Monthly and Seasonal Forecasts at ECMWF

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Seasonal Forecast Team:
ECMWF: Weather and Climate Dynamical Forecasts

- Medium-Range Forecasts
  - Day 1-10
  - Atmospheric model
  - Ocean model

- Monthly Forecast
  - Day 10-32
  - Atmospheric model
  - Ocean model

- Seasonal Forecasts
  - Month 2-6
  - Atmospheric model
  - Ocean model
ROC scores - day 12-18
Probability that 2-meter temperature is in upper tercile

ECMWF Monthly Forecast, 2mtm in upper tercile, Area: Northern Extratropi
Day 12-18  20041007-20050505
ROC score = 0.663
ROC scores - day 19-32
Probability that 2-meter temperature is in upper tercile
Merging monthly forecasting with VAREPS

Present system:

Initial condition → Coupled forecast at TL159

Future system:

Initial condition → EPS Integration → Coupled forecast at TL255

Heat flux, Wind stress, P-E

Ocean only integration

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Heat flux, Wind stress, P-E

Ocean only integration
Day 12-18

N. PACIFIC
MOFC/EPS: 20/10 (92% sign)

EAST ASIA
MOFC/EPS: 24/6 (95% sign)
CY29R2 first case of a 3-legs VAREPS (17 July 2002)
Case study: Precipitation over Central Europe
1st August 2002-18 August 2002
(day 15-32)

Analysis:

clim:

3 best ensemble members of VAREPS
Preliminary results: 12 5-ensemble member cases. CY29r2

Probability that T850 is in the upper tercile.

Northern Extratropics

DAY 12-18
ROC AREA: 0.72 0.65

DAY 19-32
ROC AREA: 0.58 0.50
10th ECMWF workshop on Meteorological Operational Systems
14-18 Nov 2005

Calibration period
From 1987 to 2001
5 members

40 forecasts start 1st of month
5 member ensemble of ocean analysis (wind perturbations)
Atmosphere (IFS): Cy 23R4, T95, L40, semi-Lagrangian Ocean (HOPE): L29 ~0.3 eq. ~1 midlat.

5 member ensemble of an improved ocean analysis (wind perturbations)
Atmosphere (IFS): Cy 30R1, T159, L62, semi-Lagrangian Ocean (HOPE): L29 ~0.3 eq. ~1 midlat.

From 1981 to 2005
11 members

41 forecasts with SV start 1st of month

Present system
Next system

The coupled model

Ocean analysis

Ensemble generation

Calibration period

From 1987 to 2001
5 members

From 1981 to 2005
11 members
Ocean analysis:
April forecasts

GPCP anomalies JJA2005

ECMWF Seasonal Forecast
Probit (lower tercile) - precipitation
JJA 2005
No significance test applied

ECMWF Seasonal Forecast
Mean precipitation anomaly
JJA 2005
EUROSIP multi-model system:

3 Coupled Systems: ECMWF, Météo France, Met Office

• Ensemble generation for the 3 systems is different
• Met Office and Meteo-France systems are both running at ECMWF
• Development of multi-model products is ongoing
Tropical Storms
Forecasts starting on 1st June 2005: JASON

ECMWF
Met Office
Meteo-France
Multimodel

Obs 1st May-mid Nov.

W-Pac  E-Pac  ATL

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EUROSIP predictions for DJF 2006

Forecast started Nov 2005

2m temp ens. mean anomaly

MSLP ens. mean anomaly

Prob(2mtemp < lower tercile)
Correlation
NAO – 2 m temperature
Dec - Feb (1987-2001)

ERA-40

ECMWF Seasonal forecast
Monthly forecast:

- Beyond forecast day 15 the effect of the coupling becomes relevant.
- The prototype of the future monthly system using a 3-legs VAREPS gives promising results.

Seasonal Forecast:

- Good West-African monsoon predictions – this case indicates some of the advantages of the coupled versus the uncoupled approach.
- The very active Atlantic tropical storm season was well predicted.
- Predictions for the coming winter: enhanced probability of an anomalous high over Northern Atlantic (negative NAO) but absence of large temperature anomalies over Europe.
Precipitation EUROSIP probability
JJA 2005

Probability (precip < lower tercile)

Ensemble mean precipitation

GPCP anomaly JJA 2005