Multi-model ensemble forecasts in South Africa

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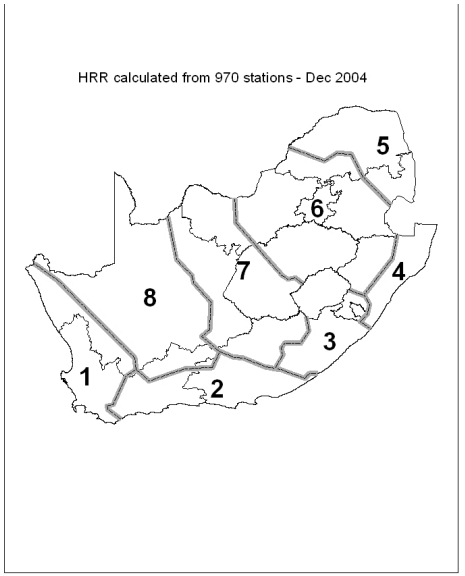
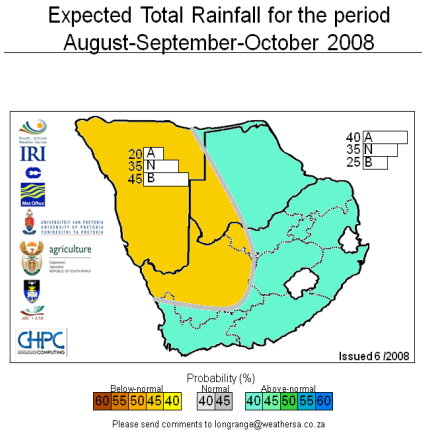
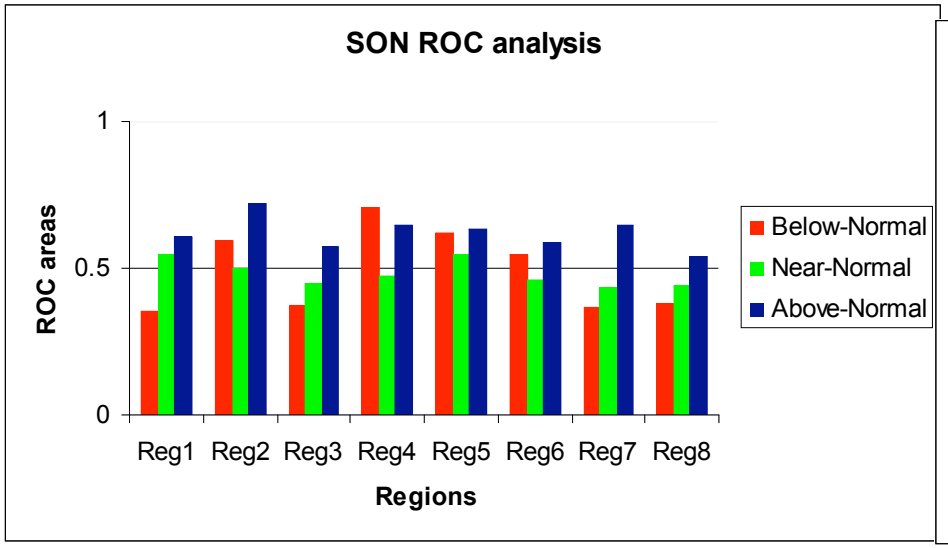
Operational Forecast Skill

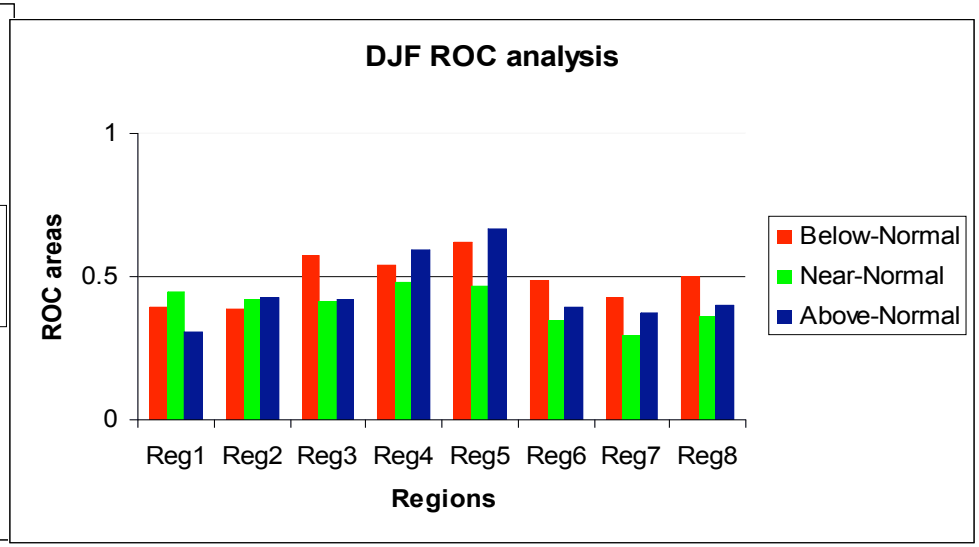
From CONSENSUS discussions

Verification work by Peggy Moatshe

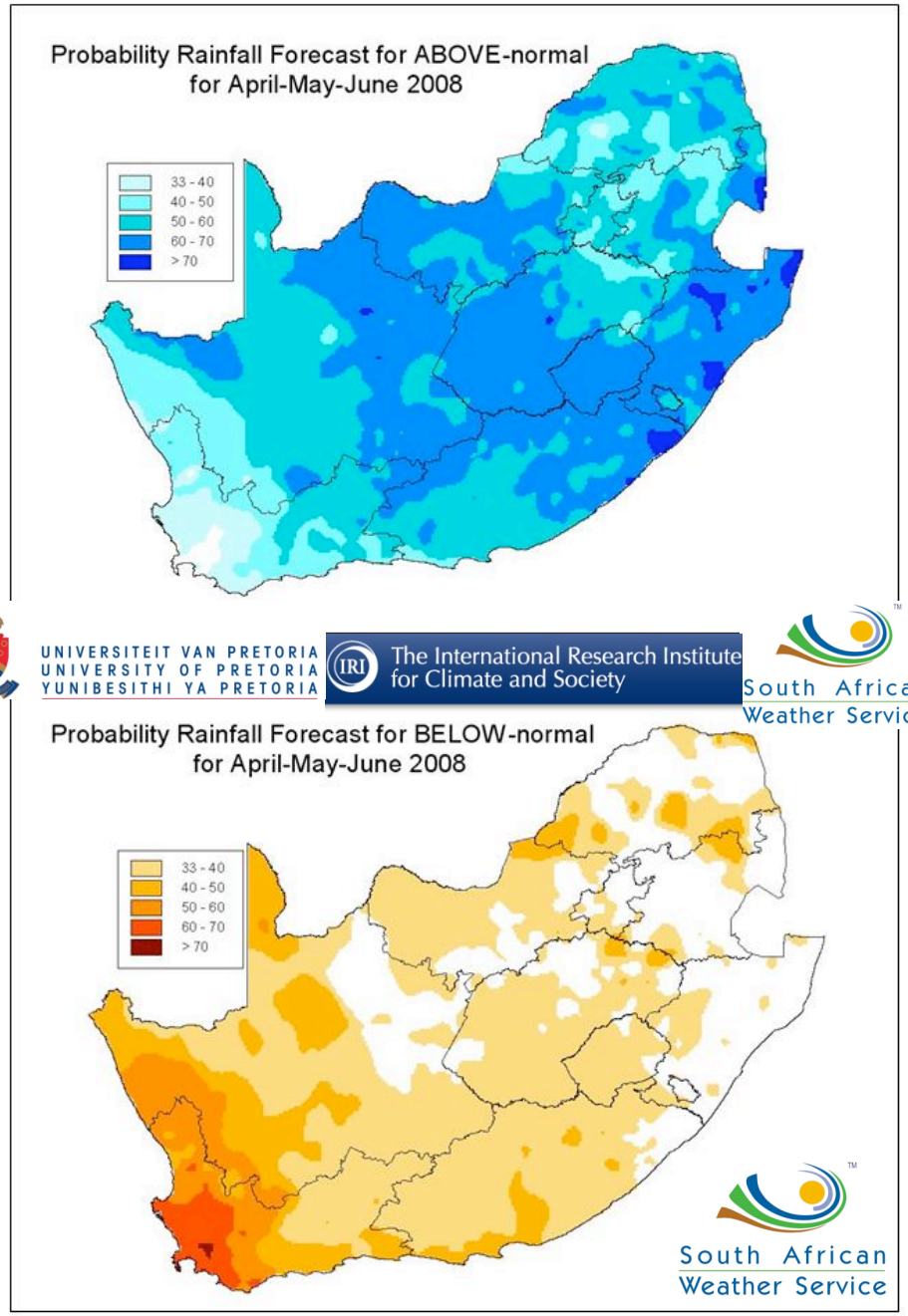






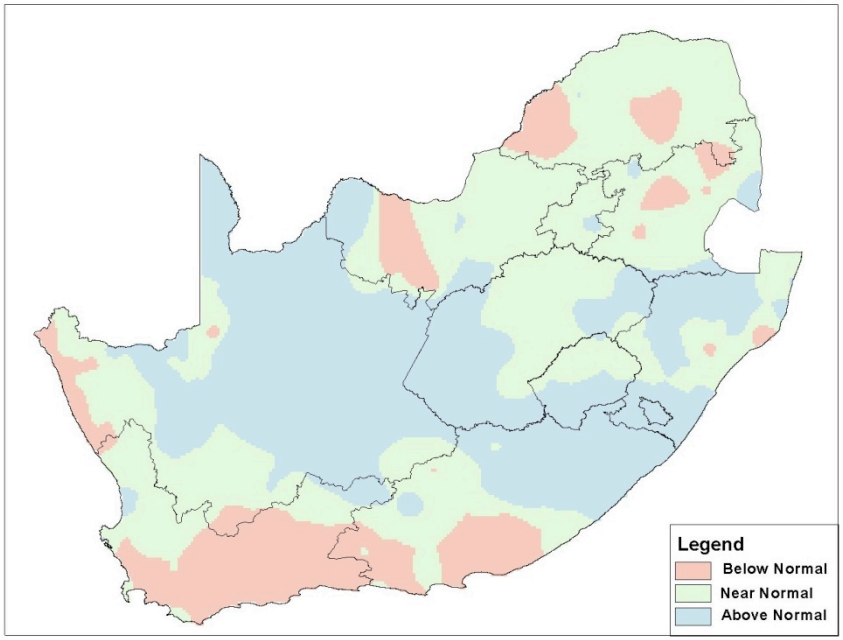


New objective multi-model forecast



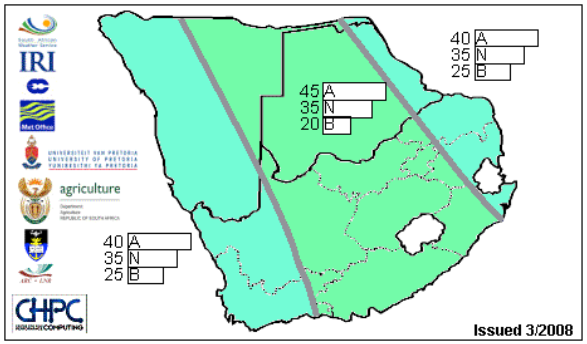
Assessment of Rainfall for
April to June 2008

South African Weather Service



Old subjective consensus forecast

Expected Total Rainfall for the period
April-May-June 2008



Probability (%)

Below-normal					Normal		Above-normal				
60	55	50	45	40	40	45	40	45	50	55	60

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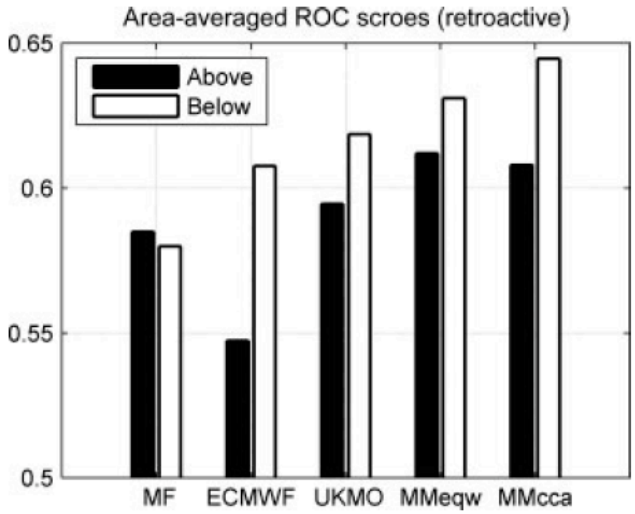


Figure 3. ROC scores, averaged over the southern African domain, for the above-normal and below-normal rainfall categories. Scores for the single models and for the two multi-models are shown.

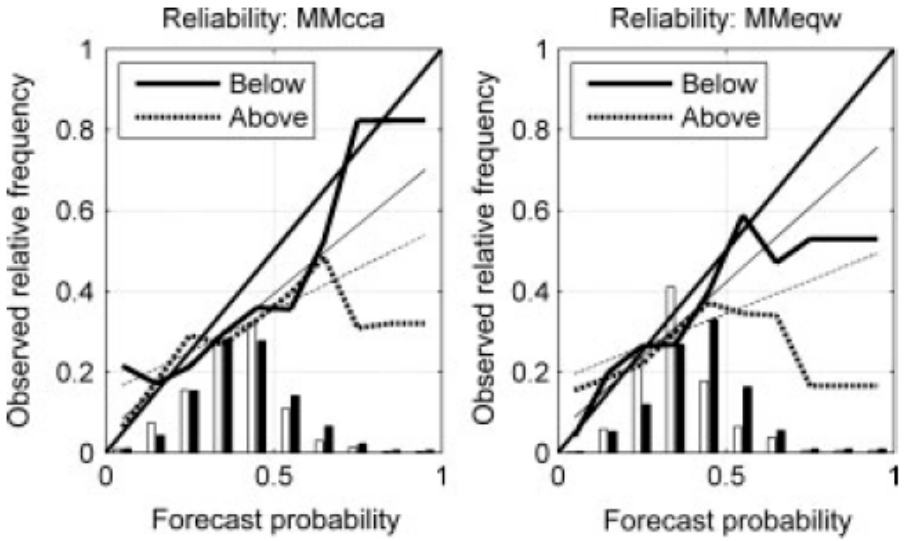


Figure 6. As in Figure 5, but for the two multi-models.

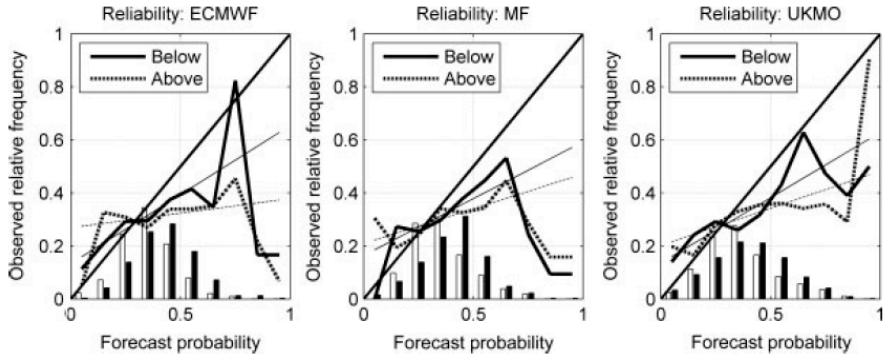


Figure 5. Reliability diagrams and frequency histograms for above- and below-normal DJF rainfall forecasts produced by the single models. The thick black curves and black bars of the histogram represent the below-normal rainfall category, while the thick black dotted curves and white bars of the histogram represent the above-normal rainfall category. For perfect reliability the curves should fall on top of the thick black diagonal line. The thin solid and dotted lines are respectively the weighted least-squares regression lines of the above-normal and below-normal reliability curves.

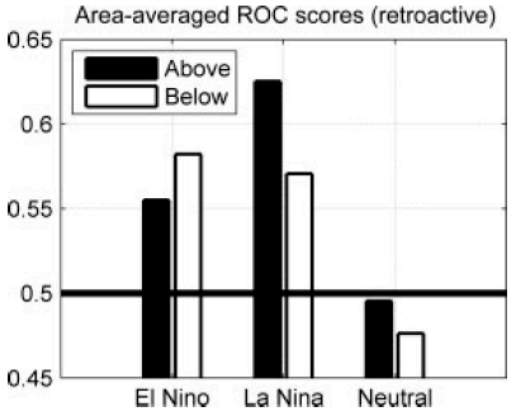
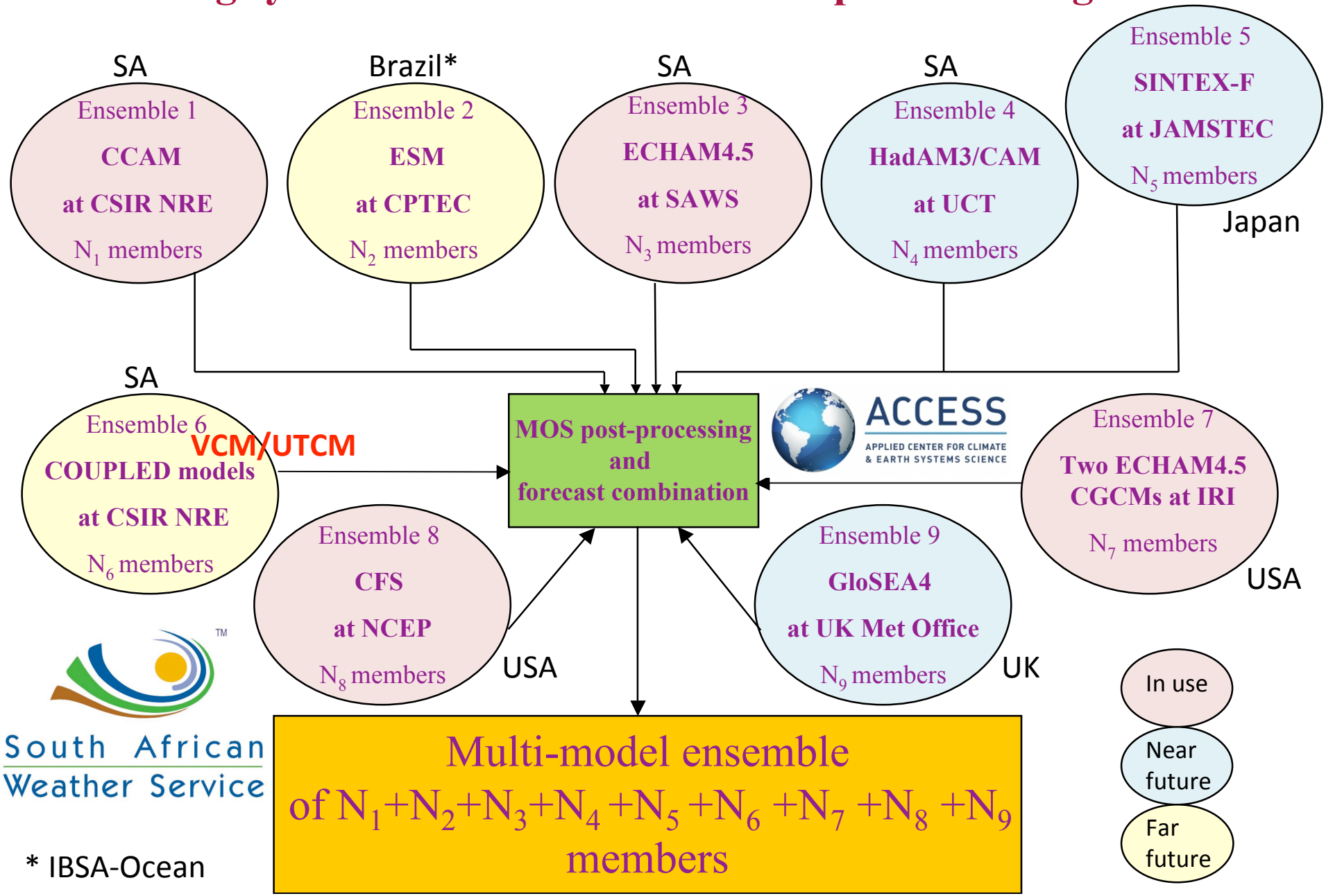


Figure 7. ROC scores, averaged over the southern African domain, for the above-normal and below-normal rainfall categories during El Niño, La Niña and neutral seasons. Scores for the MMcca multi-model are shown.

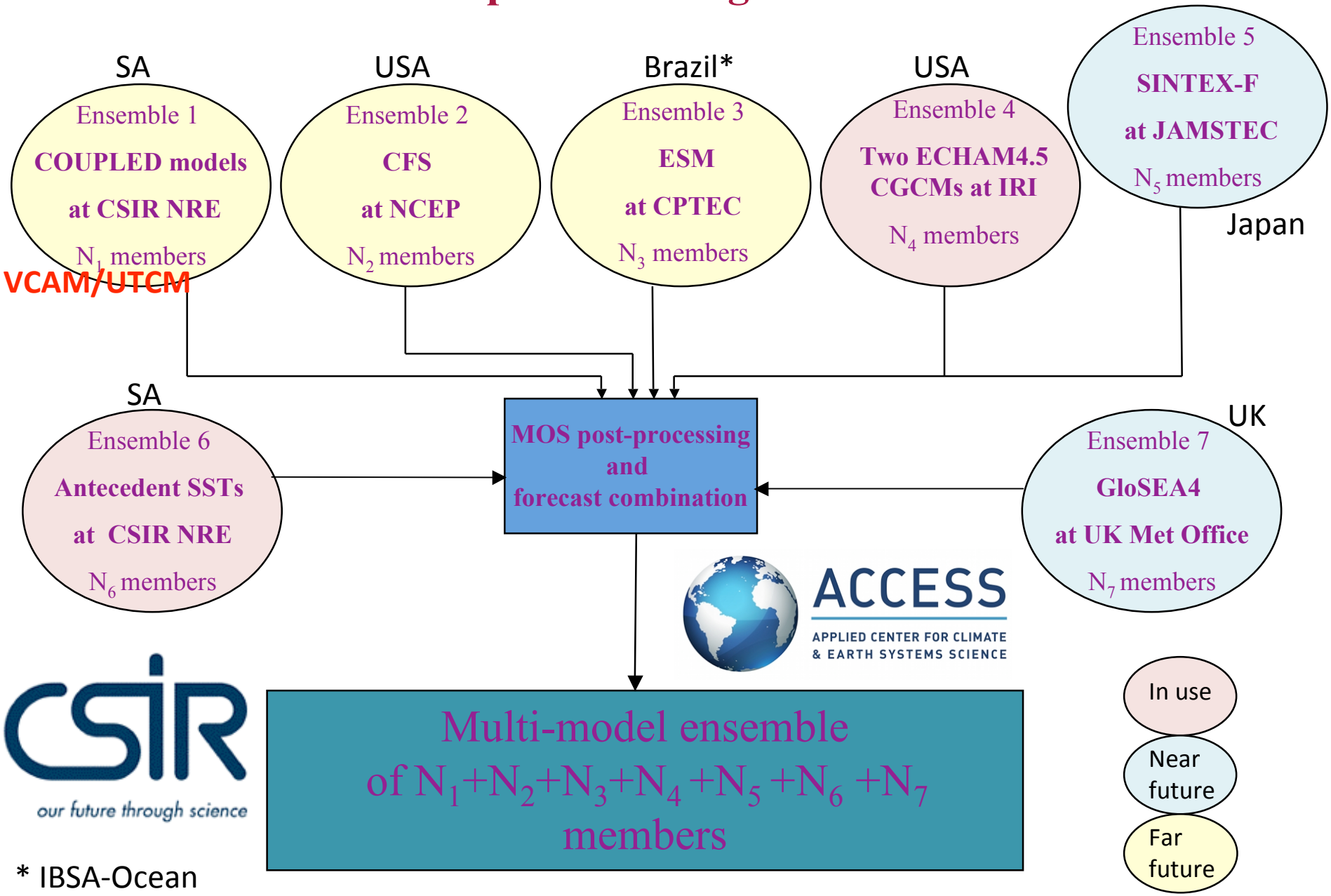
Production and Dissemination of Seasonal Forecasts in South Africa

- Seasonal modelling efforts at the CSIR for operational forecast production are focussed towards
  1. Multi-model sea-surface temperature (SST) forecast system development.
  2. The development of the conformal-cubic atmospheric model (CCAM) as operational seasonal forecasting system.
- Both the multi-model SST and the CCAM systems' forecast output will be provided to SAWS for inclusion in their forecasting systems. The real-time predicted global SST fields of the CSIR will be used to force the ECHAM4.5 being run at SAWS for fulfilment of their role as Global Producing Centre for Long-Range Forecasting (GPC for LRF).
- The CSIR will stop producing multi-model SADC forecasts, and multi-model streamflow forecasts for South Africa.
- The multi-model-multi-institutional SADC and streamflow forecasts for South Africa will become the responsibility of SAWS, with additional partners such as UCT, JAMSTEC, IRI, UKMO, etc. also contributing to the products. The names of the contributing agencies will appear on the forecast maps. These multi-model forecasts will also be displayed on the website of the South African Risk and Vulnerability Atlas.
- The institutions in South Africa currently running global models are encouraged to use the website of the Global Forecasting Centre for Southern Africa (GFCSA; www.gfcsa.net) to display their respective global model forecasts.

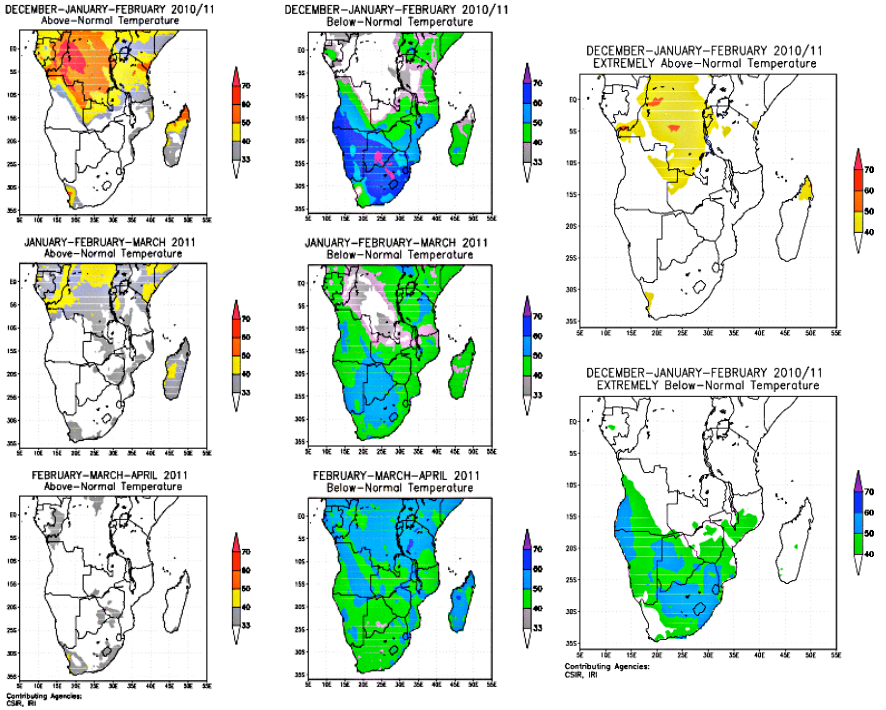
The multi-model seasonal rainfall and surface temperature forecasting system for SADC under development through ACCESS

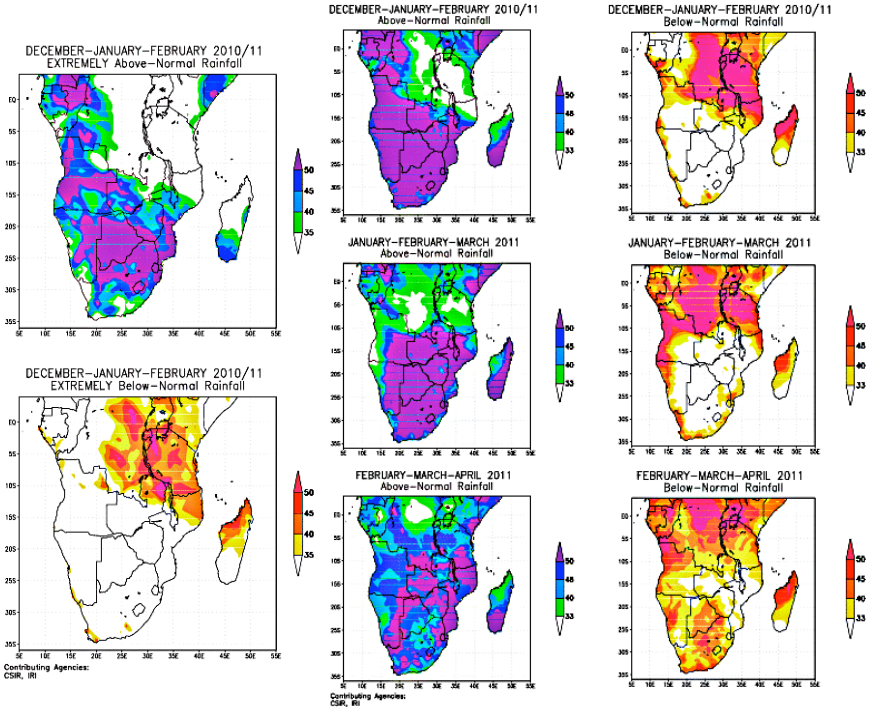


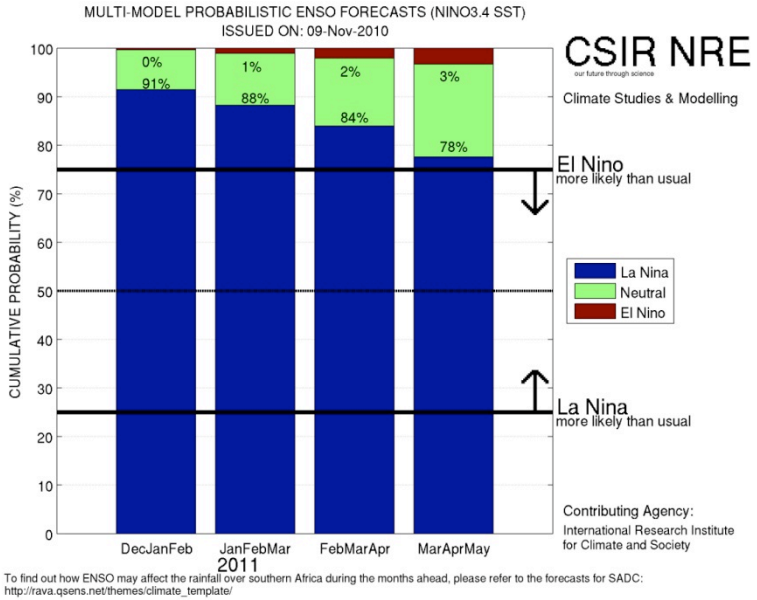
The multi-model sea-surface temperature forecasting system under development through ACCESS

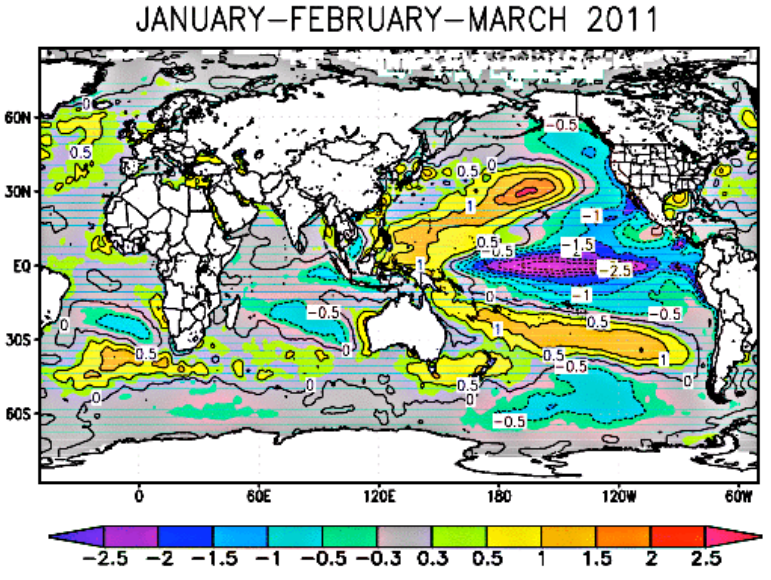


Seasonal forecast examples: *Issued Nov 2010*

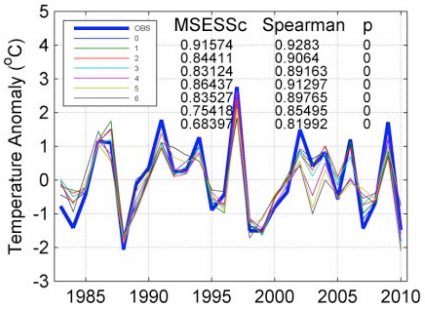








DECEMBER NINO3.4 MULTI-MODEL



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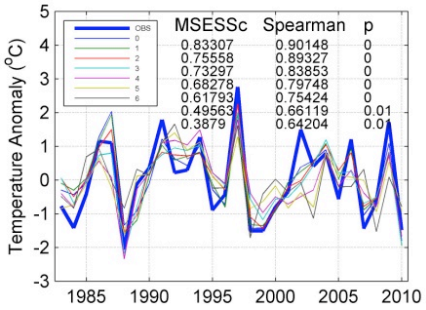

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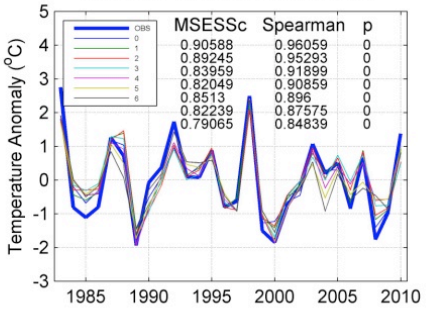

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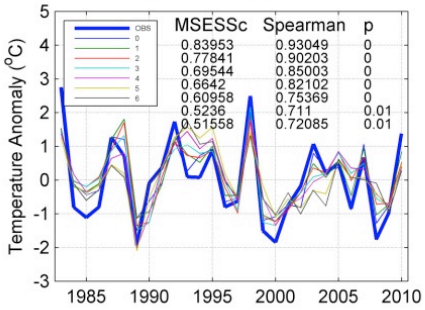

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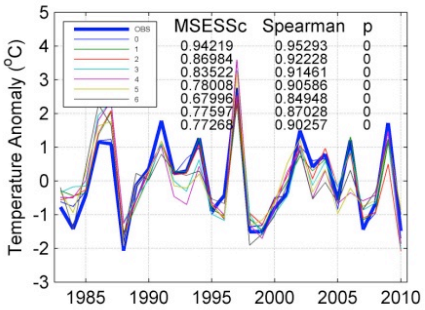

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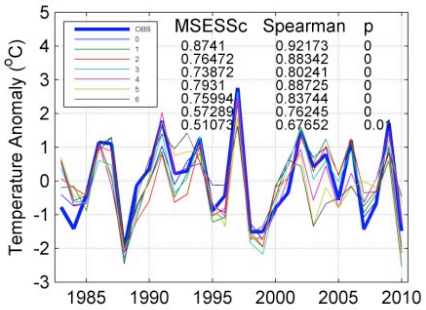

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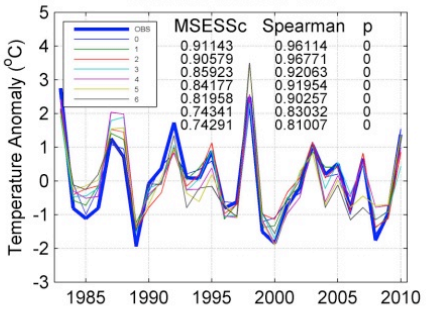

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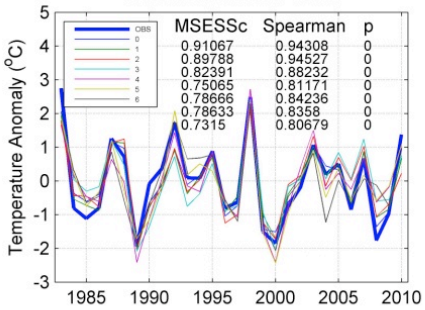
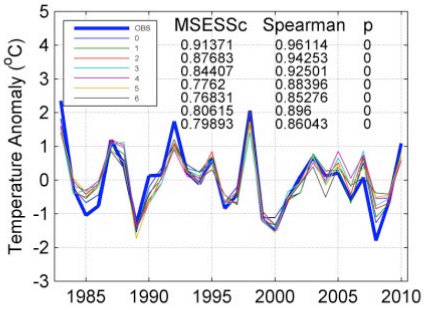


FEBRUARY NINO3.4 MULTI-MODEL



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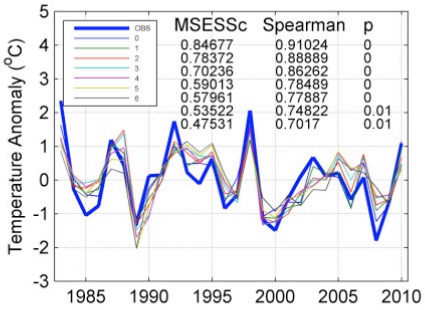

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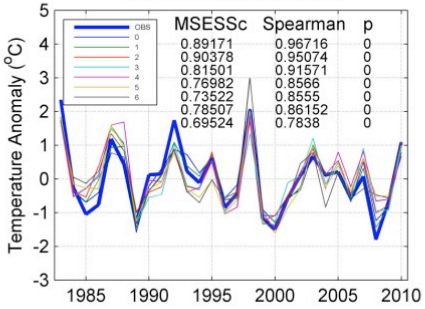

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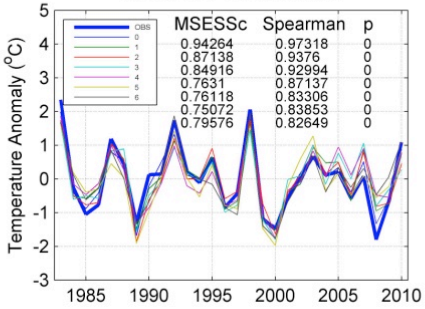
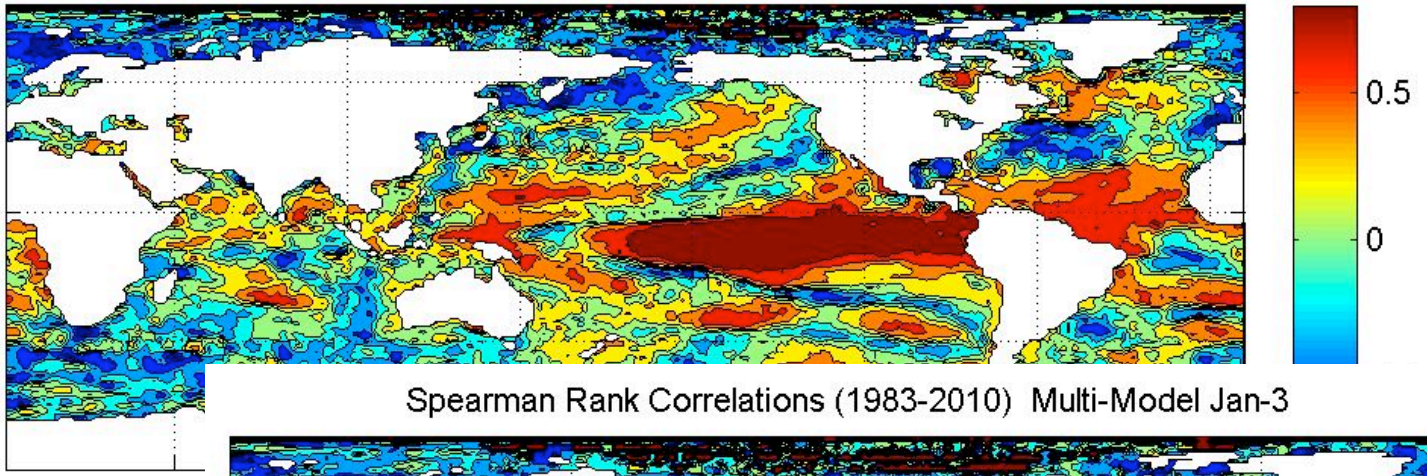
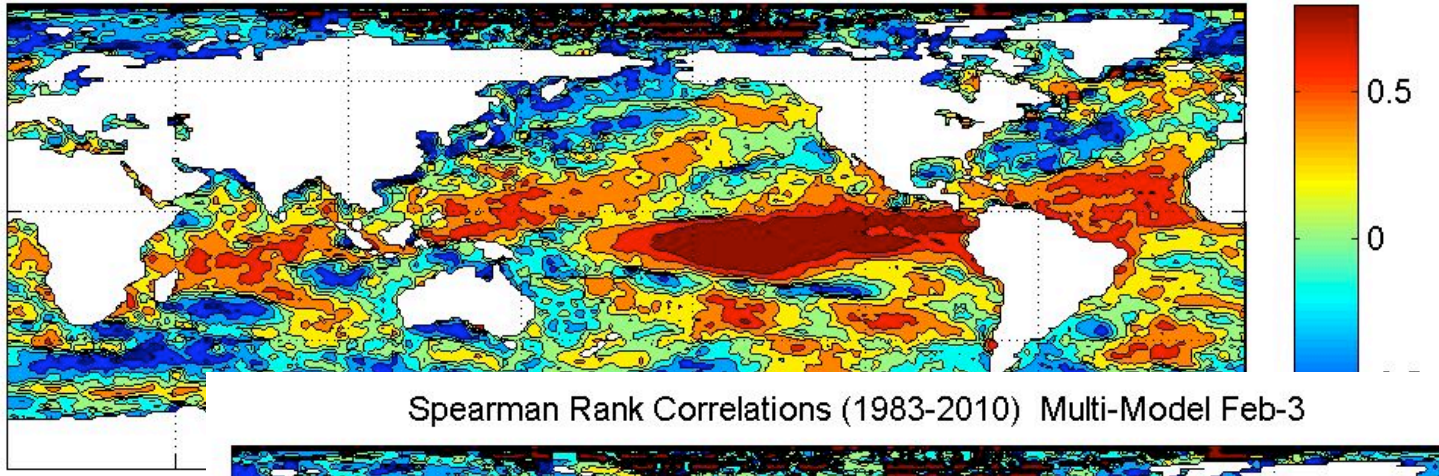


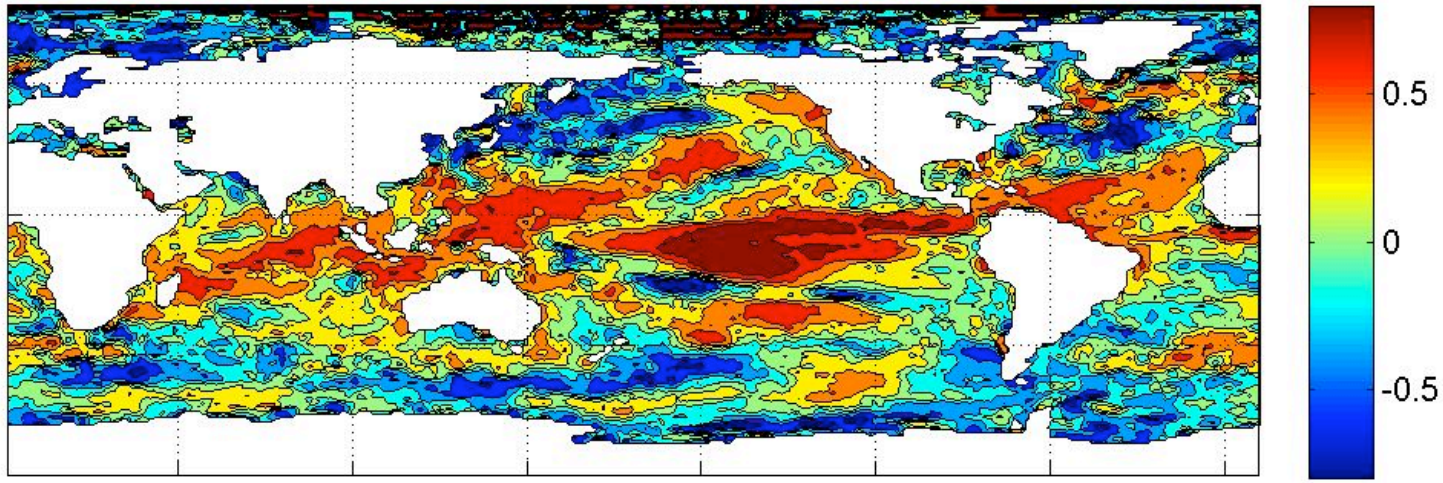
Spearman Rank Correlations (1983-2010) Multi-Model Dec-3

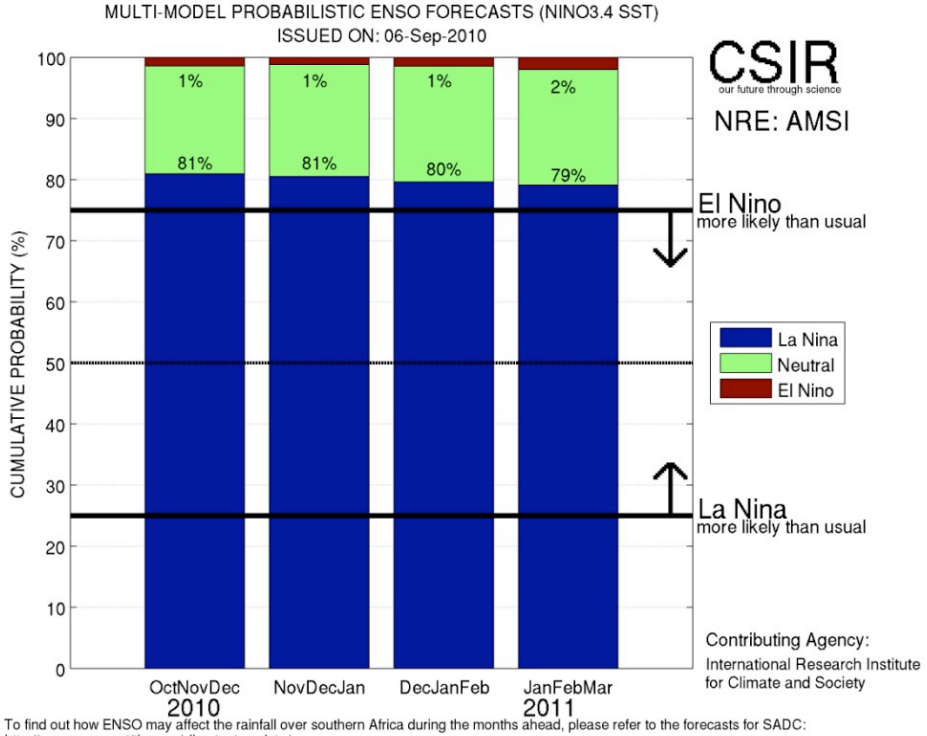


Spearman Rank Correlations (1983-2010) Multi-Model Jan-3

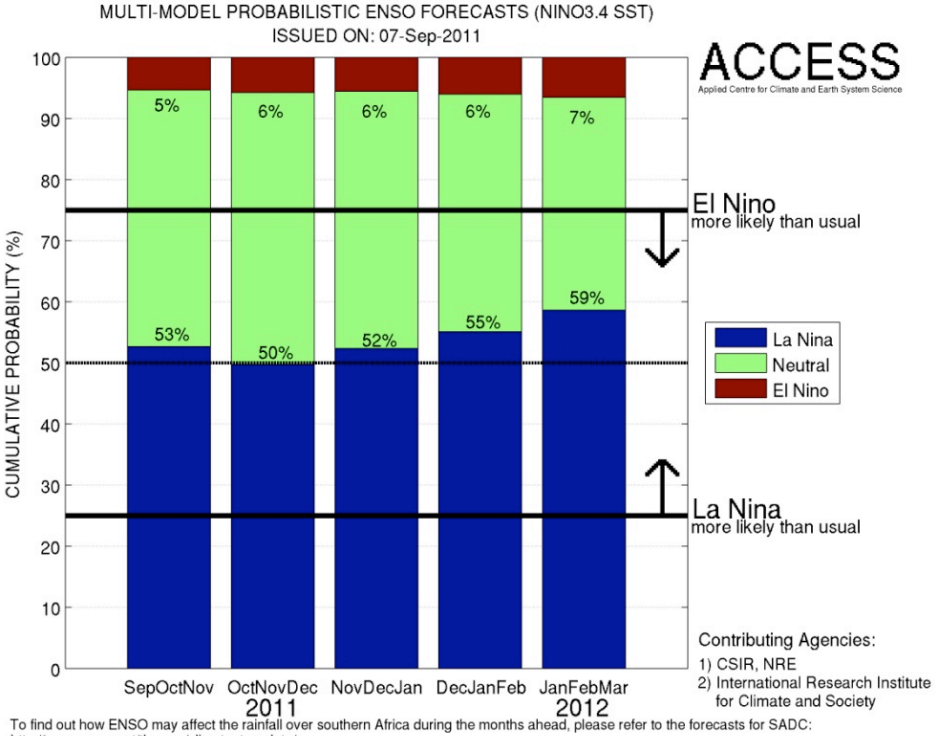


Spearman Rank Correlations (1983-2010) Multi-Model Feb-3





To find out how ENSO may affect the rainfall over southern Africa during the months ahead, please refer to the forecasts for SADC:
http://rava.qsens.net/themes/climate_template/



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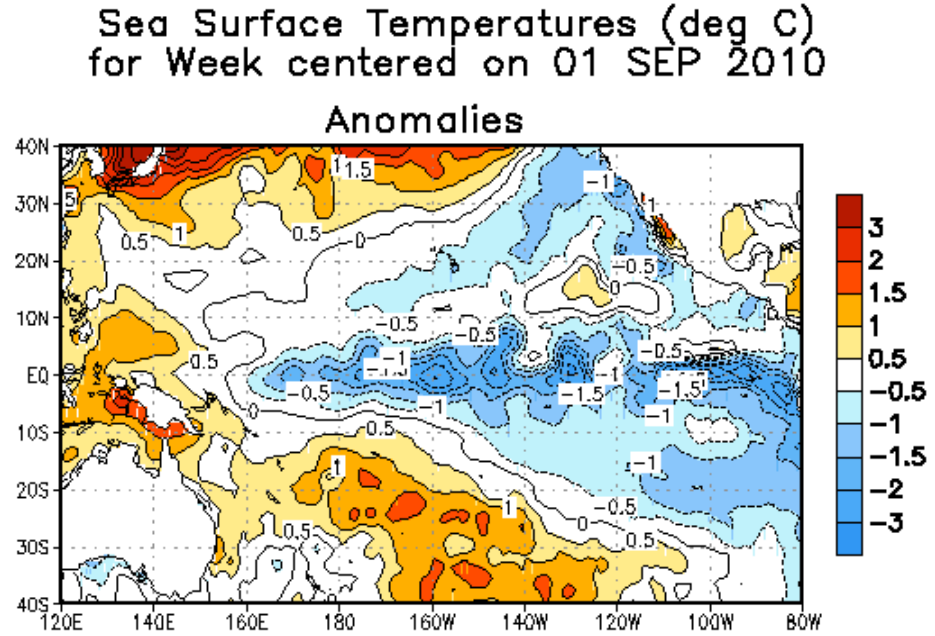
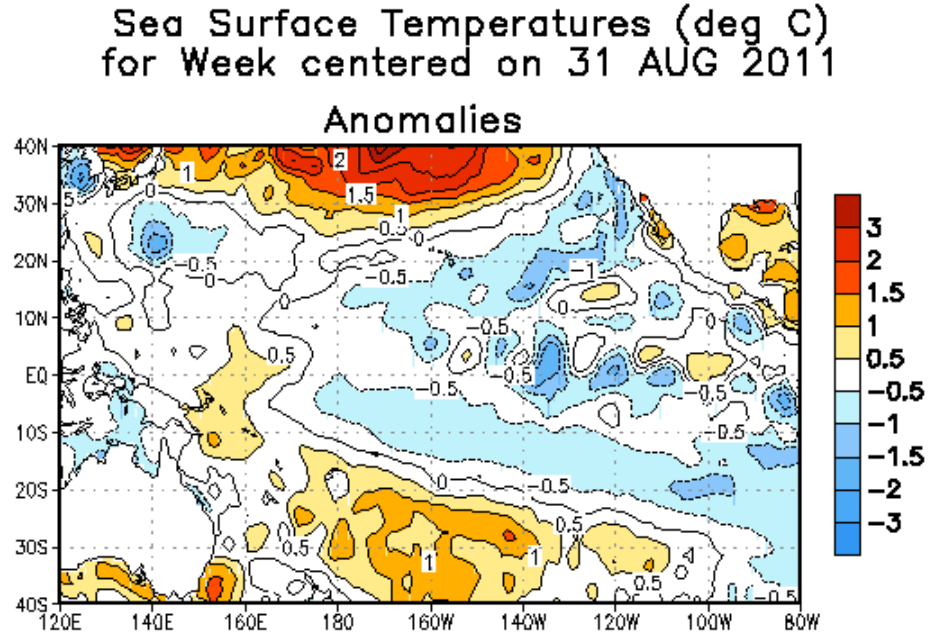
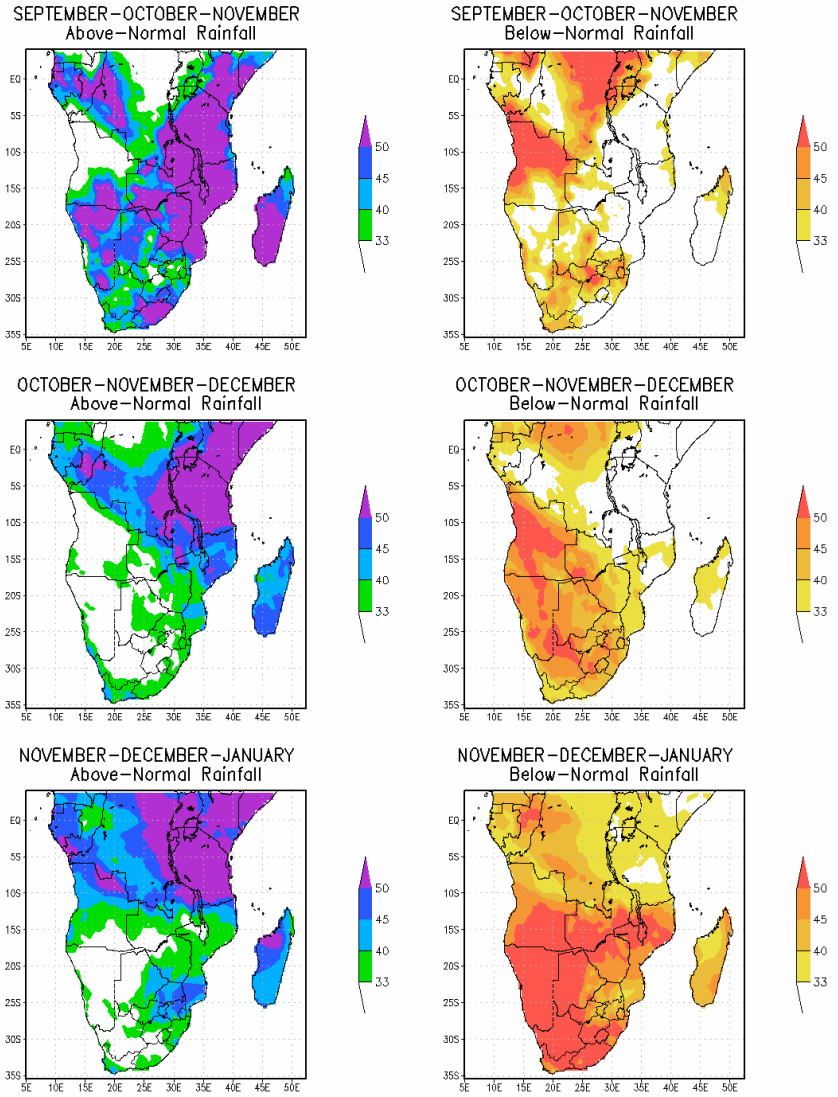




SADC forecast issued in August 2011



South African Weather Service IRI NCEP CSIR

Logo's of current contributing agencies

In summary

- The change from subjective “multi-model” forecasts to objective multi-model combination and verification is complete
  - SADC
  - Global SST, and for key ocean areas such as NINO3.4
- The multi-model forecasts for SADC has become the responsibility of SAWS
  - Local and international centres contribute