NEWSLETTER

INSTITUT CARTOGRÀFIC DE CATALUNYA

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ORTHOPHOTOMAP OF CATALONIA 1:5 000, v.3.0

An orthophotomap is a cartographic document consisting of a vertical aerial photograph which has been rectified in such a way that a uniform scale is maintained over the entire area of the image. The essential and complementary information that all maps require is added above and in the margins of the rectified image.

For some years the ICC has produced various series of orthophotographic cartography of the territory of Catalonia, the oldest of these being the first version of the 1:5 000 series completed in black and white between 1986 and 1992. At present, version 3.0 is being produced over a period of two years (2002-2003). The production process is completely digital, so a digital orthophoto can be obtained as a parallel product to the orthophotomap.

"THE FIRST OBJECTIVE OF THIS SERIES IS TO PROVIDE LARGE SCALE CARTOGRAPHIC BASES OF CATALONIA"

Since it is an orthophoto, emphasis should be made of the possibility of superimposing information and delimiting areas, based on both what is visible on the image and on information provided by other sources; for example, land use, areas affected by natural phenomena, environmental impact areas, scenic areas, areas of urban morphology, etc.

"LIKE ALL BASIC DOCUMENTS, IT CAN BE USED AS A SOURCE OF INFORMATION (E.G. TO INVENTORY, ANALYZE) OR AS A CARTOGRAPHIC BASE (E.G. TO SUPERIMPOSE THEMATIC INFORMATION)"

The aerial photographs on which the orthophotomaps version 3.0 are based are in color, the flight scale is 1:22 000 and the flight dates span the years 2000-2003.

The geodetic reference system is the official system in force, known as ED50 (European Datum 1950), established as the statutory system by Decree 2303/1970 and based on the international ellipsoid (Hayford, 1924) and the Potsdam datum (Helmert Tower). This system is deployed over the territory with the utilitarian geodetic network of Catalonia, the ICC being the body responsible for its construction and conservation, and for the determination and distribution of the official coordinates of its points.

With respect to the origin of the geodetic coordinates, the latitudes are taken with reference to the Equator and are considered positive to the north, while the longitudes are taken with reference to the Greenwich Meridian and are considered positive to the east. The altitudes are taken with reference to the average sea level in Alicante. With the grid of the network of UTM coordinates superimposed on the image, any point can be located with its coordinates.

The sheet section is obtained from the subdivision 8 x 8 of the *Mapa Topográfico Nacional 1:50 000* (National topographic map, MTN).

The positions of well-defined points are estimated as accurate to within 1 meter.

"THE RADIOMETRIC VARIATIONS IN COMMON AREAS ON MORE THAN ONE ORTHOIMAGE ARE NEGLIGIBLE"

On the other hand, the toponymy added to the image represents a source of highly useful information, both from a geographic point of view, since it facilitates the identification, location and interpretation of all kinds of elements on the land surface, and from a philological point of view, due to the representation of different linguistic variations. The toponymy is drawn from the *Base toponímica de Catalunya 1:5 000* (Toponymic database of Catalonia), which contains some 350,000 toponyms.

The most significant differences to be noted by the user with respect to the previous version are the use of color images and the geometric and radiometric continuity over the entire territory; that is to say, there are no appreciable changes in color between one orthoimage and adjacent images, and the structures to be observed on the images are not cut or moved.

With regard to their reproduction, the orthophotomaps are not printed, but drawn to order on ink-jet plotters.

SUMMARY

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Generalitat de Catalunya
Institut Cartogràfic de Catalunya

GEOLOCATION AIMED AT HIKERS

The ICC is taking part in the international project PARAMOUNT (Public Safety & Commercial Info-Mobility Applications & Services in the Mountains), financed by the IST program of the European Union, and in which the following institutions are participants:

- IfEN Gesellschaft fuer Satellitennavigation mbH (leader of the consortium).
- AGIS, University of the Bundeswehr, Munich.
- Institut Cartogràfic de Catalunya.
- Bayerische Bergwacht (Bavarian mountain rescue service).
- Österreichischer Bergrettungsdienst (Austrian mountain rescue service).

The aim of the project is to develop a location service for hikers and rescue services in the Alps and the Pyrenees, where two test areas have been defined. There are plans to develop three types of service:

Infotour. This will provide the user with a variety of local information and forms of navigation, such as guides, three-dimensional views of the environment, information about points of interest (peaks, refuges, public transport, etc.), local meteorological forecasts and information about the risk of avalanches.

Safetour. This will provide information related with mountain safety. Functions will also be introduced which will make it possible to monitor registered users in dangerous terrain, and to alert and coordinate rescue teams in emergencies.

Datatour. This will directly involve users in the acquisition and maintenance of the PARAMOUNT database (information about routes and the difficulty of paths, capture and updating of points of interest, meteorological observations concerning snow and avalanches, etc.). The data will be automatically processed and checked before being introduced into the PARAMOUNT database.

Communication between the servers that will provide the aforementioned information and the mobile devices - comprising a Pocket PC with GPS, electronic compass and mobile telephone - will be achieved by means of GPRS technology. The data will be transferred via HTTP protocol using XML.

The ICC will develop a new method for automatic cartographic representation of the Avalanche risk bulletin by means of raster modeling within the framework of a GIS. In this way it is aimed to improve the spatial interpretation of the current bulletin (in text format), and to systematize and store the bulletins in a database.

Furthermore, the ICC will implement this cartography and the remaining functions developed by the test area in the Pyrenees, established in the area of Núria-Ulldeter. This will involve the generation and extension of a database with tourist information and mountain cartography (DTM, network of footpaths, etc.).

DISCOVER CATALON REGIONAL MAP 1:10

In December 2001, in collaboration with the Associació Conèixer Catalunya (Discover Catalonia Association, ACCAT), the ICC began a new series of topographic and tourism-oriented cartography of the *comarques* (administrative divisions) of Catalonia at 1:100 000 scale, under the name of *Conèixer Catalunya* (Discover Catalonia).

"FOR THE FIRST TIME IN CATALONIA A SCALE OF 1:100 000 HAS BEEN EMPLOYED FOR A CARTOGRAPHIC SERIES ORIENTED TOWARDS TOURISM"

The series comprises 41 sheets (1 for each *comarca*), which provide complete, updated information on the most relevant items of tourist and cultural interest in the *comarca*. This information has been provided by the ACCAT and monitored by the Departament d'Indústria, Comerç i Turisme (Industry, Trade and Tourism) of the Generalitat de Catalunya.

The information is shown in detail with the help of pictograms and panels to high-

RESEAR

GEOVAN

Mobile Mapping is the technique for compiling cartographic information from a mobile vehicle. Through the GeoVan project the ICC is developing its own Mobile Mapping system.

"GEOVAN INCORPORATES, INSIDE A VAN, ALL THE SENSORS REQUIRED FOR THE CAPTURE OF STEREOPAIRS OF DIGITAL IMAGES AND THEIR SUBSEQUENT GEOREFERENCING FOR THE EXTRACTION OF INFORMATION"

The GeoVan includes an image capture subsystem based on a pair of digital cameras of 1,024 x 1,024 pixels, a direct image orientation subsystem based on GPS/INS, a synchronization subsystem, a subsystem for acquisition and control of the operation of all the equipment, a storage subsystem based on extractable and interchangeable disks, and finally, a supply subsystem which distributes the electricity from a generator to all these subsystems.

With respect to data capture, the necessary software has been developed to capture the information contained on the images.

The camera calibration procedures have also been defined, in order to be able to

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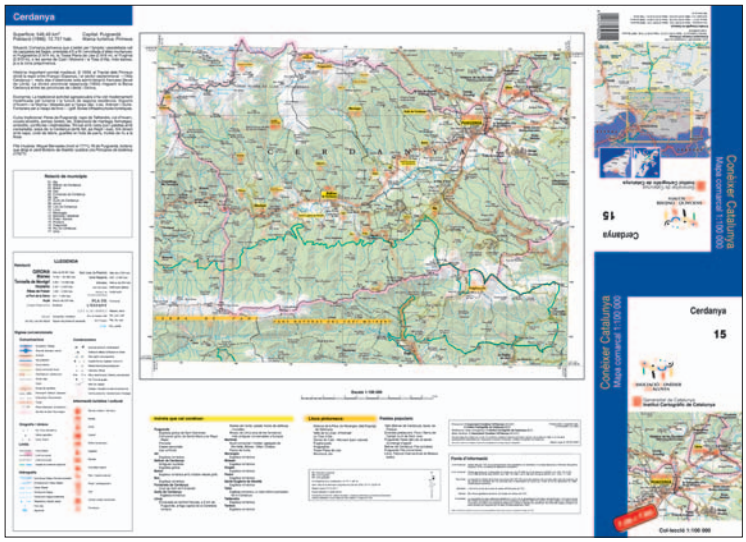


light the places that are worth visiting and picturesque places.

As complementary information, the sheets contain carefully selected tourist and cultural information to help the user to identify the most relevant aspects of the *comarca* by means of the following sections: places worth visiting, picturesque places and traditional festivities. There is also a brief description of the *comarca*, with information about its situation, history, economy, traditional cuisine and the famous people who were born there.

"TO DATE 8 SHEETS HAVE BEEN PUBLISHED: ALT EMPORDÀ, BAIX EMPORDÀ, CERDANYA, GARROTXA, GIRONÈS, PLA DE L'ESTANY, RIPOLLÈS AND SELVA"

CH AND DEVELOPMENT

determine the GPS/INS orientation misalignment and to correct the errors due to the distortion of the optics of the digital cameras used.

The GeoVan system is highly modular; it is relatively simple to increase the number of digital cameras installed, since they would share the orientation, synchronization and supply subsystems that already exist.

"THE INTEGRATION OF THE FIRST PROTOTYPE HAS BEEN COMPLETED DURING THE FOURTH QUARTER OF 2002 AND FIELD TESTS HAVE BEEN COMMENCED"

NEW

ROAD MAP OF CATALONIA 1:250 000

In July 2002, the ICC published the third edition of the *Mapa de carreteres de Catalunya 1:250 000* (Road map of Catalonia). As in the case of previous editions, the thematic information has been provided by the Direcció General de Carreteres (Road Office). The new feature of this latest edition is the inclusion of tourist information drawn from the thematic databases of the ICC.

This edition, which has updated the roads in Catalonia and their names, is published in 6 languages (Catalan, Spanish, English, French, German and Italian).

The towns and villages, hydrographic network, basic toponymy and the current road network, classified according to their various categories, are drawn over a shaded background representing mountainous areas and vegetation cover. Furthermore, the map shows the points where each road starts and ends, and the distance in kilometers between junctions, both for short sections and long distances. A guide map shows the principal distances by road when routes using main roads are taken.

"THE NEW FEATURE OF THE LATEST EDITION IS THE INCLUSION OF THEMATIC TOURIST INFORMATION"

In order to offer the user an additional service, the complementary tourist information employs pictograms to highlight the position of aerodromes and airports, spas, theme parks, skiing areas, golf courses, marinas, nature reserves, historical monuments, etc. The places of tourist interest are labeled and highlighted through the use of color, according to whether they are towns and villages, buildings of note, important orographic or hydrographic features, or other elements of interest. With the help of these distinctive features, this type of information is made available to a wider public.

In addition to the cartographic section itself, the map has four windows showing the areas of Barcelona, Girona, Lleida and Tarragona in greater detail at 1:25 000 scale.

BRIEF NOTES

EVENT TO COMMEMORATE THE TWENTIETH ANNIVERSARY OF THE CREATION OF THE ICC

The Hon. Mr. Felip Puig, Minister of Regional Planning and Public Works of the Generalitat de Catalunya and President of the ICC, welcomed participants to the event held on 9 October 2002 at the headquarters of the ICC to commemorate the twentieth anniversary of the creation of the Institute. The Hon. Mr. Artur Mas, Chief Councilor of the Generalitat de Catalunya, presided over the occasion.

The event was opened by the Hon. Mr. Felip Puig and the Director of the ICC, Mr. Jaume Miranda, who spoke on the subject of "A panoramic look at the cartography of the Catalan nation". Following this, Mr. Rafael Lucas, Head of Systems Engineering for the Galileo Project of the European Space Agency (ESA), presented "The Galileo project: its present and future position". Finally, the Hon. Mr. Artur Mas said a few words to bring the occasion to a close.

HISTORICAL IMAGES AND ORTHOIMAGES IN VINÇON

The ICC has established an agreement with Hewlett Packard for the distribution in Vinçon (Passeig de Gràcia 96, Barcelona) of 6 historical images from the collection of the Catalonia Map Library (1 of Europe, 1 of Spain, 1 of the Mediterranean, 1 of Catalonia and 2 of Barcelona), in addition to 123 orthoimages in color 1:5 000 of the city of Barcelona and its environs, all of which may be acquired in two different sizes.

These images, which are available at Vinçon's Printing kiosk, can be selected from a terminal, whereupon the images requested are plotted on an ink-jet plotter on photographic quality paper.

The ICC has made a commitment to this innovative system as a new way to distribute its printed cartographic products.

IV EUROPEAN CONGRESS ON REGIONAL GEOSCIENTIFIC CARTOGRAPHY AND INFORMATION SYSTEMS

On 17-20 June 2003 the fourth in a series of congresses organized by the geological services of Emilia-Romagna, Catalonia and Bavaria will be held in Bologna (Italy). This congress will focus on "Geoscientific information for territorial planning".

The ICC forms part of the Scientific Committee and will present 8 papers. For further information, please consult the ICC web site.

DIGSA CONGRATULATES THE ICC

From 30 September to 4 October the XIX meeting of directors of geographic institutes in South America, Spain and Portugal (DIGSA) was held in Quito (Ecuador).

At this meeting the members of DIGSA congratulated the ICC on the quality of the organization, training and program of the I Theoretical and practical training course on digital photogrammetry, which was held in Barcelona on 3-14 June 2002 (see ICC Newsletter No. 15).

APPLIED GEOLOGY AND GEOTECHNICS

The work undertaken by the ICC in the field of applied geology and geotechnics includes the complete range of tasks related with construction, town planning, public works and geological risks, and these may involve geology, geotechnics, surface and subterranean hydrology, hydraulics or soil engineering.

Much of this work is commissioned by the Departament de Política Territorial i Obres Públiques (Regional Planning and Public Works) and also by other departments of the Generalitat de Catalunya, public administration and the private sector.

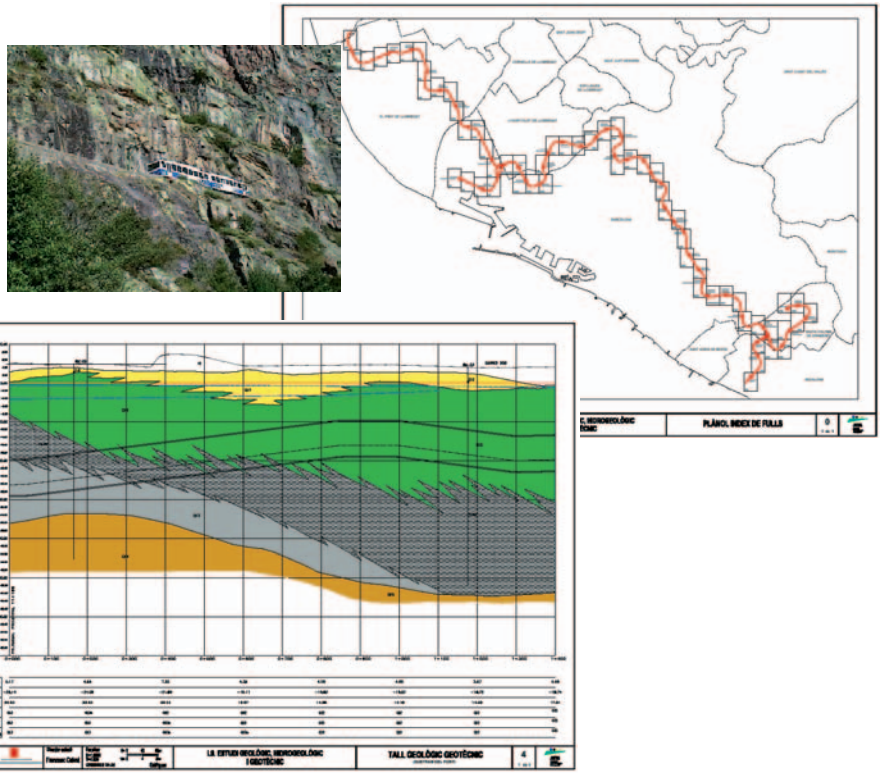
"AMONG THE APPLIED GEOLOGY AND GEOTECHNICS TASKS UNDERTAKEN, THE NEW LINE 9 FOR THE UNDERGROUND AND THE RACK RAILWAYS OF NÚRIA AND MONTSERRAT ARE WORTHY OF SPECIAL MENTION"

Thus the geological, geotechnical and hydrogeological work involved in the construction of the new line 9 for the underground network has been commissioned by the Autoritat del Transport Metropolità (Metropolitan Transport Authority) and Gestió d'Infraestructures, SA (GISA) (2000-2002).

In outline, with respect to the geological studies completed for this project, a description has been made of the materials and the structure; hydrogeological studies have also been completed: tests, hydrogeological evaluation of formations, hydrochemical operating conditions and presence of phreatic water; and geotechnical tasks have been performed: boring, tests *in situ*, definition of lithotypes and geotechnical evaluation of materials.

Besides the specific objective of providing support for the project, the more than 150 bores completed (8,000 m drilled) and all the geological, hydrogeological and geotechnical studies made with reference to the course of this line have greatly improved knowledge of many aspects of the geology of the substratum of the city of Barcelona and the surrounding area.

With respect to hazards, and particularly the fall of blocks, through observation, analysis and modeling, and with the help of digital terrain models, the trajectories, speed, energy and rebound heights of the blocks can be determined. Based on this, risk cartography can be produced, which makes it possible to prioritize the corrective measures and risk reduction initiatives that need to be taken. In particular, the ICC is commissioned by Ferrocarrils de la Generalitat de Catalunya (Catalan Railways, FGC) to periodically monitor the slopes of the rack railways of Núria and Montserrat: thus it carries out the stabilization study and project, which includes both active safety measures (anchorage, bolting, gunned concrete, etc.) and passive safety measures (netting, cables, screens and static and dynamic barriers, etc.).



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