Evaluation of global model precipitation forecast skill using SYNOP data

Thomas Haiden and Jean-Noël Thépaut

➢ **Data and methodology**

➢ **Scores**

➢ **Model inter-comparison**
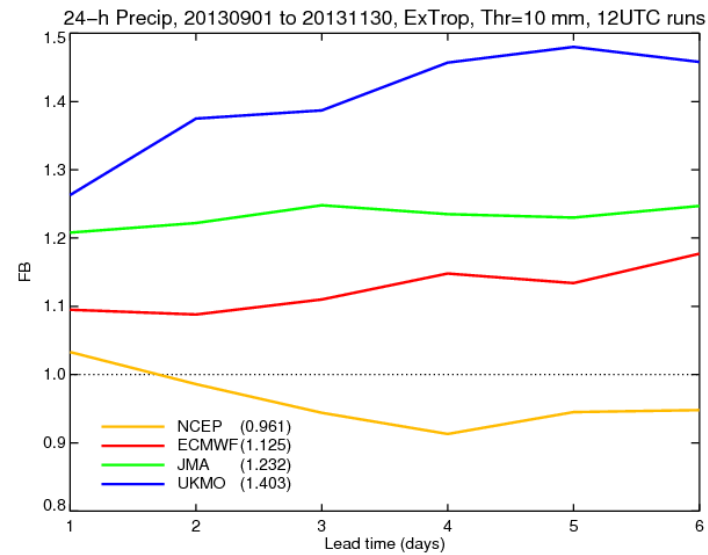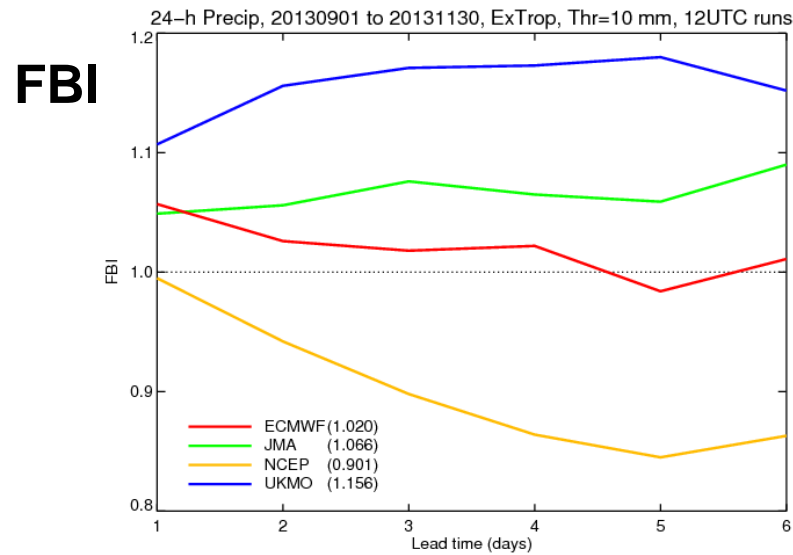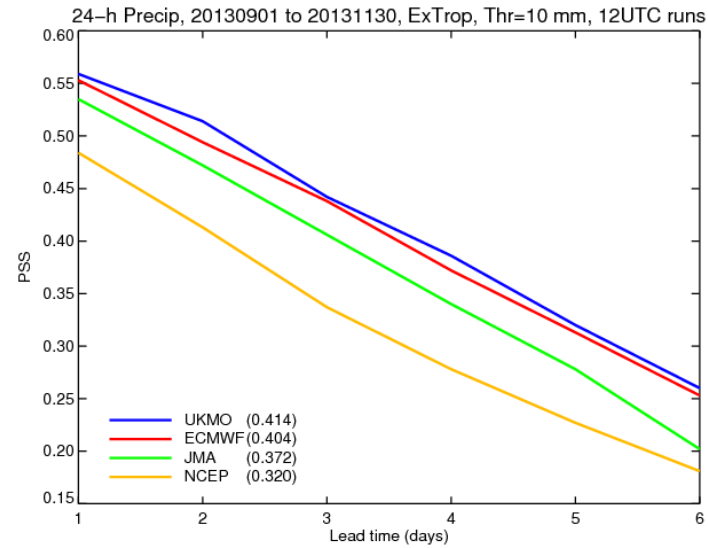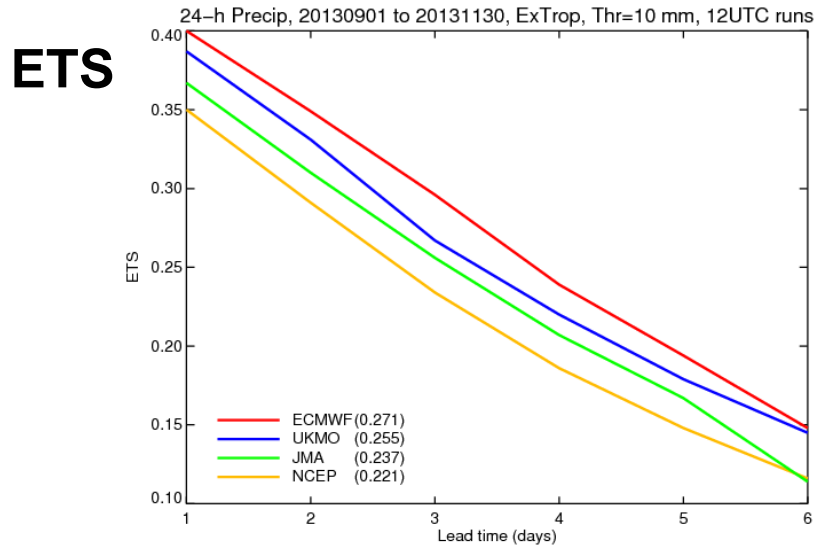
➢ **Longer-term evolution**

Data

- ➢ **Deterministic and probabilistic forecasts from**

  - **- Japan Meteorological Agency (JMA)**

  - **- National Centers for Environmental Prediction (NCEP)**

  - **- United Kingdom Met Office (UKMO)**

  - **- European Centre for Medium-Range Weather Forecasts (ECMWF)**

- ➢ **Raingauge observations from SYNOP obtained via GTS**
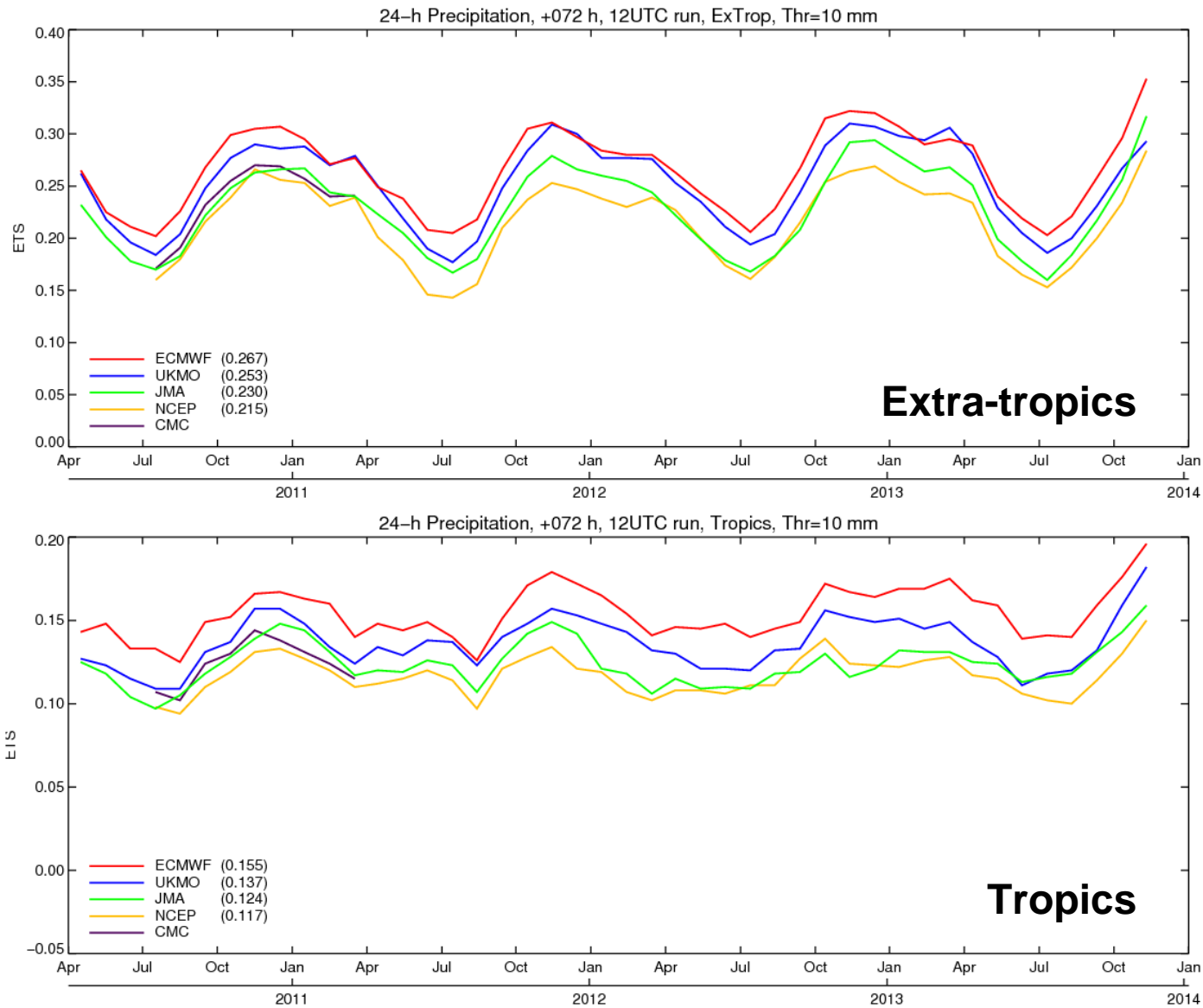
- ➢ **24-h and 6-h accumulations**

ECMWF

Scores

- **Deterministic**

  - **ETS, PSS, FB, FBI**

  - **EDI and SEDI**

  - **SEEPS**

- **Probabilistic**

  - **BSS, CRPSS, ROC area**

- **Thresholds for event definition**

  - **Absolute values (e.g. 5 mm / 24 h)**

  - **Relative values (e.g. 98th percentile)**

ECMWF

Deterministic forecasts

ETS

PSS

FBI

FB

Deterministic forecasts

24–h Precipitation, +072 h, 12UTC run, ExTrop, Thr=10 mm

Extra-tropics

ECMWF (0.267)
UKMO (0.253)
JMA (0.230)
NCEP (0.215)
CMC

24–h Precipitation, +072 h, 12UTC run, Tropics, Thr=10 mm

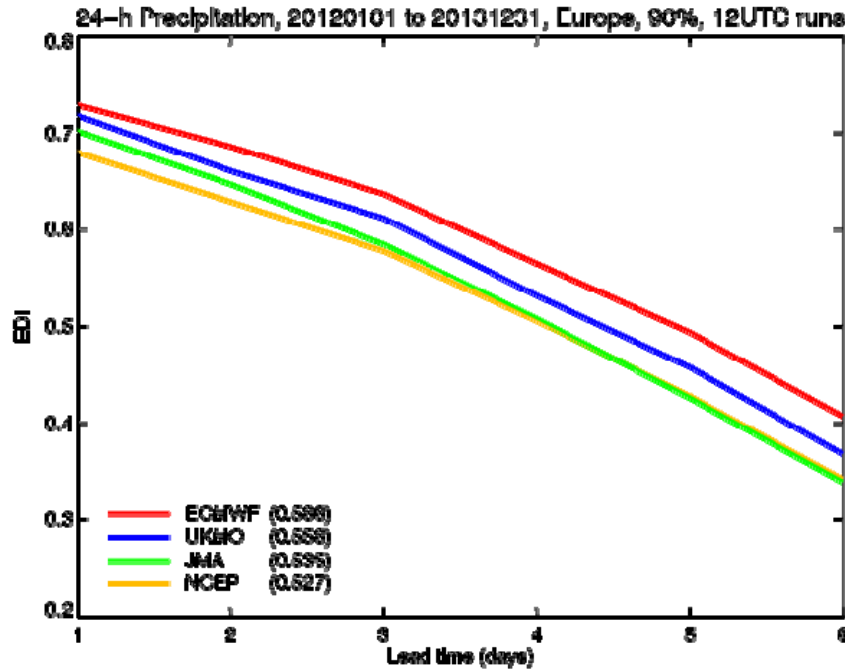**Tropics**

ECMWF (0.155)
UKMO (0.137)
JMA (0.124)
NCEP (0.117)
CMC

Evaluation of heavy precipitation

The Elbe river next to the village of Elster, Germany, 5 June 2013

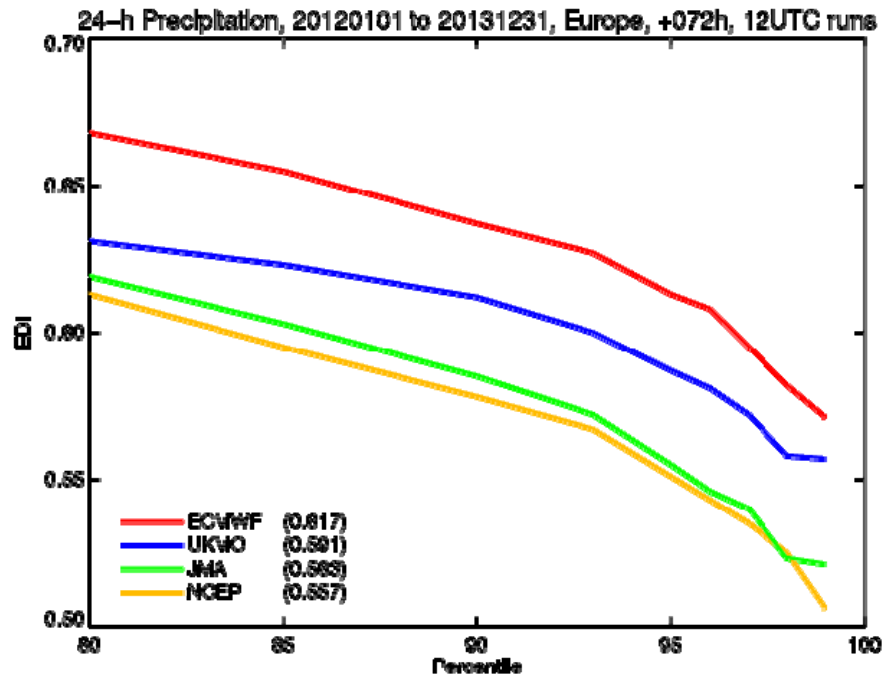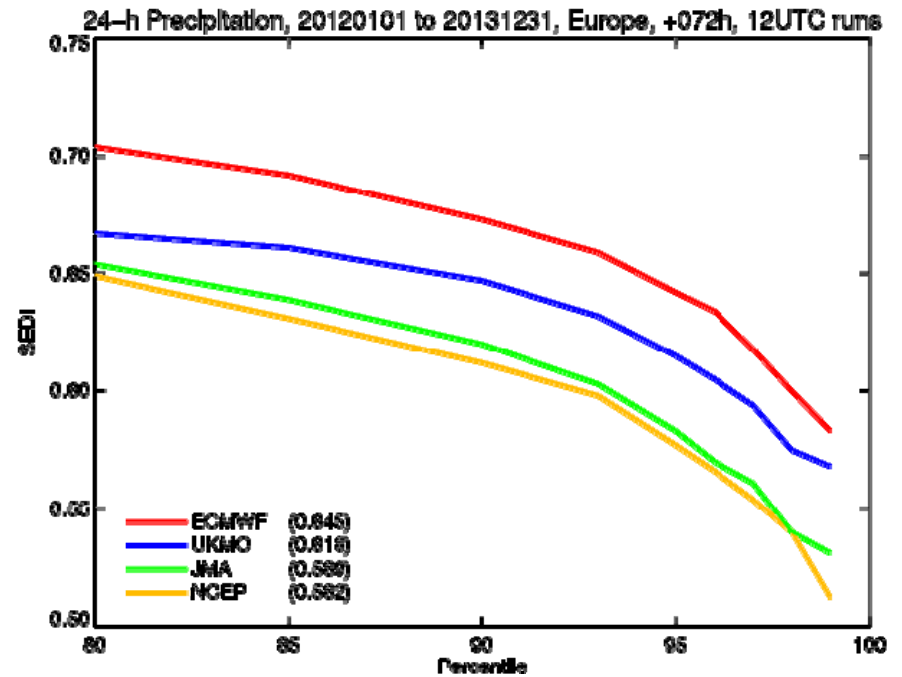# Extremal Dependence Index (EDI)
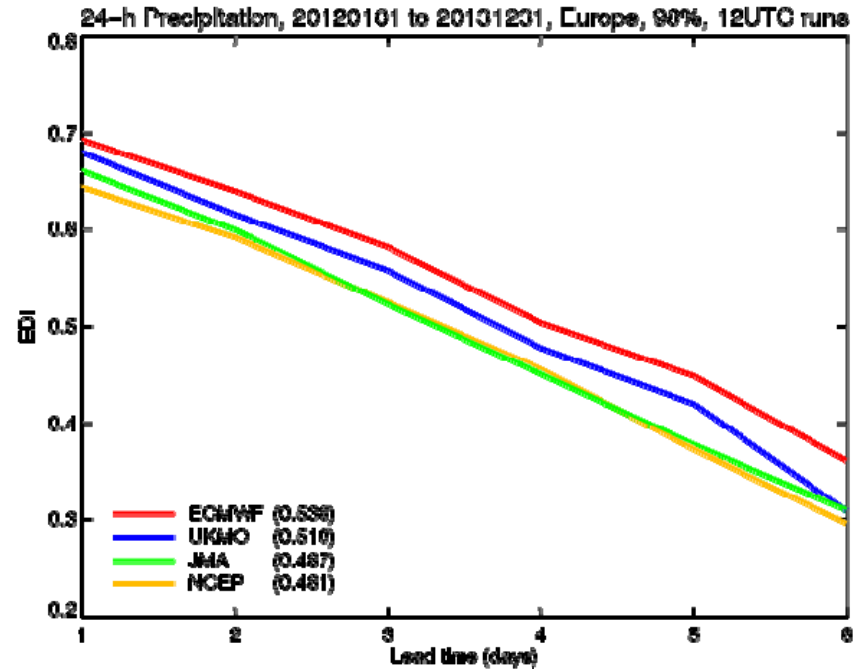
90th percentile   98th percentile
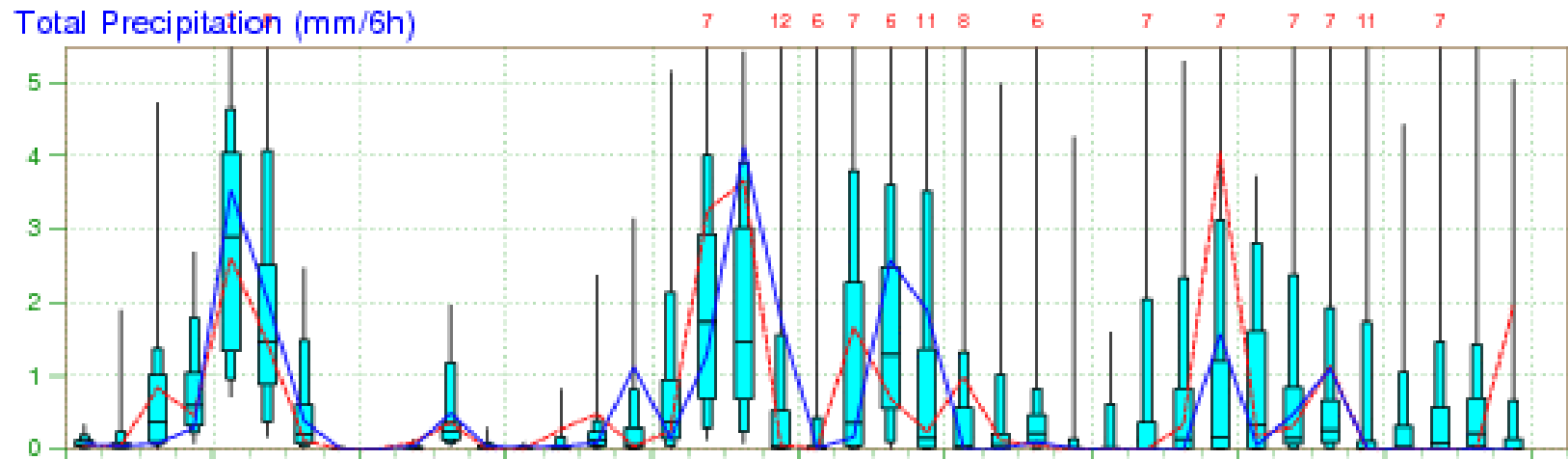
Extremal Dependence Index: EDI
Symmetrical EDI: SEDI

EDI

SEDI

ECMWF

Evaluation of ensemble forecasts

Total Precipitation (mm/6h)

ECMWF

Probabilistic forecasts, BSS
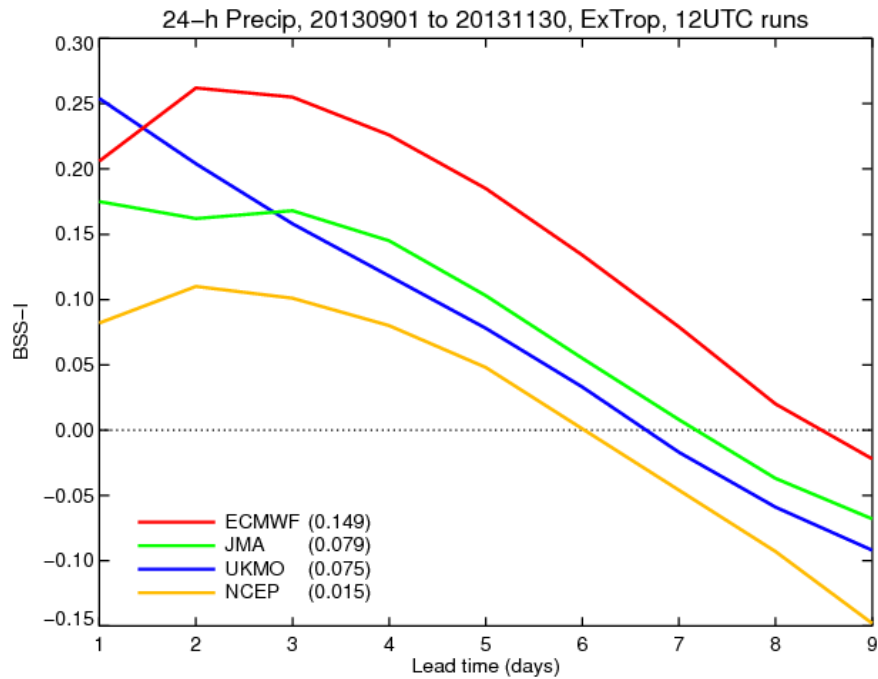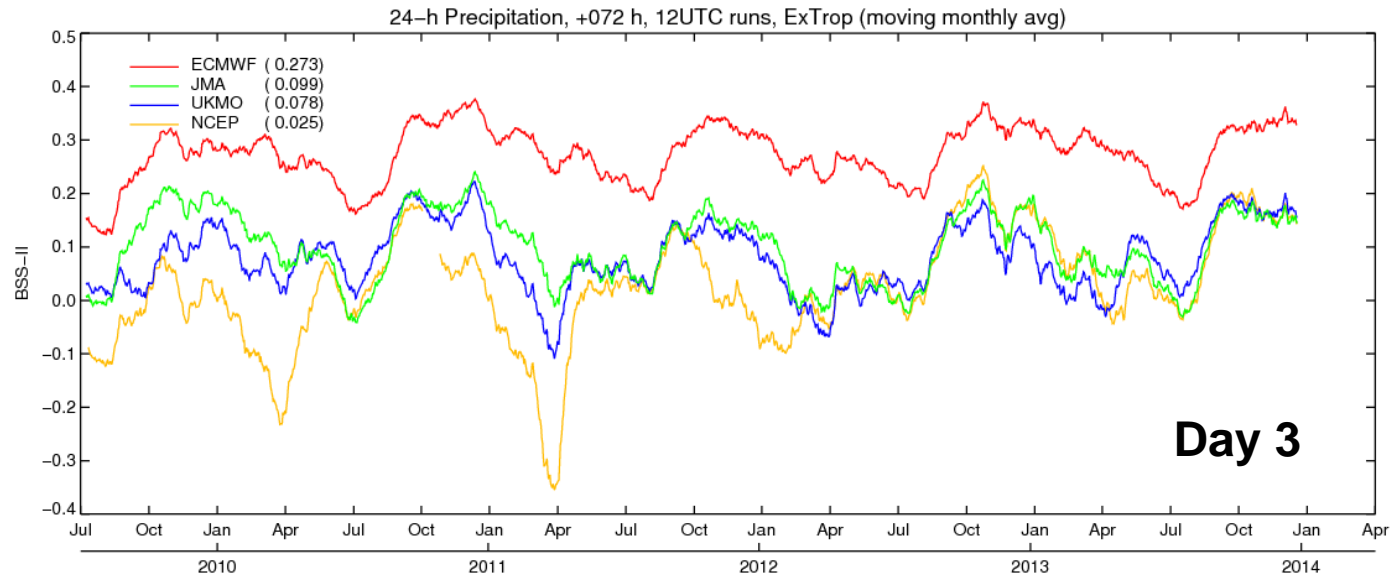

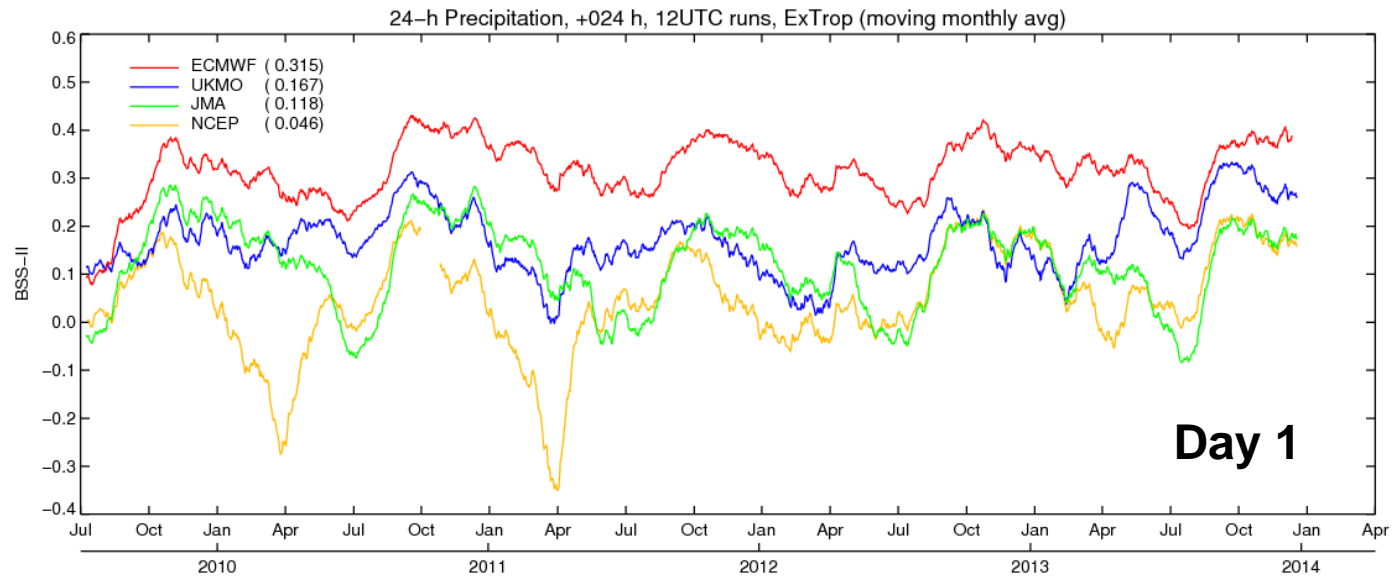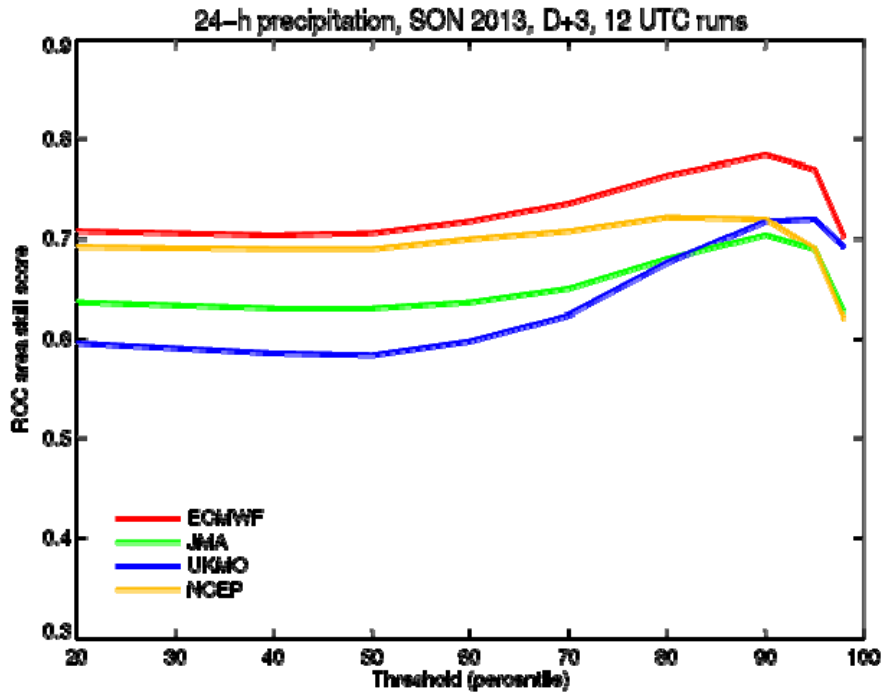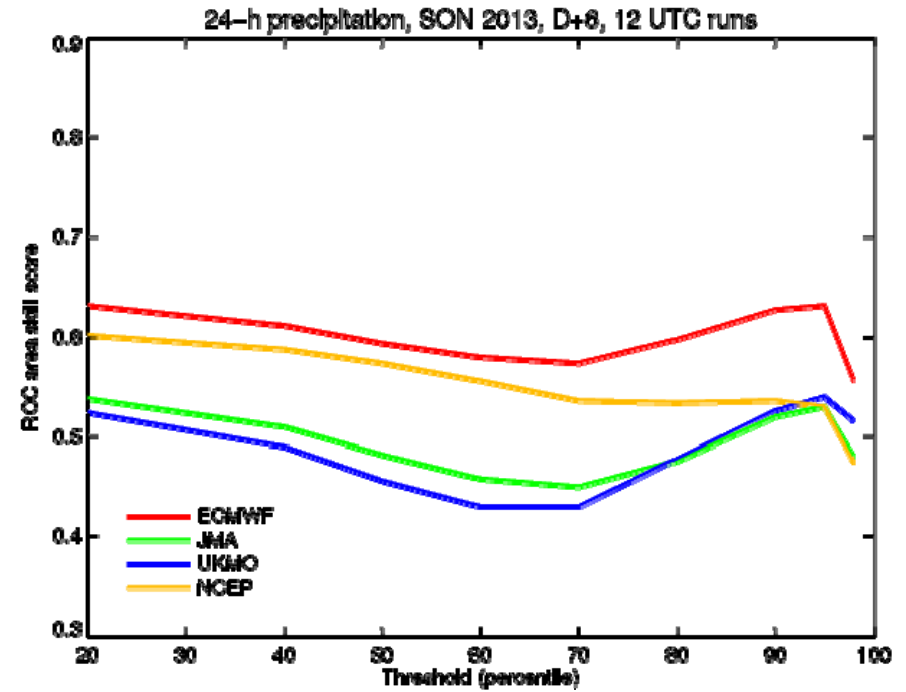**Precipitation yes/no**   **Light/heavy**

ECMWF
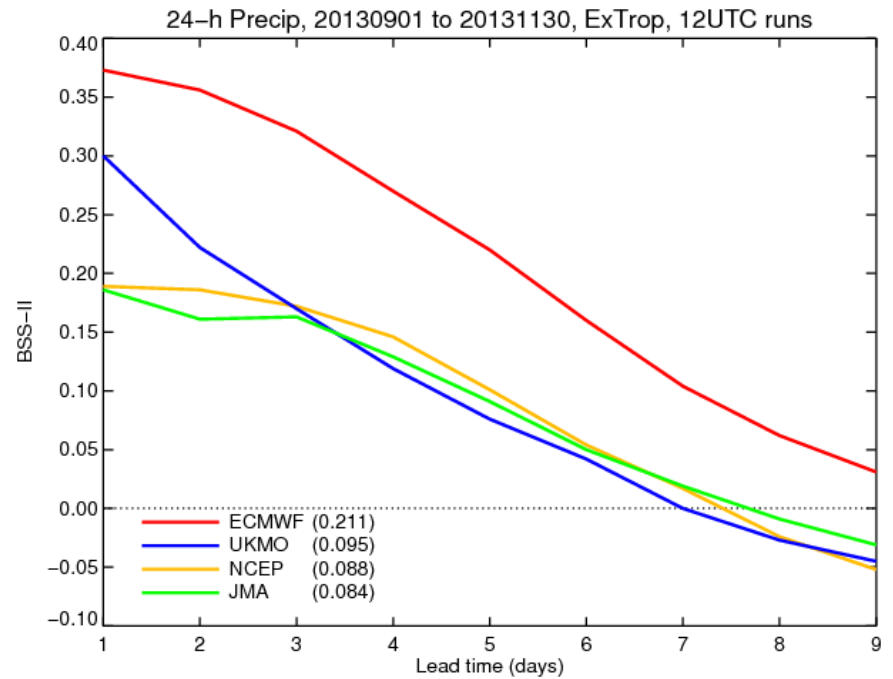
Probabilistic forecasts, BSS

Probabilistic forecasts, ROC area

Day 3

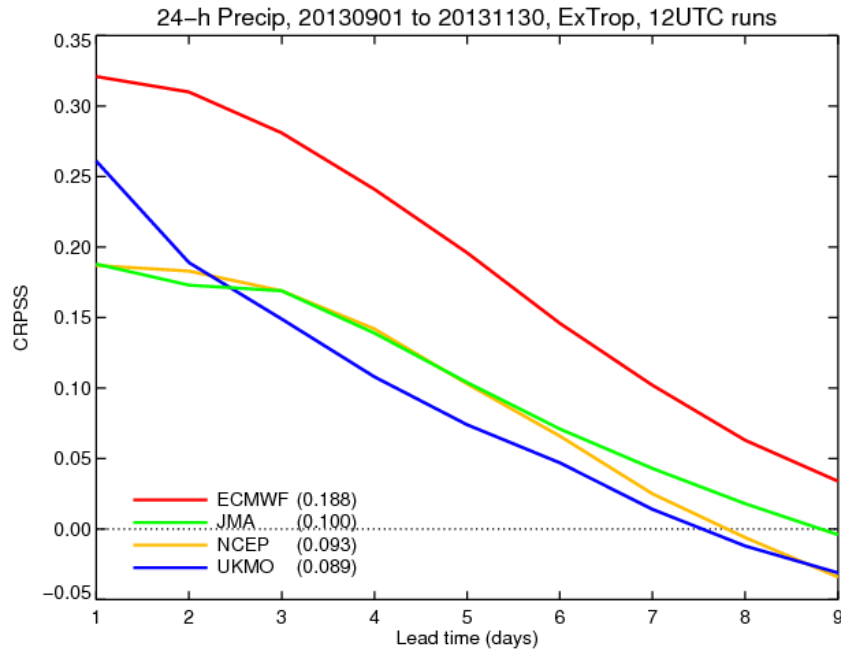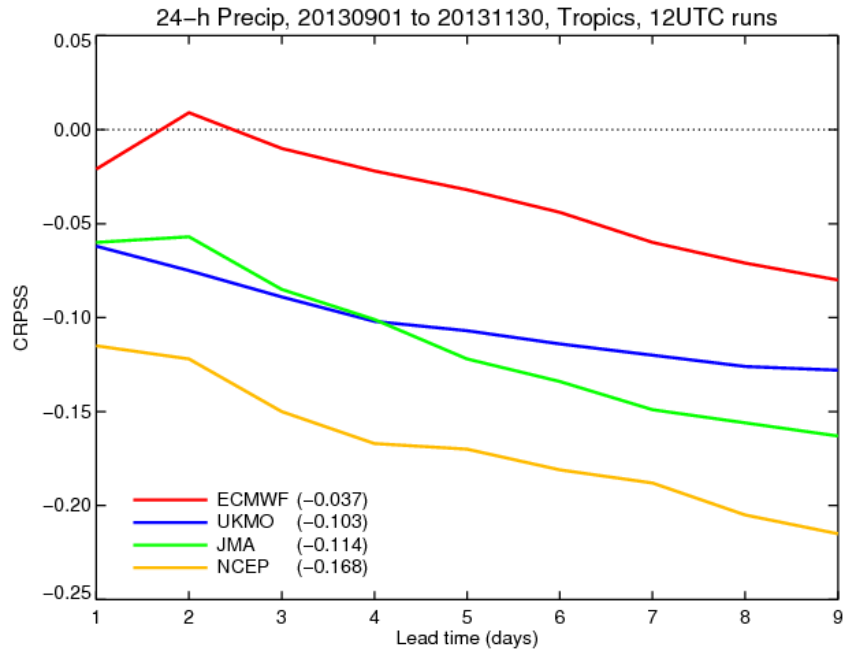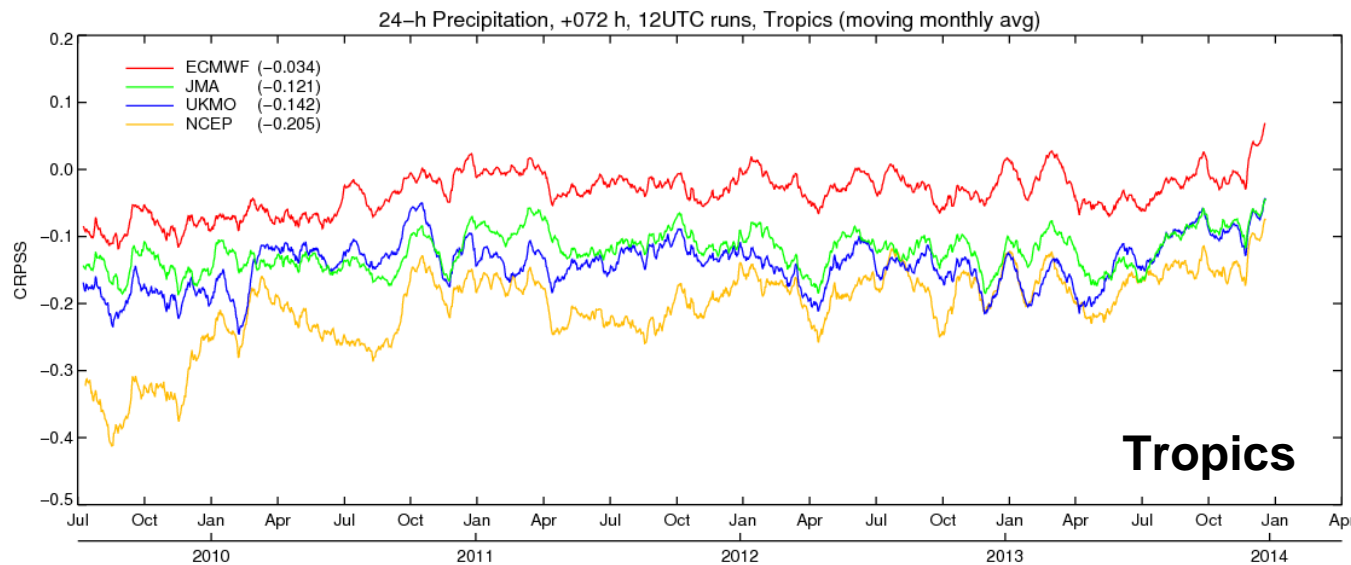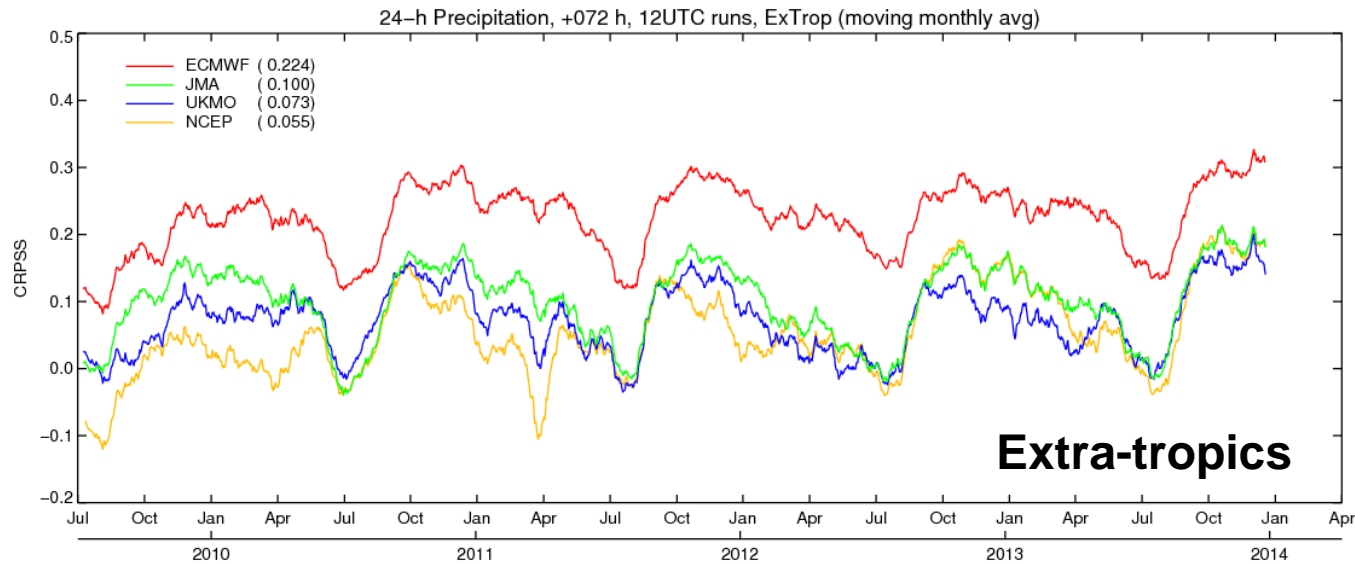**Day 6**

Probabilistic forecasts, CRPSS

Extra-tropics　　　　　　　　　　　**Tropics**
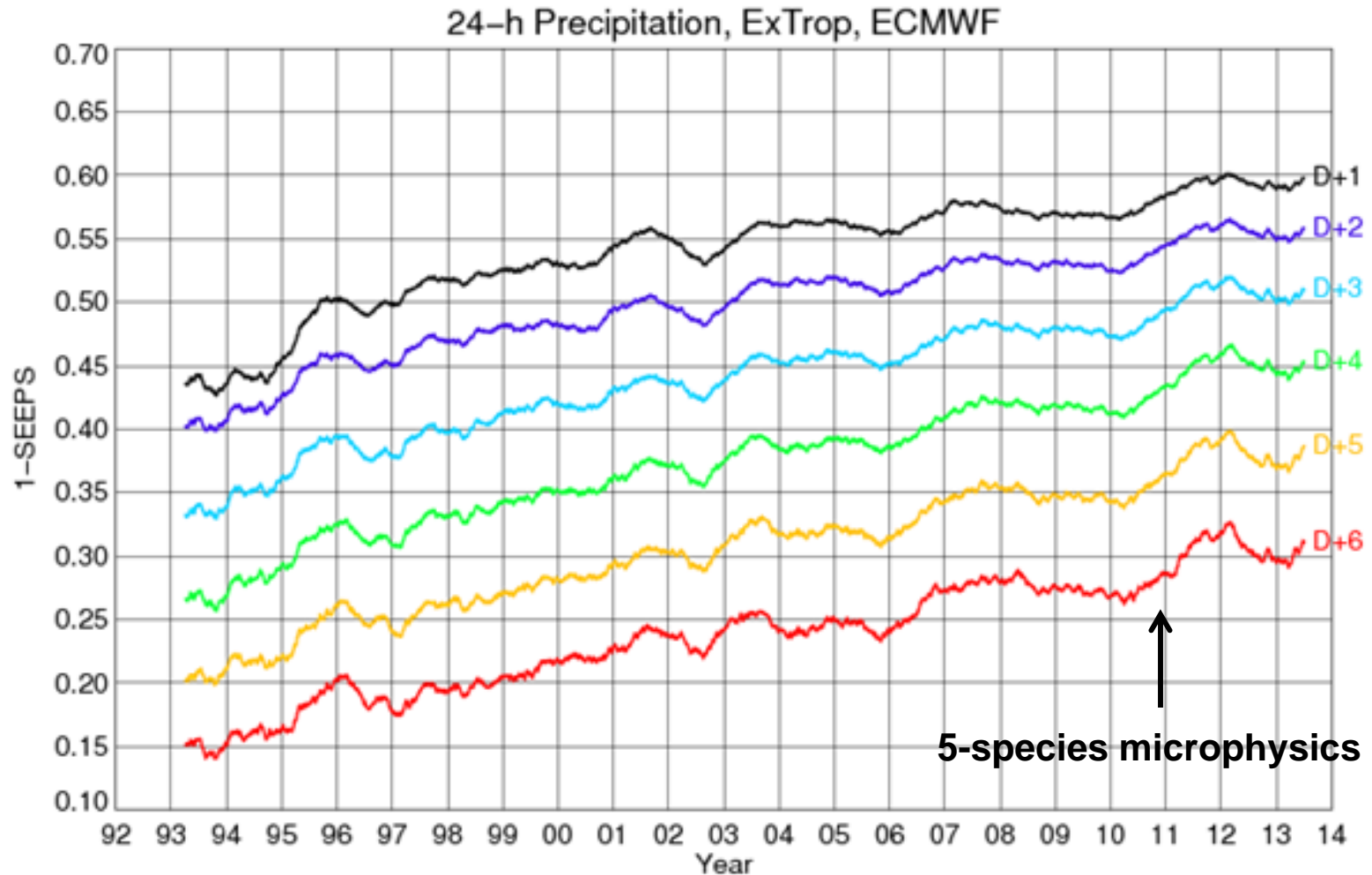
Probabilistic forecasts, CRPSS, Day 3

24-h Precipitation, +072 h, 12UTC runs, ExTrop (moving monthly avg)

ECMWF (0.224)
JMA (0.100)
UKMO (0.073)
NCEP (0.055)

Extra-tropics

24-h Precipitation, +072 h, 12UTC runs, Tropics (moving monthly avg)

ECMWF (−0.034)
JMA (−0.121)
UKMO (−0.142)
NCEP (−0.205)

Tropics

ECMWF

Deterministic forecasts, long-term trend

24-h Precipitation, ExTrop, ECMWF

Deterministic forecasts, long-term trend

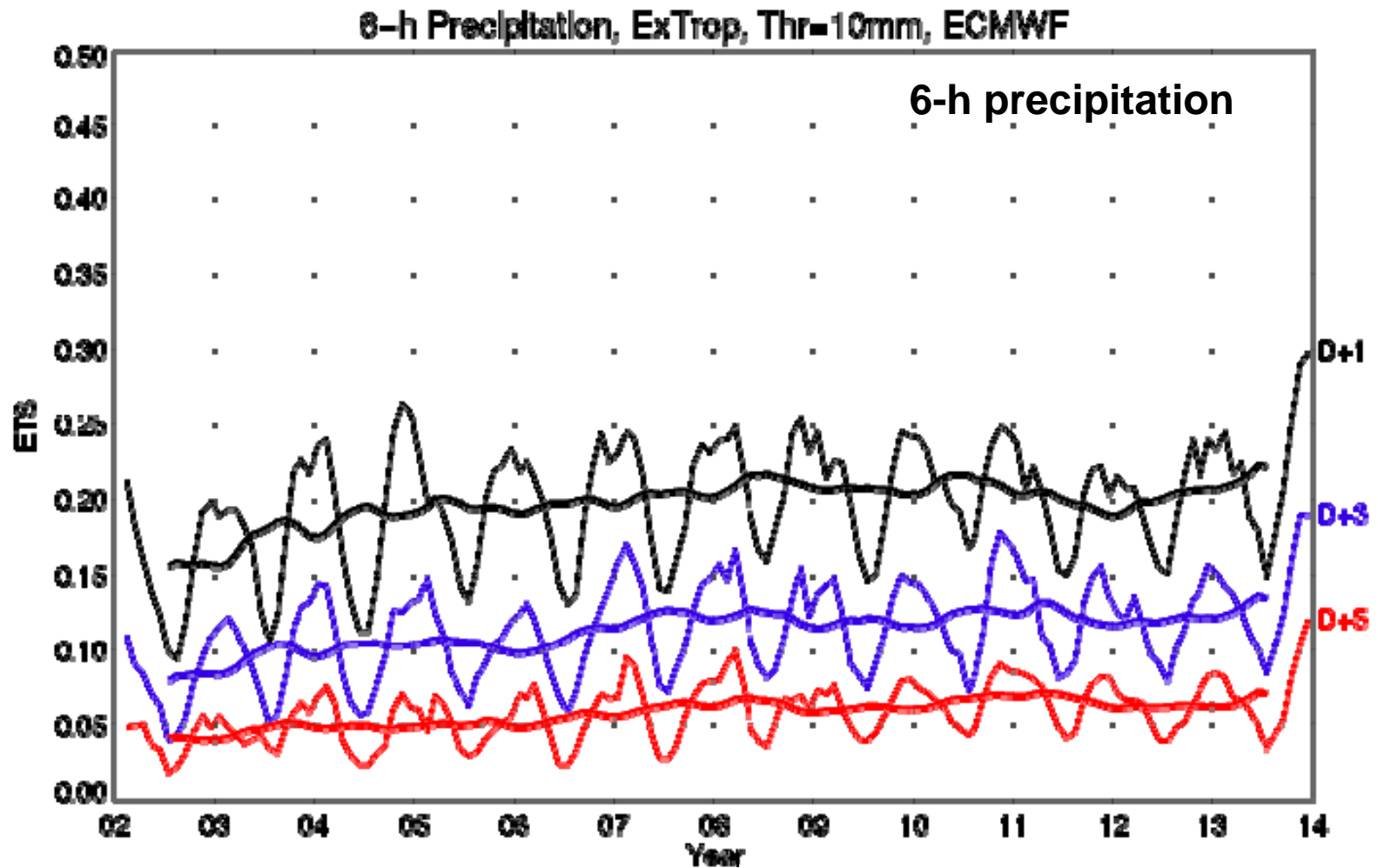24-h Precipitation, ExTrop, Thr=10mm, ECMWF

24-h precipitation

ECMWF

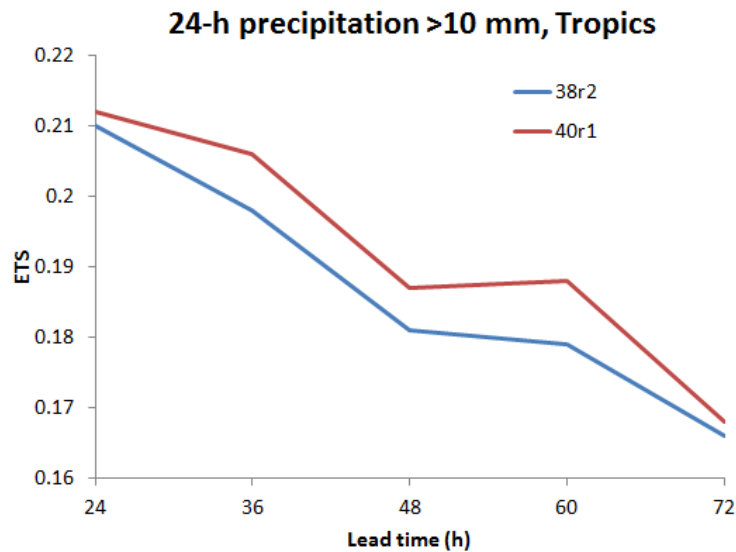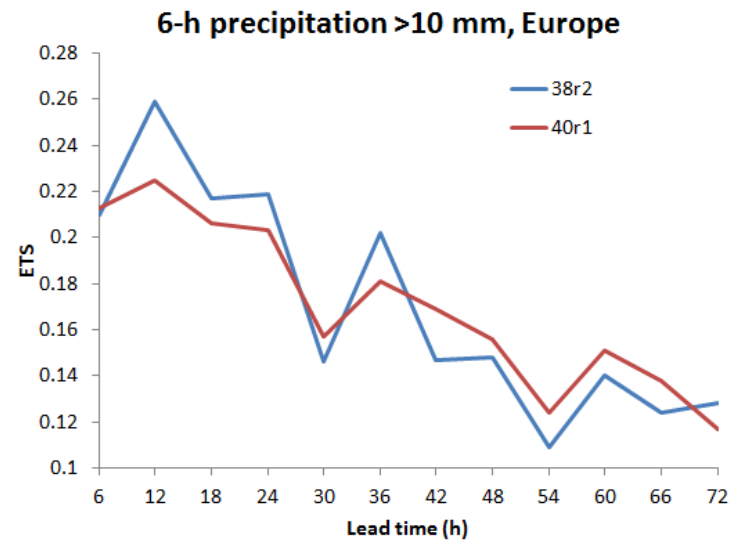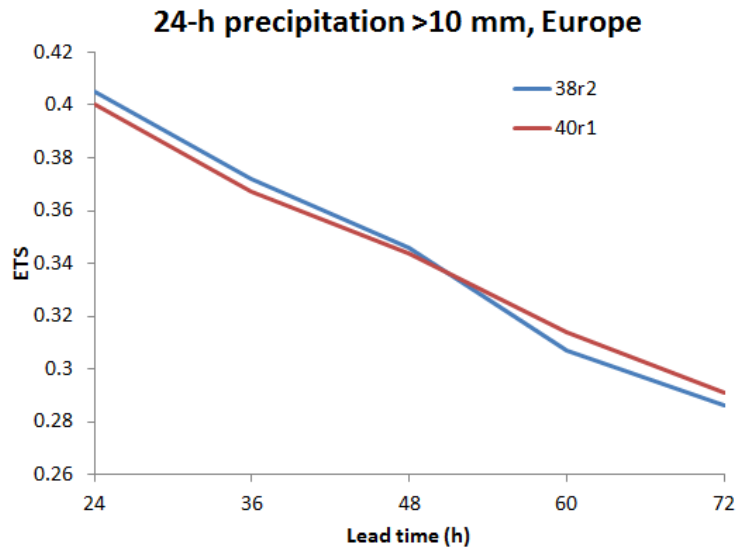# Deterministic forecasts, long-term trend

6-h Precipitation, ExTrop, Thr=10mm, ECMWF

6-h precipitation

ECMWF
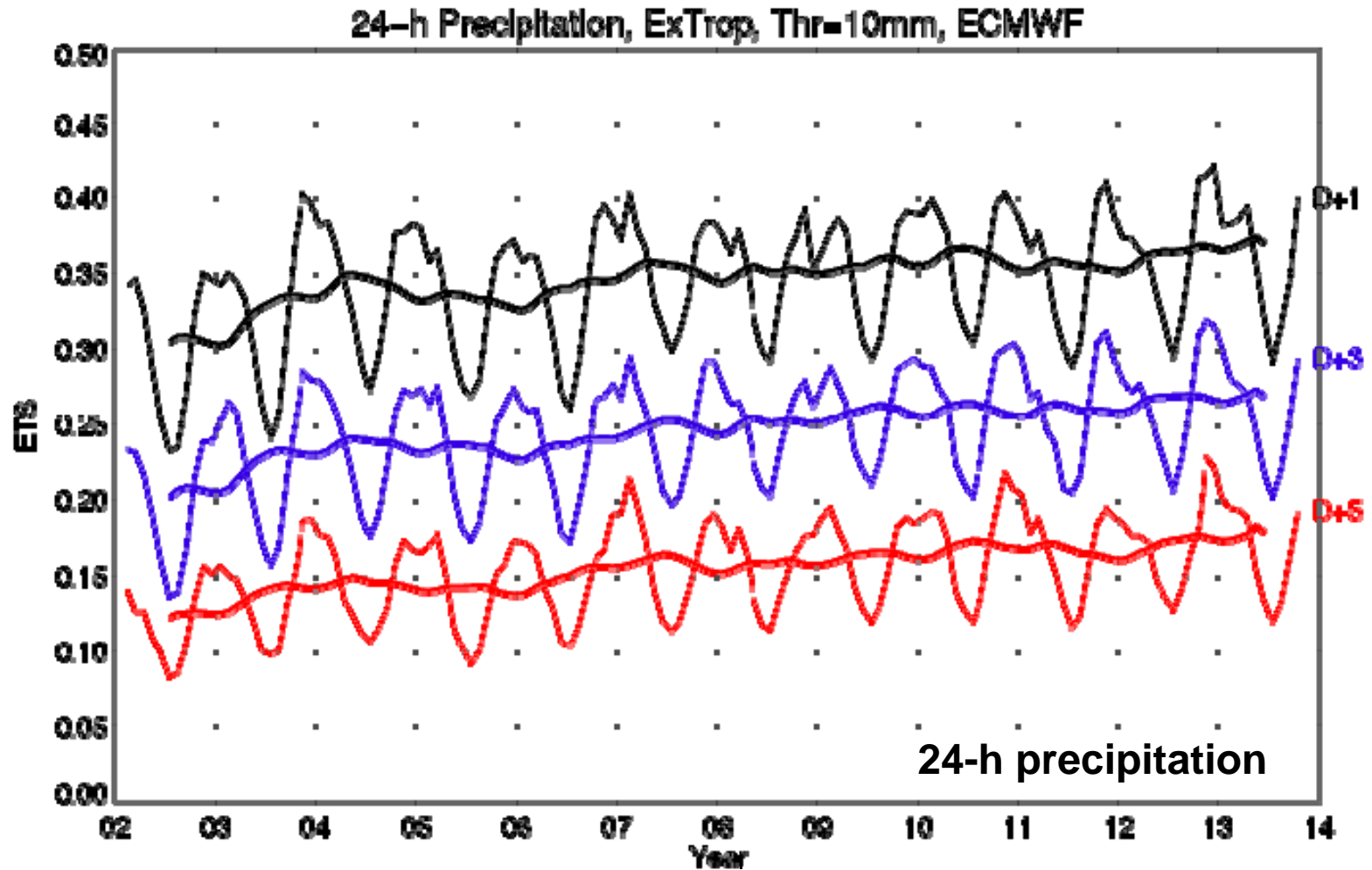
Improving deep convection
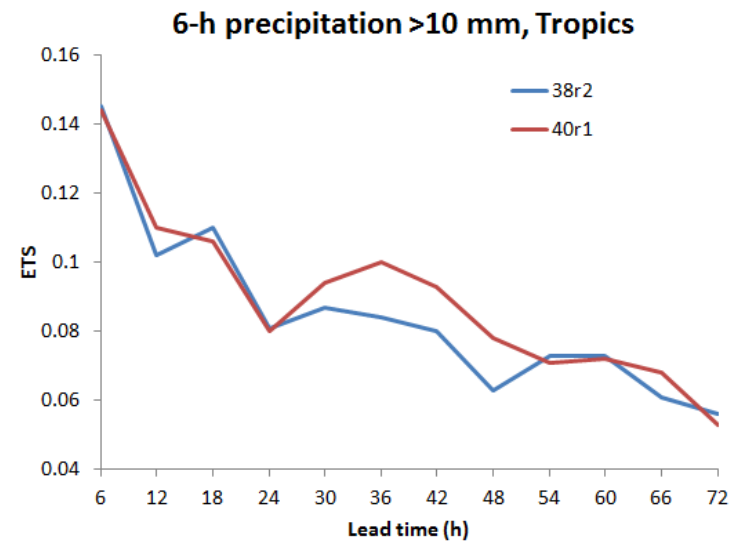
Conclusions

➢ **NWP forecasts of precipitation still improving across centres**

➢ **Models differ mostly with respect to frequency bias**

➢ **Verification of 6-h totals (in addition to 24-h) getting more important as forecasts improve**

➢ **Useful to look at different, complementary scores to identify score-dependent aspects vs robust results**

➢ **Both actual and potential skill relevant for users**

➢ **TIGGE archive extremely valuable resource for evaluation**

A full written report by T. Haiden will be made available on the WGNE-29 website

ECMWF