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OF THE INSTITUT CARTOGRÀFIC DE CATALUNYA

Generalitat de Catalunya
Departament de Política Territorial
i Obres Públiques
Institut Cartogràfic de Catalunya

Information about the production, development and research projects
of the Institut Cartogràfic de Catalunya

18th International Cartographic Conference

The International Cartographic Association awards two cartography prizes to the Institut Cartogràfic de Catalunya

The members of the International Cartographic Association (ICA/ACI) meet every two years to hold the International Cartographic Conference. The 18th Conference was held in Stockholm on 23-27 June 1997 and its central theme was *Maps and mapping in the Information Society*. The event was attended by approximately 920 participants from 86 ICA/ACI member states.

The scientific programme included a wide range of subjects: cartographic generalisation and databases, cartographic production, digital cartography and geographic information systems, cartography of the environment, and the organisation and the strategic programmes of the national cartographic institutions, among others. A number of other events were held at the same time as the scientific programme: the Technical Exhibition, at which the latest innovations in the field of cartographic production were displayed; the Barbara Petchenik Award, a drawing competition for children around the world on cartographic themes; the International Philatelic Exhibition, an exhibition of stamp collections on the subject of cartography, and the International Cartographic Exhibition.

Many events and scientific and/or technical contributions stood out at the Conference. Particularly worthy of mention, due to its relevance to the field of Catalan cartography, was the International Cartographic Exhibition, at which more than 800 cartographic documents from 42 countries were displayed. The aim was to show the best cartographic products completed in the last two years (1996-1997) by the various cartographic institutions world-wide. The material exhibited was divided into six categories: topographic maps, geological maps, navigation charts and bathymetric maps, city maps, atlases and other maps and publications; a award was awarded in each of these categories, based on the votes of the participants during the Conference.

The Institut Cartogràfic de Catalunya (Cartographic Institute of Catalonia, ICC) was represented by 13 exhibits: 5 topographic maps, 2 geological maps, 2 atlases and 4 publications of other maps. In this respect, mention should be made of the high degree of recognition enjoyed by Catalan cartography at an international level and the notable contribution it made, since two cartographic products produced by the ICC received awards. One was the *Mapa topogràfic de Catalunya 1:25 000* (Topographic map), to be precise, the sheet showing the *Parc Nacional d'Aigüestortes i Estany de Sant Maurici*, in the topographic maps category, and the other award was given to the third edition of the *Mapa d'usos del sòl de Catalunya 1:250 000* (Map of land use), in the other maps and publications category. Thus the ICC obtained two of the six awards given by the ICA/ACI at this 18th Conference.

The *Parc Nacional d'Aigüestortes i Estany de Sant Maurici* sheet is the first in the new *Mapa topogràfic de Catalunya 1:25 000* series, begun by the ICC in 1997. The *Mapa d'usos del sòl de Catalunya 1:250 000* (3rd edition, 1996) has a key with 21 different categories, and the shaded mountainous areas and various planimetric elements have been added to it.

It should be remembered that the ICC has participated on a continuous basis in the conferences of the ICA/ACI, of which it is currently an affiliated member, and that at the 16th International Cartographic Conference (Cologne, 1993) it received the diploma rating the *Mapa hipsomètric de Catalunya 1:500 000* (Hypsometric map) as highly recommended in the thematic maps category, due to its content and clear design. Furthermore, at the 17th Conference, held in Barcelona in 1995 a diploma was awarded to the *Alta Ribagorça* sheet in the *Mapa comarcal de Catalunya 1:50 000* (Regional map) series, rated as highly recommended in the topographic maps category, due to its clear design and the production method; another diploma was awarded to the Republic of Argentina, to be specific, to the Instituto Geográfico Militar de Argentina (Military Geographic Institute of Argentina, IGMA), for the *Carta de imagen satelitaria de la República Argentina 1:250 000. Ciudad de Buenos Aires* (Satellite image map of the Argentinian Republic), realized by the IGMA, and produced and published by the ICC. This award was awarded in the image maps category, in which the document was rated as highly recommended due to its clarity of presentation.

Mapa topogràfic de Catalunya 1:25 000

In 1997 the ICC has begun publication of the *Mapa topogràfic de Catalunya 1:25 000* (Topographic map) series, which, when finished, will consist of 83 sheets covering the whole of Catalonia. The series is divided into three distinct parts: the sheets showing the regional capitals (41 in total), those showing the protected open spaces (18 in total) and those showing the geographic units not covered by the other sheets (24 sheets). The first sheet in the series is the *Parc Nacional d'Aigüestortes i Estany de Sant Maurici*, a sheet which has received an award from the ICA/ACI.

All the sheets in the series will have a cartographic format of 122 x 92 cm, like the published sheet, and will also consist of an extensive key including all the geographical elements that can be represented throughout Catalonia, a general guide map showing position, another showing the approaches to the area mapped, the sources of information consulted for the elaboration of the map and a list of survey points included in the cartographic section, with their identifier. Furthermore, on the first sheet published, due to its particular characteristics, a list of possible routes in the area of the Park, including how long they take, has been added, in addition to the mountain huts and the contact telephone numbers.

The altimetry of the *Parc Nacional d'Aigüestortes i Estany de Sant Maurici* sheet comes from photogrammetric plotting drawn from a flight at 1:40 000 scale made by the ICC in 1989; the contour lines are shown at intervals of 10 m. The shaded mountainous areas shown on the map are obtained from the digital terrain model, derived from stereoplotting. The planimetric information shown comes from the same stereoplotting and was fully updated and revised in March 1997. The uses of the land and the rocky areas have been directly obtained by photointerpretation of the *Ortofotomapa de Catalunya 1:25 000* (Orthophotomap) produced by the ICC in black and white and in colour. The toponymy, updated and revised, has been taken from the toponymic base of the Institute.

The thematic information on the map, be this the list of routes or the special information pictograms, has been provided by the Parc Nacional itself, in accordance with the agreement between the ICC and the Direcció General del Medi Natural (Environmental Office) of the Departament d'Agricultura, Ramaderia i Pesca (Department of Agriculture, Stockbreeding and Fishing) of the Generalitat de Catalunya (Catalan Autonomous Government).

Mapa d'usos del sòl de Catalunya 1:250 000 (3rd ed.)

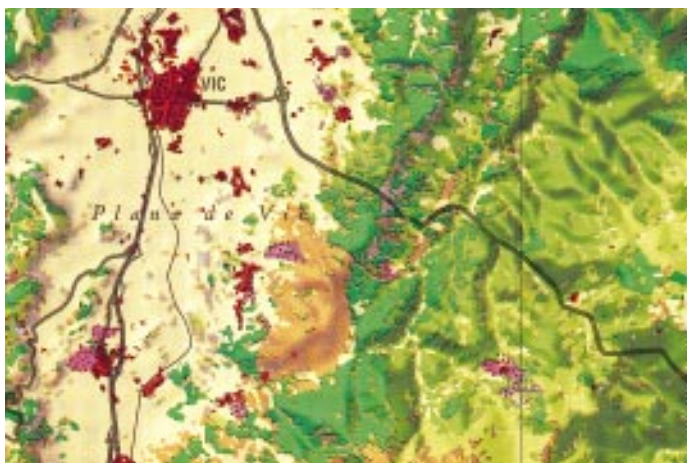
In 1992 a collaborative agreement was signed between the Departament de Medi Ambient (Department of Environment), the Direcció General de Planificació i Acció Territorial (Territorial Planning and Initiatives Office) and the ICC, with the aim of updating the second edition (1990) of the *Mapa d'usos del sòl de Catalunya 1:250 000* (Map of land use), on which the land use information dated from 1987. The 21 categories to map and the scale chosen for the production of the third edition (1996) determined the use of similar methodology to that employed for the second edition, with some innovations.

The third edition, which has been awarded by the ICA/ACI, was completed following the digital processing of multispectral data from the Thematic Mapper sensor of the Landsat-5 satellite corresponding to images captured during the spring and summer of 1992, with the aim of gathering dynamic information about the seasonal phenology of the vegetation. This information, once corrected geometrically in the UTM system, was analysed together with topoclimatic information (from the base of the ICC's geographic information system). The joint analysis of all these variables was made with a digital classification process, based on the maximum similarity method, which led to the segmentation of the study area into homogeneous zones (classes) from a spectral and topoclimatic perspective. At the same time the so-called field file was produced, which consists in selecting areas that are representative of all the cover types to be mapped and assigning them a label that is characteristic of the cover they represent. The digital crossing of the two files (classification and field files) links each pixel of the classified image with a set of possible labels that correspond to the labels of the class that contains it. Then, by means of automatic analysis that considers the representativeness of these labels, as well as the label that each of these pixels had in the study of 1987, an output code was assigned to them. Finally, the cartography produced in this way was checked with photointerpretation techniques on photogrammetric flights, in order to be able to detect and correct possible errors of assignation.

The artificial uses (urban cover and uses and road infrastructure) were obtained from the planimetry of the *Mapa comarcal de Catalunya 1:50 000* (Regional map), and supplemented by the *Mapa CORINE Land Cover de Catalunya 1:250 000* (CORINE Land Cover map), which enabled these uses to be distinguished with greater accuracy.

On the other hand, a shading technique was applied to the information produced, in accordance with the topographic characterisation of the territory. This shading aids the location of the different uses and land cover types in Catalonia and permits a visual analysis of the relationships of interdependence or cause and effect between topographic and land use factors. Planimetric elements were added (roads, railways and population nuclei) which also help to explain interdependent aspects between these and the different land uses and types of land cover.

The cartographic format of the map is 111 x 107 cm. The documentation also consists of a key to the different land uses, a hypsometric map of the area mapped, an explanation of how the map was produced, a table showing the distribution of uses at a regional level (% for each of the categories of the key) and a matrix of accurate and confusing aspects, in order to evaluate the results obtained in the classification.



Production of orthoimages 1:25 000 for the Republic of Venezuela

The ICC has signed a contract with the Ministerio de Agricultura y Cría (Ministry of Agriculture and Stockraising, MAC) of the Republic of Venezuela for the capture and production of digital orthorectified images. The main aim of the project is to supply, in the short term, digital cartographic information about the land for the *Sistema de Información Georeferenciado Catastral* (Land Registry Georeferenced Information System) at the Dirección General Sectorial del Catastro (Land Registry Regional Office).

In order to undertake this project, the Republic of Venezuela has arranged a loan with the Banco Interamericano de Desarrollo (BID) to partially finance the cost of the *Plan de Inversiones para la Transformación del Sector Agropecuario* (Investment Plan for the Transformation of the Agricultural Sector, PITSA) and, specifically, to complete the rural land registry component in this Plan.

The project will cover a total of 18 million hectares of Venezuelan territory, situated to the north of the Orinoco River, and the rural land registry is to be completed. This area includes the states of Barinas, Lara, Monagas, Portuguesa, Sucre, Yaracuy, Zulia and Guárico. The project to be completed during 1997 and 1998 entails the total production of 1,500 sheets at 1:25 000 scale.

The main objective of the production of georeferenced orthoimages for the MAC is that these may be used in land registry applications by means of a geographic information system. These digital products are also used to create three-dimensional digital models of the entire territory in the project, which make it possible to represent the altimetry with contours at different intervals and complete analyses of the inclines and the relief, of great benefit to agricultural and territorial planning, etc., and another consequence will be the development of basic digital cartography at 1:25 000 scale.

The process of producing the orthoimages begins with the geodesic support for the aerotriangulation and georeferencing, which is completed using GPS instruments, together with the photogrammetric flight at 1:60 000 scale in black and white, planned and executed with the geometry necessary for the production of orthoimages. The photograms obtained, previously monitored, are scanned and, then by using a digital terrain model obtained by automatic correlation of the images, a new continuous digital image with orthographic projection is produced.

The toponymy, compiled from official cartography, is sited digitally in a workstation with the density and the form that are appropriate for the type and the scale of the cartographic document, considering the particular characteristics of each area mapped and taking account of special geographic features, while applying a uniform and coherent approach for all the sheets.

The marginal information and the cover are also completed digitally. The process ends with the presentation of the orthoimages at 1:25 000 scale both in digital form and as printed output.

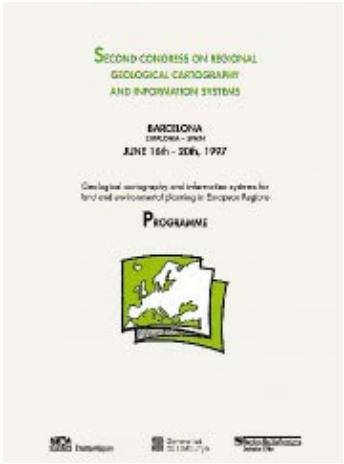
III Barcelona Geomatic Week

On 8-11 April 1997 the III Barcelona Geomatic Week was held at the headquarters of the ICC. This event was organised by the Col·legi Oficial d'Enginyers Tècnics en Topografia (Official Association of Topographic Technical Engineers, ETT) of Catalonia and the ICC, with the aim of creating a meeting-point for professionals, scientists, students, users and commercial companies that work directly or indirectly in the field of cartography, topography, photogrammetry and geographic information systems.

The theme of this event, held for the third time and attended by approximately 180 participants, was *Cartography and Information Systems*. The opening paper, entitled "GIS data revision - visions and reality", was presented by Dr. Ing. Dieter Fritsch, of the Institute of Photogrammetry of the University of Stuttgart. Over the four days of the Week, a total of 24 papers were presented, grouped into three subject areas: Cartographic technology, Topography and photogrammetry, and Information systems, and 10 product presentations were made by various commercial companies. Finally, to bring the conference to a close, a round-table was held, at which the main subject for discussion centred on the challenges facing topographic technical engineers in the 21st century.

As on the previous occasion when this event was held, the "Jordi Viñas i Folch" prize was awarded by the ICC to a piece of research work in the field of geomatics, and the "Luis Martín Morejón" prize was awarded by the ETT to an end-of-course project.

Second Congress on Regional Geological Cartography and Information Systems



On 16-20 June 1997 the Second Congress on Regional Geological Cartography and Information Systems was held at the ICC. It should be remembered that the first congress was held in the city of Bologna (Emilia-Romagna, Italy) in 1994.

As at the last congress, the Promoting Committee was formed by the Presidents of Catalonia, Bavaria and Emilia-Romagna, and the Ministers for Public Works and the Environment of the three regions.

The work and the papers sessions fell to the responsibility of the Scientific Committee, composed of two people from each of the three regions, while the staff of the ICC, having formed a Local Organising Committee, took responsibility for the internal organisation and running of the event.

The opening session was chaired by the Minister of Política Territorial i Obres Públiques (Regional Planning and Public Works) of the Generalitat de Catalunya (Catalan Autonomous Government), and the Minister of Medi Ambient (Environment), the director of the ICC, a representative of the Ministry of Public Works and Environment of Bavaria, a representative of the Ministry of Public Works of Emilia-Romagna and a representative of the Scientific Committee took part. The opening session included a lecture by the director of the Instituto Tecnológico Geominero de España (Spanish Technological Geomining Institute) on geological cartography and hydrogeology.

The six work sessions, which were either oral presentations or followed the poster sessions, were as follows:

Session 1. Geological cartography. Perspectives on geological information. Quantification of the social value of geological maps.
Session 2. Specific geological cartography. Urban and alluvial-coastal plain areas.
Session 3. Natural hazards. Geologic and economic evaluation and predictability.
Session 4. The water as a geologic constituent. Its relationships with geological hazards.
Session 5. Use of technologies to improve predictability tools.
Session 6. Final round-table. Discussion and conclusions.

A total of 34 oral presentations and 45 poster sessions were presented. All the papers presented were included in a document that compiles all the knowledge expounded. Furthermore, the three regions presented the current position of their respective geological cartography in an exhibition entitled “Geological cartography, yesterday and today”.

The Congress was attended by 120 participants from 15 European countries, one from Israel, three from Morocco and four from Mexico.

The third congress will be held in Munich in 2000.

Exhibition: *Neu, allaus i risc natural*

To celebrate the tenth anniversary (winter 1996-1997) of the beginning of the joint project undertaken by the Geological Service of Catalonia and the University of Barcelona to assess the risks of avalanches in the Catalan Pyrenees, on 10-21 March 1997 the exhibition on snow, avalanches and natural risk was opened to the public in the Exhibition Hall of the ICC.

At the beginning of this joint project, it was necessary to devote time to the technical and scientific training of the personnel involved by means of training and advisory courses with institutions from other countries with greater experience in the study of snow and avalanches.

Such efforts were of great importance, because avalanches are fundamentally destructive. They have a powerful impact on the environment: they destroy woodland, erode the soil and cause damage to infrastructure and people, and since the phenomenon of avalanches poses a natural risk, it is necessary to study and locate them.

After ten years, we believe that a highly positive evaluation may be made of the efforts invested, due to the results obtained, among which it is worth highlighting the production of cartography of avalanche paths, the information made available to the public on a daily basis through the avalanche danger report (via the Internet http://www.icc.es and by telephone 93-423 29 67 for the western Pyrenees, 93-423 25 72 for the eastern Pyrenees and 93-325 63 91 in Spanish), and participation in international research and development projects.

The Exhibition chose a thematic and informative format to present the phenomenon of avalanches, the risks that they pose and how these can be minimised. The main aim was that visitors to the Exhibition would become aware of their danger, and therefore the exhibition was divided into four principal areas:

1. Presentation
2. Prediction in time
3. Prediction of avalanche location
4. Research and development

It was also possible to watch an audio-visual presentation and a video about avalanches, to see a demonstration of the applications of geographic information systems to avalanche cartography, and to consult the ICC web pages about avalanches on the Internet.

Special mention should be made of the presentation within the Exhibition of the *Mapa de zones d’allaus de Catalunya 1:25 000 (Val d’Aran nord)* (Map of avalanche areas), produced and published by the ICC; this is the first example of a cartographic document on avalanches to be published in Spain.

Foto: J. M. Vilaplana

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