NEWSLETTER

INSTITUT CARTOGRÀFIC DE CATALUNYA

YEAR 7 ■ JUNE 2002 ■ NUMBER 15

20 YEARS OF THE ICC

This year 2002 sees the celebration of the twentieth anniversary of the creation of the ICC.

To carry out any territorial planning and action it is essential to have a quality cartography suitable for representing the territory of a country with the maximum accuracy and the highest detail.

"THE ICC WAS CREATED IN 1982 BY THE LAW 11/1982, (OCTOBER 8TH) OF THE CATALAN PARLIAMENT"

In view of this necessity of national interest, and with the desire that Catalonia should have an organization to act as the single entity entrusted with ensuring the correct cartographic representation of the territory, the Generalitat de Catalunya (autonomous government) created the ICC as an autonomous, commercial, industrial and financial institution of the Department of Regional Planning and Public Works (DPTOP). Renewing the task initiated by the geographic services of the Mancomunitat (consortium of regional councils that existed in Catalonia between 1914 and 1923) and the Generalitat of the republican period, the foundation of this organization signified the culmination of a process of institutional organization of the cartography of Catalonia begun sixty-eight years before, when an administrative unit of the Mancomunitat was formed in 1914.

Since its beginnings, its aim has been clear: to be the technical institution for the technological development and production of geomatic information on Catalonia, and to ensure that Catalonia will have spatial data infrastructures appropriate to its territory.

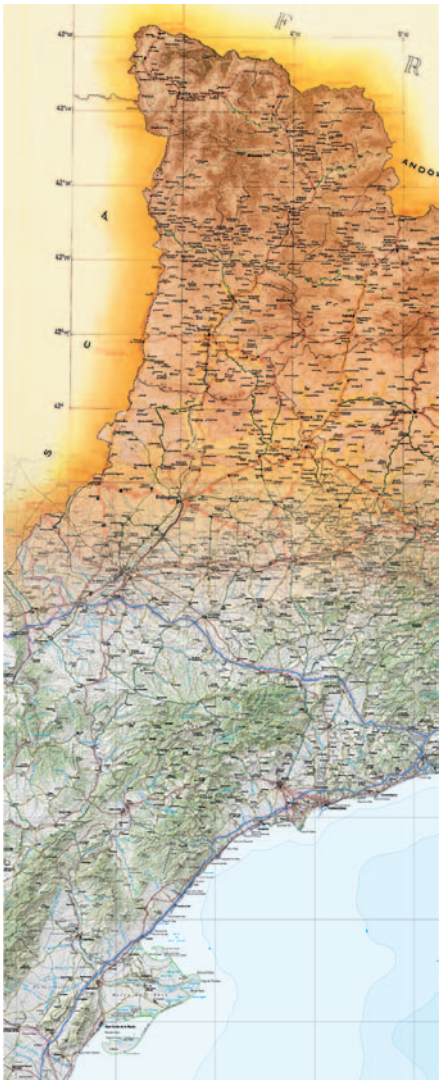
"IN 1997, THE ICC CHANGED ITS JURIDICAL STRUCTURE AND BECAME A PUBLIC ORGANIZATION OF THE AUTONOMOUS GOVERNMENT OF CATALONIA"

In 1997, in view of the experience accumulated over the fifteen years since its creation, the ICC changed its juridical structure by the law 6/1997 (June 11th) of the Parliament, with the objective of continuing to develop its functions with a greater degree of agility and efficiency.

Today, twenty years after its creation, and in a constant process of technological renovation, it can be confirmed that the consolidation and maturity that it has attained set the technological studies and the cartographic production carried out in Catalonia on levels of innovation and modernity that are illustrative of its status as a thoroughly advanced country.

There have been many actions carried out over these twenty years of uninterrupted activity: the incorporation of the Servei de Cartografia i Fotogrametria (Cartographic and Photogrammetry Service) of the Diputació de Barcelona (Barcelona Regional Council), where the historic documentary collections of the Servei Cartogràfic (Cartographic Service) of the republican Generalitat were preserved; the incorporation of the Servei Geològic de Catalunya (Geological Service of Catalonia), to provide unity of action within the DPTOP; the creation of the Institut de Geomàtica (Institute of Geomatics) consortium, to develop applied research in the sector; the continuous introduction of technological developments in cartographic production to obtain the most precise representation of the territory; the expansion of the public services destined to users of geomatic information; the consolidation of the Institute's presence in the national and international geomatic world...

For this reason, the Institute has published a document in summary form that recalls the milestones that have marked the development of the ICC, the past being understood as one more tool for reflection on the present and as an enriching and necessary experience with a view to the future.



SUMMARY

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

Year 7 – June 2002 – Number 15 – ISSN: 1137-2370
D. L.: B. 40 970-1996

Generalitat de Catalunya
Institut Cartogràfic de Catalunya

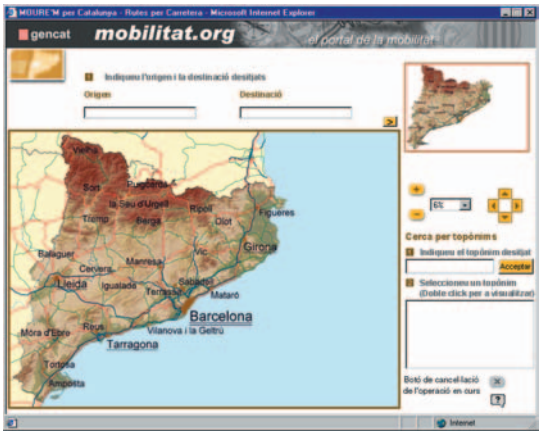
OPTIMUM ROUTES ON THE ROADS OF CATALONIA

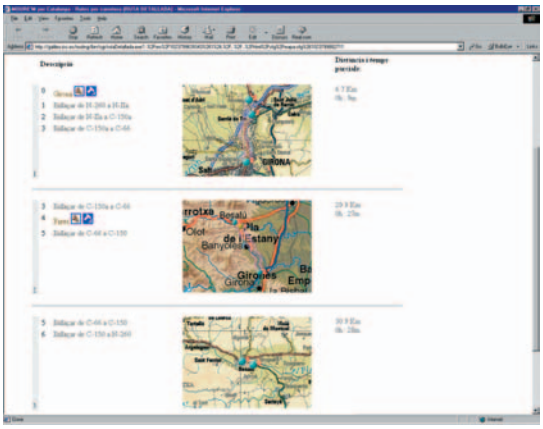
The ICC has developed a web application for calculating routes on the roads of Catalonia for the mobility gateway of the Department of Regional Planning and Public Works (DPTOP). Once an origin and a destination have been fed into the computer, this application serves to show the fastest and shortest route, in time or distance. The result is visualised on the topographic map of Catalonia to different scales and a "road book" is generated, with the indications of the directions to be taken to follow the route correctly.

For the creation of the graph on which the application functions, we started from the sections of catalogued roads of the roads network of the topographic database of Catalonia at 1:50 000, and this has been completed with the sections of the non-catalogued roads from the same database, which are necessary to guarantee the connectivity of the network and access to all the nodes (2 379 corresponding to municipal capitals and other nuclei of population of Catalonia).

This public service can be found at the following address:

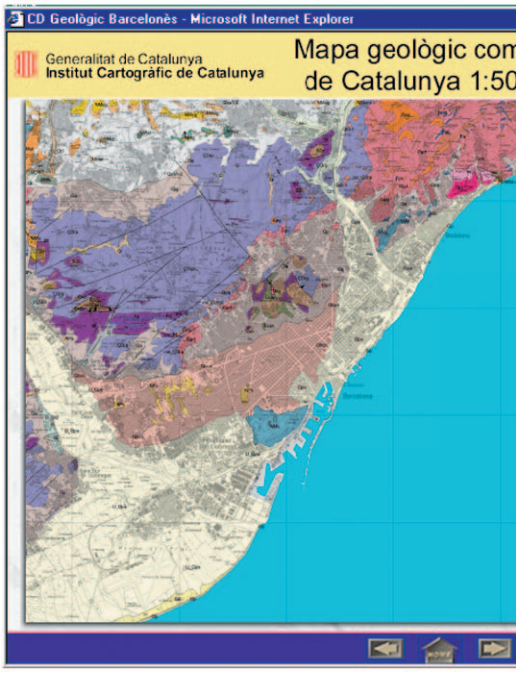
www.mobilitat.org





THE GEOLOGY OF CATALONIA ON CD-ROM

Mapa geològic comarcal de Catalunya 1:50 000
Institut Cartogràfic de Catalunya and Instituto Geológico y Minero de España
1st edition: Barcelona, June 2002
15 euros incl. IVA



The ICC has begun the series *Mapa geològic comarcal de Catalunya 1:50 000* in CD-ROM format. The series is co-published with the Instituto Geológico y Minero de España (Spanish Geological and Mining Institute, IGME) and it has been undertaken in collaboration with the Departament de Medi Ambient (Catalan Department of the Environment).

"THE GEOLOGICAL INFORMATION REPRESENTED IS DRAWN FROM THE ANALYSIS, INTERPRETATION AND SYNTHESIS OF THE MAGNA SHEETS"

The series, published in bilingual Catalan and Spanish, and comprising 41 *comar-*

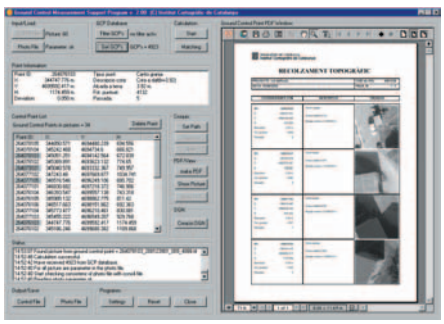
RESEARCH AND

AUTOMATED CONTROL POINT LOCATION

The ICC has supervised a diploma thesis that consist in developing a program for the automated location of ground control points (GCP) in aerial images. The functionality of the application includes:

1. The automatic selection of all GCP, lying within a photogrammetric block.
2. The sub-selection of those points using defined criteria (e.g. point type, accuracy, etc.) and their export into Zeiss/Intergraph(Z/I) format.
3. The calculation of approximate image coordinates and their export into Z/I-format using the housekeeping data of the flight navigation system CCNS-4
4. The generation of listings (PDF-files), containing all important information and a respective image chip of all user-selected GCP (see right part of the figure).

The initial location of the points in the image depends on the accuracy of the CCNS-4 housekeeping data, and can easily reach a magnitude of several 100 pixel. Therefore, an additional module of the program applies an hierarchical matching approach to supply image coordinates with pixel accuracy. For this task, larger sections of the digitized aerial images around the calculated positions are matched to existing image chips of the GCP. These chips are generated on a routine bases at three resolution levels (factors 1,4,12) from images of the same (or former) flights, establishing a growing control point image database (5 000 points in June 2002). First tests using 60 aerial images of scale 1:5 000 (project Sort) result in 54 of 73 correctly matched image points (74%). The error in the location is 10 pixel. The final measurement of the image coordinates is done manually.



ques (administrative divisions in Catalonia), is consulted using the navigator MS_Explorer.

The geological map –with cartographic continuity of the elements and a single legend– is completed by a location map, a lithological map, and geological columns and cross sections. It also includes the descriptions of the geological units, illustrated by field photographs.

This information is complemented by an introduction, a guide on how geological maps are made, and how they should be read. Details about the source of the information are also available.

"BY JUNE 2002 ONE COMARCA WILL HAVE BEEN PUBLISHED BARCELONÈS"

The remainder will be published in succession.

DEVELOPMENT

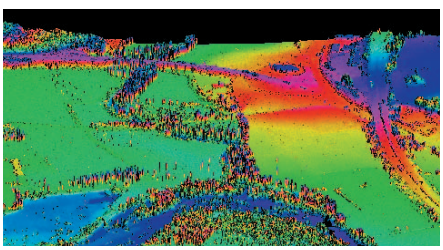
LASER ALTIMETRY

In December 2001 the ICC acquired the laser altimeter ALTM 2025E, which serves to do precise measurements of the terrain elevations.

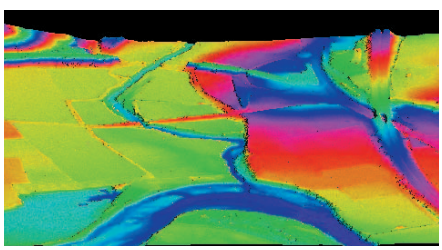
This is an airborne laser that illuminates the terrain with a laser signal and obtains range by measuring the return time of the signal emitted.

With present day measurement techniques it is possible to measure the distance travelled by the laser to the accuracy of one centimetre, although GPS and inertial navigation system errors reduce this precision to 15-30 centimetres in normal operational conditions.

This system is capable of measuring 25 000 points per second and can operate between 550 and 3 000 metres above the terrain, regardless of the light conditions. The high point density means that this technology is an alternative to photogrammetry for obtaining extremely precise and dense terrain models. It is possible to obtain terrain models with densities of one point per square metre, or even higher, while maintaining high productivity. Other possibilities are the obtention of digital surface models of towns and cities for applications such us antenna placement in telephony, the mapping of electric power lines to detect when a high tension line touches vegetation or gets too close, obtaining basic data for flooding risk studies, monitoring coastline changes, measuring the height of vegetation for forestry management, etc.



Original laser data (the confluence of the Terri with the Ter rivers, Medinyà).



Filtered terrain model from laser data.

NEW

DIGITAL PHOTOGRAMMETRY

Fotogrametría digital
Toni Schenk
Institut Cartogràfic de Catalunya and Marcombo
1st edition: Barcelona, June 2002
53,49 euros incl. IVA

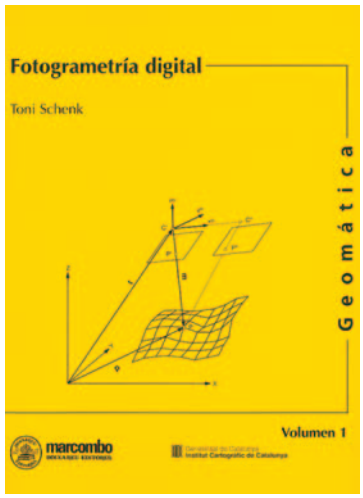
The ICC, in collaboration with the publisher Marcombo, has just published the Spanish version of the book by Toni Schenk *Fotogrametría digital* (Digital Photogrammetry). The author has been professor of Photogrammetry and the Science of Geo-Information at Ohio State University since 1985. His research is set in the framework of the disciplines of digital photogrammetry, computer vision and artificial intelligence, specifically in the automation of some of their procedures.

"THE BOOK IS BASED ON THE MATERIAL USED IN THE DIGITAL PHOTOGRAMMETRY PROGRAMME OF THE OHIO STATE UNIVERSITY OVER THE LAST TWELVE YEARS"

The book begins with background information on digital photogrammetry: the processing of the signal and the image, human and computer vision, radiometry and photometry (part I). It then deals with the fundamentals of digital photogrammetry, including electronic image capture systems, scanners, digital photogrammetric stations and the fundamentals of image correspondence (part II). The third part is dedicated to automatic orientation processes.

"THE READER IS OFFERED A RESOURCE PROVEN IN UNIVERSITY CLASSES"

The book accentuates the concepts and algorithms that are useful for resolving photogrammetric problems automatically. The intention is to provide a coherent text on digital photogrammetry, suitable for use as a text book or as a reference book.



BRIEF NOTES

IN MEMORIAM FRANCESC CONFORTO

Francesc Conforto i Tutzó, head of the Flight Unit of the ICC, died suddenly on the 21st of March. His experience, both in technical aspects related to flights and more specific questions of photography, and above all, his enthusiasm to go ahead with all kinds of proposals and his charming manner with all his colleagues will remain in our memory always.

PERMANENT CARTOGRAPHIC EXHIBITION

The exhibition, which has been on show since February 2002 in the Exhibition Hall of the ICC, has the presentation of the collections of the Map Library of Catalonia as its main objective, in its role as the centre of the cartographic documentation of the Institute.

The material, which corresponds to a careful and representative selection of maps, books and photographs, demonstrates that its cartographic collections have a coverage of universal scope from the geographic point of view and a general coverage as far as its subject matter is concerned. With reference to its chronological setting, the collections move in a very broad space of time that ranges from the first cartographic representations –the exhibition begins with the facsimil edition of two *beatus* from the 8th century– to the most modern examples created with the latest cartographic techniques of the moment. The exhibition, therefore, concludes with the ICC's most recent productions.

The books bear witness to the importance of the specialised library and clearly demonstrate how much this should be considered an essential auxiliary tool for effective cartographic research.

The photographic archive is made up of postcards, oblique and vertical aerial photographs.

REAL TIME DIFFERENTIAL CORRECTION SERVER

On the 10th of May 2002 the ICC started up a real time differential corrections server over the Internet, in collaboration with the BKG (Bundesamt für Kartographie und Geodäsie).

The CATNET-IP service has been included in the EUREF-IP project, which has correction servers in Switzerland, Italy and German.

For more information:
(http://igs.ifag.de/root_ftp/EUREF/reports/euref_realtime.doc)

The URL address of the DGPS of the ICC is: catnet-ip.icc.es

1ST THEORETIC-PRACTICAL TRAINING COURSE ON ADVANCED CARTOGRAPHIC TECHNIQUES: DIGITAL PHOTOGRAMMETRY

The 1st Theoretic-practical training course on advanced cartographic techniques: Digital photogrammetry was held in the headquarters of the ICC from the 3rd to the 14th of June 2002, with the objective of providing a broad view of digital photogrammetry from a practical and applied point of view, placing emphasis on the concepts and algorithms that are effective for resolving photogrametric problems automatically.

"THE OBJECTIVE OF THE COURSE WAS TO PROVIDE A BROAD VIEW OF DIGITAL PHTOGRAMMETRY"

The course was directed towards civil engineers and graduates from DIGSA cartographic institutions (directors of geographic institutes of South America, Spain and Portugal) with knowledge of photogrammetry, either decision makers dedicated to research and development of digital photogrammetry or those dedicated to cartographic production; expert photogrammetrists who wished to learn the most recent developments in this field, or specialists from related disciplines who wished to complement their training with the photogrammetric technique.

The fundamentals of digital photogrammetry were dealt with in the course:
- Equipment (cameras, digital sensors, scanners and digital photogrammetric stations).
- Orientation processes with special emphasis on tools for the automation of the process.
- Extraction of cartographic information (terrain models, photogrammetric restitution, generation of orthophotos).
- The introduction of productive chains (production flows, system architecture).

The course, given over two weeks, had a total of 60 hours of training distributed in theoretical and practical sessions of 6 hours per day.

The classes were given by professionals from the ICC, experts in the field of digital photogrammetry, and with the collaboration of the Centro Geográfico del Ejército (Army Geographic Centre) and the Instituto Geográfico Nacional (National Geographic Institute), who showed their production flows. All the contributors have a wide experience in research, in development and in production areas.

In total 15 technicians attended, from Bolivia, Brazil, Chile, Ecuador, Paraguay, Portugal, Uruguay and Venezuela.

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