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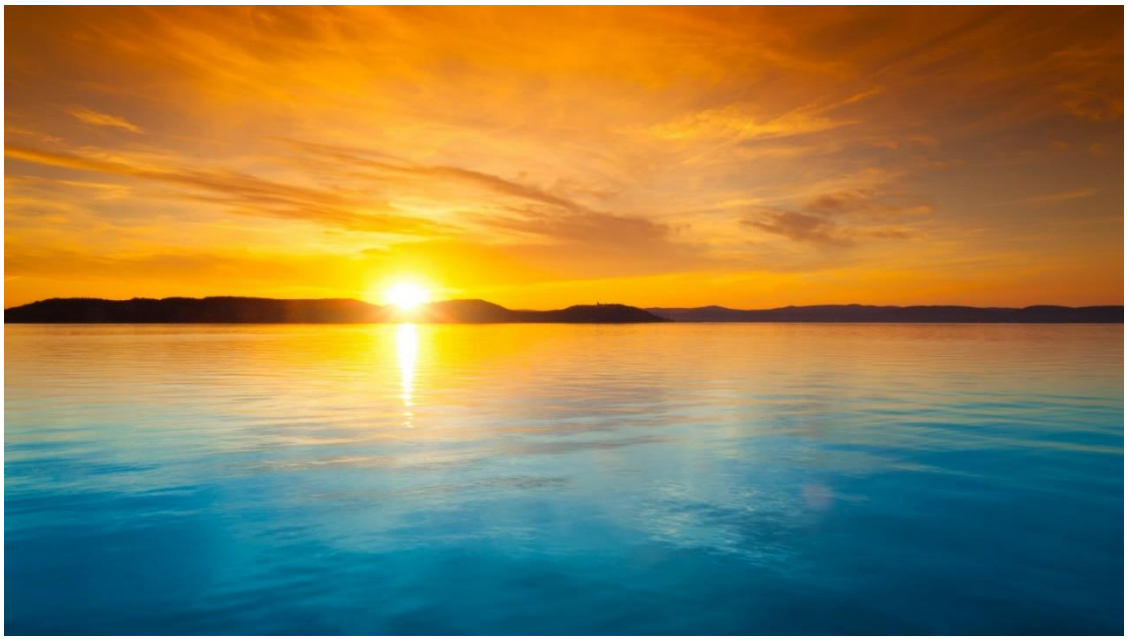
Australian Government
Bureau of Meteorology

Sub-seasonal variability & prediction:

Exploring the reliability of forecasts at the weather-climate interface



Harvey Stern, School of Earth Sciences, University of Melbourne

Conclusion

The absence of skill in day-to-day weather forecasts beyond Day-14 has been documented.

However, this does not necessarily have any implications for seasonal forecasting.

This is on account of the latter's goal of providing an overall picture of the next few months' weather.

Indeed, verification statistics demonstrate that some seasonal forecasting capability does exist.

Background (1)

Several years ago, Stern and Pollock (2011) completed an analysis of the accuracy of the Bureau of Meteorology's seasonal climate outlooks.

Stern H and Pollock J (2011) Verifying the accuracy of two decades of seasonal climate outlooks. 5th International Verification Methods Workshop, 1 - 7 December 2011, Melbourne, Australia

[Link: Refer to Abstract Book]

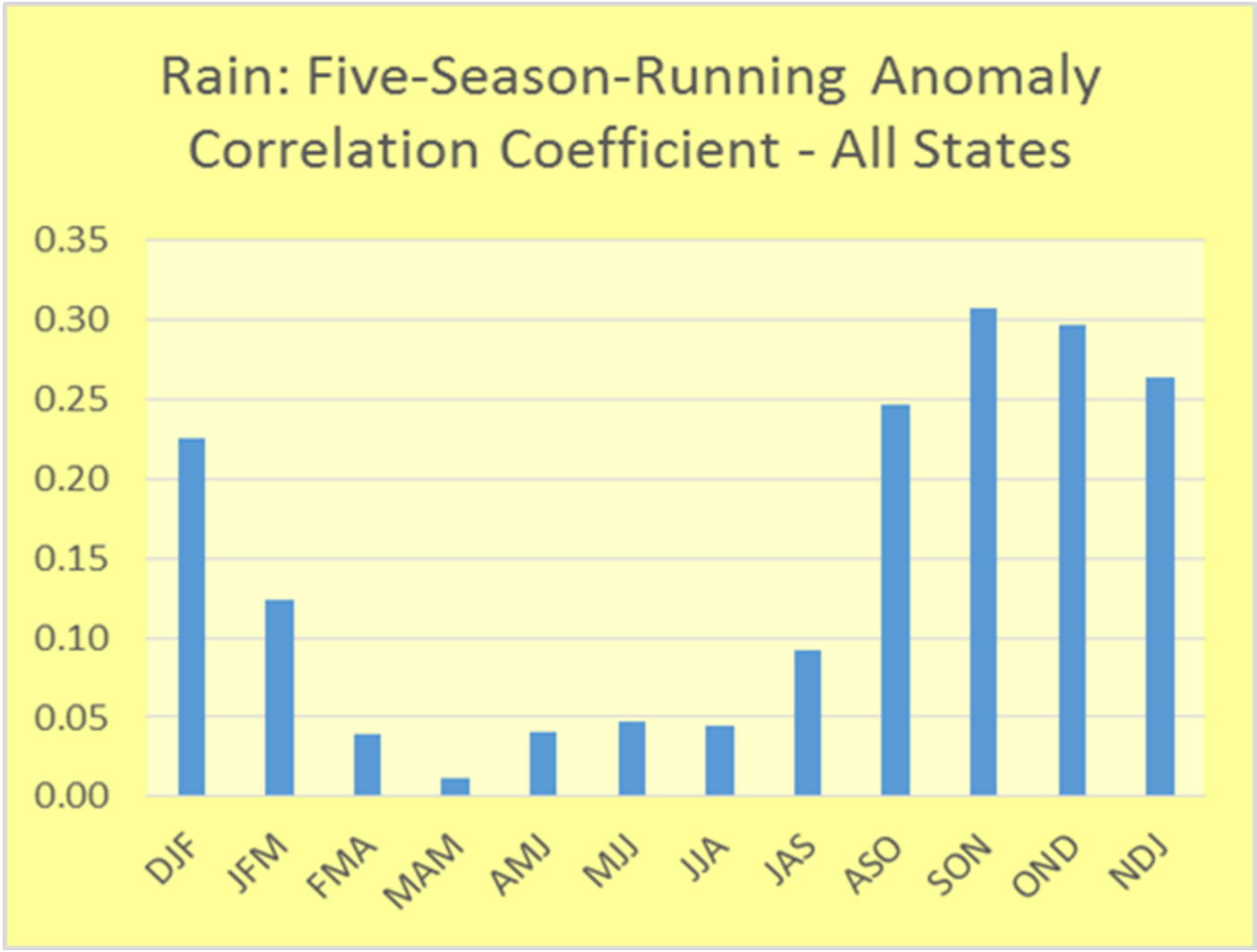
Background (2)

- subsequently updated (Stern and Pollock, 2013).

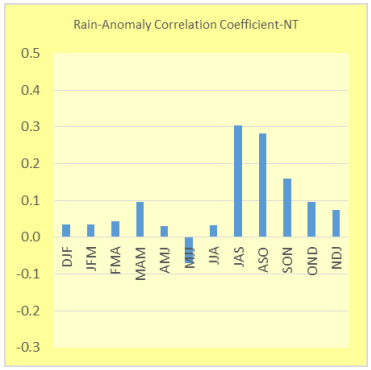
Stern H and Pollock J (2013) Verifying the accuracy of seasonal climate outlooks - an update. AMOS 19th National Conference, 11-13 February 2013, Melbourne, VIC.

[Link: Refer to Abstract Book]

Background (3)



Background (4)



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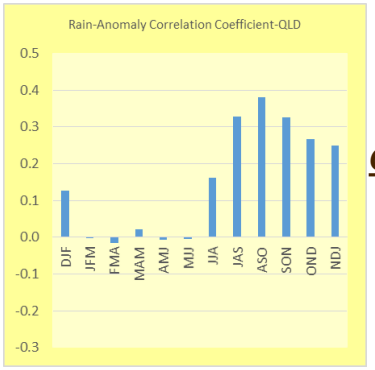
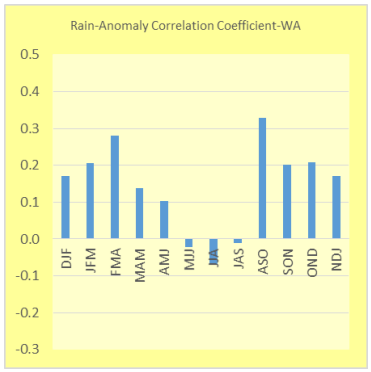


QLD



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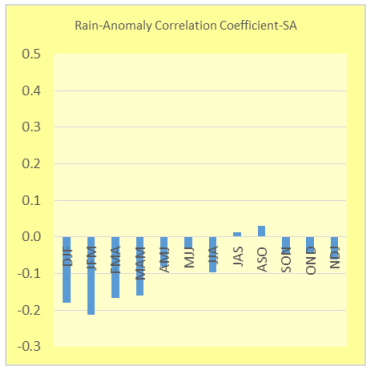

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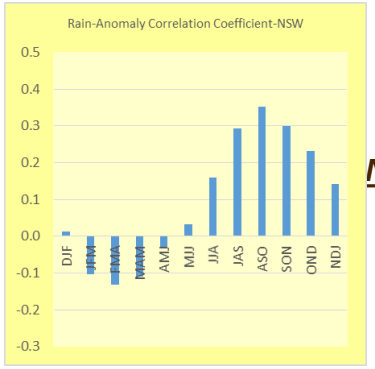

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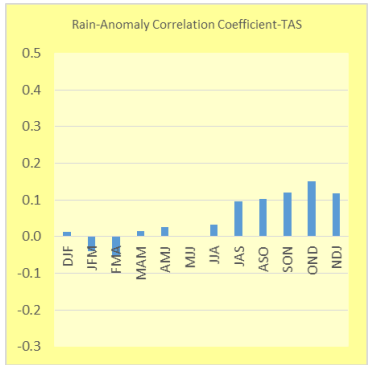
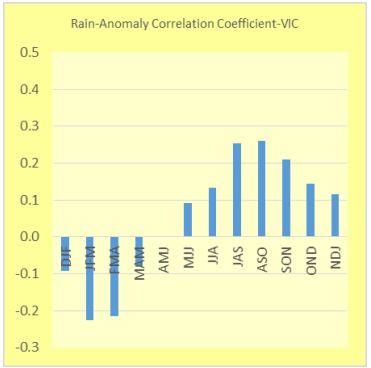
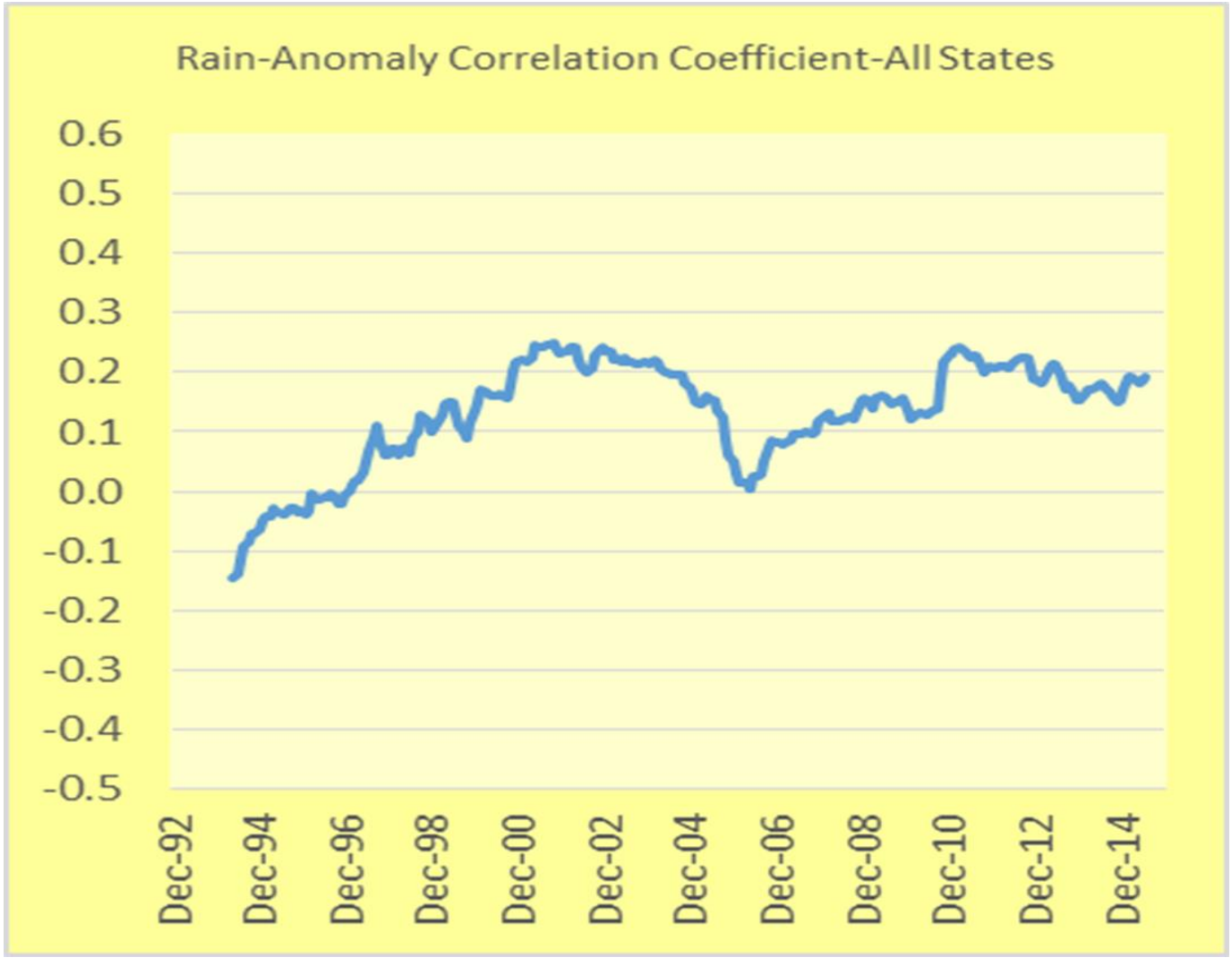
TAS



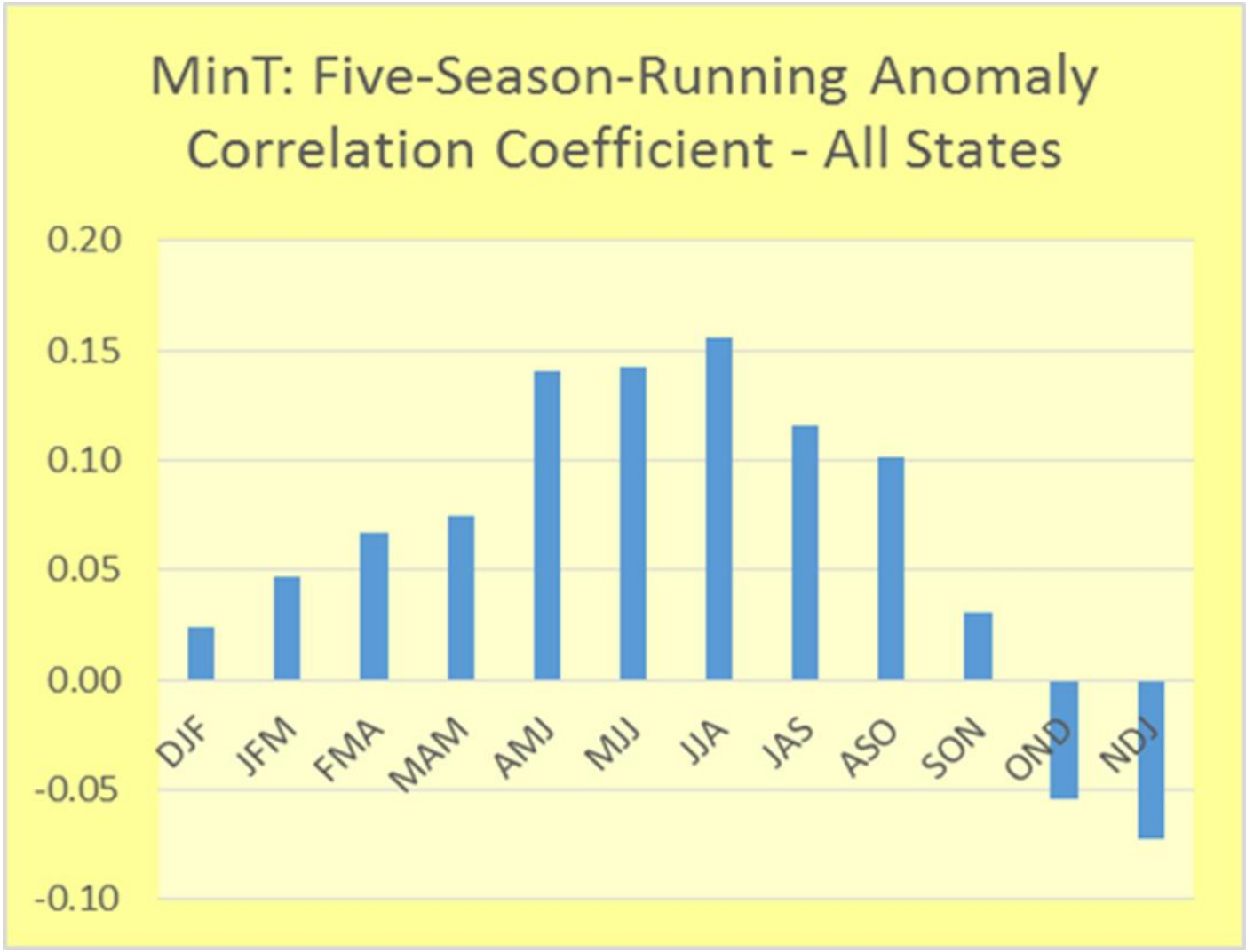


VIC

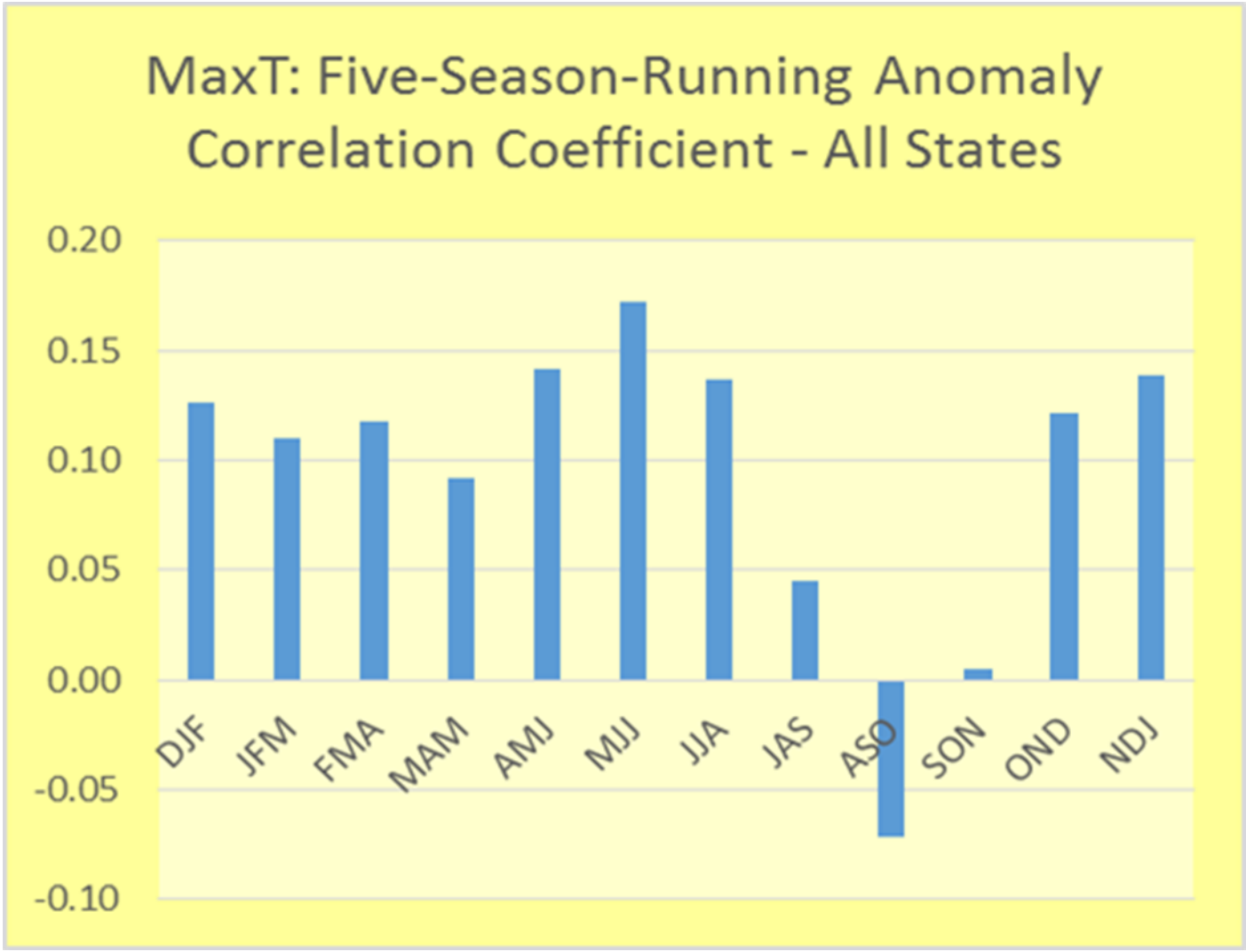
Background (5)



Background (6)



Background (7)



Background (8)

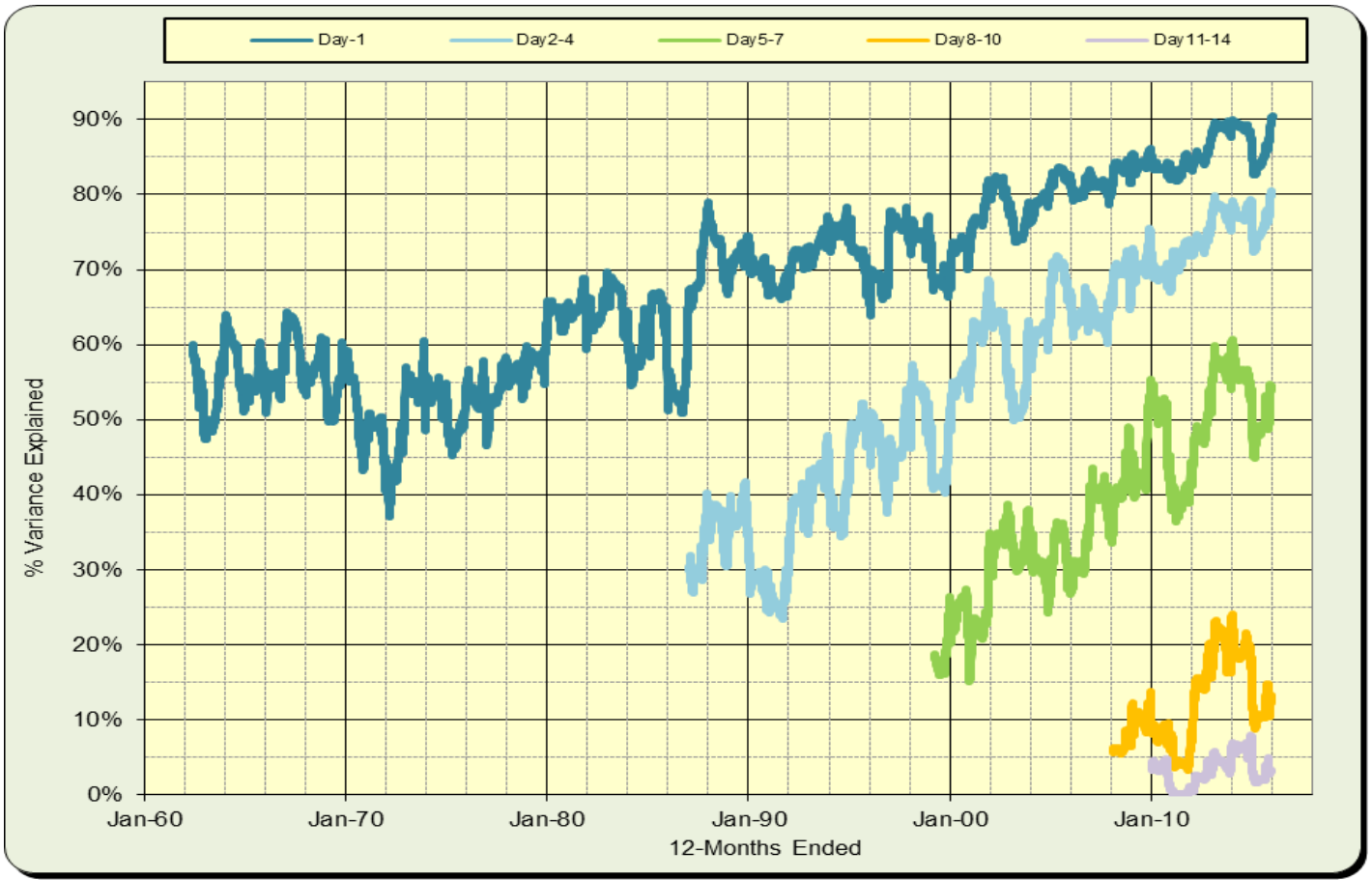
About a year ago, Stern and Davidson (2015) completed an analysis of the accuracy of the accuracy of day-to-day weather forecasts, both official Bureau of Meteorology forecasts and experimental forecasts, out to Day-14.

Stern H and Davidson N E (2015) Trends in the Skill of Weather Prediction at Lead Times of 1 to 14 Days. QJRMS, 2015

[Link: Refer to Abstract Book]

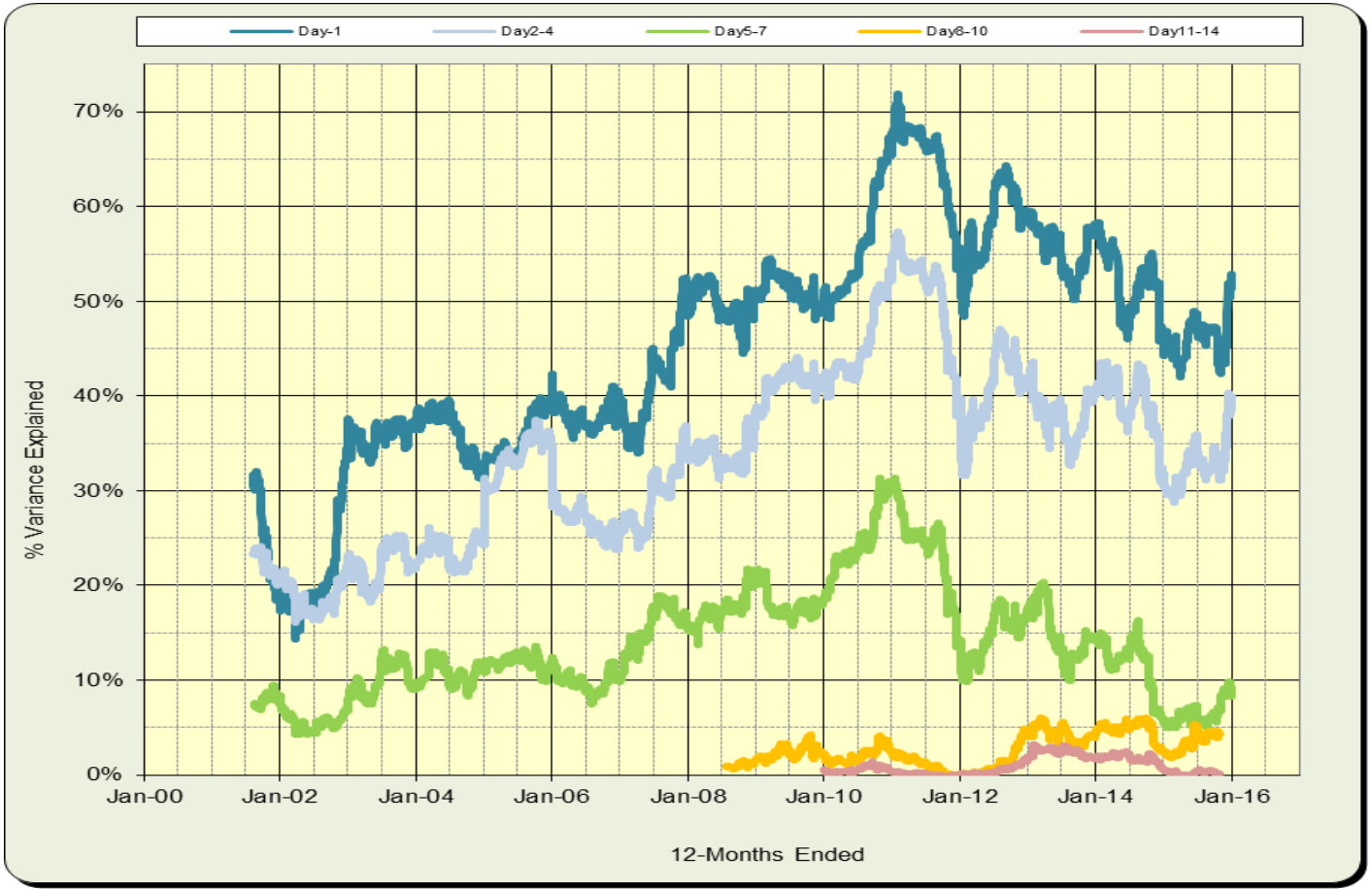
Background (9)

Trend in the accuracy of Melbourne maximum temperature forecasts



Background (10)

Trend in the accuracy of Melbourne rainfall amount forecasts



Purpose

The purpose of the current work is to blend and, where appropriate, update, the aforementioned studies into an exploration of the reliability of forecasts at the weather-climate interface.

Results (1)

More recently, Stern and Davidson (2016) presented a study of the accuracy of the day-to-day predictions generated by the ECMWF control model out to Day-32.

Stern H and Davidson N E (2016) On the limits of predictability of day to day weather forecasts for Melbourne Australia. Special Symposium on Seamless Weather and Climate Prediction - Expectations and Limits of Multi-scale Predictability, New Orleans, LA, 10-14 Jan. 2016, Amer. Meteor. Soc.

[Link: Refer to Abstract Book]

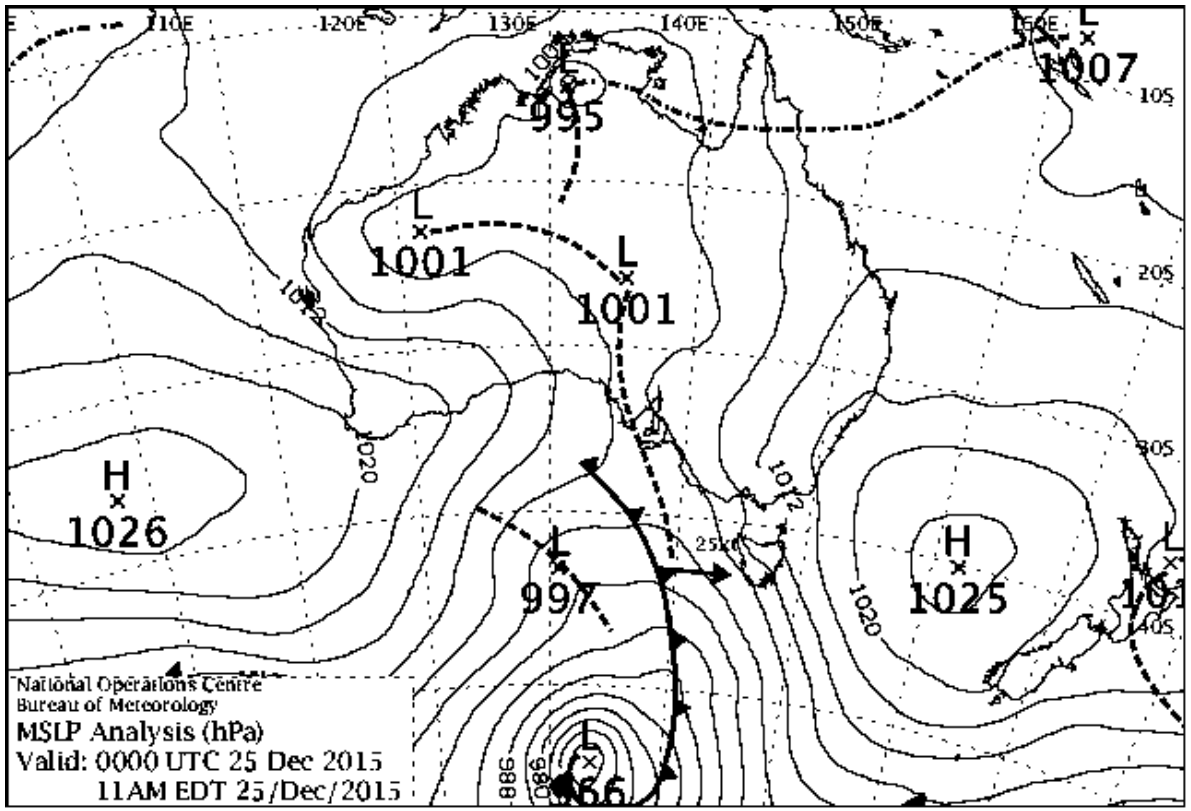
Results (2)

Leading to Christmas Day 2015…ECMWF Model

Day	Date	Month	Model	MIN TEMP	MAX TEMP	AMT RAIN	PROB RAIN	WEATHER	SYNOPTIC TYPE
Sat	19	Dec	*Previous EC Day 26*	13.1	25.9	0	18	MOSTLY SUNNY	Light Variable Antiycylonic
Sun	20	Dec	*Previous EC Day 27*	15.4	25.8	0	14	MOSTLY SUNNY	Light ENE Anticyclonic
Mon	21	Dec	*Previous EC Day 28*	15.6	23.1	0	11	BECOMING SUNNY	Light SSE Antiyclonic
Tue	22	Dec	*Previous EC Day 29*	15.1	25.7	0	14	MOSTLY SUNNY	Light ENE Anticyclonic
Wed	23	Dec	*Previous EC Day 30*	15.4	23	0	11	BECOMING SUNNY	Light SSE Antiyclonic
Thu	24	Dec	*Previous EC Day 31*	14.8	22.7	0	11	BECOMING SUNNY	Moderate ESE Antiyclonic
Fri	25	Dec	*Previous EC Day 32*	13.4	33.3	0	12	MOSTLY SUNNY	Strong NNE Anticyclonic

Results (3)

Observed on Christmas Day 2015 : Min 22.4 Max 34.1 Nil Rain



Results (4)

Leading to Christmas Day 2015…ECMWF Model

32 days ahead … Strong NNE Anticyclonic
29 days ahead … Strong ESE Anticyclonic
25 days ahead … Moderate ENE Anticyclonic
22 days ahead … Moderate ESE Anticyclonic
18 days ahead … Moderate WSW Cyclonic
15 days ahead … Light Variable Anticyclonic

Results (5)

Figures 1, 2, 3, 4 & 5 of the latter reference are now presented.

[Stern H and Davidson N E (2016) On the limits of predictability of day to day weather forecasts for Melbourne Australia]

Results (6)

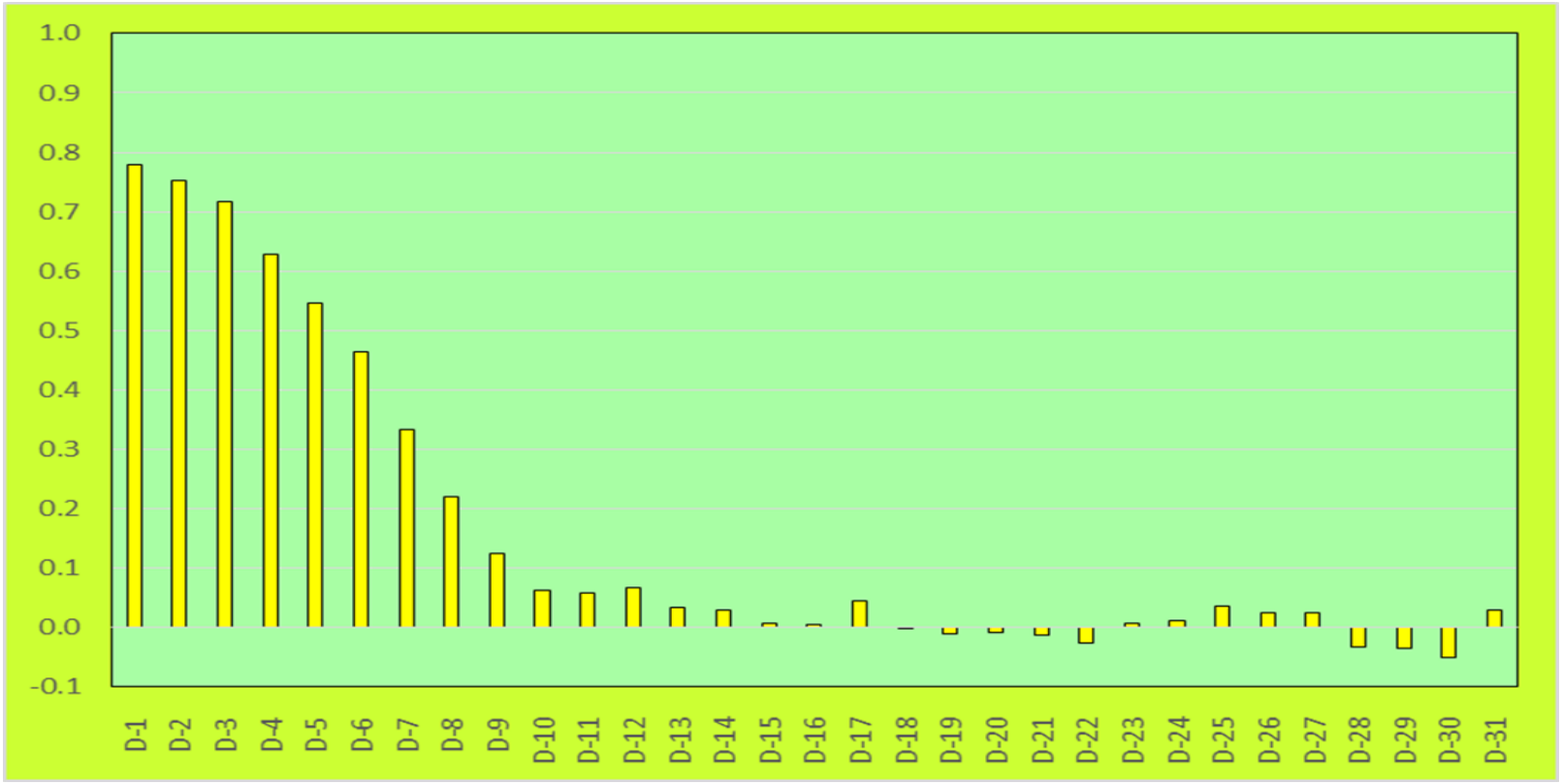


Figure 1 Correlation coefficients between forecast and observed inter-diurnal sets of changes in minimum temperature.

Results (7)

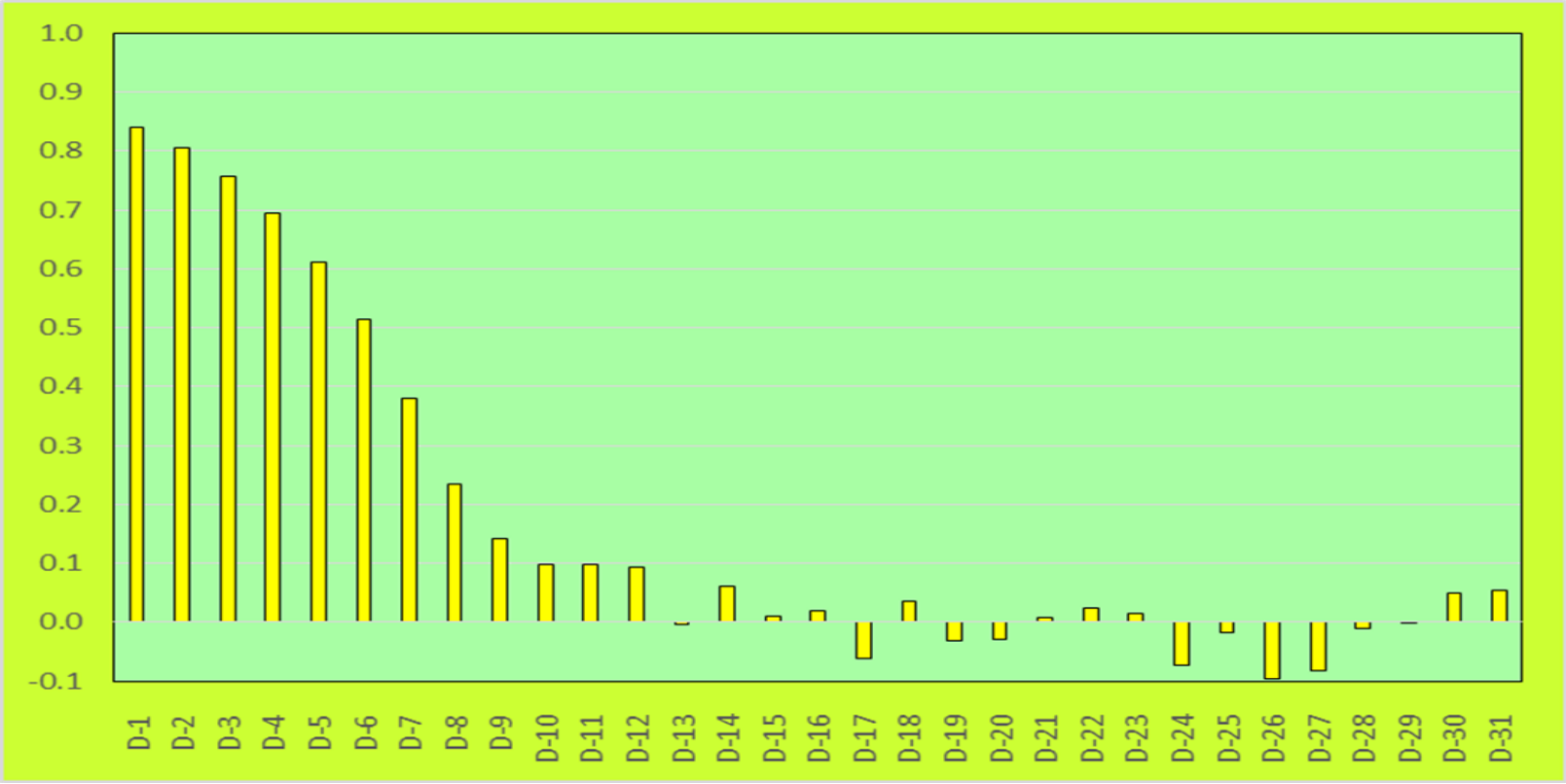


Figure 2 Correlation coefficients between forecast and observed inter-diurnal sets of changes in maximum temperature.

Results (8)

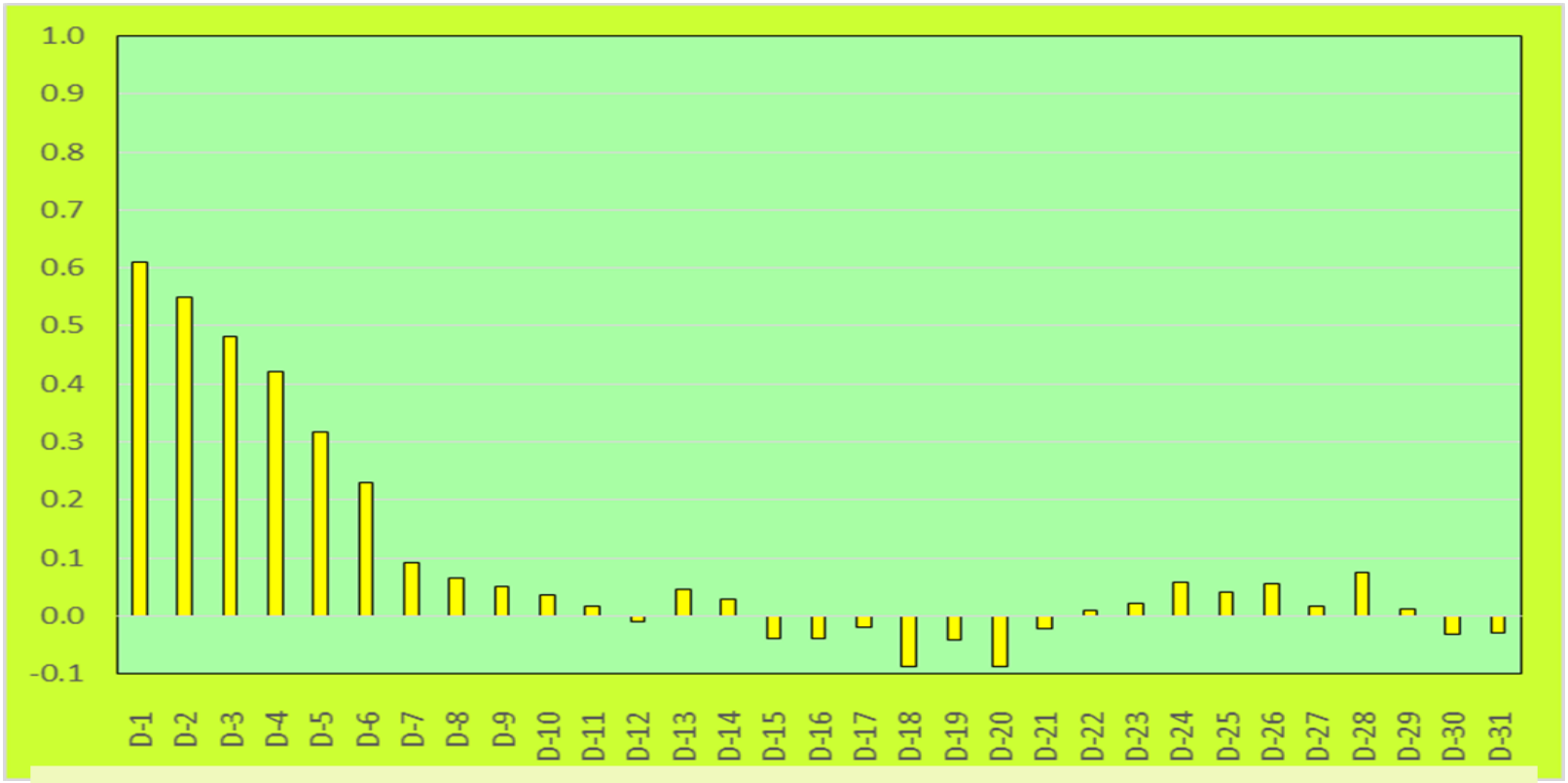


Figure 3 Correlation coefficients between forecast and observed inter-diurnal sets of changes in precipitation amount.

Results (9)

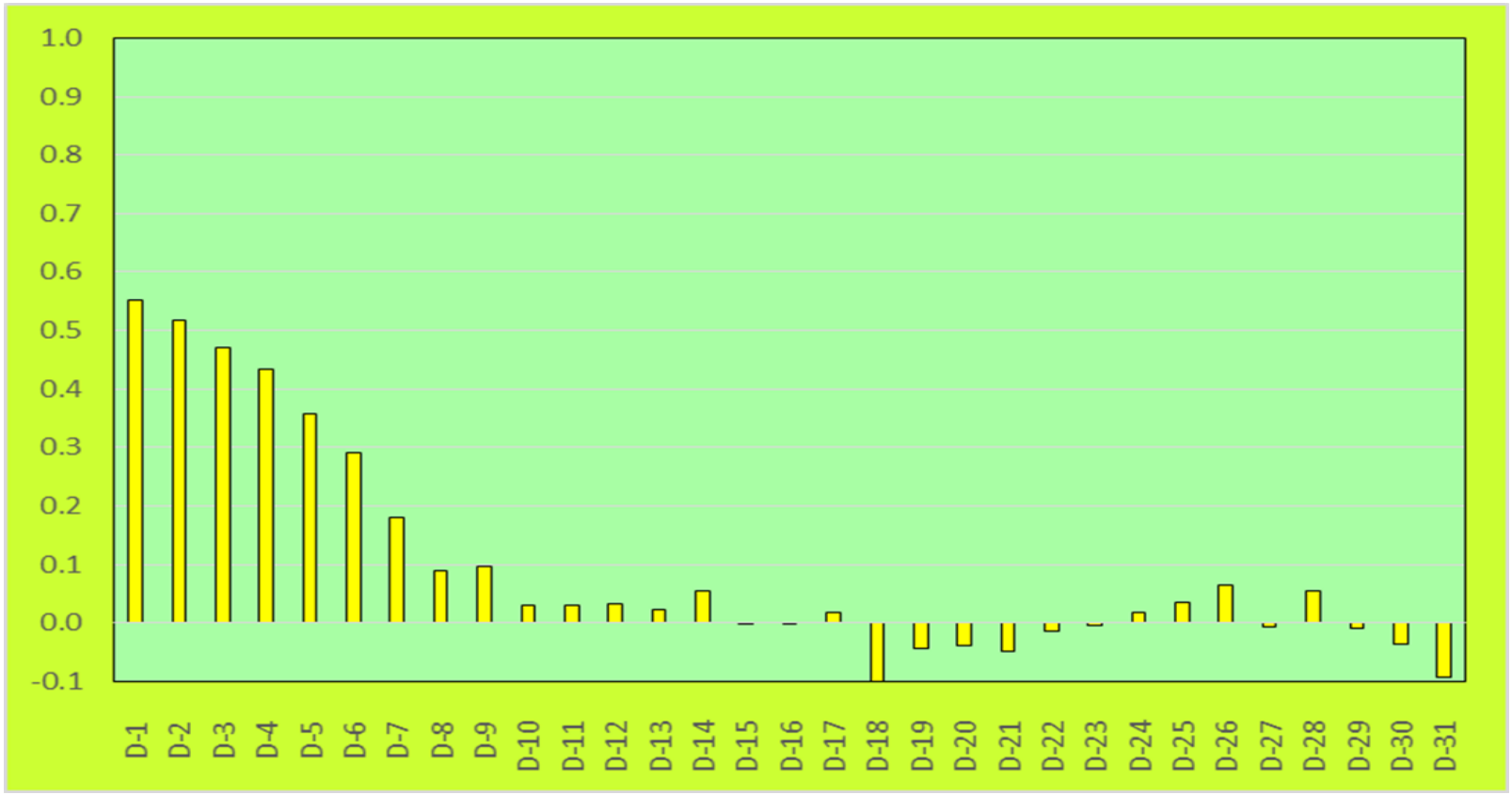


Figure 4 Correlation coefficients between forecast and observed inter-diurnal sets of changes in precipitation probability.

Results (10)

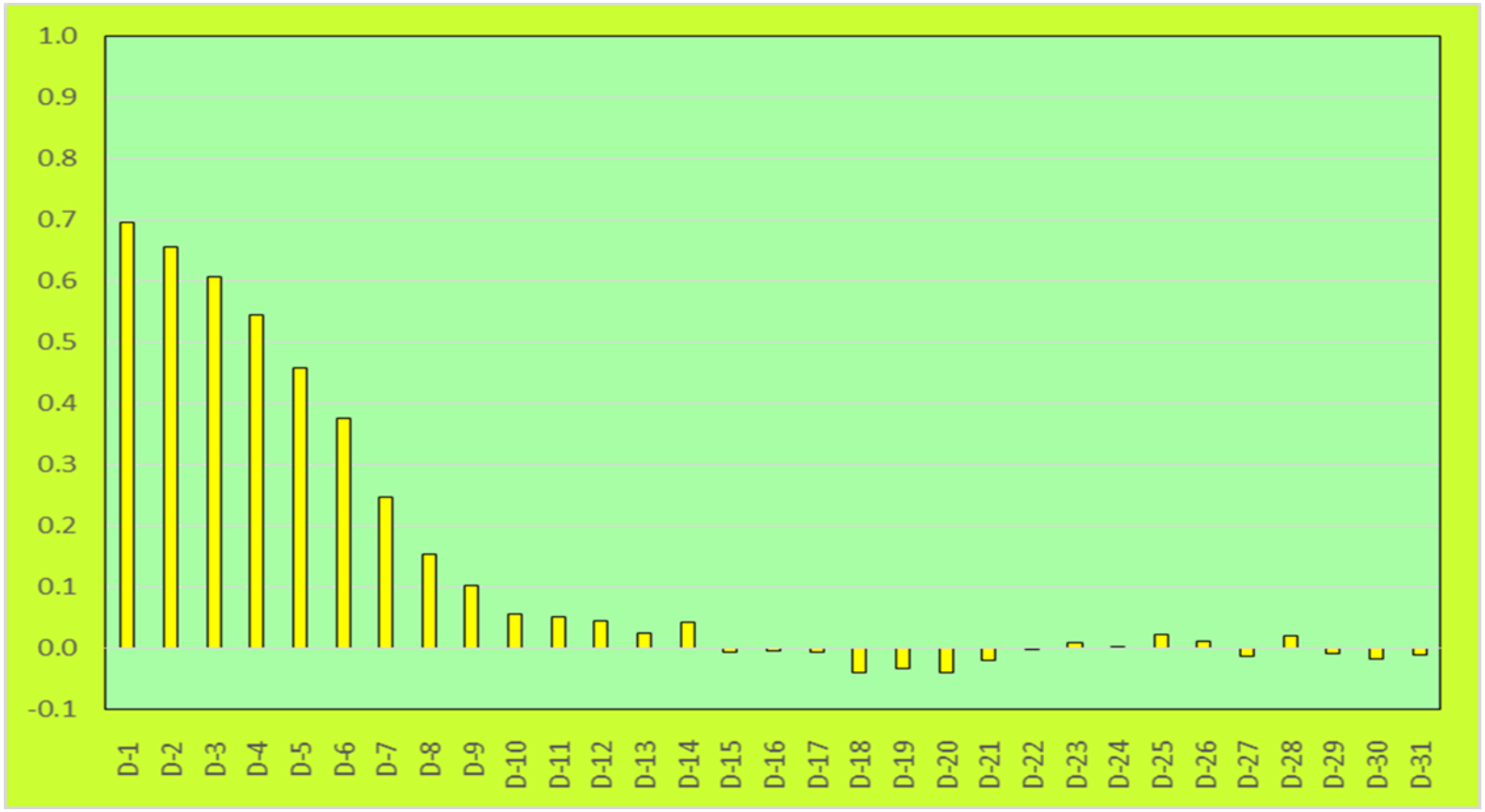


Figure 5 Averages of the sets of correlation coefficients between forecast and observed

Implications for day-to-day forecasting

The average of the sets of correlation coefficients between the post Day-14 forecast and observed inter-diurnal changes for:

- *minimum temperature is* ***+0.0005****,*
- *maximum temperature is* ***-0.0111****,*
- *rainfall amount is* ***-0.0068****,*
- *rainfall probability is* ***-0.0123****,*
- *'overall' is* ***-0.0074****.*

The averages, all being very close to zero, strongly suggest the absence of skill in day-to-day weather forecasting beyond Day-14.

Implications for seasonal forecasting

The absence of skill in Melbourne's day-to-day weather forecasts beyond Day-14 has been documented.

However, this does not necessarily have any implications for seasonal forecasting.

This is on account of the latter's goal of providing an overall picture of the next few months' weather.

Indeed, verification statistics demonstrate that some seasonal forecasting capability does exist.

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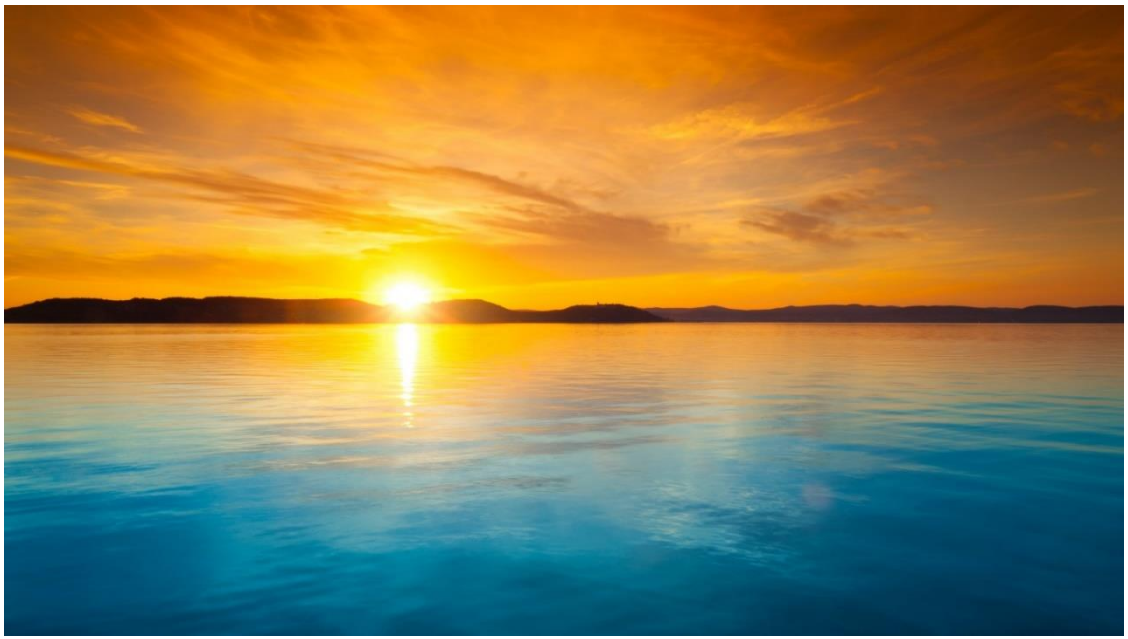

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