

Results from Met Office coupled and forced hindcasts

Richard Barnes, Mike Davey, Margaret Gordon, **Richard Graham**, Matt Huddleston, Sarah Ineson, Peter McLean

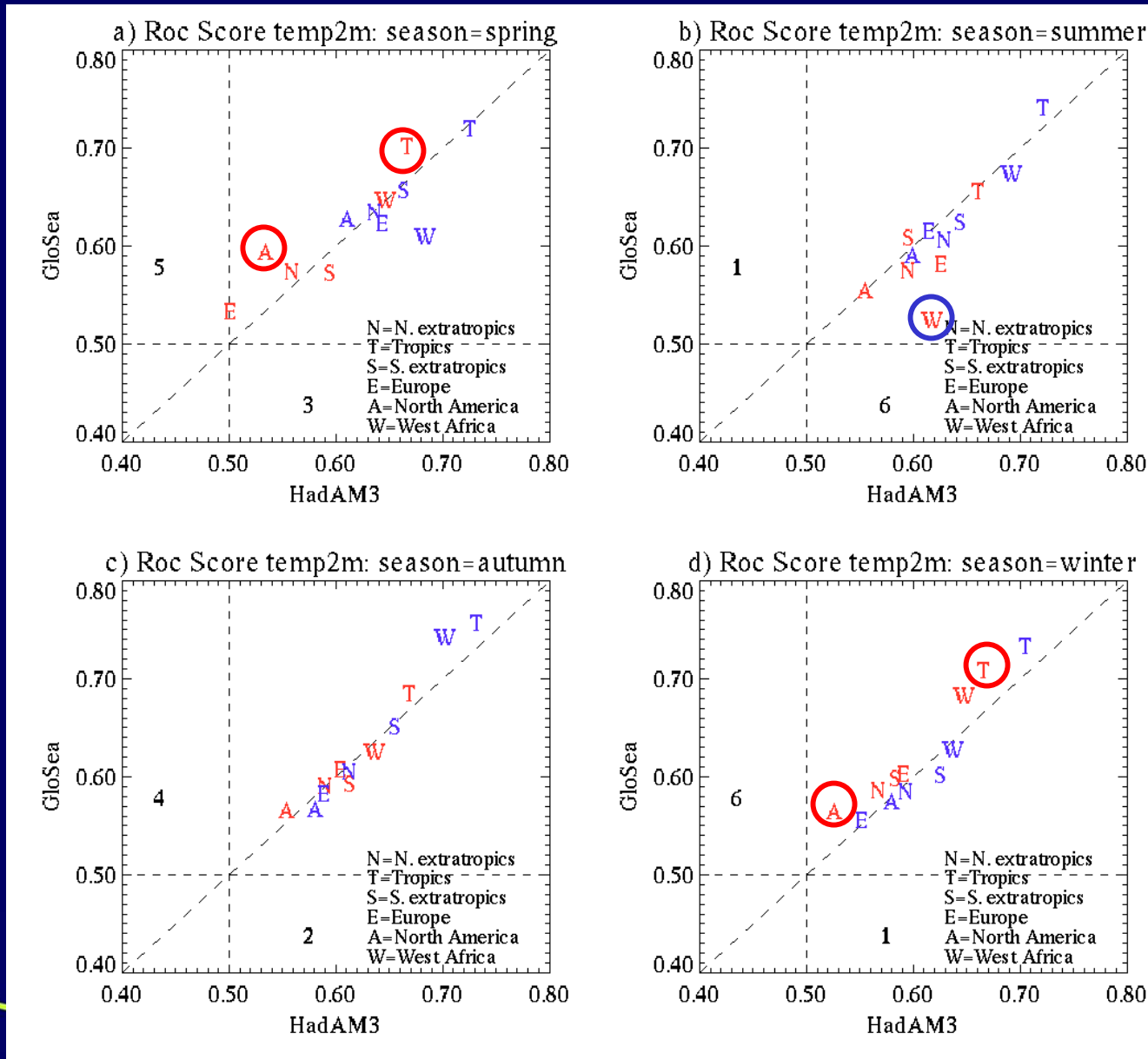
Met Office



GloSea and HadAM3 models

- 43 years of hindcasts completed with both models
 - same atmospheric component -> assess impact of coupling
 - compare performance for t2m and precip (seasonal/monthly)
 - ROC and reliability diagnostics, for “above/below” events
- GloSea
 - fully coupled, based on HadCM3, includes ODA
 - perturbations: ocean - windstress and SST, atmos: nil
- HadAM3
 - uncoupled, forced with predicted SSTA based on persistence of the last months anomalies
 - perturbations: ocean - nil, atmos: lagged starts 6hrs apart

T2m anomaly > 0, ROC Area: GloSea Vs HadAM3 (43 years: 1959-2001)



“spring”
 1m lead (MAM)
 3m lead (FMA)

“summer”
 1m lead (JJA)
 3m lead (MJJ)

“autumn”
 1m lead (SON)
 3m lead (ASO)

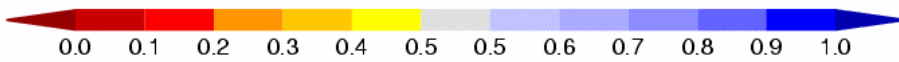
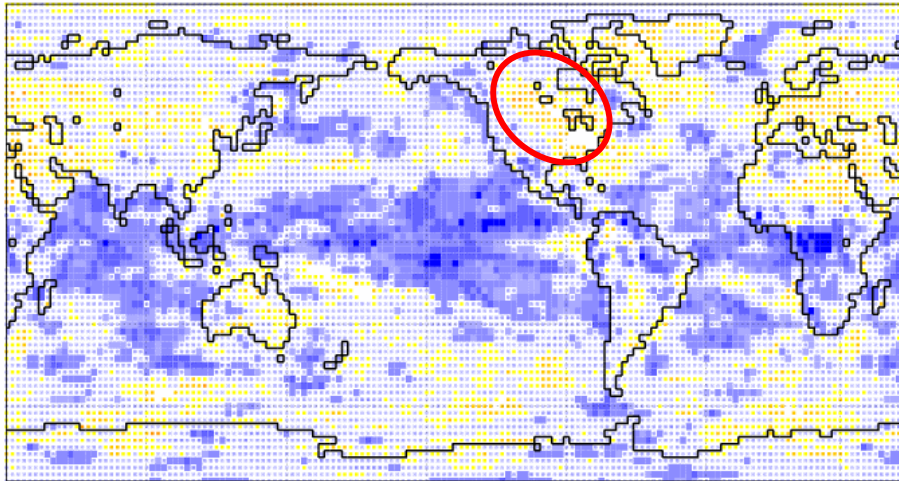
“winter”
 1m lead (DJF)
 3m lead (NDJ)

T2m anomaly >0, ROC Area: GloSea Vs HadAM3

FMA at 3 months lead

HadAM3

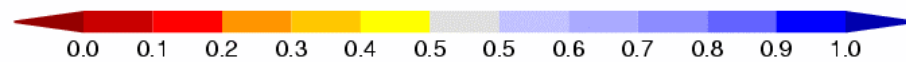
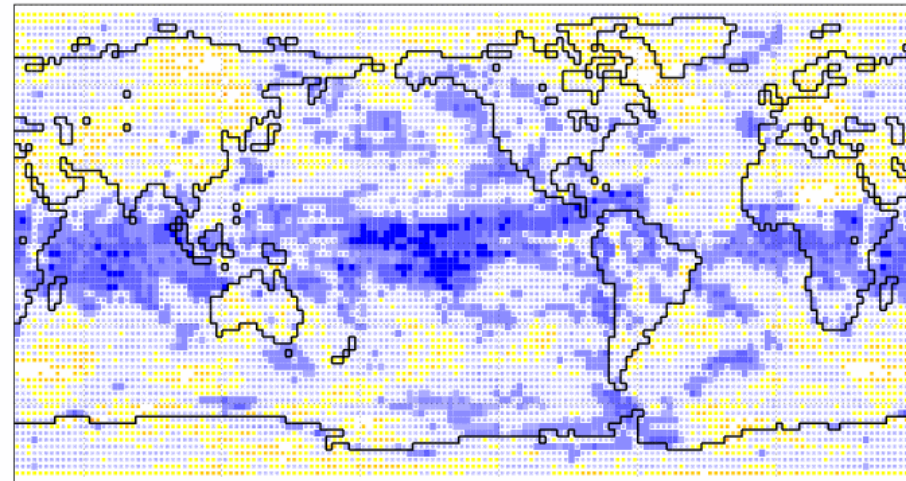
ROC Score: EXP(UKMO_uncoupled) regarding ERA-40 reanalysis
Event: 2m-Temperature Anomaly > 0
Forecast start month and years: November / 1959-1969, 1974-1979, 1987-1998
FC period: months 4-6 (FMA), ens: 0-8



Corr. PNA index = 0.34

GloSea

ROC Score: EXP(UKMO) regarding ERA-40 reanalysis
Event: 2m-Temperature Anomaly > 0
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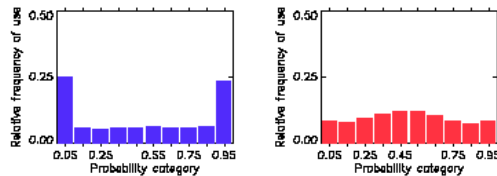
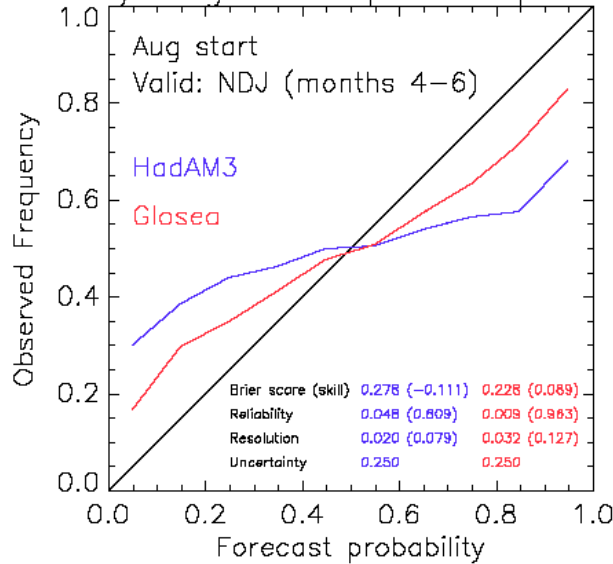


Corr. PNA index = 0.50

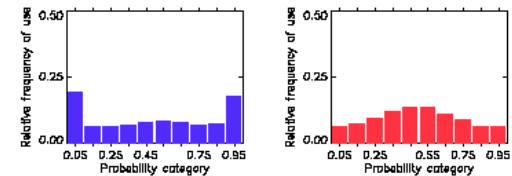
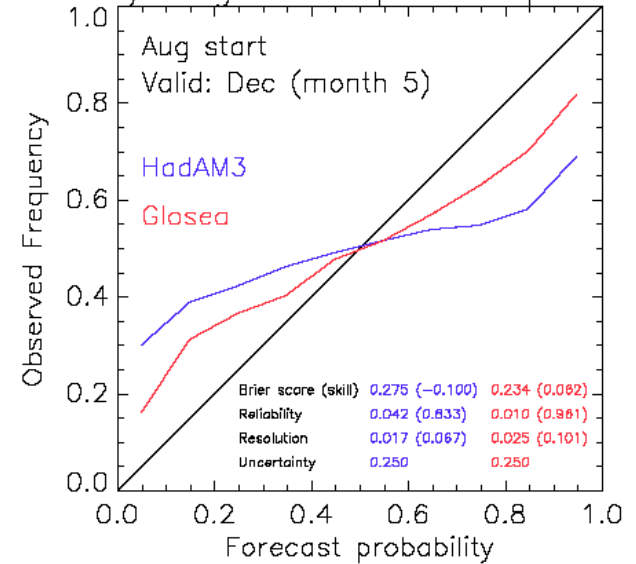
Reliability: GloSea Vs HadAM3

Event = t2m anomaly > 0, tropics

Reliability diagram: tropics temp2m > 0 °C



Reliability diagram: tropics temp2m > 0 °C

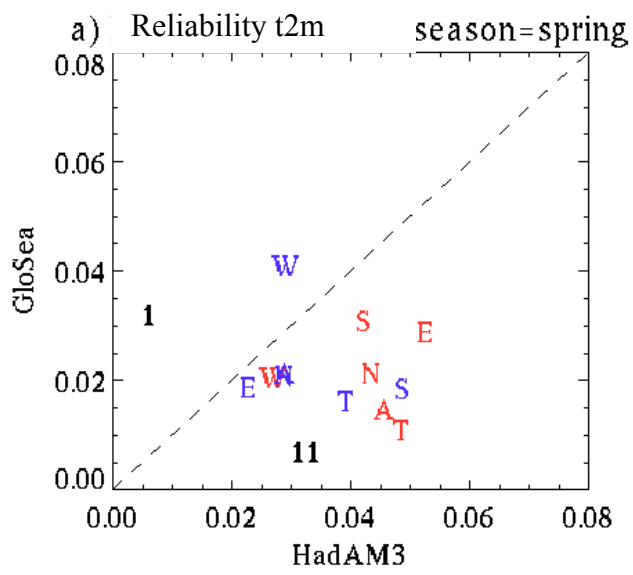


NDJ, months 4-6

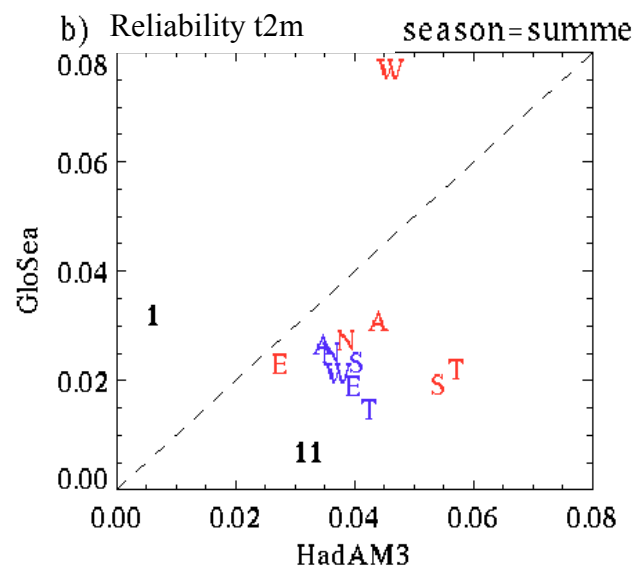
Dec, month 5

T2m anomaly > 0, Reliability: GloSea Vs HadAM3 (43 years: 1959-2001)

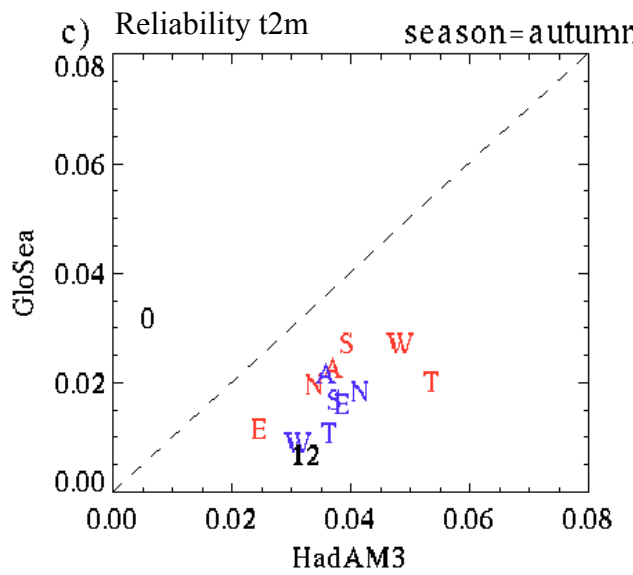
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1m lead (MAM)
3m lead (FMA)



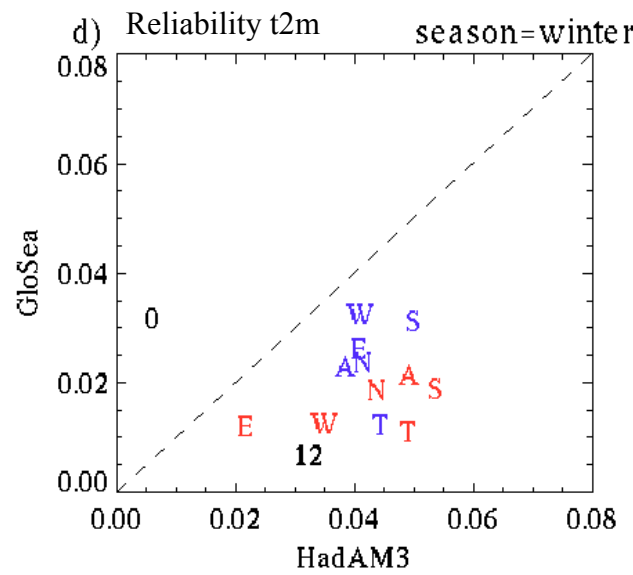
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1m lead (JJA)
3m lead (MJJ)



“autumn”
1m lead (SON)
3m lead (ASO)



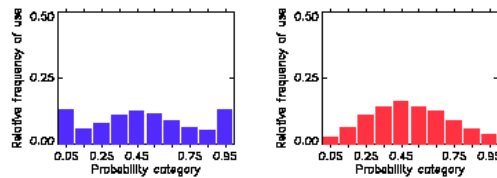
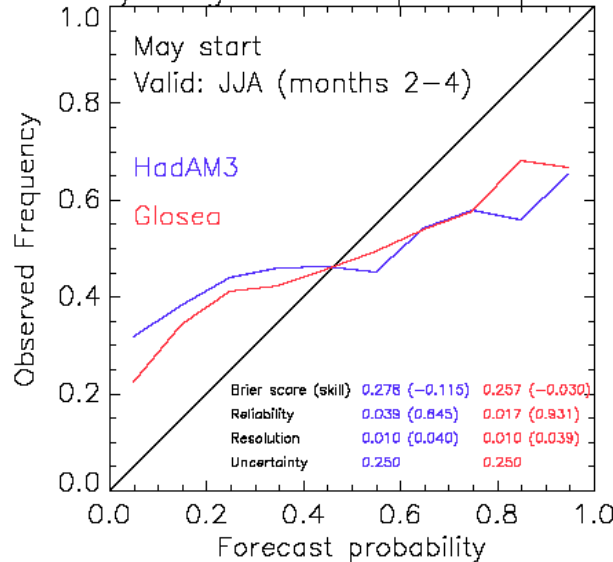
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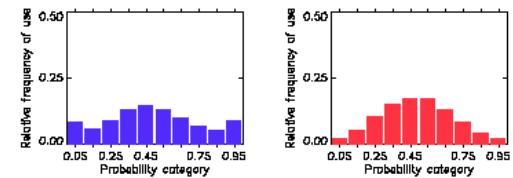
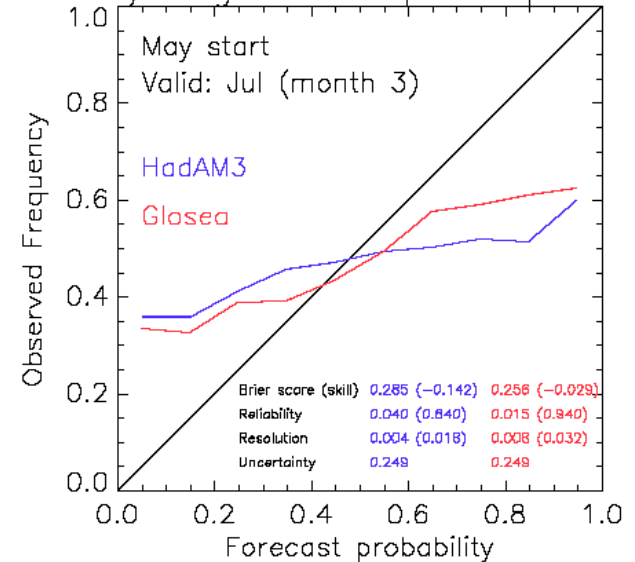
Reliability: GloSea Vs HadAM3

Event = t2m anomaly > 0, Europe

Reliability diagram: europe temp2m > 0 °C



Reliability diagram: europe temp2m > 0 °C

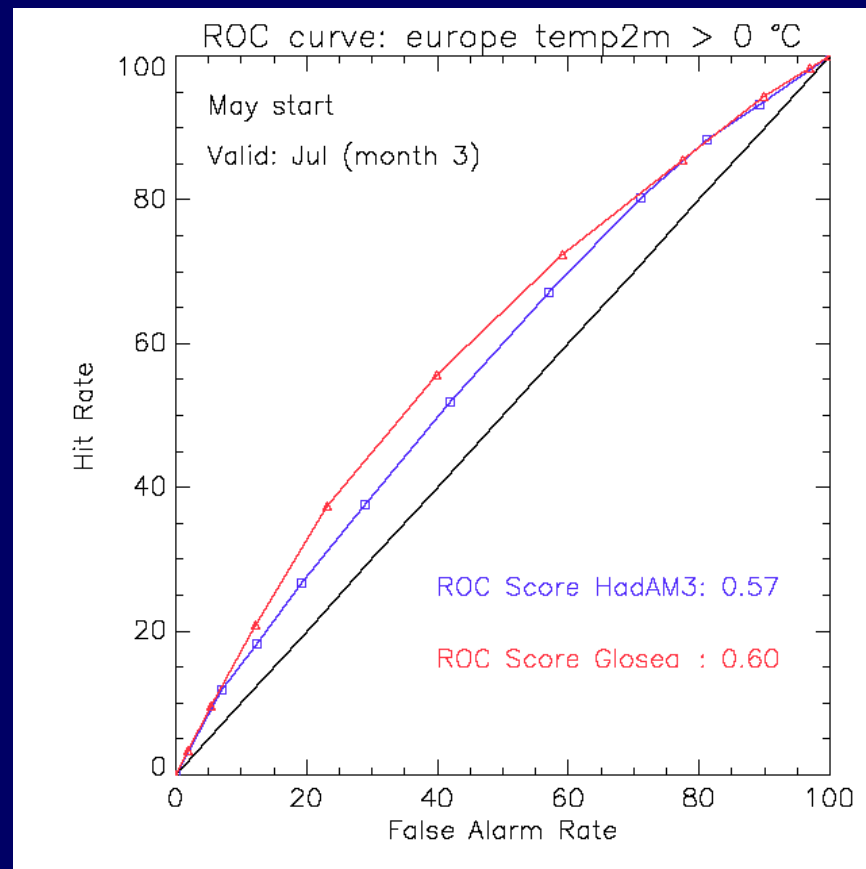
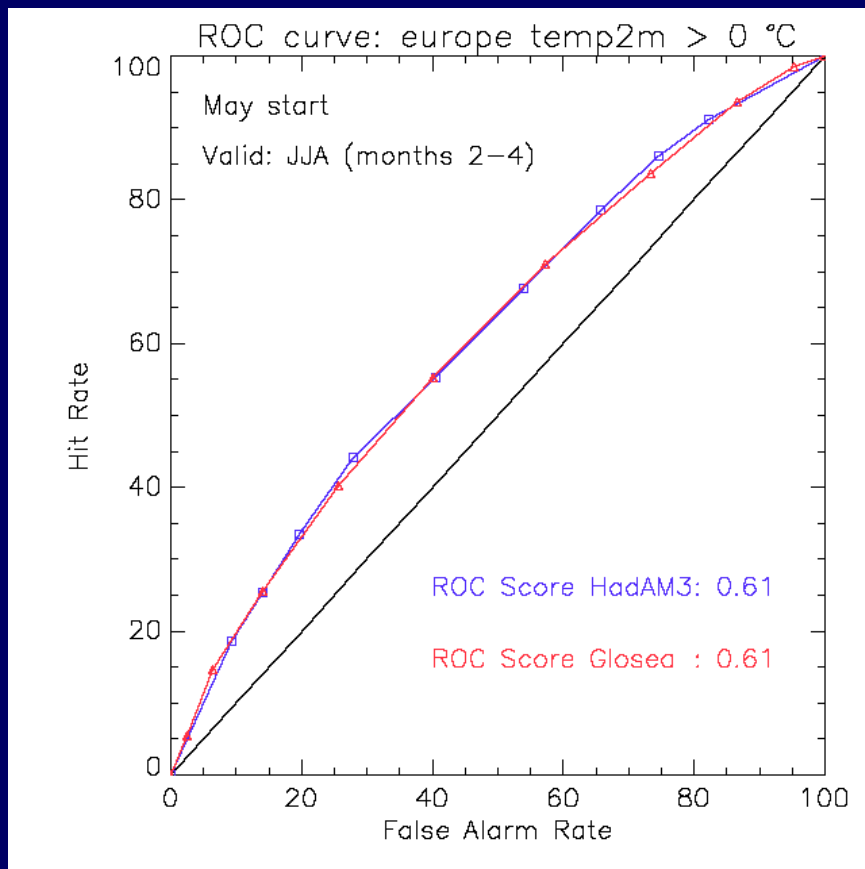


JJA, 2-4 months

July, month 3

ROC: GloSea Vs HadAM3

Event = t2m anomaly > 0, Europe

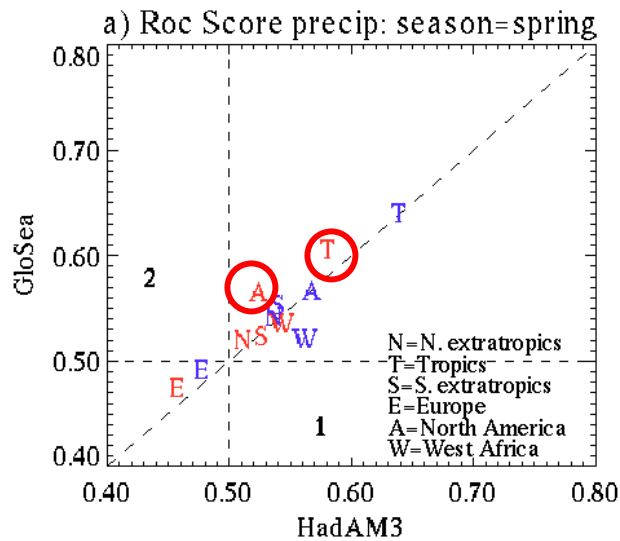


JJA, 2-4 months

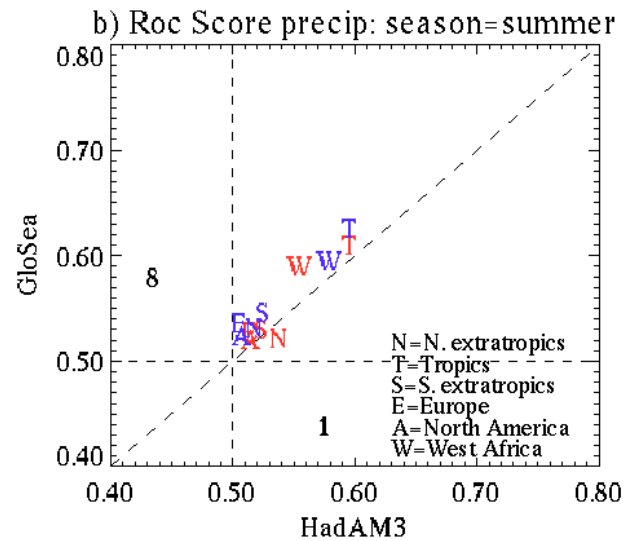
July, month 3

Precip anomaly > 0, ROC Area: GloSea Vs HadAM3 (43 years: 1959-2001)

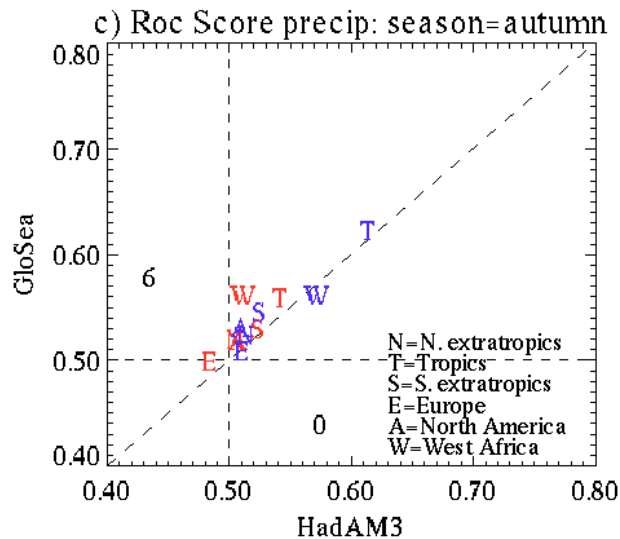
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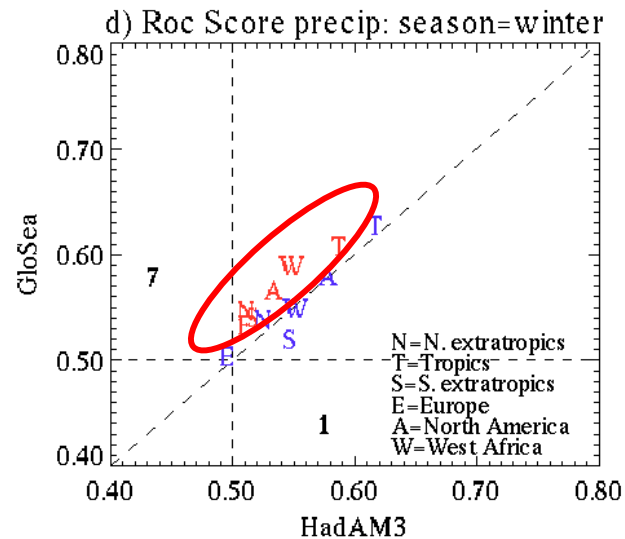
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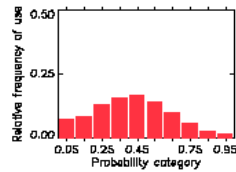
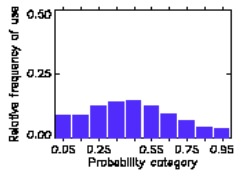
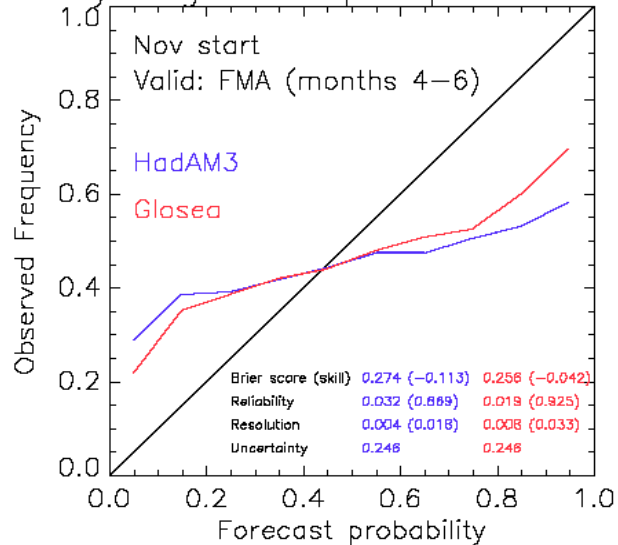
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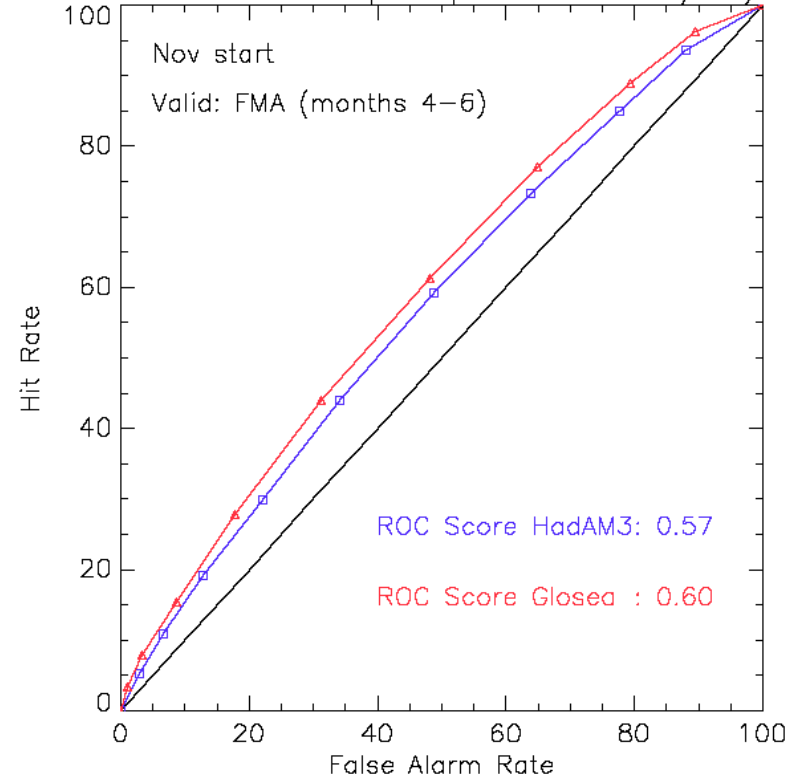
Reliability/ROC: GloSea Vs HadAM3

Event = precip anomaly > 0, FMA tropics, 3m lead

Reliability diagram: tropics prec > 0 mm/day



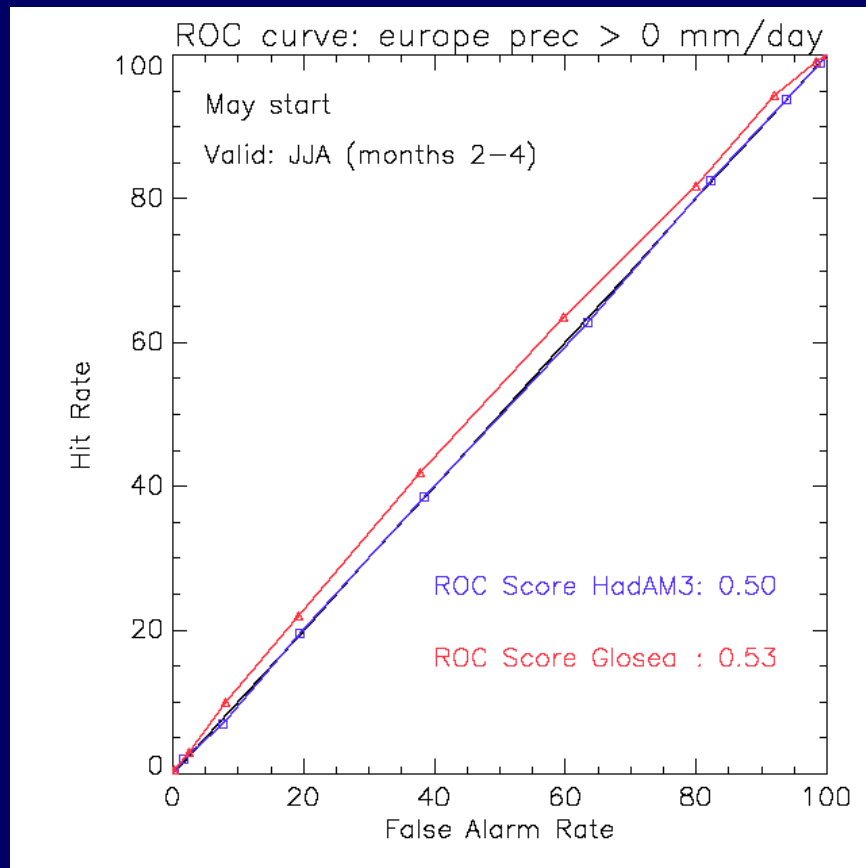
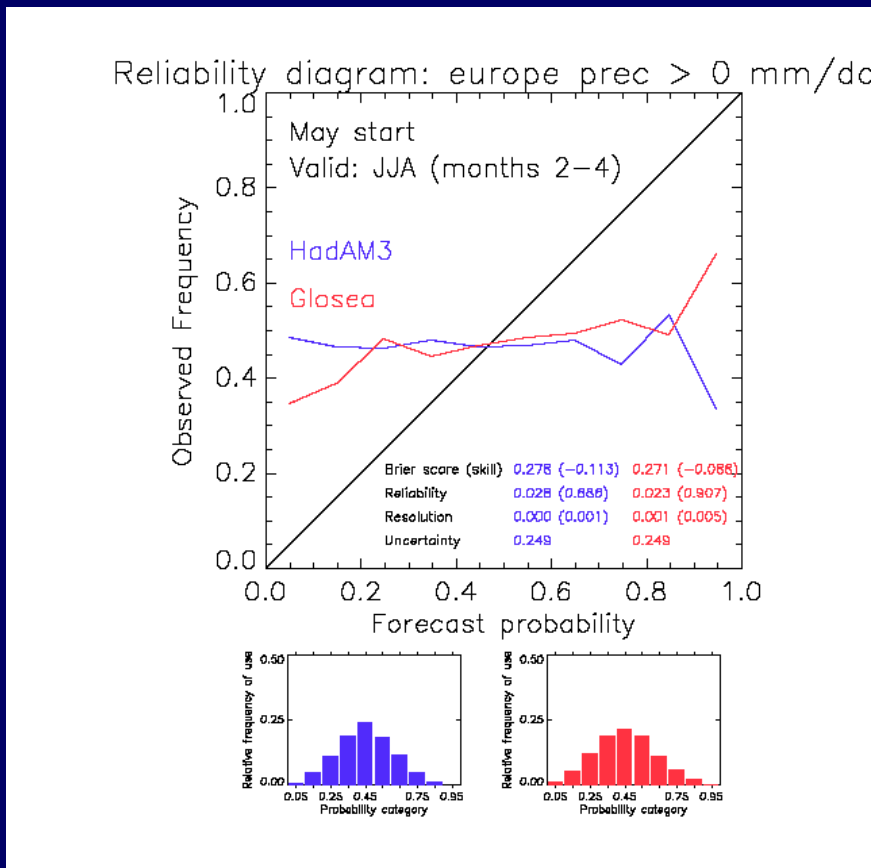
ROC curve: tropics prec > 0 mm/day



FMA, months 4-6

Reliability/ROC: GloSea Vs HadAM3

Event = precip anomaly > 0, Europe

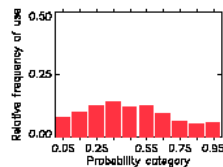
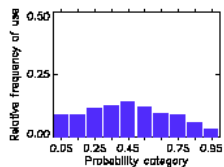
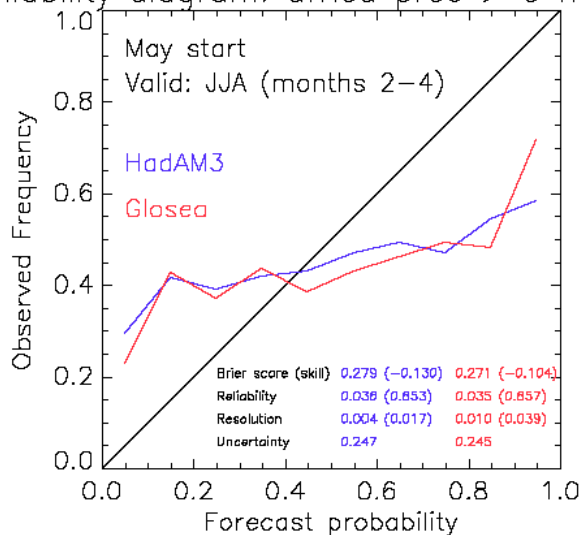


JJA, 2-4 months

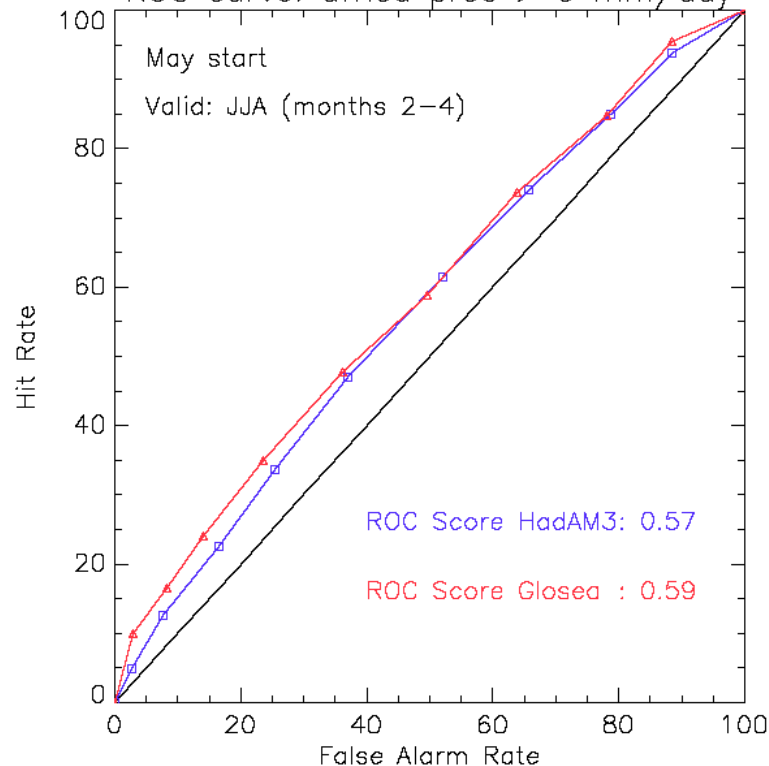
Reliability/ROC: GloSea Vs HadAM3

Event = precip anomaly > 0, West Africa

Reliability diagram: africa prec > 0 mm/day



ROC curve: africa prec > 0 mm/day



JJA, 2-4 months

GloSea Vs HadAM3: summary

- T2m anomaly > 0
 - GloSea better most seasons/regions. Notably at 3m lead for tropics and North America in spring and winter
 - GloSea has consistently better reliability (and Brier Score)
 - more realistic spread (ocean perturbations... coupling..?)
 - encouraging skill over Europe, including on monthly scales
- Precipitation anomaly > 0
 - GloSea better most seasons/regions.
 - Skill over Europe improved, but still low