IS-ENES – WP 11

D 11.5 – Report and manuscript journal paper on key characteristics for a prototype of an e-based pan-European climate data service network

Abstract:

This document describes the approach to publish a report and a manuscript journal paper on key characteristics for a prototype of an e-based pan-European climate data service network. The approach will be to have an article published in a magazine targeted at the potential climate4impact user community, covering a wide audience and to have a journal paper.

The article has been submitted to EGU's GeoQ magazine and will probably be published in the June issue of this magazine

For the journal paper we target for a special issue (Springer) from the EGU ESSI and/or CL session. Abstracts to these sessions have been submitted and are approved, and will be presented at the EGU 2013.

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1.0	27/2/2013	All	All	Initial version
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1. INTRODUCTION

The main purpose of the D11.5 "report and a manuscript journal paper on key characteristics for a prototype of an e-based pan-European climate data service network" is dissemination of the portal. Therefore we aim at an article published in a magazine targeted at the potential climate4impact user community, covering a wide audience. The EGU's GeoQ magazine covers a large area of our potential climate4impact user community: climate impact researchers in EGU divisions of Biogeosciences, Climate, Energy, Hydrological sciences, Natural Hazards, Ocean Sciences and Soil system sciences.

The article for the GeoQ newsletter is written by a journalist, Bram Semeijn. The article has been submitted to EGU's GeoQ magazine and will probably be published in the June issue of this magazine.

Besides dissemination of the portal itself, we want to disseminate the knowledge gained and lessons learned creating the portal. For this purpose we have submitted abstracts to two EGU sessions:

- CL: Climate: Past, Present, Future: CL5.8 Climate Services – Underpinning Science

- ESSI: Earth Science and Space informatics: ESSI3.1 Techniques and tools for effective visualization in the geosciences

Abstracts to these sessions have been submitted and are approved, and will be presented at the EGU 2013. One of these abstract will be selected as base for an article in a special issue (Springer) related to the sessions (pending discussions with the session conveners).

2. EGU GEOQ NEWSLETTER

The GeoQ is EGU's quarterly newsletter, a magazine and information service for its members. Each new edition of the publication is distributed for free to EGU members (~10,000) in the form of an interactive PDF file, and is made available from the EGU website every three months.

Goal is to have the article published in the June 2013 issue of the magazine.

2.1. DRAFT ARTICLE (AUTHOR: BRAM SEMEIJN)

Climate4impact: a new gateway for Global Climate Impact community's

Over the years the community of climate impact researchers made great efforts to make their global climate models (GCM) comparable and inter-usable. An important step in this process is the development of a dataportal from which all these models can easily be accessed. That portal (the climate4impact portal) is finished as of march this year. The portal is still a prototype, but the data can already be searched and used by climate modelers throughout the world.

The newly launched dataportal (climate4impact.eu) can best be described as a web interface for GCM data. Meteorological- and research institutes have collected impressive amounts of climate data, but when you want to access that information you have to contact every single institute separately. Some institutions lack a gateway from which data can be properly downloaded. The climate4impact website offers a distributed search which gives the user the possibility to look at all these databanks in one single session. In this way users can access and download data from over seventy global and (to a lesser extend) regional climate impact models. Since a lot of data is involved a search can be targeted according to their variable, type of experiment and frequency. The portal has options to visualize the models, so a researcher can get a quick grasp of the predictions provided. Although the website is still a prototype, some organizations already make use of the climate4impact portal. The hydrological consultancy firm Deltares for instance uses climate impact scenarios for their models on sea level rise and flooding risks and use the climate4impact portal to extract data.

Easiness

The construction of the climate4impact-portal was just one part of a much larger EU funded project of the European Network of Earth System Modeling (ENES) called IS-ENES (pronounced easiness). The project's main goal was to set up an infrastructure that allows the ENES-members to exchange GCMs more easily. A lot has been done. Facilities have been set up and interconnected so that data exchange is possible. Metadata of models has been described and all the European models have run so that the members can evaluate the differences between the models. The climate4impact interface is probably the most visible output of the project. It was a joint effort of several ENES-members, the research centers CERFACS (France), CNRS-IPSL (France), CMCC (Italy) and Wageningen university (Netherlands) and the meteorological institutes MF-CNRM (France), KNMI (Netherlands), INHGA (Romania) and SMHI (Sweden).

According to Wim Som de Cerff, one of the project leaders in charge of building the portal, there are virtually no GCM portals available that offer the same kind of overview as the ENES-portal. "Other climate impact portals have a regional focus or are specialized for a certain type of research. The ENES-portal is by far the biggest in size", says de Cerff. The portal was built on the data

infrastructure of the Earth System Grid Federation (ESGF), which also provides search services and security infrastructure. The ESGF has its own gateway as well, but the climate4impact portal offers extra means in order to make it easier for users to handle the data. "We offer tools to visualize the data and offer documentation that gives researchers an idea of what they are looking at. The process of downloading the data is also easy. Therefore this portal is also suitable for researchers less familiar with climate modeling, which wasn't the case in the past."

One of the biggest gains of the dataportal is that researchers have to spend less time on data analysis, allowing them to spend more time at looking into multiple climate models. "A typical climate impact researcher spends most of his time collecting and converting data and making a cut out of an area where he or she is interested in", says de Cerff. "There is simply no time for more than one or two model runs. As a result a scientist would not necessarily choose the best model that is most suitable for his question." De Cerff emphasizes that there can be significant differences between models and some models are more useful to predict certain phenomena than others. "That's something we would really want to bring into perspective with the dataportal."

Next steps

Though the possibilities of the portal are nice for the moment, a lot of work still has to be done. The project group views the portal still as a prototype. One of the problems is that a search still results in to many records. "A search most of the time still gives an overwhelming amount of data", says developer Maarten Plieger. "With a portal search a user can bring the amount of data back from a million records to 30.000 records. That's a big step forward, but a lot of researchers still can't work with that amount of data. Especially the ones using Microsoft Excel won't be able to do that." As a consequence the portal momentarily is more useful for climate modelers than for researchers coming from other fields who just use climate change as one variable in a model.

However all this has to change in the near future with the IS-ENES 2 project. By imbedding processing tools into the portal users should be able to extract even a smaller subset of data. The tools should also allow the users to derive data from the values used in the models, so that the extracted data better matches their question. Processing tools that help to downscale the data are also on the agenda, though the group is still debating how far they can go with that. Next to imbedding these processing capabilities the group also wants to enrich the dataportal with Regional Climate Data models (RCM) from the CORDEX group. CORDEX (COordinated Regional climate Downscaling Experiment) is an initiative with a somewhat similar goal as ENES, exchanging and comparing climate impact models in order to pinpoint the main differences. "They're with a lot more institutions, less organized and still in the phase that they have to describe metadata in order to make the models comparable. For the moment that is not possible, because every organization uses its own set of terms and variables", says de Cerff. "By joining with the ESGF infrastructure they can make use of the lessons we learned."

2.2. EGU CLIMATE4IMPACT ABSTRACTS

The climate4impact portal: bridging CMIP5 data to impact users

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Together with seven other partners (CERFACS, CNRS-IPSL, SMHI, INHGA, CMCC, WUR, MF-CNRM), KNMI is involved in the FP7 project IS-ENES (http://is.enes.org), which supports the European climate modelling infrastructure, in the work package 'Bridging Climate Research Data and the Needs of the Impact Community'. The aim of this work package is to enhance the use of climate model data and to enhance the interaction with climate effect/impact communities. The portal is based on 17 impact use cases from 5 different European countries, and is evaluated by a user panel consisting of use case owners. As the climate impact community is very broad, the focus is mainly on the scientific impact community. This work has resulted in a prototype portal, the ENES portal interface for climate impact communities, that can be visited at www.climate4impact.eu. The portal is connected to all Earth System Grid Federation (ESGF) nodes containing global climate model data (GCM data) from the fifth phase of the Coupled Model Intercomparison Project (CMIP5) and later from the Coordinated Regional Climate Downscaling Experiment (CORDEX). This global network of all major climate model data centers offers services for data description, discovery and download. The climate4impact portal connects to these services and offers a user interface for searching, visualizing and downloading global climate model data and more.

A challenging task was to describe the available model data and how it can be used. The portal tries to inform users about possible caveats when using model data. All impact use cases are described in the documentation section, using highlighted keywords pointing to detailed information in the glossary. The current portal is a Prototype. It is built to explore state-of-art technologies to provide improved access to climate model data. The prototype will be evaluated and is the basis for development of an operational service.

The portal and services provided will be sustained and supported during the development of these operational services (2013-2016) in the second phase of the FP7 IS-ENES project, ISENES2.

In this presentation the architecture and following items will be detailed:

- Security: Login using OpenID for access to the ESGF data nodes. The ESGF works in conjunction with several external websites and systems. The portal provides access to several distributed archives, most importantly the ESGF nodes. Single Sign-on (SSO) is used to let these websites and systems work together.

- Discovery: Intelligent search based on e.g. variable name, model, institute. A catalog browser allows for browsing through CMIP5 and other climate model data catalogues (e.g. ESSENCE, EOBS, UNIDATA).

- Download: Directly from ESGF nodes and other THREDDS catalogs

- Visualization: Visualize any data directly on a map (ADAGUC Map services).

- Transformation: Transform your data into other formats, perform basic calculations and extractions

Generic visualization of OpenDAP data resources using OGC services

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OpenDAP provides functionality to access and subset large datasets over the web without the need for downloading a full copy. OpenDAP is great for centralized data access and data exploration, but does not provide for visualization by default. In this presentation we describe a generic method to create visualizations of interesting OpenDAP data resources using OGC Web Map Services (WMS).

Visualizing remote datasets using WMS is achieved by adding OpenDAP URLs as parameter to the service. This enables automatic visualization of OpenDAP datasets without any necessary configuration. The same method is used to create an OGC Web Coverage Services (WCS), allowing for data re-projection, subsetting and conversion to other formats. This way, OpenDAP datasets become available to Geographical Information Systems (GIS).

The functionality has been built into the ADAGUC OGC server which uses the NetCDF-C library for OpenDAP access. Currently raster data described by the climate and forecast (CF) conventions is supported. Colors and styles are selected on basis of CF standard names and units, e.g. temperature in Celsius is displayed with different colors than precipitation in kg/m2. The technology is used in the climate4impact portal developed during the IS-ENES FP7 EU project. In this portal data from the fifth phase of the Coupled Model Intercomparison Project (CMIP5) can be visualized. This presentation describes the method in more detail and examples are shown.