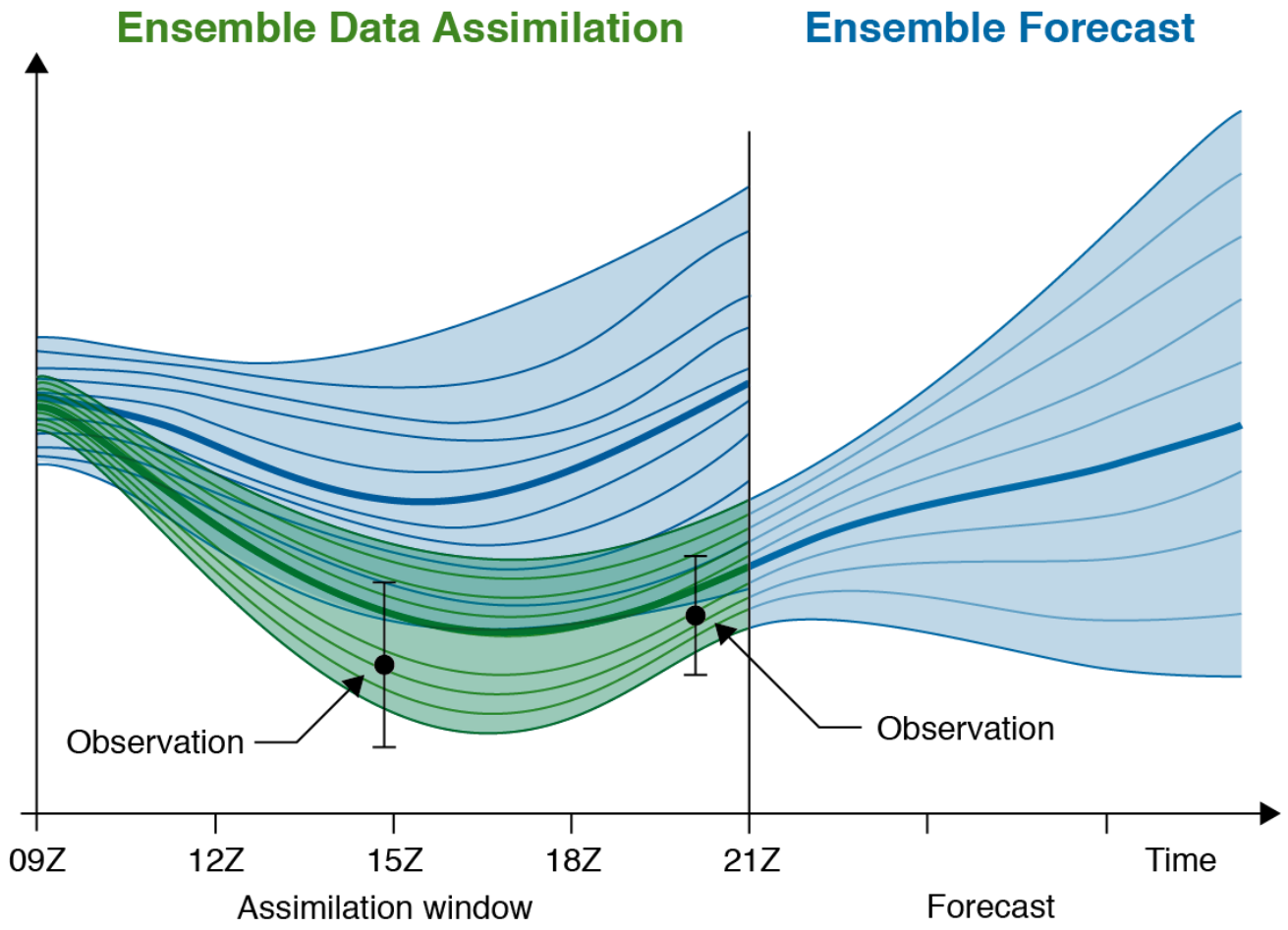
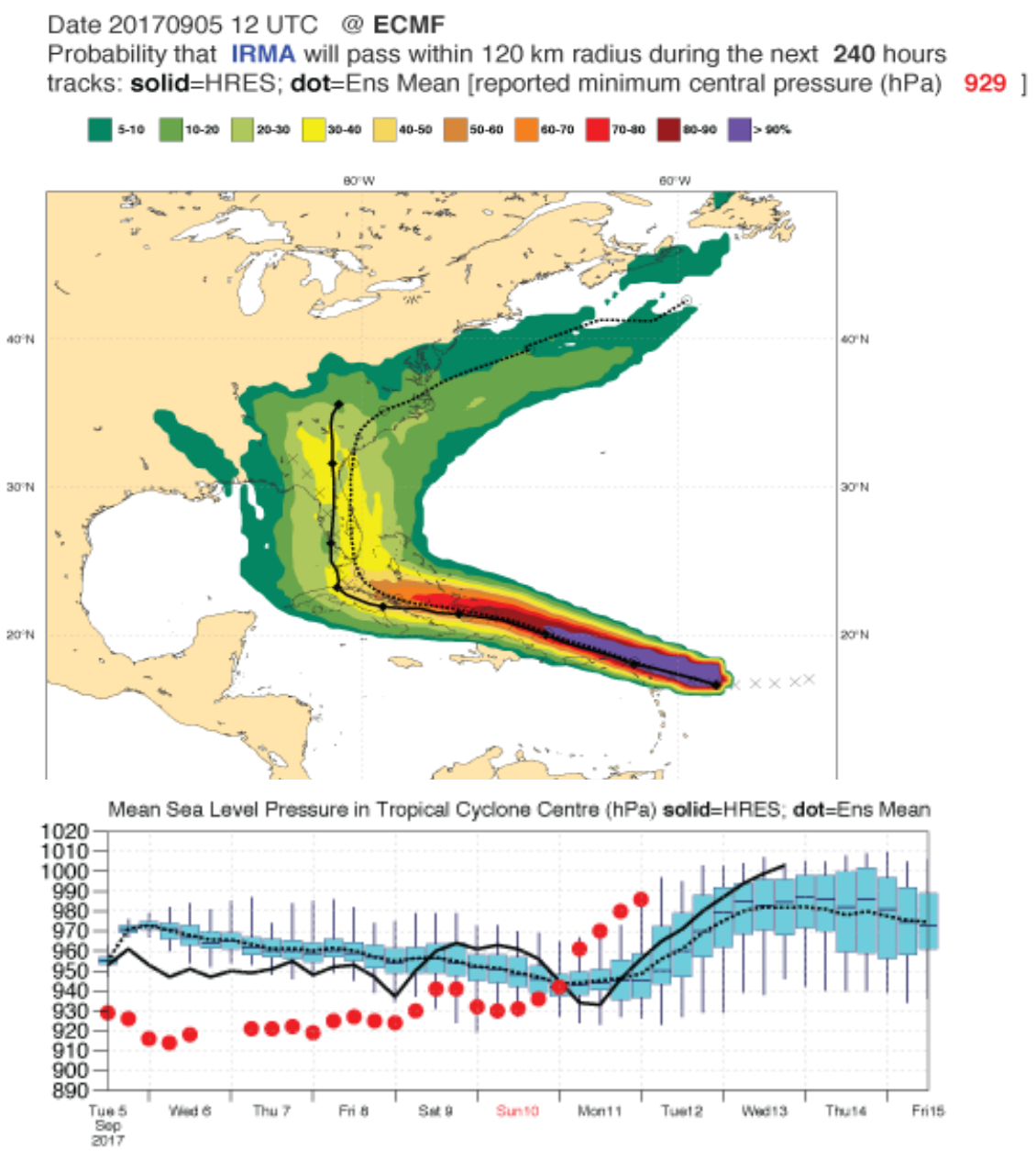
Florence Rabier

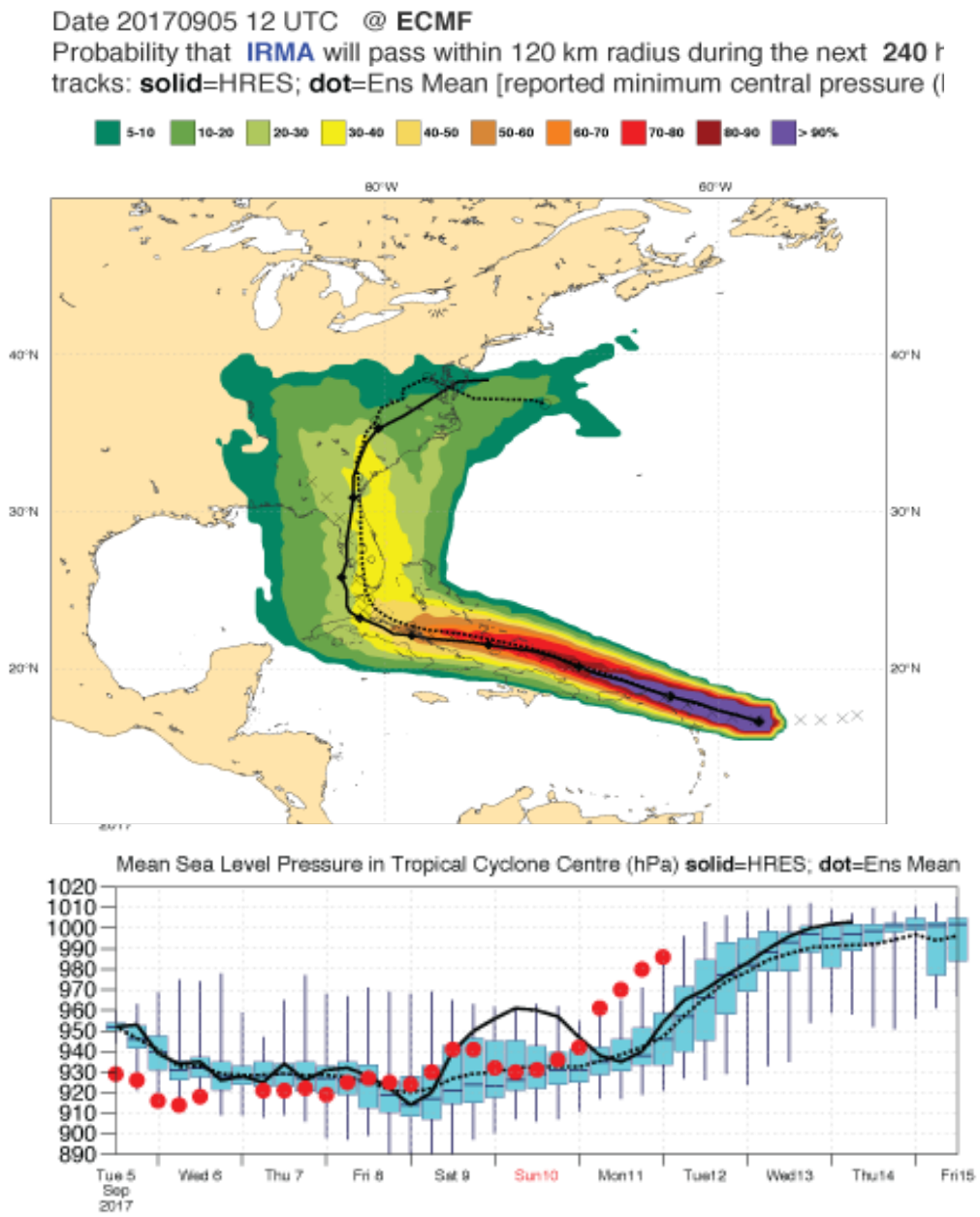
AMS 2019

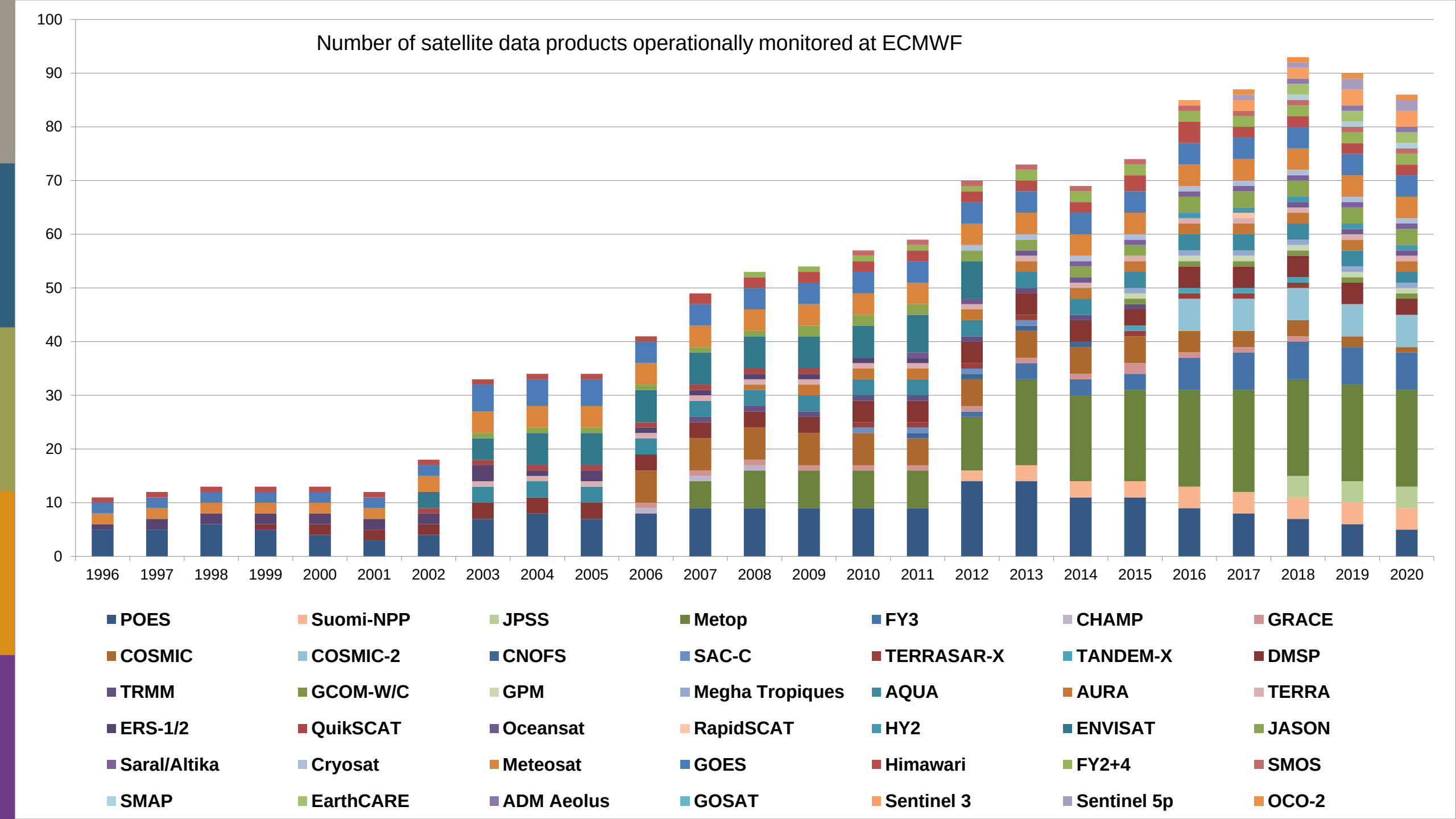
Data Assimilation and Ensembles



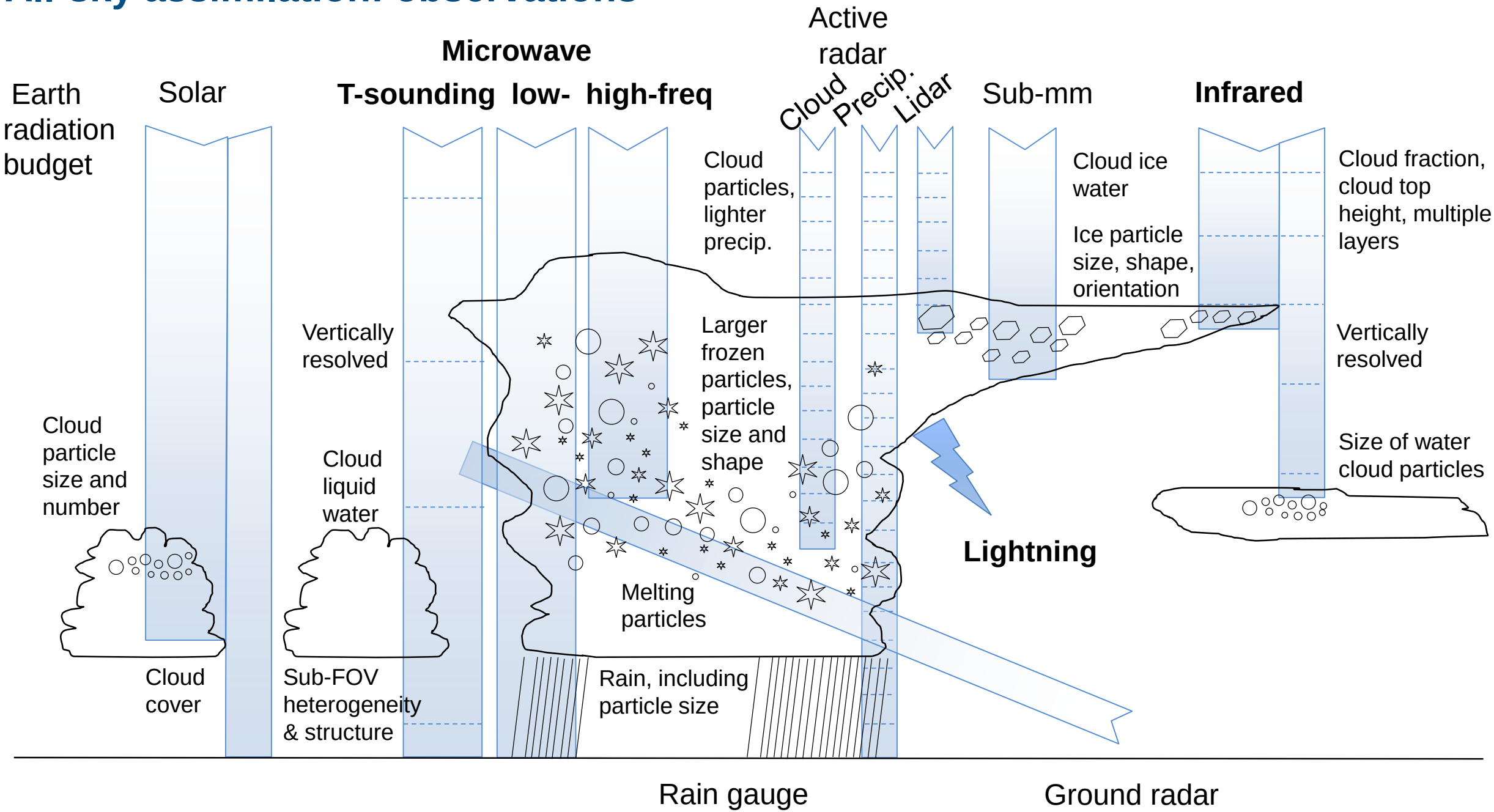
IRMA operational (18km ENS) vs **5km**



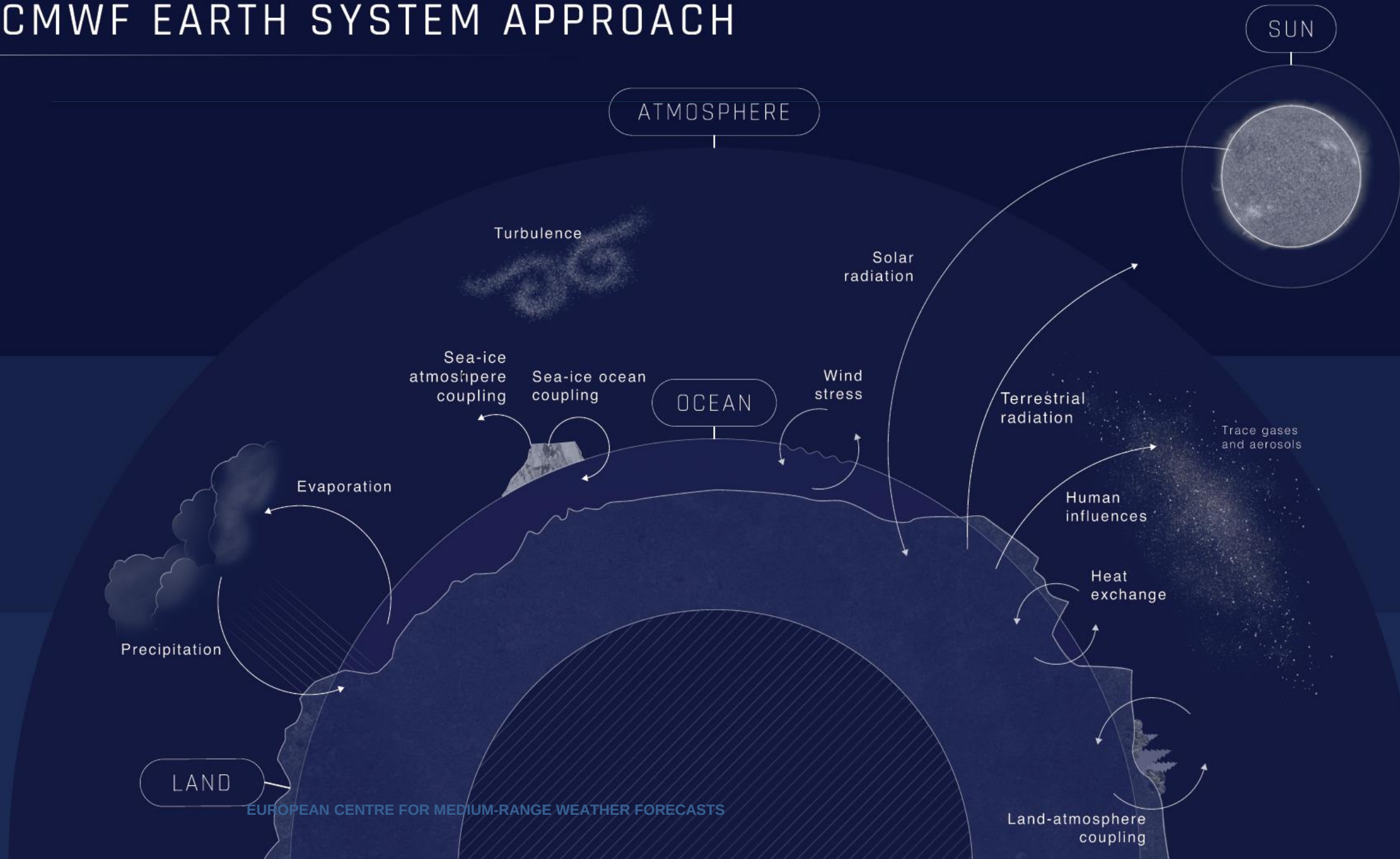



Number of satellite data products operationally monitored at ECMWF
100
90
80
70
60
50
40
30
20
10
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
POES
Suomi-NPP
JPSS
Metop
FY3
CHAMP
GRACE
COSMIC
COSMIC-2
CNOFS
SAC-C
TERRASAR-X
TANDEM-X
DMSP
TRMM
GCOM-W/C
GPM
Megha Tropiques
AQUA
AURA
TERRA
ERS-1/2
QuikSCAT
Oceansat
RapidSCAT
HY2
ENVISAT
JASON
Saral/Altika
Cryosat
Meteosat
GOES
Himawari
FY2+4
SMOS
SMAP
EarthCARE
ADM Aeolus
GOSAT
Sentinel 3
Sentinel 5p
OCO-2

All-sky assimilation: observations

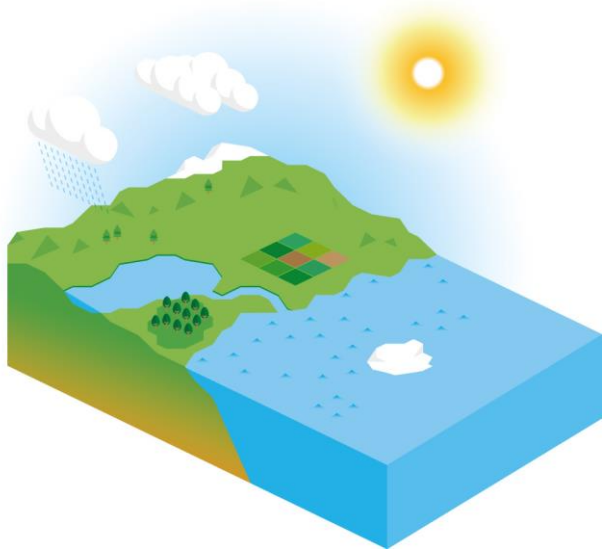


ECMWF EARTH SYSTEM APPROACH

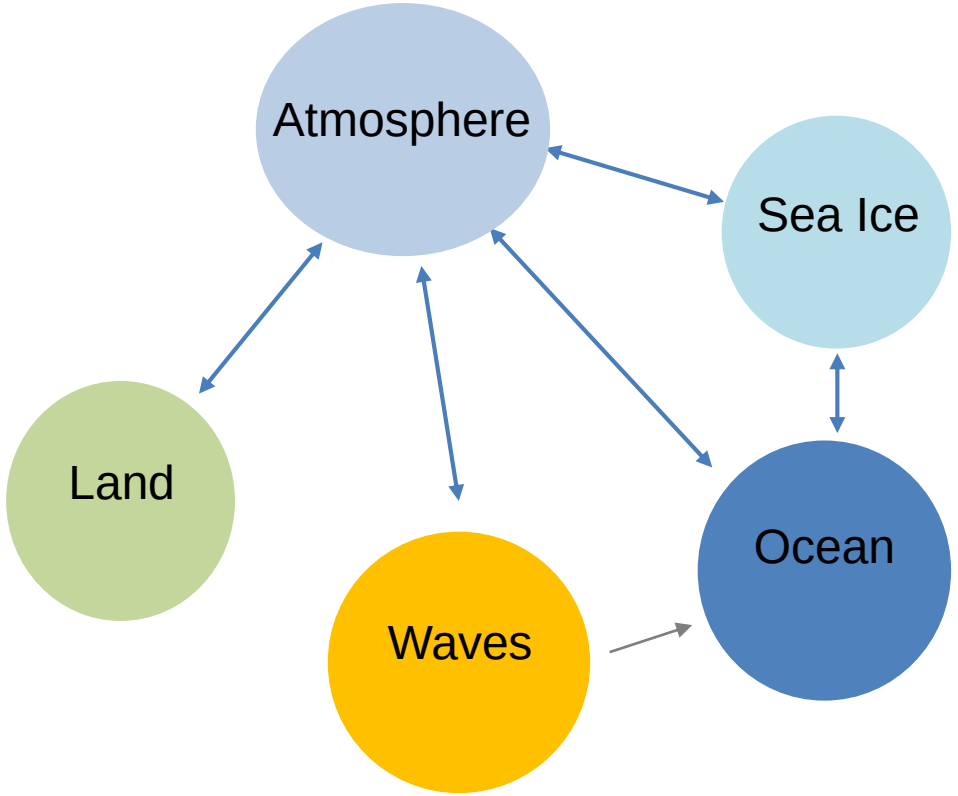


Earth System components

Coupled models

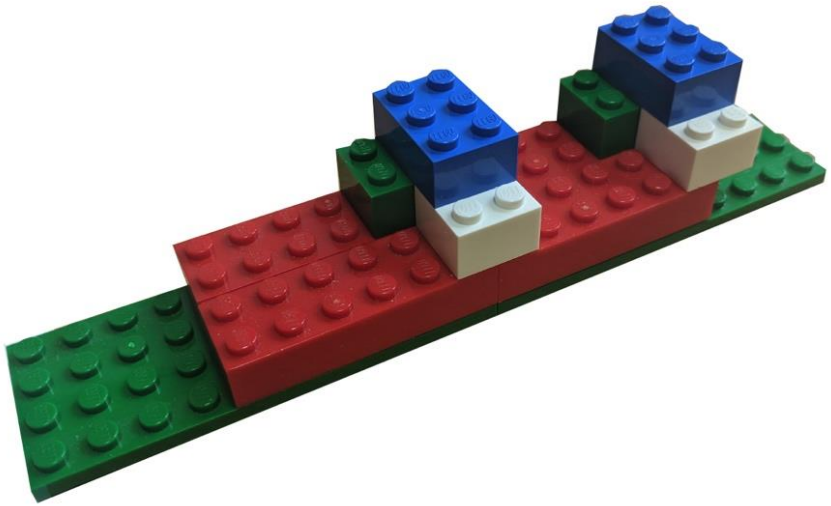


Integrated Forecasting System (IFS)



Coupled data assimilation (CDA) continuum / spectrum

Weakly Coupled Data Assimilation



Delayed observation information transfer
Freedom to plug together different timescales and methods

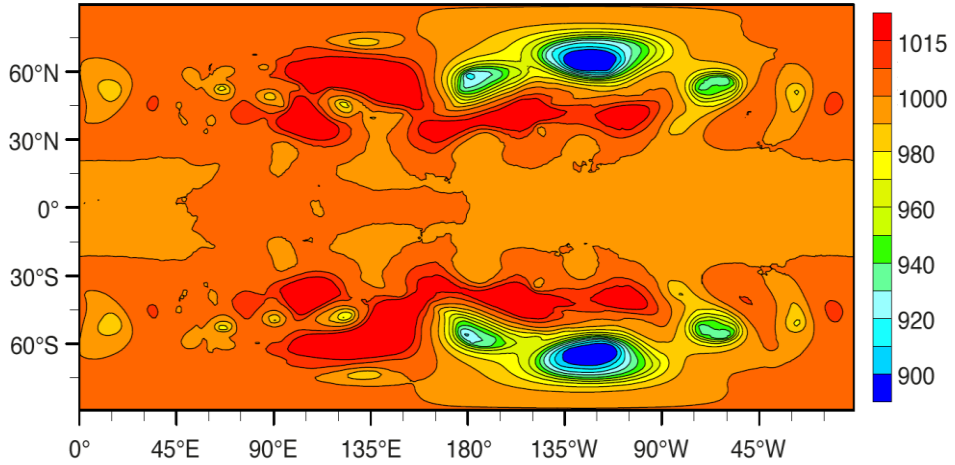
Strongly coupled Data Assimilation

Immediate observation information transfer
Constrained to 4D-Var timescales and framework

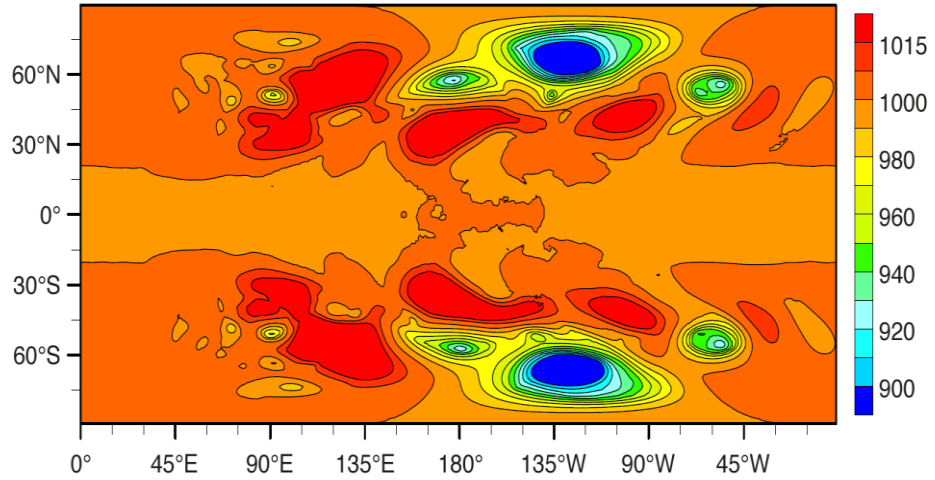
Finite Volume Module: A scalable model framework

Enhanced flexibility to be able to take advantage of evolving HPC architectures

New IFS-FVM



Existing IFS



Ensembles

Optimal use of observations

Earth-system model and assimilation

Scalability