



Towards the creation of a climatic database for Catalonia (18th to 21st centuries)

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Abstract

This article presents the project that is being carried out in the Climatology Department of the Servei Meteorològic de Catalunya (Meteorological Service of Catalonia), which aims to create a climatic database for Catalonia that is as complete and of the highest quality possible. Due to historical events, this climatic information is still incomplete and widely scattered in many different sources. As a consequence, it has been necessary to make a previous identification and cataloguing of the sources containing climatic material. Later on, a methodology used to integrate such a volume of information in a database was created, taking two aspects into consideration: the recovery of the metadata and the generation of climatic series. METADEM was developed to preserve all the information related to the metadata of a meteorological observatory, while a methodology was also designed to create complete and high quality climatic series. This one includes three levels: digitalization, quality control and homogeneity analysis. As a result of this project, which is still in its initial phase, ca. two hundred series have had their temporary coverage improved, while ca. one hundred and fifty new series have been identified.

Key words: Climatic database, metadata, Catalonia

1 Introduction

In the context of global warming of an anthropic origin, and linked to the uncertain consequences that this phenomenon could have on the unstable social and economical balance of our planet, studies about variability and climate change have become top priority research lines. Therefore, the availability of high temporal and spatial resolution climate registers, with contrasted quality and homogeneity, have become a key factor for evaluating future events with certainty.

Catalonia, geographically located in the southwestern end of Europe and in the northeast of the Iberian Peninsula, has a long tradition in the field of meteorological observation, since the end of the 18th Century. The bibliography regarding this topic is vast and complete. As an example, we can quote the works of Barriendos (2001), Sureda (2003), Roca et al. (2004) or Prohom (2006). The first instrumental observations documented were done by Dr. Francesc Salvà, who

initiated what is considered to be the longest instrumental series of the Iberian Peninsula (Barriendos et al., 1997). Since then and until now, there have been countless initiatives, often of individual and altruistic origin, which have had and continue to have as their main goal to deepen the knowledge of the climatic characteristics of the area through the observation of atmospheric phenomena. This legacy has reached our time as series of climatic variables, but it is fragmented and sometimes incomplete, as a consequence of the nonexistence of a single institution to centralize the ongoing compilation and cataloging of information since the end of the 19th Century. Moreover, the dramatic events of the Spanish Civil War meant the loss of a lot of climatic documentation prior to the conflict or, at best, it was disintegrated and fragmented.

In this context, the *Servei Meteorològic de Catalunya* (SMC) -Meteorological Service of Catalonia- has begun an ambitious project. Its main goal is to create a climatic database for Catalonia that is as complete and of the highest quality possible, which could become a useful tool for



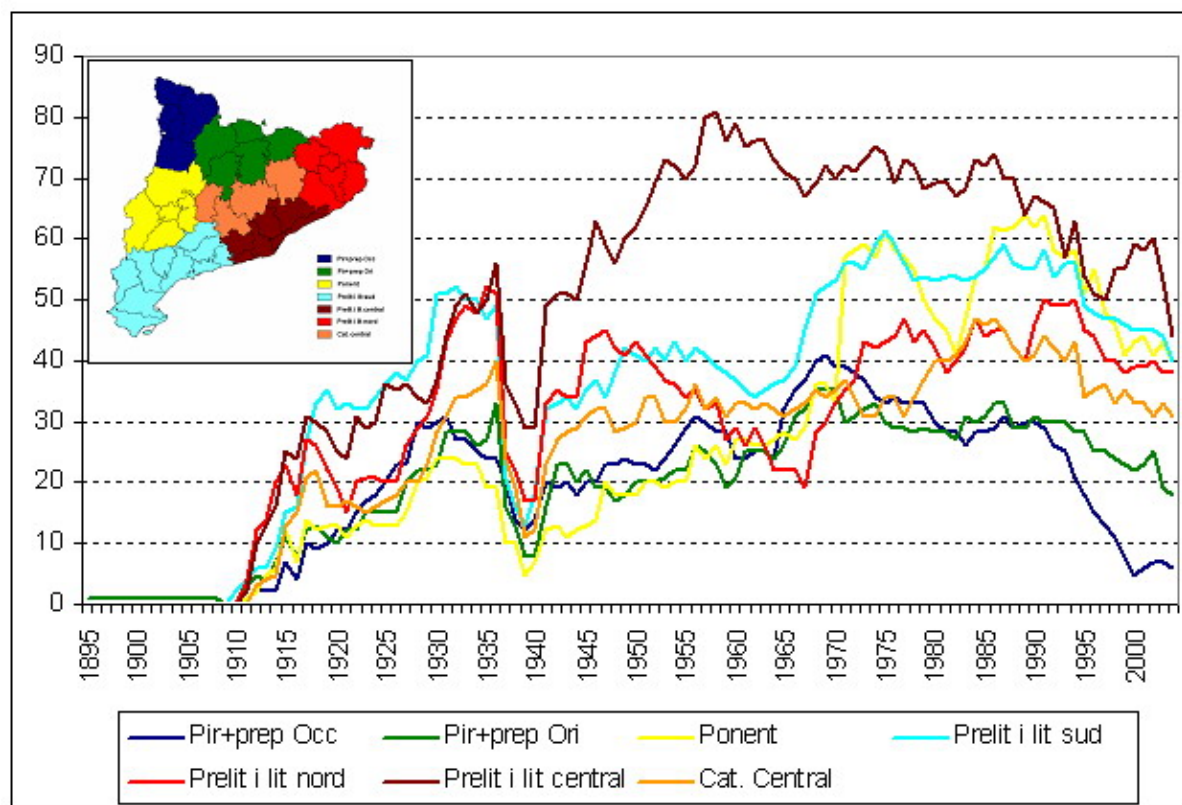


Figure 1. Temporal distribution regarding geographical fields of the number of pluviometric series from the *Banco Nacional de Datos* (Spanish national data bank) of AEMET.

the scientific community. This article presents the steps that are being carried out in order to achieve this goal, which are structured in a twofold manner: the identification and cataloguing of sources that could potentially contain material of climatic interest, and the design of a methodology that allows an organized incorporation of these materials in an easily accessible environment.

2 Climatic information sources

As mentioned above, in Catalonia the material of climatic interest is fragmented. For this reason, an initial task would be the identification and cataloguing of the sources which contain climatic information. There is a large variety of sources that cover a vast spectrum: public and private archives, publications of old institutions or academies, existent digitalized databases, historical press, material from meteorological observatories...

Keeping in mind that the identification of climatic sources will always be open to the discovery of unpublished or forgotten sources, the ones that have been identified until now and the interventions carried out are presented below.

2.1 The *Banco Nacional de Datos* (Spanish national data bank) of AEMET

Since the end of the Spanish Civil War, the Spanish meteorological service, under its different denominations (SMN, INM, AEMET), has been in charge of compiling and storing climatic registers coming from the network of state meteorological stations. For this reason, the database managed by these institutions is one of the main sources of climatic information. Due to the signing of a collaboration agreement with the old *Instituto Nacional de Meteorología* -the Spanish meteorology institute- (since the beginning of 2008 named *Agencia Estatal de Meteorología*, AEMET), the SMC has access to two different kinds of material:

- meteorological series from Catalonia in digital format for different variables and temporal resolutions, and
- scanned images of the original observation cards of most of the manual meteorological stations.

Digitalized series come from the *Banco Nacional de Datos* (Spanish national data bank) which is managed by the agency. Despite the diversity of the data typology, the majority belongs to the daily thermopluviometric registers of the manual stations. The time coverage of this data goes further back than the outbreak of the Civil War, in the oldest

PROVINCIA DE Barcelona MES DE Octubre DE 1931

Estación E. P. Escoles Pies de Sabadell Observador E. Fontcuberta

Hora de las mediciones 11.5.15 Altura del pluviómetro sobre el suelo 3.10

Día	Altura m/m	Forma-Hora-Viento	Día	Altura m/m	Forma-Hora-Viento	Día	Altura m/m	Forma-Hora-Viento
1	5'5	☉ m y t →	11		☉ ↘ ☉ n	21		
2	2'8		12	4'2	☉ 5'15 ↘ T	22		
3		☉	13			23		☉ 8'15
4			14		☉	24	1'1	☉ n
5			15			25	6'2	☉ 10'55 ↘ SW
6			16			26	1'4	☉ 14'15
7			17		☉ 12'45	27	1'2	
8			18	6'5		28		
9			19		☉ ²	29		
10			20		☉ ²	30		☉
Suma	18'3		Suma	14'6		31		☉ ²
						Suma	9'9	Suma mensual 96'8

Número de días de lluvia 8 Número de días de nieve —

Altura mayor de lluvia recogida en 24 horas 4'2 el día 12

Figure 2. Example of pluviometric card from the FHSMC. This case corresponds to the observatory of the Escoles Pies in Sabadell, October 1931.

cases, to 1910 (except the Puigcerdà series, which began on 1895). There is an important volume of data: on 2007 ca. 840 pluviometric series were counted and ca. 490 thermometric series. Some works have started based on this, taking into account the advantages and inconveniences of working with inherited information which has been through a previous digitalization process of unknown characteristics. Thus, an evaluation of the time coverage of the series and of the gaps in each of them has been made, and it is reflected in the generation of some posters and graphics, which give a first idea of the state of the art. For example, Figure 1 shows the temporal distribution of the number of pluviometric series for different geographical areas. The drop in the number of series that occurred in the areas of the Pyrenees and western pre-Pyrenees during the 1990s and the one originating from the war conflict between 1936 and 1939 are noteworthy.

On the other hand, the access to scanned observation cards has made it possible to contrast digitalized series with the original information and to locate mistakes or false gaps in the observations, since these circumstances are linked to the digitalization process. At the same time, and besides purely numeric information, these cards also include information about metadata, such as changes of observers or changes in the direct location of the meteorological station.

2.2 The Historical repository of the *Servei Meteorològic de Catalunya*

During its existence (1921-1939) the old *Servei Meteorològic de Catalunya* (Catalan meteorological service) coordinated a vast network of meteorological observatories around the region. The information generated was received and archived in the auspices of the SMC, and a number of studies and publications have been done making use of its validity. Due to its dissolution as a result of the events of the Spanish Civil War, part of this material was confiscated by force. Then it belonged to the *Servicio Meteorológico Nacional*, while a large part of it was lost forever. The arrival of democracy and the restitution of the *Generalitat de Catalunya* made possible the devolution of the remains of the historical repository of the SMC (FHSMC), and it is now located in the map library of the *Institut Cartogràfic de Catalunya* -Catalan cartographic institute- (ICC). In 2000, the SMC promoted a project to reorganize and catalogue the repository, thanks to the signing of an agreement with the ICC and the *Institut d'Estudis Catalans* -Catalan studies institute- (IEC). The definitive catalog was a result of this agreement (Batlló, 2000). Simultaneously, another project funded by the SMC was the first step to analyze its meteorological and climatic potential (Barriandos and Peña, 2001). The content of this repository is not only documentation generated by the old SMC during its op-

Termometro					Barometro			
Dieta	Manana	Tarde	Noche	Cabeza	Manana	Tarde	Noche	Elevacion
1	81	81	81	81	28.5	28.5	28.5	28.5
2	81	81	81	81	28.5	28.5	28.5	28.5
3	81	81	81	81	28.5	28.5	28.5	28.5
4	81	81	81	81	28.5	28.5	28.5	28.5
5	81	81	81	81	28.5	28.5	28.5	28.5
6	81	81	81	81	28.5	28.5	28.5	28.5
7	81	81	81	81	28.5	28.5	28.5	28.5
8	81	81	81	81	28.5	28.5	28.5	28.5
9	81	81	81	81	28.5	28.5	28.5	28.5
10	81	81	81	81	28.5	28.5	28.5	28.5
11	81	81	81	81	28.5	28.5	28.5	28.5
12	81	81	81	81	28.5	28.5	28.5	28.5
13	81	81	81	81	28.5	28.5	28.5	28.5
14	81	81	81	81	28.5	28.5	28.5	28.5
15	81	81	81	81	28.5	28.5	28.5	28.5
16	81	81	81	81	28.5	28.5	28.5	28.5
17	81	81	81	81	28.5	28.5	28.5	28.5
18	81	81	81	81	28.5	28.5	28.5	28.5
19	81	81	81	81	28.5	28.5	28.5	28.5
20	81	81	81	81	28.5	28.5	28.5	28.5
21	81	81	81	81	28.5	28.5	28.5	28.5
22	81	81	81	81	28.5	28.5	28.5	28.5
23	81	81	81	81	28.5	28.5	28.5	28.5
24	81	81	81	81	28.5	28.5	28.5	28.5
25	81	81	81	81	28.5	28.5	28.5	28.5
26	81	81	81	81	28.5	28.5	28.5	28.5
27	81	81	81	81	28.5	28.5	28.5	28.5
28	81	81	81	81	28.5	28.5	28.5	28.5
29	81	81	81	81	28.5	28.5	28.5	28.5
30	81	81	81	81	28.5	28.5	28.5	28.5
31	81	81	81	81	28.5	28.5	28.5	28.5

Figure 3. Scanned image of the first page of the Meteorological Tables done by Dr. Salvà (January 1780).

erational years, but also material from prior or contemporary institutions: *Xarxa Meteorològica de la Granja Escola Experimental d'Agricultura* (meteorological network of the agriculture experimental school farm), *Observatori Català de Sant Feliu de Guíxols* (Catalan observatory of Sant Feliu de Guíxols), *Societat Astronòmica de Barcelona* (SAB) (Barcelona astronomic society), *estació Aerològica de Barcelona* (Barcelona aerologic station) and *Fundació Concepció Rabell d'estudis nefològics* (Concepció Rabell Foundation of nephologic studies).

The typology of the material deposited in the FHSMC is very diverse and includes, among other things, observation sheets and cards (see Figure 2) and varied correspondence. As a result of the analysis of this documentation, many observation points with associated climatic series have been identified. Some of them already were present in AEMET of the *Banco Nacional de Datos*, but some others were still unpublished. Therefore the intervention carried out has been the digitalization of these data (at the moment focused in a thermopluviometric series), as well as the compilation of anything related to metadata (type of instruments and conditions of installation, observers, location...).

2.3 Royal Academies of Medicine and Arts and Sciences

In 2007, the revision of the documentary repository of the *Reial Acadèmia de Ciències i Arts de Barcelona* -royal academy of sciences and arts of Barcelona- (RACAB) and of the *Reial Acadèmia de Medicina* -royal academy of medicine- (RAM) was carried out, thanks to the signing of an agreement with the department of modern History of the faculty of Geography and History of the *Universitat de Barcelona*. Due to the nature of the scientific activities that both institutions have been carrying out since the 18th Century, their archives potentially contain some climatic information. A first catalogue was created from the analysis of the RACAB repository, which still needs to be looked and exploited in depth, especially the ones that might contain valuable information. On the other hand, the RAM repository contains one of the most outstanding scientific treasures in Catalonia: the meteorological observation tables of Dr. Francesc Salvà i Campillo, initiated in 1780. The climatic information that they contain has already been partially put to use (Barriandos et al., 1997; Rodríguez et al., 2001), the efforts have been focused on scanning the information in order to preserve and later digitalize it (Figure 3).

Table 1. Newspapers and periodic publications of the *Diputació de Barcelona* (Barcelona county council) which contains meteorological information. The abbreviations mean: T, air temperature / P, atmospheric pressure / PPT, rainfall / C, cloud cover / VV, wind speed / DV, wind direction / HR, relative humidity.

Publication	Place	Meteorological variables available	Time coverage
El Eco de Igualada	Igualada	T and P	1863-1869
El Ateneo: revista mensual del Ateneo	Igualada	T, P, PPT and C	1882-1884
Igualadino de la clase obrera			
Diari d'Igualada	Igualada	T and PPT	1932-1933
El Ausonense	Vic	T and atmospheric conditions	1861-1863
Eco de la montaña, periódico de ciencias, literatura y bellas artes, agricultura, industria y comercio	Vic	T, VV, DV and atmospheric conditions	1863-1868
Diario de Vich	Vic	T and atmospheric conditions	1877
La Costa de Llevant	Arenys de Mar	T, P, HR, VV and DV	1899-1900
La Costa de Llevant	Blanes	T, P and PPT	1908

2.4 Historical press

Historical press is a source of climatic information, which has not been exploited much, usually due to the difficulties of accessing local newspapers or gazettes. However, in the last years, some local or regional archives, as well as national libraries, county councils and even the Ministry of Culture have made some parts of their newspaper libraries accessible through the internet. As a result of this effort, it was possible to elaborate a first catalogue of those periodical publications, which include meteorological data of the town where it was printed. This information could allow the identification of new series or complete the information of others previously identified. As an example, Table 1 (from <http://www.diba.es/xbcr/default.htm>) shows a compilation of publications with climatic information from this repository: the *Fons Local de Publicacions Periòdiques Digitalitzades de la Diputació de Barcelona* (local repository of digitalized periodic publication of Barcelona county council).

2.5 Other bibliographic sources

Parallel to the search for previous sources, information arising from other bibliographic sources that are known and published by different individuals and institutions were consulted and incorporated. In addition to including meteorological data from each observatory, some of these publications made it possible to compile a lot of information related to metadata, especially about people or groups who were in charge of the observatory, as well as details about its location. Table 2 compiles those sources.

3 Methodology

Once the sources containing climatic information were identified and catalogued, the next step was the design of the methodology needed to incorporate all this information in a proper manner and in a friendly environment of exploitation.

The work method designed starts with the identification of the different meteorological observatories or stations, which were assigned their own code. It must be possible to access two large information blocks at each observation point: everything related to the metadata and the climatic series generated.

3.1 The metadata: METADEM

The metadata could be defined as all the information which goes with the meteorological data and allows the evaluation of its final quality. As Aguilar et al. (2003), points out, in studies about variability and climatic change, the metadata is as important as the data, as the first one provides valuable information about possible behavior unrelated to climatic circumstances. Therefore, METADEM (*METADades d'Estacions Meteorològiques* -metadata of meteorological stations) was created. This is a database which contains all the information about the metadata of a meteorological station. Figure 4 shows an example of the structure and contents of METADEM. For each meteorological station or observatory, a group of generic aspects are reported: code, name, municipality, region, geographical coordinates, kind of observatory, institution or people who manage or have managed it, description of the location of the observatory (with photographs, if available) and names of the observers and the period during which they were in charge of the observations. METADEM includes specific information for each variable: beginning and end of the series, percentage of the period covered with data, temporal resolution of the series, instrumental resources and periods when different instruments have been functioning, conditions of the installation and measure units. In this last point, the presence or lack of instrument shelter and its model is a paramount factor for evaluating the quality of the thermometric series (see Brunet et al., 2006), while the height of the top of the rain gauge is also important for pluviometric series. Finally, METADEM also includes a part reserved to specify the source of the information related to

Table 2. Consulted bibliographic sources with climatic and meteorological information. The abbreviations mean: SAB, *Sociedad Astronómica de Barcelona* (Barcelona astronomic society) / SMC, *Servei Meteorològic de Catalunya* (Catalan meteorological service) / OM, *Observatorio de Madrid* (Madrid observatory) / OCM, *Observatorio Central Meteorológico* (central meteorological observatory) / ICM, *Instituto Central Meteorológico* (central meteorological institute) / OfCM, *Oficina Central Meteorológica* (central meteorological office) / SMN, *Servicio Meteorológico Nacional* (national meteorological service) / INM, *Instituto Nacional de Meteorología* (national meteorology institute).

Work	Author/s	Type of data	Resolution	Time coverage
Catalan meteorology. Observations in Sant Feliu de Guíxols. Results from 1896 (partial) to 1905	Rafael Patxot	Pluviometry	Monthly	1896-1905
Catalan pluviometry	Rafael Patxot	Pluviometry	Monthly	1906-1910
Pluviometric atlas of Catalonia	Joaquim Febrer	Pluviometry	Monthly	1861-1925
Bulletins of the <i>Sociedad Astronómica de Barcelona</i>	SAB	Pluviometry ^a	Monthly	1910-1921
Study notes	SMC	Pluviometry ^a	Monthly	1921-1936
Summary of meteorological observations	OM/OCM/ICM/ OfCM/SMN	Several variables	Monthly/Diari	1868-1961?
Monthly meteorological bulletin	SMN/INM	Several variables	Monthly	1940-1976

^aData of other meteorological variables were published occasionally.

that observation point. Therefore, the aim is to record all information which will be very useful for the study to follow on the homogeneity of the series.

3.2 Generation of climatic series

Once the different observation points have been identified, the next step is the generation of daily series of air temperature and precipitation associated with them, based on the information from the different sources defined in the second section of this study. It must be noted that, until now, special attention was paid to thermopluviometric series, in order to later widen the range to other series that are generated. Some of these sources already had a digital database, such as the *Banco Nacional de Datos* of AEMET, but the others were in paper format and they had to be digitalized. Based on the consultation of different sources, this digitalization process which is still being carried out must improve the time coverage of many series, as well as its quality, therefore, filling false gaps in the observations and correcting systematic mistakes. Only in the case of precipitation series, a monthly series of pluviometric totals were generated, due to the fact that in some observatories there are no daily series, especially for those series prior to the decade of 1930s. The series generated are preserved in files in ASCII format so they are easier to read.

3.3 Quality and homogeneity analysis

The analysis of the quality and homogeneity of the series is the last step before leaving the series prepared for its climatic exploitation. In recent years, a large number of articles and studies related to methods to analyze the quality and homogeneity of climatic series have been published. Aguilar et al. (2003) have done an exhaustive review of them. A protocol for quality control has been defined from these refer-

ences, which establish different hierarchical levels and are briefly described below:

- Detection of large mistakes. This first level attempts to detect values that are clearly wrong and usually exceed the boundary of logical tolerance. For instance, negative precipitations, temperatures over 50°C, etc.
- Outliers: these tests identify values that exceed the higher or lower limits predefined from the series' historical memory. Statistic dispersion of the series is usually used to detect suspicious values (for instance, 2 or 3 times the typical deviation of a variable in a particular temporal resolution).
- Internal consistence tests: this level analyzes the coherence between different elements that could be related among them (for instance, minimum temperature lower or equal than maximum temperature, temperature of the dry thermometer of the psychrometer greater or equal than temperature of the humid thermometer).
- Temporal coherence tests: this level reports if the observed values are solid with the expected change in a certain element and in a defined time interval. For instance, a difference higher than 25°C between two consecutive maximum temperatures is considered doubtful.
- Spatial coherence tests: this last control compares the registered values in a given meteorological station with the values registered in the same temporal period in stations that are close to it and under the same climatic conditions.

For the precipitation series a sixth level is included, because of the dichotomous or discrete character of the variable. This level includes, for instance, algorithms to detect changes in the observation methods, that is, in the note of the date of the precipitation or relative control tests with stations close to it in order to discriminate months with no precipitation and months without observations. Once the quality

Codi	AE039		Municipi	Figueres		X	496632	Y	4678852	Z	28
Nom	Figueres - 2		Comarca	Alt Empordà		Lat	421540	Lon	025733		
Tipus	TP		En funcionament?	<input type="radio"/>		Actualització	30/10/2007		Codi INM	0429A	
Referent a la gestió de l'EM											
Instal·lada per:		Particular		període:		1907-1920		Gestió posterior:			
Referent al/s observador/s											
Observador/s (Nom i període)											
Joan Camps (catedràtic d'Institut), 1907-1920 Francisco Ugalde, 1917-1918 Salvador Bosch, 1919-1920											
Referent a l'emplaçament											
Descripció:						Institut de Segon Ensenyament. El pluviòmetre està instal·lat en un hort i al seu costat la garita model OCM, tot això sobre gespa. L'anemòmetre i penell estaven instal·lats a uns 2-3 m sobre el terrat de l'edifici (1915).					
Material gràfic?						No					
Referent a les observacions termomètriques (T)											
TD des de:		01/02/1915		a		31/08/1920		% amb dades:		100	
TM des de:		01/02/1915		a		31/08/1920		% amb dades:		100	
TD Font 1:		AHDINM		1915-1920		TM Font 1:		AHDINM		1915-1920	
TD Font 2:						TM Font 2:					
TD Font 3:						TM Font 3:					
Condicions inst (garita,...)		Garita OCM		període:		1915-1920					
Model termòm.:		Tmàx i Tmín		període:		1915-1920					
		Termògraf Six (només Tmàx)		13/08 a 20/09/1915							
Tipus mesura:		Tmàx, Tmín, Tmín a 0.10 m, Ts i Th (8 i 16h)									
Unitat mesura 1:		°C									
Unitat mesura 2:											
Altra informació T:		Entre el 13 d'agost i el 20 de setembre de 1915 la tmàx es va prendre amb un termògraf Six, per trencament del termòmetre de màx. A agost de 1916 es trencà el tmín a 0.10 m del terra, es col·locà un altre el 10 de									
Referent a les fonts consultades (T i PPT)		ROM, 1915 i 1918 / FEB / INM (dades digitalitzades + fitxes escanejades + AHDINM)									
Referent a les observacions pluviomètriques (PPT)											
PD des de:		01/02/1915		a		31/08/1920		% amb dades:		100	
PM des de:		01/01/1907		a		31/08/1920		% amb dades:		97	
PD Font 1:		INM		1915-1920		PM Font 1:		FEB		1907-1920	
PD Font 2:		AHDINM		1915-1920		PM Font 2:		INM		1915-1920	
PD Font 3:						PM Font 3:		AHDINM		1915-1920	
PD Font 4:						PM Font 4:					
Pluv. 1:		Hellmann		Alt. boca (m):		1,50		dià:		Període:	
Pluv. 2:				Alt. boca (m):				dià:		Període:	
Informació addicional PPT:		S'ha pogut digitalitzar les dades de 1917(jun i des) i 1920(mar) a partir de les targetes escanejades.									
Informació complementària sobre l'EM		L'observatori tenia a 1915(feb) el següent instrumental: baròmetre Fortin, termòmetre de màxima, termòmetre de mínima, termòmetre de mínima a 0,10 m del terra, psicròmetre, evaporímetre, pluviòmetre Hellmann, termògraf i barògraf. També es feien observacions de Nv (AHDINM). A 1915(mai) es diu: l'anemòmetre i el penell estan instal·lats a uns 2-3 m respectivament sobre el nivell del terrat de l'edifici de l'Institut, una mica									

Figure 4. Format of a METADEM card. Example taken from Figueres meteorological station (l'Alt Empordà).

analysis process is finished, each value is labeled as valid or non valid, depending on if it has passed the different levels and a technician/climatologist must ratify the final validity of the register.

Finally, the analysis of homogeneity aims to guarantee that the fluctuations that a given variable undergoes along time are exclusively caused by the existing meteorological and climatic conditions, and they do not depend on external factors. The SMC currently is taking part in the action COST ES0601 HOME (*Advances in Homogenisation of Climate Series: An integrated Approach*, <http://www.homogenisation.org>). Its goal is to define uniform criteria to analyze homogeneity in climate series. The results of this project will contribute to obtaining results of a higher quality. Some of the series have already undergone quality and homogeneity analysis through testing, with highly satisfactory results (Prohom et al., 2008). However, the whole process will not be applied until the series collection phase is finished. Then the Database of Climate Series of Catalonia, BDSCLIM, will be available.

As a summary, Figure 5 shows the whole of the applied methodology as a diagram.

4 Discussion and conclusions

This article presents a project which is being carried out in the climatology department of the Catalan meteorological service. Although it might seem like something that should have been resolved a long time ago, historical events and the limited importance that climatology has had been given throughout history in the management structure of different meteorological services, have made it a task yet to be resolved.

Different steps have been designed to achieve the final goal, but until now a large part of the efforts have been focused on obtaining as much information as possible of the metadata in each meteorological observatory, as well as the improvement of the time coverage of daily temperature and precipitation series. As a result of this process, in the series from the *Banco Nacional de Datos* of AEMET, the time coverage of ca. 200 series has been improved and ca. 150 new ones have been detected (Figure 6).

Related to the compilation of information about the metadata, a complete database will be available for the first time, and it will be possible to access all the available information about the record of each meteorological observatory that exists or has existed in Catalonia. In addition to the benefits that such a task has for the improvement of the ultimate quality of climatic registers, its importance in the recovery

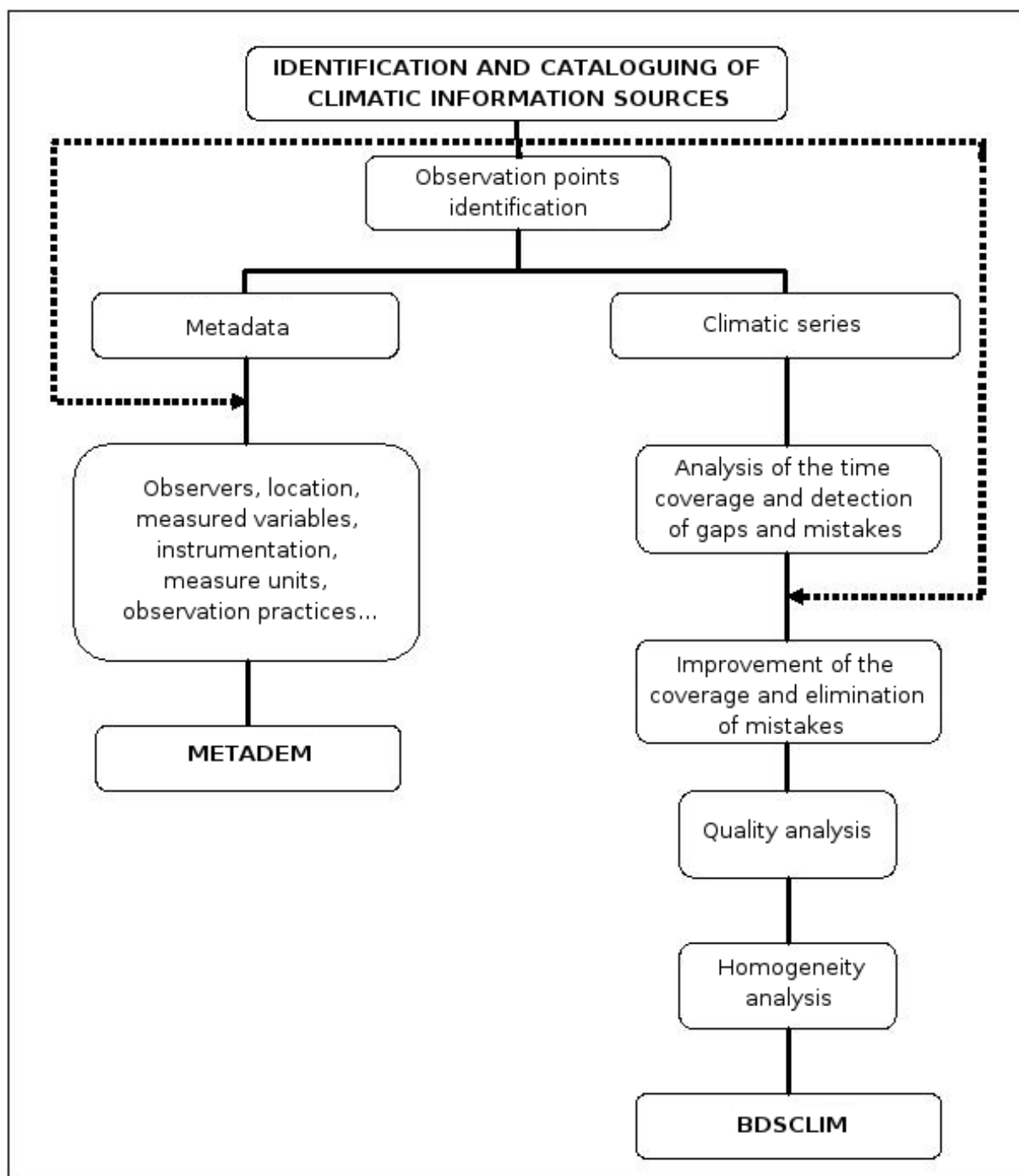


Figure 5. Diagram of the working methodology to create a metadata and climatic series database. The dotted line indicates when there is a maximum volume of information about metadata and climatic series, obtained from the identification of climatic information sources.

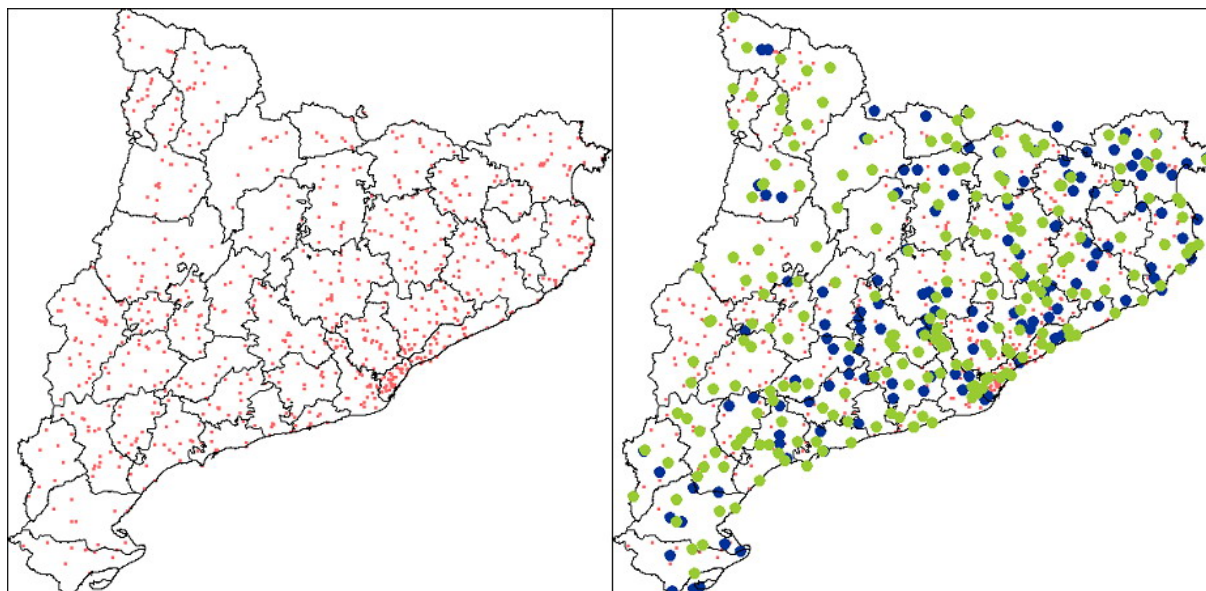


Figure 6. Comparison between the number and initial distribution of the observation spots present at the *Banco Nacional de Datos* of AEMET (left) and the new spots detected (right and blue points), and those which have had the time coverage of its series improved (right and green points). Period 1860-2005.

of the scientific heritage of Catalonia is also unquestionable. Even though the methodology that has to be followed in order to achieve the final goal is well defined, including the analysis of quality and homogeneity of the registers, we must be aware of the fact that the climatic database of Catalonia will be in constant evolution, and subject to the discovery of new climatic sources.

Undoubtedly, this is a project that fully fits into the legal orders of the SMC (to maintain the meteorological database of Catalonia and promote studies in order to improve the knowledge of its climate and meteorology) and it is part of the lines of action of contemporary climatic science.

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