# *Knowledge Data Base of extreme weather events in Europe*

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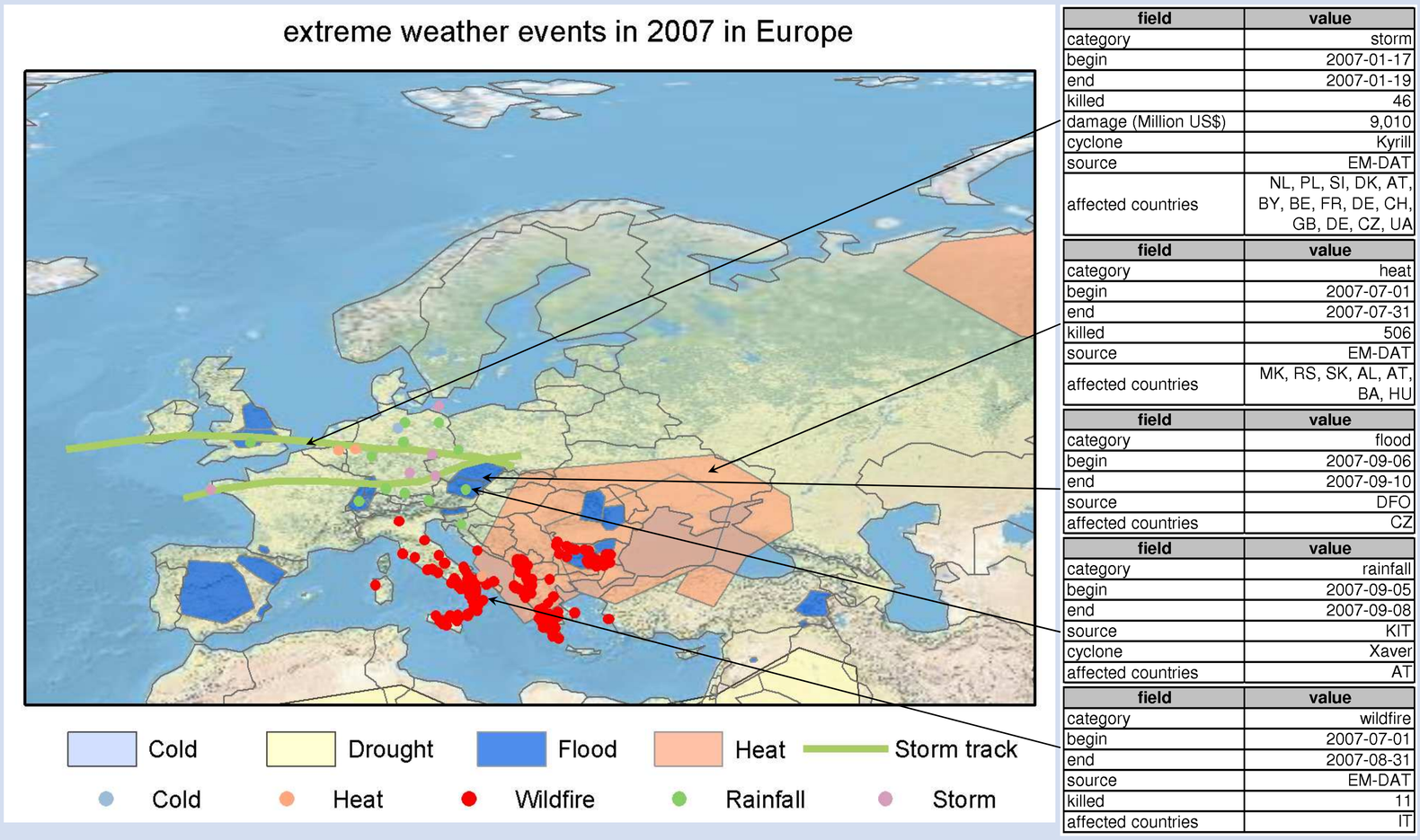
***Wetter und Klima aus einer Hand***

**The aim of the development of a knowledge data base is the collection of information about extreme weather events within the region of RA VI of WMO (Europe and Middle East) over the last 50 years. The data base focuses on the impact of weather extremes and damages. This data base will be applied in Climate Watch System.**




| field | value |
|---|---|
| category | storm |
| begin | 2007-01-17 |
| end | 2007-01-19 |
| killed | 46 |
| damage (Million US$) | 9,010 |
| cyclone | Kyrill |
| source | EM-DAT |
| affected countries | NL, PL, SI, DK, AT, BY, BE, FR, DE, CH, GB, DE, CZ, UA |

| field | value |
|---|---|
| category | heat |
| begin | 2007-07-01 |
| end | 2007-07-31 |
| killed | 506 |
| source | EM-DAT |
| affected countries | MK, RS, SK, AL, AT, BA, HU |

| field | value |
|---|---|
| category | flood |
| begin | 2007-09-06 |
| end | 2007-09-10 |
| source | DFO |
| affected countries | CZ |

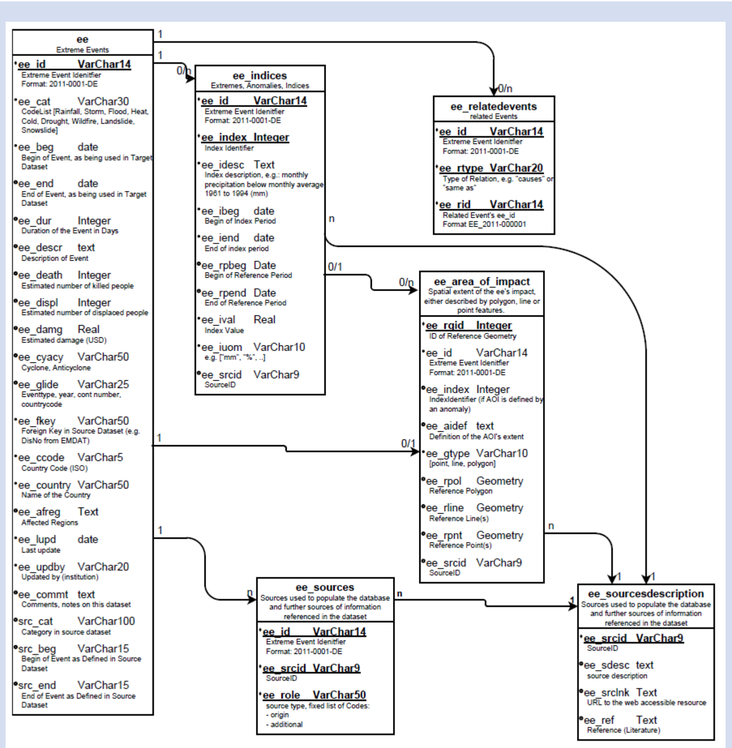
| field | value |
|---|---|
| category | rainfall |
| begin | 2007-09-05 |
| end | 2007-09-08 |
| source | KIT |
| cyclone | Xaver |
| affected countries | AT |

| field | value |
|---|---|
| category | wildfire |
| begin | 2007-07-01 |
| end | 2007-08-31 |
| source | EM-DAT |
| killed | 11 |
| affected countries | IT |

*Visualisation of Knowledge Data Base information for 2007*

## Technical Aspects

PostgreSQL is used as data base. PostGIS extension allows to store geographical information in the data base. Different Geographical Information Systems (GIS) can handle directly with PostgreSQL like Quantum GIS. Export from data bases is possible to use data in ArcGIS. PostgreSQL provides the possibility to use complex data models. Geographical information is stored once with links to country-specific reports.




*Data model of PostgreSQL data base*

## Content of Knowledge Data Base

Actually the knowledge data base includes 2052 data sets. Events which affected several countries are separated into national scale. So usually country-specific damage reports are available. The events are described by event category, begin and end, duration, damage, affected region, name of cyclone or anticyclone and supplementary information if available. Further information about the anomaly of extreme events, the reference period and extreme values during the extreme event are stored. Sources and references of the event information are included to track the origin of the data. The geographical description of extreme events depends on event class, detection and source. Polygons, lines and point information are applied.

## Context: Regional Climate Centre

The knowledge data base was developed in the WMO RA VI Pilot Regional Climate Centre on Climate Monitoring (RCC-CM). RCCs are Centres of Excellence that assist WMO Members in a given region to deliver better climate services and products including regional long-range forecasts, and to strengthen their capacity to meet national climate information needs. The primary ‚clients' of a RCC are National Hydrological and Meteorological Services and other RCCs in a region and in neighbouring areas.

## Climate Watch System

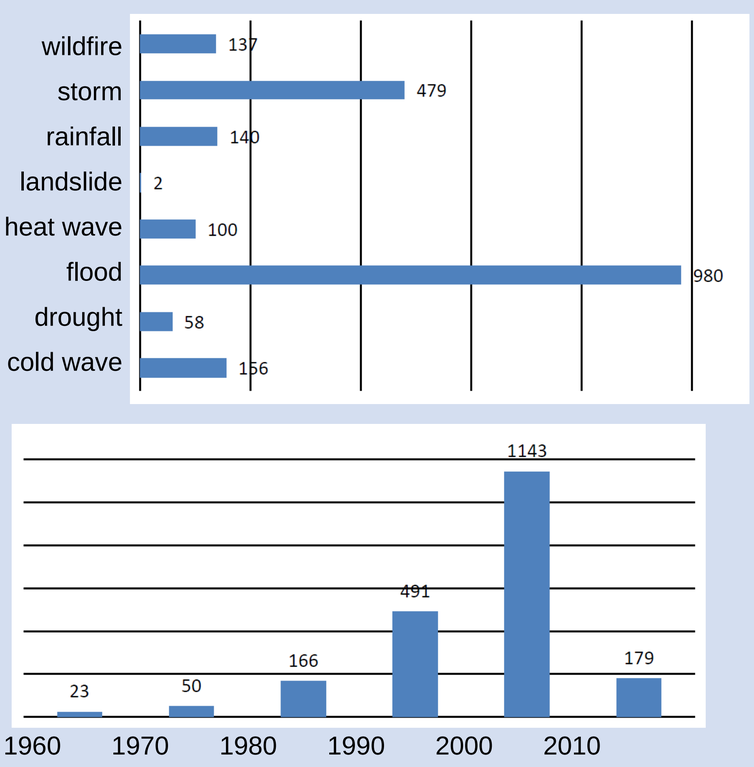
Climate Watch Systems have been suggested by WMO. Climate Watch Systems are early warning systems, which use climate monitoring data and results from long-range forecasts to detect critical weather periods such as heat waves, cold waves, floods, droughts, wildfires and others. If the monitoring indicates outstanding weather events and the long-range forecast shows continuation of those events, **the knowledge data base can provide information about the impact of similar events, hazards and damages in the affected region.**

## Input data

The input is provided by different data collections like International Disaster Database (EM-DAT), Dartmouth Flood Observatory (DFO), the archive of extreme weather events of Karlsruhe Institute of Technology (KIT) and GLIDE Number Database. Some data already include geographical information as the flood data from DFO which comprehend the affected parts of catchments. Reanalysis from National Center for Atmospheric Research (USA) were used to define the geographical extension of cold and heat waves. The extension of droughts were derived from drought monitoring from Deutscher Wetterdienst. Storm tracks are extracted from a technical report of European Environment Agency (EEA). The “ATSR World Fire Atlas” was used to identify the geolocation of wildfires. Extreme Events from KIT are mostly linked to the meteorological stations, where the extreme values were observed.

## Outlook

Currently we are working on an extension of the considered period until the beginning of the 20th century. Systematic analysis of raster data sets will be performed to include historical events which were not yet documented in the various data sources. To visualise the data base information for our users we prefer Web Map Services, like GeoServer. Queries will be built to find individual information about event type, region, duration and time. Aggregation of country-specific data will be possible to receive e.g. total damage information. Other input data can be considered like European Severe Weather Database.




*Number of events by category and occurrence*

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