

## Unified VarEPS–Monthly Forecasting System

### Unified VarEPS–Monthly Forecasting System

ECMWF combined its *V*ARIABLE *R*ESOLUTION *E*NSEMBLE *P*REDICTION SYSTEM (VarEPS) and monthly forecasting into a single system. On Thursday of each week, the 00 UTC VarEPS forecast are extended from 15 to 32 days at a resolution of T255 L62 with ocean coupling introduced from day 10.

This page gives a brief description of the unified VarEPS–monthly system and provides technical details about access to the data during the pre–operational test phase both in MARS and through dissemination.

***The page will be updated as required. It was last changed on 18.03.2008.***

For a record of changes made to this page please refer to [Document versions](#).

A [printable version](#) of this page is available.

Further information and advice regarding the upgrade can be obtained from User Support

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## News

### ***14 March 2008***

On Tuesday, 11 March 2008, ECMWF integrated its Monthly Forecasting System with the medium–range Ensemble Prediction System (VarEPS). The new monthly forecast products were produced for the first time on Thursday, 13 March 2008.

Details of this change can be found at:

[http://www.ecmwf.int/products/data/operational\\_system/evolution/evolution\\_2008.html](http://www.ecmwf.int/products/data/operational_system/evolution/evolution_2008.html)

### ***22 February 2008***

Test dissemination products have been generated and made available for transmission on ECPDS. The products are based on current operational Monthly Forecast dissemination requirements. See [Dissemination](#) for further details.

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The test products on ECPDS will be updated every Thursday until the implementation of the new VarEPS–Monthly system in operations on 11 March 2008. Then these test dissemination requirements will be made operational.

### 12 February 2008

The planned implementations data for the unified VarEPS–monthly system is **Tuesday 11 March 2008**.

The first products to be affected will be the Boundary Condition products for 06 UTC followed by the main deterministic forecast and analysis products and the EPS for 12 UTC.

The first 32–day extension of the VarEPS–monthly system will be for the 00UTC cycle on the following **Thursday 13 March 2008**.

### 13 December 2007

Initial announcement of VarEPS–monthly implementation to Member State representatives.

## Timetable

The planned timetable for the implementation of the unified VarEPS–monthly system is as follows:

### **13 December 2007**

- Initial details of the unified VarEPS–monthly implementation sent to Member States.

### **11 March 2008**

- Implementation of the unified VarEPS–monthly system. The first products to be affected will be the Boundary Condition products for 06 UTC followed by the main deterministic forecast and analysis products and the EPS for 12 UTC.

### **13 March 2008**

- The first 32–day extension of the VarEPS–monthly system will be for the 00UTC cycle.

## Introduction to the unified VarEPS–monthly system

The *VA*riable *R*esolution *E*nsemble *P*rediction System (VarEPS) has been designed to benefit from an increased resolution in the early forecast range initially to 15 days and now to one month with the merger of the medium–range ensemble and the monthly forecasting systems.

The process of implementing VarEPS has taken place in three phases:

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- **Phase 1 (Implemented February 2006):** increase of the horizontal and vertical resolutions of the 10–day EPS from T255 L40 to T399 L62. For further information see: [http://www.ecmwf.int/products/changes/high\\_resolution\\_2005/](http://www.ecmwf.int/products/changes/high_resolution_2005/)
- **Phase 2 (Implemented 28 November 2006):** extension of the forecast range to 15 days using the VarEPS system with a resolution of T399 L62 for day 1 to day 10 and T255 L62 for day 11 to day 15. For further information see: <http://www.ecmwf.int/products/changes/vareps/>
- **Phase 3 (Implementation planned for 2008):** weekly extension of VarEPS to one month with a T255 L62 atmospheric resolution and ocean coupling introduced at day 10.

This web page describes **Phase 3** of the upgrade process.

**With the implementation of the unified VarEPS–monthly system, the current monthly forecast is no longer run and no further data are archived in the MARS streams MNFC and MNFH.**

As part of this upgrade:

- the IFS cycle number changed to 32r3V;
- the model number identifier (generating process identification number – GRIB Section 1, Product Definition Section, Octet 6) for atmospheric fields changed to 131. There was no change to the model number identifier for wave and ocean fields.

**These changes apply to both the deterministic, medium–range EPS as well as the 32–day VarEPS–monthly forecasts.**

Additional changes affecting the deterministic and medium–range EPS forecasts are listed separately below, see [Changes to the deterministic and medium–range EPS forecasts](#).

## Technical configuration of the VarEPS–monthly system

Each VarEPS–monthly member is generated by a three–leg forecast.

### Atmospheric component

The configuration of the atmospheric component is summarized in the following table.

<i>VarEPS–monthly (Atmospheric)</i>	<i>Spectral resolution / Vertical levels</i>	<i>Reduced Gaussian grid</i>	<i>Horizontal grid resolution</i>	<i>Forecast range</i>	
				<i>days</i>	<i>hours</i>
<i>Leg 1</i>	T399 / L62	N200	50km	1–10	000–240

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<i>Leg 2</i>	T255 / L62	N128	80km	11–15	246–360
<i>Leg 3</i>	T255 / L62	N128	80km	16–32	366–768

### Oceanic component

The resolution of the oceanic component is unchanged from the previous monthly system:

- The zonal resolution is 1.4 degrees.
- The meridional resolution varies from 0.3 degrees in the equatorial region (within 10 degrees of the equator), smoothly increasing to 1.4 polewards of 30 degrees.
- There are 29 vertical levels.

### Other VarEPS–monthly technical characteristics

- The atmospheric model is coupled to the ocean model only from day 10 onwards. For the first 10 days, the atmospheric and oceanic components run uncoupled.
- For days 1 to 10 the atmosphere model is forced by persisted SST anomalies.
- The hindcast system consists of a 5–member ensemble of 32–day VarEPS–monthly integrations, starting on the same day and month as the real–time forecast for each of the past 18 years. This constitutes a 90–member ensemble for the back–statistics.
- Archiving of data in MARS is changed to be fully consistent with that of VarEPS. See MARS archiving of VarEPS–monthly products for further details.
- GRIB headers use ECMWF local extension definition 30. This local definition is used for VarEPS–monthly fields both from MARS and in the dissemination.
- Care is needed when computing differences for flux parameters (quantities accumulated since the beginning of the forecast, e.g. all precipitation and snowfall parameters) across the VarEPS truncation timestep at T+240. See Flux parameters in VarEPS for further details.

### Persisted Sea–Surface Temperature anomalies

Previously, the sea surface temperatures were persisted from the initial conditions during both the deterministic and the medium–range EPS forecasts.

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With the implementation of the unified VarEPS–monthly system, the sea surface temperature anomalies relative to the 1979–2001 ERA–40 daily climate are persisted. The anomalies are added to the ERA–40 daily climate to produce the full SST field.

*This means that the SSTs now evolve in time during both the deterministic and the medium–range EPS forecasts.*

## Changes to the deterministic and medium–range EPS forecasts

The changes affecting both the deterministic and medium–range EPS forecasts are as follows:

- Persisted SST anomalies are used for both the deterministic and medium–range EPS forecasts;
- *Leg 2* of the 00 UTC medium–range EPS forecast is run daily with a coupled ocean;
- There is a new Extreme Forecast Index (EFI) climate based on the VarEPS–monthly hindcast forecasts.
- Archiving of medium–range and monthly products is harmonised. Details will be made available later.

## MARS archiving of VarEPS–monthly products

The MARS archiving of the monthly forecasting system has been changed to be fully consistent with that used for VarEPS. Changes to the MARS streams used are summarised in the table.

Description	MARS Stream
Atmospheric real–time (including weekly means)	ENFO
Atmospheric hindcast (including weekly means)	ENFH
Wave real–time	WAEF
Wave hindcast	ENWH
Ensemble forecast hindcast statistics	EFHS
Ensemble forecast hindcast variable resolution overlap	EFHO
Wave ensemble forecast hindcast variable resolution overlap	EWHO

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For further details see [Mars archiving for the VarEPS–Monthly system](#).

For help with translating MARS requests from those for the current monthly forecast to those for the new VarEPS–monthly system, see [Differences between the MARS archiving of current monthly forecast and VarEPS–monthly](#).

For help with adapting data retrieval and data processing of the Extreme Forecast Index products archived in MARS, see [Differences between the MARS archiving of current EFI and the VarEPS–monthly EFI](#).

## Dissemination

The main technical change for the monthly extension is for the GRIB description to use [ECMWF local extension definition 30](#), analogous to the current VarEPS data.

In addition, the requests in product dissemination and MARS correspond to the requests for the medium–range EPS. See [MARS archiving of VarEPS–monthly products](#) for further details.

*Member States' current operational requirements for monthly products will be translated to the new system.*

## Transmission of products

Monthly Forecast products continue to be disseminated as one file per forecast day. The file naming convention is as described in the [Dissemination Manual](#) and this is *not* changed: data Stream Indicators for:

- 'Monthly Forecast real time atmospheric data' will remain 'F'
- 'Monthly Forecast hindcast atmospheric data' will remain 'H'
- 'Monthly Forecast real time wave data' will remain 'V'
- 'Monthly Forecast hindcast wave data' will remain 'Z'

*There is no change to the dissemination schedule for either the medium–range or the monthly products.*

## Choosing between daily and monthly VarEPS products

Users have the choice to distinguish between daily and monthly VarEPS products on the requirement level. The new language keyword "USE" is used for this purpose. If users set 'USE=MONTHLY RUN' in their request they will get these products as one dissemination file per forecast day once a week (at the moment we run the extended forecast to day 32 once a week).

### Example 1

If the request contains STREAM=ENFO,STEP=0/to/768/by/6,USE=MONTHLY RUN users will get these products only once a week disseminated as one file per forecast day. The same principle applies for any range of STEPs requested.

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### Example 2

If the request contains STREAM=ENFO,STEP=0/to/768/by/6 with the keyword USE not present or USE=OFF users will get the products:

- every day for steps 0 to 360 as one file per forecast step (six hourly) like normal EPS products and;
- once a week for steps 366 to 768 as one file per forecast day like normal monthly products.

### Availability of test data

All results from the e–suite runs are available from the MARS archive. See [Test data sets from pre–operational e–suite](#) for details.

Test data from the new monthly extension of the VarEPS–monthly system is now also available in the dissemination system (ECPDS) in delayed mode. The test products are based on current operational Monthly Forecast dissemination requirements and have been generated using Experiment Version Number EXPVER=36 with a Basetime of 00 UTC on 21 February 2008.

Test dissemination files can be found on ECPDS under 'Date' 'Thu\_21' and 'File Name' '\*36'.

The test products on ECPDS will be updated every Thursday until the implementation of the new VarEPS–Monthly system in operations on 11 March 2008. Then these test dissemination requirements will be made operational.

*Member States are encouraged to access these products to test their own systems.*

Should you need to make any modifications to the translated requirements before the implementation date or help with any of the products then please contact Dragan Jokic .

## Test data sets from pre–operational e–suite

Test data for the unified VarEPS–monthly e–suite are available in MARS. The data are available with experiment version is 0036 (MARS parameter expver=0036) for

- 00 UTC from 17 December 2007;
- 00 UTC and 12 UTC cycles from 28 January 2008.

Data for the monthly extension to 32 days is available for the 00 UTC cycle each Thursday from 20 December 2007.

Test data can be accessed in MARS from:

- [Ensemble Prediction System](#) (Class=od, Stream=enfo, Expver=0036)
- [Wave Ensemble Forecast](#) (Class=od, Stream=waef, Expver=0036)

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- [Ensemble Forecast Hindcast](#) (Class=od, Stream=enfh, Expver=0036)
- [Ensemble Forecast Hindcast Statistics](#) (Class=od, Stream=efhs, Expver=0036)
- [Wave Ensemble Forecast Hindcast](#) (Class=od, Stream=enwh, Expver=0036)

*Only registered users of ECMWF computing systems will be able to access the test data sets in MARS.*

The quality of these data sets is not guaranteed. Please report any problems you find with this data to User Support . The data are intended for testing technical aspects of the combined VarEPS–monthly system.

## Further reading

- [ECMWF Monthly Forecasting System Documentation](#)
- [Implementation of VarEPS](#)
- The new ECMWF Variable Resolution Ensemble Prediction System (VarEPS): methodology and validation.  
[ECMWF Technical Memorandum No. 499 \(July 2006\)](#)
- The ECMWF Variable Resolution Ensemble Prediction System (VarEPS)  
[ECMWF Newsletter No. 108 \(pp14–20\) – Summer 2006](#)
- [Computation of accumulated fields in VarEPS](#)
- Recent developments in extreme weather forecasting  
[ECMWF Newsletter No. 107 \(pp8–17\) – Spring 2006](#)

## Document versions

<i>Date</i>	<i>Reason for update</i>
<i>17.12.2007</i>	Initial Version.
<i>12.02.2008</i>	Announcement of unified VarEPS–monthly implementation date. See <a href="#">News</a> .
<i>19.02.2008</i>	Information about MARS archiving of VarEPS–monthly EFI products provided. See <a href="#">MARS archiving of VarEPS–monthly products</a> and <a href="#">EFI MARS archiving</a> .
<i>22.02.2008</i>	Test dissemination products generated and made available for transmission on ECPDS. See <a href="#">Dissemination</a> .

## Unified VarEPS–Monthly Forecasting System

<b><i>14.03.2008</i></b>	Successful implementation of the unified VarEPS–monthly system announced. See <a href="#"><u>News</u></a> .
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