NEWSLETTER

INSTITUT CARTOGRÀFIC DE CATALUNYA

YEAR 3 ■ JULY 1998 ■ NUMBER 7

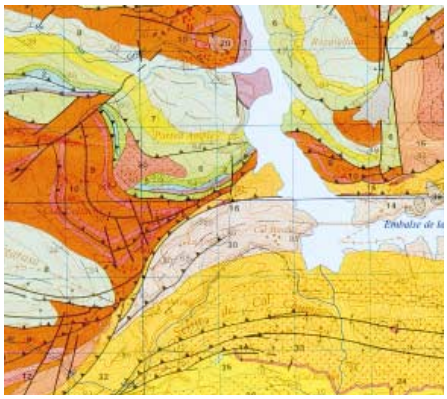
MAGNA PROJECT. GEOLOGICAL CARTOGRAPHY 1:50 000

One of the objectives of the Instituto Tecnológico Geominero de España (geomining, ITGE) is to publish the *Mapa Geológico Nacional 1:50 000* (geological map, MAGNA), and since the Servei Geològic de Catalunya (geological survey) of the ICC plans to obtain geological data about the territory of Catalonia and to

"OF THE 85 SHEETS THAT COVER CATALONIA, 52 HAVE ALREADY BEEN PUBLISHED"

publish the *Mapa geològic de Catalunya 1:25 000*, both institutions made an agreement in 1997 to continue their collaboration, with the result that the ICC is to produce five more sheets in this project. Specifically, these sheets will cover Bellver de Cerdanya, Gósol, Sant Llorenç de Morunys, Oliana and Artesa de Segre, and each of these will be accompanied by complementary records and reports: stratigraphic-sedimentary, palaeontological, tectonic and neotectonic, points of geological interest, stratigraphic columns, a photographic album, a collection of samples and analysis records.

In addition to this, as a result of an objective common to both two institutions, which in the case of the ITGE consists in the creation of a geographical information system that will contain the geological and mining database produced by the digitalization of 1 118 sheets of the MAGNA project, and, in the case of the ICC, consists in the creation of a bank of geological data relating to Catalonia and a geographical information system that will include the database of digital information from the MAGNA sheets, an agreement was also made in 1997 to digitalize the 85 MAGNA sheets corresponding to Catalonia, adhering to the finish, quality and format of the series, and based on the digital topographic database of the ICC at 1:50 000 scale. In order to undertake this task, which will be completed in the course of three years, the two institutions will draw up common working criteria and standards to ensure that the information is perfectly unified.



Partial image from the Berga sheet, produced by the ICC

Furthermore, the Departament de Medi Ambient (environment) has commissioned the ICC to produce the digital geological database at 1:50 000 scale, which will include the most relevant elements of the MAGNA series.

SUMMARY

This newsletter is a free publication available in Catalan, Spanish and English.

Year 3 – July 1998 – Number 7 – ISSN: 1137-2370
D. L.: B. 40 970-1996

Generalitat de Catalunya
Institut Cartogràfic de Catalunya

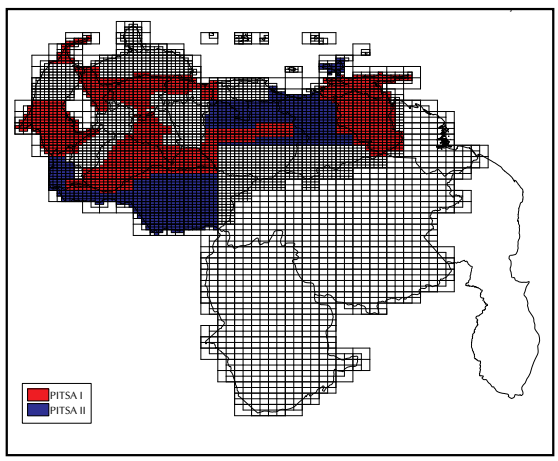
CARTOGRAPHY AT 1:25 000 FOR THE REPUBLIC OF VENEZUELA

This project was commissioned by the Ministerio de Agricultura y Cría (agriculture and stockraising, MAC) of the Republic of Venezuela and consists of two parts: PITSA-I (1997 contract) and PITSA-II (1998 contract). As a result of these contracts the ICC is to produce orthophotomaps in black and white and topographic maps of the north of the River Orinoco at 1:25 000 scale.

For PITSA-I, 180 000 km^2 have been covered, producing a total number of 1 500 sheets. For PITSA-II, 121 009 km^2 will be covered and 973 sheets will be produced.

The orthophoto production process comprises the photogrammetric flight at 1:60 000 scale, geodetic control for the aerial triangulation and georeferencing with GPS instruments, and the use of a digital terrain model obtained by automatic correlation of images, which enables a digital orthophoto to be produced. The production of the topographic maps consists of the first two aforementioned stages and photogrammetric plotting. The project includes the transfer of technology.

The aim of this project is to include the territorial information collected about the Republic of Venezuela in the investment plan for the transformation of the agricultural sector of this country by means of a geographical information system.



Territory covered by PITSA-I and PITSA-II

CASI SENSOR. APPLICATIONS

The CASI (Compact Airborne Spectographic Imager) is an airborne multispectral sensor that records spectral information about the territory flown over. It contains a CCD scanrod that captures each scanline by means of an optical system. Each scanline on the territory contains 512 pixels with spectral information. Spatial resolution of 2 to 10 metres can be obtained. The spectral resolution can be recorded for all the pixels up to a maximum number of 19 bands, to be selected from a total of 288.

The ICC acquired this sensor in 1994, through financing from the Comissió Interdepartamental de Recerca i Innovació Tecnològica (centre for technological research, CIRIT), in order to study subjects that require a high spectral and spatial resolution by means of remote sensing techniques. As a result of its acquisition, the ICC was able to extend the services that it offers in thematic cartography relating to the environment.

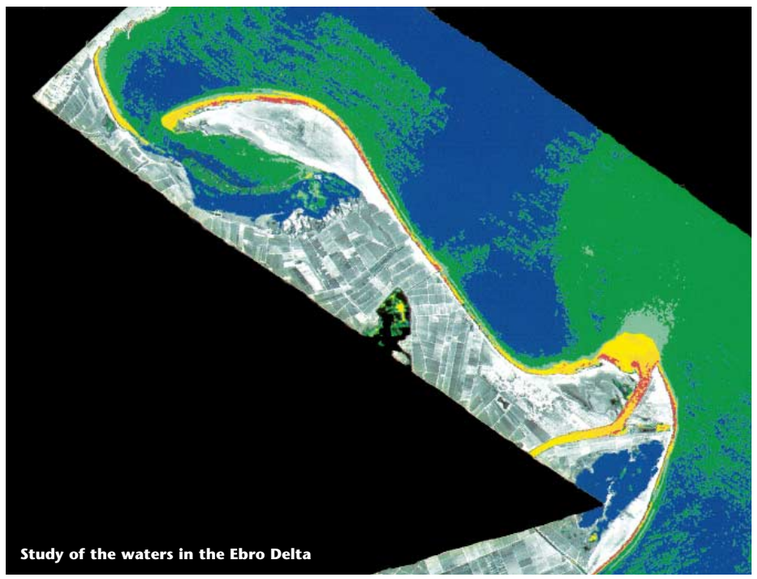
The ICC is constantly striving to improve the images provided by the CASI, by improving the geometry, the radiometric calibration tools, etc. These advances make it possible to refine the information captured by the images, and as a result of this, to enhance the precision of the studies completed using these images.

Some examples of the service provided by this sensor are the control of deforestation and water pollution, the evaluation of natural disasters such as fires or floods, the preparation of inventories of natural resources, the updating of agricultural and forestry

Section where the TGV passes through Montcada

Campaigns completed by the ICC using the CASI sensor

- Study of the waters of the Catalan seaboard. The aim was to measure the content of physical and chemical parameters (total and faecal coli bacteria, aeromonads, turbidity, salinity, chlorophyll, etc.) that determine the quality of the water and the degree of pollution.
- Compilation of source data destined for the geographical information system for the management of the volcanic area of La Garrotxa.
- Studies of the fires that occurred in Catalonia. The ICC and the Departament de Medi Ambient (environment) worked together to monitor and calculate the territorial impact of the fires and the areas affected. The Institute was responsible for the acquisition of CASI images and for the processes of rectification, georeferencing and classification of the type and area of the fires.
- Campaign to obtain images along the various sections of the route proposed for the TGV high-speed train from Lleida to Barcelona.
- Study of crops in Andalucía through an agreement with Matra Marconi Space.



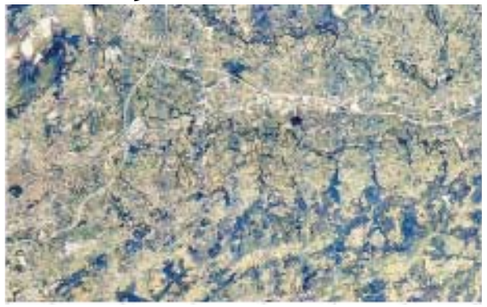
Study of the waters in the Ebro Delta

ORTHOPHOTOGRAPHIC AND ORTHOIMAGE CARTOGRAPHY FOR EXTERNAL PROJECTS

The base of this type of cartography is a vertical aerial photograph or a satellite image, and therefore the elements of the land surface are visible. The original images are geometrically rectified and other information is superimposed on these. The most commonly used scales range from 1:500 000 to 1:5 000. Sometimes the relation between the flight scale and the project scale is such that digital mosaic techniques of two or more components are required, and the tasks of generating terrain elevation data should always be included.

The ICC, which has considerable experience in the production of orthophotographic and orthoimage cartography, has published cartographic documents of the territory of Catalonia on several scales: satellite image maps, radar maps, orthoimages in relief, orthophotomaps, maps in false colour, etc.

Furthermore, it constantly receives assignments from national and international organizations. Of the production of the ICC undertaken to order, the following are some of the current projects on which it is working:



Orthophotomap of Asturias 1:25 000, Oviedo sheet

Orthoimage of Tierra del Fuego (Argentina)

- Orthophotomap of Andorra 1:5 000 following an agreement with the Ministeri d'Ordenament Territorial (town and country planning) of the Government of Andorra. This is based on a photogrammetric flight at 1:16 000 scale and the final output of the project is in digital form. There is a total of 85 sheets, covering the entire territory of Andorra.
- Orthophotomap of Asturias 1:25 000 following an agreement with the Consejería de Fomento (public works) of the Principality of Asturias. It is based on a photogrammetric flight in colour at 1:60 000 scale. This project consists of several stages, of which the first and the second have been completed. Work is currently being undertaken on the third stage, which consists of 51 sheets.
- Satellite orthoimage of the Dominican Republic, through a contract with SPOT Image SA. More specifically, this entailed coverage of the terrain based on orthorectified panchromatic SPOT satellite images in black and white at 1:50 000 and 1:100 000 scales, radar coverage of the territory at 1:250 000 and orthorectified multispectral coverage in colour of 12 sheets corresponding to the 1:50 000 series of the Dominican Republic.
- Orthoimage of Tierra del Fuego at 1:100 000 scale, following an agreement with the Dirección General de Catastro y Tierras Fiscales (land registry and fiscal territories). Elaborated from multispectral SPOT images, which will serve as a base for the completion of the land register. There are a total of 27 sheets.
- PITSA-I and PISA-II, projects

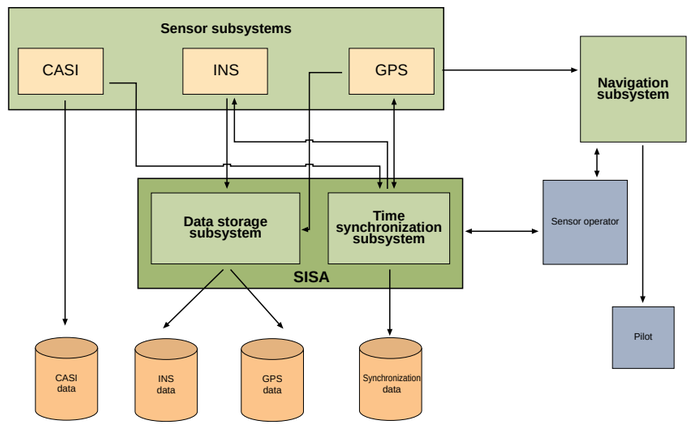
RESEARCH AND DEVELOPMENT

SISA (INTEGRATED AIRBORNE SENSOR SYSTEM)

The purpose of this system is to integrate the various airborne sensors necessary for the correct orientation of the set of images collected during the flight. The correctly orientated images enable documents of a high cartographic quality to be obtained.

The system integrates the capture of images (CASI sensor, metric camera), GPS observations (necessary in order to determine the position), data from the Litton LTN-101 inertial system (to determine the angle parameters) and components for the synchronization of the entire system.

In particular, it is used to orientate the CASI



APPLICATIONS OF ARTIFICIAL INTELLIGENCE TO CARTOGRAPHY

The ICC is using artificial intelligence technology to produce the information on the *Mapa d'usos del sòl de Catalunya 1:250 000* (land use) with the CLIPS set of program, which make it possible to construct an expert system that is instrumental in the extraction of thematic information from remote sensing data.

Through the application of prior parameters, this expert system automatically assigns the various categories of land use. The parameters are established from the combination of the different layers of information: satellite image band (which gives radiometric values), topographic information (heights, inclines and orientation) and climatic data (extracted from the *Atles climàtic de Catalunya* –climatic atlas–, published by the ICC in conjunction with the Departament de Medi Ambient –environment–).

NEW

ATLAS OF CATALONIA. BAIX EMPORDÀ

The ICC is continuing the initiative begun in 1994, when it published the first volume in the collection *Atles comarcal de Catalunya*, which was devoted to the *comarca* (administrative division in Catalonia) of La Val d'Aran. In 1995, the second volume appeared, covering Baix Llobregat, and in 1988 the third has been presented, which focuses on Baix Empordà. This latest volume marks the beginning of a new collaboration with the Diputació de Girona (provincial council), which will lead to the publication of the regional atlases of all the *comarques* in the province of Girona.

The new feature of this third volume is its distribution not only in paper form, the form in which the first two volumes appeared, but also in digital form on a CD-Rom.

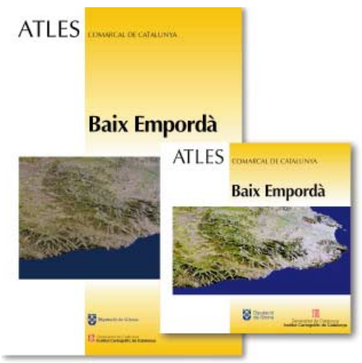
This collection offers a new way to discover the real nature of Catalonia and it is designed to make consultation easy and to provide a comprehensible picture of the *comarques.* Each volume contains a number of chapters, which despite a necessarily closed structure, show the interrelationships between the various geographic elements. Aspects that shape and

"First volume available on CD-Rom"

form the customs and the day-to-day life of the *comarca* are presented with a thematically organized structure, based on the classic parameters of the regional geography. Together, these parameters provide a descriptive overview, without omitting to quantify the most important aspects of the area studied.

The presentation of each and every one of the themes included in the atlas is accompanied by a considerable number of illustrations: maps, graphics, diagrams, photographs, etc., which make it easier to view and understand the information.

Due to the nature of this document and the way in which it is presented and structured, it is considered to be an informative work intended for a general public that is interested in the material, as well as for students and specialists seeking new references, and above all, for schoolchildren, who will be able to use it as basic material in their studies



BRIEF NOTES

GEOFONS

The sets of data collected by the permanent GPS stations are used for the calculation of the photogrammetric control of the ICC and this information is available to the geodetic community on a daily basis.

Currently, GeoFons can be consulted at the ICC's Website:

http://www.icc.es

where a set of geodetic calculators have been installed that enable coordinates to be converted to various reference systems.

THE UMBRIA-MARCHE EARTHQUAKE SEQUENCE. GROUND MOTION AND DAMAGE OBSERVATIONS PATTERNS

The ICC, as a member of the Thematic Network of Seismology and Seismic Engineering, hosted this lecture on 11 May 1998, which was given by Dr. Carlos Sousa Oliveira. The lecture focused on the analysis of the seismic sequence of Umbria-Marche, in central Italy, which began in September 1997.

The most significant images of the damage caused by the seismics in this region were shown. These were of little magnitude, but were numerous and of considerable macroseismic intensity, as is reflected in the damage caused to old constructions. After the presentation of the events, new proposals for action were put forward.

The study of the sequence of the seismics and of their effects on the buildings is of great importance, since it enables the historical data relating to seismics of similar characteristics to be more precisely interpreted.

APPLICATIONS OF GIS AT THE DPTOP

On 22 April 1998, the SIG-DPTOP technical symposium was held in the function room of the Departament de Política Territorial i Obres Públiques (regional planning and public works). The ICC was responsible for its organization and 8 lectures were presented in 3 sessions. The theme linking these lectures was Geographical Information Systems as a tool of support for management and planning tasks.

The aim of the symposium was twofold: firstly, that specialists and users would have the opportunity to provide information about the mechanisms developed in the field of GIS and observe the experience of others, while the second objective was to increase specialized cooperation that will enable new advances to be achieved in territorial management.

GENERAL FRAMEWORK OF AGREEMENT WITH THE INSTITUTO NACIONAL DE TÉCNICA AEROESPACIAL (INTA)

On 11 February 1998, the ICC and the INTA (aerospace technology) signed a General Framework of Agreement to work together to jointly undertake a series of activities in the field of space and remote sensing on board aircraft.

The most important points included in this agreement are the joint use of instrumental equipment and resources, the joint undertaking and financing of research programmes and projects, and cooperation in training and in the exchange of research staff between both institutions in order to carry out research programmes and projects.

With these objectives in mind, a joint committee will be created that will take responsibility for the study and monitoring of joint initiatives.

LATIN-AMERICAN CARTOGRAPHY

Since 1990, the Cartoteca de Catalunya (map library) of the ICC and the Departament de Geografia of the Universitat Autònoma de Barcelona (autonomous university) have been responsible for organizing the cycle of lectures on the history of cartography, which will continue until the year 2000. The main theme of the ninth course, imparted in February 1998, was "Latin-American cartography", given that the year 1998 marks the centenary of the loss of the Spanish colonies overseas.

"THE 583 PIECES ON SHOW CAN BE FOUND AT THE FAR END OF THE CARTOTECA DE CATALUNYA"

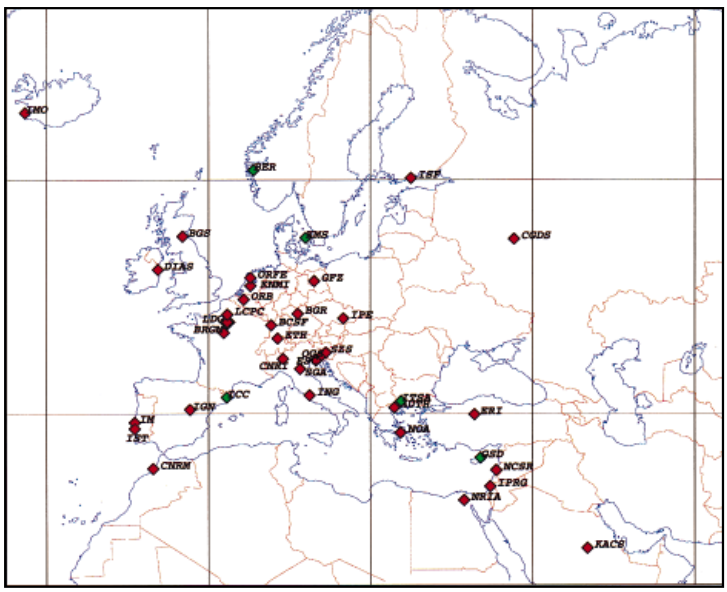
To coincide with this course, an exhibition of a broad sample of Latin-American cartography was organized in the exhibition hall of the ICC. 583 pieces were shown from 33 different countries, of which 424 were originals. The oldest piece on show dated from the year 1483, while the most modern was produced in 1998. All the pieces exhibited form part of the resources of the Cartoteca de Catalunya, and thus they are available to any member of the public who may wish to consult them.

This exhibition, of a strictly cartographic and, in this sense, scientific nature, represents one further contribution to the numerous activities that are being prepared in Barcelona this year to commemorate the events that took place in the year 1898.

THE ICC BECOMES A MEMBER OF THE EURO-MEDITERRANEAN SEISMOLOGICAL CENTRE

In August 1997, in the 17th General Assembly of the Euro-Mediterranean Seismological Centre (EMSC), the ICC was accepted as a new member of the Centre. Our membership will facilitate the exchange of seismic information between the ICC and the various members of the Centre, and the data generated by the seismic network in Catalonia will be recognized at a European level.

The EMSC is responsible for the promotion of scientific contacts between European and Mediterranean countries in the field of seismology, exchange of seismological data, rapid determination (in less than one hour) of the epicentres of important earthquakes, distribution of this information to the members of the Centre and to the international authorities based on the data collected from the various seismic networks, maintaining the operation of European seismic databases, and promoting and suggesting methods designed to improve the collection of information, etc.



Member organizations of the Euro-Mediterranean Seismological Centre

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