



WP5: CIM Toolkit



Outline



- Introduction...
 - what is WP5?
 - how does it fit into the rest of METAFOR?
- Progress so far...
 - Query Tool Prototype
 - Differencing Tool Design
 - CIM Viewer
- Still to do...
 - frontend / backend separation

What is WP5?



- Being able to describe data and models with the CIM is *good...*
- Being able to serve instances of those descriptions is *better...*
- But being able to do something with those instances is *really good!*
- WP5 is building tools to allow (non-expert) users to ask questions not just about the content of the data, but also about its provenance and the scientific detail of the models & experiments associated with generating the data

What is WP5, really?



- Tools to...
 - **Locate**
 - The Query Tool
 - **Analyse**
 - The Differencing Tool
 - **Present**
 - Query & Differencing Results
 - The CIM Viewer

How does it relate to the rest of METAFOR?



- The queries & viewer are based on the structure of the CIM (WP2)
- The instances are stored on a server exposed by a front-end portal (WP4)
- The tools must satisfy specific use-cases (WP3)

Query Tool



- The Query Tool will provide “unrestricted” and “advanced” search; Will not provide “faceted search”
 - Uses an XML-based solution (XQuery against an eXist database) instead of an RDF-based solution (SPARQL against an RDF Triple Store)
 - The APPCIM is conveniently already in XML

Query Tool



some navigational thingies...

Here is some documentation. This is a free-text search on all the content of a CIM instance.

unrestricted search:

document type: any

search terms: hadcm3

search

advanced search:

model component simulation

Here is some documentation.

search for: all conditions any conditions

| | not | | |
|-----------------|--------------------------|----------|------------|
| (sub)model name | <input type="checkbox"/> | contains | 2D-Sources |
| startDate | <input type="checkbox"/> | equals | |
| endDate | <input type="checkbox"/> | equals | |

search

Query Tool



some navigational thingies...

[back to search](#)

unrestricted search results

searching for: "hadcm3" of type: "*" in collection: "/db/test/search/data/cim"

Here is some documentation. If the text that matched the query term(s) happens to be displayed in the results table, it should be highlighted. Click on the column titles to sort by column.

matching documents:

[3 climate models](#)

[0 ensembles of climate experiments](#)

[0 datasets](#)

[1 transformers or post-processors](#)

[0 climate experiments](#)

[0 simulations or parts of simulations](#)

[0grid descriptions](#)

climate models:

| compare | view | export (XML) | name | description (hover over text to see full description) | sub-models (click on a model to view) |
|--------------------------|----------------------|------------------------------|----------------------|---|--|
| <input type="checkbox"/> | | | HadCM3 | | four |
| <input type="checkbox"/> | | | HadCM3 | | two one |
| <input type="checkbox"/> | | | GCM Template dup | Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut pretium bibendum ultricies. Nam rhoncus tincidunt dui, at aliquet quam accumsan at. Curabitur eu lacus quis nisi aliquet pulvinar non eu felis. Mauris ipsum est, consectetur eu malesuada vel, blandit imperdiet felis. Nullam molestie nibh eu just | Aerosols AerosolKeyProperties |

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut pretium bibendum ultricies. Nam rhoncus tincidunt dui, at aliquet quam accumsan at. Curabitur eu

Differencing Tool



- CIM Differencing differs from other types of feature comparison tools because...
 - There will be several variants of comparisons depending on the type of CIM instances being compared and the type of information being requested.
 - The set of features being compared is potentially orders of magnitude larger than those typically found in online catalogs (hundreds vs. tens).
 - CIM instances have a very rich structure to draw on. Sometimes this helps; Other times it is a hindrance.
- So...
 - Only small focused comparisons across the same document type will be supported
 - And users should be able to constrain how the results are presented to them in real-time

Differencing Tool



CIM Compare

http://www.metafor.com/auery/compare.html?type=conformance?cim1=myID?cim2=myOtherID

metafor

A Navigation Menu

Summary + -

This is a CONFORMANCE comparison between 3 SIMULATIONS relative to a single EXPERIMENT

| experiment | requirements | simulation | commonality |
|------------|--------------|------------|--------------|
| exp1 | 20 | simA | 20 with simB |
| exp2 | 30 | simB | |
| exp3 | 40 | simC | 23 with simB |

Options + -

excluded

- requirement1
- requirement2
- requirement3
- requirement8
- requirement9
- requirement20
- requirement21

included

- requirement4
- requirement5
- requirement6
- requirement7

name: requirement20
source: exp3
description: "use double-CO2 forcings"

detail:

- high-level view
- low-level view
- show differences only

this setting can be overwritten on a per diagnostic basis below

reset update

updating/resetting view...

Here the "master" approach is used with users choosing a particular experiment whose requirements to compare and a particular simulation whose conformances to that experiment's requirements to use as a baseline.

Some way of displaying more information is needed. Here I'm using a separate text area to display details of the selected item(s) in the list boxes.

updating/resetting view...

Differencing Tool



| toggle detail <input type="checkbox"/> | requirement | simA | simB |
|--|--|--|---|
| <input type="checkbox"/> | requirement4 | " conformant " | "non-conformant" |
| <input checked="" type="checkbox"/> | <p>name: requirement5 source: exp3 <i>make sure that gravity = 1.63 m/s^2 (just like on the moon!)</i></p> | <p>▷ conformant ▽ description added code to multiply the gravitational constant by .167 ▽ source(s) ▽ component: atmos</p> | <p>▷ conformant ▽ description used a certain ancillary file_ ▽ source(s) smallGravity.nc some of these items are hoverable/clickable for more detail</p> |

Differences should be in red or something (in this mockup they're italicised), and parents should inherit the "differenceness" of children.

CIM Viewer



- The CIM Viewer has two variants:
 - A stand-alone tool (currently offered as part of the CMIP5 Questionnaire)
 - A service that can be plugged into a portal (to be used in the METAFOR portal to view CIM query results)
- It presents an intuitive graphical summary of an XML CIM instance

CIM Viewer



CIM Document Viewer



| Models | Experiments | Simulations | Data |
|--------|-----------------|-------------|---|
| HIGEM | 1.1 decadal1960 | 1.1_1960 | Sulphur_landEmissions.pp Volc_emiss_cmip5_1960_glob.nc |

Component Information

Short Name HIGEM

Long Name UK High Resolution Global Environment Model

Description HIGEM brings together expertise from NERC, the UK academic community and the Met Office in a concerted UK effort to develop coupled climate models with increased horizontal resolutions. Increasing the horizontal resolution of coupled climate models will allow us to capture climate processes and weather systems in much greater detail.

Document ID e54cc34f-2842-11df-8637-001de019e26d

Child Components

Still to do...



- Currently, much of the CIM toolkit is written as a single unit of code, mixing together front-end and back-end functionality. The codebase is being refactored to address this.
- The METAFOR portal is being hosted in Pylons. The look-and-feel of the site will be controlled with common Mako templates which use JQuery widgets and CSS stylesheets.
- There will be separate Python projects for the portal (front-end) and services (back-end)
- CIM instances will continue to be stored as XML within the eXist database. XQuery routines to query CIM instances will be accessible via HTTP. The server Python code will interact with that XQuery.
- The Python portal and server will not directly communicate with one another. Instead, a JavaScript proxy library which communicates with the server will be used.

In conclusion



- A Query Tool prototype has been written using XQuery and XML
- A Differencing Tool has been designed in detail
- A CIM Viewer has been written as part of the CMIP5 Questionnaire
- These are all being refactored in order to separate the front-end and back-end
 - Although, much of the back-end functionality has already been written as part of the Query prototype
- And the tool functionality needs to be integrated together
 - It is expected that users will use the query tool, differencing tool, and viewer together in order to locate and analyse the instances they are interested in