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Supporting the climate community by providing common metadata for climate modelling digital repositories: the METAFOR project.

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There is more interest than ever in the results of climate models; users are no longer limited to the scientific and academic communities, and can now be found in as diverse areas as local government, policy and the general public. Climate modeling, however, is a complex process, which requires accurate and complete metadata (data describing data) in order to identify, assess and use the climate data stored in digital repositories and made available to these users.

The EU-funded METAFOR project has developed a Common Information Model (CIM) to describe in a standard way climate data and the models and modelling environments that produce this data. Climate modelling is a complex process with a wide degree of variability between different models and different modelling groups. The CIM exists to document the whys, wherefores and issues associated with any particular simulation, and has been designed to be highly generic and flexible. The CIM's generic structure can be paired with more specific "controlled vocabularies" in order to restrict the range of valid CIM instances. Although the CIM is primarily associated with global climate modelling, statistical downscaling data can also be easily described through the metadata framework developed for global climate modelling.

Whilst informationally rich, the CIM, as outlined above, is largely an inert artefact. In order to incubate a vibrant CIM based eco-system, Metafor is constructing a CIM web portal plus associated CIM web-services and tools. The web portal encapsulates a diverse set of use cases: CIM knowledge base, CIM search, CIM record validation, CIM record viewing, CIM record comparison...etc. It also allows metadata administrators to register metadata servers for overnight harvesting into the CIM system. The associated CIM web-services and tools allow institutes to either fully automate CIM metadata publishing, or to integrate functions such as search, validation and viewing directly into their own portals. The portal, web-services and tools benefit from modern software engineering techniques predicated upon a service orientated architecture underpinned by loosely coupled components.

METAFOR was also charged by the Working Group on Coupled Modelling (WGCM) via the Coupled Model Inter-comparison Project (CMIP) panel to define and collect model and experiment metadata for CMIP5; hence the project team developed a web-based questionnaire to collect this from the CMIP5 modelling groups. The outputs of the questionnaire will be CIM xml instances, which will document the climate models in sufficient detail so that the CMIP5 data can be located and compared in a scientifically meaningful way by a wide and diverse community. The questionnaire outputs will also form the input documents into the tools and services also being developed.

A new set of "controlled vocabulary" has been produced to describe in a standard and structured way the dynamics, physics, numerical schemes and other parameterisations of the components (ocean, atmosphere, land surface, sea ice, atmospheric chemistry, etc.) of the earth system models used in CMIP5. These controlled vocabularies exist independently of, but are complementary to the CIM, and governance structures for the CIM, controlled vocabularies and the CIM tools and services are being put in place to allow them to improve and develop further, even after the completion of the METAFOR project.