

# DEMETER: A multi-model ensemble seasonal prediction experiment

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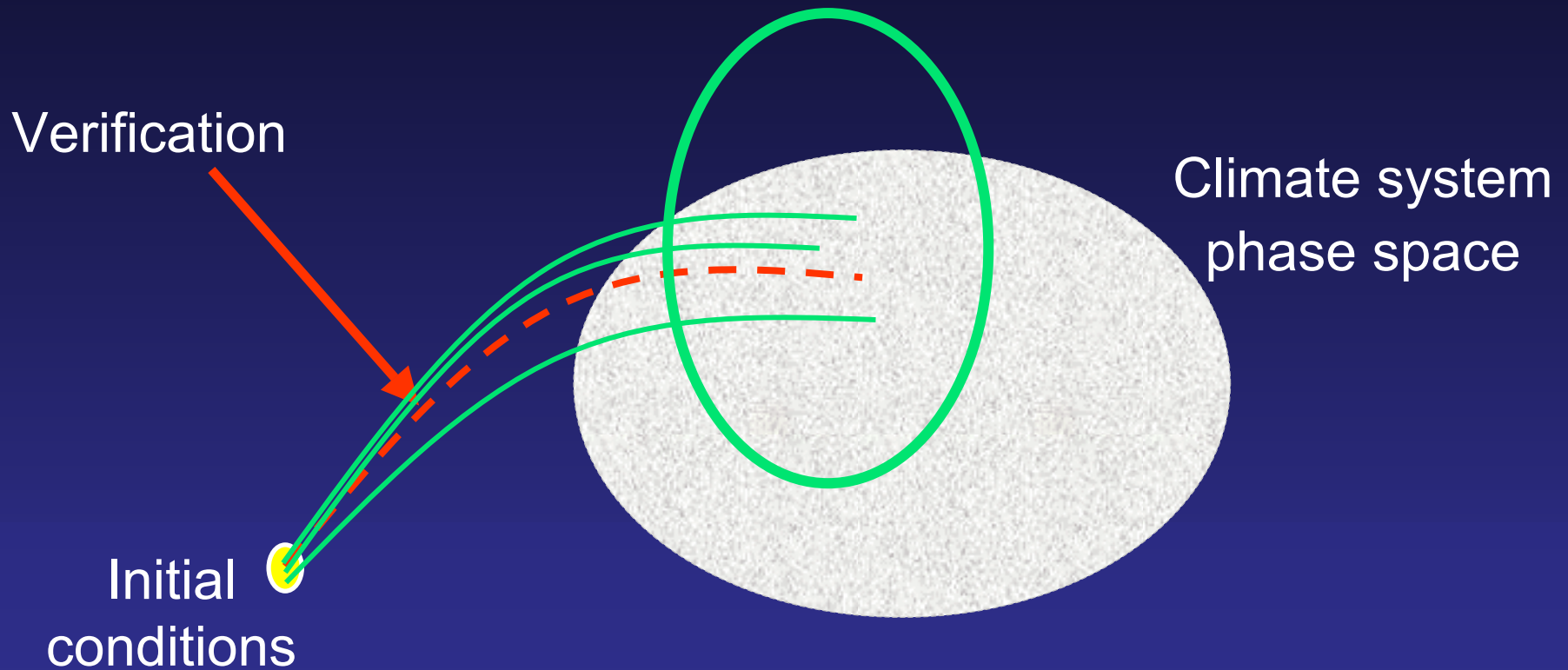
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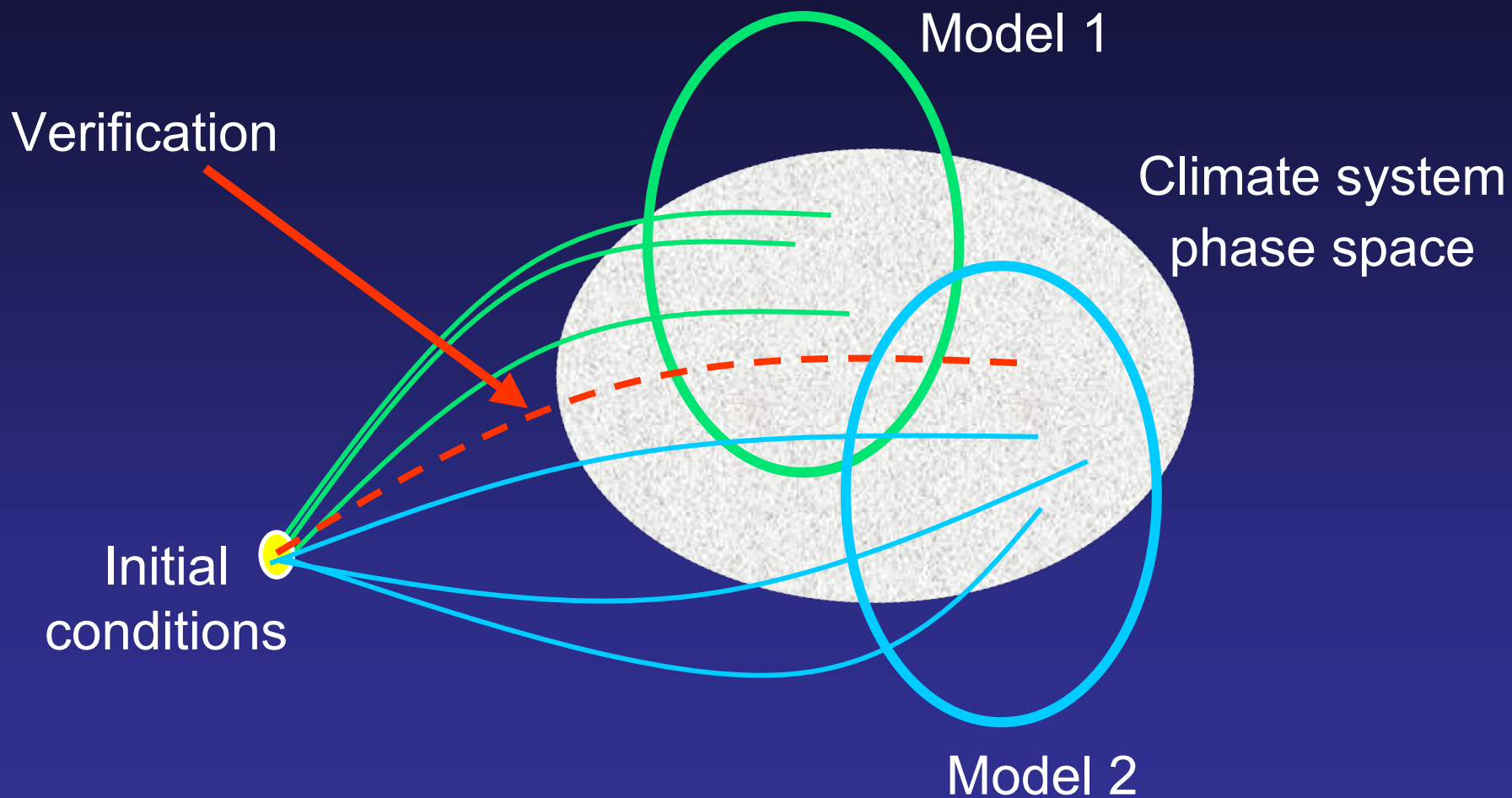
# The idea behind DEMETER

- Growing demand for reliable seasonal forecasts
- Two main sources of uncertainty
  - ⇒ error in initial conditions
  - ⇒ error in model formulation
- Install a Multi-Model Ensemble System
- Evaluate the skill and potential utility

# Multi-model ensemble approach



# Multi-model ensemble approach



# Multi-model ensemble system

- DEMETER system: 7 coupled global circulation models

Partner	Atmosphere	Ocean
ECMWF	IFS	HOPE
LODYC	IFS	OPA 8.3
CNRM	ARPEGE	OPA 8.1
CERFACS	ARPEGE	OPA 8.3
INGV	ECHAM-4	OPA 8.2
MPI	ECHAM-5	MPI-OM1
UKMO	HadCM3	HadCM3

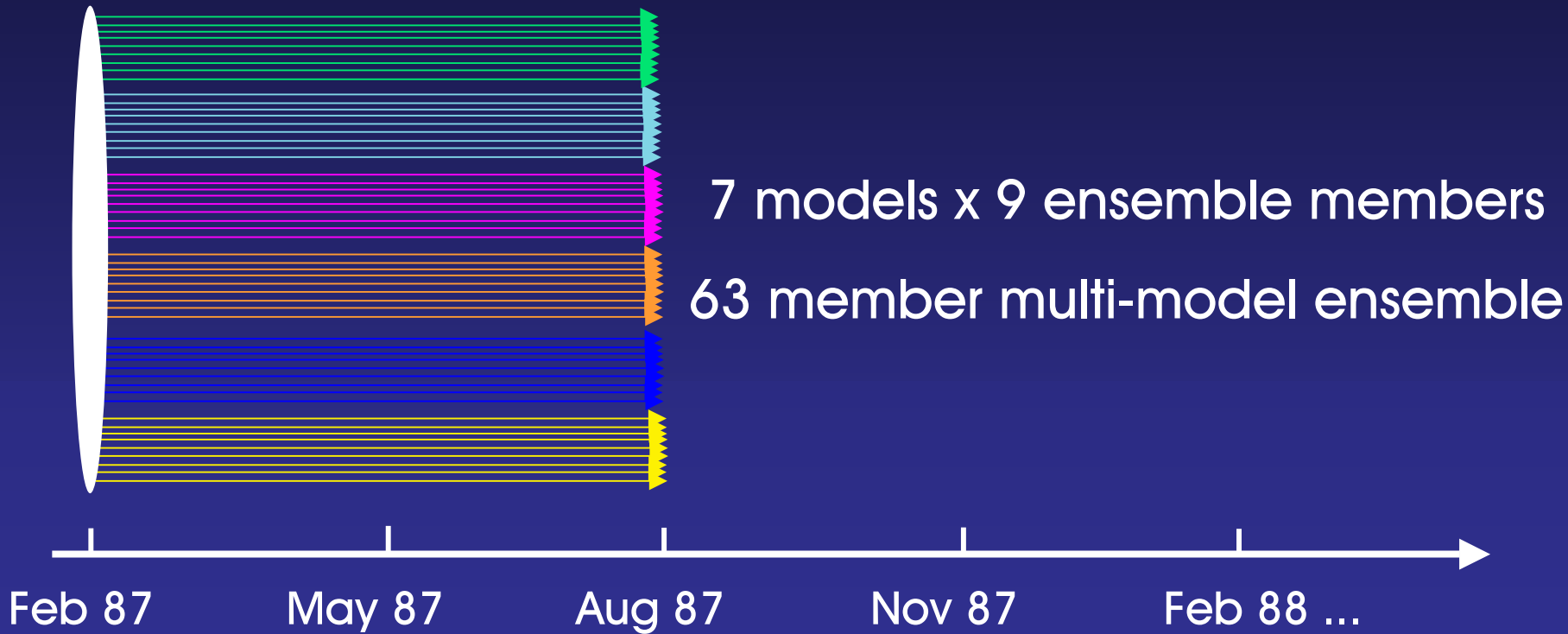
9 member ensembles  
ERA-40 initial conditions  
SST and wind perturbations  
4 start dates per year  
6 months hindcasts

- Hindcast production for: 1987-1999 (1958-2001)

# Multi-model ensemble system

DEMETER system: 6 coupled global circulation models

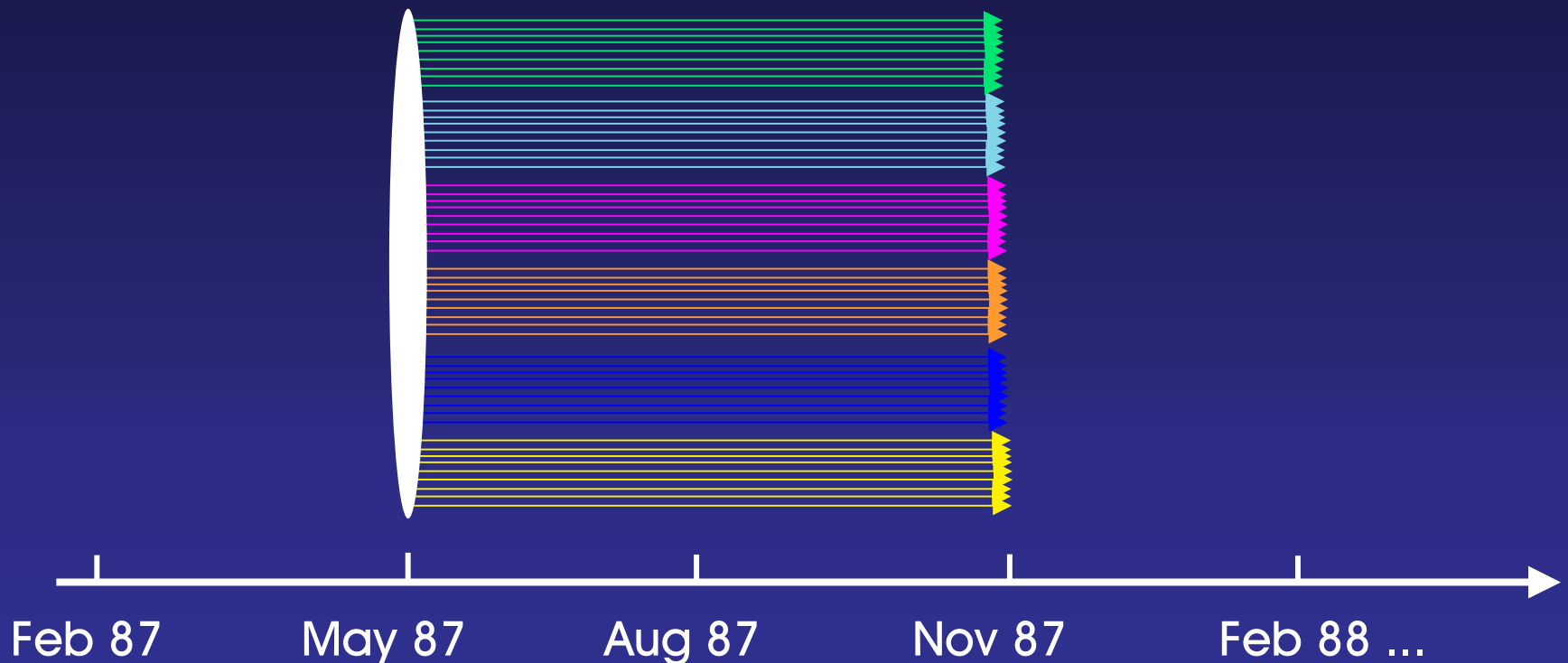
CNRM (FR) ECMWF (INT) INGV (IT) LODYC (FR) MPI (DE) UKMO (UK)



# Multi-model ensemble system

DEMETER system: 6 coupled global circulation models

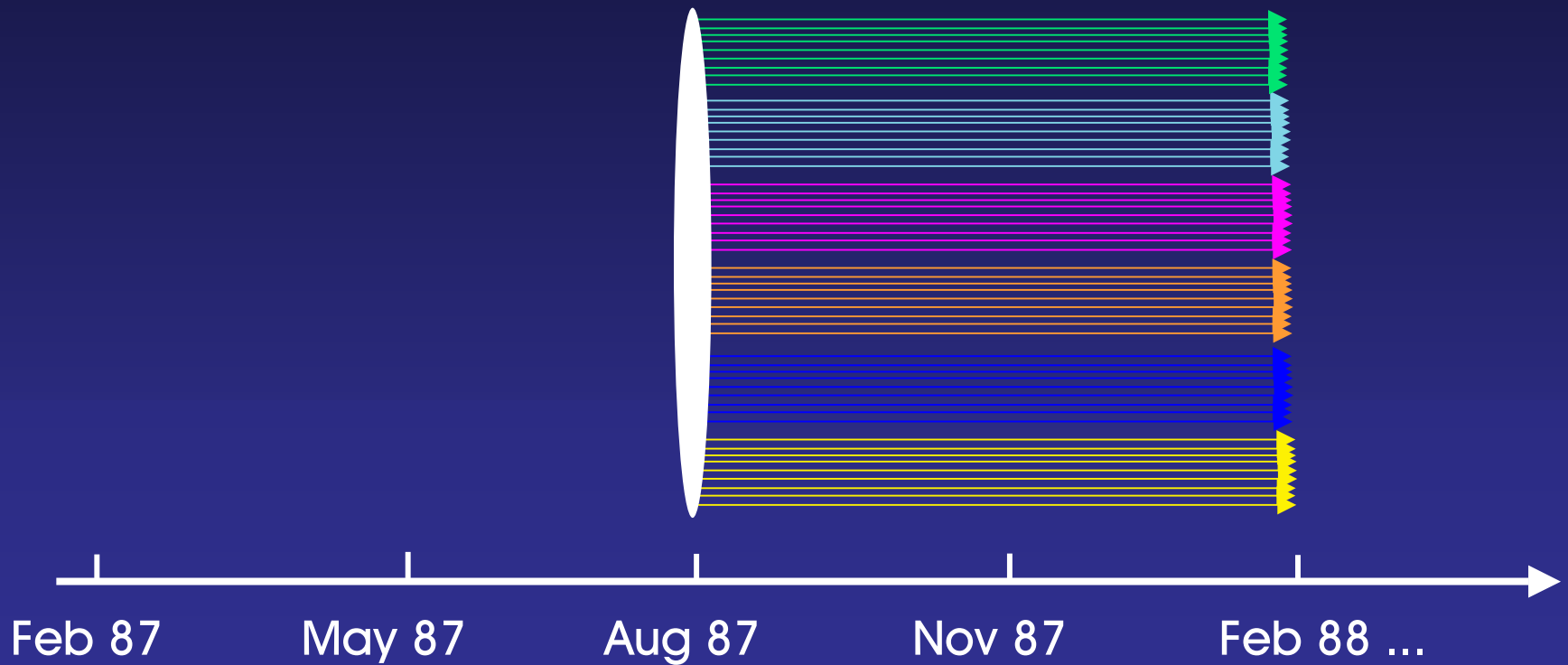
CNRM (FR) ECMWF (INT) INGV (IT) LODYC (FR) MPI (DE) UKMO (UK)



# Multi-model ensemble system

DEMETER system: 6 coupled global circulation models

CNRM (FR) ECMWF (INT) INGV (IT) LODYC (FR) MPI (DE) UKMO (UK)

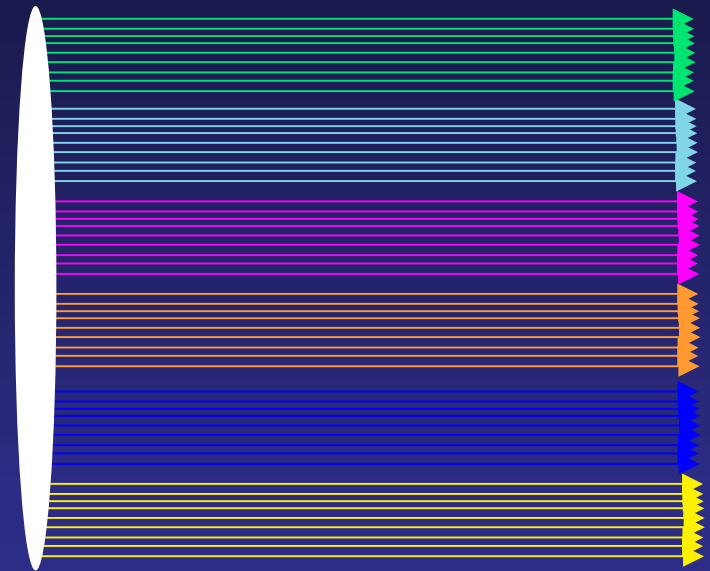


# Multi-model ensemble system

DEMETER system: 6 coupled global circulation models

CNRM (FR) ECMWF (INT) INGV (IT) LODYC (FR) MPI (DE) UKMO (UK)

63 member multi-model ensemble  
= 1 hindcast



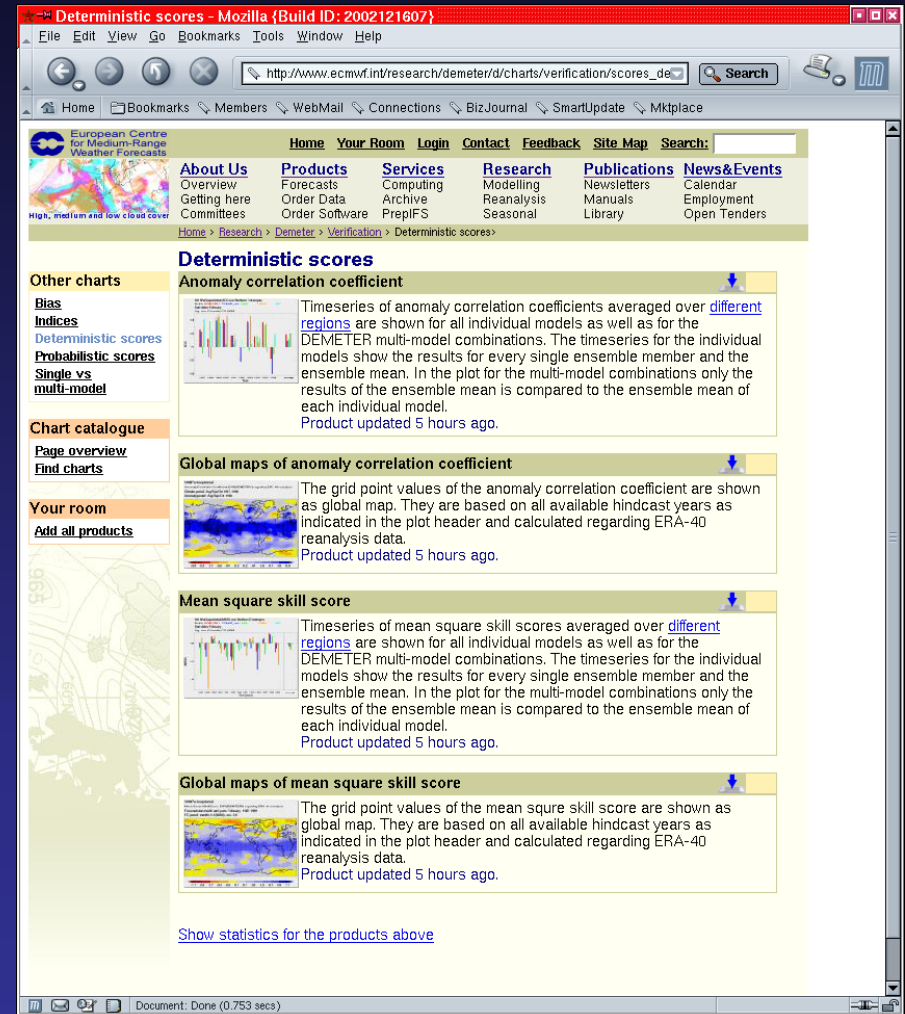
Production for: 1958-2001 =  $44 \times 4 = 176$  hindcasts

# Verification

- Bias
- Indices
- Deterministic Scores
- Probabilistic Scores
- Single vs. multi-model

To be updated and  
enlarged soon

[www.ecmwf.int/research/demeter/verification](http://www.ecmwf.int/research/demeter/verification)



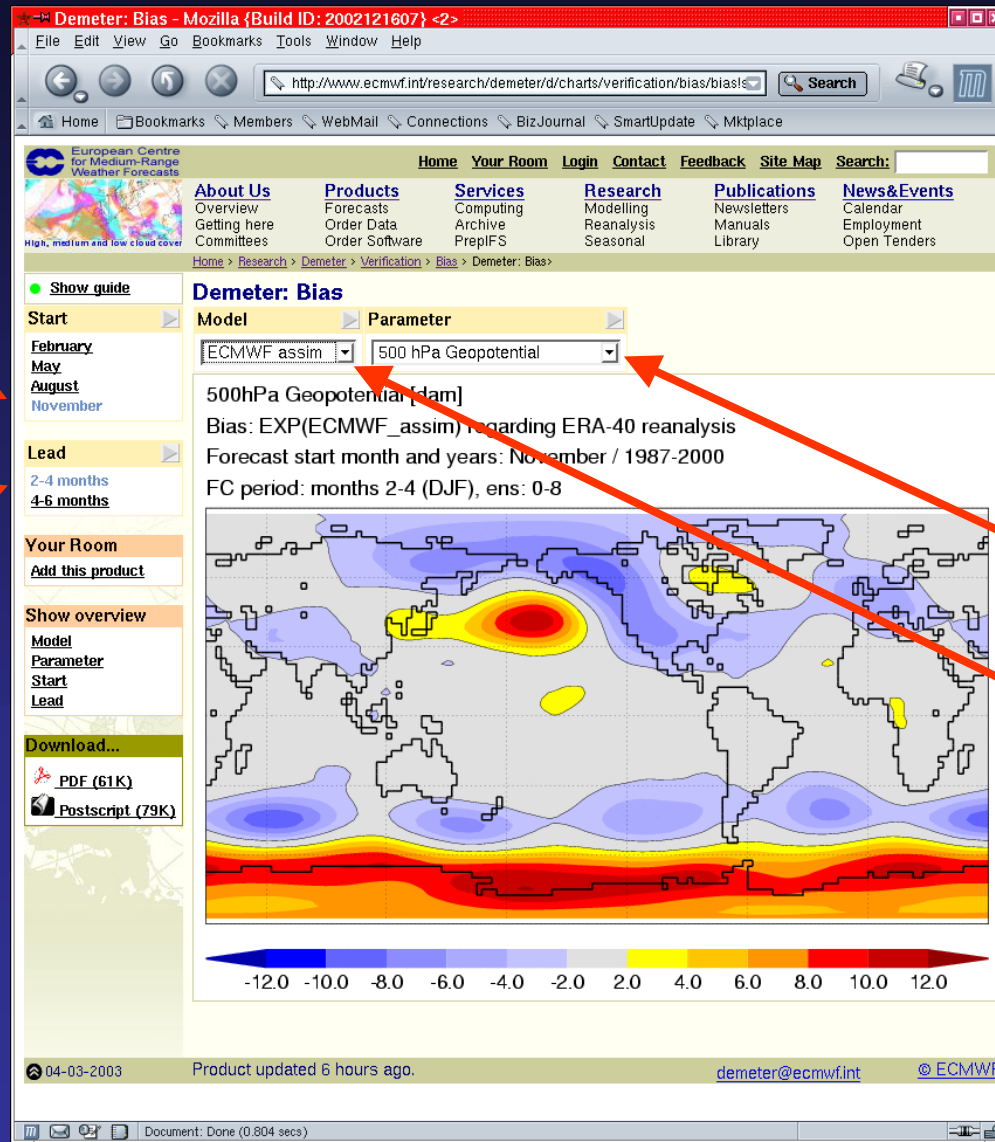
# Verification

Start date

Lead time

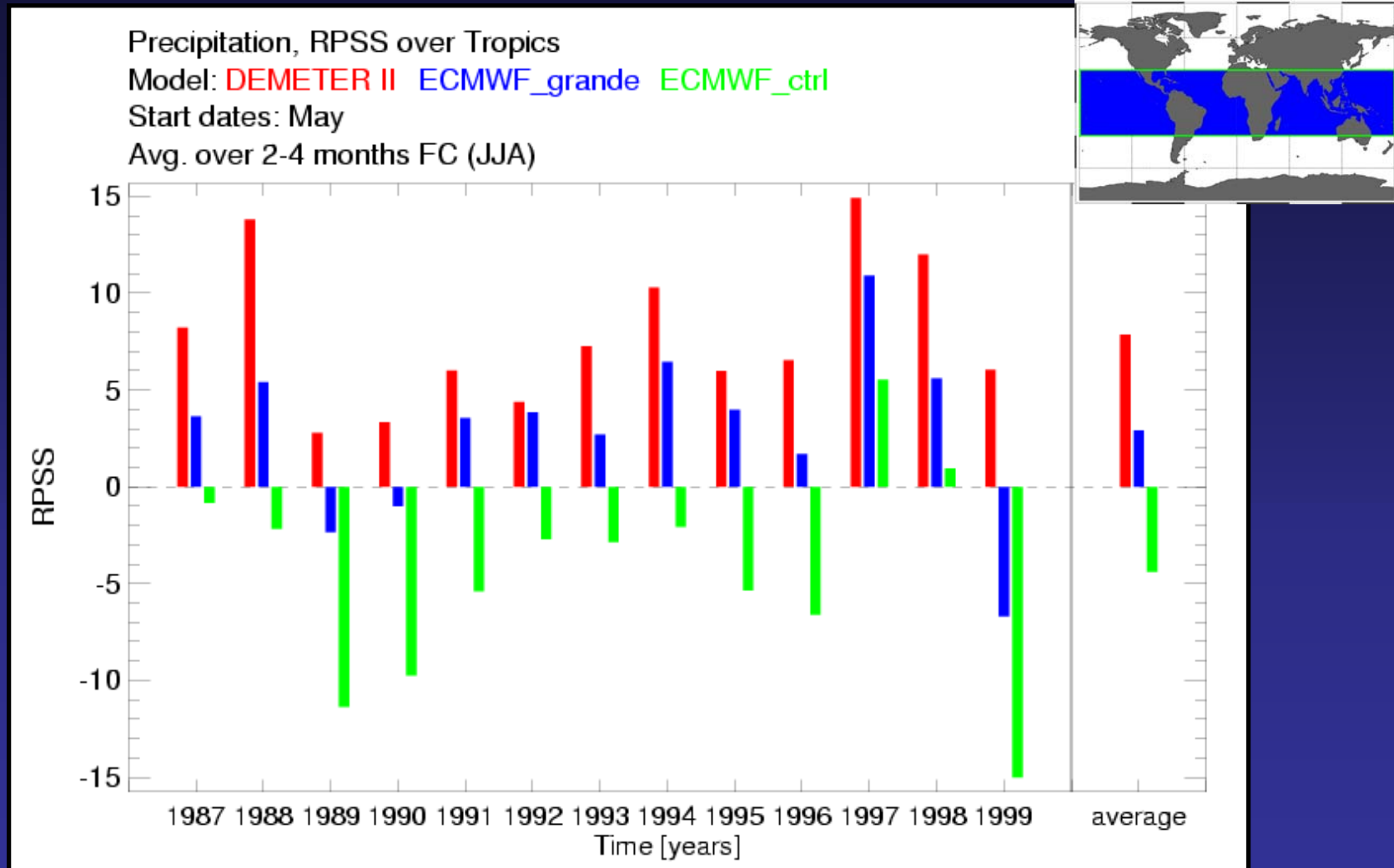
Parameter

Model



# Multi-model vs. ensemble size

Multi-model (54 members) single model (54) single model (9)



# <http://data.ecmwf.int/data>

Public data  
distribution  
(model and  
ERA40  
for verification  
purposes)

The screenshot shows a Mozilla browser window titled "Demeter - Mozilla {Build ID: 2002121607}" with the address bar containing "http://data.ecmwf.int/data/d/demeter/pl/1990/hindcasts/". The page header includes the ECMWF logo and navigation links: Home, Your Room, Login, Contact, Feedback, Site Map, and Search. A secondary navigation bar lists: About Us, Products, Services, Research, Publications, and News&Events. The main content area is titled "Demeter" and contains several selection sections: "Select Experiment" with checkboxes for CERFACS, ECMWF, INGV, LODYC, Météo France, Max Planck Institute, and UK Met Office; "Select Starting date" with checkboxes for years from 1990-02 to 1997-11; "Select Level and Parameter" with a table for parameters like Geopotential, Temperature, U velocity, V velocity, and Specific humidity; "Select Forecast month" with checkboxes for months 1 through 6; and "Select Ensemble member" with checkboxes for members 0 through 8. At the bottom, there are buttons for "Retrieve GRIB", "Retrieve NetCDF", and "Plot data".



