

Forecast Products User Meeting:
13-15 June 2007
Summary

Model changes 2006-2007

➤ **Cycle 30r1 (1 February 2006)**

- high-resolution forecast system

➤ **Cycle 31r1 (12 September 2006)**

- Physics changes including cloud scheme, convective transports, orographic drag; revised assimilation of rain-affected radiances, variational bias correction of satellite radiances
- Used for seasonal forecast System 3 and interim reanalysis
- Increased low level wind speeds; also revised gust parametrization

➤ **Cycle 31r2 (12 December 2006)**

- Assimilation of GPS radio occultation (improves stratospheric temperature)

➤ **cycle 32r2 (5 June 2007)**

- Improved moist physics and third inner loop in assimilation; new short-wave radiation
- Large improvements in tropical troposphere throughout forecast
- Improvements in extratropics from revised DA in first 4 days

Model changes 2006-2007

➤ **11 January 2007**

- **Operational assimilation of MetOp-A data (AMSU-A and MHS)**

➤ **12 June 2007**

- **Operational assimilation of IASI and ASCAT from MetOp-A**

Model changes – coming next

➤ **Cycle 32r3 (autumn 2007)**

- **Big changes to convection (major increase in tropical variability)**
- **New soil types (drier Sahel)**
- **Revised radiosonde bias correction**
- **Assimilation of AMSR-E, TMI, SSMIS window channels (clear sky), SBUV (N-17, N-18) and OMI; increase of number of RO from COSMIC**

➤ **Also to come**

- **new ocean wave advection scheme, revised and higher resolution European shelf wave model**
- **More parametrization changes**
- **Variational soil moisture analysis**
- **More satellite data assimilation (AMSR-E/TMI/SSMIS (rain), GRAS RO, GOME)**

ECMWF – Performance 2006-07

- **Upper-air scores excellent for Europe, good for NH, OK for SH**
- **Tropics OK**
- **Maintained lead over other centres, gap similar to previous year**
- **Weather parameters Europe: 2m T bias, skill good; precip skill good; wind bias increased (skill OK)**
- **Waves: good lead over other centres**
- **Tropical cyclone errors improved, especially core pressure**
 - **positive tropical cyclone report from NHC**
- **Good performance for WMO Severe Weather Forecast Demonstration Project (SWFDP) southern Africa**

EPS

- **Extended to day 15 (VarEPS); T399 (50 km) to day 10; T255 (80 km) days 11-15**
 - **Operational dissemination of day 11-15 products from 28 November 2006**
- **Improved match between spread and error**
- **Winter 06/07 performance substantial improvement over previous winters (RPSS and ROC-area)**
- **Preliminary results from TIGGE (April 2007) - in terms of Z500 over NH, the skill of the ECMWF ensemble system is superior to the skill of the NCEP, UKMO and JMA ensembles**
- **Plans**
 - **new moist moist physics in the computation of tropical singular vectors will improve the reliability of cyclone tracks predictions.**
 - **EDA-based initial perturbations could be used to replace evolved singular vectors**
 - **Stochastic backscatter scheme**

Monthly forecast

- **Better scores for days 12-18 than in previous years; also some skill last winter for the period day 19-32.**
- **Some skill in predicting the sub-seasonal variability of the Indian monsoon**
- **The onset of the African monsoon was predicted at about the right time by the model in 2006.**
- **Proposed 32-day VAREPS/monthly system produces slightly better (weekly-averaged) probabilistic forecasts than the current TL159 monthly system. The improvement was evident in the prediction of the summer 2003 heat wave in the time range of day 12-18.**
- **Ocean/atmosphere coupling improves ensemble forecast skill beyond forecast day 10.**

Unified VarEPS/monthly forecast system - Planned configuration

- **VarEPS run to day 15 twice per day**
 - **00 UTC run: coupled from D10 (persisted SST anomalies to D10)**
 - **12 UTC run: persisted SST anomalies throughout**
- **VarEPS extended to 32 days for 00 UTC Thursday**
- **Coupling from day 10 will delay dissemination of day 11-15 products (30-45 minutes)**
- **Re-forecasts for calibration**
 - **18 years, 5 members, once per week**
 - **Run 2 weeks in advance and archived in MARS (allows 5 weeks to be used in calibration e.g. for EFI)**
 - **Same reforecast datasets for monthly and medium-range products (will replace current EFI climatology)**

Seasonal forecasts

- **New seasonal forecast System 3 was introduced in March 2007**
- **System 3 gives improved predictions of tropical/summer variability than the previous system.**
- **SST predictions are good in the tropical Pacific and during NH winter, still not better than persistence in parts of the Indian Ocean and tropical Atlantic during NH summer/autumn.**
- **Predictive skill for seasonal rainfall is generally good over the Pacific and tropical S. America, poor along the coast of the Indian Ocean (esp. in early summer), better in summer than in winter over Europe.**
- **Predictions for regional teleconnection indices are often better than for area-averages.**
- **Predictive skill over land can be improved by exploiting teleconnections**

Seasonal forecasts

- **Transition from warm to cold SST anomalies in the Eastern trop. Pacific well captured by System 3**
- **Good prediction of NH 2m-T anomaly in DJF by System 3 and EuroSIP**
- **Revised web site for System 3 and extended set of graphical products is available to users**
- **The construction of verification statistics is in progress and soon will be made available on the web**

ECMWF - product development

➤ **Since June 2006**

- Added 10th, 90th centile to EPSgrams
- Extended EPS products to day 15
- Added EPSgram with daily steps (Tmax, Tmin)
- Added probabilities for 5-day period D11-15 (based on existing products for D6-10)

➤ **2007 (in progress)**

- Ensemble mean and spread
- Percentile maps
- Revision of clustering (for individual steps)
- Tracking of tropical cyclones developing during forecast
- Wave products
- Climate information on EPSgrams, EFI maps; probabilities to exceed quantiles of climate
- Clickable EFI map (show EPS and climate distribution at point)
- EPSgrams new parameters (wind direction, waves)

Users: performance

- **Overall, users reported good performance of ECMWF forecast systems, in agreement with results noted at ECMWF**
- **More realistic diurnal cycle in convection (D)**
- **Tropical cyclone genesis in deterministic and EPS; some examples of better timing at medium-range than short-range (F)**
- **Regime dependence of errors noted in some areas (Ro)**
- **Some impression that model has some difficulty maintaining persistent anomalies towards end of 10-day range (D)**
- **Too much persistence of anomalies in monthly forecast (I)**
- **Monthly forecast well calibrated; skill limited after week 2 (CH)**
- **Better wind gust climate in seasonal System 3 (CH)**

Users: use and applications

- **Reported several developments in use of products from medium-range deterministic and EPS suites for official duties and commercial use (including media) (D,N, UK, F)**
- **Increasing use of ECMWF web pages for products at all ranges (problem if not available) (D, Ro, P)**
- **15-day EPS already in use by forecasters and for commercial customers (NL, S, F, UK, D, Ser). Several presentations of 15-day EPSgrams**
- **Work on educating customers in value of probability products (including media) (N, Ser, UK)**

Users: use and applications

- **Developments of applications for severe weather (early warnings)**
 - **Post-processing: bias correction, statistical downscaling**
 - **Some biases noted compared to observations; reforecasts potentially valuable for calibration (NL)**
 - **Precipitation (H)**
 - **Work on convective activity (CAPE, LI, KO) (D, N, Ro, NL)**
 - **Potential of TC genesis and wave products (F)**
 - **PREVIEW windstorms (UK)**
 - **Heat stress – using monthly forecast (UK)**

Users: use and applications

- **Boundary conditions for short-range EPS (E), VarEPS to drive dispersion model (UK)**
- **Monthly forecasts**
 - **Use is increasing; new users (Ser, Ro); use for civil protection briefings (inc. forest fire risk planning) (P, I)**
 - **Inclusion of 15-day EPS in preparation of monthly forecast products (Ser, I)**
- **Seasonal forecasts**
 - **Reports on use and evaluation for internal and external users**
 - **new users (Ser)**
 - **Product developments – monthly maps, climagrams for specific areas, different probability thresholds (A); tailored products for commercial users (A); soil moisture for crop models (CH); risk assessment for wind storms (CH)**

User comments and requests (1)

- **Expressed interest in earlier delivery of day 1-10 products (~30 minutes)**
- **Monthly forecast run on Sunday preferred by some users (Thursday run still also required by other users)**
- **Requests for new products**
 - **Confirmed requirement for current ECMWF product developments**
 - **additional requests for**
 - **More pressure level data**
 - **Interest in improved sunshine duration, precipitation duration/onset (subject to future research)**
 - **Wave EPSgrams and EFI; visualisation of altimeter data with wave analysis fields**
 - **Daily precipitation frequency for seasonal forecast**
 - **Development of extra-tropical cyclone track products**

User comments and requests (2)

- **Strong interest in re-forecasts for both medium-range and monthly use (will be available in unified VarEPS/monthly)**
 - **Request to run ahead of real time (as planned)**
 - **Interest in 51-member hindcast set for performance assessment for medium-range and monthly forecasts**
- **Interest in zoomable maps: display more details (higher resolution) for smaller regions**
- **Interest in development of more sophisticated routines (available to users) for interpolation in both space and time, for use in product generation**