Seasonal-to-Decadal (s2d) Activities during the Initial 18 Months

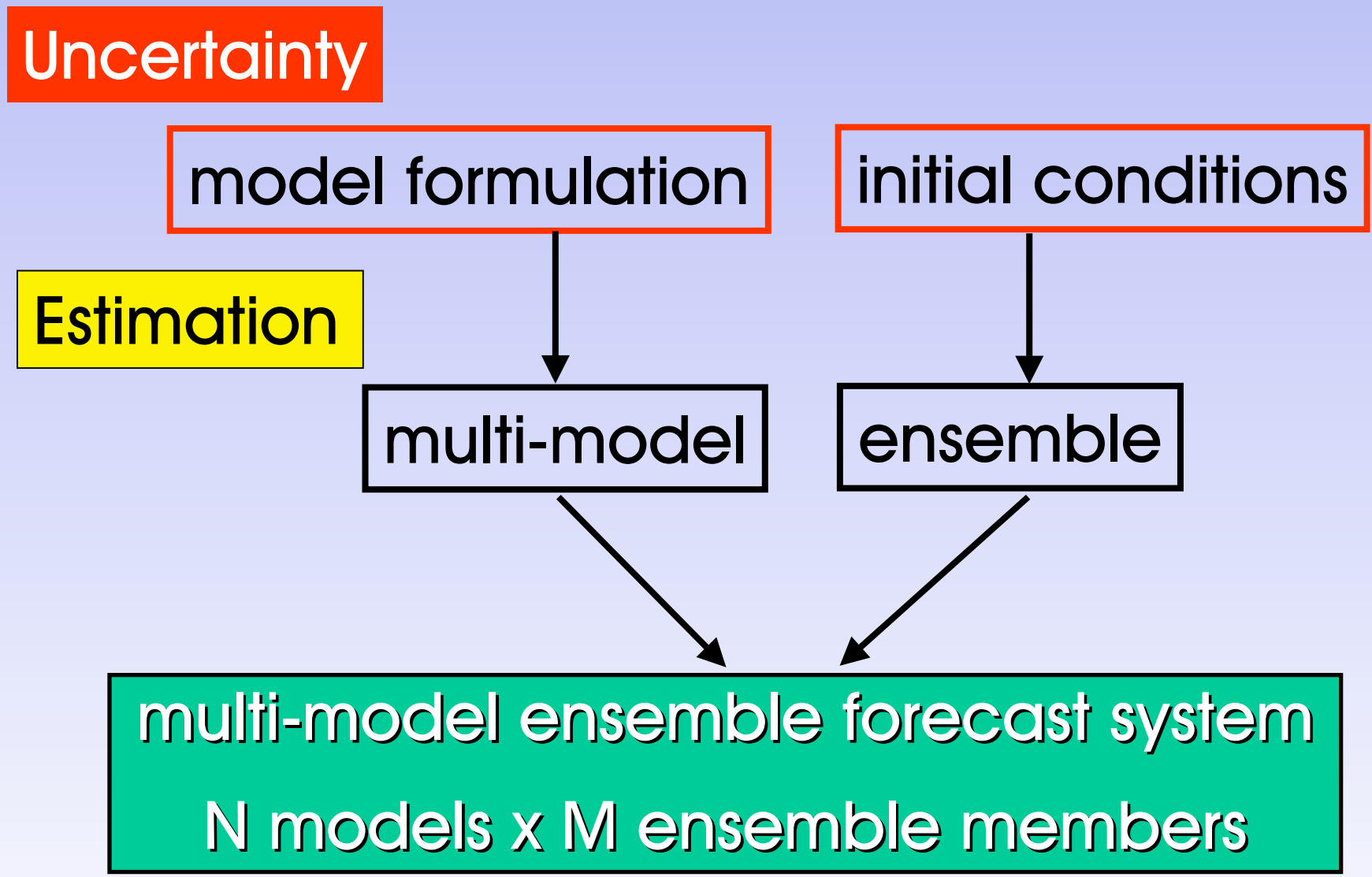
Oncoming s2d activities (RT1)

- Main goal: assess best method to estimate model uncertainty among multi-model, perturbed parameter and stochastic physics approaches.
- Estimates of model uncertainty using a new multi-model ensemble, a recently developed stochastic physics scheme (ECMWF and Met Office) and the perturbed parameters approach (Met Office with 2 different versions of HadCM3).
- Ocean initial conditions from ENACT and generation of new sets when possible.
- Common output archived at ECMWF in MARS (atm) and ECFS (ocean).
- Pre-production for 1991-2001 with reduced start dates and expected completion for end 2005.
- Additional experiments to test the consistency of the predictions and the impact of the ensemble size.

Three different forecast systems to estimate model uncertainty

- Multi-model, built from ECMWF, Met Office, Météo-France operational activities and DEMETER experience.
- Perturbed parameter approach, built from the decadal prediction system (DePreSys) at the Met Office.
- Stochastic physics, built from the stochastic physics systems developed for medium-range forecasting at ECMWF.
- Design of a set of common experiments to determine the benefits of each approach.

Multi-model ensemble approach



Multi-model ensemble system

- ENSEMBLES system: 7 coupled GCMs running at ECMWF

Partner	Atmosphere	Ocean
ECMWF	IFS	HOPE
ECMWF	IFS	OPA
CNRM	ARPEGE	OPA
CERFACS	ARPEGE	OPA
UKMO	GloSea	
UKMO	DePreSys	
MPI	ECHAM5	MPI-OM1

9-member ensembles

ERA-40 atmosphere and soil initial conditions

ENACT-based ocean initial conditions with SST and wind perturbations

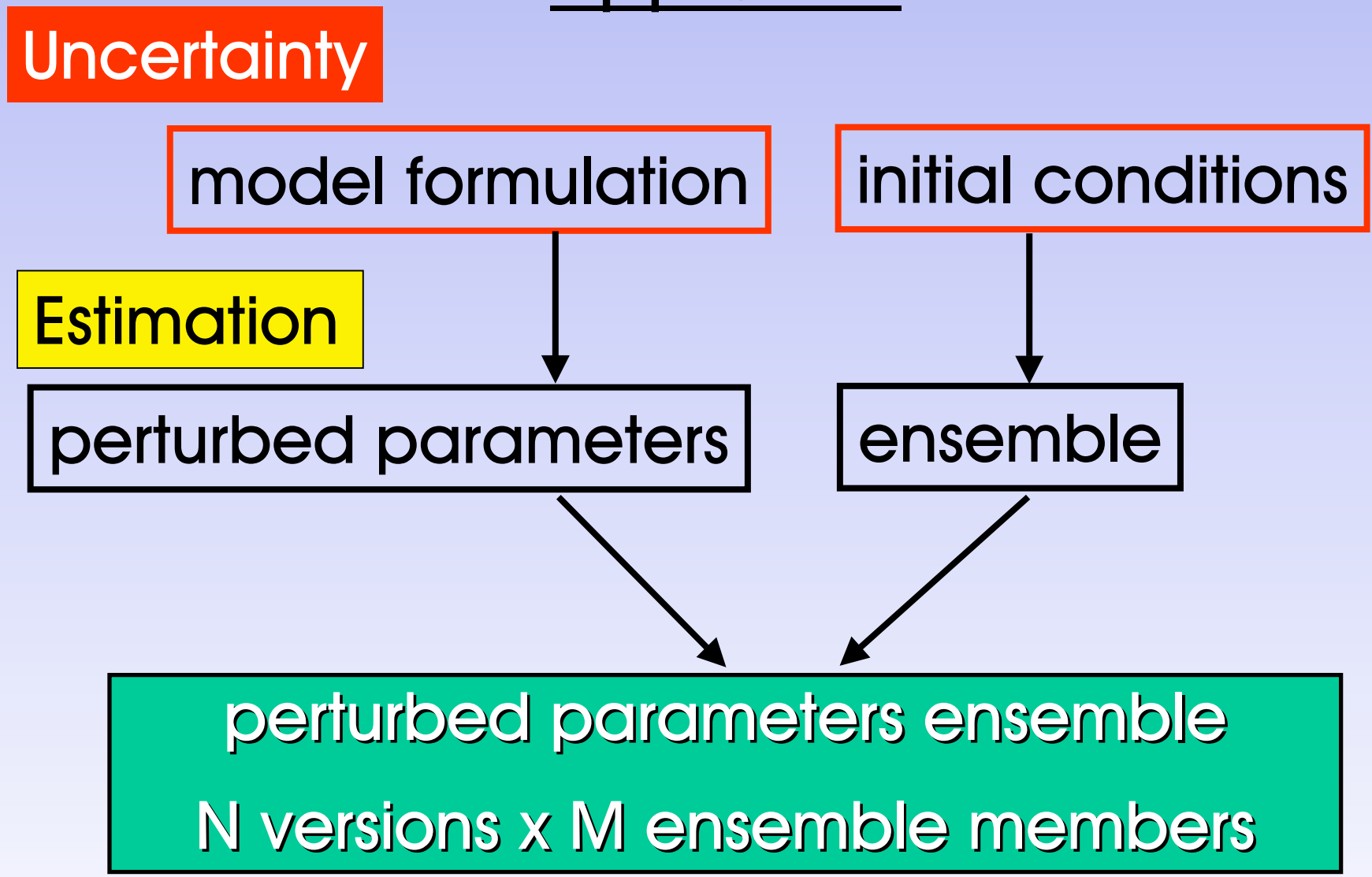
2 seasonal (7 months),1 annual (12-14 months) runs per year

Two multi-annual runs (1965, 1994) except 2 per year for DePreSys)

Realistic boundary forcings: GHGs, aerosols, solar forcing, etc.

- Hindcast production period for: 1991-2001

Perturbed parameters ensemble approach



Perturbed parameters ensemble system

- ENSEMBLES system: 2 coupled GCMs running at ECMWF

Partner	Atmosphere	Ocean
UKMO	GloSea	
UKMO	DePreSys	

Same design as multi-model, except:

Operational perturbed parameters

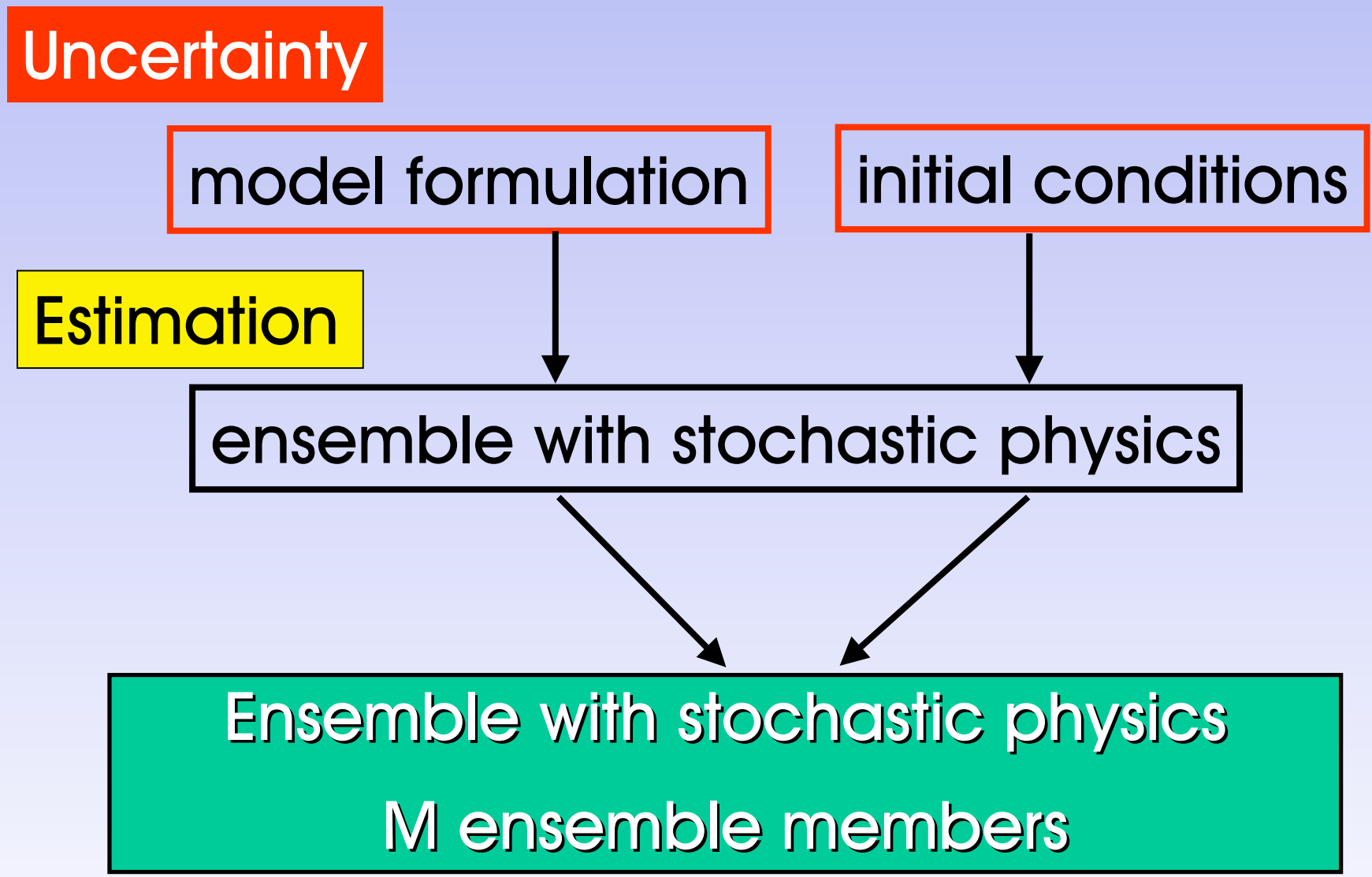
Every year, two annual (14 months) for GloSea and two decadal runs for DePreSys

ENACT-based ocean initial conditions (OI assimilation) for GloSea, calibrated anomalies assimilation for DePreSys

Lagged average method

Two multi-annual runs (1965,1994) for GloSea

Stochastic physics ensemble approach



Stochastic physics ensemble system

- ENSEMBLES system: 1 coupled GCM running at ECMWF

Partner	Atmosphere	Ocean
ECMWF	IFS	HOPE

Same design as multi-model, except:

Use of CASBS (Cellular Automaton Stochastic Backscatter Scheme) to introduce random perturbations in the atmosphere during the integration

Other experiments

- Additional (Met Office and ECMWF) seasonal and annual simulations starting on the 15th of the month and the 1st of the next month, to check the consistency of the ensemble.
- Additional (ECMWF) seasonal simulations with larger ensemble sizes.

Data storage

- Archiving at ECMWF (seasonal to decadal) and M&D (decadal to centennial in CERA).
- Archiving of model levels in some Met Office and ECMWF experiments (to be decided yet) for use as boundary conditions in limited area models.
- Use of a common list of variables (minimum requirement) for atmosphere and ocean variables.
- Atmosphere (GRIB) in MARS and ocean (NetCDF) in ECFS and, eventually, in MARS too. Need of an ENSEMBLES class for MARS.
- Scripts available for archiving and retrieval.
- Public data dissemination and additional OPenDAP server.

Future s2d activities (RT2A)

- Details to be confirmed, build on the RT1 experience.
- Starting in ~month 24: seasonal, annual and multi-annual integrations.
- New set of (ensemble) ocean initial conditions from ENACT and/or RT1.
- Common output (based on RT1 lists and scripts) archived in MARS and ECFS.
- Dissemination based on public data and OPenDAP servers.
- Production period 1960-2001.
- 4 times per year, multi-annual hindcasts with the perturbed-parameter approach (using HadCM3 or HadGEM).

Multi-model ensemble system

- ENSEMBLES system: 5 coupled GCMs (4 running at ECMWF)

Partner	Atmosphere	Ocean
ECMWF*	IFS	OPA
CNRM	ARPEGE	OPA
UKMO	GloSea	
MPI	ECHAM5	MPI-OM1
INGV	ECHAM4	OPA

* Initial conditions (EnKF) in collaboration with KNMI

9-member ensembles

ERA-40 atmosphere and soil initial conditions

RT1-based ocean initial conditions

4 seasonal, 1 annual runs per year

At least 1 multi-annual run every 5 years

Realistic boundary forcings in forecast mode: GHGs, aerosols, solar forcing, etc.

- Hindcast production period for: 1960-2001