Seasonal prediction skill of 4 models over Western Europe and Eastern Africa

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1.- INTRODUCTION

The main objective of this poster is to show the skill of seasonal forecasts of temperature and precipitation for updated versions of four systems (integrated in the EUROSIP framework) over two selected domains (covering Eastern Africa and Western Europe).

Two probabilistic skill scores (ROC Area and RPPS) -- presented as bubble plots and tables-- are selected for communicating differences in skill depending on model, variable, region and season.

2.- DATA

Hindcasts of the following seasonal coupled atmosphere-ocean models have been used for their verification at seasonal time scales: ECMWF System 4 (S4), NCEP (CFSv2), Météo-France System 4 (MF4) and UK Met Office GloSea5.

Depending on the area and variable, the following datasets have been used for verification: 1) ERA-Interim monthly temperature dataset 2) E-OBS gridded dataset from the EU-FP6 ENSEMBLES project and 3) GPCC precipitation dataset.

The original anomaly data were three monthly averaged and up-scaled to a common 1°x1° lat-lon grid to verify seasonal models outputs.

Forecast System	Verification Period
S4	1991-2010
MF4	1992-2010
GloSea5	1997-2008
CFSv2	1991-2010

3.- METHODOLOGY OF VERIFICATION

Seasonal forecasts of temperature and precipitation anomalies obtained with the four different forecasting systems here considered are verified using two probabilistic skill scores. The anomalies -- computed as the difference between the forecasted and climatological values for each system-- are obtained by cross-validated forecasts on data not used in the estimation. The anomalies of the observation datasets have been computed in a similar way.
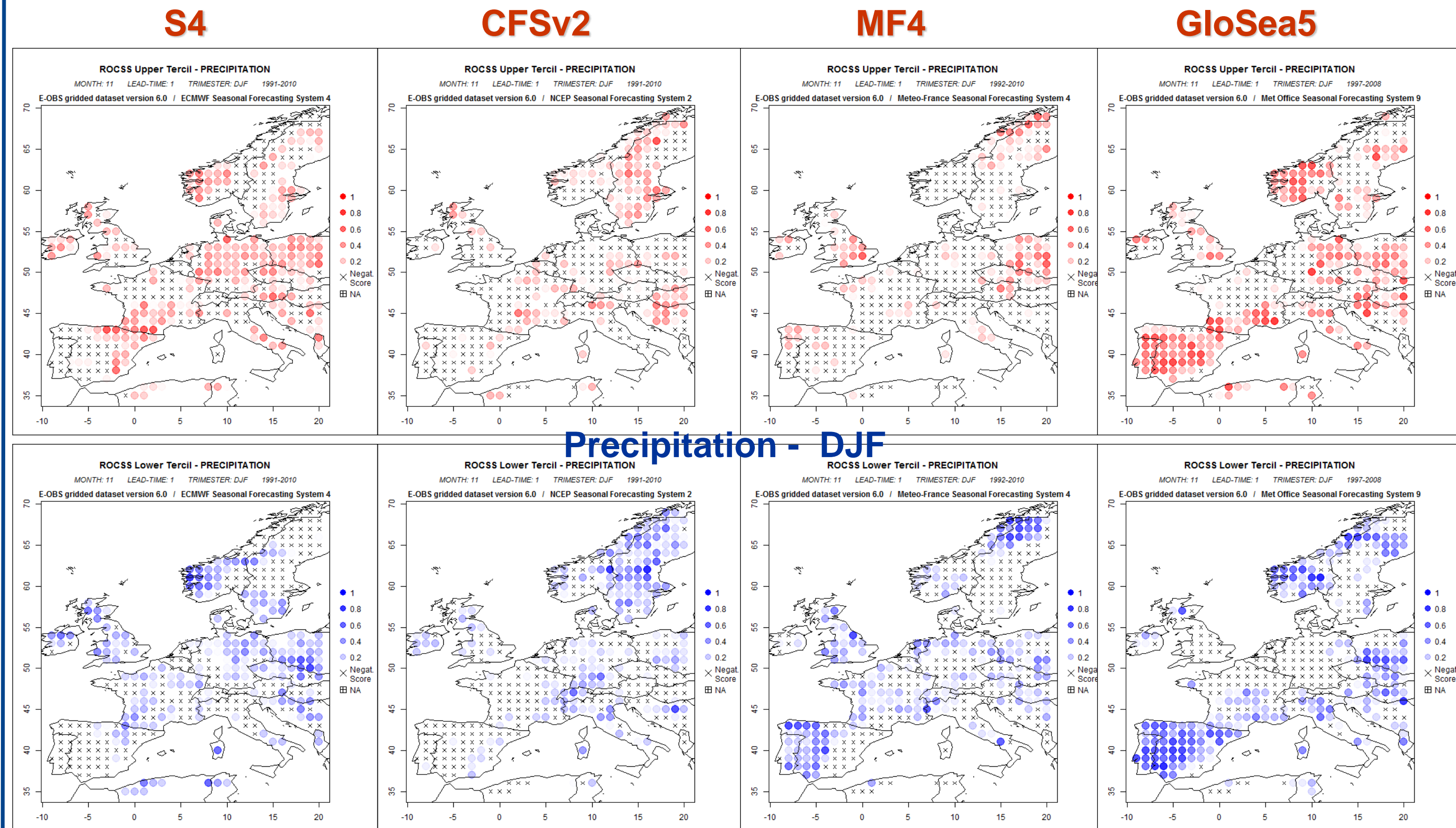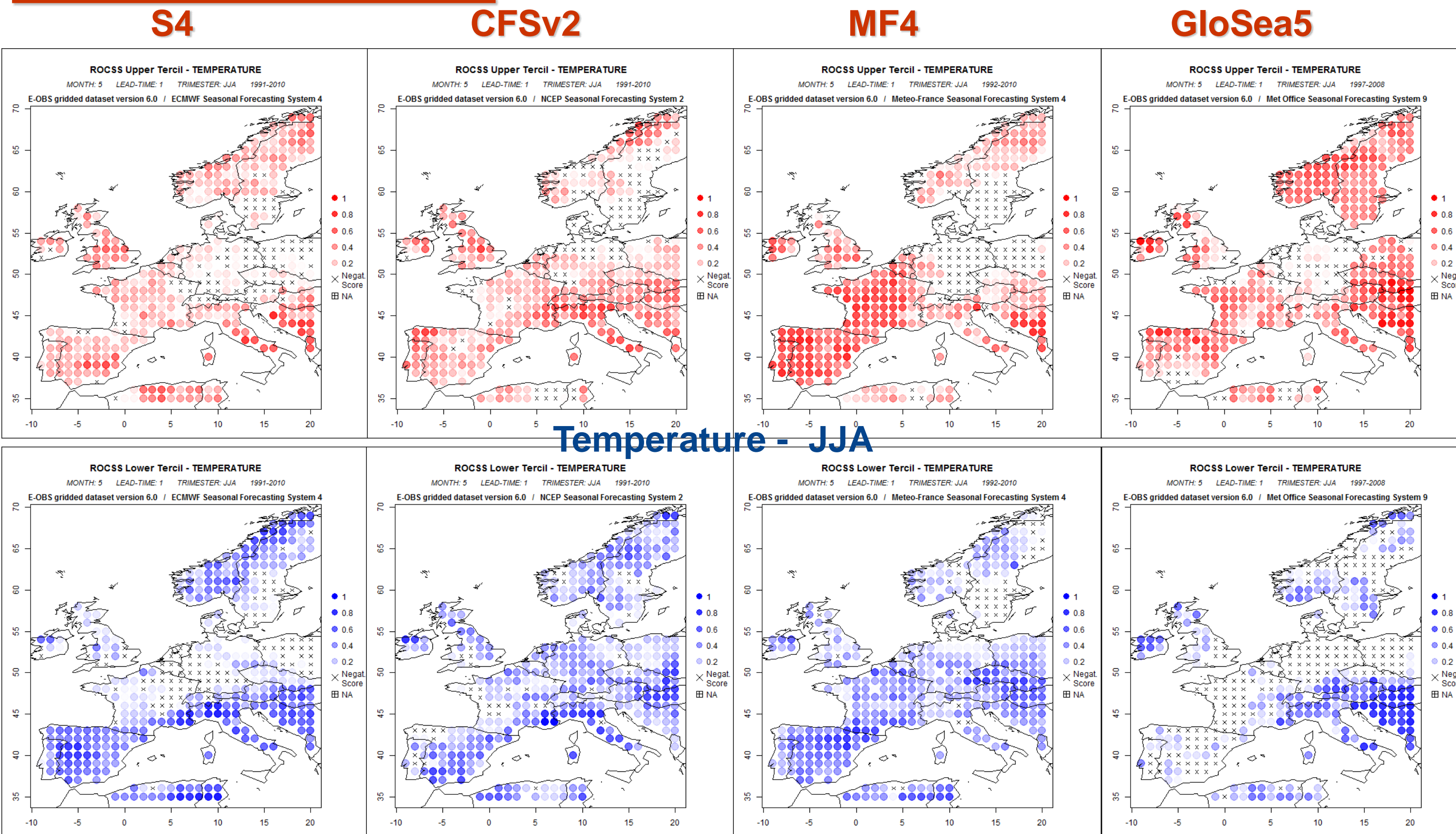
We have used the last 20 years (when available) or the maximum number of years available as verification period covered by the hindcasts of the forecast systems.

Two skill scores (Wilks 1995) have been computed over a selected domain over Eastern Africa and Western Europe for 12 different three-month periods and for lead time 1:
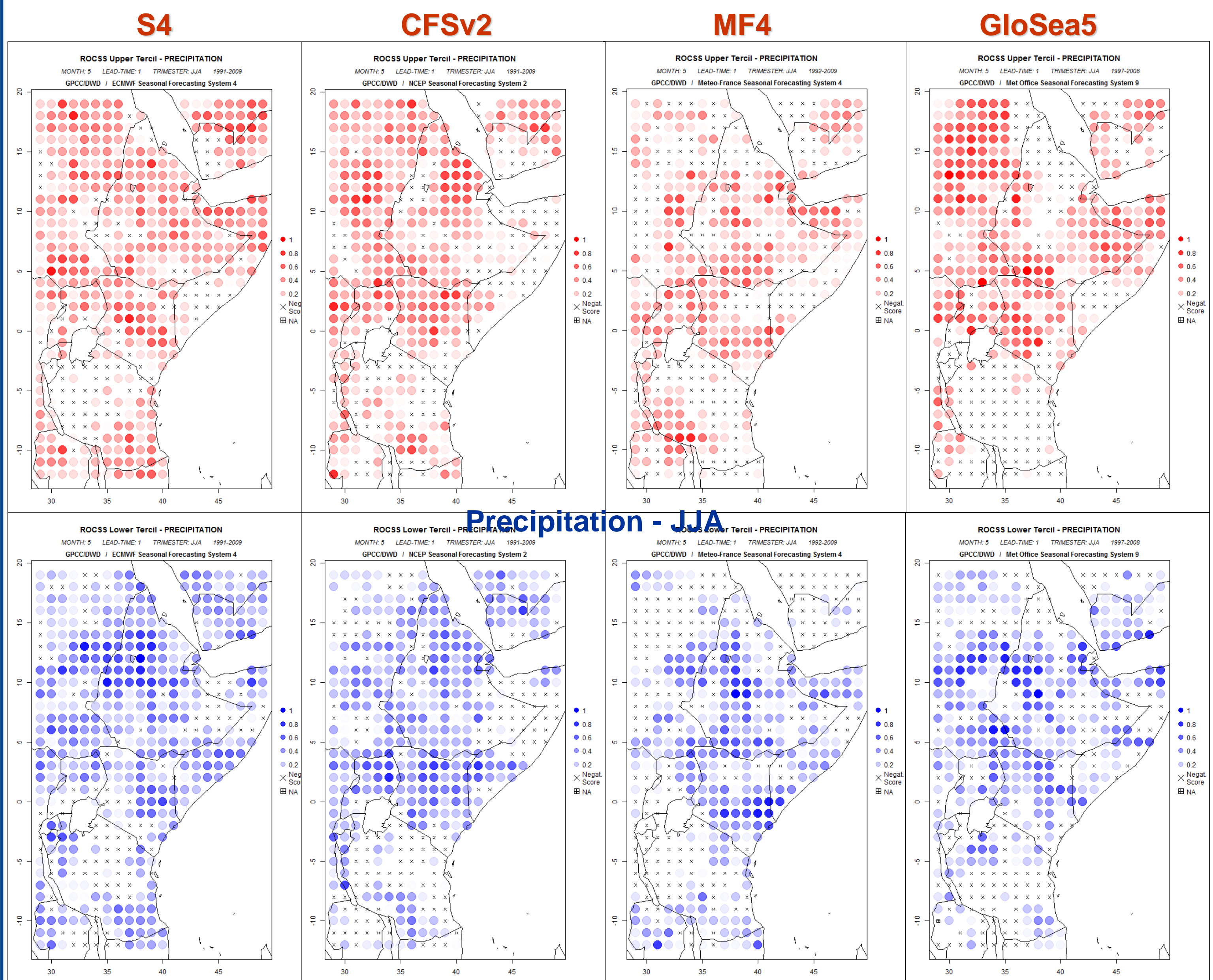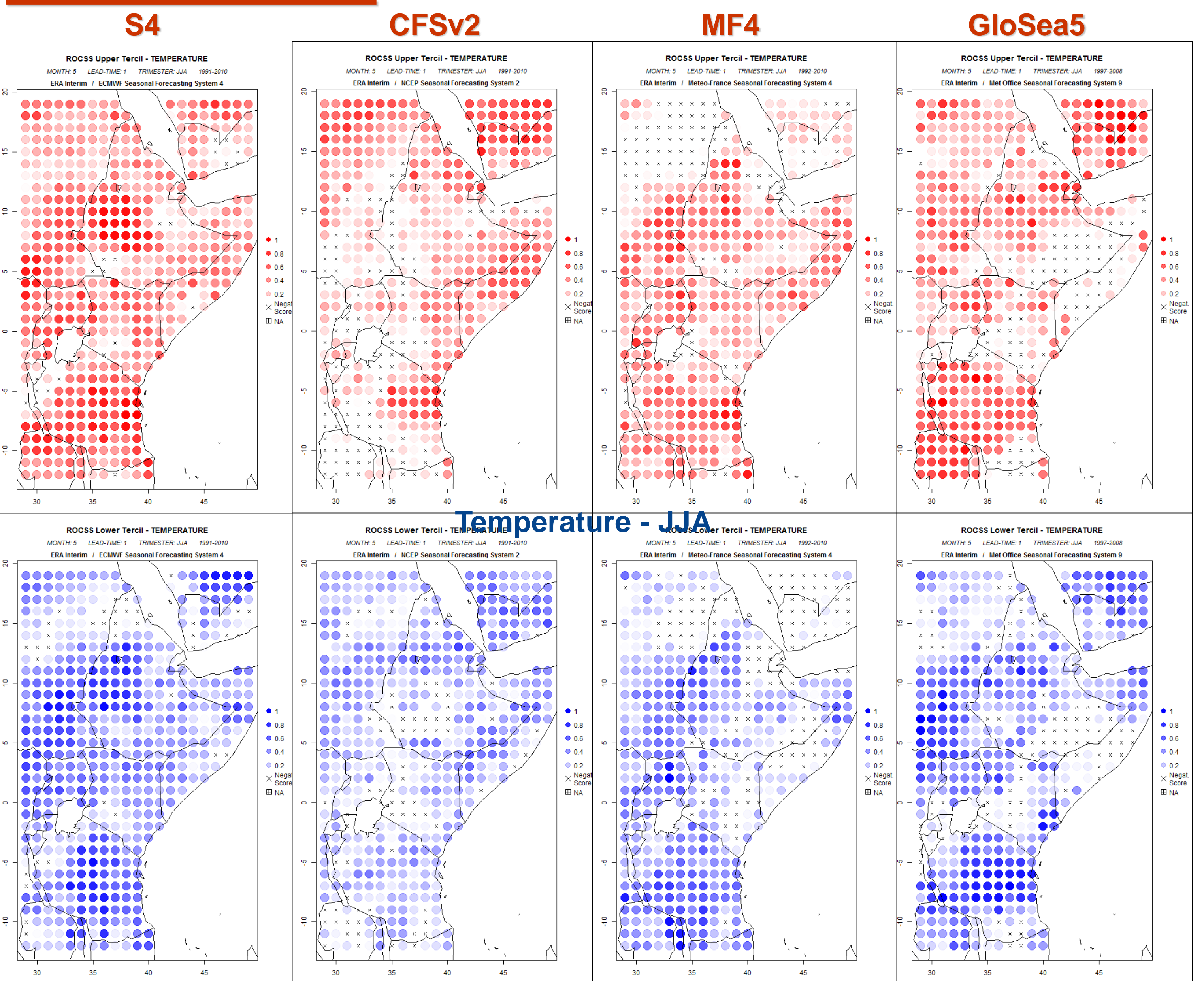• Ranked Probability Skill Score (RPSS) for terciles
• Lower/Upper Relative Operating Characteristic (ROC) area

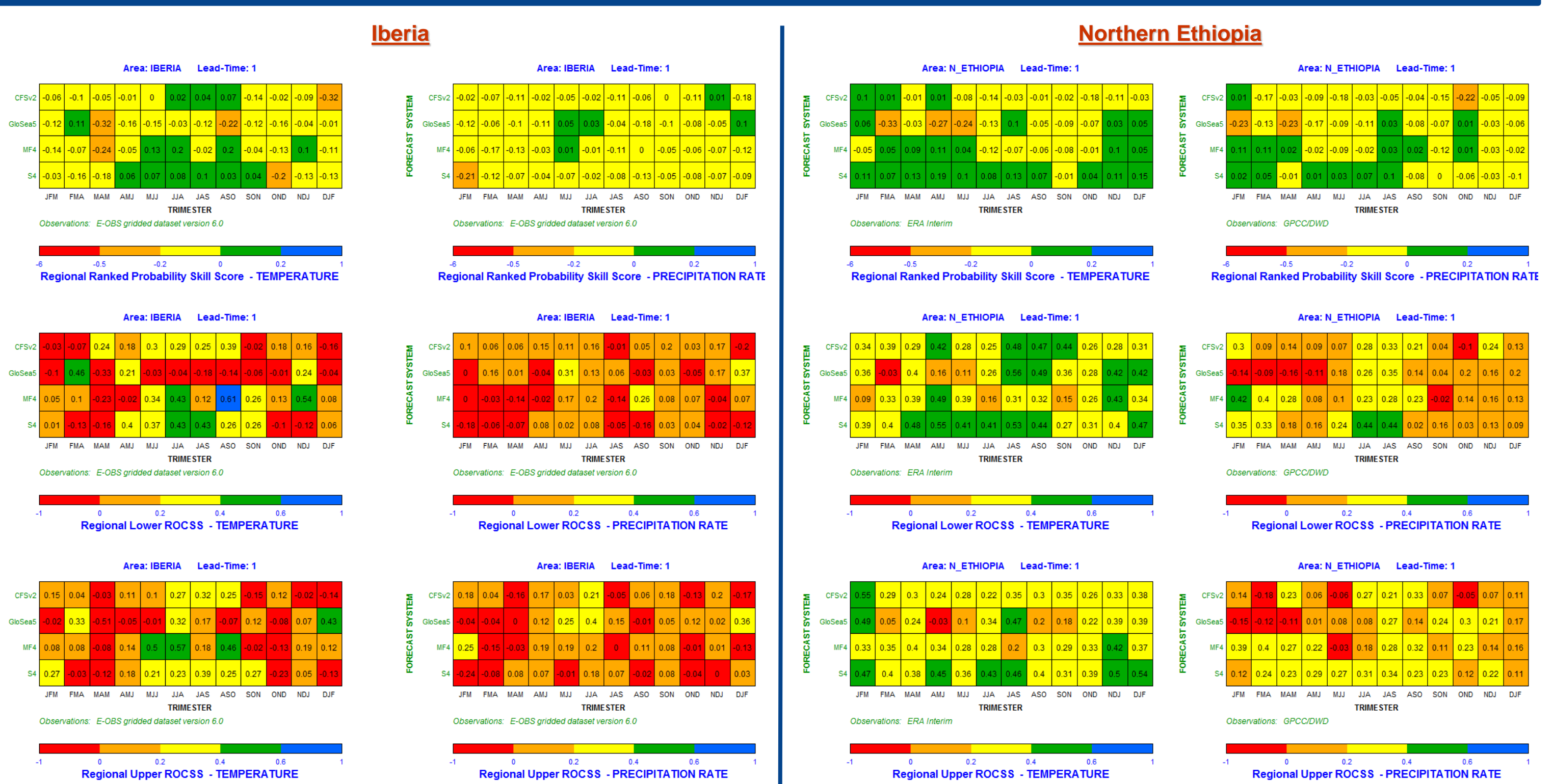## 4.- BUBBLE PLOTS - ROC SKILL SCORE (UPPER AND LOWER TERCILES)

WESTERN EUROPE

Temperature - JJA

Precipitation - DJF

EASTERN AFRICA

Temperature - JJA

Precipitation - JJA

5.-TABLES: RPSS and ROCSS

Iberia

Northern Ethiopia

6.- RESULTS

A preliminary inspection of the maps and tables shows the following features for the conducted verification of seasonal forecasts:

• As expected, there is generally higher skill for temperature than for precipitation and for E-Africa than for Europe.

• For summer W-Europe temperature:
  • General higher skill over Balkans, S-Europe, W-Scandinavia and lower over C-Europe.
  • S4 shows higher skill over Mediterranean and W-Scandinavia, MF4 shows higher skill over France/Iberia.

• For summer E-Africa temperature:
  • General higher skill over Tanzania (except CSFv2).
  • Better than climatology for all seasons over N-Ethiopia.
  • S4 performs very well over the entire region.

• For winter W-Europe precipitation:
  • Noticeable skill of S4 and GloSea5 over Western facade (NAO better catched?).

• For summer E-Africa precipitation:
  • High skill for all models over most of the area except Tanzania.
  • Noticeable higher skill of S4 over N-Ethiopia.

References

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• Doblas-Reyes, F. (2010). Seasonal prediction over Europe. Proceedings of the ECMWF Seminar on Predictability in the European and Atlantic regions, 6 to 9 September 2010.
• Kirtman, B. y A. Pirani. (2008). WCRP Position Paper on Seasonal Prediction: Report from the First WCRP Seasonal Prediction Workshop, June 4–7, 2007, Barcelona, Spain. WCRP Informal Report No. 3/2008, ICPO Publication No. 127.