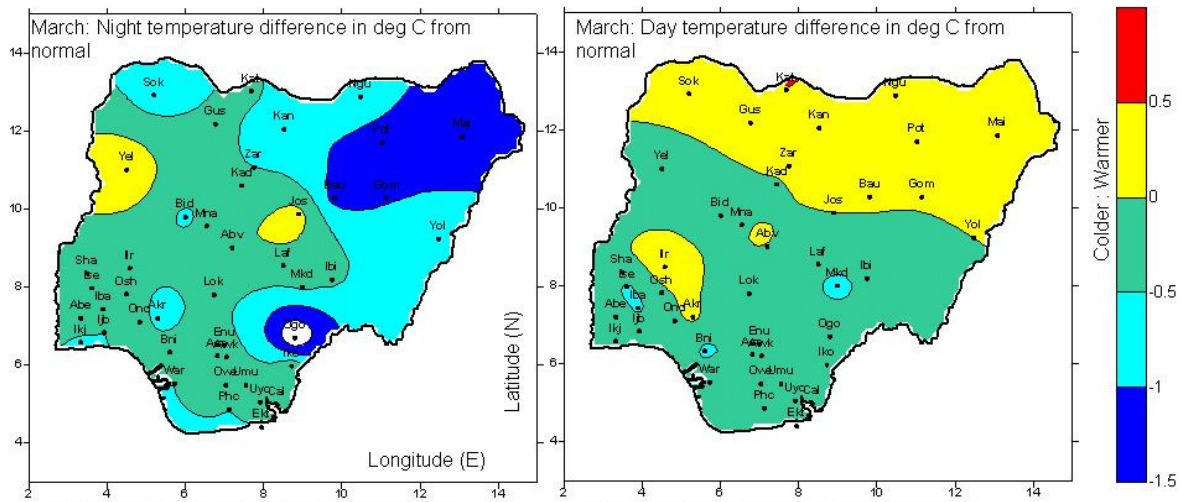




**Figs 2c&d: Night and day temperatures in February respectively**

### 1.1.3 March 2011

Nights are likely to be cold to colder in March, particularly in the northeast corner of the country (Fig 3a). Day time temperatures are expected to get warmer in the north while that trend would not be felt in the rest of the country. After a colder than normal February, day-time temperatures are expected to return to normal in March over the northern half of the country, while southern parts of the nation are likely to remain colder than normal (Fig. 3b).

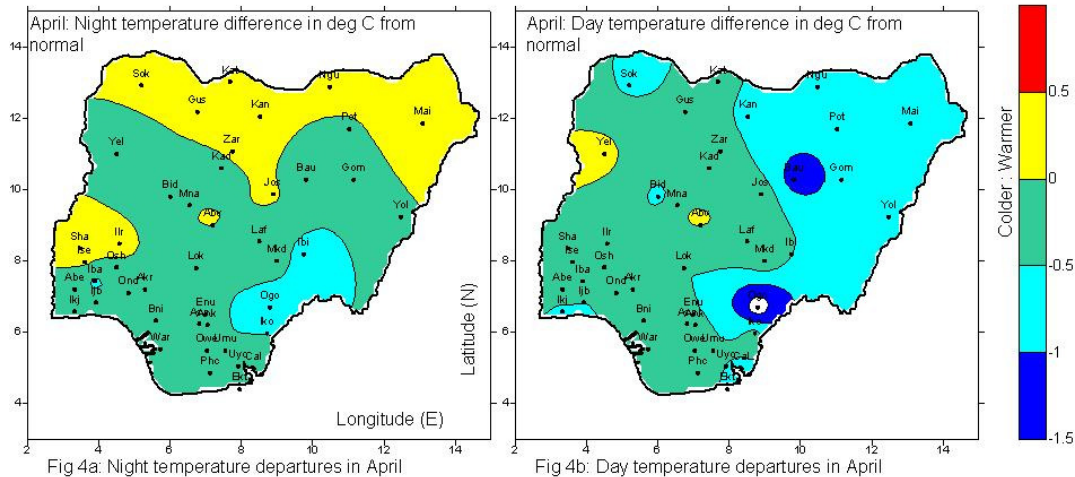


**Fig 3a: Night temperature departures in March**

**Fig 3b: Day temperature departures in March**

### 1.1.4 April 2011

April temperature pattern will be slightly warmer nights and colder days in the north while colder nights and days in the south. This is likely to be triggered by the vanishing harmattan season all over the country.



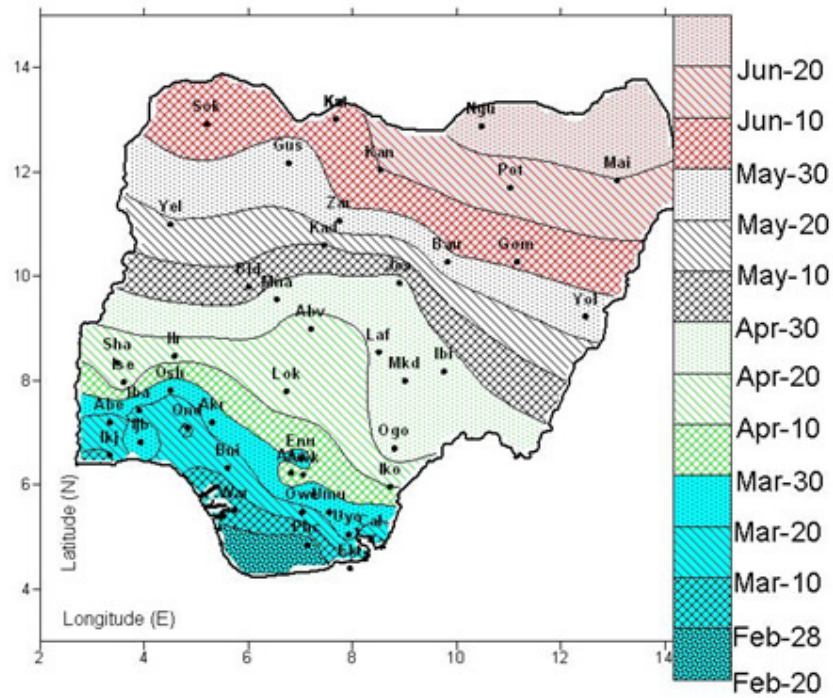
## 2.0 Rainfall Prediction for 2011

In Nigeria, where the economy is largely dependent on rainfed agriculture, the timing of rainfall is indispensable to agriculture for the commencement of the farming season. It affects the choice of crops, their establishment, growth and development, and essentially agricultural productivity and regional economies. Farmer's best seeds are lost to early season dry spell in the event of wrong onset prediction, in addition to heavy financial losses incurred from land preparation operations.

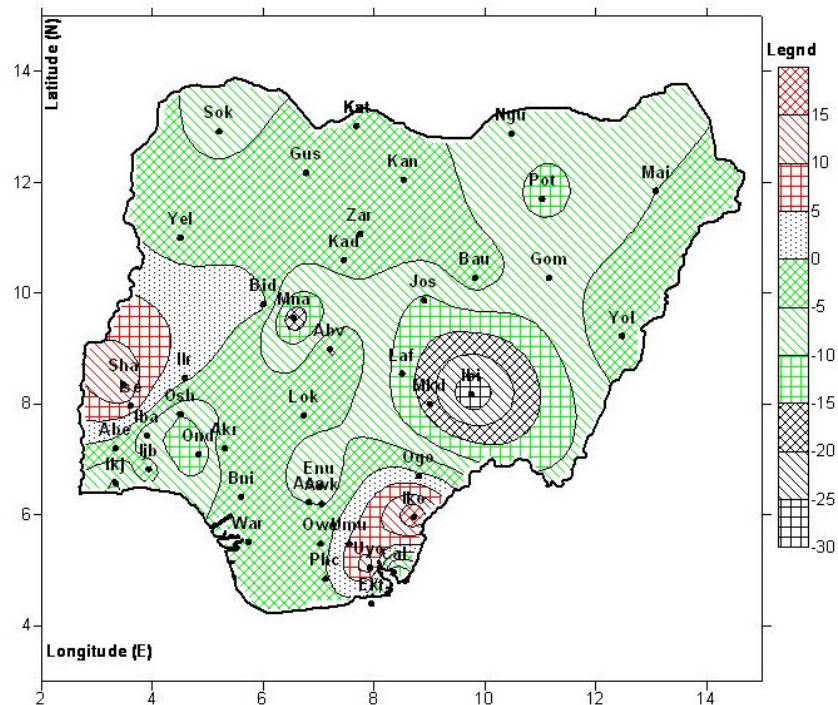
### 2.1 ONSET & BEGINNING OF FARMING SEASON

A failure in the early establishment of rainfall onset usually affects farmers negatively in the country. That is why farmers have identified the onset date as the single most desirable piece of forecast information. From farmer's perspectives, *it is essential that, after a given date, the rain will become fairly continuous and sufficient to ensure adequate soil moisture for and after planting. This soil water level should be maintained as the season advances for successful establishment of crops.* Therefore, *onset identification was based on a daily analysis of the soil water balance depending upon which crop was planted first at the location of analysis.* The analysis focused over the initial establishment stage by identifying and quantifying the risk of crop failure. A combination of historical daily weather data from about 8-La Nina years at 38-stations spatially distributed over Nigeria (as listed in Table 1) and soil water balance for crops were used for 2011 forecast.

From past experience it has been shown that rainfall onset can be reliably predicted using ENSO-phase specific rainfall analysis and crop simulation models for soil moisture analysis. Using this methodology, in 2011, Nigeria is expected to have rainfall onset between February 20 and June 20 as illustrated in Fig 5a. *The prediction shows an early onset of rains in 2011 compared to the normal (1971 – 2000) over large part of the country except around Uyo, Ikom, Ibadan and Shaki (Fig.5b).* Therefore farmers need to be prepared to sow their crops early compared to 2010. Judicious use of these predictions in planning cropping activities will lead to safe sowing and enhanced crop production and food security. This information should be made widely available to extension services and agencies that have the responsibility of advising farmers on appropriate time of planting and varieties to be planted.



**Fig 5a: 2011 Forecast Onset Dates**



**Fig. 5b Change in onset date in 2011 (Negative: Early; Positive: Later)**

## 2.2 CESSATION & END OF FARMING SEASON

Rainfall cessation periods are crucial in Nigeria since they affect both non-irrigated agricultural production and irrigation demand from dry-season crops. Cessation date calculation was based on a daily analysis of the soil water balance calculated using appropriate crop model by quantifying when the available water content of the root zone during crop maturation goes down to 50%. *In 2011, the cessation period is predicted to be between October and November over the county. The rainy season is expected to end later by up to 2 weeks than normal except in pockets around Bida, Minna, Jos, Abuja, Yola, Ibadan and Lagos where it is likely to be up to 2 weeks earlier (Figs 6a & 6b).*

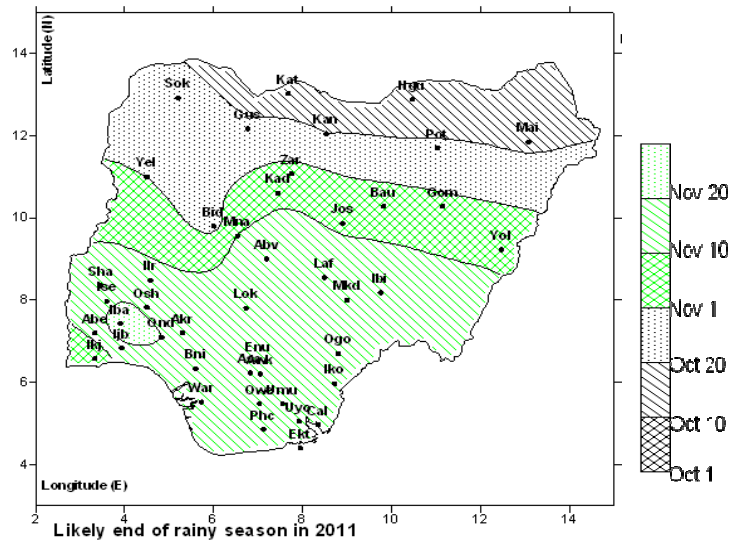


Fig.6a: Likely end of rainy season in 2011

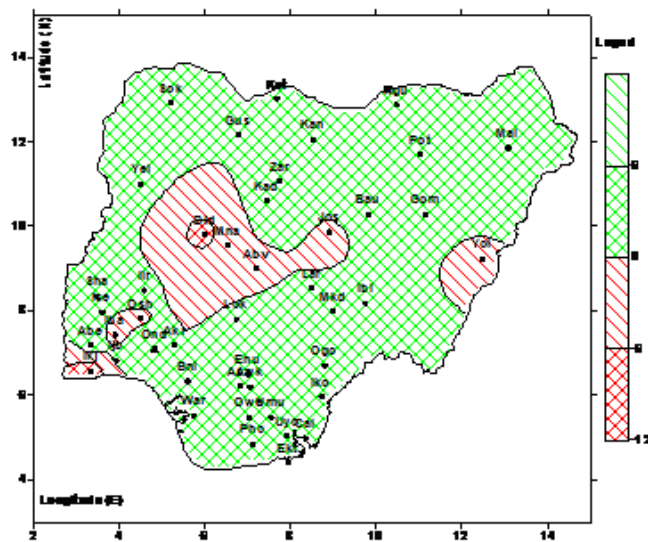


Fig 6b: Change in season end date in 2011  
(Negative: Early; Positive: Later)



## 2.3 LENGTH OF RAINY SEASON

The length of growing season for 2011 was obtained from the difference between forecast cessation and onset of 2011. **From the prediction the length of the rainy season in 2011 is expected to be between 90 and 270 days. Over a large part of the country longer rainy season is expected especially in the northern states.** Figures 7a & 7b should be used to determine the spatial extent of these changes in various states. Because of longer rainy season, it is important that full season crops are planted as soon as favorable conditions are established as **guided by the planning maps above (Figs 6a and 6b)**. In areas of shorter rainy season farmers may consider short season varieties instead of later maturing varieties.

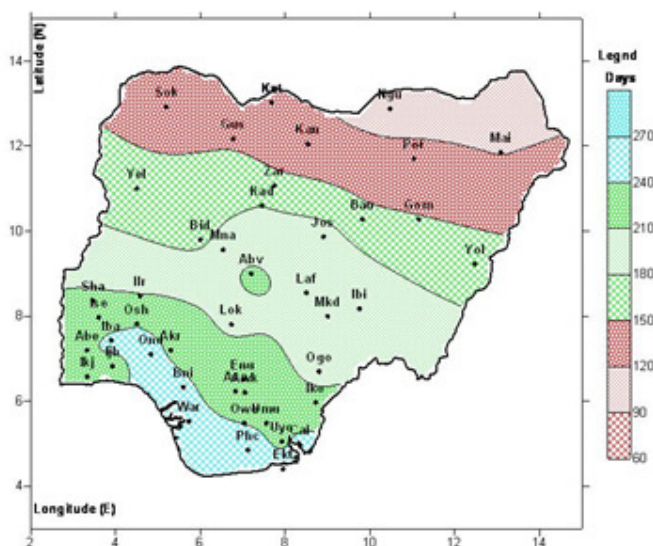


Fig 7a: 2011 Forecast Length of Growing Season

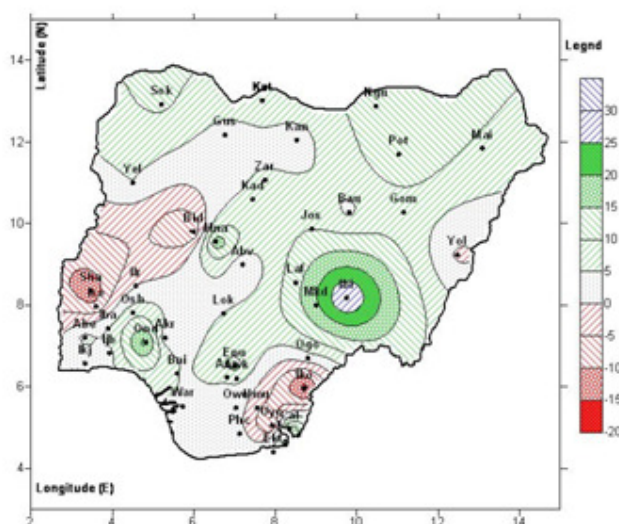


Fig 7b: Change in Length of Season in 2011  
(Negative: Shorter; Positive: Longer)

## 2.4 SEASONAL RAINFALL AMOUNT

The rainy season is defined as the period between the onset and cessation dates of rain in each part of the country. It is expected that there will be considerable variations in annual rainfall over the country (Figs 8a and 8b). The annual rainfall is expected to vary from **300-1100mm** in the northern half of the country. In the south, this will rapidly increase from **1200 – 2700mm**, implying high surface runoff. ***Predicted 2011 rainfall values tend to be higher than normal over large area of the country, particularly in the north-east corner of the country.*** This is likely to create water surpluses in lakes, dams and rivers, for both hydroelectric power generations as well as for irrigation.

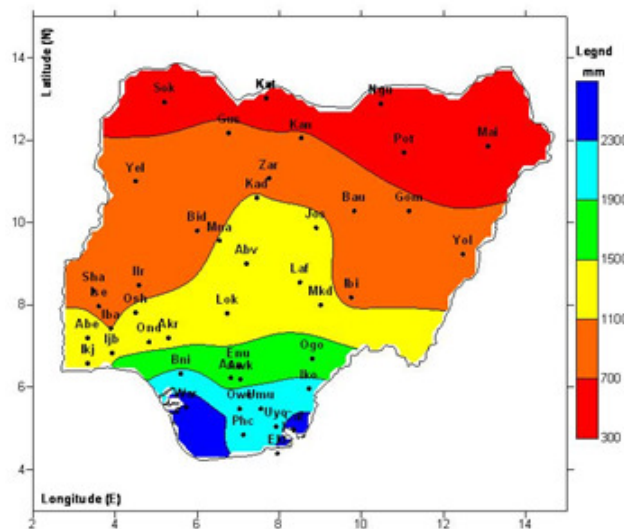


Fig 8a: 2011 Forecast Rainfall in mm

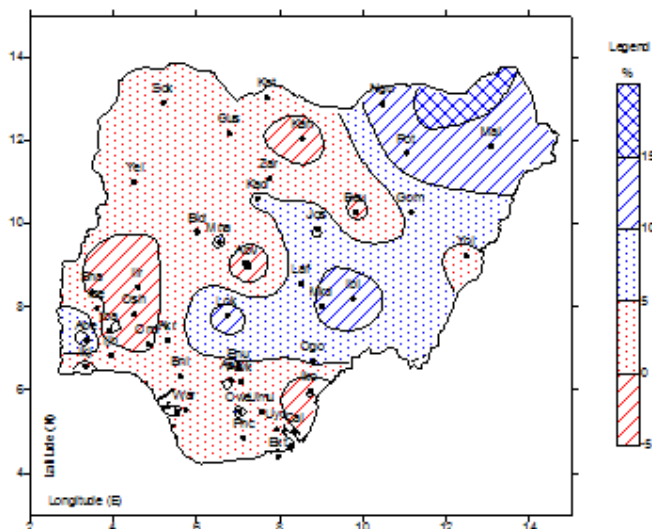


Fig. 8 b. % Change in rainfall from normal



### 3.0 SOCIO-ECONOMIC IMPLICATIONS OF 2011 SEASONAL RAINFALL PREDICTION

#### 3.1 Agriculture:

##### 3.1.1 Crops:

Agricultural drought is less likely across the country in 2011. Due to longer than normal rainy season, agricultural production is therefore likely to increase leading to food surplus. Farmers can also take advantage of the longer than normal rainy season for double cropping of crops such as maize, cowpea and groundnut, and relay intercropping of such root/tuber and grain crops for enhanced productivity and food security. They are advised to source and plant improved high-yielding varieties of seeds, cuttings and seedlings for all crops commonly grown in the country, such as maize, millet, sorghum, rice, soya bean, cowpeas, groundnut, yam, cassava and potato. Farmers should also have access to credit before the planting season commences to enable them buy relevant farm inputs such as fertilizers, agro-chemicals, and hire tractors and other services. Governments at all levels are therefore required to make available improved crop varieties, agro-chemical additives/farm inputs, farm implements (tractors, etc.) and other incentives to farmers and users, on time at subsidized prices.

Substantial rainfall expected over the savannah regions would be enough to give high agricultural yields while the predicted adequate rainfall over the south would be sufficient for a good yield of both cereal and root crops. Farmers in the southern and central parts of the country should plant tuber crops immediately the predicted dates are achieved which fall between February 18 and April 20. The storage problem faced by some tuber farmers in 2009 is likely to occur as a result of longer length of growing season. Farmers are advised to harvest when crops are matured and process for value addition when storage conditions are not favourable. Relevant authorities should ensure that improved crop production be accompanied by the provision of adequate storage facilities and processing capability for value addition and enhanced financial empowerment of farmers.

##### 3.1.2 Livestock

Livestock production would be positively impacted by the expected above normal rainfall. A good management of rangeland with this prediction would greatly help to achieve enough pastures for good production of fodder against the dry season period. This would go a long way in settling the usual conflict between farmers and cattle rearers in quest for fodder. However, farmers are advised to take necessary precautionary measures against diseases that are usually associated with excess rainfall such as Chronic Respiratory Disease (CRD) and high humidity stress especially in poultry birds. Governments at all levels are therefore advised to provide

livestock inputs such as improved breeds, feeds, vaccines, etc. on time to enhance high potential for livestock production.

### **3.1.3 Pest and Diseases**

**Attack of grasshoppers (desert locust), flower-feeding insects, millet head miners and grain-eating birds (quela birds) and environmental related diseases on crops are most likely to occur.** These threats are expected to affect farmers in and around states in extreme northern parts of the country. Relevant government agencies such as the ADPs, LGA Agricultural Departments and Federal Ministry of Agriculture Departments should provide technical and material support to farmers through adequate provision of extension services to ameliorate the impacts.

### **3.2 Coastal and Maritime Sector,**

The prospect of having a high fish production in the country may be bright due to the expected above normal rainfall. The possibility of rainstorms and gustiness may exacerbate the **prospect of coastal flooding and erosion which may result in landslide and loss of lives and properties.** Hence, sensitization of relevant security outfits to ensure adequate emergency preparedness for associated risks and fatalities.

### **3.3 Hydrology and Water Resources**

Water plays a vital role in attainment of energy security. Thus, the above normal rainfall predicted for 2011 over most parts of the country will impact positively on hydrology and water resources of the various hydrological areas of Nigeria and its water-related socio-economic activities. However, the magnitude of the impacts will vary from one hydrological area to the other in the country. It is therefore, imperative that the hydrological and water resources managers become mindful of this forecast and take advantage of the opportunities it offers.

### **3.4 Transportation Sector:**

**Severe rainstorms and strong winds are being predicted** during the rainy season and could reduce visibility. Most of the city roads may be quite slippery and unsafe to travel on a high speed, especially the vehicles with worn out tyres. Hence the Federal Road Safety Corps (FRSC) should ensure that motorist plying the roads have good tyres and maintains minimum/controllable speed in order to reduce the rate of accidents on the roads at such periods. The roads and bridges also need to be adequately maintained before the rains set in.

In addition, our scientific findings show that the activities of hoodlums and vehicle theft increases during the rainy season. Hence, the public and police need to be more cautious and vigilant.

### 3.5 Health:

Apart from the possibilities of increased air-borne diseases due to the harmattan dust haze during the dry season, the lower than normal temperature predicted over some regions of the country during the dry season, will reduce heat stress. This may limit incidences of meningitis over such places and may make malaria parasites more active. Therefore, the health services sector should also take advantage of the advisory to strengthen its contingency preparedness plans.

### 3.6 Disaster Management:

The predicted above normal rainfall may result in flash flooding over the extreme north, particularly to the northeast. It should also be noted that wet spells and flash floods could occur even in areas with a likelihood of near normal to below normal rainfall. Such excessive rainfall may lead to physical damage to crops in the field, and to agricultural equipment and structures (e.g. dams), as well as physical damage to infrastructure – roads, railway lines, telecommunication networks etc. Also, loss of lives and displacement of large populations due to disruption of agricultural activities as a result of extreme weather is very likely.

In addition, the lower than normal temperature predicted over most regions of the country during the dry season, makes the environment less susceptible to fire outbreak. Therefore, the Emergency Management Services are advised to take advantage of these advisories and strengthen their preparedness.

## 4.0 RAINFALL PREDICTION TABLES FOR 2011

Table 1:. A detailed station-by-station analysis of rainfall onset, cessation, and length along with total seasonal rainfall expected in 2011 and their margin of errors (ME).

Station	Onset		End Of Season		Length of Season		Seasonal Rainfall	
	Likely	ME Days	Likely	ME Days	Likely	ME Days	Likely	ME mm
ABE	15-Mar	9	8-Nov	1	240	9	1232	80
ABU	16-Apr	12	13-Nov	4	213	10	1279	105
AKU	26-Mar	5	13-Nov	1	234	5	1325	50
BAU	27-May	7	31-Oct	3	158	6	834	70
BEN	12-Mar	7	12-Nov	1	246	7	2003	57
BID	5-May	8	23-Oct	12	171	19	965	126
CAL	6-Mar	9	15-Nov	1	255	9	2597	83
ENU	26-Mar	7	11-Nov	1	230	7	1690	72
GUS	24-May	5	17-Oct	8	147	9	792	52
IBA	16-Mar	4	21-Nov	4	250	4	1091	67
IBI	24-Apr	12	11-Nov	3	202	12	1003	49
IJE	2-Apr	3	13-Nov	1	226	4	1461	82
IKE	9-Mar	11	27-Oct	16	233	16	1196	90
IKO	9-Apr	17	13-Nov	2	219	17	2007	188
ILO	13-Apr	3	9-Nov	2	211	2	1058	59
ISE	18-Apr	7	13-Nov	2	210	9	1074	58
JOS	24-Apr	5	3-Nov	3	194	4	1230	53
KAD	8-May	2	3-Nov	3	180	3	1144	55
KAN	8-Jun	6	16-Oct	3	130	7	745	90
KAT	2-Jun	6	13-Oct	3	134	6	478	45
LOK	17-Apr	7	6-Nov	1	204	7	1216	92
MAI	18-Jun	4	14-Oct	3	119	3	573	40
MIN	22-Apr	13	6-Nov	2	200	14	1121	54
NGU	23-Jun	8	8-Oct	3	108	9	385	38
OGO	24-Apr	6	11-Nov	1	202	7	1732	147
OND	7-Mar	10	15-Nov	1	254	11	1379	76
ONI	5-Apr	13	10-Nov	2	220	14	1698	133
OSG	21-Mar	7	13-Nov	1	239	7	1142	48
OWE	16-Mar	9	10-Nov	1	239	11	2302	76
PHC	22-Feb	6	13-Nov	1	266	6	2117	75
POT	12-Jun	7	18-Oct	2	129	6	618	35
SHA	11-Apr	7	13-Nov	2	217	7	1081	50
SOK	5-Jun	6	19-Oct	2	137	6	565	45
UYO	27-Mar	8	10-Nov	1	229	6	2071	177
WAR	4-Mar	4	11-Nov	1	252	4	2590	62
YEL	18-May	5	26-Oct	3	161	7	842	128
YOL	24-May	6	3-Nov	3	164	7	802	35
ZAR	27-May	4	30-Oct	3	158	5	908	37

Table 2. A detailed town-by-town results of rainfall onset, cessation, and length along with total seasonal rainfall expected in 2011 and their margin of errors.

State	City	Long	Lat	Onset date	Season end	Season Length Days	Season Rainfall mm
		Degrees	Degrees	<i>Margin of error</i>	<i>Margin of error</i>	<i>Margin of error</i>	<i>Margin of error</i>
				2-17 Days	1-16 Days	2-19 Days	35-188mm
Abia	Aba	7.35	5.10	6-Mar	11-Nov	257	2222
	Umuahia	7.48	5.52	11-Mar	11-Nov	250	2051
Adamawa	Michika	13.43	10.70	16-May	28-Oct	164	751
	Mubi	13.25	10.27	11-May	31-Oct	171	802
	Yola	12.45	9.23	24-May	3-Nov	164	802
	Jada	12.10	8.72	21-Apr	7-Nov	197	1071
Akwa Ibom	Eket	7.95	4.40	26-Feb	9-Nov	268	2530
	Ikot Ekpene	5.18	7.70	8-Apr	10-Nov	214	1322
	Uyo	7.92	5.05	27-Mar	10-Nov	229	2071
Anambra	Ihiala	5.30	6.30	21-Mar	12-Nov	237	1760
	Onitsha	6.78	6.15	5-Apr	10-Nov	220	1698
	Awka	6.20	7.07	31-Mar	11-Nov	224	1505
Bauchi	Bauchi	9.82	10.28	27-May	31-Oct	158	834
	Azare (Katagun)	11.67	10.17	9-May	31-Oct	173	816
	Alkaleri	10.25	10.32	11-May	31-Oct	170	796
Bayelsa	Yenagoa	4.92	6.25	21-Mar	12-Nov	238	1777
	Nembe	4.48	6.37	22-Mar	12-Nov	236	1735
	Brass	4.30	6.25	21-Mar	12-Nov	238	1777
Benue	Gboko	7.32	9.02	25-Apr	6-Nov	192	1009
	Makurdi	9.00	8.00	12-Apr	9-Nov	209	1242
	Oturkpo	7.18	8.13	13-Apr	9-Nov	207	1209
Borno	Biu	10.58	12.18	4-Jun	17-Oct	140	655
	Maiduguri	13.08	11.85	18-Jun	14-Oct	119	573
	Kukawa	12.92	13.57	21-Jun	4-Oct	117	677
Cross River	Calabar	8.35	4.97	6-Mar	15-Nov	255	2597
	Ikom	8.72	5.97	9-Apr	13-Nov	219	2007
	Ogoja	8.80	6.70	24-Apr	11-Nov	202	1732
Delta	Asaba	6.82	6.23	20-Mar	12-Nov	238	1784
	Sapele	5.88	5.67	13-Mar	11-Nov	247	1993
	Warri	5.73	5.52	4-Mar	11-Nov	252	2590
Ebonyi	Abakaliki	6.33	8.08	13-Apr	9-Nov	208	1222
	Afikpo	5.88	7.91	11-Apr	10-Nov	210	1265
Edo	Benin	5.60	6.33	12-Mar	12-Nov	246	2003
	Auchi	7.07	6.25	21-Mar	12-Nov	238	1777
Ekiti	Ado Ekiti	7.60	5.20	7-Mar	11-Nov	255	2181
	Ikere Ekiti	7.50	5.22	8-Mar	11-Nov	255	2173

Enugu	Ilawe Ekiti	7.37	5.05	5-Mar	11-Nov	258	2243
	Enugu	7.00	6.50	26-Mar	11-Nov	230	1690
	Nsukka	6.85	7.38	4-Apr	11-Nov	219	1412
	Awgu	6.07	7.47	5-Apr	10-Nov	218	1386

Table 2 (Continue). A detailed town-by-town results of rainfall onset, cessation, and length along with total seasonal rainfall expected in 2011 and their margin of errors.

State	City	Long	Lat	Onset date	Season end	Season Length Days	Season Rainfall mm
		Degrees	Degrees	Margin of error	Margin of error	Margin of error	Margin of error
				2-17 Days	1-16 Days	2-19 Days	35-188mm
Gombe	Gombe	10.27	11.17	22-May	25-Oct	156	708
	Nafada	11.1	11.32	24-May	24-Oct	154	696
Imo	Okigwe	5.83	7.35	4-Apr	11-Nov	220	1421
	Owerri	7.03	5.48	16-Mar	10-Nov	239	2302
Jigawa	Gumel	12.62	9.37	29-Apr	4-Nov	186	942
	Hadejia	12.42	10.03	7-May	1-Nov	175	835
	Dutse	11.8	9.33	29-Apr	5-Nov	187	949
Kaduna	kaduna	7.45	10.6	8-May	3-Nov	180	1144
	Kafanchan	9.57	8.28	15-Apr	9-Nov	204	1172
	Zaria	7.75	11.07	27-May	30-Oct	158	908
Kano	Kano	8.53	12.05	8-Jun	16-Oct	130	745
	Gaya	11.83	9	24-Apr	6-Nov	192	1013
	Rano	11.53	8.57	19-Apr	8-Nov	199	1104
Katsina	Funtua	11.52	7.3	3-Apr	11-Nov	220	1436
	Katsina	7.68	13.02	2-Jun	13-Oct	134	478
	Daura	13	8.3	16-Apr	8-Nov	204	1167
	Musawa	12.11	7.67	8-Apr	10-Nov	214	1330
Kebbi	Jega	12.2	4.43	27-Feb	9-Nov	268	2516
	Argungu	12.72	4.52	28-Feb	10-Nov	266	2475
	Birnin Kebbi	12.43	4.2	24-Feb	9-Nov	272	2622
Kogi	Lokoja	6.73	7.8	17-Apr	6-Nov	204	1216
	Okene	7.55	6.22	20-Mar	12-Nov	238	1788
	Idah	7.1	6.72	27-Mar	11-Nov	230	1617
Kwara	Ilorin	4.58	8.48	13-Apr	9-Nov	211	1058
	Lafiaji	9.08	6.52	24-Mar	12-Nov	233	1684
	Offa	8.12	4.7	1-Mar	10-Nov	263	2395
Lagos	Ikeja	3.33	6.58	9-Mar	27-Oct	233	1196
	Ikorodu	6.6	3.5	15-Feb	6-Nov	283	2695
	Badagry	6.37	2.88	7-Feb	4-Nov	294	2695
Nasarawa	Lafia	8.47	8.5	18-Apr	8-Nov	201	1120

	Akwanga	8.9	8.4	17-Apr	8-Nov	202	1144
	Keffi	8.83	7.87	10-Apr	10-Nov	211	1276
Niger	Kontogora	10.4	5.45	10-Mar	11-Nov	251	2079
	Minna	6.54	9.56	22-Apr	6-Nov	200	1121
	Bida	6	9.8	5-May	23-Oct	171	965
Ogun	Ijebu-Ode	3.93	6.83	2-Apr	13-Nov	226	1461
	Abeokuta	3.33	7.2	15-Mar	8-Nov	240	1232
	Sagamu	6.83	3.63	16-Feb	7-Nov	281	2695
Ondo	Akure	5.3	7.2	26-Mar	13-Nov	234	1325
	Ondo	4.83	7.1	7-Mar	15-Nov	254	1379
	Owo	7.18	5.58	12-Mar	11-Nov	249	2028
Osun	Ila	8	4.9	3-Mar	10-Nov	260	2307
	Oshogbo	4.5	7.82	21-Mar	13-Nov	239	1142
	Ilesa	7.62	4.73	1-Mar	10-Nov	263	2381
Oyo	Saki	3.47	8.35	16-Apr	8-Nov	203	1155
	Iseyin	3.6	7.97	18-Apr	13-Nov	210	1074
	Ibadan	3.9	7.43	16-Mar	21-Nov	250	1091
Plateau	Jos	8.9	9.87	24-Apr	3-Nov	194	1230
	Bokkos	9.28	8.98	24-Apr	6-Nov	193	1017
	Pankshin	9.3	9.43	30-Apr	4-Nov	185	931



Table 2 (Continue). A detailed town-by-town results of rainfall onset, cessation, and length along with total seasonal rainfall expected in 2011 and their margin of errors.

State	City	Long	Lat	Onset date	Season end	Season Length Days	Season Rainfall mm
		Degrees	Degrees	<i>Margin of error</i>	<i>Margin of error</i>	<i>Margin of error</i>	<i>Margin of error</i>
				2-17 Days	1-16 Days	2-19 Days	35-188
Rivers	Phc	7.12	4.85	22-Feb	13-Nov	266	2117
	Opobo	4.62	7.55	6-Apr	10-Nov	216	1363
	Bonny	4.42	7.15	1-Apr	11-Nov	223	1481
Sokoto	Gada	13.73	5.65	13-Mar	11-Nov	248	2000
	Lema	12.93	4.22	24-Feb	9-Nov	271	2613
	Sokoto	5.2	12.92	5-Jun	19-Oct	137	565
Taraba	Ibi	8.17	9.73	24-Apr	11-Nov	202	1003
	Wukari	7.87	9.77	4-May	3-Nov	180	874
	Gembu	6.7	11.25	23-May	25-Oct	155	701
Yobe	Nguru	10.47	12.88	23-Jun	8-Oct	108	385
	Potiskum	11.03	11.7	12-Jun	18-Oct	129	618
	Damaturu	11.75	11.95	1-Jun	19-Oct	143	662
Zamfara	Gummi	12.13	5.1	6-Mar	11-Nov	257	2222
	Talata Mafara	12.55	6.07	18-Mar	12-Nov	241	1842
	Gusau	6.77	12.17	24-May	17-Oct	147	792
FCT	Abuja	7	9.25	16-Apr	13-Nov	213	1279
	Kwali	8.85	6.98	30-Mar	11-Nov	226	1533
	Karshi	8.82	7.55	6-Apr	10-Nov	216	1363

### NIMET CONTACTS

S/NO	STATE	STATION	CONTACT PERSON	GSM No.
1	Abia	Umuahia	O.O. Ufor	08068183876
2	Akwa Ibom	Uyo	I. J. Akpan	08037609960; 08026394336
3	Adamawa	Yola	S. Buba	08058368711; 08051726509
4	Anambra	Awka	K. Osawaru	08023311111
5	Bauchi	Bauchi	S.O. Adenigbo	08054968140; 08036277475
6	Bayelsa	Yenagoa	W.N. Uriah	08028693332; 08038822237
7	Benue	Makurdi	N.C. Iwuoha	08060205863; 08053298064
8	Borno	Maiduguri	A. D. Zakariya'u	08057564406; 08028267295
9	Cross River	Calabar	E.O. Effiong	08023832965; 08054968133
10		Ikom	A.B. Ikara	07035397567
11		Ogoja	J. S. Jacob	08037606649
12		Eket	B.U. Ayi	08052726068
13		Bebi	J.A. Akpauo	08076235272
14	Delta	Asaba	V.M. Okaka	08076188464; 08023195704
15		Warri	O.J. Idahagbon	08078706259
16	Ebonyi	Abakaliki	S.O. Nwachukwu	08069426580
17	Edo	Benin	E. E. Mmumu	08054968132; 08077884077
18	Ekiti	Ado-Ekiti	M.A. Olatunji	08034257790; 08058742053
19	Enugu	Enugu	I.I. Nwoko	08050871756; 08031344699
20	FCT	Abuja	C. G. Osague	07042112168; 08055419640
21	Gombe	Gombe	E.E. Abasi	08059534934; 08036231223
22	Imo	Owerri	M.N. Osakwe	08054950089; 08065518281
23	Jigawa	Dutse	J.O. Noah	08036820716
24	Kaduna	Kaduna	J.O. Chigbu	08033677744; 08077554786
25		Zaria	F.I. Eshimiakhe	08051792290
26	Kano	Kano	I. Ibrahim	08059424299; 08023005928
27	Katsina	Katsina	G.M. Eyah	08032656396; 08054968137
28	Kebbi	B/Kebbi	A.O. Salami	08036208810
29		Yelwa	M. K. Abdulahi	08067990231
30	Kwara	Ilorin	D.J. Ojedian	08033859232; 08081425192
31	Kogi	Lokoja	R.A. Adamson	07084171314
32	Lagos	Oshodi	D.T. Ngana	08023052053
33		Ikeja	M.O. Iso	08054643806; 08023005890
34		Marine	L.E. Edafienene	08023213456; 07039825551
35	Niger	Minna	E.O. Udezo	08077185673
36		Bida	O.A. Osunlalu	08023372951
37	Nasarawa	Lafia	E. O. Nsemoh	08036424397; 08050834532
38	Ogun	Abeokuta	R.B. Awotiku	08056156630; 08025072733
39		Ijebu-Ode	G.O. Alebiosu	08052984481
40	Ondo	Akure	R.B. Omojuyigbe	08065989345; 08065989345
41		Ondo	J. Apotiola	08081003861
42	Osun	Oshogbo	J.O. Adenle	08032900145; 08054944137
43	Oyo	Ibadan	M.A. Ajisafe	08051040999; 07030575399
44		Iseyin	J.A. Okunlola	08034813305
45		Shaki	F.O. Bolaji	08076563168
46	Plateau	Jos	C.C. Ihekandu	08054415845; 08054968159
47	Rivers	Port Harcourt	B.N. Alilonu	08121983464; 08054627500
48	Sokoto	Sokoto	I.M. Limis	08035678997; 08054968134
49	Taraba	Jalingo	P.F. Tuwase	08085233150

50		Ibi	E.L. Samuel	08022059725
51	Yobe	Damaturu	H.K. Peters	08036851974
52		Nguru	A. Garba	08069594843
53		Potiskum	Moses John	07037624162; 08060606508
54	Zamfara	Gusau	A.S. Maiwurno	07068265367