

Climate data sets availability in RAVI with an emphasis on the Mediterranean RAVI and RA I countries.

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Introduction

On 29 June 2007 the European Commission launched a Green Paper with as key message: *Europe must not only make deep cuts in its greenhouse gas emissions but also take measures to adapt to current and future climate change in order to lessen the adverse impacts of global warming on people, the economy and the environment.*

In the CGOS contribution to the Nairobi Work Programme (Draft, 3 Sept 2007, “The Role of Observations in Support of Adaptation”) it is concluded:

Adaptation of natural and human systems to the impacts of natural climate variability and human-induced climate change is not optional. If climate change is inevitable, then so is adaptation. Further in this report the rationale for DARE (Data Rescue) activities is expressed: *At the present time, in many countries neither the quality nor quantity of observations needed is adequate to allow reliable projections needed for adaptation purposes (..)observation networks and data use will need to be strengthened, especially in vulnerable areas.*

This rationale is well in line with the statement made by GCOS in its 2nd adequacy report (2003): *The requirement for information on trends and change – makes historical data as important as new observations*

This paper has as aim to improve the use of (historical) data by describing existing available and potential datasets in the Greater Mediterranean Area of WMO RAVI and RAI.

First an overview is given of datasets, often built up by the meteorological observational networks of the NMHS's, available for monitoring and research purposes. Also the existence of sets of observations, made by individuals and occasional networks before the foundation of the NMHS's and the usefulness of paleoclimatic data sets of proxies will be touched.

The outcomes of a questionnaire of DARE activities, addressing the NMHS's with respect to their early and modern observations are presented. The last section offers tracks to potential valuable documentary (paper, image file, film) datasets that deserve to be “dared”

The all over picture obtained is that in Europe especially the (eastern) parts of the Mediterranean area, including the Balkan (RA VI) and the North African coast (RA I), are to be labelled as “data sparse”. This urges to promote the use of already existing and available digitised data sets, the need to search for and preserve documentary observational records (and metadata!) that are threatened by deterioration and to continue or start the digitisation of existing documentary and image file observational records.

Instrumental period

The scope of this paper is predominantly the instrumental period that starts in the late 17th century.

The motivation for carrying out the early meteorological measurements was often pragmatic. One was interested in the climatology (the long term characteristic of the weather) of the area in concern. For instance, in the beginning of the 18th century, Dutch engineers carried out regular observations of wind, precipitation and evaporation in the Low Countries to estimate the amount of water that had to be pumped away out of the lakes to reclaim new land (the polders) and the number and geographical locations of the water-windmills that had to be established for this purpose (Engelen, A.F.V. van and Geurts, H.A.M. 1985). From a Hippocratic motivation the physician Herman Boerhaave (1668-1738) promoted the

observations of the air pressure because he expected a relation between the air pressure and the dissemination of diseases (Zuidervaart, 2005). From a physical-theological motivation many clergy men carried out individual observations: this served a better understanding of the principles of the weather that was managed by God and so contributed to a better understanding of and raised devotion to Him (Zuidervaart, 2003).

One of the earliest observational networks (ca. 1653) of Europe stems from the Mediterranean. Ferdinand II from Tuscany (1610-1670), measured with thermometers, barometers and hygrometers at several locations in Northern Italy and at several times during the day (Geurts, H.A.M. and Engelen, A.F.V., 1983).

The arrival of the electrical telegraph in 1837 (Samuel Morse, 1791-1872) afforded a practical method for quickly gathering weather information over a wide area. This data could be used to produce synoptical maps that showed how the state of the atmosphere evolved through time. Especially the army was interested in proper forecasts for planning war actions.

A safe society was one of the major reasons for the foundation of the official NMHS's; the majority around the second half of the 19th century. The NMHS's established their observational networks. The (early) 'modern' instrumental data from these networks are the most promising subjects for DARE activities. But one should of course not neglect the earlier 'historical' instrumental observations, needed to extend the longer series back in time.

Overview of data sets

Examples of data sets that are useful for climate monitoring and generally good accessible are:

The Global Climate Observing system (GCOS) is the global climate observing system, which aim is to ensure the availability from the meteorological services to the research community of satellite and in situ observations for climate in the atmospheric, oceanic and terrestrial domain. The GCOS Surface Network gives access to daily and monthly records of temperature and precipitation from 1016 stations (<http://www.wmo.int/pages/prog/gcos/index.php>)

The Global Historical Climatology Network (GHCN-Monthly) data base, probably the largest in the world, contains historical temperature, precipitation, and pressure data for thousands of land stations worldwide. The length of the record periods varies from station to station, with several thousands extending back to 1950 and several hundreds being updated monthly via CLIMAT reports. The data are available without charge through NCDC's anonymous FTP service (<http://www.ncdc.noaa.gov/oa/climate/ghcn-monthly/index.php>). Both historical and near-real-time GHCN data undergo rigorous quality assurance reviews. It is used operationally by NCDC to monitor long-term trends in temperature and precipitation. It has also been employed in several international climate assessments, including the Intergovernmental Panel on Climate Change 4th Assessment Report. Besides this monthly network, also a daily network exists. In RAVI, GHCN encompasses 89 precipitation and 54 mean temperature long series, covering more than 150 years.

The Hadley Centre Central England Temperature data set (HadCET) is world's longest instrumental record of temperature. The mean, minimum and maximum datasets are updated monthly. The mean daily data begins in 1772 and the mean monthly data in 1659. Mean maximum and minimum daily and monthly data are also available, beginning in 1878. These daily and monthly temperatures are representative of a roughly triangular area of the United Kingdom enclosed by Lancashire, London and Bristol. Since 1974 the data have been

adjusted to allow for urban warming. Met Office, Hadley Centre:
<http://hadobs.metoffice.com/hadcet/>

Improved understanding of past climatic variability from early daily European instrumental sources (Improve) is a EU research project that produced for seven locations in Europe (Padova 1725 >, Milan 1763 >, Central Belgium 1767 >, Uppsala 1722 >, Stockholm 1756 >, San Fernando/Cadiz 1776 > and St Petersburg 1743 >) the longest daily European temperature and pressure series (<http://www.isac.cnr.it/~microcl/climatologia/improveb.htm>)

MedCLIVAR is an international programme which aims to coordinate and promote the study of the Mediterranean climate (<http://www.medclivar.eu/>). It is endorsed by CLimate VARIability and Predictability (CLIVAR), a project of the World Climate Research Programme (WCRP) of the World Meteorological organisation (WMO) and approved by the European Science Foundation. A priority of MedCLIVAR is a climate reconstruction for centuries. Luterbacher et al (2006) published an overview of long instrumental and proxy records in the Mediterranean area (table 1).

By comparing contemporary instrumental and proxy records it is possible to translate the latter into instrumental terms, making it possible to extend the instrumental series centuries back in time. From the map of figure 1 it is obvious that the Balkan and North African regions can be considered as data sparse with respect to the instrumental readings and deserve thus special attention for searching to not yet “dared” data sets.

MILLENNIUM is an EU project with as central question *does the magnitude and rate of 20th Century climate change exceed the natural variability of European climate over the last millennium?*

(<http://137.44.8.181/millennium/>). Within this project several partners collected and recovered various instrumental series and proxy series as well. The data will be put – still for use by project members only- on the project website (<http://www.geogr.muni.cz/millennium/index.htm>)

Location	Time period	Type of “proxy”	Temporal resolution	Parameter	References
Padova (Italy)	1721–present	Instrumental records	Daily, monthly	Precipitation	Camuffo (1984)
Padova (Italy)	1721–present	Instrumental records	Daily, monthly	Temperature, pressure	Camuffo (2002a,b,c); Cocheo & Camuffo (2002)
Bologna (Italy)	1813–present	Instrumental records	Daily, monthly	Temperature, precipitation	Branetti et al. (2001)
Milan (Italy)	1763–present	Instrumental records	Daily, monthly	Temperature, pressure	Maugeri et al. (2002a,b)
Po Plain (Italy)	1765–present	Instrumental records	Daily, monthly	Pressure	Maugeri et al. (2003)
Barcelona (Spain)	1780–present	Instrumental records	Daily, monthly	Pressure	Rodriguez et al. (2001)
Cadiz-San Fernando (Spain)	1786–present	Documentary and instrumental records	Daily, monthly	Temperature, pressure	Barriendos et al. (2002)
San Fernando (Spain)	1821–present	Instrumental records	Monthly	Precipitation	Rodrigo (2002)
Gibraltar (UK)	1821–present	Instrumental records	Monthly	Pressure	Vinther et al. (2003b)
Southern Portugal	1700–1799	Documentary and early instrumental records	Monthly, seasonal	Temperature, precipitation, drought	Taborda et al. (2004)
Lisbon (Portugal)	1815–present	Early instrumental	Daily and monthly	Temperature, precipitation	Akcofurodo et al. (1997, 1999)

Table 1: Compilation of long early homogenized instrumental data- and proxy evidence from the Mediterranean (in Luterbacher et al, 2006)

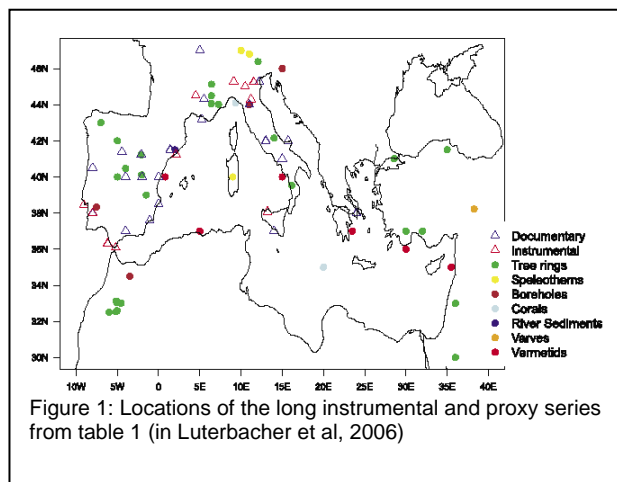


Figure 1: Locations of the long instrumental and proxy series from table 1 (in Luterbacher et al, 2006)

MILLENNIUM European Climate	
Masaryk University (Czech Republic)	temperature series (monthly) from Prague-Klementinum from 1775 and Brno from 1799, from Prešov (Slovakia) 1717-1720, Zitnice 1787-1829, Teplá 1787-1832, Jihlava 1817-1840 and Děčín 1828-1870. precipitation series (monthly) from Prague-Klementinum from 1804 and Brno from 1803, from Cieszyn (Poland) 1777, Jihlava 1821-1844 and Děčín 1828-1870.
University of Bern (Switzerland)	12 monthly precipitation approx. 1864-2000, 2 reconstructed monthly series temperature and precipitation 1760-2000 and 1867-2000.
University of Stockholm (Sweden)	Homogenized Stockholm and Uppsala daily temperature series, covering the period 1533 to 1665 (four sources) and 1636 to 1890s (12 sources)
University of Sunderland (UK)	Gibraltar : precipitation series 1791-1812: annual, 1813-2004, monthly, daily air pressure data (1821 to 1855) and temperature series (1821 to 1870)
INWM (Poland)	Monthly precipitation and temperature for Wrocław (1881 – 2007), Warsaw (1779 – 2007) and Krakow (1826 – 2007)
University of Szeged (Hungary)	Monthly series for 37 non homogenized and 6 homogenized temperature, 77 non homogenized and 6 homogenized precipitation (date 013 to present). Monthly temperature series from Buda from 1750, for precipitation, from 1841. Early instrumental data for 1780 to 1830 for Kežmarok (Slovakia) , Miskolc (Hungary) , Pécs (Hungary) , Prešov (Slovakia) and Timișoara (Romania)
CNR (Italy)	Padova (1725 onwards), Bologna (1716 – 1791) and Palermo (1794 onwards)
University of Barcelona (Spain)	Cadiz , Madrid and Barcelona , from mid- and early 19th century onwards

Table 2: New instrumental records recovered within the Millennium project (Aryan van Engelen, KNMI, Millennium first Annual Meeting, Mallorca, Spain, Febr 2007)

On the web portal of this project the authors put an overview of instrumental datasets that might be useful for the Millennium community. The data are available from the websites to which is linked. A division is made between monthly and daily and also between observational and gridded data sets.

CLIWOC, the Climate Database for the World Oceans project concentrates on data from the oceans. The objectives are based on the climatic information contained in ships' logbooks for the period 1750 to 1850. Officers on board of eighteenth and nineteenth century sailing vessels maintained detailed log books of the ships' activities and management. Included within these records were observations of the current weather. These observations were made at least three times daily and were used as an indispensable aid to navigation in a period before reliable methods of determining longitude were widely available. Fortunately many thousand such log books have survived. This project concentrates on those held in British, Dutch, French, Spanish and Argentinean archives.

The recorded data are concerned with wind direction and wind force as these two elements more than any others contributed to the speed and direction of the vessels. Other weather elements were also recorded such as precipitation, fog, ice cover, state of sea and sky. Although non-instrumental (some temperature and air pressure records begin to appear in the nineteenth century but they are relatively few in number), the data have been shown by the small scale studies thus far undertaken to be reliable and accurate (<http://www.ucm.es/info/cliwoc/>)

The EMULATE (European and North Atlantic daily to MULtidecadal climATE variability) is a EU project that developed a daily historical European–North Atlantic mean sea level pressure dataset (EMSLP) for 1850–2003 on a 5° latitude by longitude grid. This product was produced using 86 continental and island stations distributed over the region 25°–70°N, 70°W–50°E blended with marine data from the International Comprehensive Ocean–Atmosphere Data Set (ICOADS). The EMSLP fields for 1850–80 are based purely on the land station data and ship observations. The EMSLP daily fields and associated error estimates provide a unique opportunity to examine the circulation patterns associated with extreme events across the European–North Atlantic region, such as the 2003 heat wave, in the context of historical events. Gridded product as well as station series are available (<http://hadobs.metoffice.com/emslp/>)

Meteorological data	
Introduction	
This site lists instrumental meteorological datasets that might be useful to the users of Millennium. The overview presents data that cover the European region. The data are available from the websites to which is linked. A distinction is made between monthly and daily data, and between observational records and gridded dataset (or regional averages). More observational time series will become available within Millennium WP1, and will be announced later in 2007.	
A very useful site where you can also download many datasets and where you can correlate your own uploaded(proxy) data with instrumental observations and gridded datasets is the Climate Explorer . Worth taking a look at!	
We are aware that this overview might not be complete. Please, send any comments and additions to Lisette Klok: klok@knmi.nl .	
Monthly data	
Observational series	
<ul style="list-style-type: none"> Central England Temperature (CE1, temperature, 1659-2007) Global Historical Climatology Network (GHCN, global mean temperature (7280 stations), maximum/minimum temperature (4966 stations), precipitation (20590 stations) and air pressure (2668 stations), 1697-2007) GIS5 Surface Temperature Analysis (global, 1880-2007, about 7000 station series) GOOS Surface Network (GSN, temperature, precipitation, and air pressure series from stations of the global climate observing system, 1016 stations) 	
Gridded data (or regional averages)	
<ul style="list-style-type: none"> Alpine gridded analyses (25 km grid, Alps only, precipitation, 1966-1995) ALPMP Alpine precipitation data (10 min grid, Alps only, precipitation, 1800-2003) ALPMP Regional mean climate time series (regional averages of the Greater Alpine Region, precipitation, air temperature, sunshine duration, air pressure, humidity, cloudiness, 1901-2000) UK Meteoric gridded datasets (5 km grid, UK only, 26 meteorological variables, 1961-2000) SEAS (50 year gridded precipitation (1675-1999)) GRUHEM (gridded precipitation (global, 5 degree grid, temperature, 1850-2006) HUMS precipitation (global, precipitation, 5 degree and 2.5°x.75 degree grids, 1900-1998) GRUmean sea level pressure (Northern hemisphere, 5°x.10 degree grid, sea-level pressure, 1873-2000) GRUSLIP2 (global, 5 degree grid, sea-level pressure, 1850-2004) GRUITS1.12 (Europe, 10 min grid, cloud cover, daily temperature range, precipitation, temperature, vapour pressure, 1901-2000) GRUS2.1 (global, 0.5 degree grid, mean, minimum and maximum temperature, diurnal temperature range, precipitation, wet day frequency, frost day frequency, vapour pressure and cloud cover, 1901-2002) HADUKF (UK regional averages, precipitation, 1766/1873-2006) GIS5 Surface Temperature Analysis (temperature, global, 250 or 1290 km grid, 1880-2007) GHCNHC gridded temperature (temperature, global, 5 degree, 1880-2007) GHCNHC gridded precipitation (precipitation, global, 5 degree, 1900-2007) 	
Daily data:	
Observational series	
<ul style="list-style-type: none"> The EOD database, including many of the daily station series mentioned below, temperature, precipitation, air pressure, snow cover, relative humidity, cloud cover, sunshine duration, 1700/1980-2006) Central England Temperature (CE1, 1772-2006) IMPROVE (long temperature and air pressure series from Padova, Milan, Central Belgium, Uppsala, Stockholm, San Fernando/Cádiz, St Petersburg, and Central England) GOOS Surface Network (GSN, temperature, precipitation, and air pressure series from stations of the global climate observing system, 1016 stations) EMULATE (European air pressure series, 86 stations) Global daily climatology network (GDCN, precipitation and temperature series) ALPMP (Alpine precipitation data, 10 min grid, Alps only, precipitation, 1974-1992) Historical records from the Netherlands (several meteorological variables, 1701-1905) 	
Gridded data (or regional averages)	
<ul style="list-style-type: none"> HADGHCN2 (2.5°x.75 degree grid, global, temperature, 1946-2000) MARSSTAT (50 km grid, Europe, several meteorological variables, 1975-2005) Alpine Precipitation Analysis (25 km, Alps only, precipitation, 1974-1992) EMULATE mean sea level pressure data (5 degree grid, Europe, air pressure, 1850-2003) HADUKF (UK regional averages, precipitation, 1931-2006) 	

Table 3: Overview datasets for Millennium Community (Lisette Klok, KNMI, 2006)

ALP-IMP, Multi-centennial climate variability in the Alps based on Instrumental data, Model simulations and Proxy data, is another gridded dataset that starts early in the 19th century (<http://www.cru.uea.ac.uk/cru/data/alpine.htm>). It is based on 192 long precipitation records. The precipitation dataset provides monthly precipitation totals for the 1800-2003 period, gridded at 10-minute resolution. The effective coverage of the dataset depends on the observations available in the station network which progressively declines back to the early 19th century (from 192 to 5 stations).

ECA&D, the European Climate Assessment and Dataset

Regionalisation of climate assessments is a key topic in a number of recent publications from the meteorological community, such as the series of WMO statements on the status of the global climate, the fourth assessment report of IPCC and last but not least the Millennium project. A basis requirement for regional climate assessments is the availability of (and the access to) high resolution climate data obtained from the observational network. In Europe, this network is managed by a large number of predominantly National Meteorological and Hydrological Services (NMHS's). Although each of these NMHS's has its own data policy, they are convinced that access to each others data and joint research in assessing the meaning of the data in terms of climate characteristics is essential to understand the national climate in the European context. This common understanding formed the basis for the EUMETNET (the collaborative network of the European NMHS's) to launch the European Climate Assessment and Dataset (ECA&D) in 2003 after the publication of the ECA&D report (Klein Tank et al, 2002).

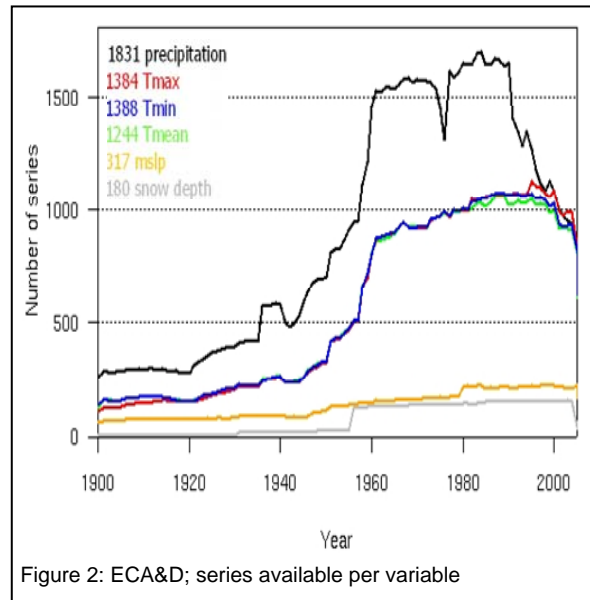


Figure 2: ECA&D; series available per variable

The goal is to realise a sustainable operational system for data gathering, archiving, quality control, analysis and dissemination. Data gathering refers to long-term daily resolution climatic time series from meteorological stations throughout Europe and neighbouring countries. Archiving refers to transformation of the series to standardized formats and storage in a centralized relational database system at the Royal Netherlands Meteorological Institute (KNMI). Quality control uses fixed procedures to check the data and attach quality and homogeneity flags. Analysis refers to calculation of derived indices for climate extremes, according to internationally agreed procedures. Finally, dissemination refers to making available both the daily data (inclusive quality flags) and the indices results to users through the internet.

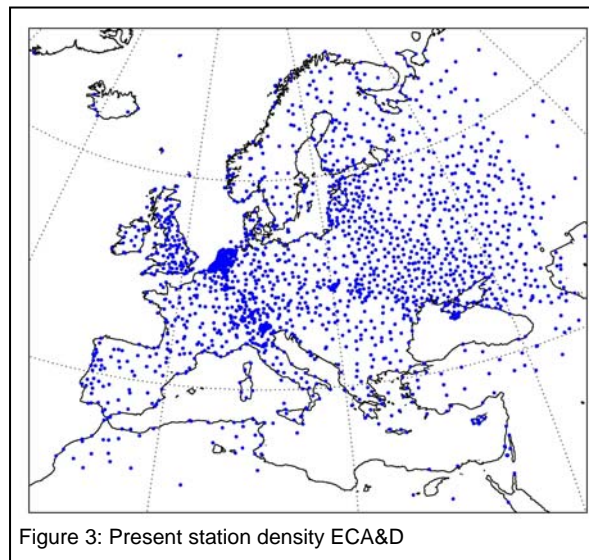


Figure 3: Present station density ECA&D

Today ECA&D has more than 50 partners, contains some 7000 quality controlled time series of, next to temperature and precipitation, variables as air pressure, snow depth, relative humidity, cloud cover and sunshine duration (figure 2) from a network of more than 2000 stations (figure 3). Some 40 derived indices are presented in graphs and thematic maps.

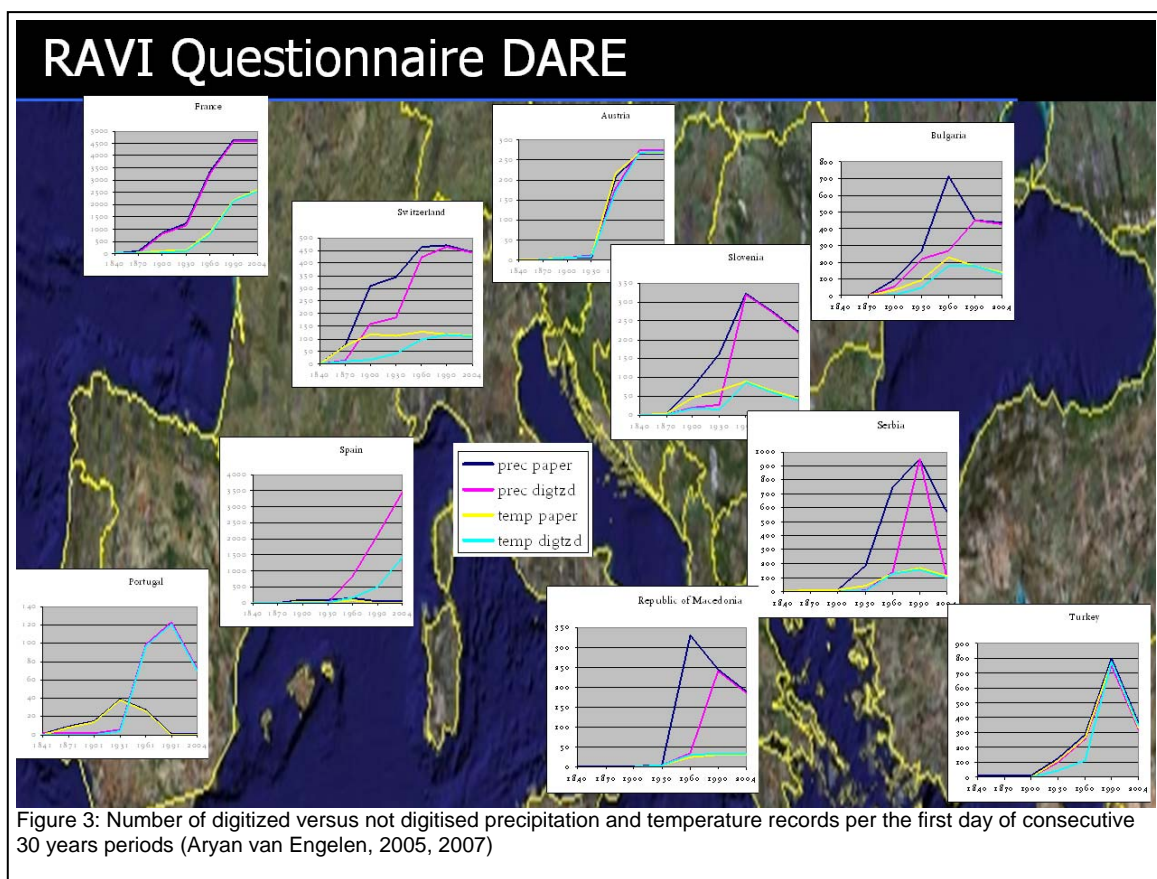
Next to the daily time series of the participants, additionally series from various other projects have been added to the dataset. Among these projects are EMULATE (European and North Atlantic daily to MULTidecadal climATE variability, Moberg and Jones, 2005; and Ansell, 2006), STARDEX (Statistical and Regional dynamical Downscaling of Extremes for European regions, Haylock and Goodness, 2004), MAP (Mesoscale Alpine Programme, Bougeault et al. 2001). GCOS is the Global Climate Observing System, a global surface reference climatological station network (GCOS Surface Network - GSN) built from a selection of the best climate stations in each region of the world (Peterson et al., 1997). The Global Historical Climatology Network – Daily (GHCND) was developed by the National Climatic Data Center (NCDC) and is the largest global data set comprising daily data (NCDC, 2004). The Joint Research Centre in Ispra, Italy houses the MARS-STAT Database containing daily series to develop an interpolated 50-km meteorological European data set for crop forecasting (Genovese, 2001). Additionally, synoptical messages are retrieved from the ECMWF MARS-archive (ECMWF, 2006) and added to the data set each month. These SYNOP data are exclusively used for updating, extending and filling gaps in existing station.

As put forward in the MEDARE meeting (Tarragona, Spain, 28-30 November 2007) ECA&D (<http://eca.knmi.nl>) offers a suitable platform for the collation, processing, analysing and exchange of new recovered (“Dared”) series. For such purposes it is formally recognised as the baseline dataset in the Millennium project. Next ECA&D gives public access to the recently released (November 2007) high resolution gridded dataset, generated by the EU FP6 ENSEMBLES project (<http://www.ensembles-eu.org/>). This project will develop a common ensemble climate forecast system for use across a range of timescales (seasonal, decadal, and longer) and spatial scales (global, regional, and local).

Outcomes for the Mediterranean Area RA-VI of a Questionnaire on Data Rescue, Preservation and Digitization.

This questionnaire was launched in 2005 (van Engelen) and addressed to the ECA&D partners of all NMHS's in RAVI as they have, working with long time series, generally a strong commitment for DARE. One question to the partners was to table per the first day of consecutive 30 years periods the number of stations of which the measurements of temperature and precipitation were available in digital and in paper forms as well. This is an approach that is comparable with that of a survey (2002) carried out in the Southeast Asia and South Pacific Region (Page et al, 2004). Figure 4 shows the course over time for various countries in RAVI of the number of digitized versus not digitised precipitation and temperature records. The following conclusions could be drawn:

- Generally the number of precipitation stations exceeds the number of temperature stations except Austria and Turkey
- The number of stations is strongly decreasing in Portugal and the Balkan Countries Bulgaria, Slovenia, Serbia, Rep. Macedonia and Turkey. This might reflect shrinking networks; a worrying tendency.
- A notable difference in the number of digitised and non digitised (paper) station records is shown in: Portugal (1840-1990), Switzerland (1840-1990), Slovenia (1870-1960), Bulgaria (1870-1990), Serbia (1900-2004), Turkey (1900-1990) and the Republic of Macedonia (1900-1990). So it might be worthwhile to undertake digitization efforts.
- Spain, Austria and the republic of Macedonia do not have series extending back in time before 1930. This justifies the undertaking of data archaeology actions as carried out in Spain.
- Countries that are recommended to digitise existing 19th century (paper) records are Switzerland, Slovenia and Bulgaria.



Tracks to potential valuable documentary datasets to be preserved and digitised

Library of the Ebro Observatory (Tarragona, Spain)

Ebro was founded by the Jesuits in 1904 and was part of an active network of geophysical observations, run by the Jesuits, with as main activity the exchange of meteorological and climatological data. Current the library, which is only partly inventoried, contains an abundant collection of meteorological reports dating from the 19th and 20th century. Fig. 4 shows three promising examples from data sparse areas: the Balkan and Middle East

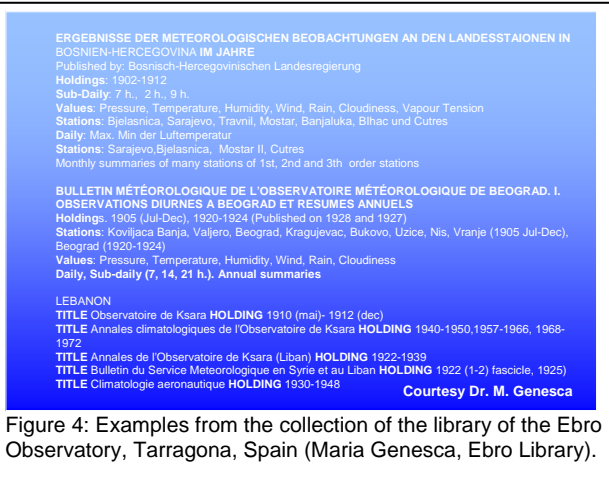


Figure 4: Examples from the collection of the library of the Ebro Observatory, Tarragona, Spain (Maria Genesca, Ebro Library).

The African Database

The historical data rescue program engaged since 1994 by Météo-France has allowed the enhancement of the French climatological heritage, especially for monthly averages of temperature and precipitation for 142 stations in 14 African countries: Benin, Burkina Faso, Cameroon, Central Republic of Africa, Congo, Ivory Coast, Gabon, Guinea, Mali, Mauritania, Niger, Senegal, Chad and Togo (see figure 5). The data were first available on a set of paper documents, tapes and punch cards. Next step was to put the data of all countries on files covering the period 1880-1950. In June 2001 a project started that aimed to transform a multi-file and low documented set into a data base structure in CLICOM international format with as characteristic period 1940-1980

http://www.wmo.int/pages/prog/wcp/wcdmp/wcdmp_series/documents/WCDMP49Annex12.pdf.

For other dare activities in RAI, especially the WMO-Belgian data rescue projects Data Bank and DARE I (microfiching of one million documents of the 9 CILSS countries), reference is made to the WMO Report of the CLICOM-DARE Workshop (San José, 17-28 July 2000) and the Report of the International Data Rescue Meeting (Geneva, 11-13 September 2001), WMO WCDMP report 49

http://www.wmo.int/pages/prog/wcp/wcdmp/wcdmp_series/report49.htm.

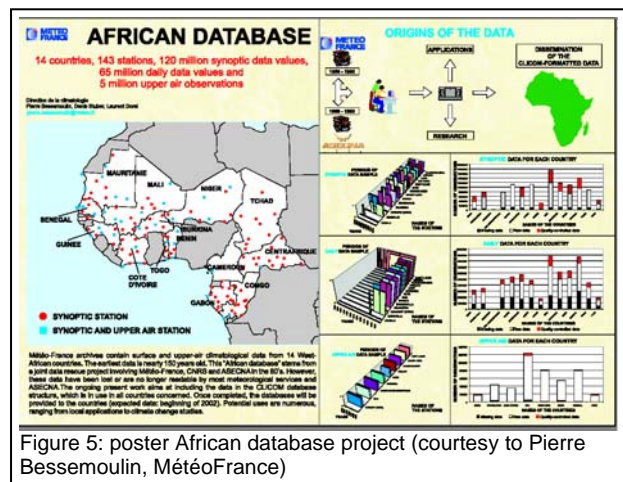
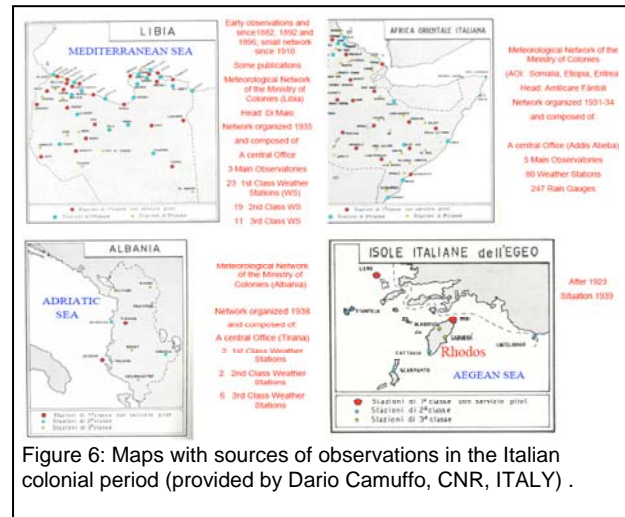


Figure 5: poster African database project (courtesy to Pierre Bessemoulin, MétéoFrance)

Former Italian colonies in RAI

With Dario Camuffo (CNR, Padova, Italy) the author (van Engelen) had personal communications about meteorological data of the Italian colonial period in Africa, in the countries Libya, Somalia and Ethiopia. Especially data from Libya seems to be relevant for the analyses of the climate in the Mediterranean part of Europe. But it is likely, according to Camuffo, that more material, also covering the other two Italian colonies can be found in four scientific institutes in Rome and Florence (figure 6)



Former Portuguese colonies in RAI

At a visit (May 2007) to the archives of the Azores Regional Delegations of the Instituto de Meteorologia of Portugal in Ponta Delgada, the author learned that it stored numbers of valuable paper documents with amongst others historical meteorological records from former Portuguese colonies as Mozambique. The documents were in a very bad condition and deserve a thorough stock taking, preservation and subsequent digitisation

NOAA Climate Data Imaging project

Image files of meteorological records are made available by the NOAA Climate Data Imaging project accessible via the NOAA Central Library Foreign Climate Data (http://docs.lib.noaa.gov/rescue/data_rescue_home.html). The time period of coverage ranges from the 1830s through the 1970s with most data from the period prior to 1960. Each series typically includes observations for a number of meteorological and other geophysical parameters. For the area in concern the image files of Algeria, Libya, Egypt and (former) Yugoslavia are relevant.

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