



EXCELENCIA
SEVERO
OCHOA



**Barcelona
Supercomputing
Center**
Centro Nacional de Supercomputación

EC-Earth and ESGF

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PRIMAVERA

03/12/2017

7th Annual ESGF F2F 2017

Outline

- Barcelona Supercomputing Center
- EC-Earth climate model
- BSC Experience
- LIU
- EC-Earth and ESGF

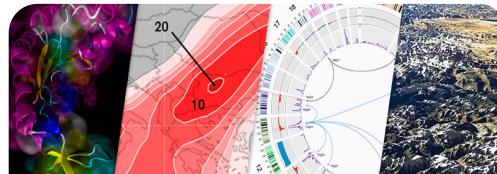
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BSC-CNS objectives



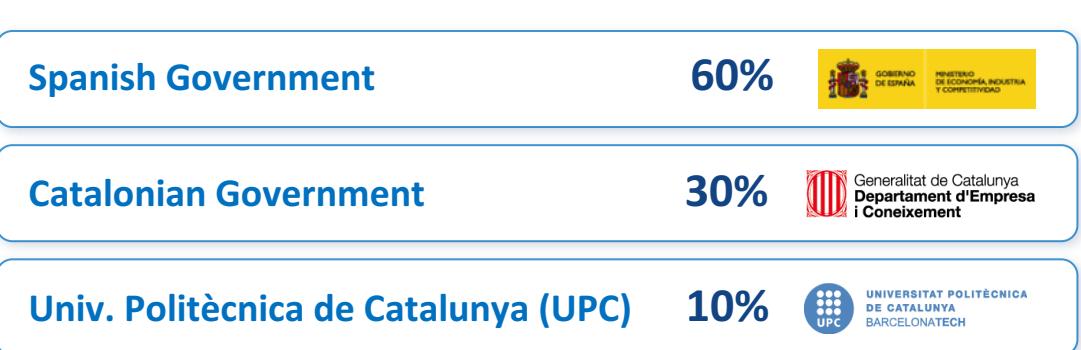
Supercomputing services
to Spanish and
EU researchers



R&D in Computer,
Life, Earth and
Engineering Sciences



PhD program,
technology transfer,
public engagement



Earth Sciences Department

What

Environmental forecasting

Why

Our strength ...

- ... research ...
- ... operations ...
- ... services ...
- ... high resolution ...

How

Develop a capability to model air quality processes from urban to global and the impacts on weather, health and ecosystems

Implement climate prediction system for subseasonal-to-decadal climate prediction

Develop user-oriented services that favour both technology transfer and adaptation

Use cutting-edge HPC and Big Data technologies for the efficiency and user-friendliness of Earth system models

Earth system
services

Climate
prediction

Atmospheric
composition

Computational
Earth sciences



EC-Earth



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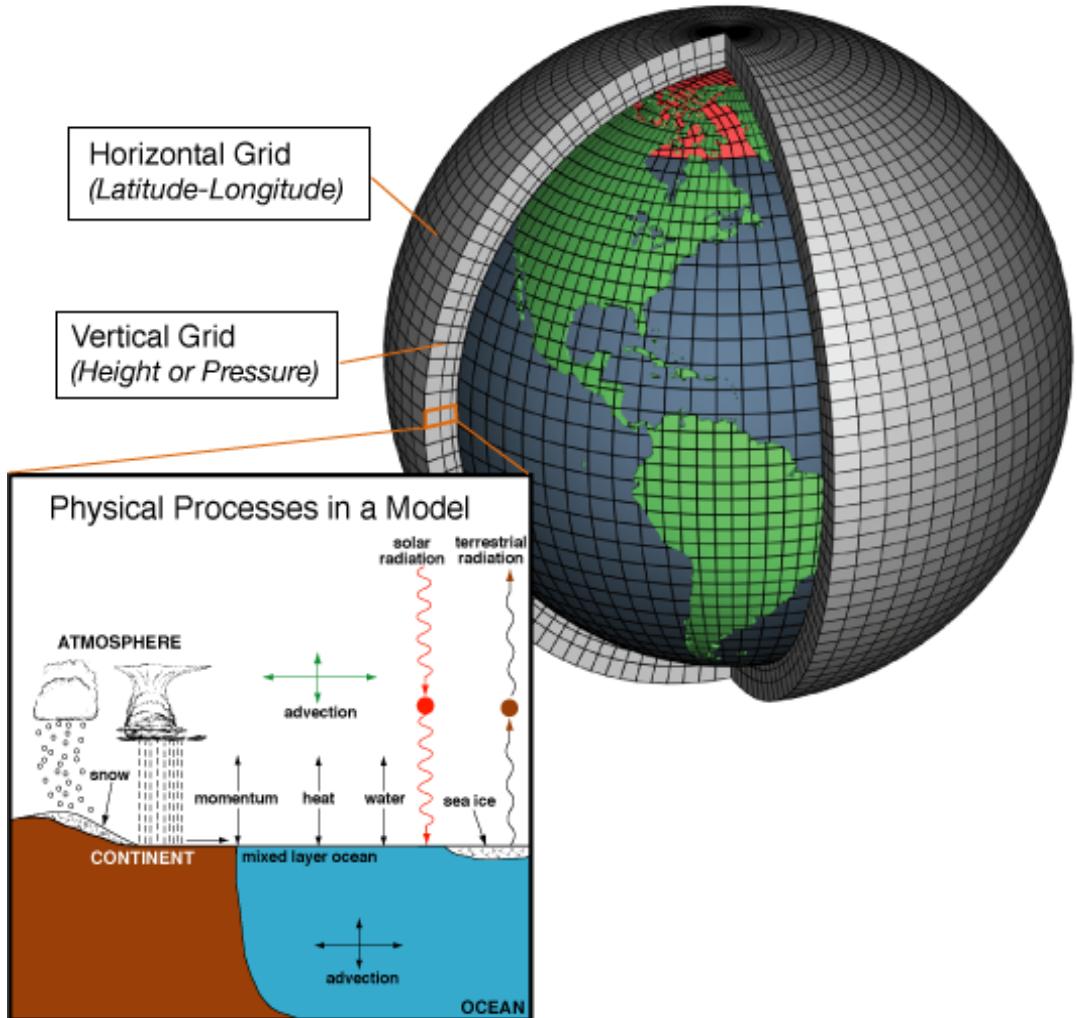
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EC-Earth Model

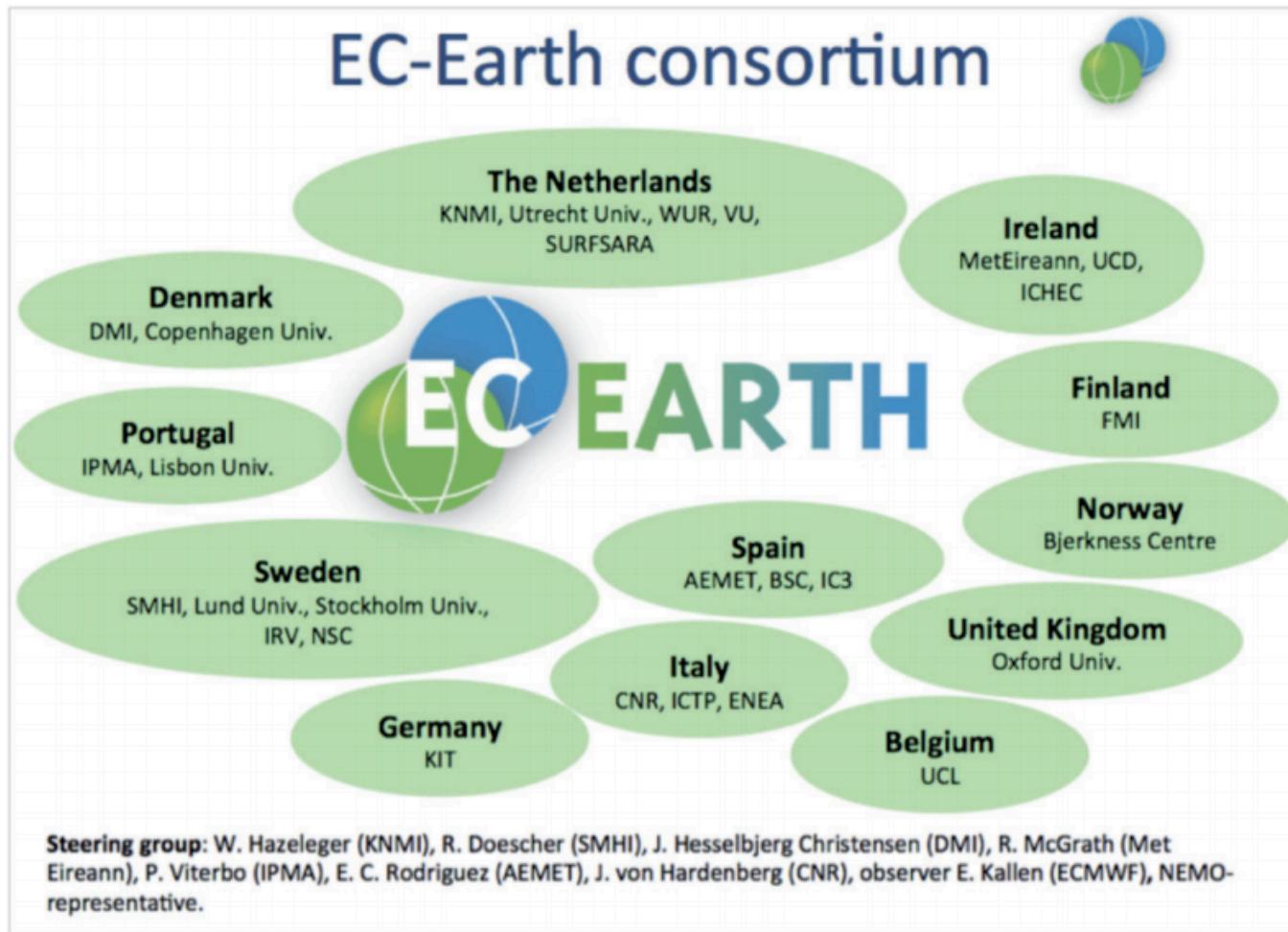


- The Integrated Forecasting System (**IFS**) as atmosphere model
- The Nucleus for European Modelling of the Ocean (**NEMO**) as ocean model
- The **OASIS3-MCT** coupler
- The Louvain-la-Neuve sea-Ice Model 3 (**LIM3**) as sea ice model

EC-EARTH coupled model



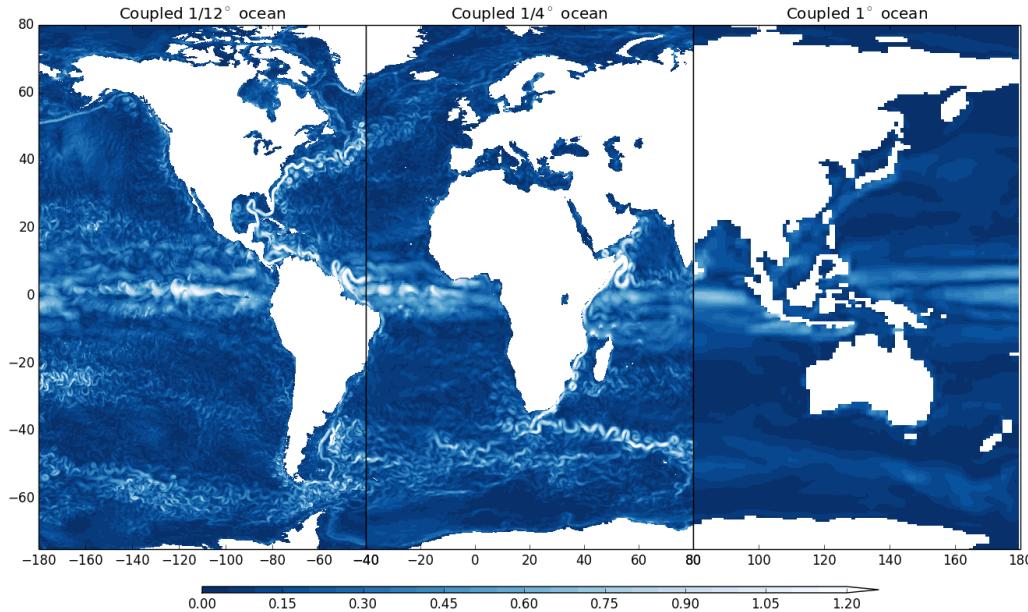
Community driven development



Schematic outline of the EC-Earth consortium and its members as of May 2014.

PRIMAVERA H2020

- a [European Union Horizon2020](#) project,
- a new generation of advanced and well-evaluated high-resolution global climate models,
- simulations and predictions of regional climate with unprecedented fidelity,
- for the benefit of governments, business and society in general.



Ocean surface currents from HadGEM3-based global coupled (atmosphere-ocean/sea-ice) models at three different resolutions - (left) 25km-1/12 degree, (middle) 60km-1/4 degree, (right) 130km-1 degree (courtesy of Malcolm Roberts)

BSC Experience



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BSC Data Node



- ESGF Tier 2 “data” node: publishing BSC and AEMET PRIMAVERA and CMIP6 data
- Index node at STFC (partner involved in PRIMAVERA)
- PRIMAVERA Stream 1 data still uploaded to Jasmin but published from BSC node
- PRIMAVERA Stream 2 data will be only stored and published from BSC
- Estimate of ~600TB of PRIMAVERA data

BSC Data Node

The screenshot shows a web browser window with the following details:

- Address Bar:** https://esgf-index3.ceda.ac.uk/projects/esgf-ceda-index3/
- Header:** Hosted by < Insert organizational logo(s) here >, Powered by ESGF and CoG, Welcome, Guest | Login | Create Account
- Main Content Area:**
 - Page Title:** ESGF back-end index node for publication by Tier 2 sites at CEDA
 - Header Bar:** Home | About Us | Resources | Contact Us | You are at the ESGF-INDEX3.CEDA.AC.UK node | Technical Support
 - Left Sidebar:** ESGF-CEDA-INDEX3 Home, Visitors
 - Q List All News
 - Q List All Files
 - Q List ESGF Data Groups
 - Central Content:** This is a back-end index node at CEDA. This node is provided to allow publication by Tier 2 sites, and to allow search indexes (at CEDA and externally) to search those records via Solr.

The current list of Tier 2 sites publishing to this index is as follows:

 - Barcelona Supercomputing Centre
 - (no more at present)
 - Right Sidebar:** Search & Download Data (Simple Text Search, Go), Browse Projects (This, All, My, Tags, Parent projects (0), Peer projects (0), Child projects (0), Enter Tag, Reset, Go), Start typing, or use the 'Delete' key to show all available tags.



BSC Data Node

← → C ⓘ https://esgf-index1.ceda.ac.uk/search/esgf-ceda/

Supported by NERC SCIENCE OF THE ENVIRONMENT Science & Technology Facilities Council is-enes INFRASTRUCTURE FOR THE EUROPEAN NETWORK FOR CLIMATE MODELING

Welcome, Guest. | Login | Create CEDA Account

Powered by ESGF and C3G

ESGF Portal at CEDA

You are at the ESGF-INDEX1.CEDA.AC.UK node

Home About Us Contact Us Technical Support

Project primavera (125) Display 10 results per page [More Search Options]

Product Show All Replicas Show All Versions Search Local Node Only (Including All Replicas)

Institute esgf-dev.bsc.es | primavera

Model Total Number of Results: 125
-1- 2 3 4 5 6 Next >

Experiment Please login to add search results to your Data Cart

Experiment Family Expert Users: you may display the search URL and return results as XML or return results as JSON

Time Frequency Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

Realm Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

CMIP Table Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

Ensemble Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

Variable Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

Variable Long Name Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

CF Standard Name Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

Driving Model Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

Data Node esgf-dev.bsc.es (125) Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

CORDEX Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

Domain Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

PCM Model Show Metadata Show Files THREDDS Catalog WGET Script Tech Note Tech Note

1. primavera.CMIP.EC-Earth-Consortium.EC-Earth3-HR.historical.r1i1p1f1.Omon.thetao.grn
Data Node: esgf-dev.bsc.es
Version: 20170907
Total Number of Files (for all variables): 1
[Show Metadata] [Show Files] [THREDDS Catalog] [WGET Script] [Tech Note] [Tech Note]
2. primavera.CMIP.EC-Earth-Consortium.EC-Earth3-HR.historical.r1i1p1f1.Amon.cl.gr
Data Node: esgf-dev.bsc.es
Version: 20170907
Total Number of Files (for all variables): 1
[Show Metadata] [Show Files] [THREDDS Catalog] [WGET Script] [Tech Note] [Tech Note]
3. primavera.CMIP.EC-Earth-Consortium.EC-Earth3-HR.historical.r1i1p1f1.Emon.zg27.gr
Data Node: esgf-dev.bsc.es
Version: 20170907
Total Number of Files (for all variables): 1
[Show Metadata] [Show Files] [THREDDS Catalog] [WGET Script] [Tech Note] [Tech Note]
4. primavera.CMIP.EC-Earth-Consortium.EC-Earth3-HR.historical.r1i1p1f1.PrimOday.mlotst.grn
Data Node: esgf-dev.bsc.es
Version: 20170907
Total Number of Files (for all variables): 1
[Show Metadata] [Show Files] [THREDDS Catalog] [WGET Script] [Tech Note] [Tech Note]
5. primavera.CMIP.EC-Earth-Consortium.EC-Earth3-HR.historical.r1i1p1f1.Emon.u2.gr



BSC cmorization

- Part of PRIMAVERA project
 - [ece2cmor3](#) is trying to standardize the cmorization within EC-Earth
 - Developed by a set of partners (KNMI/e-Science Center and BSC)
 - But each partner cmorizes its own data (lots of coordination needed)
 - online (on HPC as the simulation runs to only store cmorized data)
 - offline (adding time to publish)

BSC Data Node (installer)

- March 2017:
 - started installing version 2.3 to publish CMIP5/SPECS data as test
=> impossible due to dependencies pointing to updated versions of packages breaking compatibility of the overall installation
- August 2017:
 - Successfully ran version 2.5 of the installer, even if still under development

BSC Data Node (publisher)

Once we had the node up and running, updating:

- updating the esg.[primavera-cmip6].ini } PRIMAVERA specific
- esgcet_models_table.txt } EC-Earth specific
- certificates and PIDs landing pages } BSC specific



BSC recommendations

- Fresh start installation testing
- Semantic versioning of
 - dependencies (git submodules?)
 - releases
- Allow users to install dependencies by hand within the installer run
- Identify who (person or institution) is responsible for what (PIDs, installation, publication,...)
- Wiki/documentation for “beginners”
 - How to’s?
 - How to deploy a production and a testing server

LIU



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LiU on ESGF and CDNOT

- LiU operates a Tier-1 ESGF node, offering all ESGF services, including index peering to other datanodes, funded by SMHI and IS-ENES projects.
- Hosts CORDEX, CMIP5, SPECS, and CLIPC projects, from SMHI.
- Manages attribute services for CORDEX data access.
- Mailing list maintainer for esgf-cordex@lists.nsc.liu.se, for users registered to access CORDEX data on ESGF.
- LiU Manages one of the ESGF Federation CAs and helped develop CA policy for ESGF.
- Prashanth Dwarakanath (LiU) co-leads the ESGF Installation Working Team, and is a representative for EC-EARTH in CDNOT.
- Kai Lu (LiU) is an active contributor to user support on ESGF Users and IWT mailing lists.

Ongoing and future activities on CDNOT

- LiU has contributed to achieving better documentation by authoring manuals for data node administrators, and looks to take an active role in documenting procedures for CMIP6 data publication and node operations.
- Has conducted training workshops and code sprints and is working on developing a suite of tools to reduce uncertainties with infrastructure setups for workshops and collaborative development events.
- Actively working on setting up of an Incident-response team, and to disseminate training and documentation to ensure adoption of security best-practices.

EC-Earth and ESGF



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Previous experiences

- CMIP5 and SPECS
 - Centralized at BADC
 - Only a reduced set of partners was involved in the public
 - Data Node in LIU
 - Partners without data node had to:
 - Upload lots of data
 - Needing assistance

Future experiences

- CMIP6 (PRIMAVERA)
 - More data
 - spatial resolution increasing
 - spatial dissemination increasing (more partners)
 - More partners
 - more ESGF/EC-Earth data nodes
 - more “ESGF beginners”
 - How to deal with such a project?
 - at the EC-Earth level
 - at the ESGF level

EC-Earth's contributions to CMIP6

Institute	Contact	Contributions	HPC platform	ESGF node
1. AEMET	J. A. Parodi Perdomo	DECK (EC-Earth3-CC)	Cray XC30@ECMWF + BULL@AEMET	? (BSC?)
2. BSC/IC3	F. Doblas-Reyes	DECK, DCPP, HighResMIP (?)	Marenostrum@BSC	BSC
3. CNR	J. von Hardenberg	DECK (EC-Earth-CC, EC-Earth-CC-LR)		CNR
4. DMI	S. Yang	DECK, DCPP, GeoMIP, HighResMIP, ISMIP6, LS3MIP, ScenarioMIP	Cray XC30@DMI/IMO	DMI
5. ENER	A. Alessandri	LS3MIP	Cray XC30@ECMWF	
6. FMI	H. Korhonen	AeroChemMIP	Cray XC30@FMI	FMI/UHEL
7. IPMA	P. Viterbo	??		
8. KIT	A. Arneth	C4MIP, LUMIP		
9. KNMI	R. Bintanja	DECK, AeroChemMIP, CFMIP(?), HighResMIP, ScenarioMIP	Cray XC30@ECMWF + BULL@KNMI	KNMI
10. MetEire/ ICHEC	R. McGrath	DECK, HighResMIP, ScenarioMIP	Cray XC30@ECMWF + Cray XC40@PRACE	ICHEC
11. LU	P. Miller	C4MIP, LUMIP		
12. MISU	L. Brodeau	DECK		
13. NGSU	Q. Zhang	PMIP		NSC
14. SMHI	K. Wyser	DECK, C4MIP, HighResMIP, C4MIP, ScenarioMIP		LIU
15. UHEL	R. Makkonen	AeroChemMIP	Cray XC30@CSC	FMI/UHEL



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Thank you

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