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Development of an Information System of the Italian basins for the CUBIST project

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The CUBIST Information System is a GIS-based environment designed to manage and access hydrological and climatological data for an extensive set of watersheds in Italy.

The database core follows the design of the SIVaPi (GNDCI-CNR) project and is made of four tables, referred to nodes, basins, stations and values (hydrological data). The structure is completed by tables describing instruments and variable/data types.

The database is arranged to optimise table dimensions and access performances and the structure is compatible with the ArcHydro and CUAHSI Hydrologic Information Systems. With respect to the mentioned international projects, CUBIST shows new relevant features, such as the numerical cartography-derived dataset management, the recursive linking for the management of the hierarchical basin relations, the historical management of measurement stations.

A geodatabase extension allows to manage geo-data (nodes, stations, watersheds) within the database itself. The database has been populated by means of data coming from heterogeneous sources and coding standard, after a systematic activity of verification, correction, homogenisation and eventually re-coding.

Substantial additional morphometric data have been obtained from automated DEM analyses operating in the GRASS environment. Results of climatological and morphological analyses, producing respectively maps of average monthly mean temperatures and a map of landform properties, have produced additional catchment features.

Client and web-based tools provide full direct data access; desktop and web GIS software can browse and query geographical tables. A powerful OLAP environment has been set up to explore data cubes, applying experimentally Business Intelligence technologies in hydrology.

CUBIST Information System has been completely developed using Free and Open Source software: the database is developed in PostgreSQL with Postgis; DEM analysis is performed in GRASS or JGRASS GIS environments; psql, PgAdmin and phpPgAdmin offer direct data access; QGIS or gvSIG and Mapserver are used as GIS software; Tomcat+Mondrian+OpenI offer web OLAP tools.