



Towards the Goal of Modular Climate Data Services: An Overview of NCPP Applications and Software

Benjamin W. Koziol¹, Luca Cinquini^{1,2}, Allyn Treshansky¹, Sylvia Murphy¹, Cecilia DeLuca¹
 1. NESII (NOAA Environmental Software Infrastructure & Interoperability Project) /
 CIRES (Cooperative Institute for Research in the Environmental Sciences) / NOAA-ESRL
 2. NASA-JPL



Contact Information:
 ben.koziol@noaa.gov

In August 2013, the **National Climate Predictions and Projections Platform (NCP)** organized a workshop focusing on the quantitative evaluation of downscaled climate data products (QED-2013). The QED-2013 workshop focused on real-world application problems drawn from several sectors (e.g. hydrology, ecology, environmental health, agriculture), and required that downscaled data products be dynamically accessed, generated, manipulated, annotated, and evaluated. The cyberinfrastructure elements that were integrated to support the workshop included:

- (1) a wiki-based project hosting environment (**Earth System CoG**) with an interface to data services provided by an **Earth System Grid Federation (ESGF)** data node
- (2) metadata tools provided by the **Earth System Documentation (ES-DOC)** collaboration
- (3) a Python-based library **OpenClimateGIS (OCGIS)** for subsetting and converting NetCDF-based climate data to GIS and tabular formats.

Collectively, this toolset represents a first deployment of a **"ClimateTranslator"** that enables users to access, interpret, and apply climate information at local and regional scales.

The NCPP Platform works to advance the provision of regional and local information about the evolving climate and to accelerate its use in adaptation planning and decision making.

Climate Data, Climate Indices and Metadata

NCP is developing tools and web services that support the discovery and access of downscaled climate projections. This includes the calculation and provision of climatic indices, and development of metadata describing downscaling methods and the calculation of indices.

Evaluation and Translation Activities

NCP is working towards a standardized community evaluation capability for regional and local downscaled climate information. To support the use of climate information NCP is developing interpretative guidance and translation in collaboration with practitioners.

Building and Supporting Community

NCP supports the collaborative development of climate information for adaptation by a community of climate scientists and practitioners. NCP facilitates the definition and development of community based standards and services, community contribution of tools and capabilities, and community based decision-making.

CoG was developed under grants from the National Science Foundation and the National Oceanic and Atmospheric Administration, and in partnership with the Department of Energy Office of Science and the Infrastructure for the European Network for Earth System Modeling project supported by the European Union. Data archive and search provided by the Earth System Grid Federation.

ES-DOC is an evolution of the Metafor project (originally sponsored by the European Network for Earth System Modeling) and Earth System Curator project (part of NESII, and sponsored by NSF, NOAA and NASA).

OpenClimateGIS is being developed in the NESII Group in association with the NCPP Project under funding provided by the NOAA Climate Program Office.

Earth System CoG <http://www.earthsystemcog.org/projects/cog/>

The Earth System CoG Collaboration Environment supports collaborative Earth science research and product development in virtual organizations comprised of multiple projects and communities. It provides access to data, metadata, and visualization projects or to profile projects hosted elsewhere.

CoG is being used to support software development projects, model intercomparison projects, and short university-level courses. Its services and ontology are customizable by project.

CoG is tightly coupled with ESGF (Earth System Grid Federation) for big data storage, search, transfer, and curation. Combining the interactive project environment with data services offers a modular, customizable service infrastructure suitable for the heterogeneous nature of scientific data and research.

The image shows a web interface for the Earth System CoG. It includes a 'Page Editor' section with a text editor and a 'Page Editor' sidebar. Below that is a 'Median of Seasonal Total Precipitation [SON]' map of the United States, showing precipitation levels in mm. To the right is an 'Advanced Data Search' interface with various filters and a 'Show Metadata' button. Below the map is a legend for precipitation values.

es-doc <http://earthsystemcog.org/projects/es-doc-models/>

ES-DOC (Earth System Documentation) is an international collaboration that is developing standard tools to create, view, and compare metadata descriptions of climate system artifacts.

The ES-DOC partnership includes NESII, Institute Pierre Simon Laplace (IPSL), University of Reading, British Atmospheric Data Centre (BADC), and the German Climate Computing Center (DKRZ).

A formal structured common standard metadata language allows for:

- a common interface to enable tool development
- detailed intercomparisons
- allows provenance to be documented
- faceted search / intelligent data discovery
- shared understanding...

The image shows two screenshots from the es-doc interface. The left screenshot shows a 'Model Component Properties' table with columns for 'Model Component', 'Description', and 'Status'. The right screenshot shows a 'CIM Regional Model Component Questionnaire' form with various input fields and a 'Submit' button.

OpenClimateGIS <http://www.earthsystemcog.org/projects/openclimategis/>

ClimateTranslator <http://www.earthsystemcog.org/projects/climatetranslator/>

OpenClimateGIS (OCGIS) is a standalone, Python-based, open source software library enabling dynamic access to and manipulation of climate data.

The ClimateTranslator interface uses OCGIS on the backend to facilitate dynamic data manipulations and export data in end-user friendly formats suitable for analysis and visualization in a variety of software packages.

Software/interface goals are to overcome barriers of usability of climate projections in adaptation planning and resource management:

- translate out of climate data formats
- select geographical regions and times/levels of interest
- compute application-relevant indices and provide comprehensive metadata

The image shows two screenshots from the ClimateTranslator interface. The left screenshot shows a 'ClimateTranslator: Step 1 of 3' dialog box with various options for data selection and processing. The right screenshot shows a map of the United States with a red dot indicating a location. Below the map is a legend for precipitation values and a 'Count of Daily Precipitation Values >= 9.62 mm/day for July, 1990 (BCCA-CCMA-GCGM)' plot.