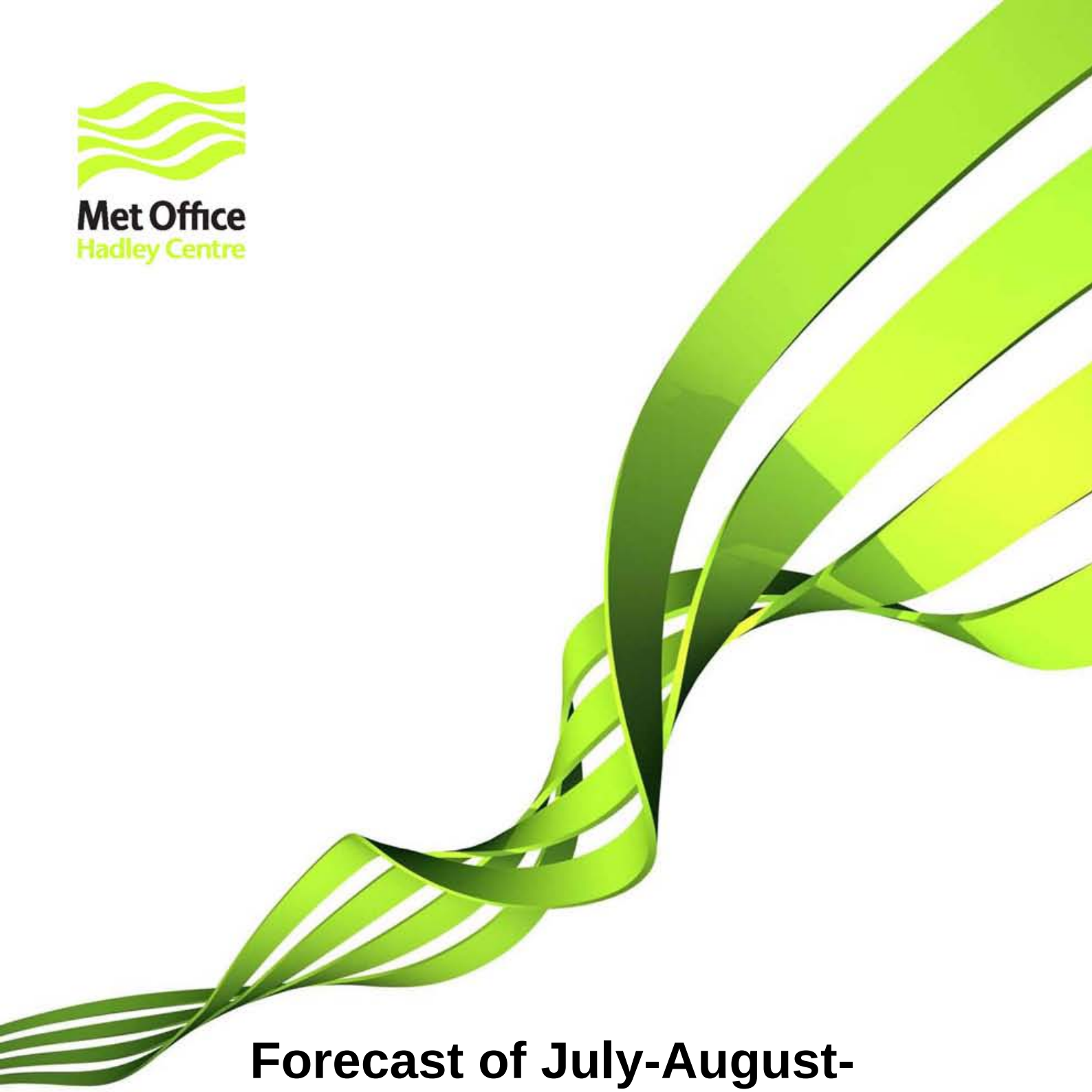

Met Office
Hadley Centre

Forecast of July-August-September 2013 season rainfall in the Sahel and other regions of tropical North Africa: Preliminary forecast

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FORECAST OF JULY-AUGUST-SEPTEMBER 2013 SEASON RAINFALL IN THE SAHEL AND OTHER REGIONS OF TROPICAL NORTH AFRICA: PRELIMINARY FORECAST

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The Met Office has made forecasts of seasonal rainfall for the Sahel and other climatologically defined regions in North Africa since 1986 using a combination of statistical and dynamical methods. A review of the performance of the forecasts in recent years (1987-2007) concluded that forecasts for these North African regions based on the Met Office dynamical model perform as well or better than combined statistical and dynamical forecasts; therefore these North Africa forecasts are now based purely on the Met Office dynamical model forecasts of July-September rainfall produced using the GloSea5 forecast system. The GloSea5 system is replacing the GloSea4 system and benefits from higher resolution (60-90 Km atmosphere and 30Km ocean) global circulation model.

The forecast is presented as a prediction for three climatologically defined regions. The three regions (figure 1) are Region 1 (referred to as the Sahel): 15W to 37.5E,12.5N to 17.5N, Region 2 (referred to as Soudan): 7.5W to 33.75E, 10N to 12.5N, and Region 3 (referred to as Guinea coast): approximately 7.5W to 7.5E, 5N to 10N.

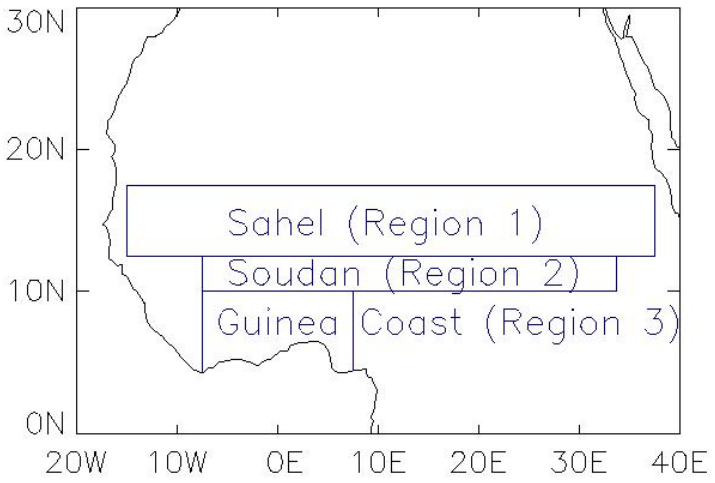

Figure 1 The 3 regions

1. Indications from global sea surface temperature (SST) anomalies

Although the SST based statistical predictions are no longer used, teleconnections between SST and rainfall are still influential in the forecast through their representation in the GloSea5 system. Neutral conditions (neither El Niño nor La Niña) are currently being observed in the tropical Pacific. Recent SST anomalies can be viewed at http://www.emc.ncep.noaa.gov/research/cmb/sst_analysis/#_sstplots. Model forecasts and expert opinion suggest that the likelihood of El Niño or La Niña conditions developing within the timescale of this forecast is low**.** For more information about El Niño and La Niña predictions see the WMO website (http://www.wmo.ch/pages/prog/wcp/wcasp/enso_update_latest.html). Therefore, the influence of El Niño or La Niña is not expected to be significant this season.

Elsewhere, sea temperatures are predominantly above average in the North tropical Atlantic and North Pacific and predominantly below average in the southern Indian ocean and South Atlantic. This inter-hemispheric contrast in SST anomaly favours above average rainfall in West Africa, particularly in the Sahel and Soudan, but the signal for "wet" is not as strong as in some recent years.

2. Prediction for the 3 regions (relative to 1961-1990 climatology)

GloSea5 forecasts for the 3 regions are presented in figure 2. Ensemble predictions from 42 start dates in between March 18th and April 28th have been combined to create an ensemble of 60 members. To calculate the ensemble mean and probabilities the third of members (20 forecast members) with latest start dates are given a 66.7% weight and the remaining members 33.3% weight. The choice of ensemble size and weighting was based on model skill and previous experience in producing these forecasts. The 60 GloSea5 ensemble members for the 2013 season are represented by the purple crosses in figure 2. Corresponding retrospective forecasts from the same start dates in late March and April for seasons between 1996 and 2009 are represented by red crosses and corresponding observations by black crosses. The forecasts and observations are standardised relative to the 1996-2009 model and observed climatology respectively. The solid horizontal lines in figure 2 show quintiles for the three regional indices. The quintiles separate 5 quintile categories which are equi-probable over the 1961-1990 period and are referred to as very dry, dry, average, wet and very wet. Whilst calculated using 1961-1990 data, the quintiles are expressed in standardised units relative to 1996-2009 in figure 2 for consistency with the forecast.

Correlation skill is quite high for the Sahel and Soudan region (r = ~0.7) but less high for the Guinea coast (r=0.3). However the correlation skill figures should be regarded with caution due to the short 14 year testing period. Probabilities of the 5 quintile categories are presented in table 1. Forecast probabilities are calculated for each member assuming it has a normal shaped error distribution with a standard error equal to the standard error of the hindcast ensemble means for 1996-2009. The values in table 1 are a weighted (as above) average of the probabilities for the 60 forecast members. For the Sahel and Soudan regions, probabilities peak for the "wet" category. For the Guinea coast region, probabilities peak for the "average" category. Therefore the "wet" category is our best estimate forecast for the Sahel and Soudan and the "average" category is our best estimate forecast for the Guinea coast region.

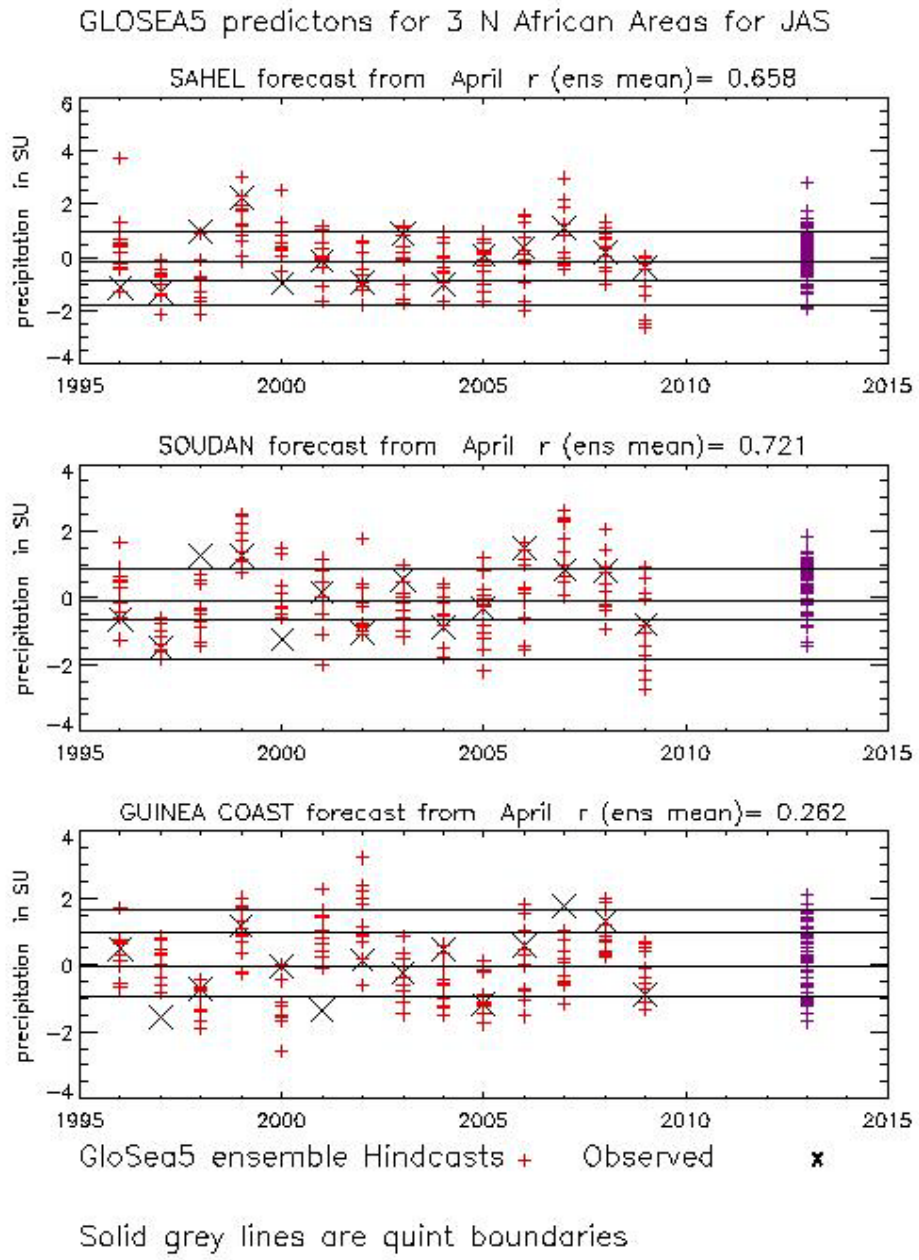

Figure 2 GloSea4 predictions for 3 North African regions for July-September. Solid horizontal lines are the quintile boundaries. Forecasts and observations are standardised relative to 1996-2009 forecast and observed climatology respectively and quintiles evaluated over 1961-1990.

Table 1 PREDICTED PROBABILITIES FOR THE 5 QUINTILE CATEGORIES

REGION	VERY-DRY	DRY	AVERAGE	WET	VERY WET
1 (SAHEL)	0.03	0.10	0.19	0.41	0.27
2 (SOUDAN)	0.02	0.11	0.15	0.38	0.35
3 (GUINEA COAST)	0.20	0.24	0.29	0.14	0.12

Note:

Glosea4 probability forecasts are also available at http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob *. These forecasts are relative to shorter more recent climatology period (1996-2009) but indicate a dry signal in agreement with this forecast.*

FORECAST SUMMARY

Our best estimate quintile categories for the 3 regions are:

Sahel: Wet
Soudan: Wet
Guinea Coast: Average

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