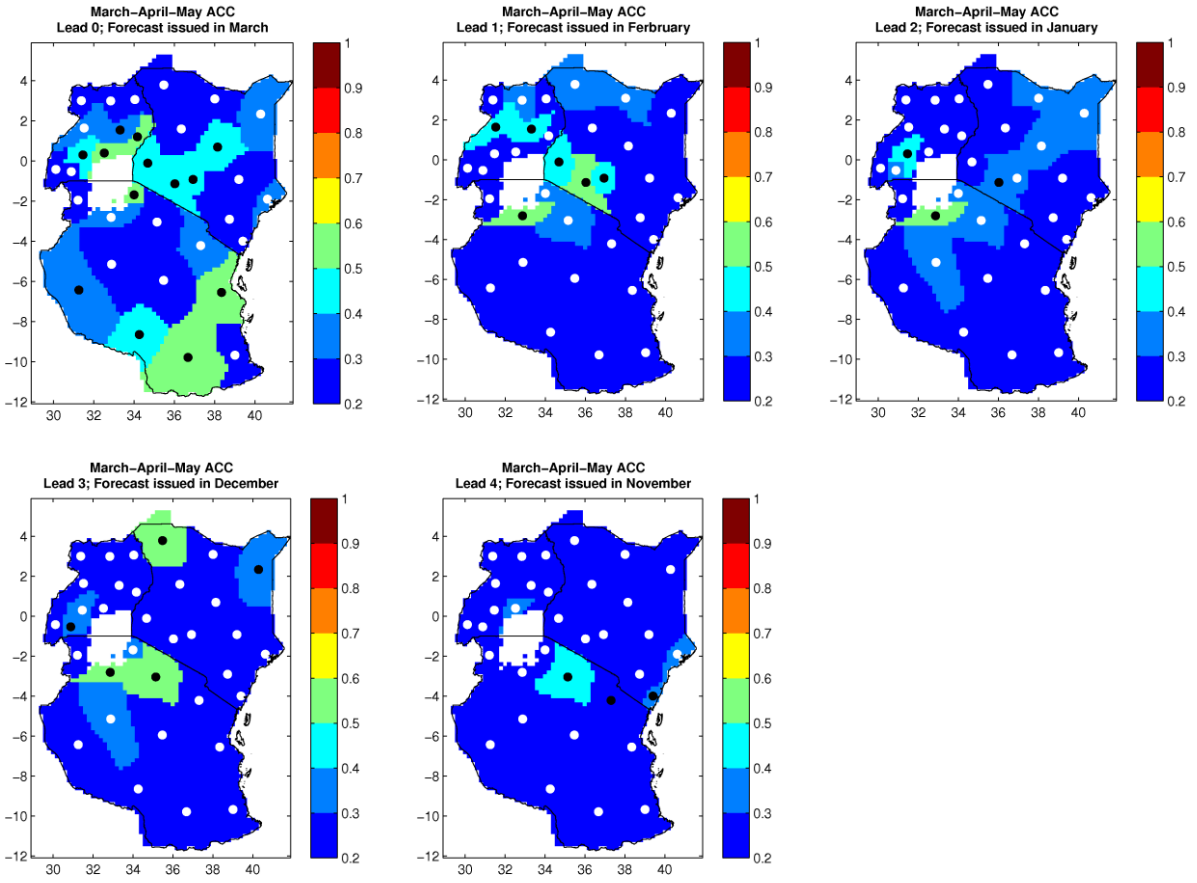
ECMWF'S SYSTEM-4 VERIFICATION AGAINST IN SITU OBSERVATIONS

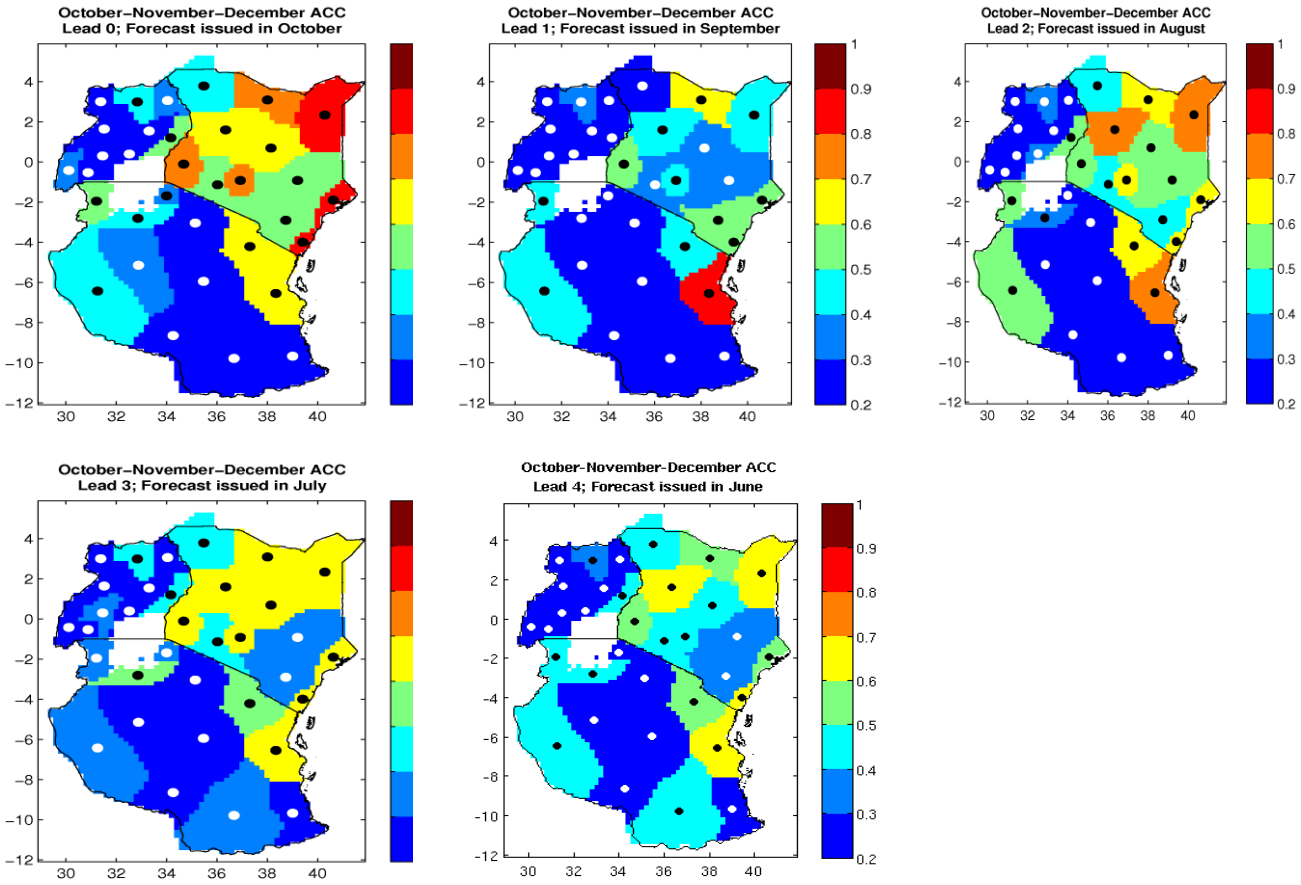
March-May (MAM) and October-December (OND) anomaly correlation coefficients and CRPSSs are shown as a function of lead times. As expected the prediction skill declines with increasing lead time. The skill is higher in the OND than in MAM. Notable is that for both methods, there is higher skill in lead time of 2 than lead time of 1 month in the OND season. This is because of a spurious SYS-4's negative drift in SSTs over the NINO 3.4 region which highly impacts precipitation over East Africa. The fastest drift of SSTs occurs during the boreal summer months. A bias in the near-equatorial winds in the west and central Pacific is the dominant factor in driving an SST bias in the coupled model, whereby SSTs in the eastern equatorial Pacific drift to cold conditions (Molteni et al., 2011).

The skill of the categorical forecasts from ROC scores decline with increased lead time and there is higher skill for OND than MAM, as in the previous results. Over 50% of the stations have considerable skill for OND season for all lead times; this is the case from January for the MAM forecast. System-4 has higher skill for the not dry (Normal and wet) category in MAM for all lead times. Since System-4 has a cold pool over Equatorial pacific then the seasonal forecasts always have a higher skill for La Nina conditions, which are associated with dry conditions over East Africa. Thus the higher skill for not wet (Normal and dry) category in the OND season.

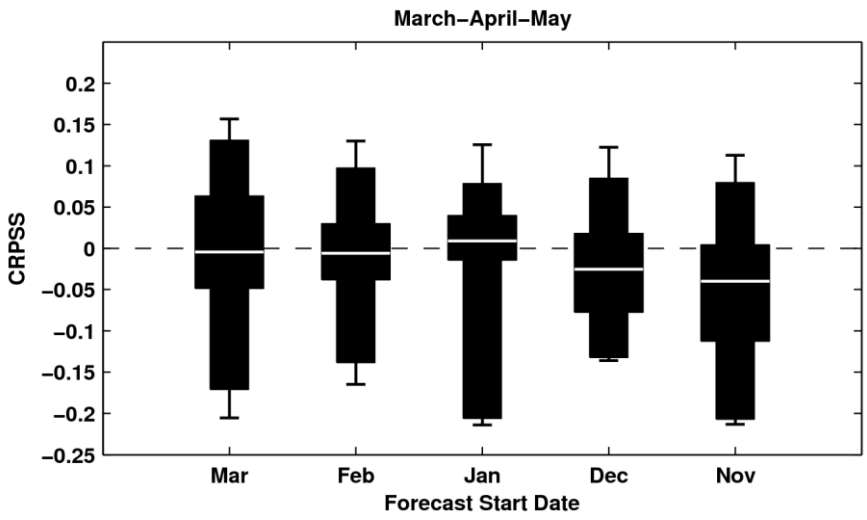
The high predictability in the Horn of Africa is well documented and is due to the teleconnection between the Indian Ocean Dipole and the ENSO. Generally, the prediction skill of System-4 is better in the OND season than the MAM season (Dutra et al., 2012) due to the documented strong relationship between the OND seasonal rains and SST and ENSO (Mutai et al., 1998; Nicholson et al., 1990; Ogallo et al., 1988). While the MAM season rains have been associated with complex interactions between many regional and large-scale mechanisms which generally induce large heterogeneities in the spatial rainfall distribution (Beltrando, 1990; Ogallo, 1982) and virtually negligible correlations with ENSO (Ogallo et al., 1988).

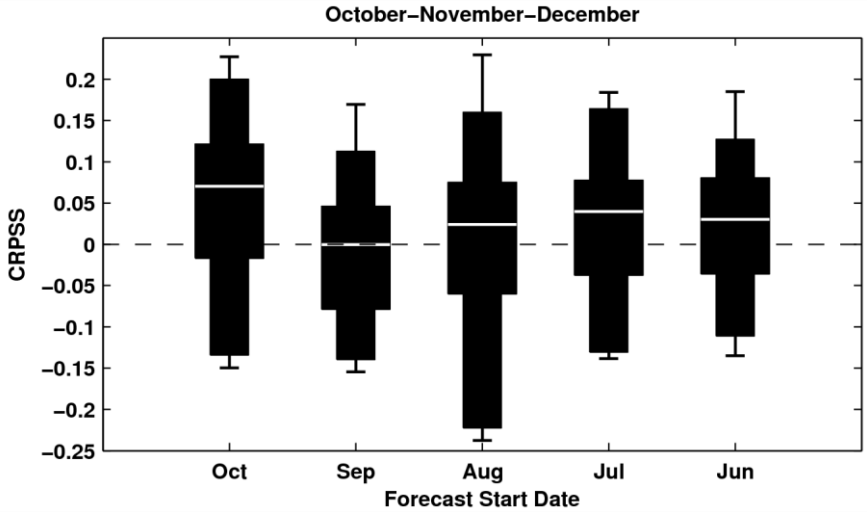


Correlation coefficients between the precipitation anomalies derived from ECMWF SYS-4 forecasts and in situ measurements during the MAM season for the period 1982-2009. Black and white dots represent regions with statistically significant ($P < 0.05$) and insignificant ($P>0.05$) values respectively.

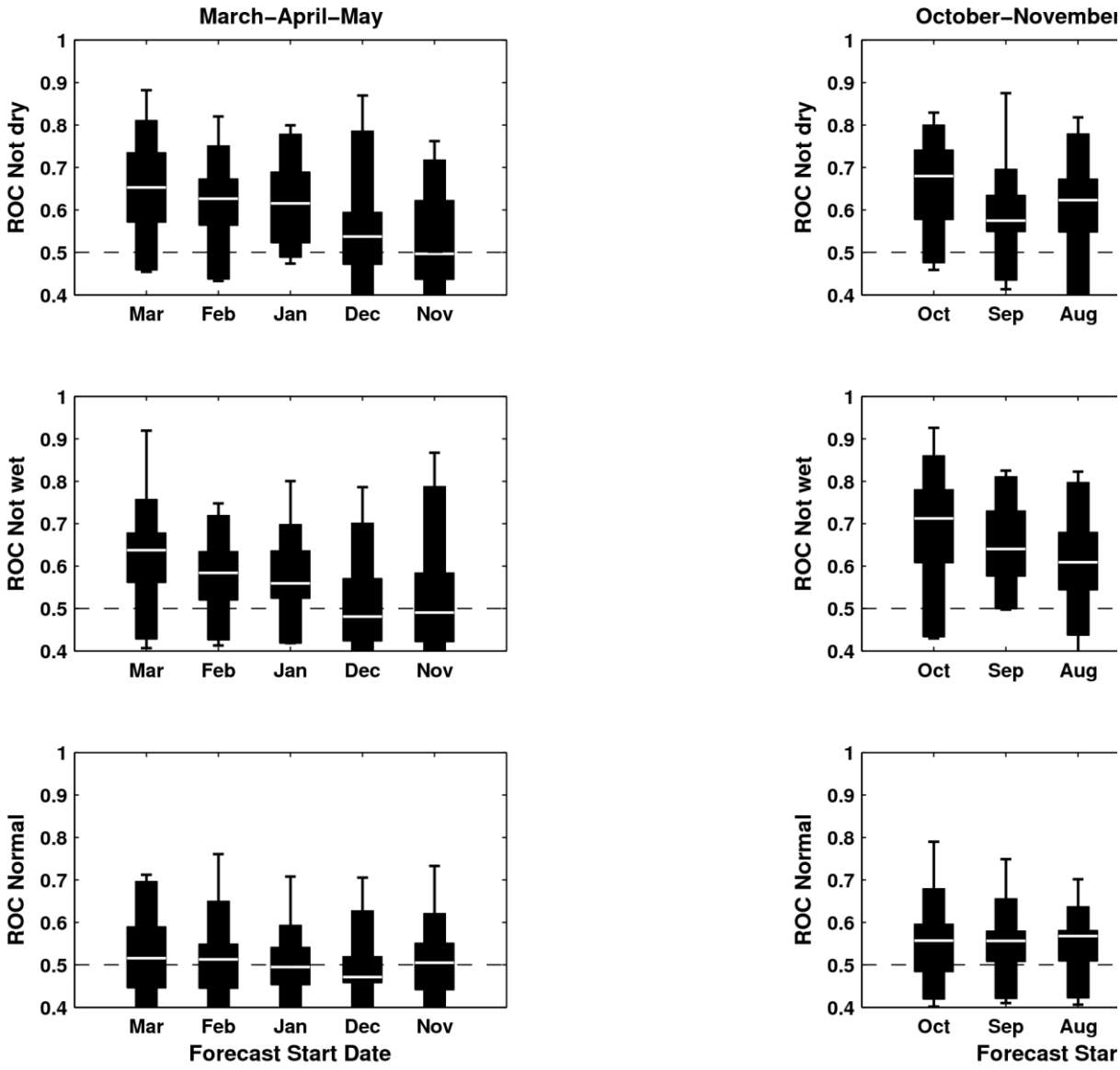


Correlation coefficients between the precipitation anomalies derived from ECMWF SYS-4 forecasts and in situ measurements during the OND season for the period 1982-2009. Black and white dots represent regions with statistically significant (P < 0.05) and insignificant (P>0.05) values respectively.

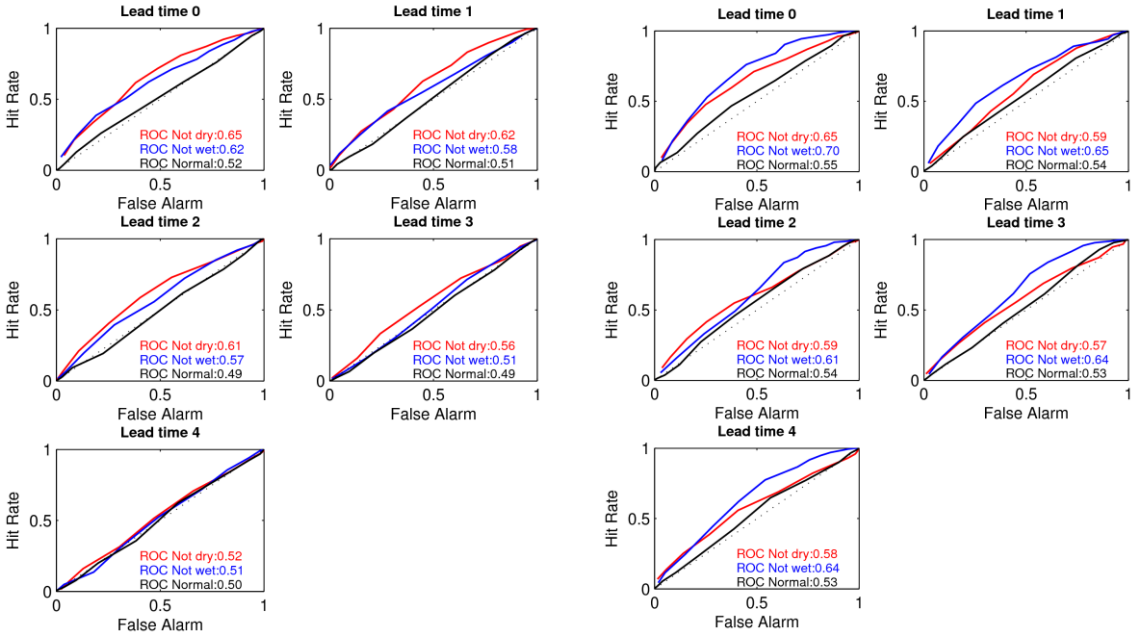




Continuous Ranked Probability Skill Score (CRPSS) for MAM (Top panel) and OND (Bottom panel). The boxplots extend from the minimum (whiskers), percentiles 10, 30, 50 (white line), 70, 90 and maximum.



ROC scores for MAM (Left panel) and OND (Right panel. The boxplots extend from the minimum (whiskers), percentiles 10, 30, 50 (white line), 70, 90 and maximum.



Relative Operating Characteristics diagrams for MAM (Left panel) and OND (Right panel).