



Project of Strategic Interest NEXTDATA

Deliverable D2.3.1: Database of mountain glaciers suitable for ice core drilling

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In the Nextdata project, WP 2.3 has to define and create a database of mountain glaciers suitable for ice core drilling. These activities have to be carried out in close collaboration with WP 1.4 which has to define the drilling sites for the cores at high altitude. So, WP 2.3 has to create a database which permits the implementation of a methodology to identify, among the world glaciers, those which are drillable. Many databases are present in the literature containing the ice core drill data, but the morphological and topographical conditions of the drill areas are not available. For this reason the definition of a methodology to identify the possibility to drill the glaciers is very important. The type of data available can be subdivided into three categories: glaciers, drill specifications and ice core data and records. In this context, we defined a conceptual model for a common Geodatadabase (database for spatial and non spatial data) for both the archives of drillable glaciers and for ice core drillings which have been already carried out. The non spatial part of the Geodatabase has been structured into separate and related modules; two modules comes from existing databases, WGMS and GLIMS, in order to identify glaciers and drilled cores with the existing identification codes; the other module contains Project informations, the Glaciers archive, ice drilling and the core data records. This structure was discussed and shared with member of Share Geo Network project in order to create an unique and sharable hierarchical structure inside NEXTDATA. This structure is defined by the database modules: Project, Glacier, Drilling and Ice core (Figure 1).

The "Glacier" module is the core of the Geodatabase and it contains general information, the identifier codes, derived from the most important international databases, and the principal morphological parameters, derived successively from a DTM analysis (they will be loaded during the second year). The "Drilling" module contains the ice drilling parameters and the "Ice core" module contains the ice core data records. Parameters of the first and second modules are essential for the definition of the methodology to identify the drillable glaciers based on the evaluation of the morphometric characteristics of the glaciers drilled in the past.

PROJCT	GLACIER	DRILLING	ICE CORE
ID_project	ID	ID	ID
Project name	NAME	Drill_ID	Drill_id
data provider	GLACIER ID	project_ID	Geographic region
reference name	GEOGRAPHIC REGION	Funding source	Period of record
year	DATA SOURCE	LONG	Funding source
	GLIMS GLAC ID	LAT	Data file Url
	WGMS_ID	drilling_year	Description
	AREA	depth	Note: Analysis executed
	WIDHT	drilling quote	Core location
	LENGHT	glacier_ID	Last update
	GEOMORFOMETRIC PARAMETERS	site location	IGBP pages/WDCa contribution series number
	GLACIER BASIN		Lists of files
	IDROGRAPHIC BASIN		Contributor
	DEM PRESENCE		Suggested data citation
	DEM SOURCE		Files description
	PERFORATED/NOT PERFORATED		File format
	PERIOD OF RECORD		Data description
	FOUNDING SOURCE		Isotope data
	DATA FILE URL		Credits
	DESCRIPTION		
	NOTE: analysis execute		
	LAST UPDATE		
	LISTS OF FILE		
	CONTRIBUTOR		
	SUGGESTED DATA CITATION		
	FILES DESCRIPTION		
	DATA DESCRIPTION		

Figure 1. Structure of the database

During the first year of the project research work has been aimed at identifying the existing archives and reviewing the scientific literature concerning ice cores drilled in non-polar glaciers. After having performed an evaluation of the available repository archives, we have analysed the data stored in the World Glacier Monitoring Service (WGMS), NOAA, National Laboratory of Ice Core (NICL, United States) and the GLIMS (Global Land Ice Measurements from Space) databases. The WGMS archive contains extensive data concerning general information about glaciers and front variations, mass balance. Data on ice core drilling and ice core analysis are stored in the NOAA and NICL databases. These public archives are not organized in form of structured databases and they are not interconnected through an unique identifier code. So at the beginning, we had data in different digital formats (xls, ascii, mdb, ecc.) with a semantic content that had to be organized into a unique relational database using different tables. Successively the list of drilled glaciers has been subdivided according to the geographic position of the glaciers and according to the analyses performed on the ice cores. Only glaciers and records data coming from Tropical and Temperate area were considered (more or less 200 records).

In the meanwhile, the GLIMS (Global Land Ice Measurements from Space) database has been used to acquire the spatial structure (polygons) of the drilled glaciers and these data have been stored into the Geodatabase. An archive of ice core data available at DISAT (Environmental Sciences Department at UNIMIB) and from other literature has been created.

In the second part of the first year, the choice of the Database management System (DBMS), in which to implement the above-mentioned database, has been discussed among WPs connected with WP 2.3. In fact, an objective of the project is to share the same DBMS for

storage point data such as meteorological stations, ice core drill data and sediment cores. For this reason, a series of meetings took place to discuss the best way to implement a common database. The discussion led to the decision to use the WDB DBMS, originally created by the Norwegian meteorological services. WDB is a database system designed to store meteorological, hydrological and oceanographic (MHO) data in a PostgreSQL database management server. The system utilizes PostGIS for GIS (Geographic Information Systems) support and handles regular grids and point data. After the complete installation of the WDB database on the DISAT server, the metadata of ice cores will be loaded in the GeoNetwork web portal.

Compared to the results planned for the first year, which included the creation of a database of mountain glaciers suitable for ice core drilling, completion of the database and data transmission to the thematic archives have been postponed to the second year.

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