

Z2: Data Management and Data Services

Georg Bareth and Olaf Bubenzer
Institute of Geography
University of Cologne



Z2

Overview

According to the DFG proposal guideline 60.06, it is expected that a CRC/TRR has a project section focusing on sustainable data storage and management.

The Z2 project facilitates the research within the CRC806 by providing data management infrastructure and services. The data management infrastructure implementation is the CRC806-Database (<http://crc806db.uni-koeln.de>), which is online since summer 2012.

Z2 consults and provides GIS- and remote sensing analyses and the acquisition and preparation of different high and low resolution satellite data for the CRC806 projects. Furthermore, using Terrestrial Laser Scanning (TLS), the creation of high resolution point clouds and surface models for different aims could be carried out.

Data Services

TLS field campaigns during Phase 1 of CRC806:

- **Jordan, 2010:** Together with project F1, a field campaign in Jordan was accomplished in March 2010 (Fig. 1). Additional geomorphological and archaeological investigations were carried out (Zielhofer et al., 2012).
- **Spain, 2012:** A survey of the Ardales Cave and the Las Palomas site (Spain) was completed in March 2011 together with the project C1 in order to determine extents and structures of both sites.
- **Egypt, 2012:** In order to calculate the dimensions of the Sodmein Cave, a TLS- and DGPS-survey was conducted in late April 2011 in cooperation with project A1 (see Fig. 2).



Fig. 1: TLS Campaign Jordan 2010.

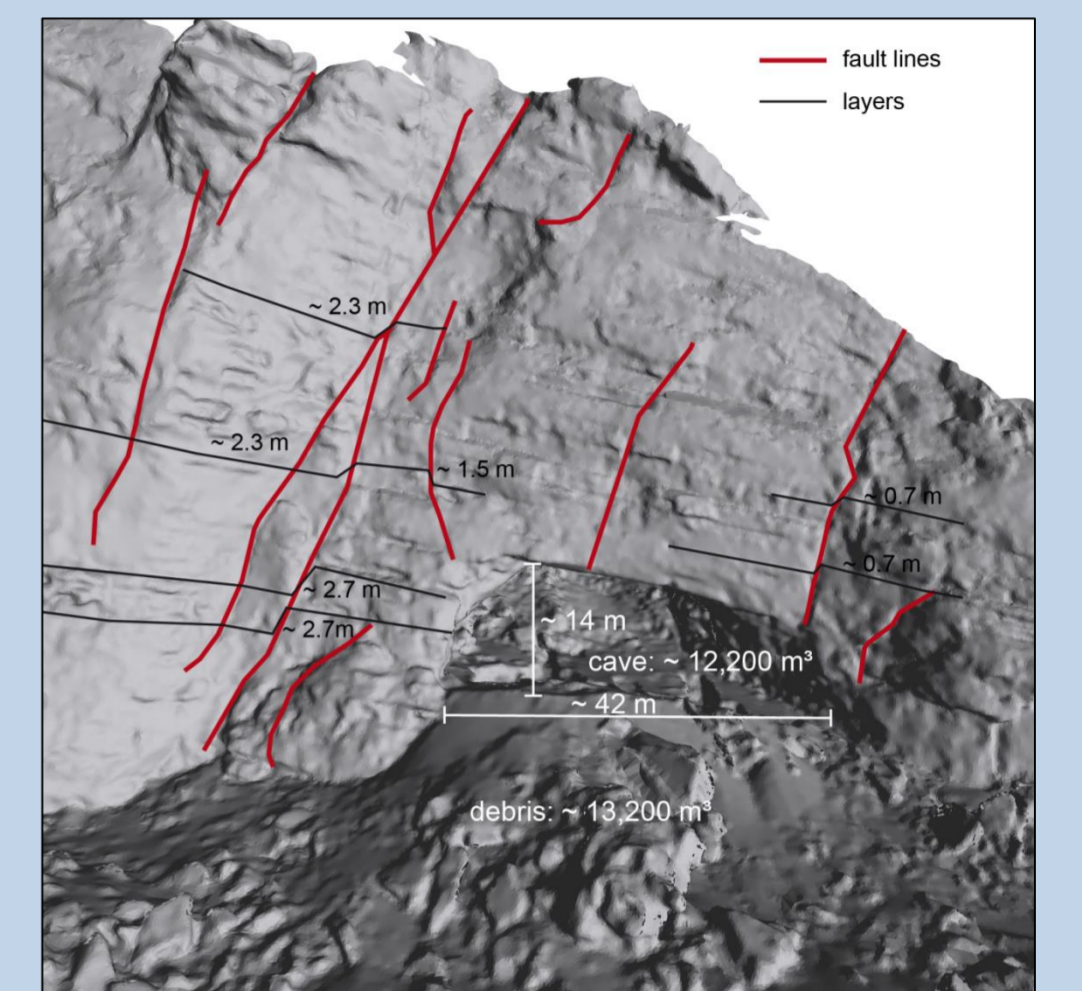


Fig. 2: 3D Analysis of the Sodmein Cave, Egypt.

Data acquisition and GIS-analyses for several regions and for several CRC-projects were carried out during the first phase. Selected topics are the

- **acquisition of high resolution satellite data** of GeoEye and WorldView I / II data for field campaigns,
- **deriving digital elevation models from stereo satellite data** of WorldView II data for Sodmein Cave region in Egypt,
- **GIS-analyses of bathymetric data** for coast lines in the Mediterranean Sea
- and **GIS-analyses of archaeological findings** on the Iberian Peninsula.



Fig. 3: Layout of a CRC806 field map.

Data Management

Hosted at the Regional Computing Centre of the University of Cologne (RRZK), the CRC806-Database provides a platform for data publication, data archiving and a comprehensive integrated data base to facilitate the research within the CRC 806.

System Architecture

The CRC806-Database is built by integrating high quality Open-Source Software Products. The CRC806-Database System can profit from the on-going developments of the integrated software products and can provide additional features regularly. The web site is based on the Typo3 CMS, the Spatial Data Infrastructure (SDI) is implemented using MapServer and MapProxy, the data catalog is implemented using CKAN and the complete system is hosted and maintained on the server infrastructure of the RRZK.

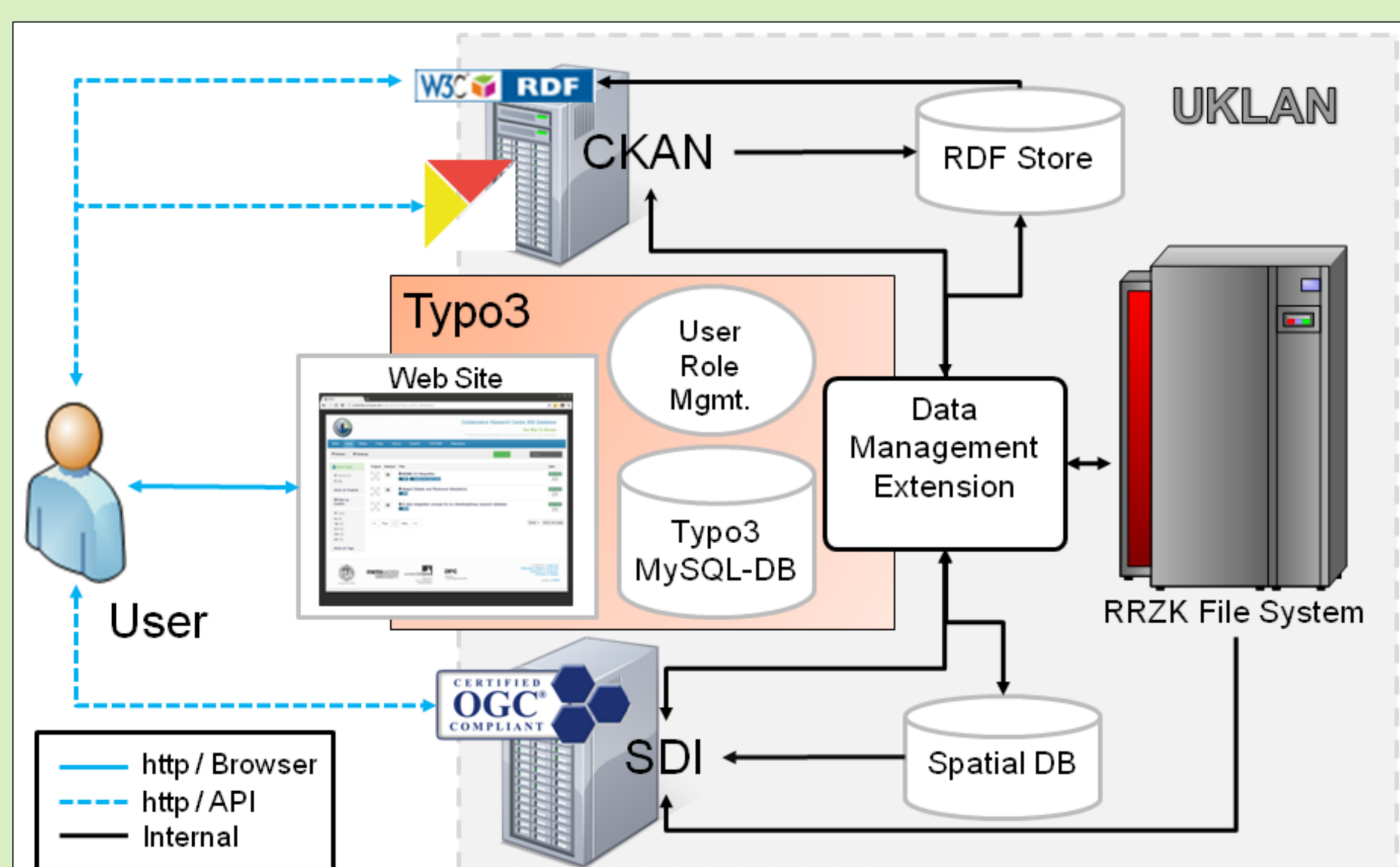


Fig. 4: System Architecture of the CRC806-Database.

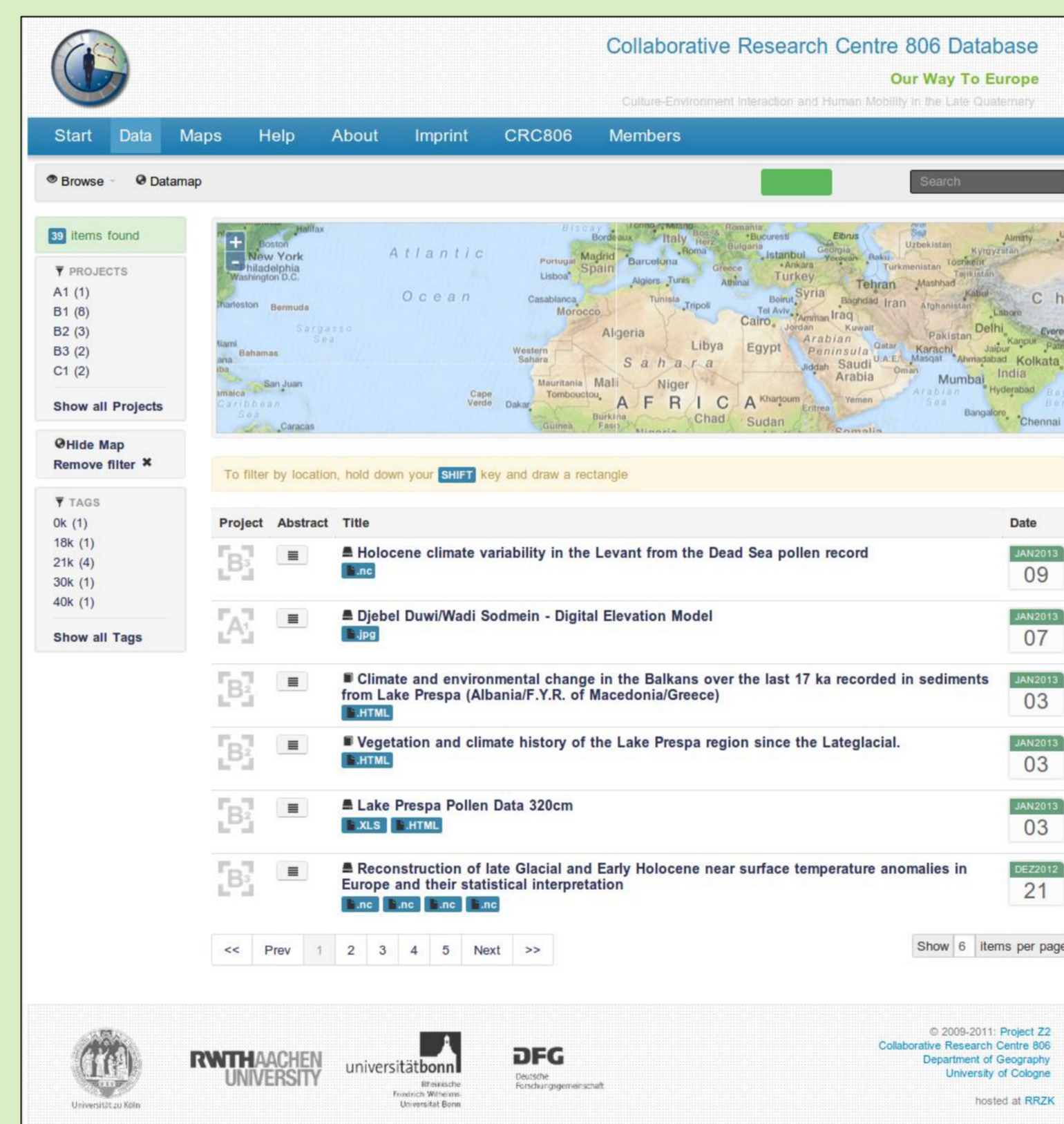


Fig. 5: Data Catalog Interface.

Integrated Database

As a basis for palaeoenvironmental and palaeo-anthropological modelling, analysis and research in general, we integrate existing published databases and datasets into a comprehensive palaeodatabase (Fig. 6) by applying a sophisticated semantic web technology approach (Willmes et al. 2012).

Repositories:

- PMIP II
- Stage3
- NOAA WDC Palaeo
- EPD
- NESPOS
- PACEA

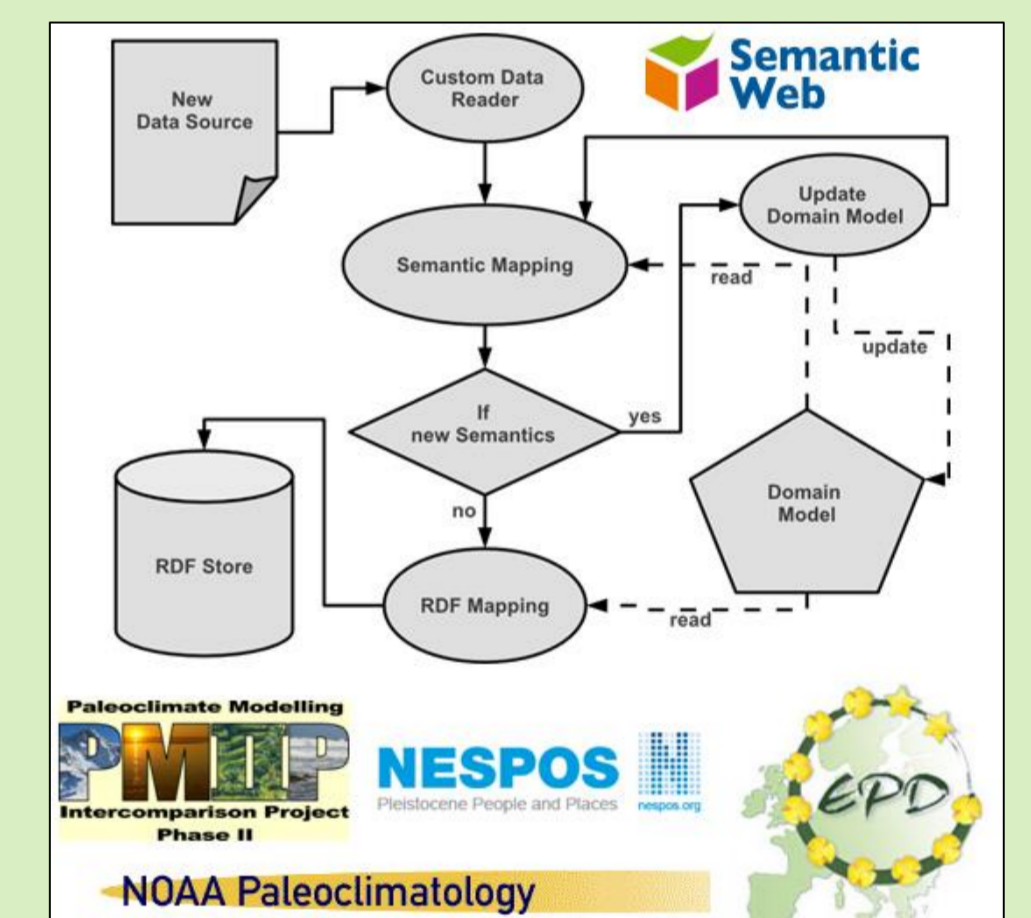


Fig. 6: Data Integration Concept.

Data Publication and Archive

The Open-Source data portal platform CKAN is facilitated to implement the data catalog and the metadata management of the research data. CKAN provides a comprehensive set of interfaces to access, browse and filter the data. Furthermore, the data is offered via the CKAN REST API and a OGC CSW interface, to allow automated access to the data.

The data is stored in a secured redundant backup file system managed by the RRZK, and will be available for at least 10 years after end of funding of the CRC 806.

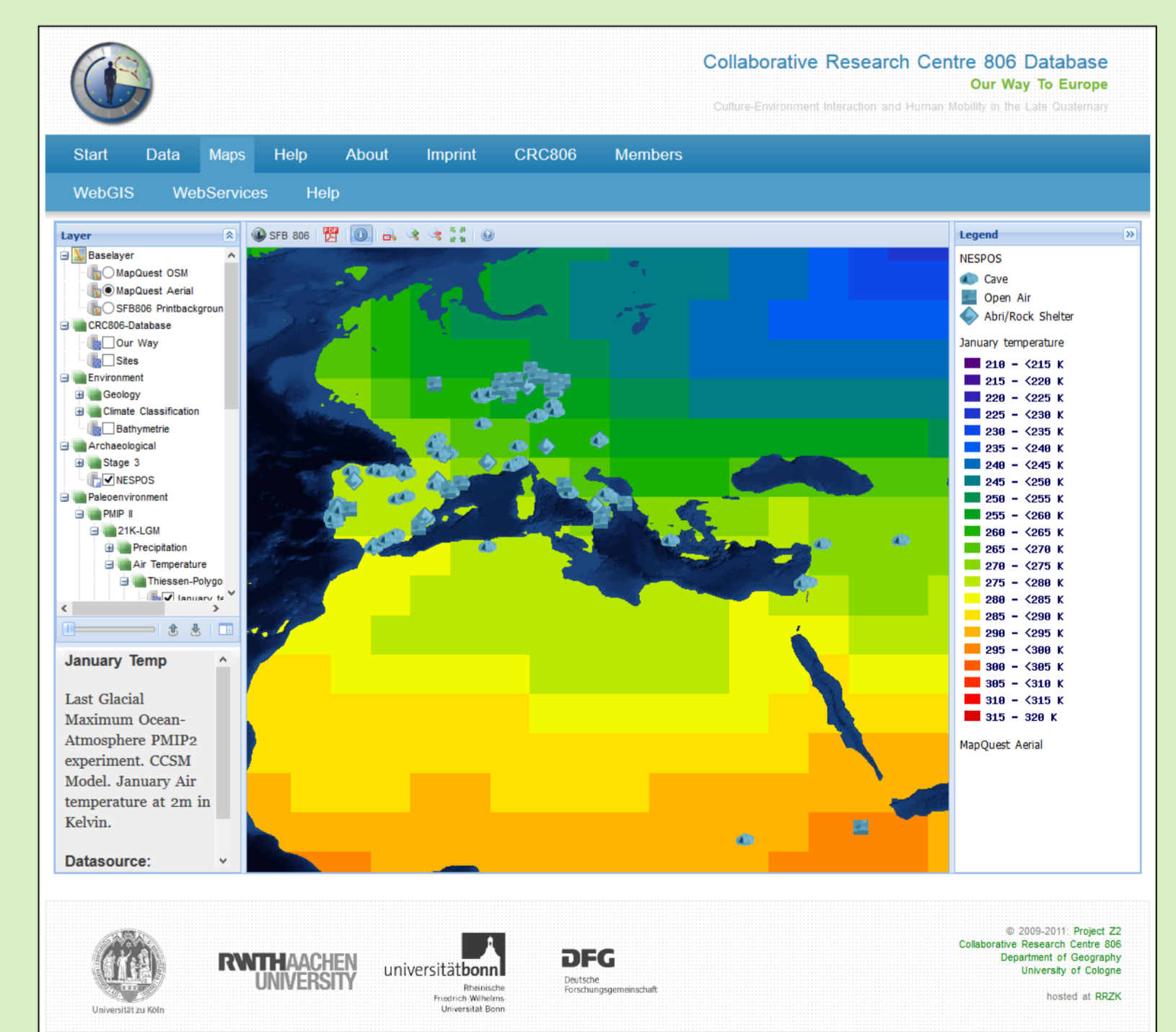


Fig. 7: WebGIS Interface.

Outlook 2nd Phase

The major goal of Z2 is to ensure long-term data storage and access of all CRC 806 project data.

Ten major tasks have been identified for the 2nd phase:

- 1) providing general data base services like user management, metadata etc.,
- 2) upload and integration of all sub-project data of the 1st phase,
- 3) training of the new CRC806DB users,
- 4) development/implementation of CRC806 data domain models,
- 5) implementation of web processing (e.g. interactive GIS analysis),
- 6) data integration of further data sources,
- 7) WebGIS development (e.g. temporal filters, web processing),
- 8) GIS, TLS, and remote sensing services,
- 9) providing services for highest resolution imagery (UAV-based),
- 10) organizing the 3rd (2014) and 4th (2016) Data Management Workshop in Cologne.

References

- Bareth, G. (2009): GIS- and RS-based spatial decision support: Structure of a Spatial Environmental Information System (SEIS). - Int. J. Digital Earth., Vol. 2(2), 134-154 pp.
- Curdt, C. and Bareth, G. (eds.) (2010): Proceedings of the Data Management Workshop, 29.-30.10.2009, University of Cologne, Germany. Kölner Geographische Arbeiten, H. 90, 154 p.
- Lenz-Wiedemann, V.I.S., and Bareth, G. (eds) (2011): Proceedings of the Workshop on Remote Sensing Methods for Change Detection and Process Modelling, 18-19 November 2010, University of Cologne, Germany. Kölner Geographische Arbeiten 92.
- Willmes, C., Brooks, S., Hoffmeister, D., Hütt, C., Kürner, D., Volland, K., Bareth, G. (2012): Facilitating integrated spatio-temporal visualization and analysis of heterogeneous archaeological and palaeoenvironmental research data. ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci. I-2, 223-228. DOI: 10.5194/isprsannals-I-2-223-2012
- Willmes, C. and Bareth, G. (2012): A data integration concept for an interdisciplinary research database. In: Proceedings of the Young Researchers forum on Geographic Information Science - GI Zeitgeist, igiPrints 44, Münster, Germany, March 2012, ISBN: 978-3-89838-663-0, Akademische Verlagsgesellschaft AKA, Heidelberg, pp. 67 – 72.
- Zielhofer C., Clare, L., Rolfe, G., Wachter, S., Hoffmeister D., Bareth, G., Roettig, C., Bullmann, H., Schneider, B., Berke, H. & Weninger, B. (2012): The decline of the early Neolithic population center of 'Ain Ghazal and corresponding earth-surface processes, Jordan Rift Valley. - Quaternary Research 78 (3): 427-441. doi: 10.1016/j.yqres.2012.08.006

