



IS-ENES2 DELIVERABLE (D -N°: 2.7)

Final version of ENES portal

File name: {IS-ENES2_D2.7.pdf}

Authors: *K. Ronneberger,*
F. Guglielmo, J. Biercamp

Reviewers: *S. Jousaume*

Reporting period: *01/04/2016 to 31/03/2017*

Release date for review: *25/04/2017*

Final date of issue: *29/05/2017*

Revision table			
Version	Date	Name	Comments
V1	25/04/2017	KR,JB, FG	Full version for internal use only
V2	29/05/2017	FG, SJ	Final version, few remarks agreed upon in a dedicated telephone conference on 02/05/2017

Abstract

This document describes the final version of the ENES portal. It summarizes function, objectives and main features of the ENES portal at end of IS-ENES2. The portal was developed in the frame of IS-ENES1 and refined and optimized during IS-ENES2 to improve its usability. The portal is used as a vehicle of information and as a platform to provide support services to the European Earth's climate modelling community.

Project co-funded by the European Commission's Seventh Framework Programme (FP7; 2007-2013) under the grant agreement n°312979		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants including the Commission Services	
RE	Restricted to a group specified by the partners of the IS-ENES2 project	
CO	Confidential, only for partners of the IS-ENES2 project	

Table of contents

1. Introduction	4
2. The ENES Portal: objectives and requirements	4
3. The ENES portal: structure.....	5
4. The ENES portal in the future	16
4.1 Contents	16
4.2 Technical aspects	16

Executive Summary

The ENES portal (<https://portal.enes.org>) was one of the central outcomes of the IS-ENES1 project. On the one hand it acted as a communication platform and a central entry point to information for the European Earth System Modelling (ESM) community; on the other hand it reflected and represented the results achieved in the IS-ENES project.

During the IS-ENES2 project the portal has been further established as the central information gateway for the European ESM community and as unique access point to the IS-ENES services. Major restructuring during the course of the project has optimized the structure as to make the access of information and services most effective.

To ensure the persistence of the ENES portal beyond the IS-ENES2 project, future updates of the content are distributed, where possible, among community members, whereas large parts of the technical infrastructure are integrated into the standard system and maintenance procedures of DKRZ.

1. Introduction

The ENES portal has a central role in integrating and serving the European community on Earth System modeling. The portal was developed in IS-ENES1 and refined and optimized during IS-ENES2. This document accompanies and documents the portal release as of the end of this second phase of the project. It summarizes function, objectives and main features of the portal and indicates the portal maintenance strategy.

2. The ENES Portal: objectives and requirements

The ENES portal was set up to gather relevant information for the European ESM community and to combine and present them in a way most efficient for the community. Furthermore the portal is the entry point to the services set up and offered by the IS-ENES projects.

Thus, the prevailing criteria underlying the design and concept of the portal are:

- *Keep it clear and simple:* The structure should quickly lead to the desired information; IS-ENES services should be clearly described and directly available.
- *Avoid duplication; minimize maintenance:* The added value of the portal lies in the collection and aggregation of information given elsewhere; own original content is mostly added to unite and coherently present collected information or should the information not available elsewhere in concise and useful presentation for the Earth system modelling community.
- *Foster community involvement:* The portal should in any case offer the community the possibility to create and maintain own content or to provide topics to be added by appointed portal editors.

According to these criteria and to the feedback received on the occasion of the midterm review, the structure of the portal was revised and further optimized in July 2015.

3. The ENES portal: structure

The portal's main structure is organized along the main aspects of Earth System Modelling: model & tools, data, and computing and hosts furthermore a section informing on community activities and initiatives. A service section proposes an integrated catalogue of IS-ENES support services thoroughly describing and providing direct access to them by pointing to corresponding pages in the model & tools and data sections. A contact form for community feedback is moreover integrated in the top navigation bar (see Figure1).

Site Map | Contact | Log in

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ENES SERVICES
It provides information and services to foster intricate simulations of the climate system using high performance computers as well as the distributions and dissemination of data produced by such simulations.

Welcome to the ENES Portal

This portal is part of the **Infrastructure** provided by the **European Network for Earth System modelling**. It provides **information and services** on the **European Earth System Models** and some associated tools, on **data** produced by internationally coordinated climate model experiments and on the use of **high-performance computing facilities** to run complex climate simulations.

It is intended to be a portal for the **climate modelling community**, but also for all the communities interested in using climate models results. In particular the **ENES** portal provides access to a specific interface dedicated to the communities working on **Impacts of climate change**.

The **ENES** portal has been developed as a prototype within the FP7 project **IS-ENES**, and is currently being maintained through the follow-on project **IS-ENES2** (InfraStructure for ENES). The IS-ENES2 website can be found [here](#).

[Click here for an overview of the services ...](#)

NEWS

21/02/2017 Climateurope 50th webinar in a series on the integration of Earth System Modelling with Climate Services
Feb 10, 2017

IS-ENES2 Final General Assembly
Jan 25, 2017

Call for abstracts EGU 2017 session CLS.13: Research Infrastructures and CMIP6
Jan 05, 2017

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POEs on the Sphere 2017
Apr 03, 2017 - Apr 07, 2017 - Paris (France)

Research Data Alliance 9th Plenary Meeting
Apr 05, 2017 - Apr 07, 2017 - Barcelona (Spain)

Climateurope Festival 2017 - explore challenges and opportunities of climate services for your activity
Apr 05, 2017 - Apr 07, 2017 - Valencia (Spain)

Previous events...

Upcoming events...

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About ENES
Aims
Strategy
Rationale
Partners

Community
Announcements
Schools & Education
Projects and Initiatives


Models
European ESMs
Support services

Data
Support services

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Figure 1: The main page of the ENES portal. The top navigation bar grants access to the different sections: community, services, models & tools, data, and computing, and to the contact form. On the right hand side portlets show community news and give notice of upcoming events (details are given upon clicking).

The **community section** (Figure 2) offers detailed information on ENES (rationale, aims, strategy etc.), collects community announcements (on news and events), hosts a collection of newsletters), has a separate section on schools and education initiatives (see Figure 3), a comprehensive collection of community projects, organization and programmes at different geographical scale, and, last but not least, indicates guidelines as on how to participate in ENES or contribute content to the portal.


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You are here: Home » Community




Community networking


Earth system modeling, i.e. building, running and interpreting the results of a model of the entire Earth system requires the collaboration of various scientific disciplines and different areas of expertise. In order to reach meaningful projections of the developments of global climate, discussion and comparisons of results at international level are indispensable.

This portal, established and maintained by IS-ENES, aims to provide the European Earth system modeling community with a marketplace to discuss, inform and interact. Besides the latest news on community efforts, upcoming events, educational activities and job offers, we regularly collect and publish short descriptions of prominent projects and initiatives in the field of climate and Earth system modeling. The contribution of the whole community is essential.


COMMUNITY

- [About ENES](#)
- [Announcements](#)
- [Schools & Education](#)
- [Projects and Initiatives](#)
- [Participate](#)









About ENES
The European Network of Earth System Modeling (ENES) gathers ~ 50 groups from the academic, public, and industrial world and is the initiator of many projects and initiatives in the field of European Earth system modeling.
[Find out more about ENES ...](#)




Announcements
Find here the latest news, events, job ads and leaflets.
[Announcements](#)



Schools and Education
Keep yourself informed on courses related to Earth system modeling.
[Schools and Education](#)



Projects and Initiatives
Browse through community projects and initiatives.
[Projects and Initiatives](#)



Participate
Find ways to join the community and/or contribute to this portal.
[Participate](#)

NEWS

21/02/2017 Climateurope 5th webinar in a series on the integration of Earth System Modelling with Climate Services
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[Previous events...](#)

[Upcoming events...](#)



Figure 2: Entry page to the community section.


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- About ENES
- Announcements
- Schools & Education**
- 3rd E2SCMS
- 2nd E2SCMS
- 1st E2SCMS
- Projects and Initiatives
- Participate



You are here: Home » Community » Schools & Education

Earth System Modeling Schools

Summer schools and similar events in Europe related to Earth System Modeling

Educational initiatives are valuable instruments to form and inform the community on the latest technical and scientific developments, and therefore of fundamental relevance among ENES activities.

ENES Schools E2SCMS

ENES European Earth System and Climate Modelling Schools, E2SCMS, supported by the European FP7 project IS-ENES phase 1 and 2:

- 3rd E2SCMS (Helsinki, June 2016)
- 2nd E2SCMS (Barcelona, June 2014)
- 1st E2SCMS (Kos, June 2012)

Other Schools

Other upcoming schools, courses, workshops and educational initiatives in Europe related to Earth system and climate modeling are listed below.

You can browse through past initiatives [here](#).

Title	Description	Start Date	End Date
Regional Climate Modelling workshop	The Met Office invites to attend its annual Regional Climate Modelling workshop at Met Office Headquarters.	May 02, 2017	May 05, 2017
4th ICOS summer school	ICOS (Integrated observation system) Research infrastructure organises a summer school on "Challenges in measurements of greenhouse gases and their interpretation"	May 24, 2017	Jun 02, 2017
Scientific Visualisation	A course in the frame of the HLRS training events.	May 31, 2017	Jun 01, 2017

NEWS

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Previous events...

Upcoming events...

Figure 3: The community section hosts a page on schools and educational initiatives in Earth system modelling in Europe (listing in first place the ENES E2SCMS schools), also accessible under <https://schools.enes.org>.

The **model & tools section** concentrates on software used by the European ESM community (see Figure 4), in particular on the 7 European models contributing to the internationally coordinated experiments CMIP5 and related shared environment tools. Information on modelling groups and related models (including CIM documentation) and on tools is presented in a standardized way (see Figure 5) as well as the IS-ENES support services provided on those all.

Site Map | Contact | Log in

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MODELS & TOOLS

Earth System Models and Modelling groups

NEMO

Software Tools

Support Services on Models and Tools

You are here: Home » Models & Tools

European Earth System Models and their environment

Simulation results can be interpreted only in the light of the simulation software used. Models do not only represent and embody the underlying mental model, they are also tools to test and analyze new hypotheses.

Consistent information on models as to highlight their similarities and differences, as well as evaluation criteria and variables as to estimate their applicability range, are thus essential building blocks of the scientific dialog.

To describe the essential details of model, experiment and simulation leading to each resulting dataset, the **METAFOR** project developed the **Common Information Model (CIM)**, a comprehensive metadata scheme.

IS-ENES collects and provides information on the **European Earth System Models**, on the **ocean modelling platform NEMO**, and on commonly used **software tools** and offers a blend of **support services** on models and modelling tools.

Earth System Modelling groups
develop models that include a full representation of the atmosphere circulation coupled to the oceans, sea ice and land surfaces.
[Find the European ESM groups...](#)

NEMO
NEMO is the ocean component model used in 5 of the 7 European ESMs and also used in stand-alone mode in many oceanographic studies.
[More on NEMO ...](#)

Software Tools
The simulation process requires not only models to represent the scientific processes, but also tools to post- and preprocess data and to exchange them among model components.
[Find widely used software tools ...](#)

Support services
IS-ENES offers special support for the CMIP5 ESMs, the ESM tools CDO and OASIS and the NEMO ocean model.
[more on the IS-ENES support services](#)

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Figure 4: Entry page of the models & tools section.

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You are here: Home » Models & Tools » Earth System Models and Modelling groups » Met Office Hadley Centre » HadGEM2

HadGEM2

Met Office Hadley Centre ESM

Name:	HadGEM2
Contact:	João Teixeira
Homepage:	www.metoffice.gov.uk

- *Component models used*
 - Met Office Unified Model:** representing the ocean atmosphere
 - TRIFFID:** representing the dynamic global vegetation model
 - diat-HadOCC:** representing the ocean biology and carbonate chemistry
 - UKCA:** representing the chemistry and aerosols
- *Model versions (CIM views)*
 - HadGEM2-A :** Hadley Global Environment Model 2 - Atmosphere
 - HadGEM2-ES :** Hadley Global Environment Model 2 - Earth System
 - HadGEM2-CC :** Hadley Global Environment Model 2 - Carbon Cycle

Support Services

Level 1: Contact person and maintenance of the ESM description on this portal, using the CIM metadata format.

Level 2: Assistance for accessing and running the Met Office Hadley Centre Earth System Models.

Model Description

HadGEM2-ES is a coupled Earth System Model that was used by the Met Office Hadley Centre for the CMIP5 centennial simulations. HadGEM2 is a configuration of the Met Office Unified Model (UM) developed from UM version 6.6. HadGEM2-ES was the first Met Office Hadley Centre model to include Earth system components as standard. The Unified Model is used by a number of institutions around the world both for operational weather forecasting and for climate research. The HadGEM2-ES climate model comprises an atmospheric GCM at N96 and L38 horizontal and vertical resolution, and an ocean GCM with a 1-degree horizontal resolution (increasing

INFRASTRUCTURE FOR THE EUROPEAN NETWORK FOR EARTH SYSTEM MODELLING

Figure 5 Example of a standardized ESM description in the model & tools section.

The **data section** (Figure 6) informs on nature and structure of the ENES data infrastructure and documents the available data and metadata (see Figure 7). Furthermore, it offers thorough (and partly unique) support services on finding, retrieving and exploring the data, *de facto* easing their access to users, and provides the interface with the *climate4impact* portal. Data providers and managers as well find useful information in the service pages of the data section.

The screenshot shows the 'DATA' section of the ENES portal. At the top, there is a navigation bar with 'DATA' highlighted. Below the navigation bar, the page content is organized into several sections:

- Navigation and Search:** Includes 'Site Map | Contact | Log in' and a search bar with 'Search Site' and 'OK' buttons.
- Warning:** A red warning icon with the text: 'WARNING: Presently, ESGF data search results are often incomplete'.
- Breadcrumbs:** 'You are here: Home » Data'.
- Main Section Header:** 'Data and Metadata'.
- Introduction:** A paragraph explaining that the section presents ENES Model Data and related Metadata, informing on WCRP internationally coordinated experiments and distributed ENES Data Infrastructure.
- Content Blocks:**
 - ENES Model Data and Metadata:** Information on different datasets available on the ENES Data Infrastructure.
 - ENES Data Infrastructure:** Overview of the ENES Data Infrastructure and its relation to ESGF and other infrastructures.
 - Support Services:** IS-ENES offers special support in finding, retrieving and exploring data in the ENES data infrastructure as well as for data producers and managers.
- Footer:** Contains copyright information '© Copyright ENES Portal 2011' and a grid of links: 'About ENES' (Aims, Strategy, Rationale, Partners), 'Community' (Announcements, Schools & Education, Projects and Initiatives), 'Models' (European ESMs, Support services), 'Data' (Support services), and '© data privacy statement (German)'.

Figure 6: Entry page of the data section.

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MODELS & TOOLS
DATA
COMPUTING
CONTACT

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DATA

- ENES Model Data and Metadata
- CMIP5 & AR5
 - CMIP5 Data Structure
 - CMIP5 Models and Grid Resolution
 - CMIP5 forcing data for RCMs
 - CMIP3/AR4
 - CIM metadata standard
 - CORDEX
- ENES Data Infrastructure
- Support Services on Data and Metadata

You are here: Home » Data » ENES Model Data and Metadata » CMIP5 & AR5

CMIP5 & AR5

Information on the data from the Coupled Model Intercomparison Project Phase 5 - CMIP5 and on the subset used for the IPCC-AR5

CMIP5 Database

CMIP5 is the fifth phase of the Coupled Model Intercomparison Project (CMIP) promoted by the WCRP's Working Group on Coupled Modelling (WGCM).

Details on CMIP5 Data

- [CMIP5 Data Structure](#)
- [CMIP5 Models and Grid Resolution](#)
- [CMIP5 Data Quality](#)
- [CMIP5 forcing data for Regional Climate Models](#)

Access to CMIP5 Data

How to get **CMIP5 Data** from the Earth System Grid Federation (ESGF) (from our Support Services on Data and Metadata pages).

CMIP5 Errata

The following links lead to known issues with CMIP5 data:

- [ACCESS](#) (also see "Other Errata" below)
- [CNRM](#)
- [IPSL](#)
- [MPI-M](#)
- [MIROC](#)
- [NASA-GISS](#)
- [NCAR \(CESM, CCSM\)](#)
- [Other Errata](#)

Official CMIP5 pages

- [Modeling Groups and their Terms of Use: see \[http://cmip-pcmdi.llnl.gov/cmip5/docs/CMIP5_modeling_groups.pdf\]\(http://cmip-pcmdi.llnl.gov/cmip5/docs/CMIP5_modeling_groups.pdf\)](http://cmip-pcmdi.llnl.gov/cmip5/docs/CMIP5_modeling_groups.pdf)
- [Experiment Design: see \[http://cmip-pcmdi.llnl.gov/cmip5/experiment_design.html?submenuheader=1\]\(http://cmip-pcmdi.llnl.gov/cmip5/experiment_design.html?submenuheader=1\)](http://cmip-pcmdi.llnl.gov/cmip5/experiment_design.html?submenuheader=1)
- [Data Description: see <http://cmip-pcmdi.llnl.gov/cmip5>](http://cmip-pcmdi.llnl.gov/cmip5)

WARNING

Presently, ESGF data search results are often incomplete

[Details ...](#)

Figure 1: Description of CMIP5 data in the data section.

The **computing section** (Figure 8) describes the collaborations, fostered by the HPC task force, among institutions dealing with climate modeling and actors of the European HPC infrastructure; it documents the ENES benchmark suite, developed in WP10 (Figure 9), introduces the Multi-Model Multi-Member High-Resolution experiment (M4HR) conducted in WP9 and outlines Workflow tools and solutions that were discussed in the frame of dedicated IS-ENES workshops (organized in WP4). Furthermore, it links to the on-going H2020 ESIWACE project focusing on HPC applications in Weather and Climate.

Site Map | Contact | Log in

COMMUNITY

SERVICES

MODELS & TOOLS

DATA

COMPUTING

CONTACT



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COMPUTING

- > ESIWACE
- HPC Task Force
- Benchmarks
- M4HR
- Workflows

You are here: Home » Computing

ENES and the HPC landscape

The optimal use of the available computing resources, does not only require optimized model codes and software environments, but also an optimal knowledge on political, technical and structural developments in the HPC ecosystem. Thus, collaborations and information exchange with European HPC ecosystem is indispensable.







ESIWACE
Approaching the upcoming exascale era, close collaboration of ENES with the weather modelling community take place in the European Centre of Excellence in Simulation of Weather and Climate in Europe (ESIWACE) which address today's and tomorrow's computing and e-Infrastructure challenges with respect to scalability and operability of earth system models at a global cloud resolving scale.
[find more information on the ESIWACE website](#)



HPC Task Force
To foster efficient solutions for the increasing needs of computing power, ENES and its HPC-task force follow and inform on the developments in the HPC ecosystem; collaborations with the European HPC-infrastructure and with ICT companies are supported.
[more information on the HPC Task Force ...](#)



Benchmarks
A suite of applications benchmarks of varying complexity ranging from simple kernels to coupled Earth System Models (ESMs) is currently being assembled within IS-ENES2 project.
[more information on benchmarks ...](#)



M4HR experiment
The Multi-Model Multi-Member High-Resolution experiment of the IS-ENES2 project is evaluating the efficiency by which European HPC systems are used in climate research.
[more information on the M4HR experiment ...](#)




Workflows
ENES fosters the development of workflow solutions by organizing workshops and motivating information exchange on available tools and best practice.
[more information on workflow solutions and tools ...](#)

Search Site

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Figure 2: Entry page of the computing section.


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DATA
COMPUTING
CONTACT

You are here: Home » Computing » Benchmarks

Performance benchmarks

The **ENES Benchmark Suite** is assembled in order to provide real application benchmarks for evaluation and development of HPC systems, compilers, libraries, and tools. It is also intended for intercomparison of the computational performance of different ESMs and preparation of these models for extreme scale computing capabilities. All available benchmarks are categorized as follows:

Earthsystem models (ESM) Coupled ESMs are state of the art tools in the climate modelling research. They produce high compute and data workloads and stress many features of the computing systems.

Uncoupled models (UM) A proper choice of processor number and distribution between different component models is essential for the load balance and overall performance of a coupled ESM. Compared to ESMs, the risk of biased interpretation of performance is largely reduced for uncoupled models.

Couplers Couplers accomplish time synchronization, transformation and exchange of data between different components of Earth System Models. Coupler benchmarks are based on simplified model components and can be useful for addressing of principal coupling challenges in ESMs.

Kernels Kernels are small applications that mimic computation, communication, memory and disk access patterns that are characteristic for climate models.



Fortran ISO benchmarks The current programming language standards required by the most climate model benchmarks are Fortran 2003 and C/C++. A number of test cases for Fortran 2003 features has been made available by the [RAPS](#) community. The codes can be downloaded [here](#).

Below you find a table with links to available descriptions, download-instructions and performance analysis for a choice of benchmarks.

Description	Type	Download Instructions	Performance
MPI-ESM1	ESM	Instructions	Performance reference
IPSL-CM	ESM	Instructions	Performance reference
CMCC-CESM-NEMO	ESM	Instructions	Performance reference
EC-EARTH	ESM	Instructions	Performance reference

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- > ESIWACE
- HPC Task Force
- Benchmarks**
- Documents
- Tools
- M4HR
- Workflows

Related activities

- Real Applications on Parallel Systems (RAPS)
- NERSC Benchmarks
- NCAR Benchmarks
- Unified European Applications Benchmark Suite
- Parallel I/O Benchmarks
- Standard Performance Evaluation Corporation (SPEC)
- NAS Parallel Benchmarks

Figure 3: Description of the ENES benchmark suite in the computing section.

The **service section** offers overview and direct access to the IS-ENES support services by linking to the support services described within the models & tools and data sections (see Figure 10).

Site Map | Contact | Log in

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SEARCH Site OK

SERVICES

You are here: Home » Services

Support Services on Models and Tools

Support Services on Data and Metadata

IS-ENES services in the ENES portal

IS-ENES, the infrastructure project of ENES, provides **support services accessible through the ENES portal** for **Models, Tools, Data, and Metadata**, targeting different user communities.

Support services on the meta-scheduling tool Cylc and on the I/O server XIOS are provided by the Centre of Excellence in Simulation of Weather and Climate in Europe **ESIWACE**, also contributing to the support services on NEMO and OASIS.

SUPPORT SERVICES ON MODELS AND TOOLS
Service catalogue, description and information.
[More...](#)

SUPPORT SERVICES ON DATA AND METADATA
Service catalogue, description and information.
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Aims
Strategy
Rationale
Partners

Community
Announcements
Schools & Education
Projects and Initiatives

Models
European ESMs
Support services

Data
Support services

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Figure 4: Entry page to the service section.

4. The ENES portal in the future

To maintain the ENES portal beyond the IS-ENES2 project, regular updates of the content as well as of the technical infrastructure have to be guaranteed. For the content, the frequency of and effort involved in these updates depend on the type of content and on its integration in the general information flow in the community; for the technical infrastructure, they depend on the nature of the intervention and on its integration into an existing update procedure.

4.1 Contents

Concerning the contents, there is some commitment in the modeling community to contribute to regular updates of the descriptions of models and modeling groups; main updates of the computing section are planned to go along with the work of the ESiWACE¹ project; main information related to the data service will mostly remain valid for CMIP6; regular publication of community news and events could be taken care of by the ENES scientific officer. Thus, a good part of the portal content could maintain the current level of quality. Information in other sections will be reformulated so as to stay consistent and require lower maintenance in the absence of common resources. A system to attribute a date-stamp to any content or at least to the information likely to undergo short-term changes is being finalized.

4.2 Technical aspects

In order to minimize the effort of technical maintenance, large parts of the technical infrastructure of the ENES portal are integrated in the existing systems and update procedures of DKRZ. In view of the foreseen evolution of the portal into a somehow less dynamical structure of affordable maintenance in a period where funding is limited, it might be useful to restrict to a minimum, if not completely avoid, the creation of IS-ENES customized content hosting structures, i.e. transforming existing special *IS-ENES contenttypes*, (such as the case of the “Modeling Groups” or “Projects” pages) into standard *Plone contenttypes* (as *Plone Pages* and *Collections*).

¹ <https://www.esiwace.eu/>