# An introduction to and overview of the CRC806-Database

**Christian Willmes (c.willmes@uni-koeln.de)**

# Content

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- What is the CRC806-Database about?

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- Research Data Management in CRC’s.

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- Technical overview of the CRC806-Database.
- Practical Example (creating a new dataset).
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- DFG funded CRCs are encouraged to conduct a so called INF project.



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crc806db.uni-koeln.de

# What is the CRC806-Database?

- DFG funded CRCs are encouraged to conduct a so called INF project.
- INF projects are funded to take care of Information Infrastructure and Research Data Management needs of a CRC.



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# What is the CRC806-Database?

- DFG funded CRCs are encouraged to conduct a so called INF project.
- INF projects are funded to take care of Information Infrastructure and Research Data Management needs of a CRC.
- This includes implementation and maintenance of a Research Data Management Infrastructure, like the CRC806-Database.



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- INF projects are funded to take care of Information Infrastructure and Research Data Management needs of a CRC.
- This includes implementation and maintenance of a Research Data Management Infrastructure, like the CRC806-Database.
- INF Projects can set their own accents and agenda for the development of the RDM infrastructure.



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# History and evolution of the CRC806-Database

## 1st CRC 806 Phase



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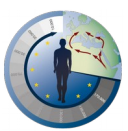

# History and evolution of the CRC806-Database

## 1st CRC 806 Phase

- 2009: Start of CRC 806.





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## 1st CRC 806 Phase

- 2009: Start of CRC 806.
- 2010: First version of CRC806-Database online.
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# History

## 1st CRC 80

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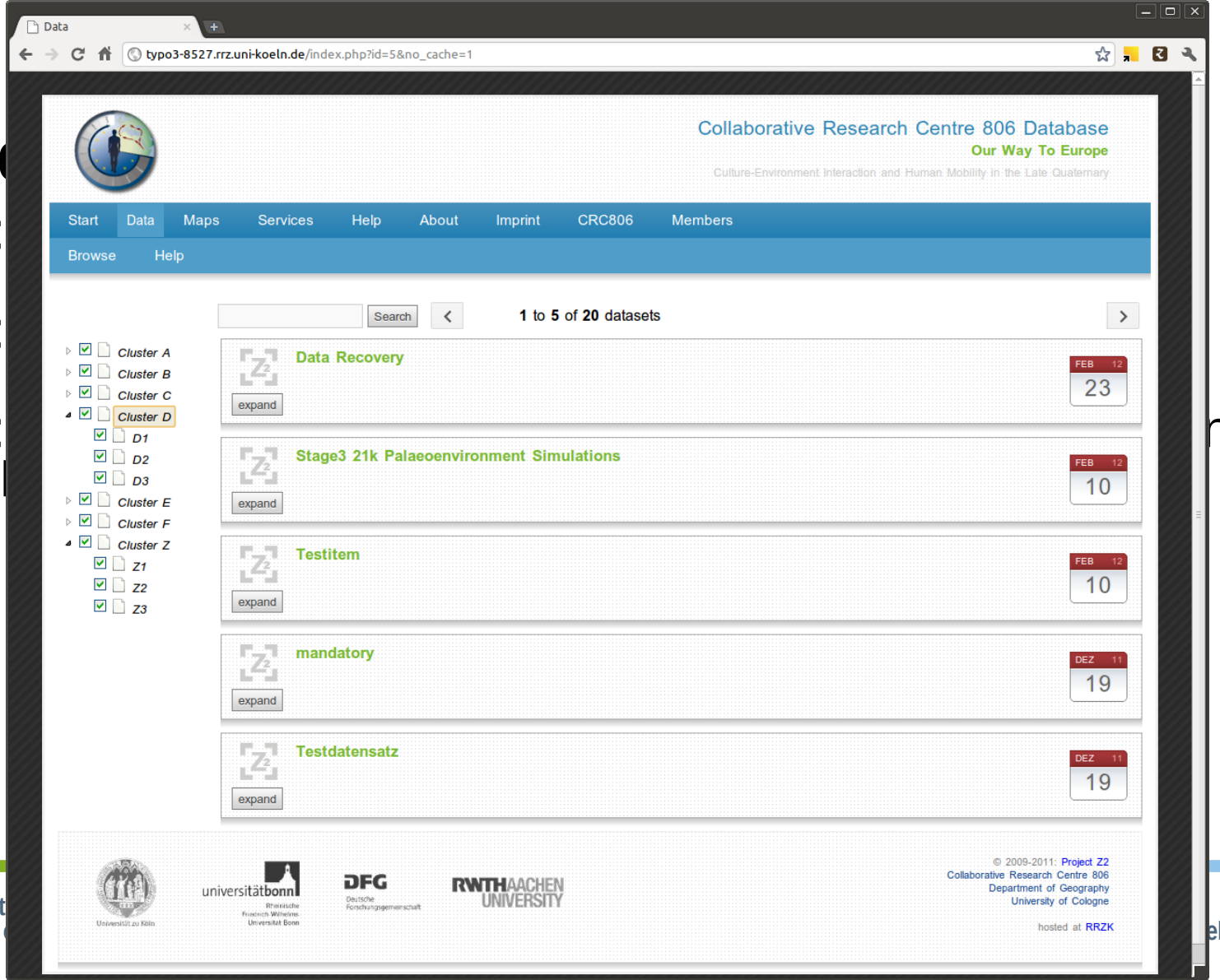

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- 2013: WebGIS+SDI component online (Mapserver + Openlayers).





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# History and

## 1st CRC 806 P

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- 2013: CR
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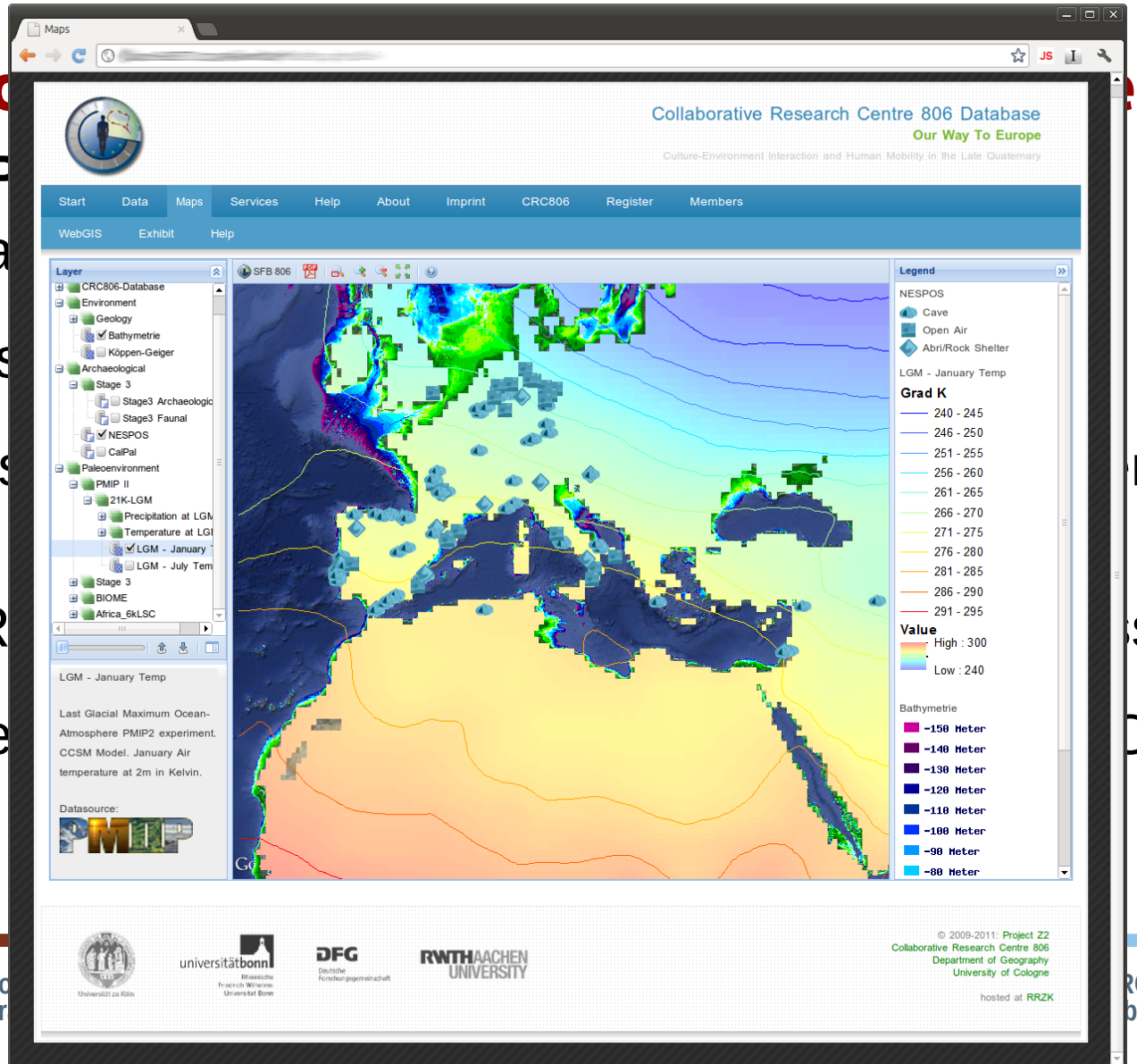

# History and evolution of the CRC806-Database

## 2nd CRC 806 Phase





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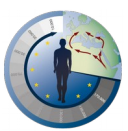

# History and evolution of the CRC806-Database

## 2nd CRC 806 Phase

- 2014: Publication database established (records on IRTG and sfb806.de).

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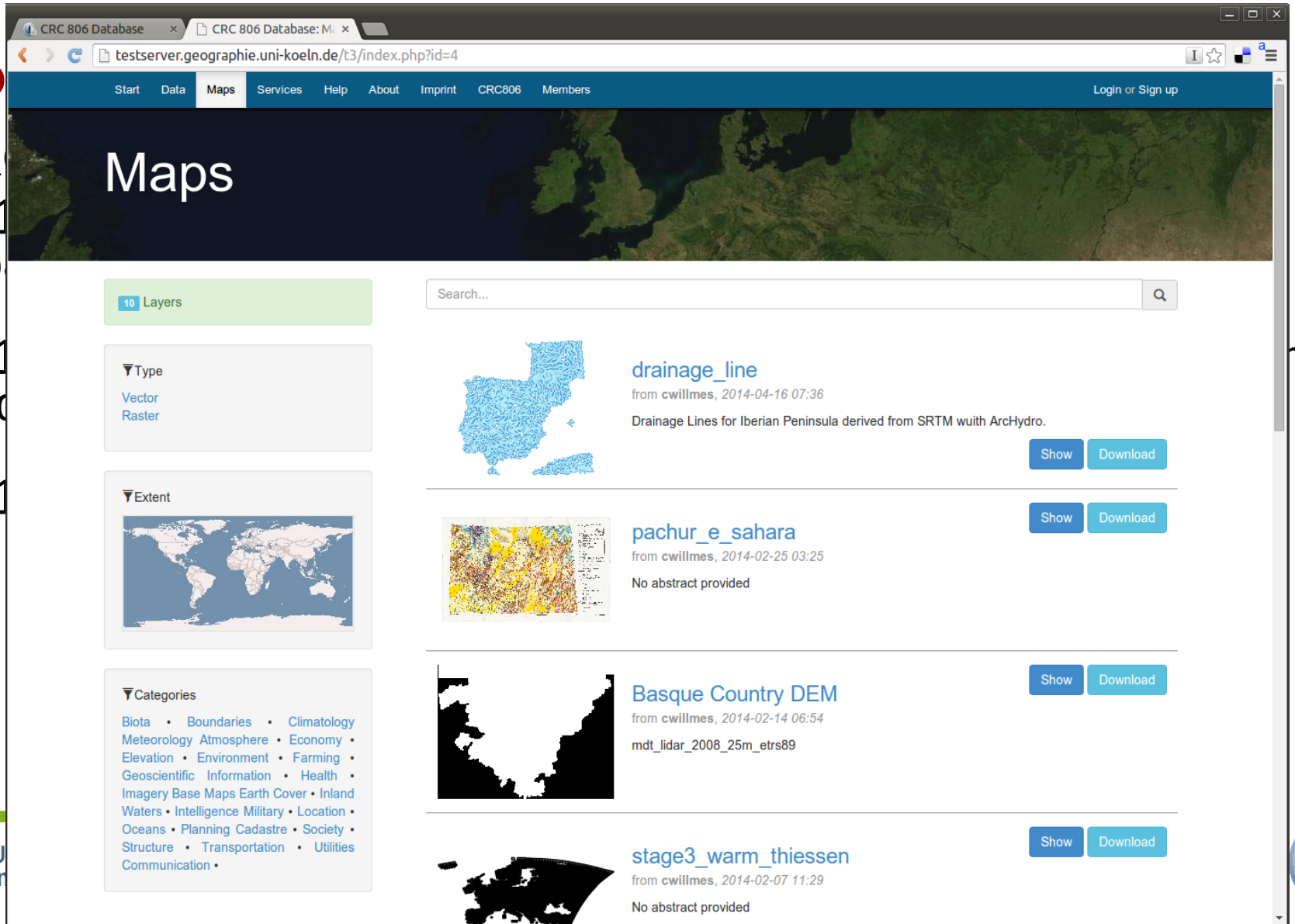

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- 2016: Sites DB.





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- 2015: SDI change to GeoNode.
- 2016: Sites DB.
- 2017: PaleoMaps.

# History and evolution of the CRC806-Database

## 3rd CRC 806 Phase

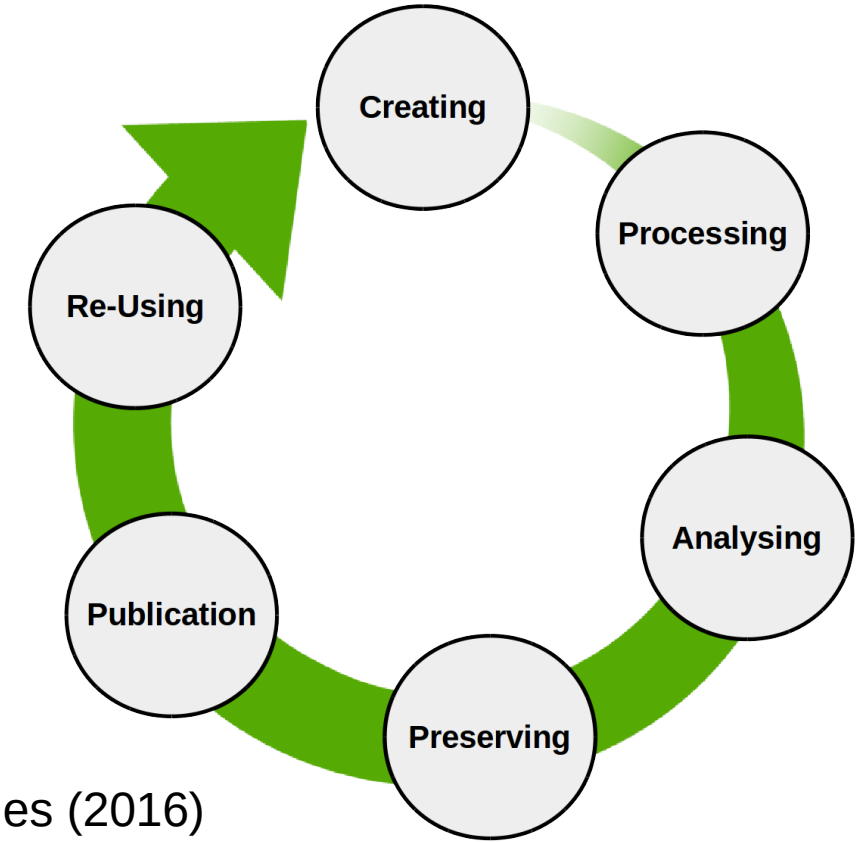
# History and evolution of the CRC806-Database

## 3rd CRC 806 Phase

- 2018: Progressive Web App.

# Research Data Management in CRCs

*Research data management concerns the organization of data, from its entry to the research cycle through to the dissemination and archiving of valuable results.*




Willmes (2016)

# Research Data Management in CRCs

*Other example RDM Projects:*

- ROCEEH ROAD DB
- Transregio 32 - TR32DB





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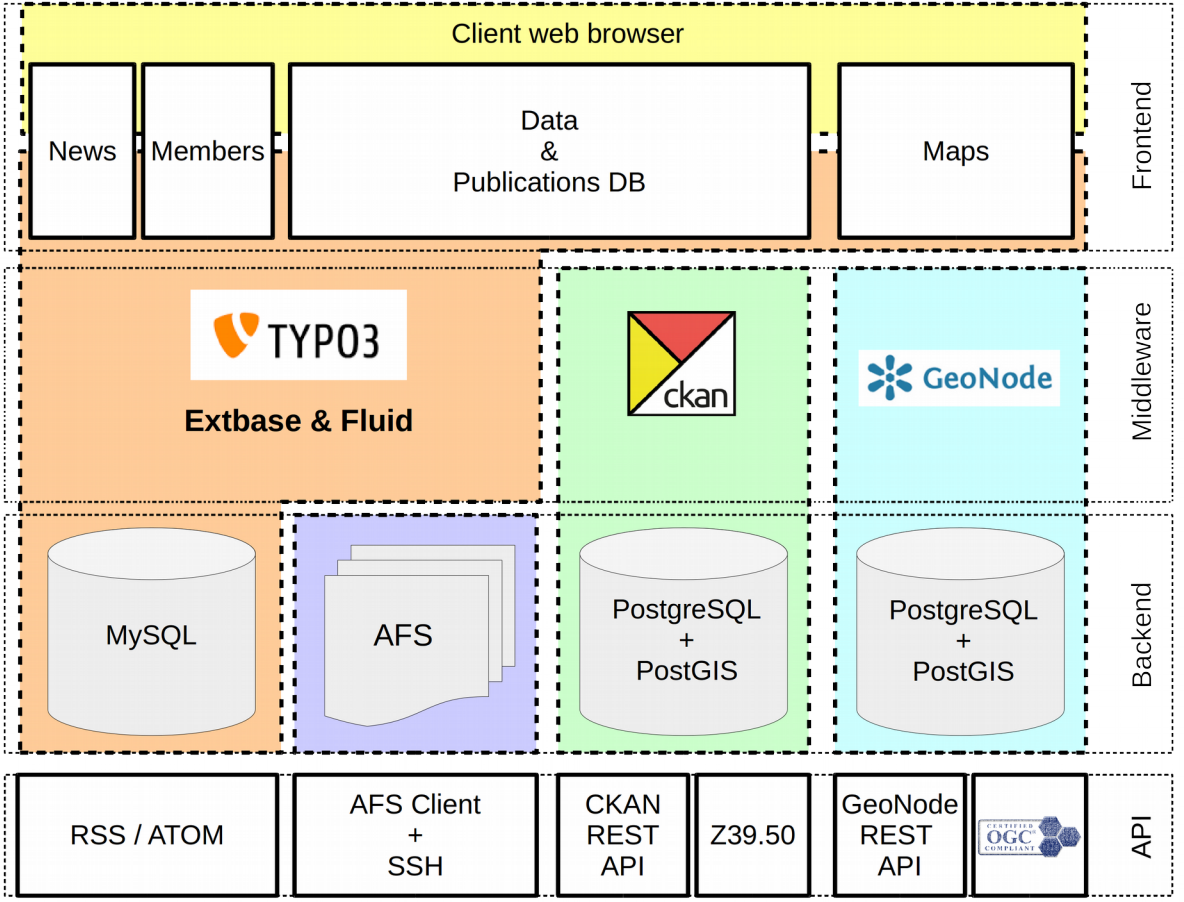
# Components of the CRC806-Database

- Data catalogue
- Publications DB
- Maps (Spatial Data Infrastructure)
- Sites DB



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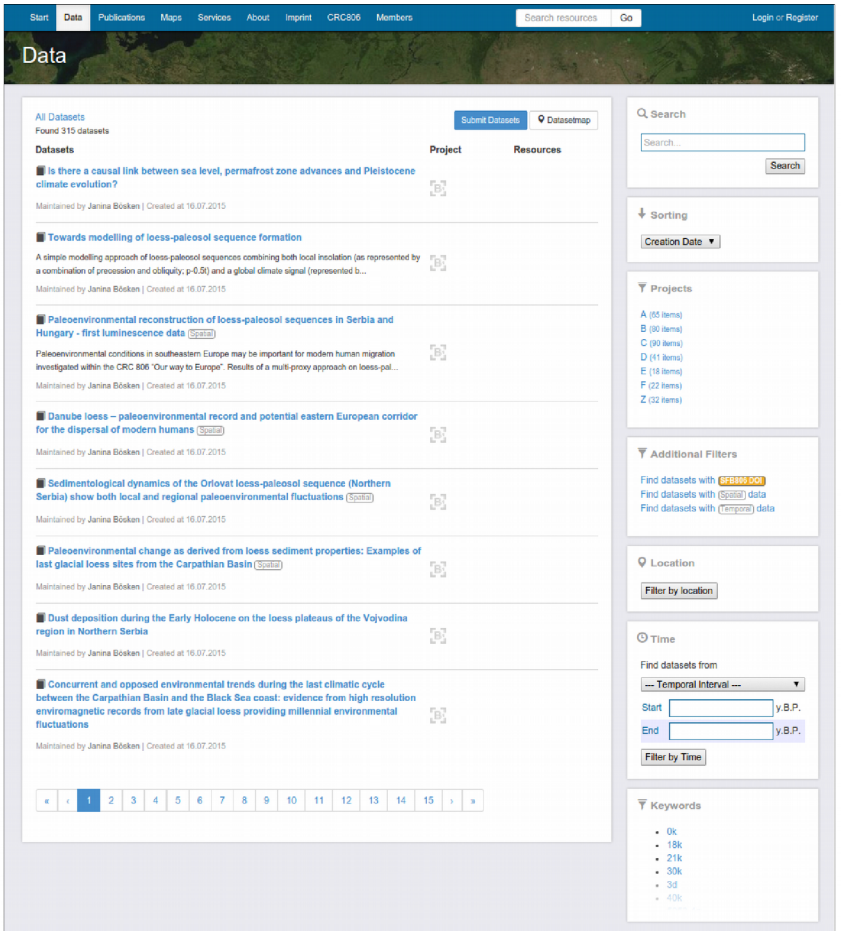
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Paleoenvironmental change as derived from loess sediment properties: Examples of last glacial loess sites from the Carpathian Basin
Spatial
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Dust deposition during the Early Holocene on the loess plateaus of the Vojvodina region in Northern Serbia
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Concurrent and opposed environmental trends during the last climatic cycle between the Carpathian Basin and the Black Sea coast: evidence from high resolution enviromagnetic records from late glacial loess providing millennial environmental fluctuations
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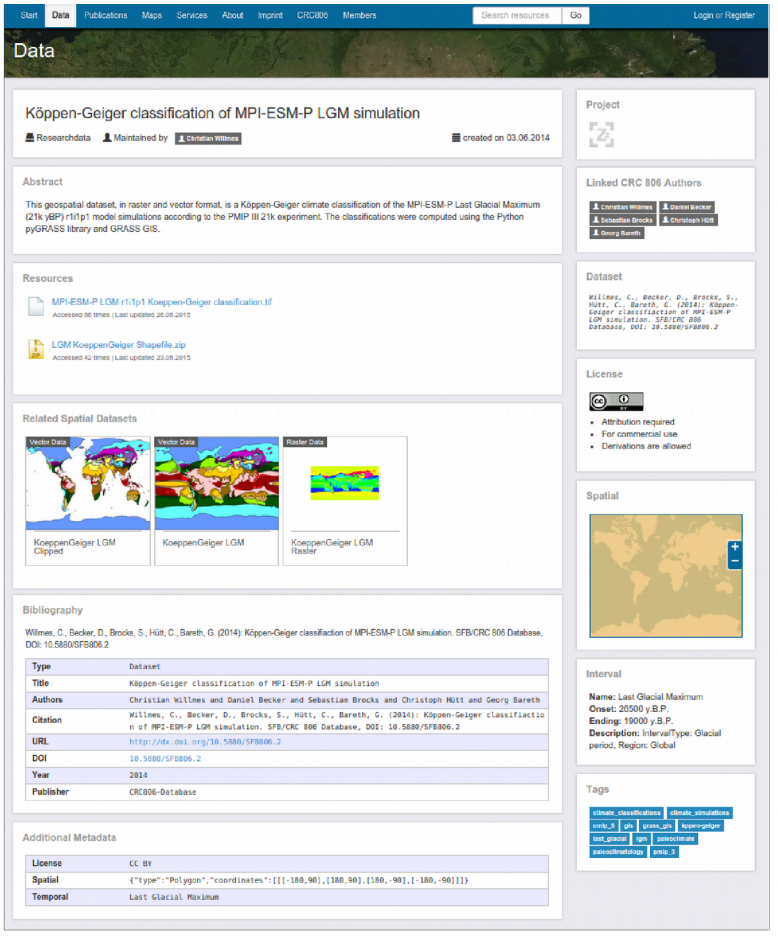
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Data
Köppen-Geiger classification of MPI-ESM-P LGM simulation
Researchdata
Maintained by
Christian Willmes
created on 03.06.2014
Abstract
This geospatial dataset, in raster and vector format, is a Köppen-Geiger climate classification of the MPI-ESM-P Last Glacial Maximum (21k yBP) r1i1p1 model simulations according to the PMIP III 21k experiment. The classifications were computed using the Python pyGRASS library and GRASS GIS.
Resources
MPI-ESM-P LGM r1i1p1 Koeppen-Geiger classification.tif
Accessed 66 times | Last updated 26.06.2015
LGM KoeppenGeiger Shapefile.zip
Accessed 42 times | Last updated 23.06.2015
Related Spatial Datasets
Vector Data
KoeppenGeiger LGM Clipped
Vector Data
KoeppenGeiger LGM
Raster Data
KoeppenGeiger LGM Raster
Bibliography
Willmes, C., Becker, D., Brocks, S., Hütt, C., Bareth, G. (2014): Köppen-Geiger classification of MPI-ESM-P LGM simulation. SFB/CRC 806 Database, DOI: 10.5880/SFB806.2
Type
Dataset
Title
Köppen-Geiger classification of MPI-ESM-P LGM simulation
Authors
Christian Willmes and Daniel Becker and Sebastian Brocks and Christoph Hütt and Georg Bareth
Citation
Willmes, C., Becker, D., Brocks, S., Hütt, C., Bareth, G. (2014): Köppen-Geiger classificatio n of MPI-ESM-P LGM simulation. SFB/CRC 806 Database, DOI: 10.5880/SFB806.2
URL
http://dx.doi.org/10.5880/SFB806.2
DOI
10.5880/SFB806.2
Year
2014
Publisher
CRC806-Database
Additional Metadata
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CC BY
Spatial
{"type":"Polygon","coordinates":[[[-180,90],[180,90],[180,-90],[-180,-90]]]}
Temporal
Last Glacial Maximum
Project
Linked CRC 806 Authors
Christian Willmes
Daniel Becker
Sebastian Brocks
Christoph Hütt
Georg Bareth
Dataset
Willmes, C., Becker, D., Brocks, S., Hütt, C., Bareth, G. (2014): Köppen-Geiger classification of MPI-ESM-P LGM simulation. SFB/CRC 806 Database, DOI: 10.5880/SFB806.2
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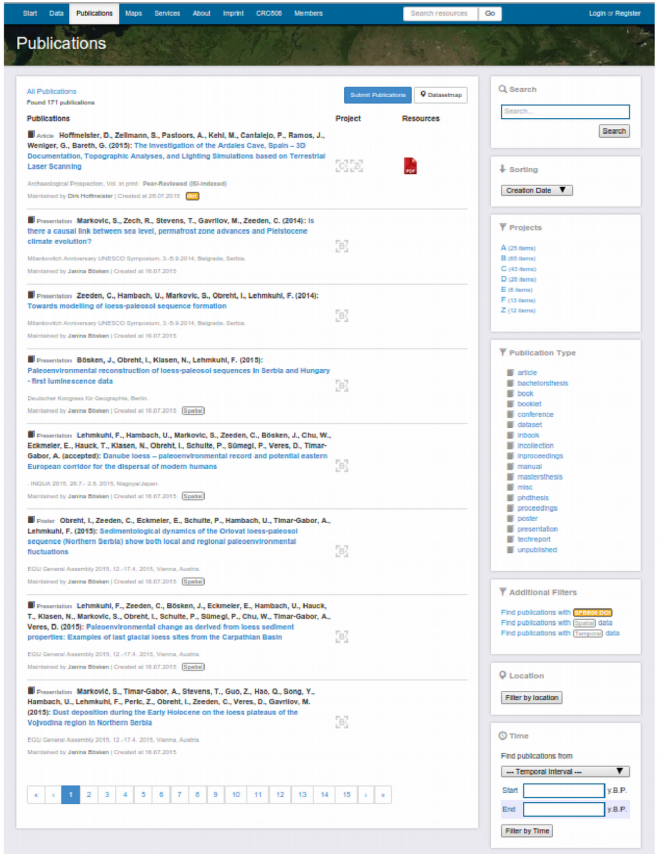
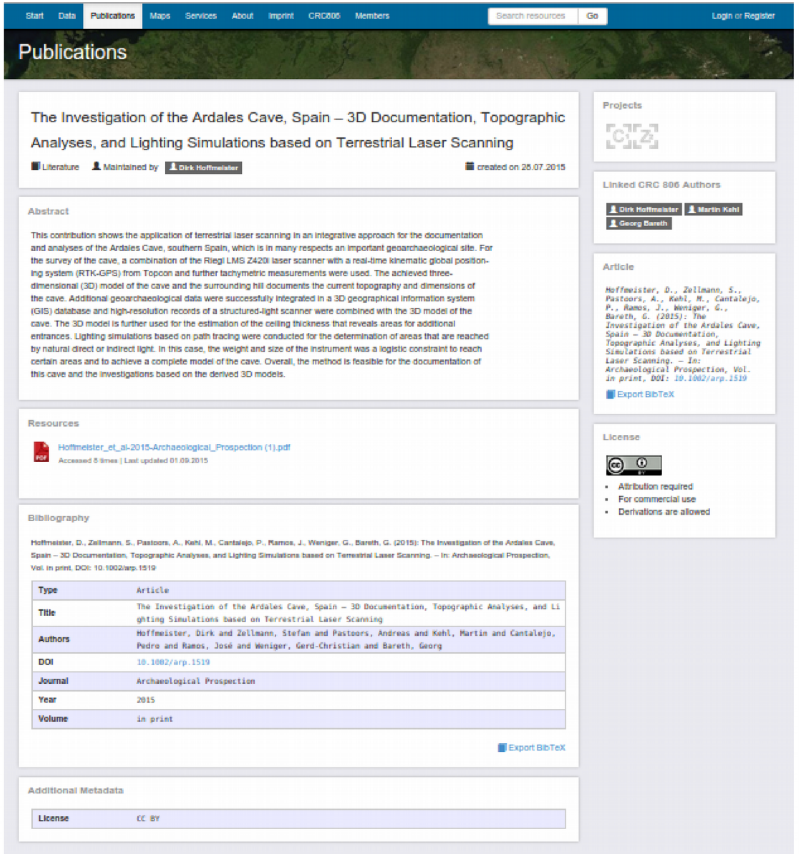
Spatial
Interval
Name: Last Glacial Maximum
Onset: 26500 y.B.P.
Ending: 19000 y.B.P.
Description: IntervalType: Glacial period, Region: Global
Tags
climate_classifications
climate_simulations
cmip_5
gis
grass_gis
koppen-geiger
last_glacial
lgm
paleoclimate
paleoclimatology
pmip_3

# Publications



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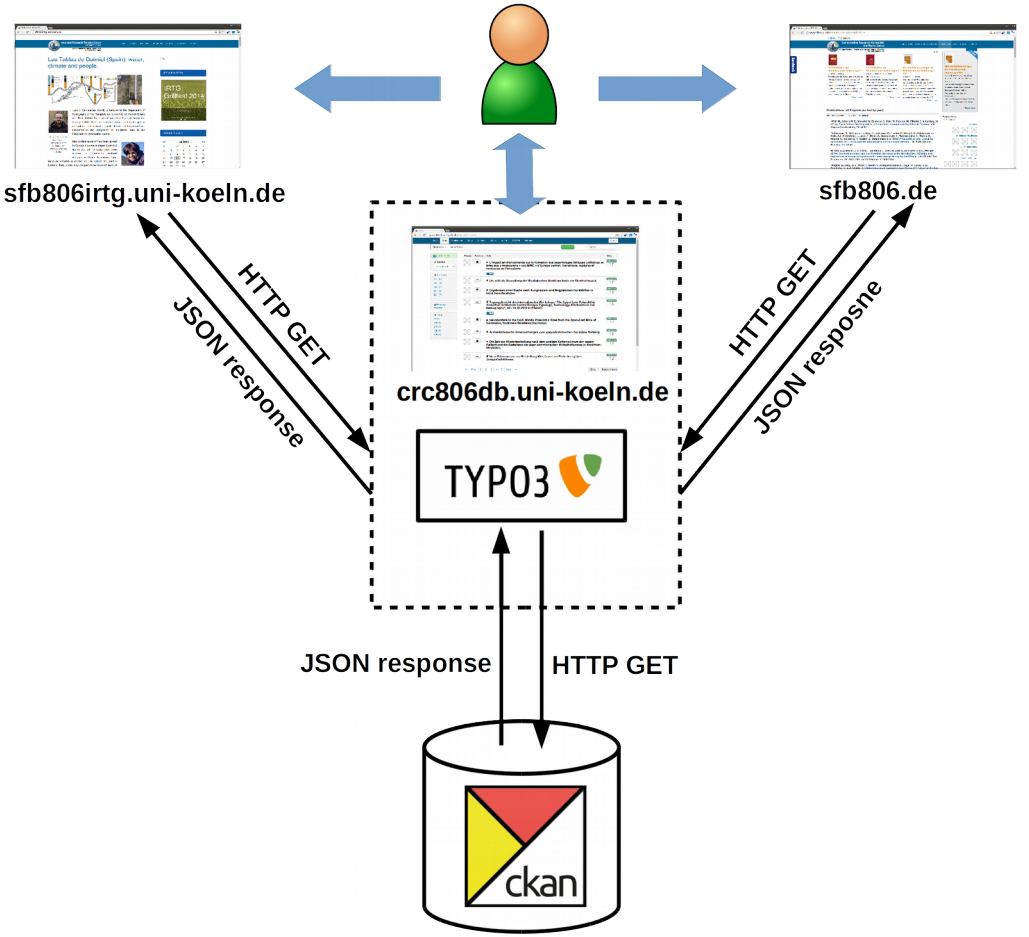
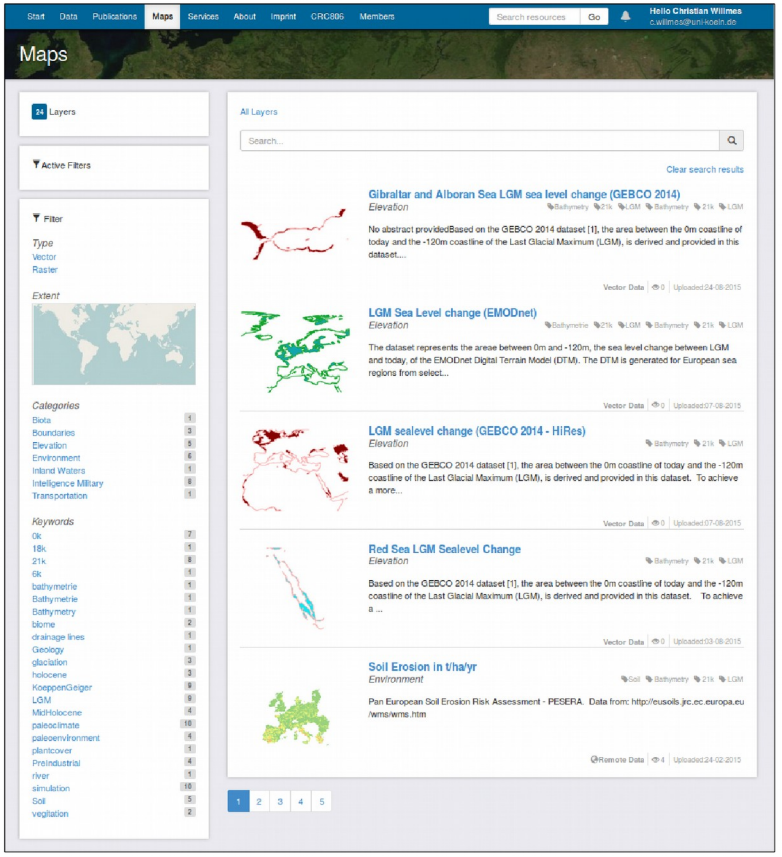


# Maps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glaciation
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paleoclimate
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plantcover
PreIndustrial
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Gibraltar and Alboran Sea LGM sea level change (GEBCO 2014)
Elevation
No abstract providedBased on the GEBCO 2014 dataset [1], the area between the 0m coastline of today and the -120m coastline of the Last Glacial Maximum (LGM), is derived and provided in this dataset....
LGM Sea Level change (EMODnet)
Elevation
The dataset represents the areae between 0m and -120m, the sea level change between LGM and today, of the EMODnet Digital Terrain Model (DTM). The DTM is generated for European sea regions from select...
LGM sealevel change (GEBCO 2014 - HiRes)
Elevation
Based on the GEBCO 2014 dataset [1], the area between the 0m coastline of today and the -120m coastline of the Last Glacial Maximum (LGM), is derived and provided in this dataset. To achieve a more...
Red Sea LGM Sealevel Change
Elevation
Based on the GEBCO 2014 dataset [1], the area between the 0m coastline of today and the -120m coastline of the Last Glacial Maximum (LGM), is derived and provided in this dataset. To achieve a ...
Soil Erosion in t/ha/yr
Environment
Pan European Soil Erosion Risk Assessment - PESERA. Data from: http://eusoils.jrc.ec.europa.eu/wms/wms.htm
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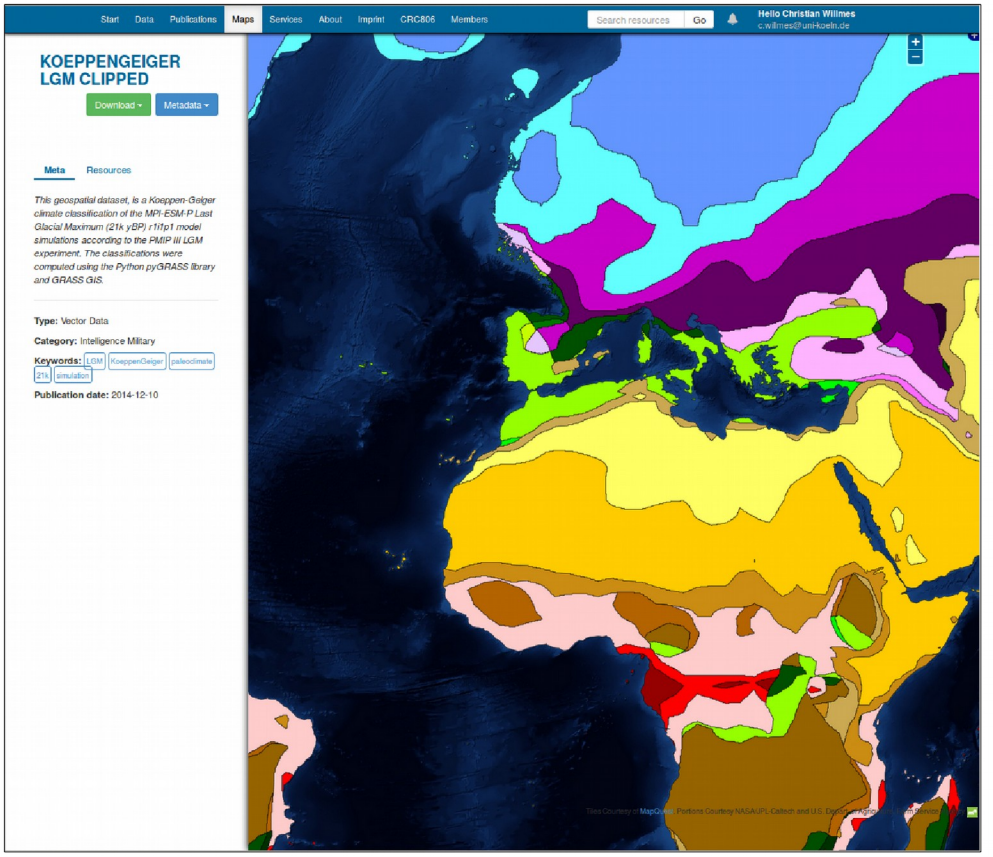
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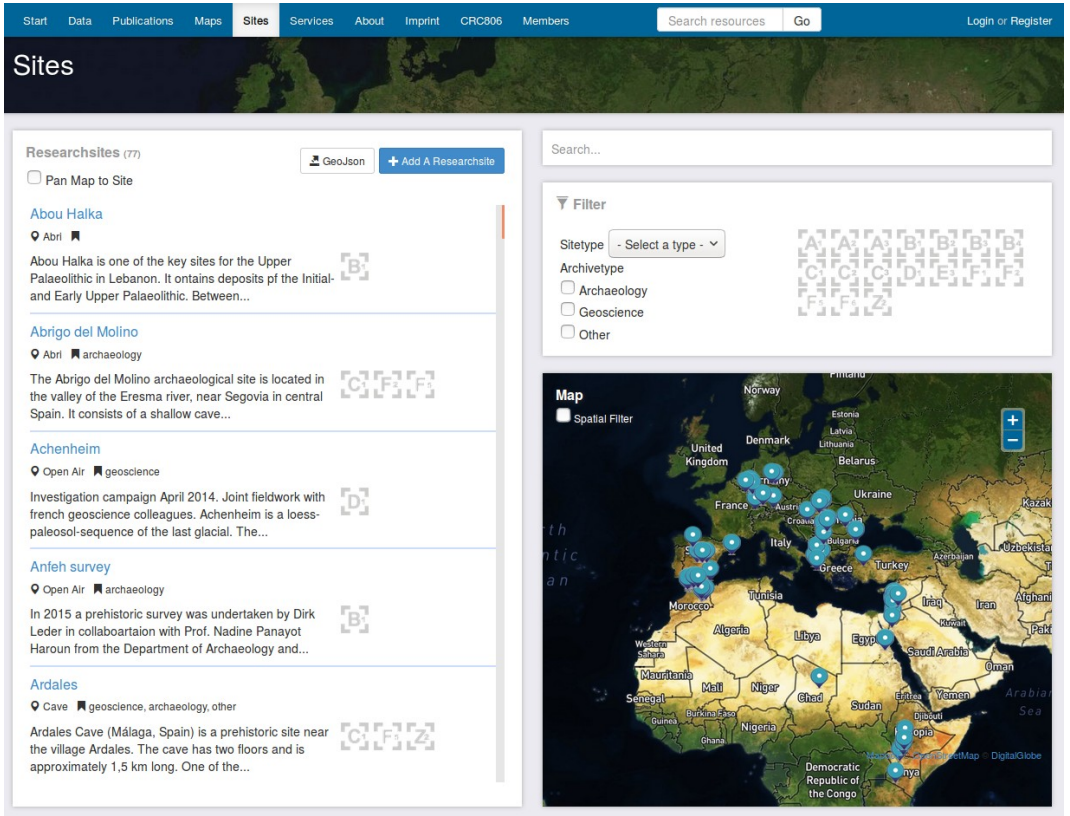
Type: Vector Data
Category: Intelligence Military
Keywords: LGM KoeppenGeiger paleoclimate 21k simulation
Publication date: 2014-12-10

# Sites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+ Add A Researchsite
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Abou Halka
Abri
Abou Halka is one of the key sites for the Upper Palaeolithic in Lebanon. It ontains deposits pf the Initial- and Early Upper Palaeolithic. Between...
Abrigo del Molino
Abri archaeology
The Abrigo del Molino archaeological site is located in the valley of the Eresma river, near Segovia in central Spain. It consists of a shallow cave...
Achenheim
Open Air geoscience
Investigation campaign April 2014. Joint fieldwork with french geoscience colleagues. Achenheim is a loess-paleosol-sequence of the last glacial. The...
Anfeh survey
Open Air archaeology
In 2015 a prehistoric survey was undertaken by Dirk Leder in collaboartaion with Prof. Nadine Panayot Haroun from the Department of Archaeology and...
Ardales
Cave geoscience, archaeology, other
Ardales Cave (Málaga, Spain) is a prehistoric site near the village Ardales. The cave has two floors and is approximately 1,5 km long. One of the...
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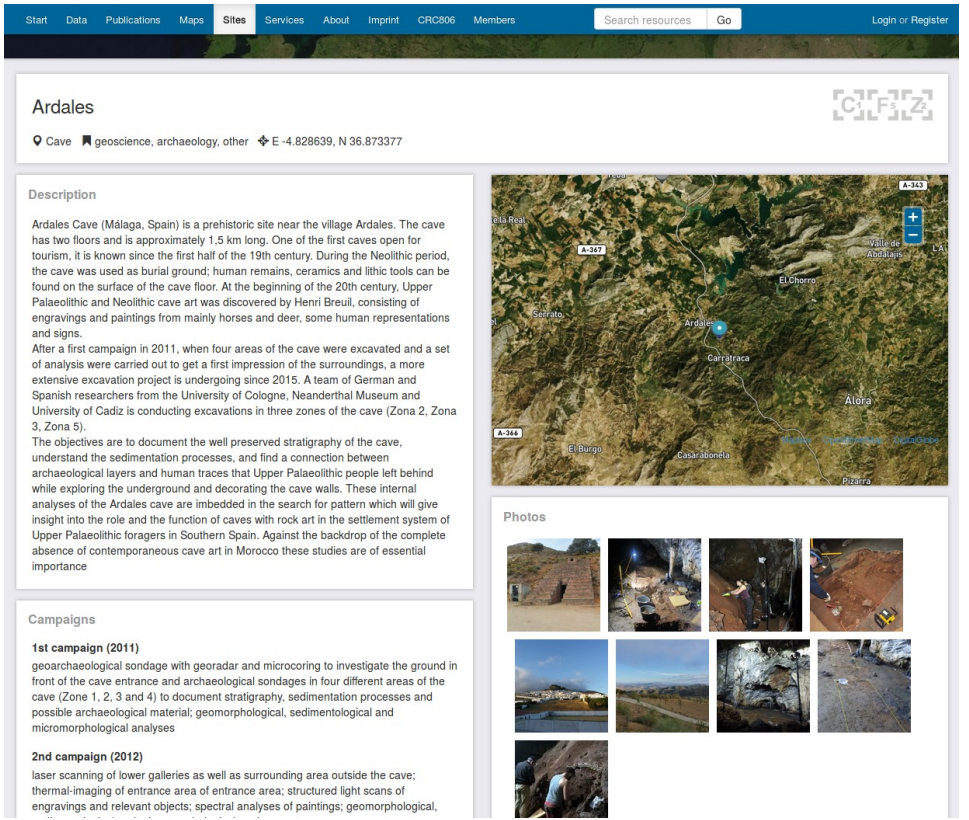
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Ardales
Cave geoscience, archaeology, other E -4.828639, N 36.873377
Description
Ardales Cave (Málaga, Spain) is a prehistoric site near the village Ardales. The cave has two floors and is approximately 1,5 km long. One of the first caves open for tourism, it is known since the first half of the 19th century. During the Neolithic period, the cave was used as burial ground; human remains, ceramics and lithic tools can be found on the surface of the cave floor. At the beginning of the 20th century, Upper Palaeolithic and Neolithic cave art was discovered by Henri Breuil, consisting of engravings and paintings from mainly horses and deer, some human representations and signs.
After a first campaign in 2011, when four areas of the cave were excavated and a set of analysis were carried out to get a first impression of the surroundings, a more extensive excavation project is undergoing since 2015. A team of German and Spanish researchers from the University of Cologne, Neanderthal Museum and University of Cadiz is conducting excavations in three zones of the cave (Zona 2, Zona 3, Zona 5).
The objectives are to document the well preserved stratigraphy of the cave, understand the sedimentation processes, and find a connection between archaeological layers and human traces that Upper Palaeolithic people left behind while exploring the underground and decorating the cave walls. These internal analyses of the Ardales cave are imbedded in the search for pattern which will give insight into the role and the function of caves with rock art in the settlement system of Upper Palaeolithic foragers in Southern Spain. Against the backdrop of the complete absence of contemporaneous cave art in Morocco these studies are of essential importance
Campaigns
1st campaign (2011)
geoarchaeological sondage with georadar and microcoring to investigate the ground in front of the cave entrance and archaeological sondages in four different areas of the cave (Zone 1, 2, 3 and 4) to document stratigraphy, sedimentation processes and possible archaeological material; geomorphological, sedimentological and micromorphological analyses
2nd campaign (2012)
laser scanning of lower galleries as well as surrounding area outside the cave; thermal-imaging of entrance area of entrance area; structured light scans of engravings and relevant objects; spectral analyses of paintings; geomorphological,
A-343
A-367
A-366
Serrato
Ardales
El Chorro
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Carratraca
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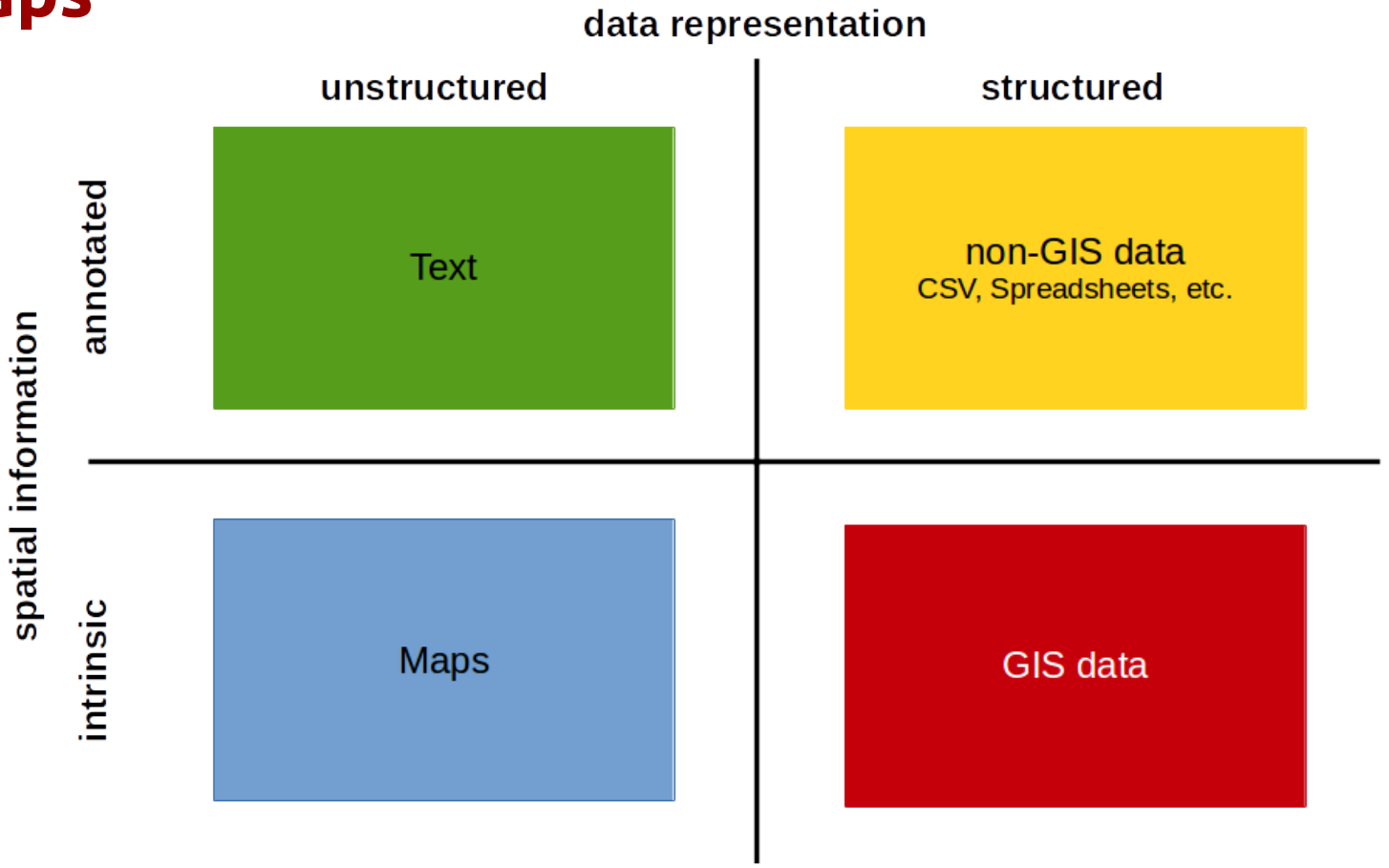
Photos

# PaleoMaps


data representation
unstructured
structured
spatial information
annotated
intrinsic
Text
non-GIS data
CSV, Spreadsheets, etc.
Maps
GIS data

# PaleoMaps



## LGM paleoenvironment of Europe - Map

D. Becker, J. Verheul, M. Zickel, C. Willmes

**Abstract**

The here documented GIS map and dataset contains a collection of Last Glacial Maximum (LGM, 21k yBP) paleoenvironmental data. It is the first result of a project that aims to acquire, produce and publish GIS datasets from non-GIS based sources such as analogous maps, textual informations or figures of scientific publications for prehistoric time slices. In combination with modelling results and already available GIS-datasets related to the mentioned time frame, it should enable other researchers and members from other projects to use the maps in their work, properly cited and referenced. The map shows LGM land ice sheets, paleo-stream networks and inland water in Europe, a sea-level adapted (-120m) land mass and a Köppen-Geiger climate classification derived from climate model data.

### 1 Context

The LGM Paleoenvironment GIS Map shows LGM land ice sheets, paleo-stream networks and inland water in europe, a sea-level adapted (-120m) land mass and a Köppen-Geiger climate classification derived from climate model data. The underlying digital elevation model is the General Bathymetric Chart of the Oceans 2014 (GEBCO 2014) in 30 arc-second resolution [General Bathymetric Chart of the Oceans (2014)]. The LGM sea level adapted coast line (-120m) was derived from the GEBCO 2009 elevation model. The global Köppen-Geiger climate classification for the LGM was computed by [Willmes et al. (2014b)].

The dataset is assigned with a DOI, and can be cited as follows in scholarly works, that use this dataset in their publications:

> D. Becker, J. Verheul, M. Zickel, C. Willmes (2015): LGM paleoenvironment of Europe - Map. CRC806-Database, doi: 10.5880/SFB806.15.

### 2 Metadata

The basic descriptive metadata of the dataset is given in this section.

#### 2.1 Basic Metadata

| | |
|---|---|
| **Title** | LGM paleoenvironment of Europe - Map |
| **Author(s)** | D. Becker, J. Verheul, M. Zickel, C. Willmes |
| **Year** | 2015 |
| **License** | CC-BY |
| **Topic** | Environment |
| **Keywords** | LGM, Paleoclimate, Paleoenvironment. |
| **Publisher** | CRC806-Database |
| **DOI** | 10.5880/SFB806.15 |

If you want you can write about, why you applied the particular license and access constraints here in free text form.

#### 2.2 Spatial Metadata

| | |
|---|---|
| **Type** | BoundingBox |
| **Place** | European part of the SFB 806 area |
| **BoundingBox (SW, NE)** | -10.0 30.0, 68.05 80.0 |
| **Region** | Europe |

The data is located in the CRC 806 area. The working area involves Northern Africa, Europe and Western Eurasia. The area is delimited by a bounding box in longitude/latitude notation for the southwestern and northeastern corners.





#### 2.3 Temporal Metadata

| | |
|---|---|
| **Type** | Interval. |
| **Name** | Last Glacial Maximum (LGM). |
| **Interval** | 26500, 19000 |

For temporal indexing the dates are given in years before present (yBP). The listed interval (26.5ka to 19.0ka) is sourced from [Clark et al. (2009)].

### 3 Data sources

The GEBCO 2014 DEM was used as the basemap to illustrate the water bodies that weren't digitized by hand, to derive the LGM land mass and coast line and to derive a hillshade to reproduce the relief in the map. The Köppen-Geiger climate classification is a representation of the climatic situation during the LGM in Europe. The dataset was produced by [Willmes et al. (2015)]. The inland water data is compiled from various sources and shows the main rivers of europe, smaller glacial lakes and the LGM shapes of the Caspian Sea and the Aral Sea. Lastly the glaciation extents illustrate the ice sheets over northern Europe, the Alps and the Zagros Mountains.

| Dataset | Source | Notes |
|---|---|---|
| Gebco 2014 | [General Bathymetric Chart of the Oceans (2014)] | The topographic data. |
| Koeppen-Geiger LGM | [Willmes et al. (2014a)] | The climate classification data. |
| Quarternary Glaciations | [Ehlers et al. (2011)] | The glaciation extents. |
| NaturalEarthData | [Kelso and Patterson (2010)] | Graticules. |
| LGM major inland waters of Europe - GIS dataset | [Verheul et al. (2015)] | Streams and inland waterbodies for the LGM. |

### 4 Maps and Visualisations

Map(s) showing the data included as figure.


Figure 1: LGM paleoenvironment of Europe.

The mapping was conducted with QGIS 2.12. GEBCO 2014 was used for the basemap and a derived hillshade for the relief. The coloring of the Köppen-Geiger climate zones, as well as the rivers and the lakes, was chosen to have a "natural" appearance. Only the main climate zones of the Köppen-Geiger classification (B, C, D, E) are depicted, with a further distinction in the D climates between hot summer (a), warm summer (b) and cold summer (c), very cold winter (d).





### 5 Data resources

#### 5.1 File resources

All files that are uploaded and attached as resource to the dataset.

| File | Format | Size |
|---|---|---|
| LGM_Europe_Map.png | PNG image file containing the map | 3.8 MB |
| LGM_Europe_Map.pdf | PDF file containing the map | 2 MB |

#### 5.2 Web resources

How and where to access and download the data. Basically a list of URLs.

| | |
|---|---|
| **DOI** | 10.5880/SFB806.15 |

### Acknowledgements

This research was conducted within the frame of the DFG funded Collaborative Research Centre 806.

### References

Clark, P., Dyke, A., Shakun, J., Carlson, A., Clark, J., Wohlfarth, B., Mitrovica, J., Hostetler, S., and McCabe, M. (2009). The Last Glacial Maximum. *Science*, 325(5941):710–714.

Ehlers, J., Gibbard, P. L., and Hughes, P. D. (2011). *Quaternary Glaciations - Extent and Chronology A Closer Look*, volume 15 of *Developments in Quaternary Sciences*. Elsevier.

General Bathymetric Chart of the Oceans (2014). GEBCO 2014 Grid - Gridded bathymetry data. http://www.gebco.net/data_and_products/gridded_bathymetry_data/, accessed: 2015-10-22.

Kelso, N. V. and Patterson, T. (2010). Introducing Natural Earth Data - NATURALEARTHDATA.COM. *Geographia Technica*, pages 82–89.

Verheul, J., Zickel, M., Becker, D., and Willmes, C. (2015). LGM major inland waters of Europe - GIS dataset. CRC806-Database, DOI: http://dx.doi.org/10.5880/SFB806.14.

Willmes, C., Becker, D., Brocks, S., Hütt, C., and Bareth, G. (2014a). Köppen-Geiger classification of MPI-ESM-P LGM simulation. CRC806-Database, DOI: http://dx.doi.org/10.5880/SFB806.2.

Willmes, C., Brocks, S., Becker, D., Hütt, C., and Bareth, G. (2015). High resolution Köppen-Geiger classifications of paleoclimate simulations. *Transactions in GIS*, ?(?):xx – xx.

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# PaleoMaps

International Journal of Spatial Data Infrastructures Research, 2017, Vol.12, 39-61

## PaleoMaps: SDI for open paleoenvironmental GIS data*

Christian Willmes , Daniel Becker , Jan Verheul , Yasa Yener , Mirijam Zickel , Andreas Bolten , Olaf Bubenzer , Georg Bareth

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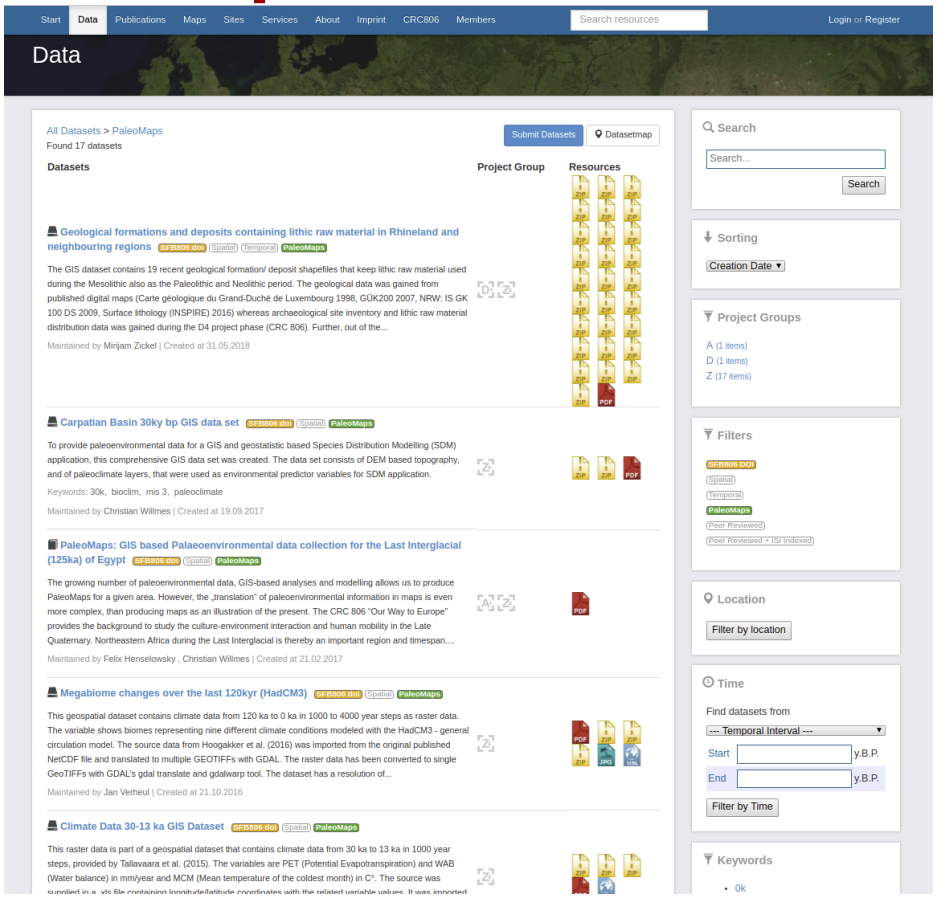
# PaleoMaps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Geological formations and deposits containing lithic raw material in Rhineland and neighbouring regions
The GIS dataset contains 19 recent geological formation/ deposit shapefiles that keep lithic raw material used during the Mesolithic also as the Paleolithic and Neolithic period. The geological data was gained from published digital maps (Carte géologique du Grand-Duché de Luxembourg 1998, GÜK200 2007, NRW: IS GK 100 DS 2009, Surface lithology (INSPIRE) 2016) whereas archaeological site inventory and lithic raw material distribution data was gained during the D4 project phase (CRC 806). Further, out of the...
Maintained by Mirjam Zickel | Created at 31.05.2018
Carpatian Basin 30ky bp GIS data set
To provide paleoenvironmental data for a GIS and geostatistic based Species Distribution Modelling (SDM) application, this comprehensive GIS data set was created. The data set consists of DEM based topography, and of paleoclimate layers, that were used as environmental predictor variables for SDM application.
Keywords: 30k, bioclim, mis 3, paleoclimate
Maintained by Christian Willmes | Created at 19.09.2017
PaleoMaps: GIS based Palaeoenvironmental data collection for the Last Interglacial (125ka) of Egypt
The growing number of paleoenvironmental data, GIS-based analyses and modelling allows us to produce PaleoMaps for a given area. However, the „translation" of paleoenvironmental information in maps is even more complex, than producing maps as an illustration of the present. The CRC 806 "Our Way to Europe" provides the background to study the culture-environment interaction and human mobility in the Late Quaternary. Northeastern Africa during the Last Interglacial is thereby an important region and timespan....
Maintained by Felix Henselowsky , Christian Willmes | Created at 21.02.2017
Megabiome changes over the last 120kyr (HadCM3)
This geospatial dataset contains climate data from 120 ka to 0 ka in 1000 to 4000 year steps as raster data. The variable shows biomes representing nine different climate conditions modeled with the HadCM3 - general circulation model. The source data from Hoogakker et al. (2016) was imported from the original published NetCDF file and translated to multiple GEOTIFFs with GDAL. The raster data has been converted to single GeoTIFFs with GDAL's gdal translate and gdalwarp tool. The dataset has a resolution of...
Maintained by Jan Verheul | Created at 21.10.2016
Climate Data 30-13 ka GIS Dataset
This raster data is part of a geospatial dataset that contains climate data from 30 ka to 13 ka in 1000 year steps, provided by Tallavaara et al. (2015). The variables are PET (Potential Evapotranspiration) and WAB (Water balance) in mm/year and MCM (Mean temperature of the coldest month) in C°. The source was
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End
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Filter by Time
Keywords
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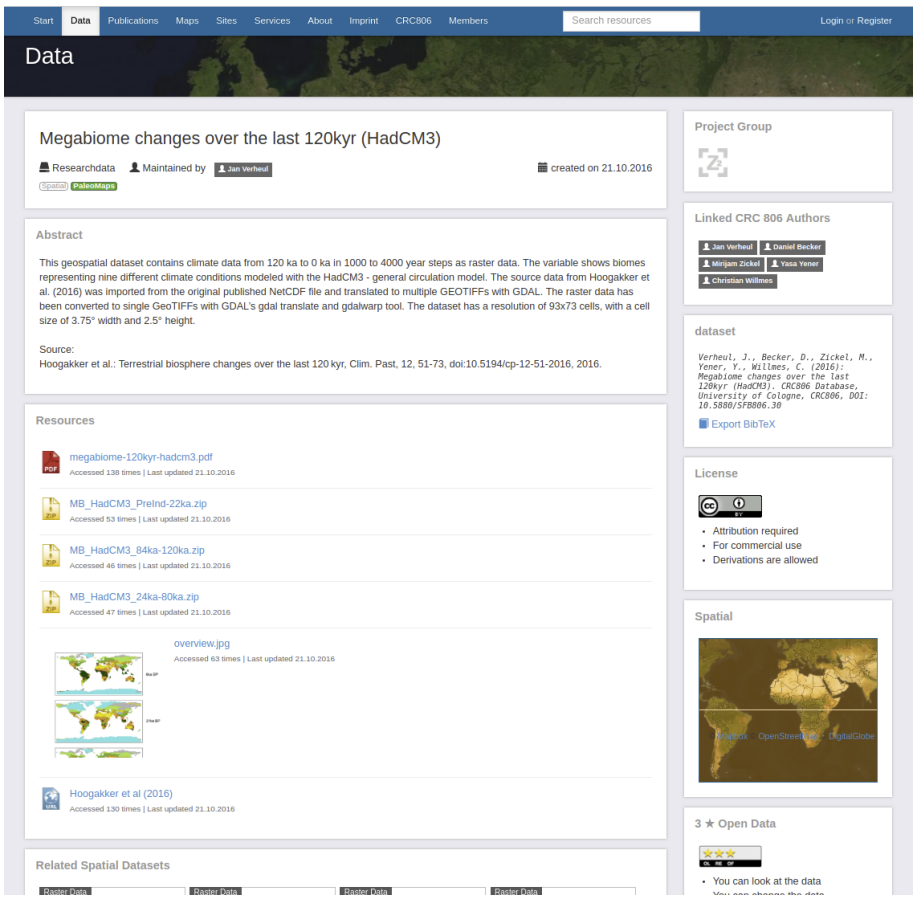
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Data
Megabiome changes over the last 120kyr (HadCM3)
Researchdata
Maintained by Jan Verheul
created on 21.10.2016
Spatial
PaleoMaps
Abstract
This geospatial dataset contains climate data from 120 ka to 0 ka in 1000 to 4000 year steps as raster data. The variable shows biomes representing nine different climate conditions modeled with the HadCM3 - general circulation model. The source data from Hoogakker et al. (2016) was imported from the original published NetCDF file and translated to multiple GEOTIFFs with GDAL. The raster data has been converted to single GeoTIFFs with GDAL's gdal translate and gdalwarp tool. The dataset has a resolution of 93x73 cells, with a cell size of 3.75° width and 2.5° height.
Source:
Hoogakker et al.: Terrestrial biosphere changes over the last 120 kyr, Clim. Past, 12, 51-73, doi:10.5194/cp-12-51-2016, 2016.
Resources
megabiome-120kyr-hadcm3.pdf
Accessed 138 times | Last updated 21.10.2016
MB_HadCM3_PreInd-22ka.zip
Accessed 53 times | Last updated 21.10.2016
MB_HadCM3_84ka-120ka.zip
Accessed 46 times | Last updated 21.10.2016
MB_HadCM3_24ka-80ka.zip
Accessed 47 times | Last updated 21.10.2016
overview.jpg
Accessed 63 times | Last updated 21.10.2016
Hoogakker et al (2016)
Accessed 130 times | Last updated 21.10.2016
Related Spatial Datasets
Project Group
Linked CRC 806 Authors
Jan Verheul
Daniel Becker
Mirjam Zickel
Yasa Yener
Christian Willmes
dataset
Verheul, J., Becker, D., Zickel, M., Yener, Y., Willmes, C. (2016): Megabiome changes over the last 120kyr (HadCM3). CRC806 Database, University of Cologne, CRC806, DOI: 10.5880/SFB806.30
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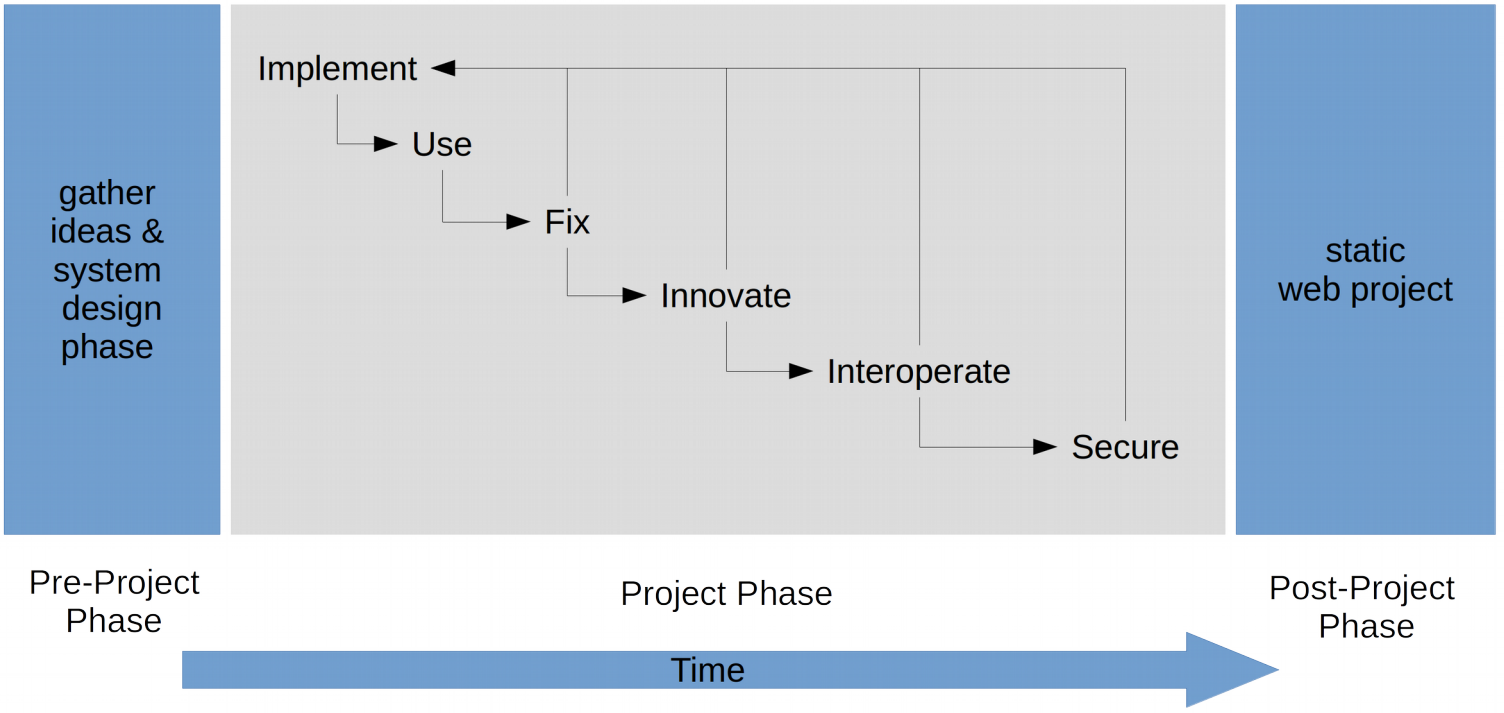

# Progressive Web App

https://crc806db.uni-koeln.de/beta/

# Example: Publish Dataset in the CRC806-Database

- Upload of this presentation into the CRC806-Database.





Dr. Christian Willmes | c.willmes@uni-koeln.de



# Sources

Willmes, C., Becker, D., Verheul, J., Yener, Y., Zickel, M., Bolten, A., Bubenzer, O., Bareth, G. (2017): PaleoMaps: SDI for open paleoenvironmental GIS data. IJSDIR, Vol. 12, 39-61, DOI: 10.2902/1725-0463.2017.12.art3

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Willmes, C., Kürner, D. and Bareth, G. (2014): Building Research Data Management Infrastructure using Open Source Software. Transactions in GIS. doi: 10.1111/tgis.12060