Science without application is constrained, application without science lacks foundation

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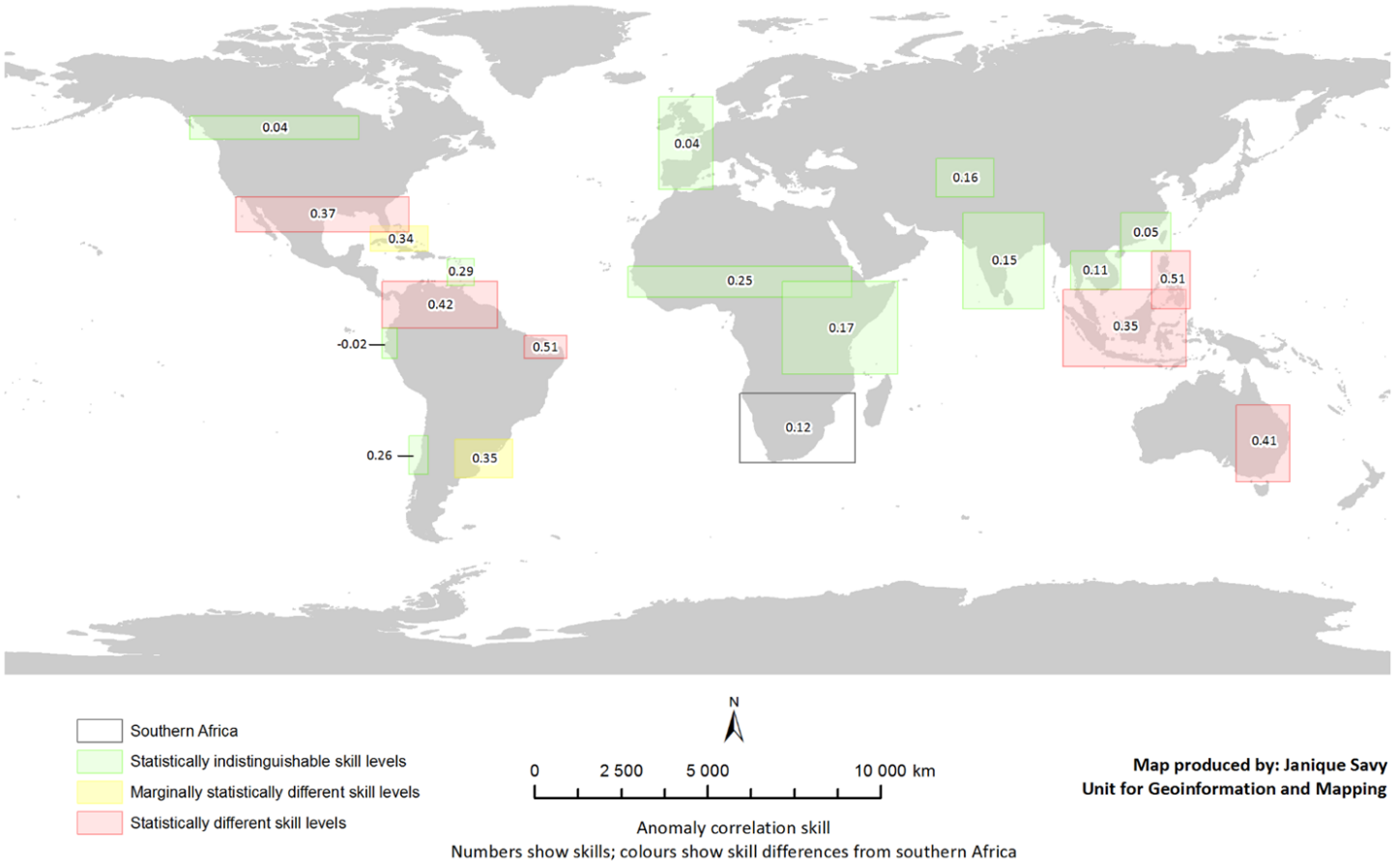
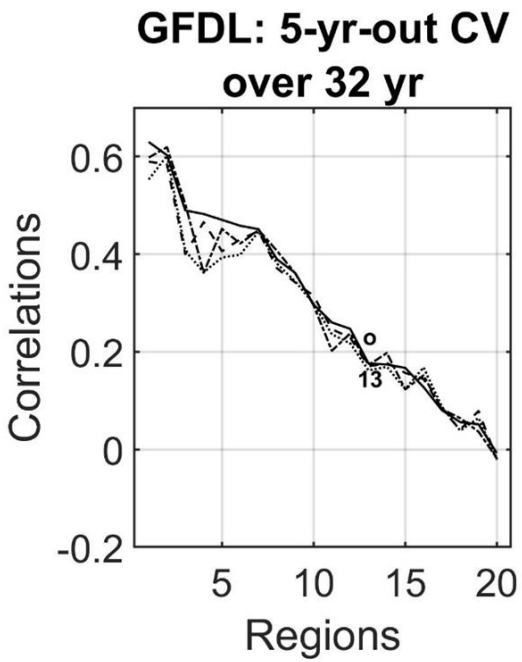
ACyS (ACCESS) Mini-Symposium, 8-9th December 2021

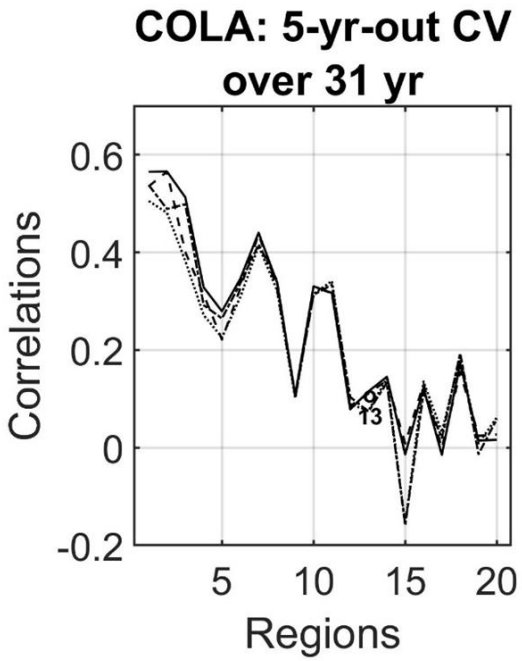
What does the science tell us about seasonal predictability?

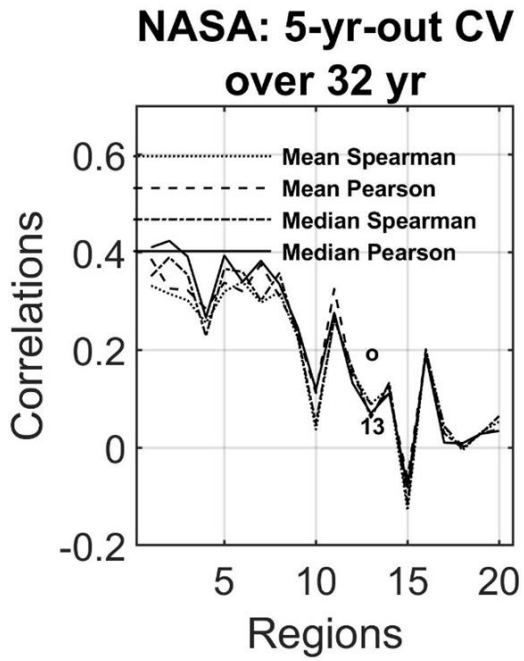
How do we rank ito forecast skill?



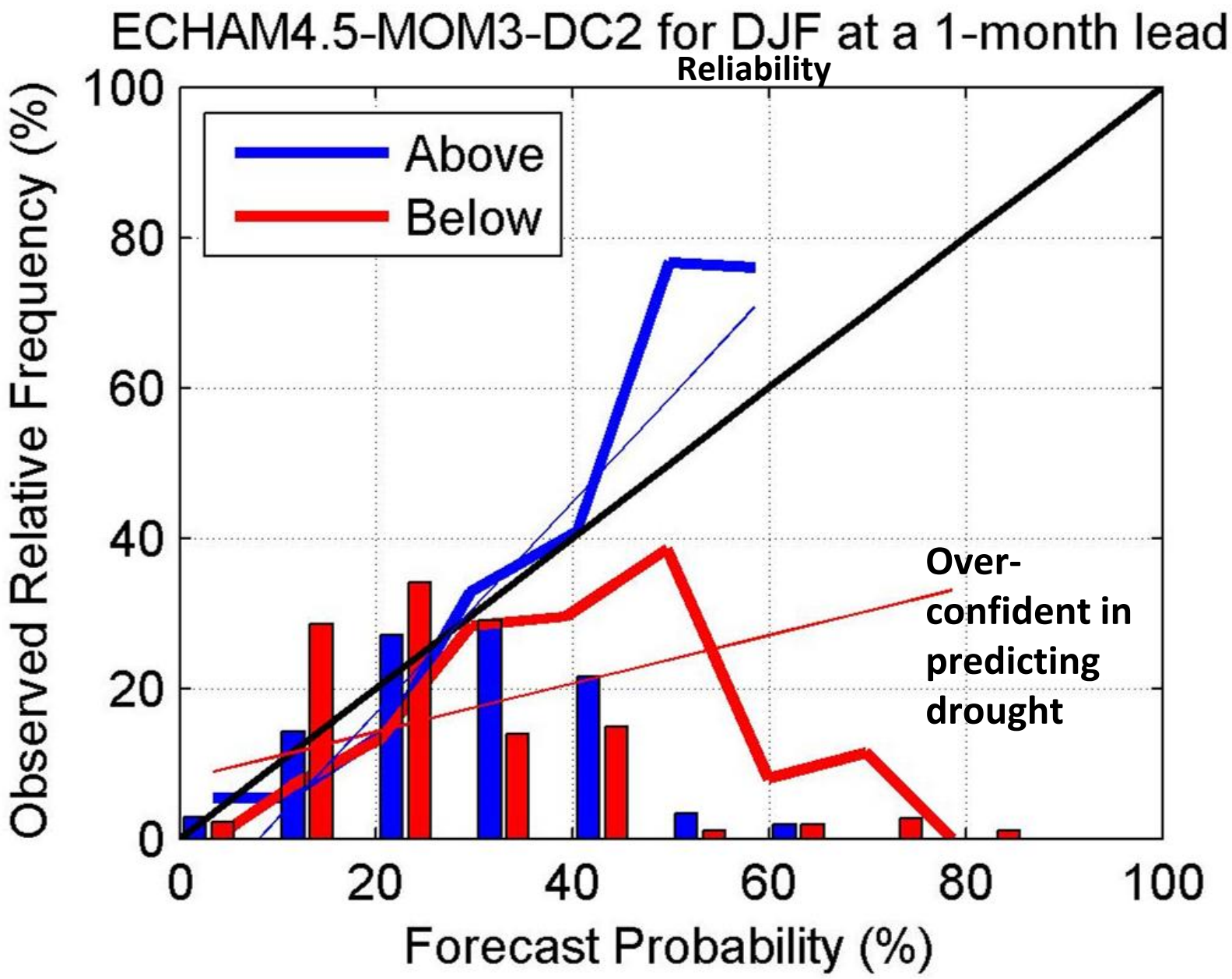


1. Philippines
2. Nordeste
3. Northern South America
4. Northwest Caribbean
5. Indonesia
6. Southern USA
7. Eastern Australia
8. Southeast South America
9. Sahel
10. Central Chile
11. Southeast Caribbean
12. Equatorial East Africa
13. Southern Africa
14. India
15. Coastal Equador, Northern Peru
16. Central Southwest Asia
17. Southeast China
18. Southeast Asia
19. Western Europe
20. South-central, SW Canada

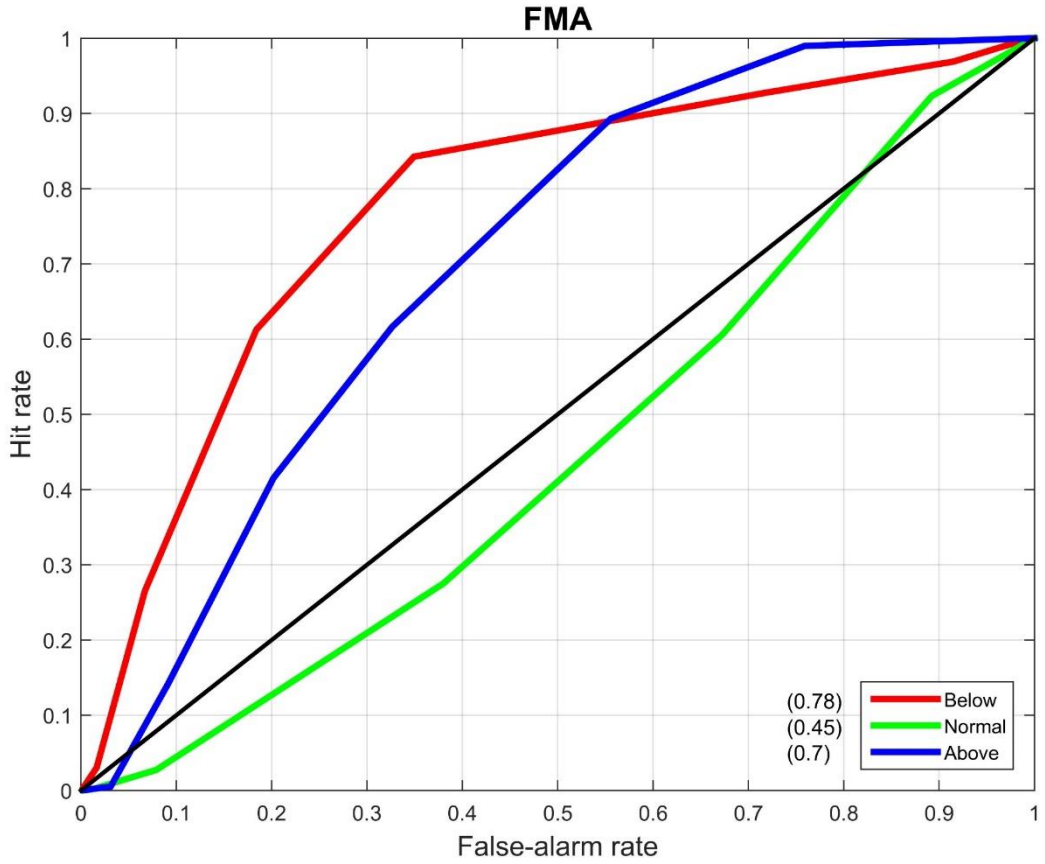


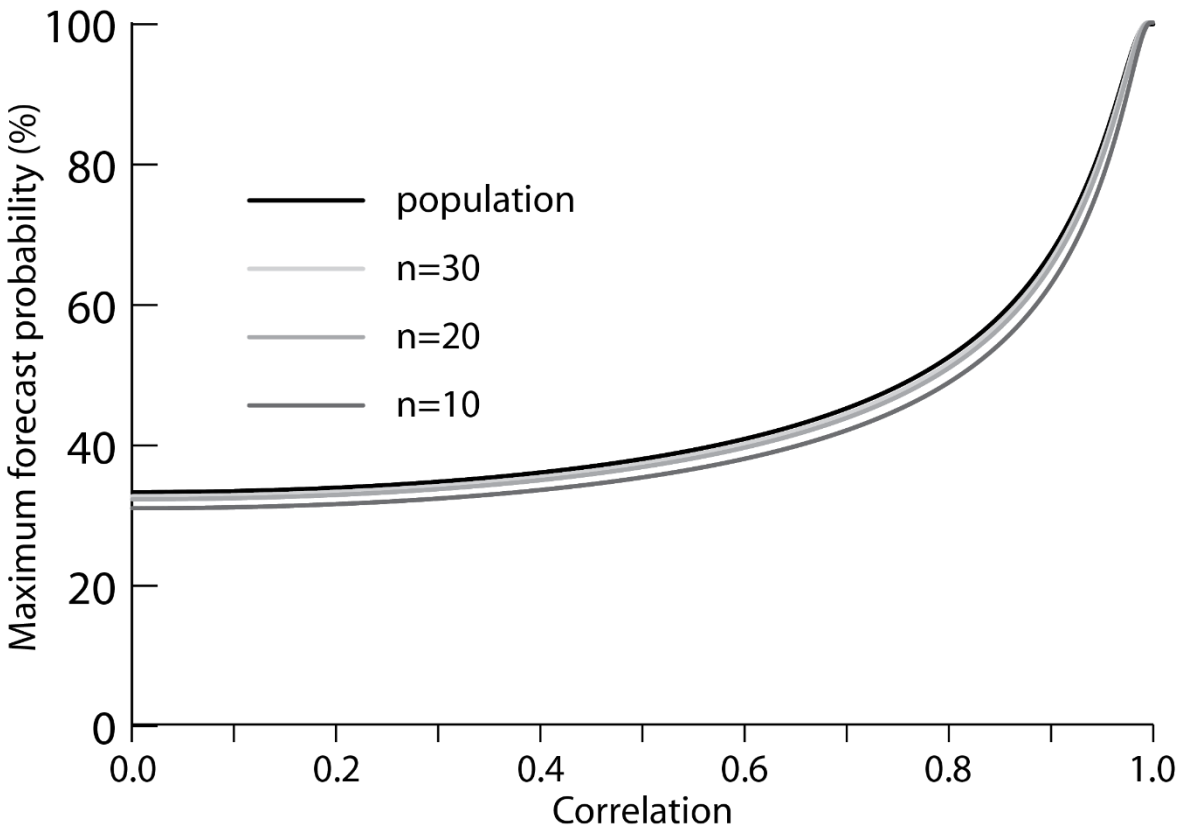


Two regions are found to be marginally compatible when the skill difference is significant at the 90% level but not the 95% level


ECHAM4.5-MOM3-DC2 for DJF at a 1-month lead
Reliability
Above
Below
Over-confident in predicting drought
Observed Relative Frequency (%)
Forecast Probability (%)
0
20
40
60
80
100

Do not predict “normal” seasons





The effects of sample size on the maximum forecast probability for the normal category

2000

Significantly, the potential for GCM seasonal forecasting of rainfall over southern Africa is high. In the past, statistical modelling offered the best prospects for seasonal climate forecasting; in future, GCMs will undoubtedly provide the best basis for doing so. At present, both methods are needed and are best blended in a multi-tiered approach to offer pragmatic and cost-effective solutions to a complex problem.

2017

Do Statistical Pattern Corrections Improve Seasonal Climate Predictions in the North American Multimodel Ensemble Models?

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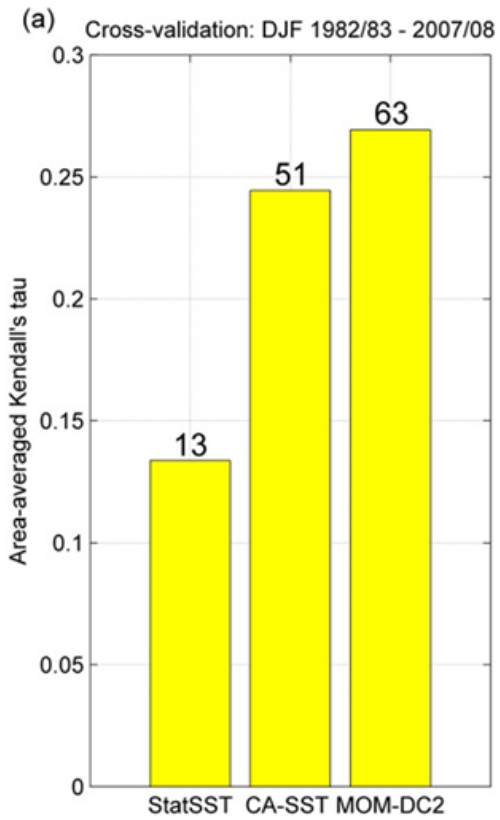
ABSTRACT

Canonical correlation analysis (CCA)-based statistical corrections are applied to seasonal mean precipitation and temperature hindcasts of the individual models from the North American Multimodel Ensemble project to correct biases in the positions and amplitudes of the predicted large-scale anomaly patterns. Corrections are applied in 15 individual regions and then merged into globally corrected forecasts. The CCA correction dramatically improves the RMS error skill score, demonstrating that model predictions contain correctable systematic biases in mean and amplitude. However, the corrections do not materially improve the anomaly correlation skills of the individual models for most regions, seasons, and lead times, with the exception of October–December precipitation in Indonesia and eastern Africa. Models with lower uncorrected correlation skill tend to benefit more from the correction, suggesting that their lower skills may be due to correctable systematic errors. Unexpectedly, corrections for the globe as a single region tend to improve the anomaly correlation at least as much as the merged corrections to the individual regions for temperature, and more so for precipitation, perhaps due to better noise filtering. The lack of overall improvement in correlation may imply relatively mild errors in large-scale anomaly patterns. Alternatively, there may be such errors, but the period of record is too short to identify them effectively but long enough to find local biases in mean and amplitude. Therefore, statistical correction methods treating individual locations (e.g., multiple regression or principal component regression) may be recommended for today's coupled climate model forecasts. The findings highlight that the performance of statistical postprocessing can be grossly overestimated without thorough cross validation or evaluation on independent data.



Forecast skill improvement is tied to model complexity – but skill may only increase incrementally from now on

Investigating predictability of seasonal anomalies for *societal benefit*

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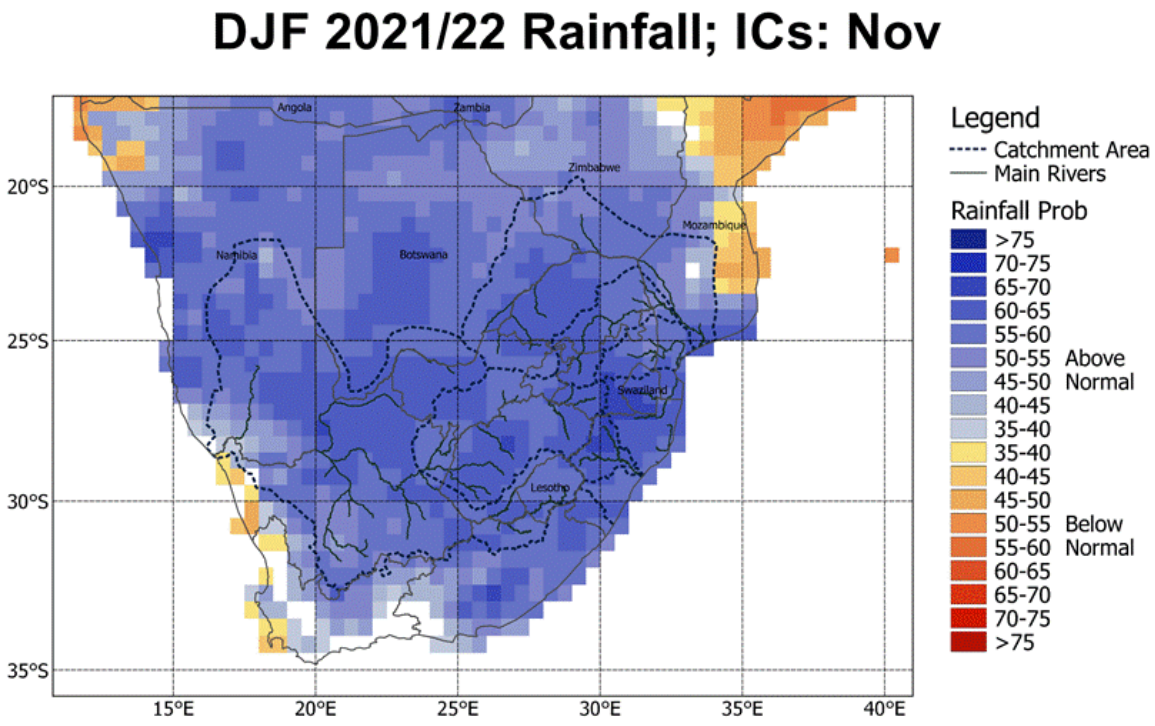
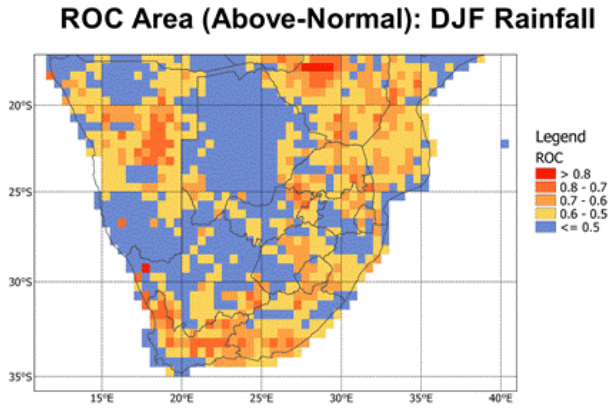
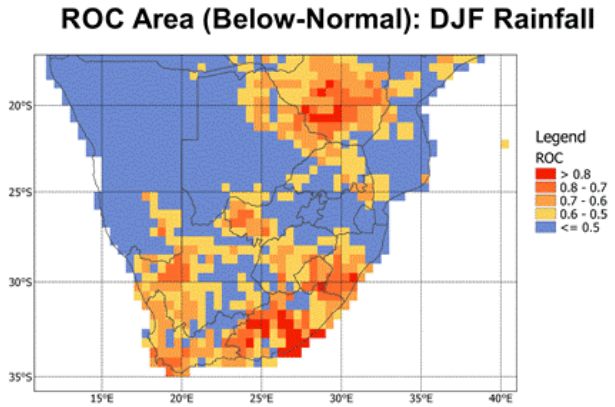
How do we predict to benefit society?

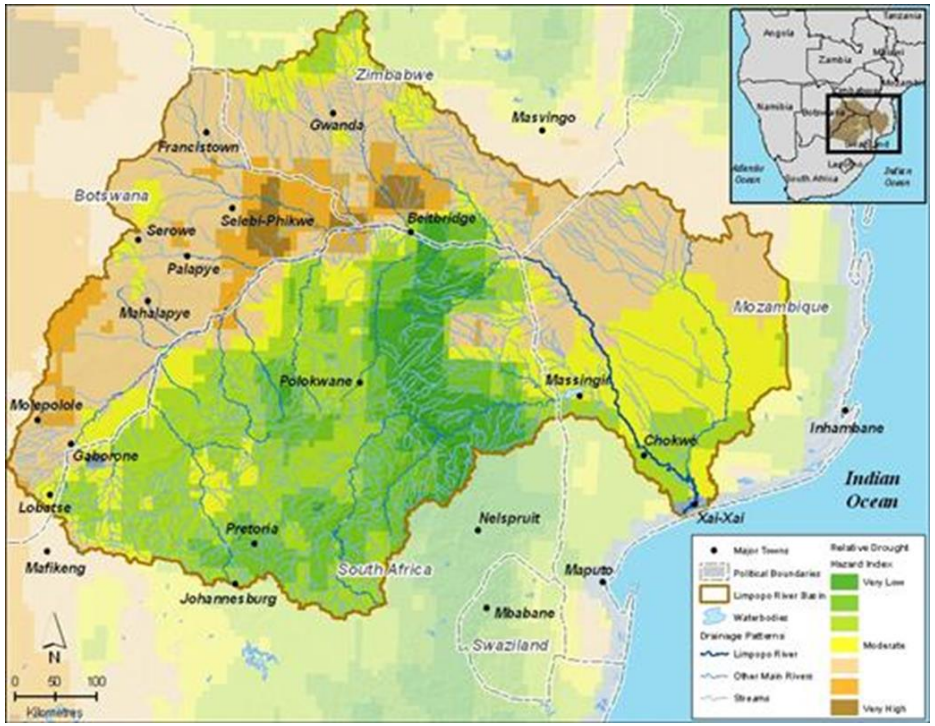
A forecast is incomplete without an indication of pervious forecast performance

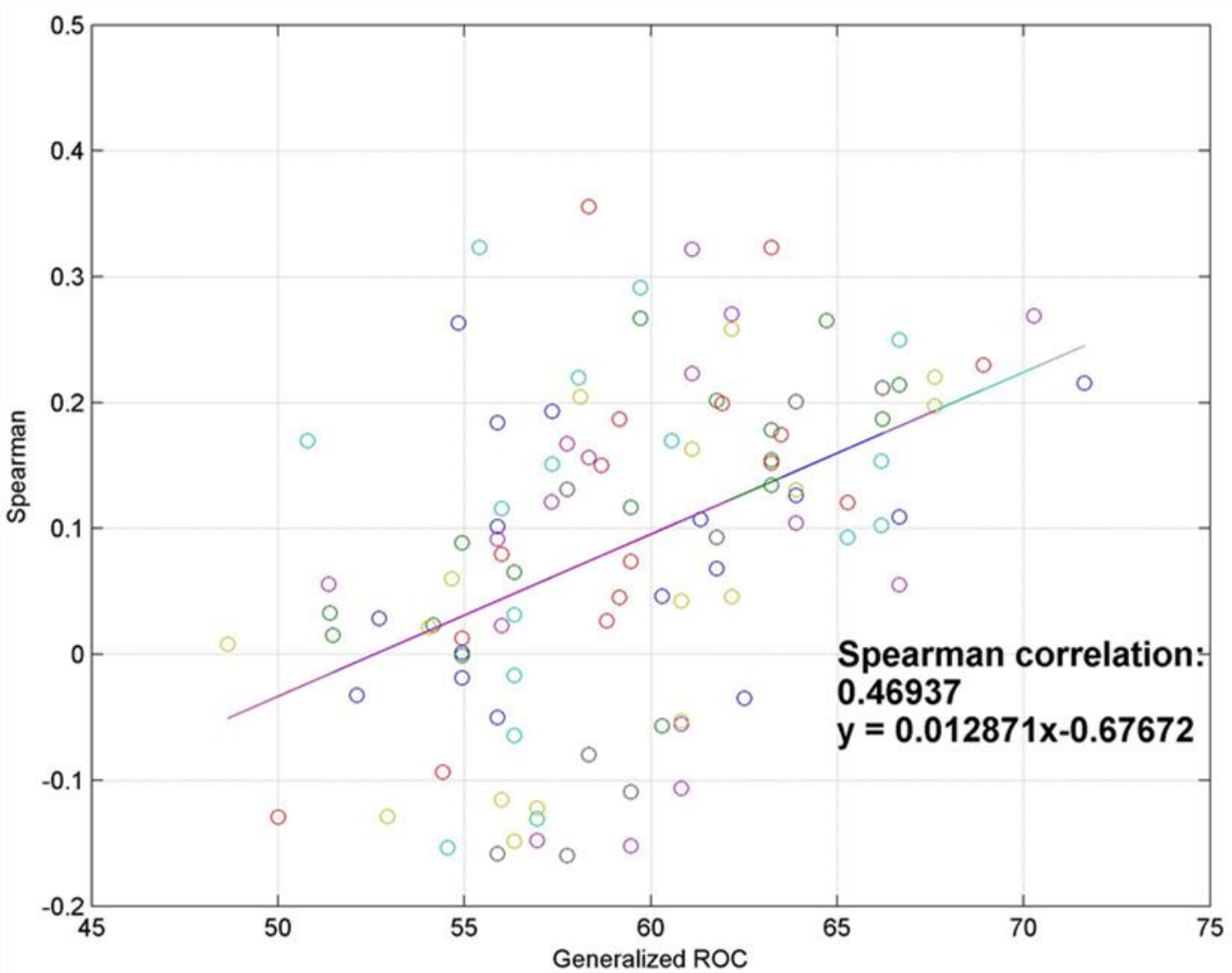




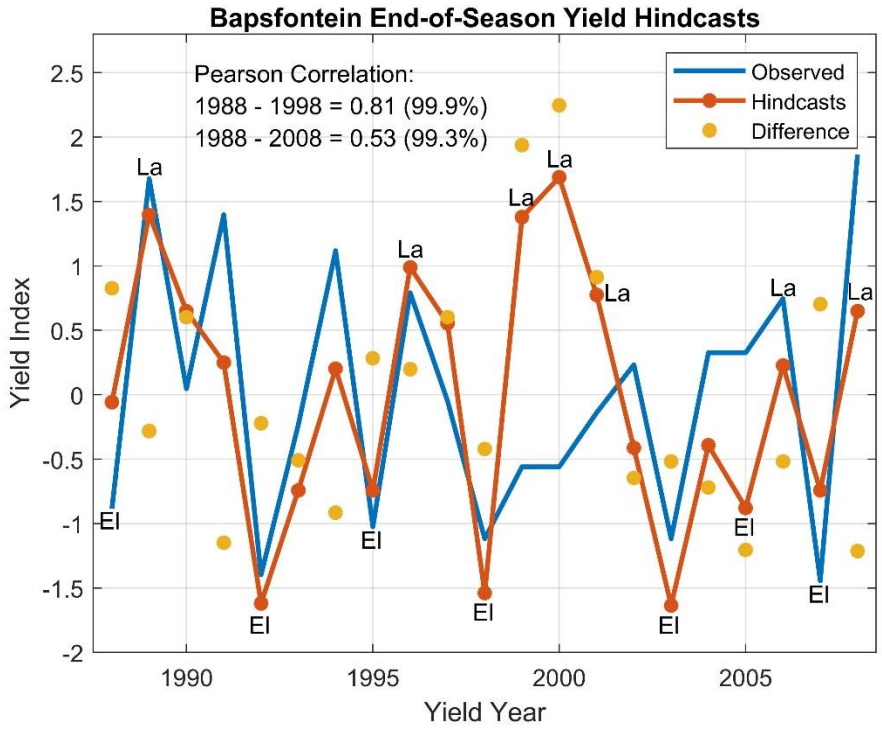


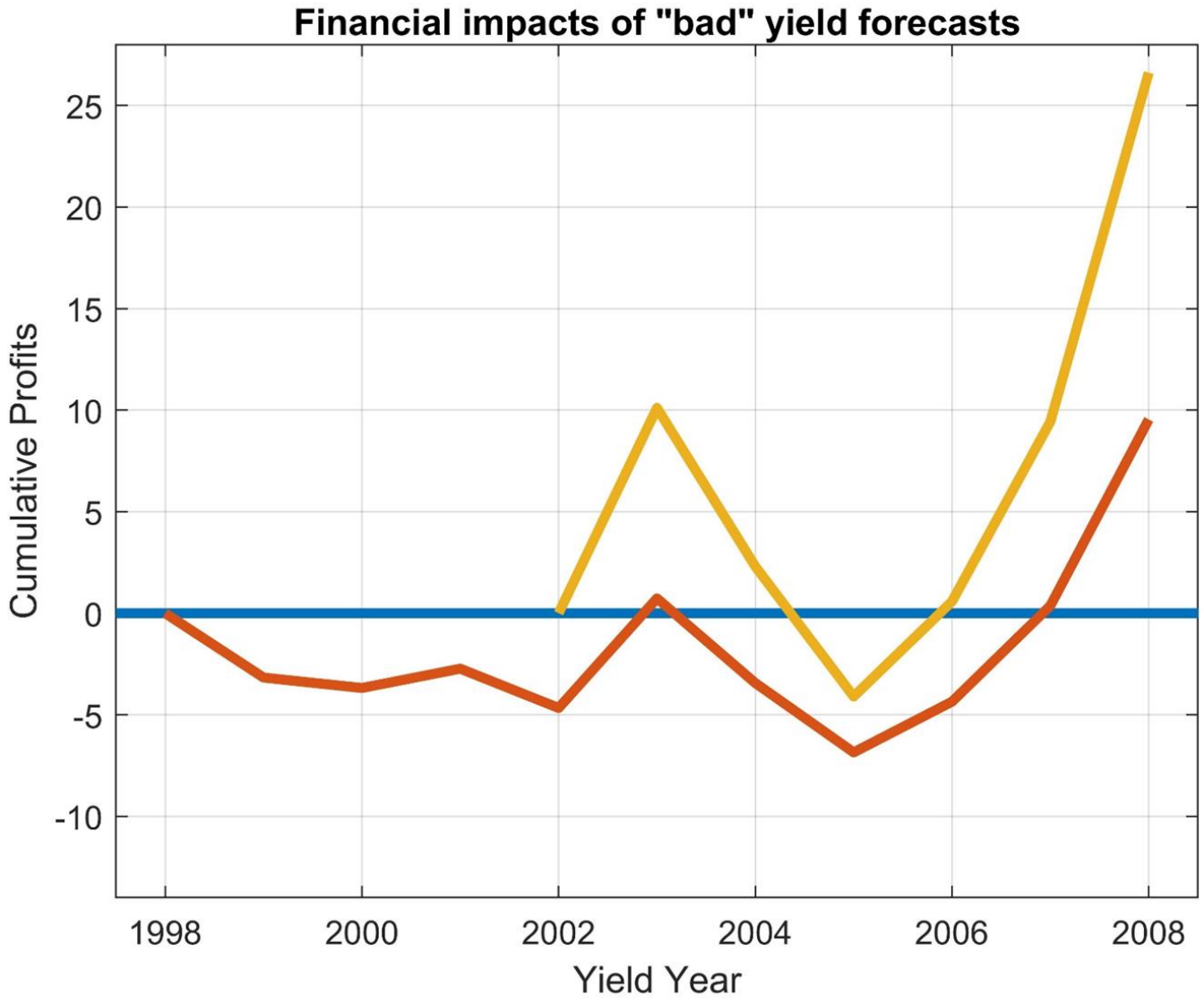
Probabilistic forecast skill “translation”



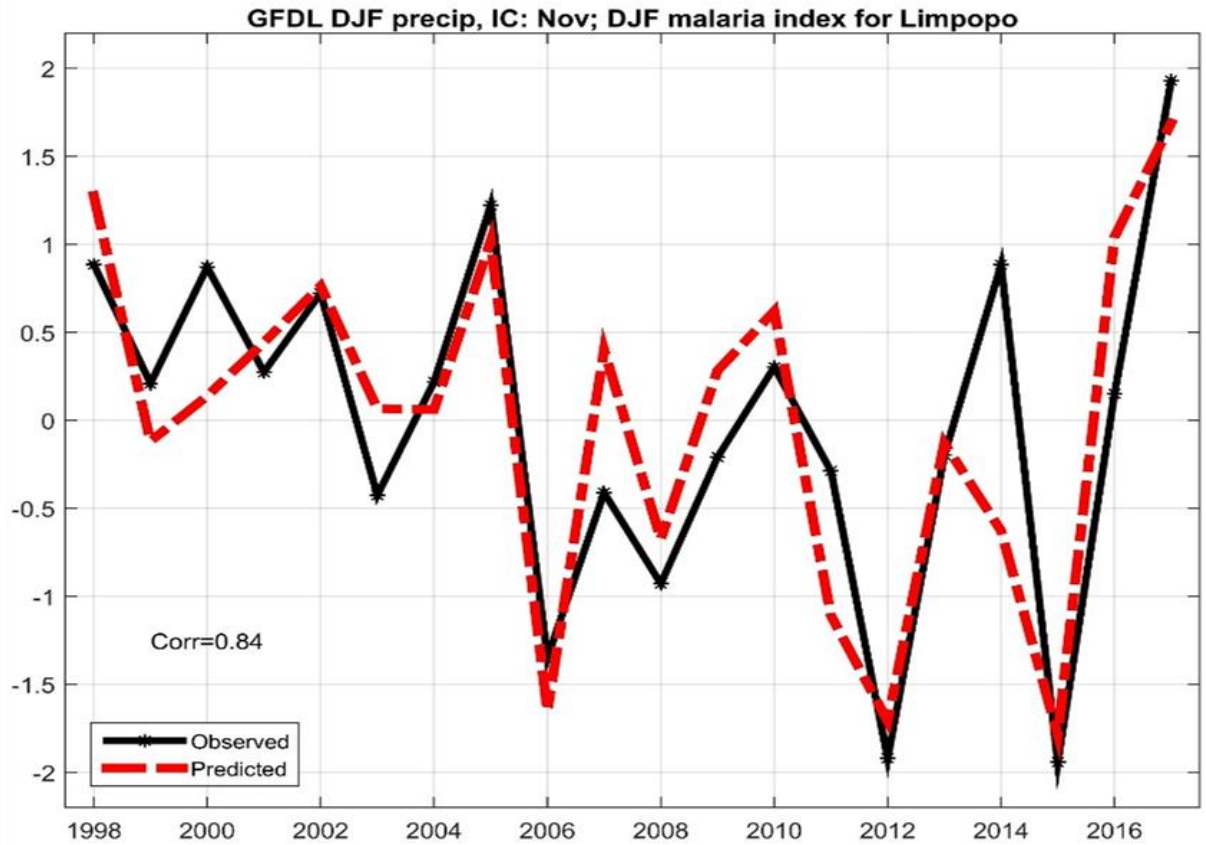


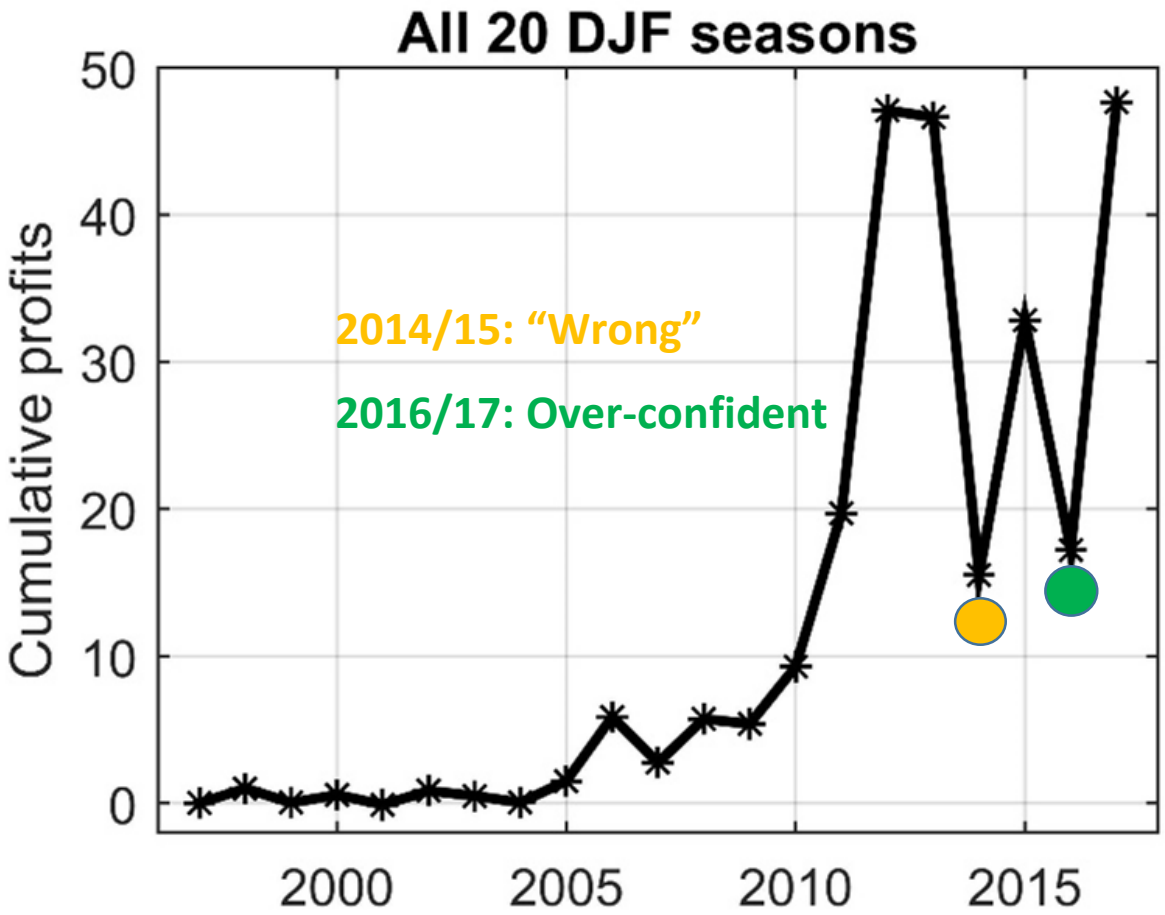
Amukelani Mkhari





- **Inclusion of the 3 consecutive poor forecasts in the CP calculations has significantly delayed financial recovery**
- **Much less of a detrimental effect is caused by a single poorly forecast season (2005)**





We urge caution in relying on these forecast models exclusively for disease management - we therefore suggest to **make sure that good climate monitoring systems are in place to supplement forecasts from models**

We propose that **disease surveillance and control activities should not be replaced by forecasts** – forecasts should **only be used to supplement existing health practices** that are currently going on in the region

Forecasts at best suggest where we might be headed, from a state determined by current **climate and non-climate** conditions

It can never be only about the forecast (or the model)