

Browsing and Selection of CTD/XBT Data through Open-Source GIS Clients

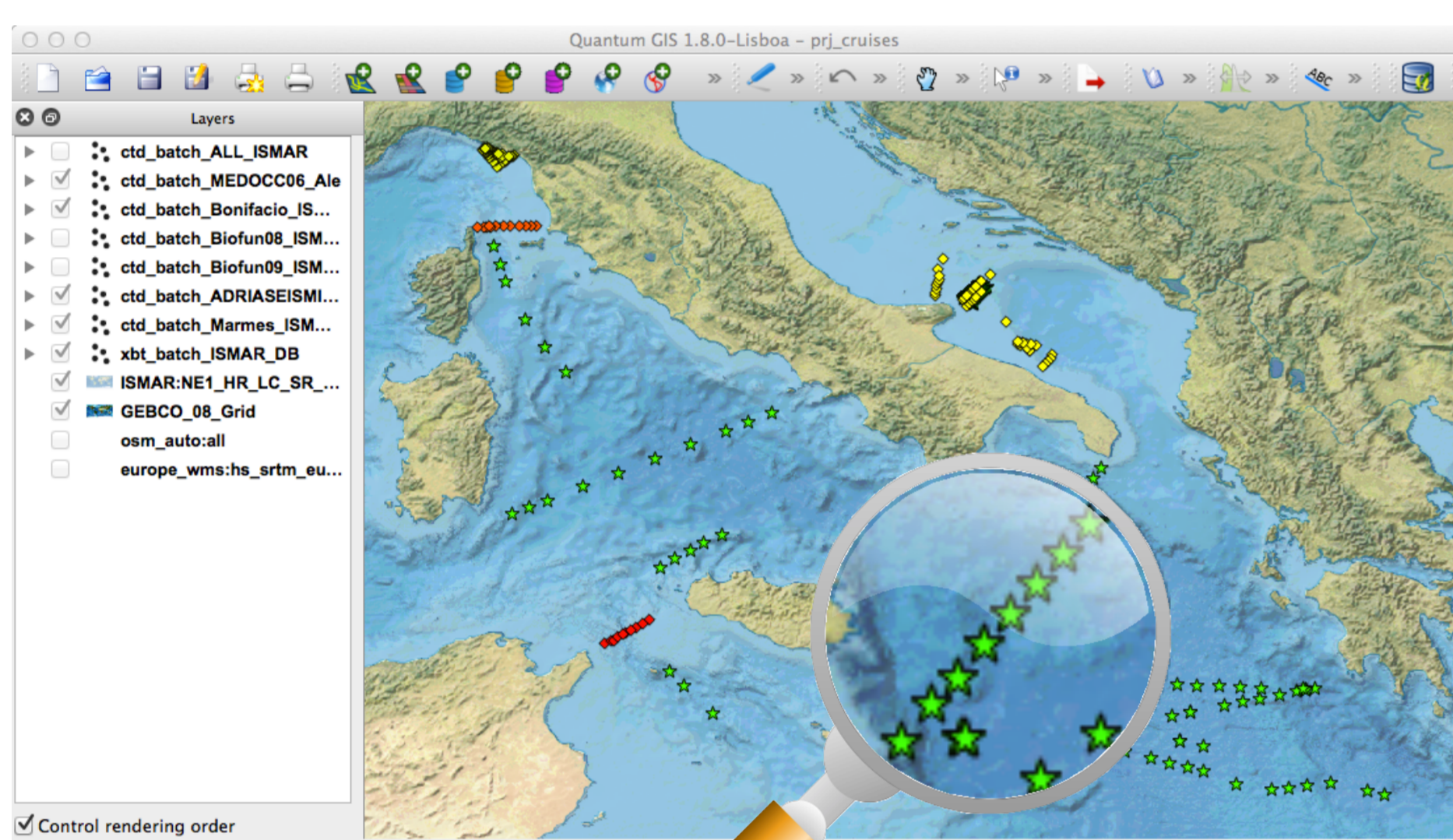
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ABSTRACT

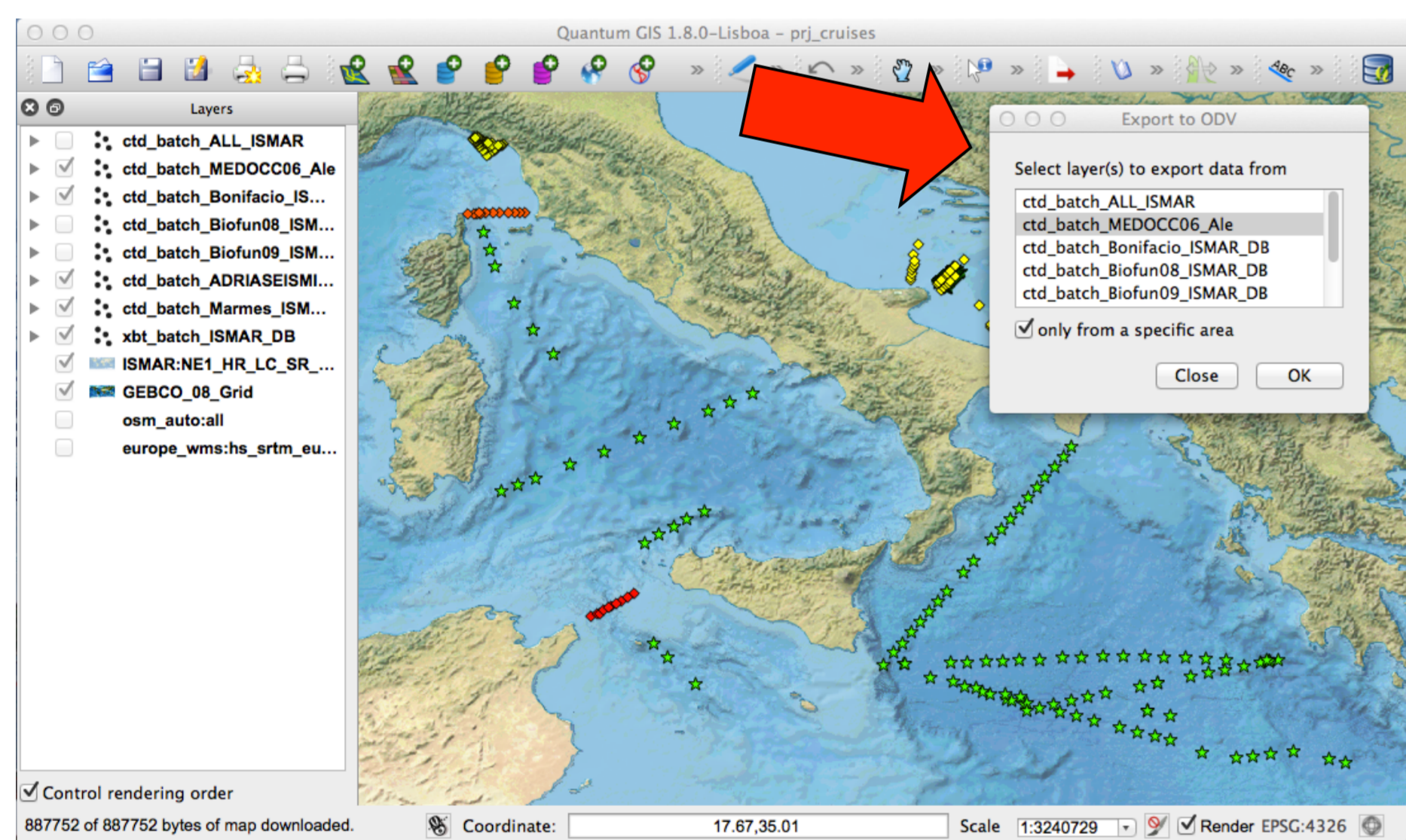
The management and storage of oceanographic data collected during dedicated in-situ surveys poses significant challenges, especially when their volume and variety are relevant. This study is aimed at providing a convenient way to access distributed data regarding hydrological vertical profiles, focusing on measurements from instruments like CTD and XBT. The principal idea is to make a concerted use of an open source GIS client (namely, Quantum GIS) and relational, ISO-19125-compliant data repositories. The adoption of a proper data/metadata model allows an effective access and browsing of the repositories' contents, and an ad-hoc plugin let the user export datasets made of elements selected from multiple sources, on a selected area, through the user-friendly GUI of the GIS client.

Metadata Browsing

CTD and XBT metadata can be browsed on a map, looking at the region(s) of interest.



Data selection for exportation is carried out both in a **cross-dataset** fashion, and pointing out also the specific geographical area.



Commitment to Open Source

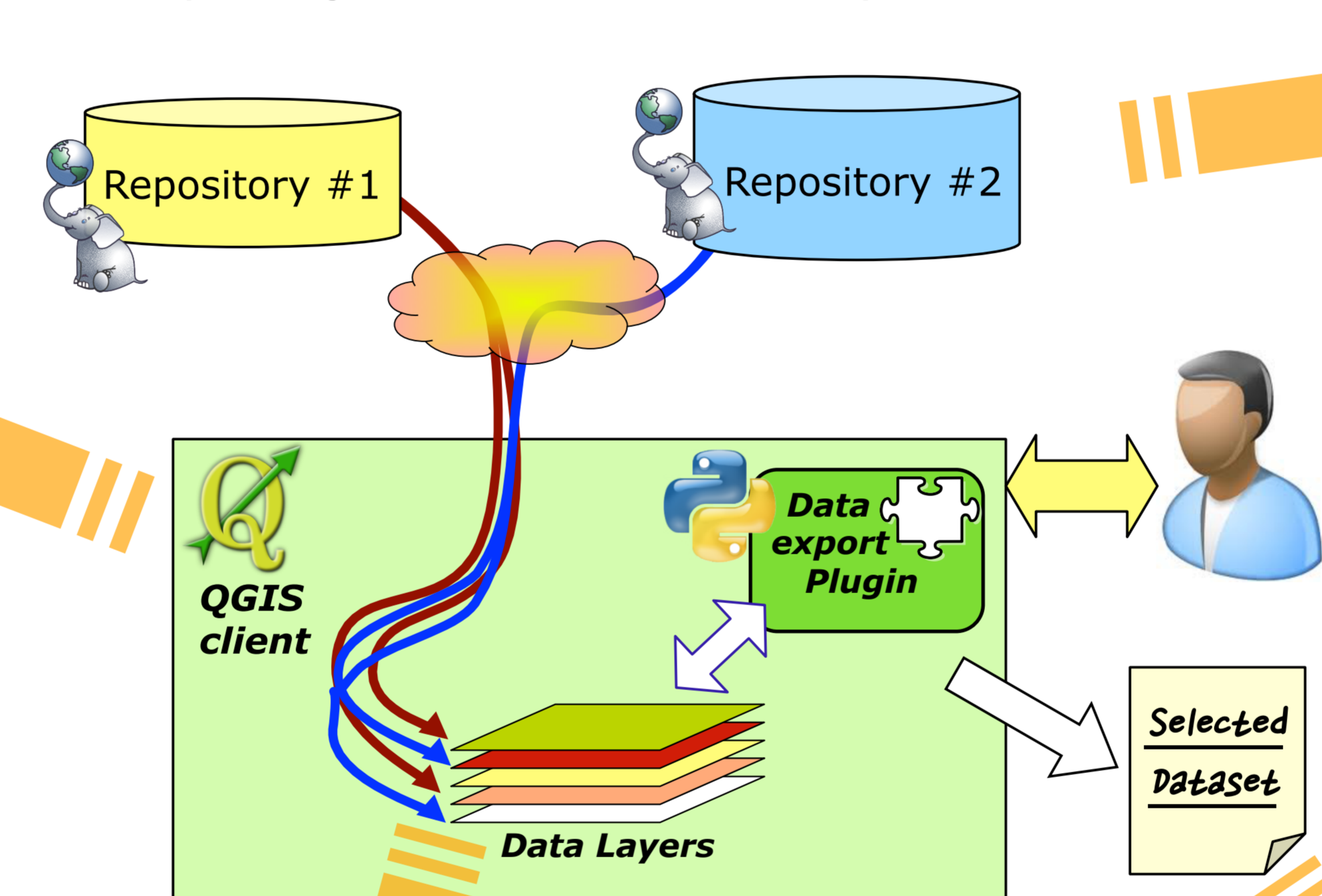
Only open source software has been used for the system components: the QGIS client platform, the PostgreSQL RDBMS, the PostGIS spatial DB, and Python (for plugin implementation).

References

- K.S. Baker, C.L. Chandler, "Enabling long-term Oceanographic Research: Changing Data Practices, Information Management Strategies and Informatics," Deep Sea Research Part II: Topical Studies in Oceanography 55 (18-19) (2008) 2132-2142, DOI: 10.1016/j.dsr2.2008.05.009
- A. Bechini, and A. Vetrano, "Management and Storage of In-situ Oceanographic Data: An ECM-based Approach," Information Systems, 28(3), May 2013, Elsevier, pp. 351-368 - DOI: 10.1016/j.is.2012.10.004
- U. Send, "In-situ Observations: Platforms and Techniques," in: E.P. Chassignet, J. Verron (Eds.), Ocean Weather Forecasting, Springer, 2006, pp. 191-206, DOI: 10.1007/1-4020-4028-8-7
- QuantumGIS Open-source Geographic Information System. URL: <http://qgis.org>

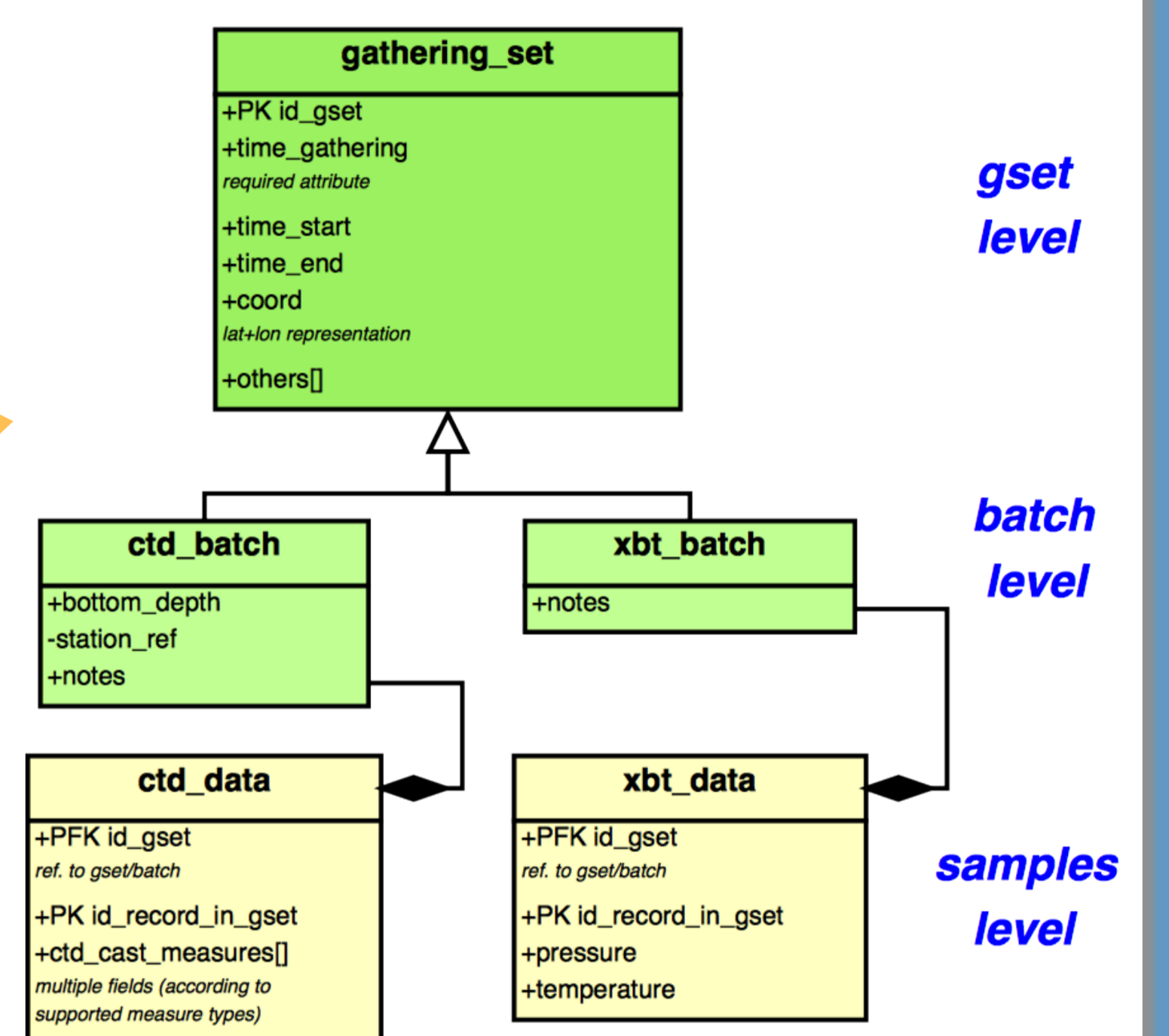
System Architecture

The GIS client can host layers with **content from different, distributed repositories**. Typically, each layer reports specifically chosen metadata. The desired dataset, which can include measurements from different sources, is **easily selected** on the basis of the graphically displayed metadata. A plugin is in charge of **retrieving all the fields** of the pertinent records from original data sources, and exporting them for further analyses.



Relational Data Model

The adopted relational model allows a **concerted management** of both **data and metadata**, properly relating them.



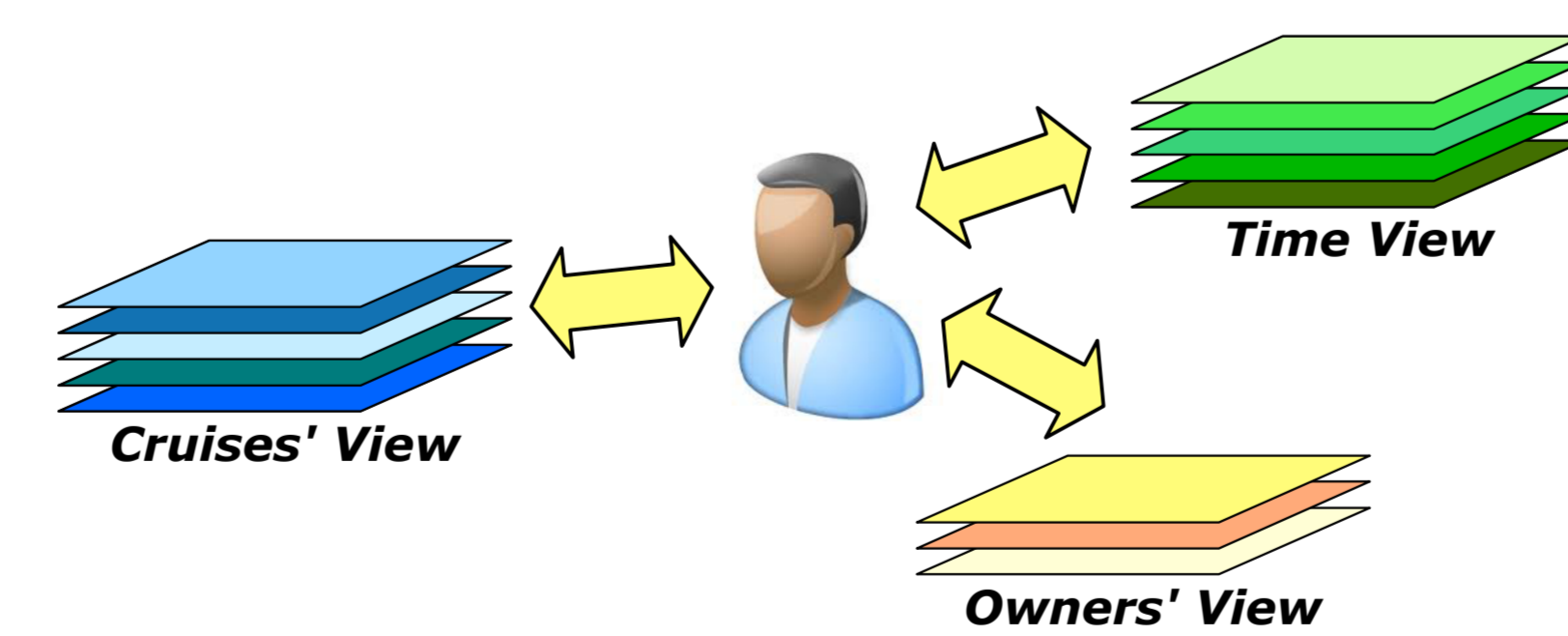
Data from the "samples level" are accessed and used only within the exportation process. This **avoids an excessive load** on the GIS client.

Layered Data Structuring

CTD and XBT casts are suitable to be easily located on a map: What casts to show?

GIS layers are used to organize metadata for the source datasets to display; each layer corresponds to a DBMS query.

Specific collections of layers can be prepared in this form to show particular **views of cross-source metadata**.



A collection of layers can be **shared** among people interested in that particular view. Data access control is transparently provided at the DBMS level.

Enabled Downstream Analysis

The exported cross-source dataset can be used for downstream analysis, by means of specific tools; the ODV format is one of the most popular in the oceanographic community, and it has been used for the charts below.

