Data archiving and dissemination of the seasonal-to-decadal experiments

ENSEMBLES Team

European Centre for Medium-Range Weather Forecasts

Set-up for seasonal-to-decadal hindcasts

stream 1 **month 18-24**

Three approaches to tackle model uncertainty:

- multi-model: 5 coupled GCMs, each 9 ensemble members
- perturbed physics: 1 coupled GCM, 9 ensemble members
- stochastic physics: 1 coupled GCM, 9 ensemble members

Hindcast production period: 1991-2001

- seasonal runs (7 months): two start dates per year (May, Nov)
- annual runs (14 months): at least one start date per year (Nov)
- multi-annual/decadal runs (10 years): starting in 1965 and 1994

stream 2 **month 48**

Temptative:

- multi-model of 5 coupled GCMs
- hindcast production period 1960-2001
- 4 start dates per year
- one annual run per year, one multi-annual run (at least) every 5 years

List of experiments already available in MARS

http://www.ecmwf.int/research/EU_projects/ENSEMBLES/table_experiments/

model	version	origin	expid	method	system	expvers	stream	years	lead	start dates	IC members	MARS	comments
all													
IFS/HOPE	29r2	ECMWF	eplo	1	1	1004	mmsf,msmm	1991-2001	7 months	May 1st	9	ENSEMBLES, rd	control
IFS/HOPE	29r2	ECMWF	epn9	1	1	1004	mmsf,msmm	1991-2001	14 months	Nov 1st	9	ENSEMBLES, rd	control
IFS/HOPE	29r2	ECMWF	epoh	2	1	1001	mmsf,msmm	1991-2001	7 months	May 1st	9	ENSEMBLES, rd	CASBS
IFS/HOPE	29r2	ECMWF	eq04	2	1	1001	mmsf,msmm	1991-2001	14 months	Nov 1st	9	ENSEMBLES, rd	CASBS
IFS/HOPE	30r1	ECMWF	eqhl	1	1	1005	mmaf,mmam	1965	120 months	Nov 1st	9	ENSEMBLES, rd	control
IFS/HOPE	30r1	ECMWF	eqju	1	1	1005	mmaf,mmam	1994	120 months	Nov 1st	9	ENSEMBLES, rd	control
IFS/HOPE	30r1	ECMWF	eqq2	2	1	1005	mmaf,mmam	1965	120 months	Nov 1st	9	ENSEMBLES, rd	CASBS
IFS/HOPE	30r1	ECMWF	eqqg	2	1	1005	mmaf,mmam	1994	120 months	Nov 1st	9	ENSEMBLES, rd	CASBS
GloSea		MetOffice		1	1	1001	mmsf,msmm	1991-2001	14 months	May & Nov 1st	9	ENSEMBLES	control
GloSea		MetOffice		1	1	1002	mmsf,msmm	1991-2001	12 months	May 1st	9	ENSEMBLES	lagged ens
GloSea		MetOffice		1	1	1002	mmsf,msmm	1991-2001	14 months	Nov 1st	9	ENSEMBLES	lagged ens
GloSea		MetOffice		1	1	1003	mmsf,msmm	1991-2001	7 months	mid April & Oct	9	ENSEMBLES	
GloSea		MetOffice		1	1	1004	mmaf,mmam	1994	120 months	Nov 1st	9	ENSEMBLES	
GloSea		MetOffice		1	1	1004	mmaf,mmam	1965	120 months	Nov 1st	9	ENSEMBLES	
DePreSys		MetOffice		10-18	51	1501	mmaf,mmam,mmsf,msmm	1991-2001	120 months	May & Nov 1st	1	ENSEMBLES	pert. param., method->ens memb
DePreSys		MetOffice		10	51	1502	mmaf,mmam,mmsf,msmm	1991	120 months	May 1st	1	ENSEMBLES	pert. param., test IC ens
ARPEGE/OPA		MeteoFrance		1	(0) 1	1001	mmsf,msmm	1991-2001	7 months	May 1st	9	ENSEMBLES	
ARPEGE/OPA		MeteoFrance		1	(0) 1	1001	mmsf,msmm	1991-2001	14 months	Nov 1st	9	ENSEMBLES	
ARPEGE/OPA		MeteoFrance		1	(0) 1	1001	mmaf,mmam,mmsf,msmm	1965	120 months	Nov 1st	9	ENSEMBLES	
ARPEGE/OPA		MeteoFrance		1	(0) 1	1001	mmaf,mmam,mmsf,msmm	1994	120 months	Nov 1st	9	ENSEMBLES	
seasonal multi-model													
IFS/HOPE	29r2	ECMWF	eplo	1	1	1004	mmsf,msmm	1991-2001	7 months	May 1st	9	ENSEMBLES, rd	control
IFS/HOPE	29r2	ECMWF	epn9	1	1	1004	mmsf,msmm	1991-2001	14 months	Nov 1st	9	ENSEMBLES, rd	control
GloSea		MetOffice		1	1	1001	mmsf,msmm	1991-2001	14 months	May & Nov 1st	9	ENSEMBLES	control
ARPEGE/OPA		MeteoFrance		1	(0) 1	1001	mmsf,msmm	1991-2001	7 months	May 1st	9	ENSEMBLES	
ARPEGE/OPA		MeteoFrance		1	(0) 1	1001	mmsf,msmm	1991-2001	14 months	Nov 1st	9	ENSEMBLES	
seasonal stochastic physics													
IFS/HOPE	29r2	ECMWF	epoh	2	1	1001	mmsf,msmm	1991-2001	7 months	May 1st	9	ENSEMBLES, rd	CASBS
IFS/HOPE	29r2	ECMWF	eq04	2	1	1001	mmsf,msmm	1991-2001	14 months	May 1st	9	ENSEMBLES, rd	CASBS
seasonal perturbed physics													
DePreSys		MetOffice		10-18	51	1501	mmsf,msmm	1991-2001	120 months	May & Nov 1st	1	ENSEMBLES	pert. param., method->ens memb, 1IC
decadal multi-model													
IFS/HOPE	30r1	ECMWF	eqhl	1	1	1005	mmaf,mmam	1965	120 months	Nov 1st	9	ENSEMBLES, rd	control
IFS/HOPE	30r1	ECMWF	eqju	1	1	1005	mmaf,mmam	1994	120 months	Nov 1st	9	ENSEMBLES, rd	control
GloSea		MetOffice		1	1	1004	mmaf,mmam	1994	120 months	Nov 1st	9	ENSEMBLES	
DePreSys		MetOffice		10-18	51	1501	mmaf,mmam	1991-2001	120 months	May & Nov 1st	1	ENSEMBLES	pert. param., method->ens memb, 1IC
ARPEGE/OPA		MeteoFrance		1	(0) 1	1001	mmaf,mmam	1965	120 months	Nov 1st	9	ENSEMBLES	
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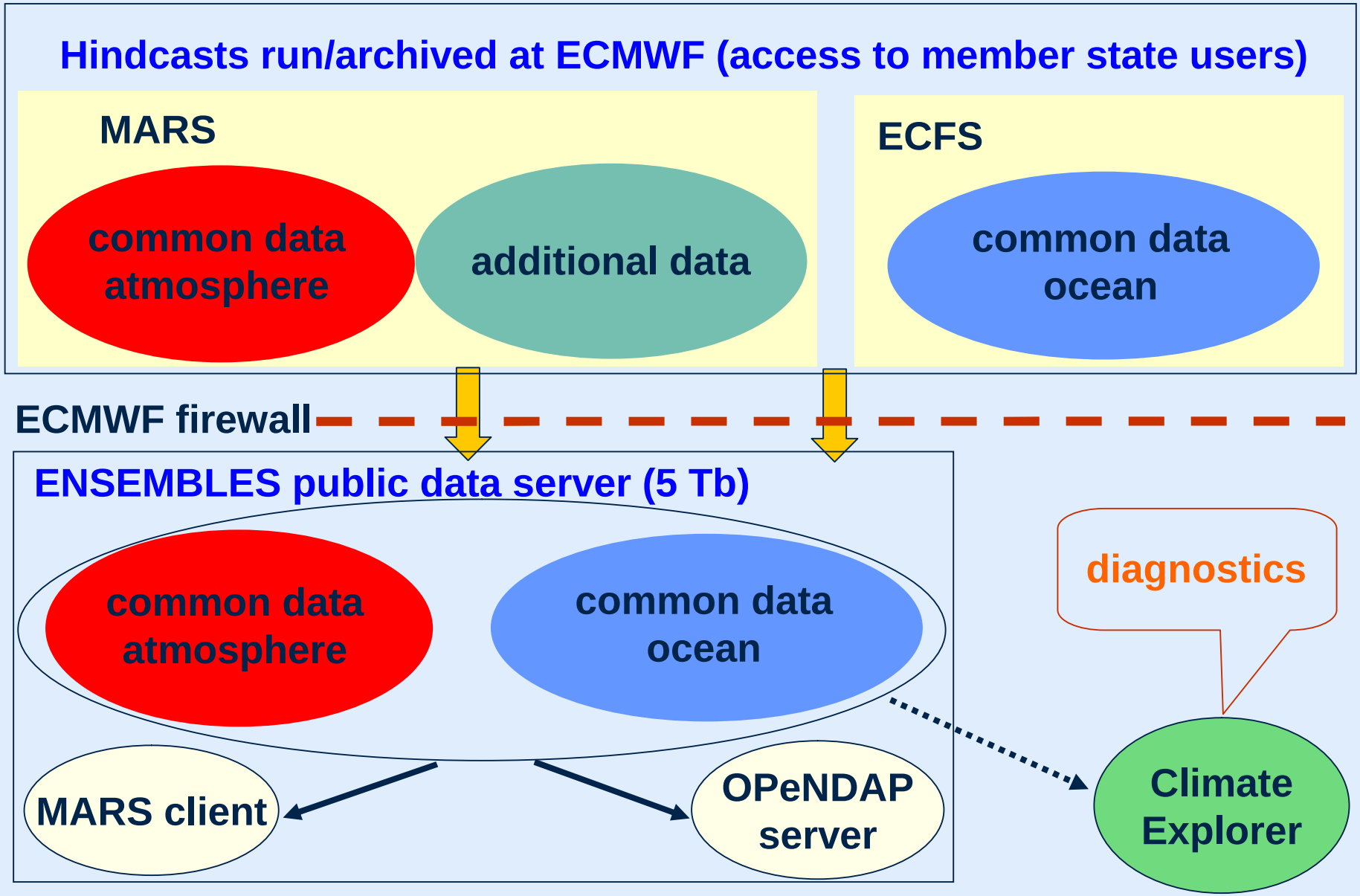
decadal stochastic physics													
IFS/HOPE	30r1	ECMWF	eqq2	2	1	1005	mmaf,mmam	1965	120 months	Nov 1st	9	ENSEMBLES, rd	CASBS
IFS/HOPE	30r1	ECMWF	eqqg	2	1	1005	mmaf,mmam	1994	120 months	Nov 1st	9	ENSEMBLES, rd	CASBS
decadal perturbed physics													
DePreSys		MetOffice		10-18	51	1501	mmaf,mmam	1991-2001	120 months	May & Nov 1st	1	ENSEMBLES	pert. param., method->ens memb, 1IC

Archiving and dissemination strategy



Content of the archive

List of common variables

- **Atmosphere**
  - 4 pressure levels (850, 500, 250, 50 hPa): Z,T,u,v,q
  - surface data
  - daily data (at 00 GMT or accumulated) and monthly means
  - common 2.5°x2.5° grid
- **Ocean**
  - monthly means of 3D and 2D fields
  - common Levitus regular grid (ENACT convention)

Additional variables

- **Model levels**: 6-hourly data from 3 GCMs
- Additional atmosphere and ocean data from Met Office and ECMWF

For units, encoding and archiving, check the information in
http://www.ecmwf.int/research/EU_projects/ENSEMBLES/data/index.html

New NetCDF definitions

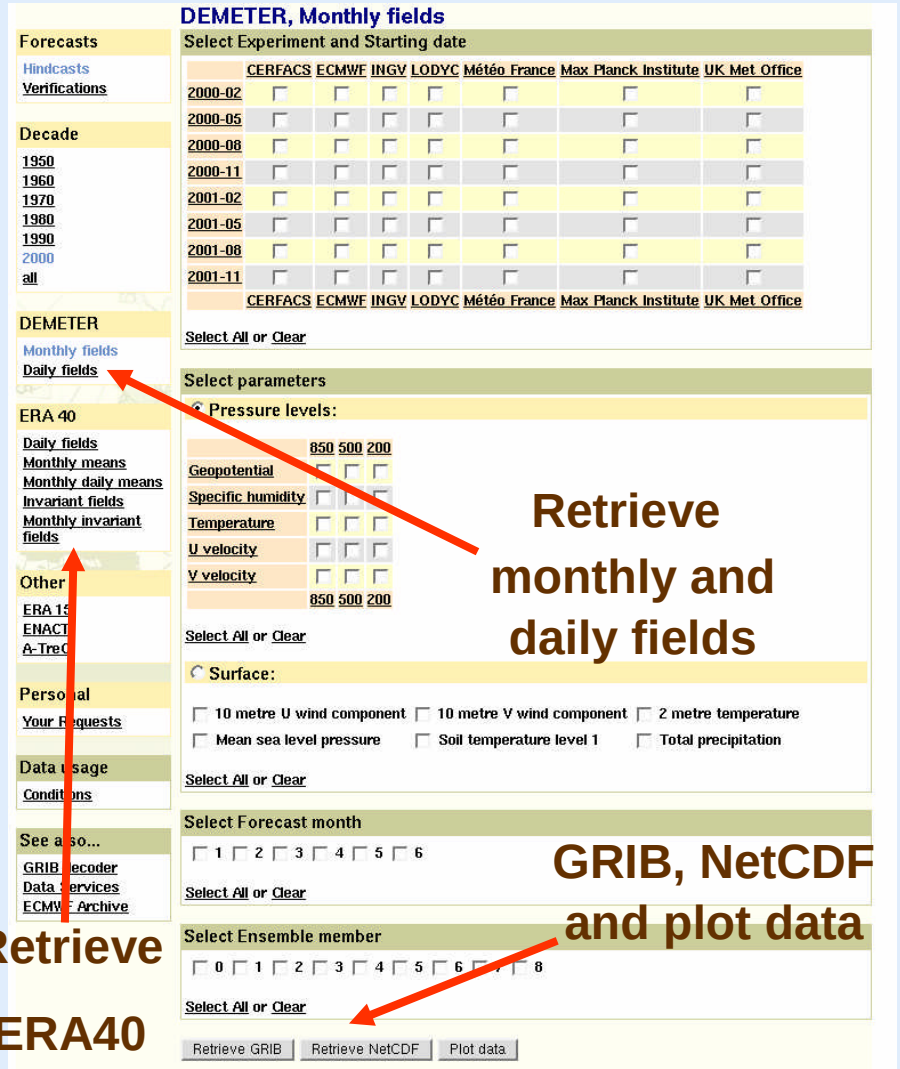
- The ocean output is required to be written in NetCDF format. A proper dissemination of the atmospheric output also benefits from the availability of NetCDF files.
- A set of NetCDF headers has been created to allow writing self-explanatory NetCDF files for operational and research ensemble forecasts in a multi-model/perturbed physics context. These headers have not been defined yet by the forecasting community.
- The new conventions need to be approved by the CF group.
- A GRIB to NetCDF translator has been written in python. It can be adapted to translate free-format NetCDF to NetCDF files compliant with the new rules.

New NetCDF variables:

- Forecast_reference_time
- Forecast_period
- Ensemble_member_number
- Experiment_identifier
- Origin
- …

Public dissemination: Examples with DEMETER data

http://data.ecmwf.int/data



http://ensembles.ecmwf.int:8080/thredds/variables.html

Thredds (OPeNDAP) aggregation server

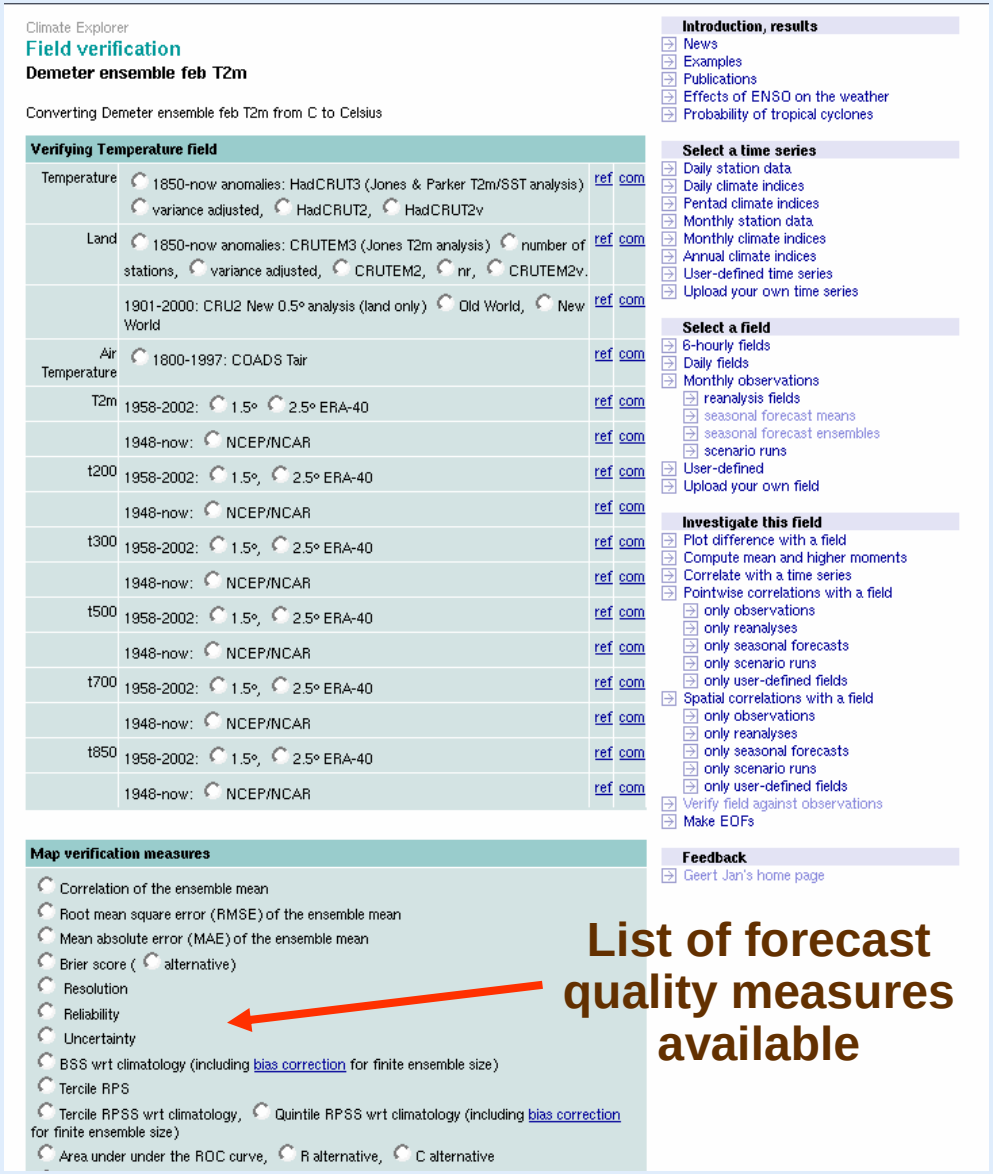
Catalog http://ensemble.ecmwf.int:8080/thredds/variables.xml

Dataset

- DEMETER geopotential
- DEMETER air temperature
- DEMETER zonal wind positive to the east
- DEMETER meridional wind positive to the north
- DEMETER mass fraction of water vapor in moist air
- DEMETER SST over sea, soil temperature over land and ice temperature over sea ice
- DEMETER mean sea level pressure
- DEMETER cloud area fraction for the whole atmosphere column
- DEMETER 10-metre zonal wind positive to the east
- DEMETER 10-metre meridional wind positive to the north
- DEMETER 2-metre temperature
- DEMETER 2-metre dewpoint temperature
- DEMETER solar radiation incident at the surface
- DEMETER longwave radiation incident at the surface
- DEMETER difference of solar radiation from above and from below at the surface
- DEMETER difference of longwave radiation from above and from below at the surface
- DEMETER difference of solar radiation from above and from below at the top of the atmosphere
- DEMETER difference of longwave radiation from above and from below at the top of the atmosphere
- DEMETER total precipitation accumulated in the previous 24 hours

THREDDS Data Server Version @VERSION.MINOR@ Build Date = 2006-05-22 18:24:58 Documentation

Public dissemination: link to the Climate Explorer

http://climexp.knmi.nl

- Development in collaboration with RT5
- Reference datasets: station data, climate indices, obs, reanalyses, seasonal forecasts, scenario runs
- Calculation of basic statistics including correlations and EOF analysis
- New feature: forecast skill assessment of DEMETER data
- In a few weeks: link to the ENSEMBLES OPeNDAP server at ECMWF and extreme event analysis (RCLIM) tools