Geophysical Research Abstracts
Vol. 15, EGU2013-7794, 2013
EGU General Assembly 2013

Architecture of the local spatial data infrastructure for regional climate change research

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Georeferenced datasets (meteorological databases, modeling and reanalysis results, etc.) are actively used in modeling and analysis of climate change for various spatial and temporal scales. Due to inherent heterogeneity of environmental datasets as well as their size which might constitute up to tens terabytes for a single dataset studies in the area of climate and environmental change require a special software support based on SDI approach. A dedicated architecture of the local spatial data infrastructure aiming at regional climate change analysis using modern web mapping technologies is presented.

Geoportal is a key element of any SDI, allowing searching of geoinformation resources (datasets and services) using metadata catalogs, producing geospatial data selections by their parameters (data access functionality) as well as managing services and applications of cartographical visualization. It should be noted that due to objective reasons such as big dataset volume, complexity of data models used, syntactic and semantic differences of various datasets, the development of environmental geodata access, processing and visualization services turns out to be quite a complex task. Those circumstances were taken into account while developing architecture of the local spatial data infrastructure as a universal framework providing geodata services. So that, the architecture presented includes:

1. Effective in terms of search, access, retrieval and subsequent statistical processing, model of storing big sets of regional georeferenced data, allowing in particular to store frequently used values (like monthly and annual climate change indices, etc.), thus providing different temporal views of the datasets
2. General architecture of the corresponding software components handling geospatial datasets within the storage model
3. Metadata catalog describing in detail using ISO 19115 and CF-convention standards datasets used in climate researches as a basic element of the spatial data infrastructure as well as its publication according to OGC CSW (Catalog Service Web) specification
4. Computational and mapping web services to work with geospatial datasets based on OWS (OGC Web Services) standards: WMS, WFS, WPS
5. Geoportal as a key element of thematic regional spatial data infrastructure providing also software framework for dedicated web applications development

To realize web mapping services Geoserver software is used since it provides natural WPS implementation as a separate software module.

To provide geospatial metadata services GeoNetwork Opensource (http://geonetwork-opensource.org) product is planned to be used for it supports ISO 19115/ISO 19119/ISO 19139 metadata standards as well as ISO CSW 2.0 profile for both client and server.

To implement thematic applications based on geospatial web services within the framework of local SDI geoportal the following open source software have been selected:

1. OpenLayers JavaScript library, providing basic web mapping functionality for the thin client such as web browser
2. GeoExt/ExtJS JavaScript libraries for building client-side web applications working with geodata services.

The web interface developed will be similar to the interface of such popular desktop GIS applications, as uDIG, QuantumGIS etc.

The work is partially supported by RF Ministry of Education and Science grant 8345, SB RAS Program VIII.80.2.1 and IP 131.