



# Enhydris: A free database system for the storage and management of hydrological and meteorological data

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Antonis Christofides, Stefanos Kozanis, George Karavokiros, Yannis Markonis and Andreas Efstratiadis

Department of Water Resources and Environmental Engineering, School of Civil Engineering, National Technical University of Athens, Greece



## 1. Enhydris — Introduction

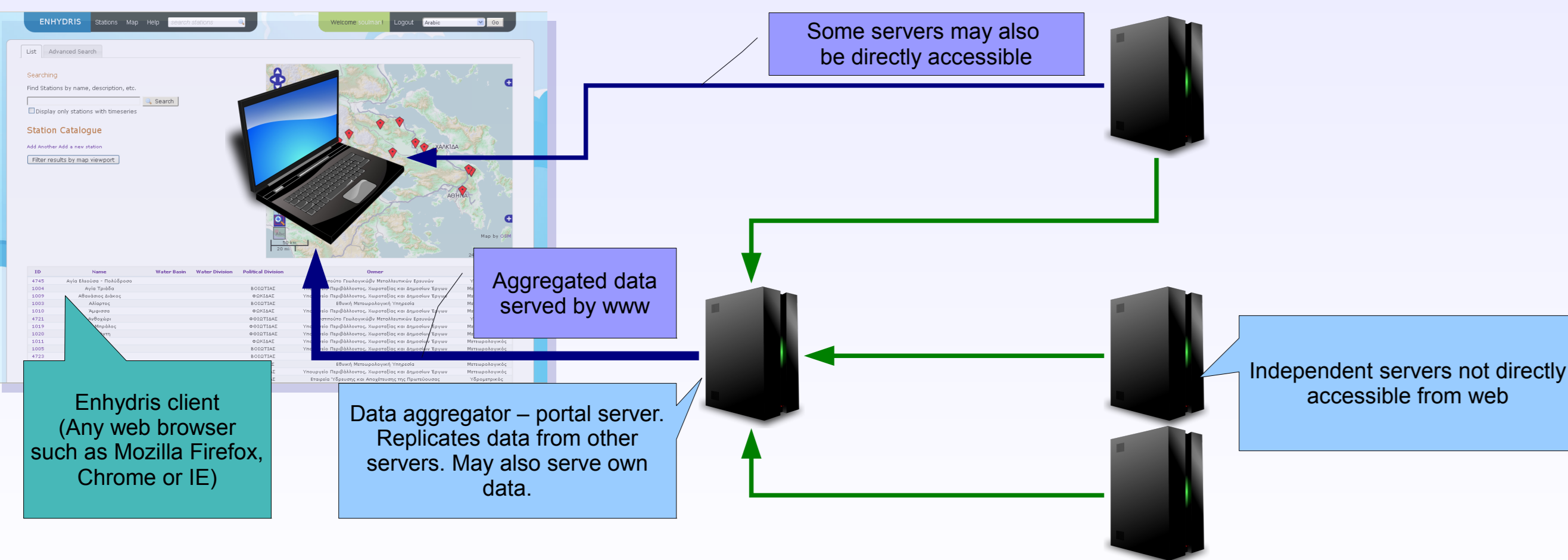
Enhydris is a database system for the storage and management of hydrological and meteorological data. It allows the storage and retrieval of raw data, processed time series, model parameters, curves and meta-information such as measurement stations overseers, instruments, events etc.

The database is accessible through a web interface, which includes several data representation features such as tables, graphs and mapping capabilities. Data access is configurable to allow or to restrict user groups and/or privileged users to contribute or to download data. With these capabilities, Enhydris can be used either as a public repository of free data or as a fully secured – restricted system for data storage. Time series can be downloaded in plain text format that can be directly loaded to Hydrognomon (<http://hydrognomon.org/>), a free tool for analysis and processing of meteorological time series.

Enhydris is free software, available under the GNU Affero General Public License, and can run on UNIX (such as GNU/Linux) or Windows.

## 2. A distributed database system

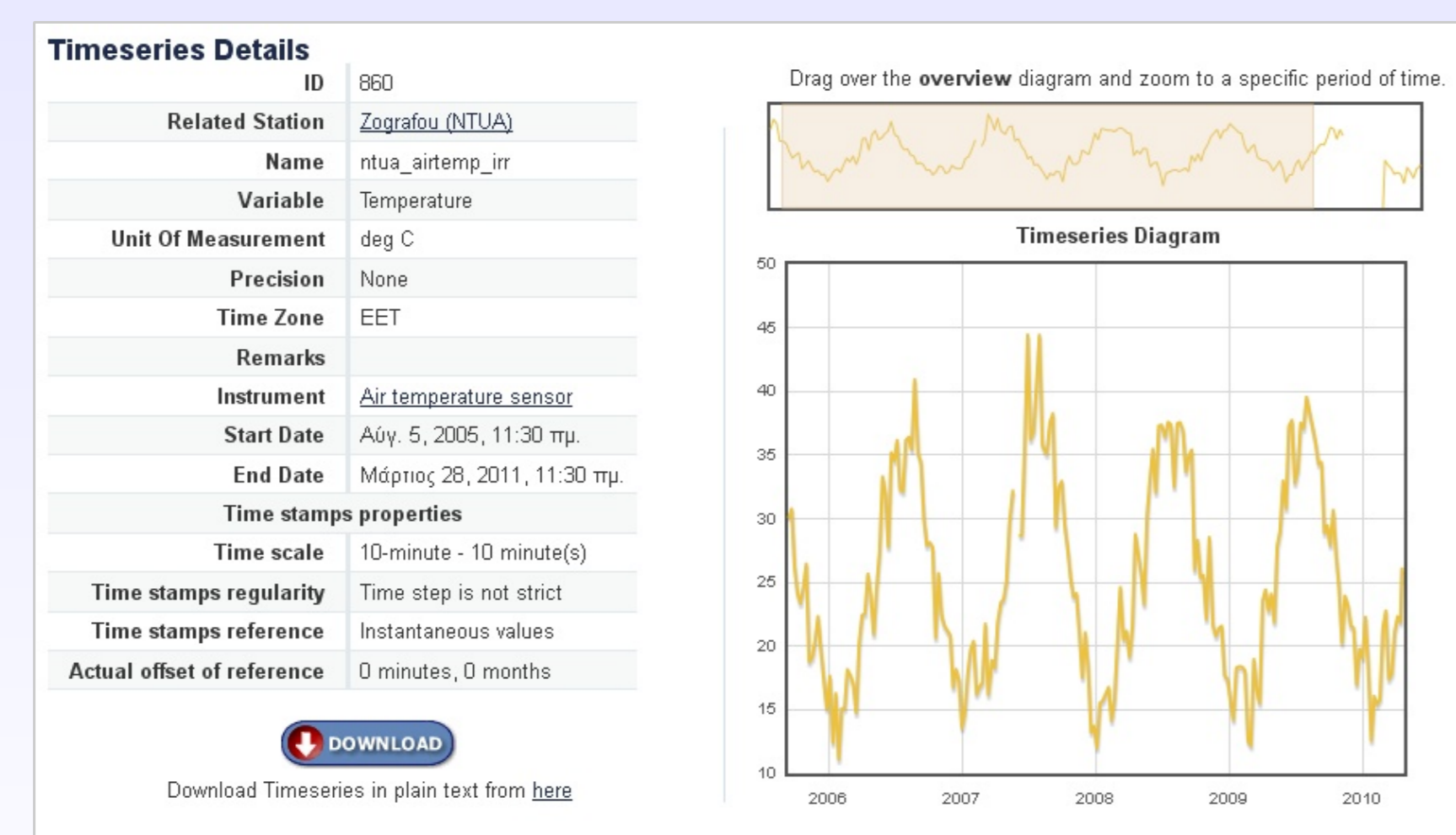
Enhydris can optionally work in a distributed way. Many organisations can install one instance each, but an additional instance, common to all organisations, can be setup as a common portal. This additional instance can be configured to replicate data from the other databases, but without the space consuming time series, which it retrieves from the other databases on demand. A user can transparently use this portal to access the data of all participating organisations collectively.



## 3. Time series is the core of the system

Time series are holding raw or processed data. Several time scales are possible, ie from minute to fine detailed data to annual or decades for hydro-climatic models.

Time series are related to measurement instruments and / or gauging stations according the hierarchical structure of the database. The hierarchical structure is one of the main design advantages of the database, helping also the geospatial organization of data.



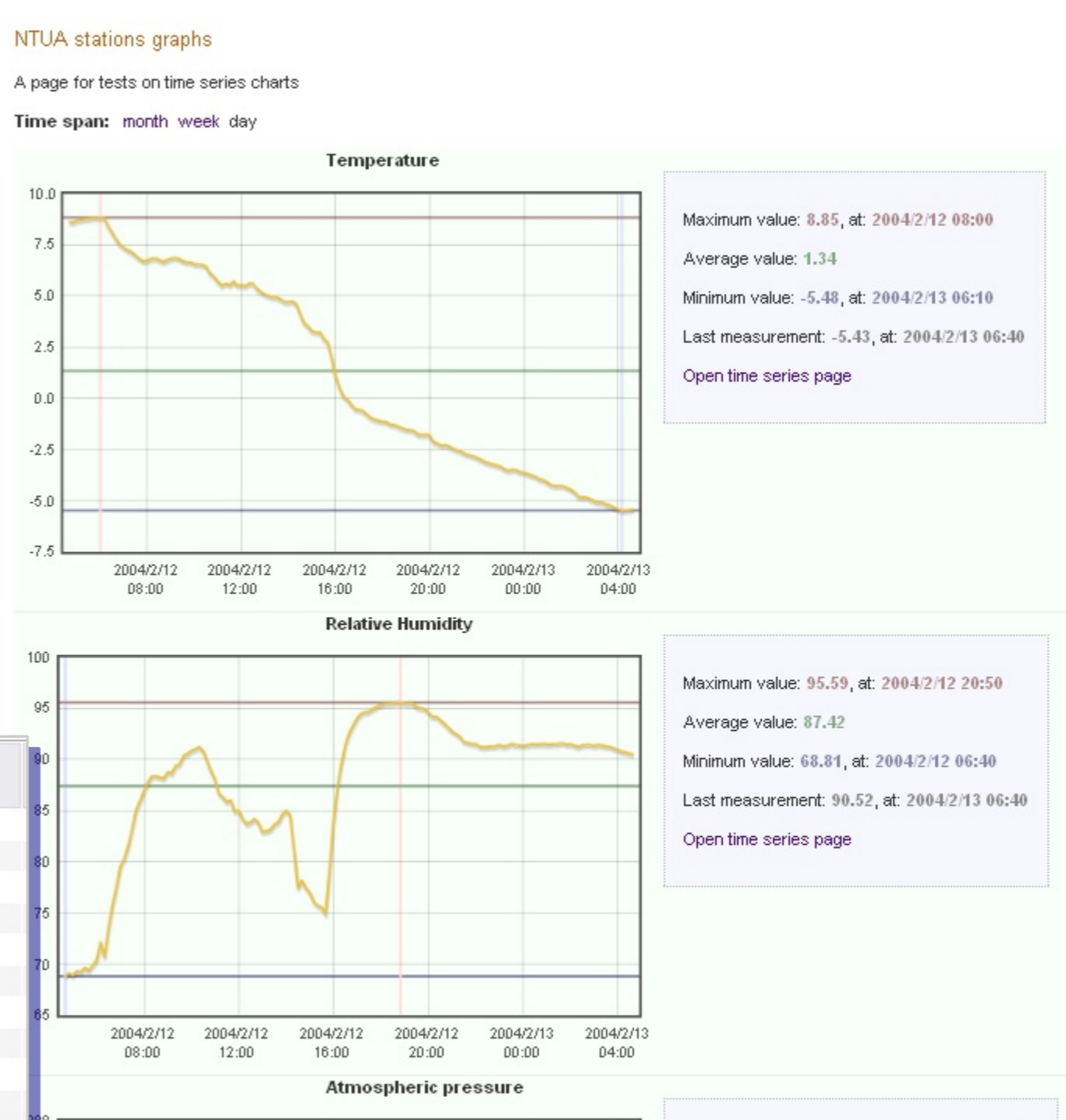
## 4. Real time monitoring of hydrometeorological variables

The Enhydris database can be updated in real time with data from automatic meteorological stations.

As the database is live updated, The data can be available to the public (or to restricted groups of persons) instantly through the Enhydris web interface.

Several tools help visualize the real-time data e.g. time series charts, data tables etc.

Table with 3 columns: Variable, Aiolos Kosmas, Pyralia, Mendi. Rows include Temperature, Humidity, Rainfall, Wind speed, Wind gust, Wind direction, Sunshine duration, Solar radiation, Net radiation, and Barometric pressure.

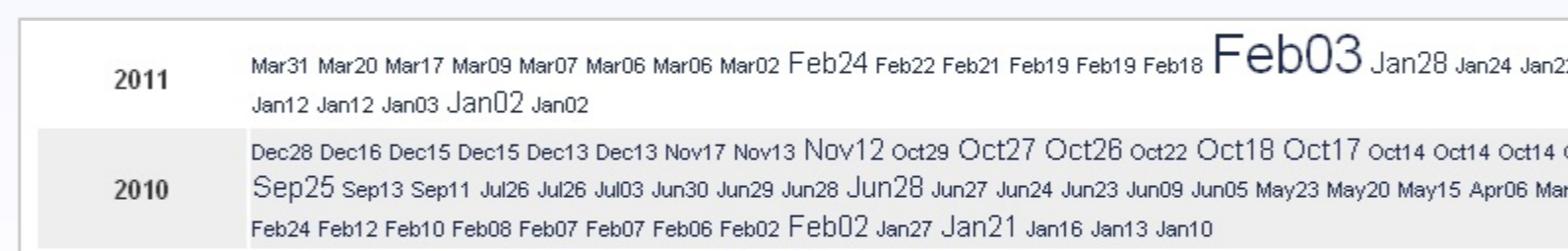


## 5. Detection and reporting of rainfall incidents

Enhydris is extensible: its core is a platform upon which more applications can be built. One such application, which is included with Enhydris and can optionally be installed, is hrain, which detects and visualizes rainfall events on a geographical area. It can be seen in action in the Hydrological Observatory of Athens (<http://hoa.ntua.gr/>), a network of 10 meteorological stations covering the wide area of Athens.

The event report includes charts displaying the evolution of the rainfall per station and a contour chart.

An event cloud (similar to the tag cloud used in blogs) helps the user locate notable rainfall events.



## 6. Installations of Enhydris

Several organisations in Greece and Europe have installed Enhydris.

- The Hydrological Observatory of Athens (http://hoa.ntua.gr/), a network of ten (10) automatic meteorological stations and four (4) flow measurement stations installed at the greater area of Athens.
The Hydroscope project is a national Greek database of hydrological and meteorological data, featuring a distributed installation of Enhydris: each participating organisation keeps its data on its own server, but all the data are accessible through a common portal (http://hydroscope.gr)
The Athens Water Supply Company (EYDAP) uses Enhydris (currently on its intranet only) to manage and store its data.
WQ DREAMS - WQ DREAMS is a database and a web application designed to store and manage water quantity data reported to the European Environmental Agency. All data are related to regions in Europe, mostly at River Basin District level. The temporary URL to reach the website is: http://wq.wise-dreams.eu/ but it will migrate soon to a permanent link, planned at: http://wq-dreams.eu/
The openmeteo database (see below).

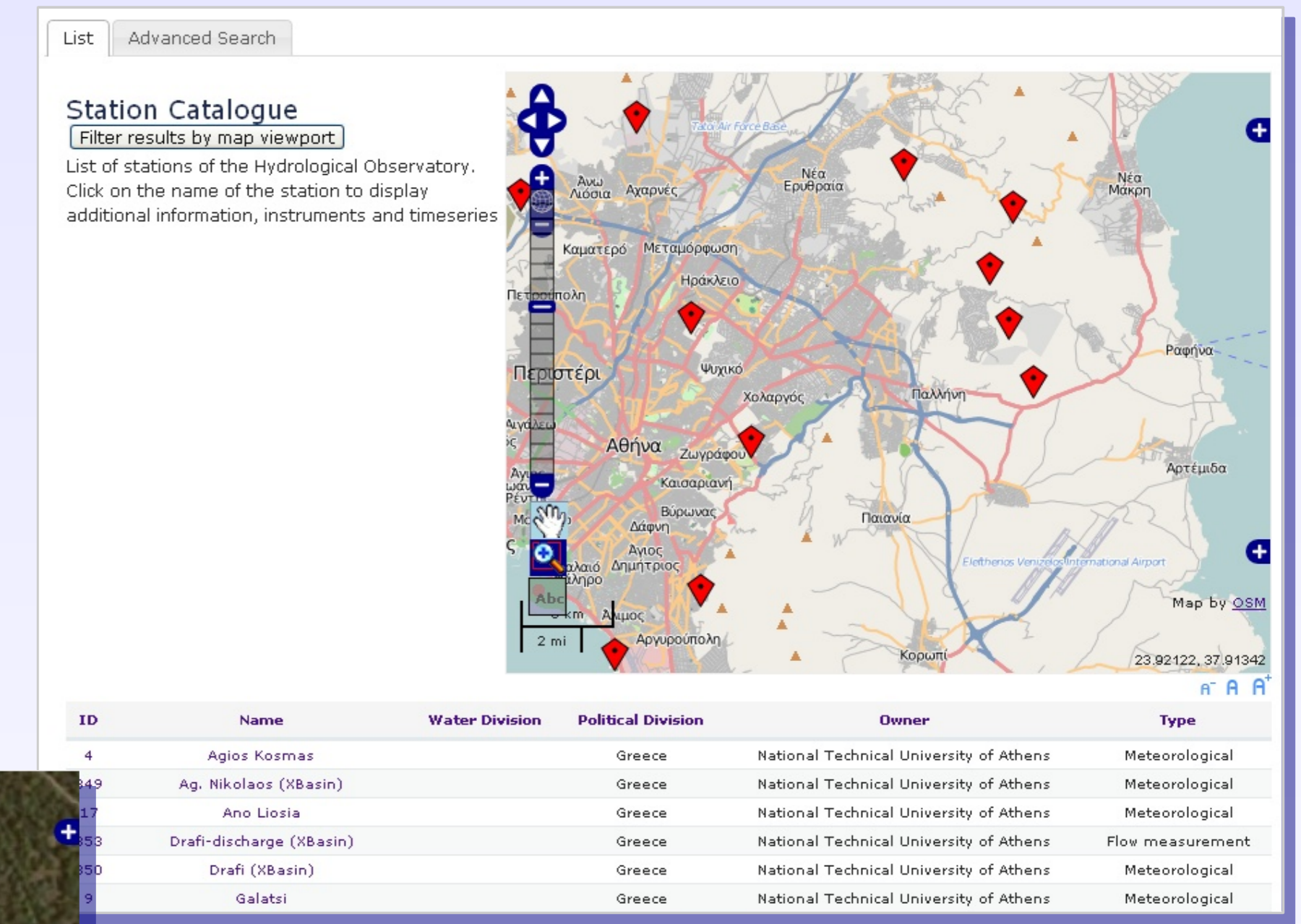
Enhydris is free software, available under the terms of the GNU Affero General Public License version 3. It is developed with Python, Django, and C.

Get poster: http://itia.ntua.gr/1120

## 7. Enhydris is a geospatial enabled application

Enhydris uses free software technologies such as GeoDjango, PostGIS and Open Layers to store, process and display geospatial data.

Maps are integrated in the Enhydris interface, and stations in specific areas may be located with geospatial queries.



Geographical data services are of a well adopted industrial standard: the KML and such information can be shared to several web sites, beyond Enhydris web and map application.

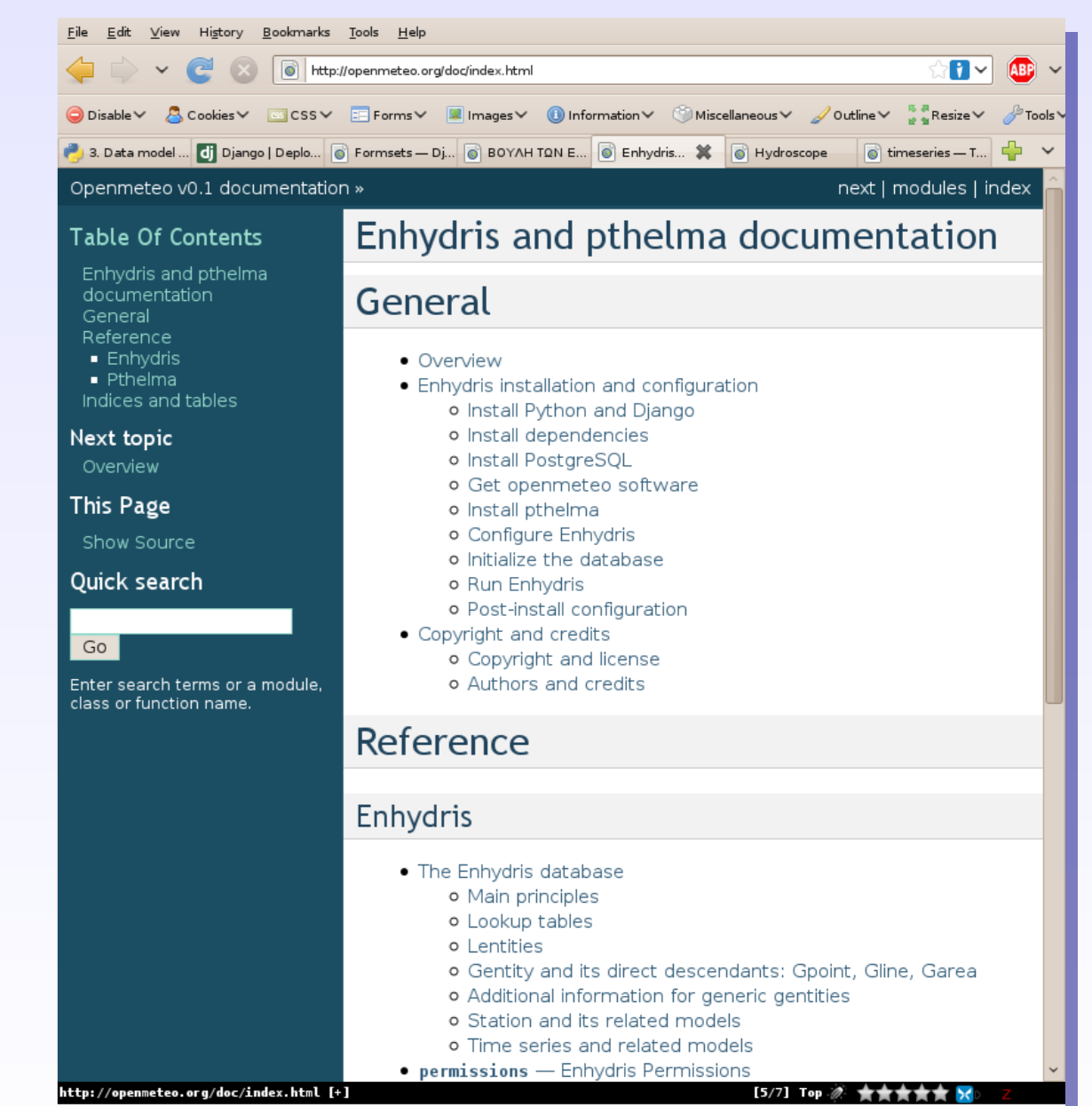
With the Open Layers technology several background map layers may be used. The default background layers are that of Open Street Map, a free source of geographical data.

## 8. Support possibilities

Not only is Enhydris free software, it also has detailed documentation for administrators and developers. Therefore, your computer guy can probably install and maintain it, especially if they have a background in Python.

If you don't have such a computer guy, there are many Python specialists and companies on the market who would love to offer you commercial support. For example, indifex.com, the Greek company who created Enhydris under supervision by the NTUA, will be more than happy to take your money.

Free software also allows you to have new features developed without the need to ask us for permission.



## 9. Data is like software: it's better when it's free

Another option is to not maintain your own Enhydris installation, but, instead, to use http://openmeteo.org/db, an international, public meteorological database we have created.

Enhydris has a security system that allows it to be used either in an organisational setting or in a public setting. In an organisational setting, there are privileged users who have write access to all the data. In a public setting, users can subscribe, create stations, and add data for them, but they are not allowed to touch stations of other users.

By using http://openmeteo.org/db, you can avoid the hassle of maintaining your own database, and you can contribute to the worldwide availability of free meteorological data.

More information on the openmeteo.org project, source code and free database at: http://openmeteo.org/