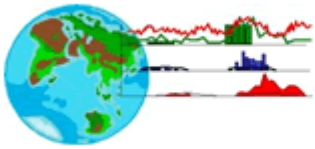
International Workshop on Rescue and Digitization of Climate Records in the Mediterranean Basin

Tarragona, Spain, 28-30 November 2007



Servei Meteorològic de Catalunya

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SESSION I

Emphasizing Needs for DARE Projects

Scientific benefits from undertaking data rescue activities: what more can be achieved with long digital records

Phil Jones
Climatic Research Unit
University of East Anglia
Norwich,NR4 7TJ

In most regions of the world there are longer instrumental records than apparent in a cursory search of the web site or the archives of a National Meteorological Service (NMS). In many cases these pre-date the founding of the NMS, and in some cases they pre-date the founding of the country. The climate is changing, so what is the use of these old records? Without even bothering to even look at them, you will never know! The talk will illustrate with some European examples the impacts of digitizing these early records. Examples of the use of long digital records include:

- longer periods for analysis and assessment of trends
- able to place the recent instrumental period in a much longer context
- provide longer records for assessing the impacts of climate change over longer periods
- provide longer records for the calibration of natural and documentary proxies for the possible further extension of the climate history of the region
- ability to provide longer records for Reanalysis extensions back to the late-19th century
- makes it known that NMSs are aware of the early data and also their quality and possible shortcomings

Early observers were generally very careful with their instruments and recorded the measurements with great details, in most cases with more thought than today. The time and effort made in taking the measurements needs to be acknowledged by NMSs. The records may not be ‘official’ but they are likely to very useful, and if digitized will likely get much more use than might initially be expected.

Climate data sets availability in RAVI, emphasis on the Mediterranean RAVI and RA I countries

Van Engelen, A.F.V. and Klok, E.J.
KNMI
PO Box 201
3730 AE De Bilt
The Netherlands
engelenv@knmi.nl

On 29 June last (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*.

So adaptation is not an option anymore. If climate change is inevitable, then so is adaptation. This is stated in the CGOC contribution to the Nairobi Work Programme (Sept 2007): "The Role of Observations in Support of Adaptation". In this report the rationale for DARE 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*.

An overview is given of datasets, often build up by the climate observing 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 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" and in this sense a rationale for the present workshop.

The presentation will be completed by presenting some tracks to valuable documentary paper data sets that have a high potential for successful data archaeology in the data "sparse & needed" areas.

The need of a historical climate data and metadata rescue project for the Mediterranean: the GCOS MedMEDARE Project

Manola Brunet
Climate Change Research Group,
URV, Tarragona, Spain

Although the Mediterranean countries have a very long and wealthy meteorological history, going back in time several centuries in some countries (i.e. Italy, France, Spain) and at least to the mid of the 19th century across much of the region, accessible digital climate data is mostly limited to the second half of the 20th century. Therefore, the existing data heritage is largely under-exploited. This reality is preventing the region for developing more accurate assessments of regional climate variability and change and impeding the development of optimum strategies to mitigate and/or adapt to the negative impacts of climate change over the region. On the last IPCC FAR chapter on regional climate projections is stated for the Mediterranean basin that the warming is likely to be larger in summer than in other seasons, annual precipitation and annual number of precipitation days are very likely to decrease and the risk of summer drought is likely to increase. However, these predictions are supported by still very limited, both at the space and time scales, and reliable instrumental climate data; reality that is hampering the efforts for better developing future climate scenarios. In this regard, long-term high-quality and homogeneous climate datasets, which can be confidently used for validating, for instance, climate models outputs or for generating reliable regional climate change scenarios, are still in need. The climate modelling community, among others end users, is urging to the observational community to develop long-term high-quality and homogeneous climate records. In this context, the Global Climate Observing System Regional Action Plan for the Mediterranean Basin (GCOS, 2006) launched a climate data and metadata project (project 12), aimed at developing a high-quality and homogeneous historical climate dataset for the Mediterranean region. Information on objectives, implementation, expected outcomes and other details will be provided during the presentation.

Developing long term homogenized data sets

Olivier Mestre
Météo-France, Toulouse, France

Many long instrumental climate records are available and can provide useful information in climate research. These datasets are essential since they are the basis of the description of the past climate. But in most cases, these series are altered by changes in the measurement conditions, such as evolution of the instrumentation, relocation of the measurement site, modification of the surroundings, instrumental inaccuracies, poor installation, and observational and calculation rules. These modifications manifest themselves as shifts (inhomogeneities) in the time series. As these artificial shifts often have the same magnitude as the climate signal, such as long-term variations, trends or cycles, a direct analysis of the raw data series might lead to wrong conclusions about climate evolution. A homogenisation method is a procedure that allows the detection and removal of possible effects of artificial changes in the measuring conditions. The problem at hand is tackled in two steps, detection of the inhomogeneities and correction of the series. The principle of those methods is described, and practical examples are shown. We provide a review of the various methods currently used, with their advantages and drawbacks, including techniques for daily data.

Data rescue and digitization: tips and tricks resulting from the Dutch experience

Theo Brandsma,
Royal Netherlands Meteorological Institute (KNMI),
De Bilt, The Netherlands,
theo.brandsma@knmi.nl

At the end of the 1980's KNMI digitized part of the huge amount of pre-1850 instrumental meteorological data in the Netherlands. The activity took place within the scope of a four-year EU-project. In the year 2000 KNMI renewed its efforts in the area of data rescue and digitization with a long-term activity (partly externally funded). Since then many types of data have been digitized and made available to the public. Examples of the data types that have been dealt with are: 18th and 19th century ship logs, 19th century KNMI year books, films with observer log books of the Amsterdam City Water Office, strip charts and paper rolls from pluviographs, logbooks with rainfall measurements in the 1850-1950 period, data from the colonial past and metadata archives.

Although the basic principles for digitization are the same for all data types, there may be important differences in the implementation. For instance, different techniques are available to make digital images of the raw data. At present we use three types of scanners for making these images. We have the ambition to make all digitized data freely available together (if feasible) with the digital images of the raw data.

Another example of a difference in implementation is a software program that is being developed at KNMI for automatically tracing curves in strip charts. These charts have first been transferred into high-resolution digital images. The meteorological archives around the world contain billions of strip charts from thermographs, barographs, hygrographs, pluviographs, etc. In general these charts contain much more quantitative information than extracted from them in the past. Automatically extracting this information would be of major interest.

An important aspect that has to be considered in data rescue and digitization projects is the durability of the work, how the digital data is archived and how future format changes will be tackled. KNMI is currently involved in discussing this subject with other institutions in the Netherlands.

SESSION II

Existing Regional initiatives and datasets.

Atmospheric Circulation Reconstruction over the Earth (ACRE) and WMO DARE missions over the Mediterranean

Dr Rob Allan.
ACRE Project Manager,
Climate Variability and Forecasting Group,
Hadley Centre for Climate Change,
Met Office, FitzRoy Road, Exeter
EX1 3PB
U.K.

Over the next 3-4 years, the Atmospheric Circulation Reconstructions over the Earth (ACRE) initiative will be facilitating the recovery, rescue, extension, quality control & consolidation of global historical terrestrial & marine instrumental surface data covering the last 100-250 years. The focus of these activities will be on surface observations of atmospheric pressure, sea surface temperature and sea-ice. These variables will be archived respectively in the International Surface Pressure Data bank (ISPD) of the GCOS AOPC/OOPC Working Group on Surface Pressure (WG-SP), the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) repository via the RECovery of Logbooks And International Marine data (RECLAIM) project, and in the National Snow and Ice Data Center (NSIDC) data base.

The ACRE initiative will facilitate the use of such data in three surface-observations-only reanalyses (the 20th Century Reanalysis Project, early to mid-19th Century to present reanalysis, and North Atlantic-European region mid 18th-early 19th Century to present reanalysis) being generated at the NOAA Earth Systems Research Laboratory/CIRES CDC, University of Colorado in the US.

All of these reanalyses will produce 3D tropospheric weather variables every 6 hours on a 2º latitude x 2º longitude grid over the globe. The longest of these reanalyses covering the North Atlantic-European region will span the last 250 years. The reanalysis products produced will be vital to new investigations of the variability and changes in observed and modelled climate and extremes. ACRE will also facilitate the downscaling and seamless linking of these reanalysis products into an immense range of climate applications models and activities.

The current state, and potential future extent, of data recovery and rescue of very long daily to sub-daily atmospheric pressure data series across the Mediterranean region for the ACRE-facilitated reanalyses will be presented. A call will be made to National Meteorological Services and WMO DARE missions to aid and support these mutually beneficial activities.

The MEDCLIVAR metadata base initiative: synergies with DARE national and regional missions across the Mediterranean countries

Dr Ricardo García
University Complutense of Madrid,
Madrid, Spain

MedCLIVAR is an international programme supported by the ESF which aims to coordinate and promote the study of the Mediterranean climate. MedCLIVAR's scientific priorities are: description of climate past evolution, assessment of climate variability at different space and time scales, understanding the mechanisms responsible for the observed climate variability, identifying trends and providing climate prediction in relation to future emission scenarios and the study of the occurrence of extreme events and climate change impacts.

The first MedCLIVAR workshop was held in Carmona,, Spain on November 2006. It focused on the analysis and identification of Unexplored sources of high resolution data in historic time. The workshop was attended by 64 researchers from 15 countries, The main purpose of the meeting was to identify sources of early instrumental data and natural and documentary climate proxies, which had not been previously explored and/or identified and could be relevant for the reconstruction of the Mediterranean climate or weather extremes of past Millennia with high temporal (annual or higher) and spatial resolution and the potential for past climate estimates from low resolution proxies covering the last ten thousands to hundred thousands of years.

This presentation will show the main results of the workshop, with special emphasis on the description of the MedCLIVAR metadata base.

Availability and quality of Italian secular meteorological records and consistency of still unexploited early data

Maurizio Maugeri
Istituto di Fisica Generale Applicata
Milan University and Istituto di Scienze dell'Atmosfera e del Clima
CNR (Italy)

Italy boasts a role at the highest level in the development of meteorological observations. As a consequence, a heritage of data of enormous value has been accumulated over the last three centuries.

In spite of this huge heritage of data and even if most records were subjected to some sort of analysis, until a few years ago only a small fraction of Italian data were available in computer-readable form.

In the last years, thanks to extensive data digitalisation performed within a number of national and international projects, the situation has improved rapidly. Moreover further improvement is expected for the next future as other activities are in progress or are planned for the next years. However, in spite of such improvement, a significant fraction of Italian data is still unexploited and will probably continue to remain as such also in the near future.

Within this context the aim of the presentation is to give an overview of present Italian data availability and quality, highlighting the importance of recent data recovery activities and discussing the potential of still unexploited sources of early data.

NOAA's Climate Database Modernization Program-
A Stewardship Commitment

Tom Ross
NOAA-NCDC Asheville, USA

The Climate Database Modernization Program (CDMP) supports NOAA's mission to collect, integrate, assimilate and effectively manage Earth observations on a global scale, ranging from atmospheric, weather and climate observations to oceanic, coastal, and marine life observations. Many of these holdings, which are part of the U. S. National Archives, were originally recorded on paper, film, and other fragile media, and stored at various NOAA Centers. Prior to CDMP, not only were these valuable data sources mostly unavailable to the scientific community, storage technology for the archives was not state-of-the-art. Without proper preservation of the media, the information they contained was in danger of being lost forever. Today, CDMP has greatly improved the preservation and access to NOAA's holdings by migrating many of these resources to new digital media. Digital images of many of the holdings are now available online, and millions of historic data records have been keyed and integrated into digital databases, with more added continually. CDMP projects span the full spectrum of NOAA, supporting all five line offices.

CDMP also works with U.S. Regional Climate Centers, State Climatologists, the U.S. Air Force, the World Meteorological Organization, and foreign meteorological services in Europe, Africa, Asia and the Americas. These efforts not only benefit NOAA, but researchers and data users throughout the Nation and world-wide. The increase in data accessibility and inclusion of these
historical data sets into the integrated global databases needed by today's climate and environmental data users validate the CDMP mission: to make major climate and environmental databases available via the World Wide Web. This presentation gives a brief overview of the CDMP program and also focuses on collaborative international data rescue projects in South America, Europe and Africa.

Report of RAI Working Group on Climate Related Matters (WGCRM)

Alphonse KANGA
Chairman of the Working Group on Climate Related Matters for Region I (Africa)

The Data Rescue project is of great importance for Africa. There are no appropriate structures to preserve climate records, which are generally on perishable support (paper). Climate records are subjected to humidity, dust and any climate hazards, and so, to deterioration. Apart climate hazard*,* there is also a need to form people to get the importance of climate records.

The project was first implemented on 1979 in Africa, in western African countries, aiming at assisting countries in the management, preservation and use of climatic data over their own territories, funded primarily by Belgium. Equipments consist of camera, microfiches reader, copier were donated. The microfilms were sent to IDCC to make microfiches

As from 27 May 1997 on, the DARE I coordination was transferred to ACMAD in Niamey. So ACMAD received IDCC's PC network, the microform equipment with remaining supplies and a diazo-copy of the 91,750 microfiches at IDCC (+ 2,408 new microfiches to be duplicated and inventoried at ACMAD).

Present situation

Following development of new technology in recent years, such as scanner, digital camera, the Data rescue project move forward.
Equipments consist of computers, digital cameras and spotlights; have been donated by WMO through VCP to African countries.
Upon reception, equipment was set up and some countries add some material to make digitalisation easer and the job started.

To get feed back of donation and to harmonise the job; a workshop with participants from Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Cote d'Ivoire, Guinea Bissau, Guinea Conakry, Liberia, Mali, Niger, Sao Tome & Principe, Senegal and Togo were held at ACMAD, in Niamey Niger on March 2006;

Suggestion.

There is a *permanent need to have equipment up dated*.
Original documents used for DARE-I are no more available, much of them have been destroyed. In some countries microfiches are also destroyed. The only way to get records is to turn to ACMAD where microfiches stored.

To day with digital camera, archives are on CD or computers. It will be useful to update supports equipments according to new technology.
There is a need to *have feedback from countries*. Lessons learnt from the workshop held in Niamey (March 2006) demonstrate a need of focal point at national level.

As for equipment, there is also a need of more workshops to adapt with new technology and software.

Deficiencies and constraints in DARE mission over eastern Mediterranean

Serhat Sensoy
Turkish State Meteorological Service, P.O.Box: 401, Kalaba, Ankara, Turkey

Climate change is brought about by the complicated interactions among the atmosphere, the oceans, the cryosphere, the surface lithosphere and the biosphere, which comprise the climate system. Climate changes being extremely complex and totally global in its nature, cooperative activities with international and interdisciplinary programs are indispensable for monitoring and predicting climate change and disseminating reliable information on it.

Historical climate data is very important value and need to be digitize in order to detect natural climate variability over historical time. An International Data Rescue meeting (September 2001, Geneva) re-defined Data Rescue as *: An ongoing process of preserving all data at risk of being lost due to deterioration of the medium, and the digitization of current and past data into computer compatible form for easy access.*

In order to detect historical climate values and their DARE activities, a questionnaire has been prepared and sent to eastern Mediterranean countries. Although four countries replied this request (Turkey, Georgia, Jordan, U.A.E.), it is clear that there are many historical sources need to recover and digitize. Also many countries have expressed their intention to rescue of their data but they mentioned some constraints and they need help from WMO and other international organizations. Turkey, Georgia, Jordan and U.A.E. have historical climate values from 1842, 1844, 1925 and 1936 respectively and some of the values are still waiting for digitization.

The measurement of temperature for Istanbul were firstly published in 1842 in the newspaper " Ceride-i Havadis" (Oguz, A, 1947). Turkish State Meteorological Service (TSMS) was founded in 1937 and before this date there are some old volumes recorded in the Ottoman Empire are as follows: French Meteorological Service has some volumes in Bureau Central Meteorologique, 1868-1897: Bulletin International XIII-XXV Annee, Jan 1-Dec 31, Paris, France. Three climate books for Istanbul from 1896 to 1914 can be found in the meteorology museum in Ankara. They are in Ottoman language and need to be translated and then digitized. European 6th framework project (MACE) included this task as WP 4.5. This project passed all evaluation but not approved yet as financially. During the 1st World War (1915-1918), some German scientists had been carried out meteorological observations from 1915 to 1918 and they published it in a book titled"Zum Klima der Türkei". These examples show that there is the potential to recover early data for the above sites in Turkey. Some of

the pressure data are already presented and available in ACRE Project at http://www.cdc.noaa.gov/Pressure/ and http://www.hadobs.com/ which are: Istanbul (EMULATE) 1866-1880 [daily] (Hadley Centre) 1847-1848; 1854 [monthly] (ADVICE/CRU, UEA, Phil Jones) 1856-present [monthly], İzmir (Hadley Centre, Rob Allan) 1864-1873; 1890-1899; 1906-1994 (gaps) [monthly]

After the reconstruction of past climate data, it will be possible to run RClimDex software to produce climate indices and to detect climate change from historic time to the present. One study has undertaken for the Middle East and published at: www.agu.org/pubs/crossref/2005/2005JD006181.shtml

How a non-profit organization can assist national meteorological services with data rescue and digitization

Mr. Rick Crouthamel
IEDRO, USA

Non-profit organizations offer national meteorological services specific benefits of collaboration in data rescue and digitization efforts.

- A Non-profit is considered an “honest broker” with no agendas other than rescuing and digitizing data.
- We are relatively free from political pressure as to where data rescue funds should be spent.
- We are free to make honest evaluations of a country’s data rescue needs and efforts without modifying our findings due to politics.
- We are free from the need to produce a profit for investors and can therefore use more funds for data rescue.
- We can use appropriate technology rather than the cheapest or only equipment made in the USA.
- We can solicit funds from a variety of sources including those which only fund non-profit organizations.
- Our finances and operations are under intense scrutiny by the U.S. Internal Revenue Service to ensure our efforts are strictly for the benefit of humanity and not for anyone to make a profit.

The presentation will describe:

- Who we are.
- What we have done.
- Our cooperative relationship with NOAA’s National Climatic Data Center
- How successful we have been.
- Why national meteorological services need us.
- How we can work together to reach our goals.

SESSION III

Reviewing National Mediterranean DARE projects

Early stages of the recovery of Portuguese historical meteorological data

Maria Antónia Valente [(1)], Ricardo Trigo[(2)], Manuel Barros[(3)], Luís Filipe Nunes[(4)], Eduardo Ivo Alves[(5)], Elisângela Pinhal[(1)], Fátima Espírito Santo Coelho[(4)], Manuel Mendes[(4)], Jorge Miguel Miranda[(1,2)]

(1) Instituto Geofísico do Infante D. Luiz, CGUL, IDL, Rua da Escola Politécnica, 58, 1250-102 Lisboa, mavalente@fc.ul.pt; (2) Centro de Geofísica da Universidade de Lisboa, IDL; (3) Instituto Geofísico da Universidade do Porto; (4) Instituto de Meteorologia, IP; (5) Instituto Geofísico da Universidade de Coimbra

Here we present the first results achieved with project SIGN (Signatures of environmental change in the observations of the Geophysical Institutes). The project's main goal is to convert into a digital database the historical meteorological data, recorded since 1856 until 1940 in several annales published by the 3 Portuguese Geophysical Institutes (of Lisbon, Oporto and Coimbra) and the Portuguese Meteorology Institute. The different sets of historical data contain monthly, daily and sometimes hourly records of pressure, temperature, precipitation, humidity, wind speed and direction, cloud cover, evaporation and ozone. The published data cover several stations in mainland Portugal, the Azores and Madeira islands and in former Portuguese African and Asian colonies. The main objective is to use the data to study the changes that have taken place in the historical records during the last 150 years, when the recovered data is merged with the post-1941 data stored in the Meteorology Institute digital database. The other aim is to make the data available to the meteorology community at large. Direct observations of pressure data for Lisbon in the 1856-1940 period were prioritised and have been manually digitised, being later subjected to quality control tests. Digital historical records of Lisbon temperature, relative humidity and precipitation data have been obtained through corrected OCR techniques applied to published hourly or bi-hourly tables. Preliminary digital results are also available for several stations in mainland Portugal, Azores and Madeira. Data for the Escola Médico-Cirúrgica station in Porto during the 1861-1898 period are already in digital format. All datasets are subjected to an initial quality control test, to detect wrong values, with more comprehensive tests to be applied at later stages. At the same time, detailed metadata files are being compiled for each station. This work will show the preliminary analysis results for the digital historical database obtained so far.

Spain

José Antonio López Díaz,
Head of Basic Climatology Area, Spanish Met Service
jalopez@inm.es

An estimated inventory of long precipitation and temperature series in Spain is presented, classifying the series according to variable, date of start, percentage of missing data and monthly *versus* daily grouping. For example the number of precipitation/temperature series in the climatological data base of the Spanish met service beginning before 1900 is around 40, of which only 8 have daily data in digitised form. Some attempts have been made to probe for the existence of daily data in the regional centres but so far with little success. This is a field which needs more work.

Recently we have formed a set of around 40 temperature series in order to form national averages with full homogeneity guarantees. Now this set will be enlarged in time with the collaboration of the University Rovira I Virgili. Some recent efforts at the digitalization of metadata will be shown, though the situation in this field is far from completely satisfactory.

The Snow and Mountain Research Centre of Andorra (CENMA): overview of the andorran climate records

Pere Esteban, Laura Trapero, Ramon Copons, Montserrat Mases
Snow and Mountain Research Center (CENMA). Andorran Research Institute (IEA). Av.Rocafort 21-23, Edifici Molí 3r pis. AD600 Sant Julià de Lòria, Principality of Andorra. Tel: 00376 742630 Fax: 00376 843585

Since the beginning of 2007 a new research centre on natural sciences is in the Principality of Andorra. In this new centre, part of the IEA (Andorran Research Institute) and called CENMA (Snow and Mountain Research Centre), the research on climatology and meteorology is also considered, specially since the natural hazards point of view. A new AWS network, a filtered database and a mesoscale meteorological model adapted to Andorra are being implemented. The knowledge about the observations that exist or have existed in Andorra, and the location of the original data is being investigated. Afterwards, the inclusion in the new database of the historical data recovered is planned. Nowadays, the CENMA is in touch with the Catalan Meteorological Service for obtaining the information related to the weather stations existing in Andorra before the Spanish Civil War which were property of this regional meteorological service.

Identification and digitization of instrumental climate data from Catalan documentary sources (19th and 20th centuries)

Anna Rius, Marc J. Prohom and Mònica Herrero
Area of Climatology - Meteorological Service of Catalonia

One of the main goals of the Meteorological Service of Catalonia (SMC) is the maintenance and recovery of climate data, in order to improve our knowledge about the Catalan climatology and meteorology. Following this statement, the Area of Climatology of the SMC is undertaken an ambitious task of cataloguing and digitizing all the meteorological series scattered all over the territory. Here we describe how these objectives are being considered, the tasks that have already been done and what are those that will be treated in the future.

Once the batches of documents from the former SMC (1921-1939) were recovered and grouped into one source, a complete catalogue was carried out. This action allowed us to have a first view of the content and volume of the material preserved, and highlighted that the amount of meteorological series available and not yet exploited was above the number that was previously thought. Thus, in a first stage of the project, a digitization of those monthly rainfall series available was completed, encompassing the period from 1861 to 1936. As a result, 226 series already identified were completed and/or extended back in time, while 192 new series were detected. As far as possible, a complete metadata of each series was also recovered.

A second stage of the project is already finished. This includes the digitization of daily series, not only rainfall series but also temperature series, and severe meteorological phenomena (heavy snowfalls, hailstorms, floods, tornados…). As a consequence of this work, 342 daily series have been identified, giving information not available until now, of which about forty series go back into the 19th century.

At present, we are designing two databases. The first one, will contain metadata of all the meteorological weather sites identified, indicating the documentary sources used, name of observers, instrumentation, environmental changes… This information will be crucial for the generation of a second database of homogeneous climatological series.

In the future, other daily and subdaily meteorological data (atmospheric pressure, wind force and direction, cloudiness, relative humidity…) will also be digitized and the whole documents will be scanned for preservation of the sources. In addition, photographic plaques containing information about instrumentation and weather station installation will be considered. Moreover, new documentary sources will be explored in order

to extend and complete these series or identify new ones, specifically that information published in historical newspapers.

Data Rescue activities at Météo-France

S. Jourdain
Météo-France, Direction de la Climatologie, France
(sylvie.jourdain@meteo.fr/Fax +33-561078309)

Data rescue activities at Météo-France managed by the Climatology department (Direction de la Climatologie) include old instrumental climate data preservation, digitization and quality control. Great efforts have been dedicated to locate relevant and to conduct inventories of the paper archives. Full identification of the relevant historical site (at least geographical coordinates, altitude, station identifier, original owner of the station) and its linking to an already identified site in the national climatological Database (BDClim) is generally a time-consuming task. Once this is completed, climate data are digitized and then inserted into the BDClim, because the primary component of the national archive resides in the BDClim. The newly inserted data are subject to some QA/QC procedures before validation. French climate data are accessible to different types of users through the internet by the so-called "Climathèque" climate data access service (http://climatheque.meteo.fr).

The historical Data Rescue program engaged in 1994 by Météo-France aimed first at enhancing the content of the BDClim database, especially monthly averages of daily minimal and maximal temperature and monthly rainfall for the 1880-1950 period, so far poor in data. The motivation for undertaking such work was to build long time series of climate data allowing to estimate long term trends (e.g. over the whole 20th century), on the basis of the homogenized time series. At that time, homogenization of yearly and monthly data was considered much more feasible that daily data.

Since 2004, Météo-France has given priority to rainfall, temperature, pressure and sunshine duration data on a daily basis for France mainland and French overseas territories, in order to address extremes.

Climate data are hidden in many places in France (Météo-France own archives in at least 100 different sites; national or departmental archives; universities or scientists associations; observatory libraries, ministry of Defense archives; etc…) and at many websites like http://gallica.bnf.fr, the digital library maintained by the National Library (Bibliothèque Nationale de France).

The author has written Guidelines to advise colleagues on how to search old climate data in France and how to undertake inventories. After data localization and inventory, we have to deal with the problem of data collection. Several times from 1976 to 1994, Météo-France deposited a vast amount of paper records at the National Archives of France in Fontainebleau. Data cover the period 1841-1993 and concern France and

Africa. The inventory is accessible on the Web but the data itself have not been accessible for several years, mainly because the buildings are polluted by asbestos (http://www.archivesnationales.culture.gouv.fr/cac/fr).

Inventories and documents can also be consulted in departmental archives rooms, but borrowing is not permitted. Consequently, Météo-France uses to buy microfilms or image files from public archives in accordance with the inventories to preserve and to digitize data. Recently very fruitful collaborations with French universities have been established and have allowed to collect and preserve very old paper documents and to digitize daily rainfall in Rhone Valley from 1845 to 1875.

Data Rescue activities at Météo-France also include preservation of old meteorological books but the lack of sufficient human and financial resources and the huge amount of paper records do not allow to preserve and digitize all the data.

Microfilms and microfiches from old French colonies are archived at the Climatology department in Toulouse. An Inventory have been undertaken. The inventories for Algeria, Tunisia and Morocco are available : 3050 microfiches and 251 microfilms for the period 1926-1960. These data should have been given to these countries when they became independent in the 60's. However, we are ready to provide them again in order to fill posssible missing data in their national databases in the future.

Actual consistence of Italian Database and future developments. Some actual Italian climate products.

Tiziano Colombo
Head of Climate Department
Operational Meteorological and Climate Center
Italian Air Force.

- The actual completeness of Italian Meteorological digitized Database is showed.
- The consistence of paper Database is showed too. Part of the whole set of paper data consists of Italian former African colonies.
- Some future developments are spoken about, like digitization of African meteorological data collected before the second world war and taking pictures of Italian observation sheets, earlier than 1951, for successive digitization.
- Some Italian climate product like Climate Atlas of Italy and some monthly bulletins are showed too.

Data Rescue Activities at Slovenian Meteorological Office

Mojca Dolinar*, Boris Pavčič, Mateja Nadbath*, Gregor Vertačnik***
** Environmental Agency of the Republic of Slovenia, Meteorological Office, Ljubljana, Slovenia*
*** Univeristy of Ljubljana, Faculty for mathematics and Physics, Chair of Meteorlogy, Ljubljana, Slovenia*

EARS has inherited a huge archive of measured meteorological data. Some of them were measured even in 19th Century. All data from 1961 on are systematically digitalized. For the earlier period only few datasets are digitized. Studying climate variability and change emerged the need for high quality (validated, controlled and homogenized) long datasets. Since it is time-demanding work and needs a lot of resources, the progress of data recovery was very slow. In recent years EARS joined Interreg project FORALPS and additional resources from the project enabled us to speed up the data recovery activities.

In the first step an inventory of existing datasets (in different formats) have been made to identify the potential long data records. According to inventory, digitization of longest data records has been performed and in parallel there have been also activities for metadata rescue and recovery.

10 datasets longer than 100 years were indicated as potential datasets for climate analysis. Only few of them have both precipitation and temperature series, most of them have complete series only for precipitation. During digitization process several deficiencies of data sets emerged, like:

- Data in historical units/instruments (Paris line, Six's thermometer – wrong reading)
- Different observation times (data cannot be in regular base, comparisons could not be made)
- General mistakes (unreadable data, missed days of observation, problems with phenomena observations; no possibility to check at the observer, few to check with other stations)

During the history some meteorological stations belonged to 4 different authorities. Reports are in four languages, in Latin and Cyrillic alphabet and in two measuring systems. Not all paper archive is in possession of EARS. Some is in different institutions in Italy and some in Austria. There are two breaks identified in almost all datasets: around 1927 and during second world war.

Metadata is in paper archive. The completeness of metadata is highly variable during the history of meteorological observations. For stations, indicated as good potentials for longer datasets, reconstruction of metadata has been performed. From different historical documents the exact locations were identified. Instruments descriptions and positions

were found from old logbooks and also from very different documents of historical institutions like schools, monasteries…. All metadata were systematically digitized and for easier retrieval of metadata a web application have been developed.

Digitalization and Data Rescue in Croatia

Mrs Janja Milkovic
Meteorological and Hydrological Service

There is a long tradition of meteorological observations in Croatia. Until the second half of the 19th century observations were carried out occasionally and periodically and the records can be found in historical chronicles, monastery and town annals, in reports on historic events, battle descriptions, travel records, medical bulletins, newspapers and elsewhere.

It can be said that systematic meteorological observations started in 1851, when observation data from Dubrovnik station were published in the meteorological yearbook for Austrian Empire. This station unfortunately did not operate continuously. The oldest Croatian station operating continuously is the Zagreb-Grič, established in 1861. Apart from the Zagreb-Grič, there are a number of stations which have a long tradition of collecting meteorological data: Osijek, Požega, Gospić, Crikvenica and Hvar. All the data recorded at the above stations are saved on a magnetic media and can thus be used in different researches, such as the research of climatic changes.

The number of meteorological station augmented steadily up to the end of 19th century, although there were frequent discontinuations of observations, mostly due to moving of observers. By 1900, 168 meteorological stations were established.

During the period from the second part of the 19th century till 1991 (Croatian independence), there were two World Wars as well as the war in Croatia (1991-1995), and because of the fact that Croatia was part of the Austro-Hungarian Monarchy and former Yugoslavia, a part of the historical data were irretrievably lost.

Today, the Croatian meteorological network consists of 41 main meteorological stations, 116 climatological and 336 precipitation stations, 2 radiosonde and 8 radar stations, and 34 automatic weather stations.

Several actions to digitize data have been undertaken. Computer data processing and storage was introduced in Belgrade, former Yugoslavia, in 1968 and was situated there till 1980. Unfortunately, considerable parts of those data were irretrievably lost. In January 1981 computer data processing and storage was started in Zagreb. Here, we are dealt with climatological data (measurements three times a day at 7, 14 and 21), of the main meteorological stations as well as ordinary climatological stations. In January 1991 computer data processing and storage all data of the precipitation stations was started. Until 1999 all controlled and

processed data have been stored in the MicroVAX computer, and since 1999 the data have also been stored in the UNIX operational system.

The data of the radiosonde stations have been stored on magnetic media since 1971.

All the data that have been recorded at the automated meteorological stations (since 1983) are saved on a magnetic media and can be used in different researches.

As a part of Hydrological Operational Multipurpose System (HOMS), in 1984 the digitalization of the rain recording gauge charts by digitizer was started.
In 1991 data entry of the hourly values of different meteorological elements were carried out.

Since 2005 there have been introduced digitizing of different meteorological charts (thermograms, hygrograms and barograms) using a scanner.

There is a plan for digitalization, prevention and data rescue. Bearing in mind that prevention and data rescue are very complex and expensive process it will not be an easy task and realization depends on financial situation.

Rescue and digitalization of climate records in Bosnia and Herzegovina

Zeljko Majstorovic
Federal Meteorological Institute B&H, Bardakcije 12, Sarajevo, B&H
Tel: 00387 33 276 708
zemajstorovic@yahoo.com

A meteorological service in Bosnia and Herzegovina exists since 1892. At the end of 19th century about 70 stations with meteorological program were working. During World War One all stations were interrupted, except Sarajevo and Bjelasnica. Network was repaired in 1923, with similar number of stations. It was working until 1941, when it was interrupted again, because of the World War Two. Only Sarajevo station was working all the time. Network was repaired and extended in period 1946 – 1951. At the half of 20th century, about 600 meteorological stations were working (100 with climatologic program, and 500 rain gauge stations). That condition maintained until 1992. During the war about 15 stations were working, with periodical interruptions. Since 1996, meteorological network is gradually repairing. Today, about 13 synoptic, 40 climatic and 20 rain gauge stations are working. That number will continue to grow.

After the war only paper data archive was preserved. Until today about 40% of data is digitalised, mostly in EXCEL. A year ago, data base CLIDATA was donated from Slovakia (with data management ORACLE). Permanent import of actual data into this base begun at the beginning of this year and still lasts. Also, historical data from EXCEL were imported to CLIDATA. Our next assignments are expert training in work with ORACLE, and expanding of hardware support.

Montenegro

Mrs. Vera Andrijasevic
Hydro-meteorological Institute of Montenegro

The first systematic measuring in Montenegro was conducted on 1 September 1882. in Podgorica . The measuring included basic climate elements, atmospheric temperature, precipitation, humidity, pressure and wind direction. At the same time, during 1882., meteorological measuring started in towns of Bar and Ulcinj for the maritime purposes. As of 1887., the measuring also started in the towns of Cetinje and Nikšić, and later on in other urban parts of the Principality of Montenegro. A central meteorological service in Montenegro was established in 1931. and was operational until 1941. Upon adoption of a Decree on Establishment of Hydrometeorological Service in Montenegro, the Hydrometeorological Institute started with operations on 20 December 1947. as a governmental agency.

The network stations of Hydrometeorological Institute of Montenegro includes 120 meteorological stations, 40 hydrological stations, 36 water quality stations and 17 air quality stations,but they are not all in function. All data measured in these stations are in paper form and they are stored in Hydrometeorological archive dating back to 1947. Archive is consisted of meteorological and climate diaries, monthly bulletins, yearbooks, charts from thermographs, barographs, anemographs, hygrographs and heliographs. Archive is well organized, but is not complete.

Hydrometeorological Institute has been using CLICOM for its database management system since 1987. All climate data (measured at 7:00, 14:00 and 21:00 in CET) is in digital form although related metadata are not currently available in durable, useful form. Climate records are time series of fifty years in length.

The main activity of national DARE project should be transferring these data from paper form to microfilm. Nevertheless, the lack of appropriate microfilm equipment is the main problem of this activity. In addition, one of aims of national DARE activities is to provide new Climate Database Management System CLIDATA. There has been a realization of this activity now.

Climate Data Rescue in the National Institute of Meteorology and Hydrology of Bulgaria

Tania Marinova
National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences
66 Tsarigradsko chaussee, 1784 Sofia, Bulgaria
Tania.Marinova@meteo.bg

Data rescue activities in the National Institute of Meteorology and Hydrology (NIMH) include preservation of all climate data and corresponding metadata, collected in the national meteorological network on the territory of Bulgaria, and their transfer from paper records to digital form in order to be imported into relational database for easy access.

Climate data records in paper form are stored in the Meteorological Archive of NIMH from the beginning of the respective measurements. In 2002 all paper records were moved into appropriate building where the temperature-humidity conditions corresponded to the requirements for such type of premises. Most of the materials were put into cardboard or plastic boxes in view of their preservation. In this way a full inventory of the paper records was also made and the real gaps in the long-term climate series were fixed.

Digitizing of current and historical data into computer-compatible form is carried out by means of specially developed programs with ASCII output for direct import into corresponding tables of the meteorological database MeteoDB (RDBMS MS SQL Server 2000), where only row hourly or daily data is stored. Data processing for different purposes (standard meteorological data processing, data quality control, performance of specialized customer requests, applications) is executed by stored procedures written in Transact-SQL. The results of the inventory of the climate data available only in paper form and digitized data are presented.

Detailed information about the meteorological stations is stored in meta tables (identical number, name, geographical location, type, land use around the station, changes of type, moving, interruption periods, measuring instruments, specific measurements, etc.) but it is not entirely imported into the database and besides, there are some omissions in the stations history. For this reason we make efforts to update the files of the stations in view of the importance of metadata for the execution of stored procedures as well as for homogenization of long-term climate series which is one of the main tasks in the next several years.

The lack of sufficient human and financial resources is the greatest obstacle to the data rescue process. That's why a part of the current data is not transferred to digital form and digitization of the past climate data, available only in paper forms, will not be completed in the near future.

Besides, most of the tape records from self-recording devices are not digitized and digital-images archive of all climate data records is not created. Last year an initiative for scanning only the documents from the files of the stations started and almost half the work is completed. The national DARE project implementation seems to be the best solution of the mentioned problems.

***Keywords**: preservation of climate records, digitization of current and historical data, relational databases.*

Processing of meteorological monitoring data basis of Georgian mountainous regions

Z. Tskvitinidze, L. Kartvelishvili, N. Gogishvili, M. Pkhakadze, N. Kutaladze

It is observed significant fall behind in direction of meteorological monitoring data basis processing and for revelation of peculiarity of regime-climatic factual characteristics of Georgian mountainous regions. This fall behind reasons are caused by following factors: According to established order of former USSR, materials of regular hydrometeorological observations of Georgian h/m net were being sent to disciplinary head organization of the USSR (located in Russian Federation, c.Obninsk), where they were being machined and formatted in data basis, which were acceptable for those times existent computer techniques. After destruction of the USSR, since 1992 principal difficulties arose regarding to provision of security and rescue of meteorological monitoring materials stored on papery bearers.

The present day on the frame of concrete project is selected regular observations primary materials for recent 15 years period of 9 stations and 20 posts of Georgian mountainous regions' h/m net, which is only 20% of existent in fact materials of Georgian meteorological monitoring and it is taking place to transfer them from paper bearer to electronic format, which contains in general recorded informational materials in conditions of effective monitoring, within 100 million symbols. Among them: the results of carried out the monitoring by the only one station during a month, which is registered in special note books by pencil and contains about 20 meteorological parameters daily regular measures with period of 3 hours and permanent observations on atmospheric events – contains nearly 50 thousand figures, concerning to posts there are only measurement on temperatures and precipitation 2 times in a day which is stored on the papers. Entirely primary materials for 9 stations and 20 posts contain for 15 years period, taking into account some of the stations' incomplete materials – nearly 100 million informational units; To keep, rescue and capability of objective usage of resulted data base is incongruous with corresponding requirement.

Computer processing of transferred in electronic format materials provides quality control of primary materials, by using of different level algorithms, which carry out both – syntactic (bringing to conformity of submission of materials to be processed with established form) and semantic (by bringing to substantial conformity revelation of suspect data and certification of materials) characters and with taking in account that number of suspect data fluctuates on average within 0.5-1.0% of total quantity of materials to be processed, this part of the project – the certification of materials, is connected with realization of very laborious

and qualified work of establishment of reliability of nearly 500 thousand suspect data;

Lebanon

Dr. Riad Assolh Al KHODARI
METEO-LEBANON
00961 3 930 765
dr.khodari@hotmail.com E.Mail:

Meteorological Department - Beirut – Lebanon
The 4th of July 1921, is be considered an Official Date of Birth of the Meteorological Department in Lebanon, with the need of Meteorological Forecast, and the establishment of a special center for this purpose. Later, 6 Synoptic Meteorological Stations, Radiosonde Station, Wind Radar, were mounted. Consequently, 187 Meteorological Stations were distributed in the different Lebanese regions.

Our progress with study although till 1975, with an unhappy civil war, overwhelmed in Lebanon. It destroyed most of stations and equipment, of NMS. After the war, Meteorological Department asked for help from METEO France, and WMO, in order to reconstruct the National Network. Project were completed in year 2000, included the following: 6 complete Synoptic Stations - 3 Agro meteorological stations - 9 climatolological stations connected to METEO centre at Beirut-Airport - 16 climatological stations non connected (using PCMCIA card). 7 climatological stations to install during months. 3 Buoys (for maritime study for the Lebanese coast).

Climatological Service in Lebanon, its tasks:
Measure and Prepare Statistical Means of different weather parameters: Temperature, Relative Humidity, Evaporation, Precipitations, Wind, Solar Radiation, Air Quality and Environmental parameters (CO, CO_3, CHч, NOX, O_3), Aerosols, and Sea Swell … Using NMS network, dispersed all around Lebanon.

Climatological data coming from NMS network form an essential data base, beneficiating to more studies, aimed act providing answers to the anomaly weather extremes, in order to decrease its negative impact on the life in this region, and on the natural resources, especially : Water and Power ! Beneficiaries from our NMS: Public - Government - Business: Agriculture - Building and construction - Insurance - Legal - Retail and manufacturing - Consulting - Environment - Media -Telecommunications - Energy - Water - Transport (Aviation, Marine , Road and rail)

Lebanese weather stations report a mixture of snapshot hourly observations of the weather (synoptic observations) and daily summaries of the weather (climate observations). Observations from around 18 synoptic stations are collected in real time. However, climate observations from 16 climate stations come in as collectives at the end of the month. All climate stations record daily maximum and minimum air temperature, daily maximum and minimum relative humidity and daily rainfall amount.

By the end of this brief approach, we bring to your kind attention our Needs from this Workshop: how to benefit of the MED-DARE programs, applications, practical studies of meteorological scientists, to resolve the difficulties and problems for fostering DARE initiatives at the national scale. Which facilitate the extraction of mid range and long range prediction, concerning the Climate Variability and change.

Data Rescue Activity in the Israel Meteorological service

Mr. Avner Furshpan
Israel meteorological Service

Instrumental measurements commenced in the Land of Israel as early as 1846/7 in Jerusalem (rain measurements in the Old City). More observations (including temperature) were made in the 19th century in Nazareth, Jaffa, Gaza, Haifa, Sarona (now Tel Aviv) and several other locactions. Paper records containing data from these stations are stored in the Israel Meteorological Service (IMS) archive. Some of the measurements however, are not continuous and contain many gaps.

Continuous meteorological measurements (mainly rainfall) started in the beginning of the 20th century, especially after the end of World War I. The number of stations increased considerably in the 1920's and 1930's, as a result of the efforts of the British Mandate Government and of Professor Ashbel from the Hebrew University of Jerusalem, who established climatological stations in new Jewish settlements.

With regard to the availability of the data above, almost all the rainfall measurements are stored in the IMS archive as digitized daily records. As for other parameters, most of the 19th century data is, as indicated above, on paper only and likewise also some of the 20th century data.

Over the last few years the IMS has been continuously promoting data entry actions for paper records going backwards from 1963. Currently about 75% of the known data from the1920's and ahead has already been entered into the database, and the rest is expected to be completed in a year. Caution should be exercised here as we have not as yet examined material from the legacy of Prof. Ashbel, which may throw light on some additional data. It should also be emphasized that the data has not been subject to quality control on a regular basis and it is not likely to go through this procedure in the near future.

Recently the IMS has started a digitization project. The characterization of the technical specifications has been completed and the actual work is planned to begin in 2008. Priority will be given to 19th century data and students are already working on the oldest paper records, in order to map their content and prepare them for digitization. It should be mentioned, however, that data entry of this material will demand considerable preparation work which could be delayed due to the complexity of the data (units, formats etc.) and shortage in manpower.

Problems that arise from the experience gained until now, with regard to the availability of old records and the creation of long climate data sets include: Considerable gaps in data, often entire years, for many stations; lack of detailed metadata (exact location, exposure etc.); lack of

knowledge about the instrumentation used; different data formats and non-standard times of observations; difficulty in applying quality control and reconstruction techniques due to the paucity of stations in the early years.

A particularly difficult problem to produce long and homogeneous climate records (especially temperature) in our region is the dramatic change of the landscape over the last century.. Some main cities in Israel today did not exist 100 years ago (Tel Aviv was founded in 1909), and that should be taken into consideration in carrying out homogenization procedures.

However, as an example for a possible effort to produce long climate series, one can present the important work done by N. Rosenan: “One hundred years of rainfall in Jerusalem - a homotopic series of annual amounts” (*Israel Exploration Journal, Vol. 5, No. 3, 1955*). A lot can be learned from his experience and difficulties as reflected in the publication. Rosenan extended his work further up to 1967/8 and all the data will be available freely, on a monthly basis (wherever possible), in the near future.

The IMS will consider extending its contribution of long climate records. Rainfall is more likely to be the case but the IMS is willing to share its experience with relevant experts in an effort towards providing long and continuous temperature records as well.

Rescue and Digitization of Climate Records of Cyprus

Stelios Pashiardis
Cyprus Meteorological Service

The presentation will cover the history of meteorological observations in Cyprus, the current network of meteorological stations, the quality control procedures to check the raw data and the existing database system to archive the climate data. Furthermore, details of the prepared inventories of digitized rainfall and temperature data will be presented including the existing digitization procedures to convert autographic charts to digital data. Finally, an overview of the assistant required to key-entry the historical climate data into digital form will be given.

Rescue and Digitization of Climate Records in Egypt

Mr Amr Mohamed Amr
Egyptian Meteorological Authority

Social and economic sectors, including agriculture, energy distribution, construction, transportation, aviation, finance, and tourism are directly affected by temperature, precipitation, and other general weather conditions. This societal benefits resulting from saving a long records for this elements, starting from this point **E**gyptian **M**eteorological **A**uthority **(EMA)** saved its data since 1968 until now in electronic form using data bank and database.

This paper will explain in brief stations details, the data collection methods from our local stations network, methods of data entry, data processing, storage media and the end user availability.

Libyan Climatic Recorders and Archive

Khalid elfadli,
Director of climate department
Libya, LNMC
k_elfadli_met@mail.lttnet.net

Introduction:
Libyan national meteorological center (lnmc) has climatic recorders for rain fall observations for some places since 1879, although irregular observations for some weather parameters for some locations in Libya were measured by some travelers before this date are mentioned in some references but not documented in our archive. In general regular observations in Libya started since 1920 at Italians occupation time, where the network of weather observations were consisted of about 60 stations and about 150 rainfall gauges at that time which were operated until the beginning of the second world war "1945", during this period the measured of highest temperature on the face of the earth was recoded in Alazizia which located south west of Tripoli for about 30 km from sea shore, this temperature was 58.0 C ,which reported by date of 13/09/1922.

Recent observation networks were established mostly by 1956, which are consisted of, 22 synoptic stations,22 climatic stations, 5 upper air stations and 200 rain fall stations which are distrusted around whole Libya.

Content of Libyan climatic archive composed of about 2 millions pages in different dimensions and sizes, all registers (one copy) are kept in one place which is being in good conditions, and in soon future we attend to implement a local project which will concern with archiving of all climatic registers by electronic technology methodologies.

Inventory of key in climatic data in computer:
Since 1996 we have accomplished by entering different sets of climatic data in different basis of time scales into computer by using some systems of soft wares (clicom,excel),our achievements in this respect (data rescue) can be briefed as follows:

- About 200 rain fall stations where their daily data entered into clicom while their monthly data entered into excel as well, for the period of (1956-2006).
- About 22 synoptic stations their 3-hourly data for the period of (1961-2005) are entered into clicom.
- About 22 synoptic stations their daily data for the period of (1956-2005) are entered into clicom.
- About 22 synoptic stations their monthly data for the period of (1956-2005) are entered into excel.
- About 3 stations from 22 climatic stations their 3-hourly data for the period of (1961-2005) are entered into clicom.

- About 22 climatic stations their daily data for the period of (1956-2005) are entered into clicom.
- About 22 climatic stations their monthly data for the period of (1956-2005) are entered into excel.
- About 30 stations from 60 met. stations (old network) their monthly data for the period of (1920-1945) entered into excel.

Upper air data which is recorded since 1971 didn't yet planed to enter it into computer systems due to the lack of the staff.

Next year we are going to install clisys system for climatic data management (CDMS) that will be used as anew data base (Oracle) in our center where 17 AWS that have been installed since 3 years ago will be connected directly with this system.

During next year also we attend to implement a new project called (Electronic Climatic Archive, ECAP) which aims to scanned, preserved and documented all climatic paper registers by computer means.

The Climatological Databank of the MNI Tunisia

Mr Ibrahim Bechir,
Ministère du Transport, Institut National de la Météorologie

The National Institute of Meteorology Tunisia has a databank climatological observed since 1900 in form of archival paper and microfilm. The climate data dating back to 1950 are managed as a database installed on a server equipped with a DBMS and connects to clients.

The data are available on 26 stations and 75 substations most since 1950.

IND_OMM	STATION	LATI. (N)	LONG. (E)	ALTITUDE (m)
60710	Tabarka	3657	0845	66
60714	Bizerte	3715	0948	6
60715	Tunis-Carthage	3650	1014	4
60720	Kélibia	3651	1105	29
60723	Béja	3644	0911	158
60725	Jendouba	3629	0848	143
60728	Nabeul	3627	1044	1
60729	Zaghouan	3622	1007	156
60732	Le-Kef	3608	0842	518
60734	Siliana	3604	0922	443
60735	Kairouan	3540	1006	60
60738	Thala	3533	0841	1091
60739	Kasserine	3510	0847	707
60740	Monastir	3540	1045	2
60742	Mahdia	3530	1104	12
60745	Gafsa	3425	0849	313
60748	Sidi-Bouzid	3500	0929	354
60750	Sfax	3443	1041	21
60760	Tozeur	3355	0806	87
60764	Kébili	3342	0858	43
60765	Gabés	3353	1006	4
60769	Jerba	3352	1046	3
60770	Médenine	3321	1029	116
60772	Tataouine	3255	1027	216
60775	Remada	3219	1024	300
60780	El-Borma	3141	0918	258

Available data

Data	Number of lines
Hourly	6 260 327
Daily	1 150 940
Monthly	38 458
Monthly normals and records	894

Parameters

Temperatures, rainfall, humidity, atmospheric pressure, wind, evaporation, sunshine, cloud cover, visibility and weather.

Algerian experience on data digitalization and management

Azzedine Saci
Office National de la Météorologie
Centre Climatologique National, ALGERIA.

The Algerian National Meteorological Service began data management in 1970 with an IBM 1160 computer, by using punch cards. Digitalization was a difficult task by employing such cards. In 1976 a development project gave powerful equipment for data processing. Three NORSK DATA computers from Norway were used for telecommunications and data processing. The Climatological Section developed in Fortran language routines for digitizing data and controlling their quality. Data for the 1953-1991 period were saved on magtapes.

Key entry data is not made in real time, as documents are sent from the stations by postal mail to the central service.
The first Personal Computer, an Olivetti M24 (4Mhz, 640 Ko RAM, 10 Mo Hard Disk, 5”1/4 floppy disk), was available on 1986.

On 1987, we started data key entry (precipitation and temperature) on an IBM XT PC’s using the software “Datastar” given by Meteo-France. Data from principal and climatological stations are digitalized in the six meteorological regions of Algeria. Data are sent to the central service on floppy disks.

CLICOM system began on 1989. After adapting it to the Algerian needs and developing a Fortran routine for data quality control (QC), we started using CLICOM for ten points, which were named CLICOM centres on 1992.

The development of a QC routine was necessary to control DAILY Data against SYNOPTIC data. The CLICOM system controls the data only by type DAILY or SYNOPTIC.

The CLICOM system was progressively installed in each principal station (70) from 1995 to 2003.

Currently each main station use to key entry and control the data in situ. They create CLIMAT messages and then the monthly ASCII files are sent through FTP server.

The monthly files contain for each day 8 synoptic observations (29 parameters by observation) followed by daily observations (36 parameters)
Daily data (precipitation and temperatures) from Climatological stations are keyed in the regions.

Manuscripts are archived on two sites: before 2003 in ORAN (West Algeria) and since 2003 in Algiers (Central Algeria). The oldest manuscript is from 1856.

Data on magtapes are transferred from NORSK DATA computer to Olivetti M24 PC and stored on floppy disks and on PC hard disk. To transfer 1163 years corresponding to 50 stations taken 30 months. The problem was that magtapes are not readable on another computer.

Electronic archiving by using scanners started on year 2000.

Currently the climatological network is composed of:

- 77 Synoptic stations (8 automatic)
- 182 climatological stations
- 117 automatic weather stations with monthly archiving

There is a new network in installation composed of:

- 40 automatic weather stations in the South region equipped with DCP
- 10 automatic weather stations for the urban region of Algiers.