NEWSLETTER

INSTITUT CARTOGRÀFIC DE CATALUNYA

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WORLD ATLAS

Atles Universal
Institut Cartogràfic de Catalunya and Enciclopèdia Catalana, SA
1st edition: Barcelona, April 1999
40,5 x 29 cm. 552 pages. 24 900 PTA incl. IVA (149.65 euros)

The Institut Cartogràfic de Catalunya (ICC) and Enciclopèdia Catalana, SA (ECSA) have published the *Atles Universal*. This atlas of the world seen from Catalonia is an innovative project, which has brought together by leading Catalan specialists in various fields of cartographic and geographic sciences.

"PHYSICAL AND THEMATIC ATLAS CONTAINING UPDATED INFORMATION ABOUT THE EARTH"

This atlas has been produced in response to demands for a cartographic publication that has not been available to date: one that provides homogenous, but at the same time detailed information about the continents (at 1:1 000 000 and 1:4 000 000 scales). Thus the countries may be subjected to comparative analysis, since all the geographic areas are presented and interpreted in the same way. Rigorous attention has been paid to the use of cartographic projections, according to the situation of the area to be represented, in order that a relatively undistorted view of the geographic reality observed may be provided.

Within this atlas, it is the maps of the world that provide more detailed information about the continents; the special area maps focus more closely on the geographic area nearest to Catalonia, and the general maps present large geographic units.

The thematic maps show the physical, economic and social variables of the territory represented, both at a global level (at 1:75 000 000 scale) and also with reference to the Catalan Regions (1:2 000 000).

"374 PAGES OF CARTOGRAPHY"

Among the resources of the ICC's Map Library of Catalonia, there are a considerable number of maps, more than 200 000, and a great variety of contemporary cartographic documents produced by cartographic organizations from all over the world. This has made it possible to directly consult official sources concerning both cartography and toponyms.

The cartographic databases of physical and thematic maps have been generated and developed by the ICC, while the thematic information and toponyms have been compiled by ECSA through the Department of Human Geography of the University of Barcelona.

On the physical maps, the relief is shown by shading the mountains, with or without hypsometry, depending on the scale. Using conventional symbols, the planimetry shows the main features of the landscape: communications, hydrography, population nuclei, etc.

With respect to the toponymy, the official toponyms or the toponyms in the particular

PHYSICAL MAPS

Maps of the world

European Union	1:1 000 000
Eastern Europe	1:4 000 000
Africa	1:4 000 000
North America	1:4 000 000
Central America	1:4 000 000
South America	1:4 000 000
West Asia	1:4 000 000
Central Asia	1:4 000 000
East Asia	1:4 000 000
Australia-New Zealand	1:4 000 000
Indonesia-Oceania	1:4 000 000
Greenland	1:6 000 000

Special area maps

Catalan Regions	1:250 000
Catalan Regions	1:1 500 000
Iberian Peninsula	1:3 000 000
Mediterranean countries	1:10 000 000

General maps

Europe	1:12 000 000
Remaining continents	1:25 000 000
The Poles	1:25 000 000
Oceans	1:50 000 000
The World	1:75 000 000

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SUMMARY

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

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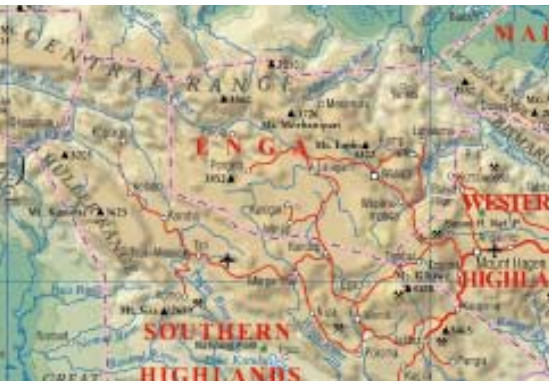
Generalitat de Catalunya
Institut Cartogràfic de Catalunya

North of British Islands, 1:1 000 000

(continued from the previous page)

language have been respected, and the Catalan version of the names has been transcribed where it exists; in the case of languages wiht non-Latin alphabets, the international transliteration system accepted by each language has been employed.

"More than 268 000 toponyms have been compiled"

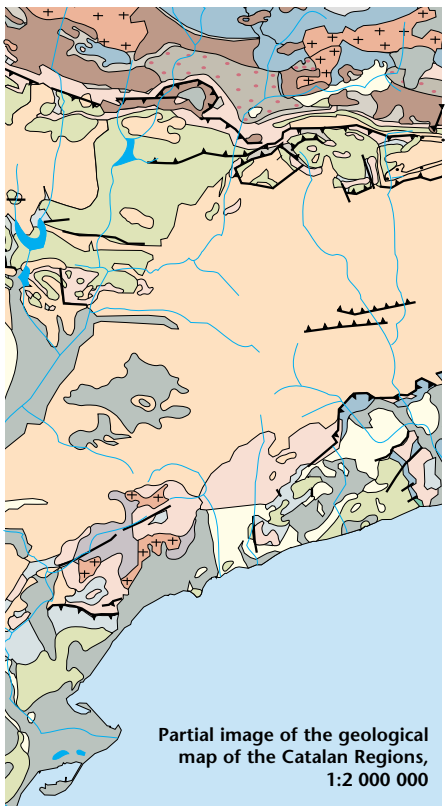


Eastern Indonesia, 1:4 000 000

Thanks to the striking graphic depiction of the main features of the landscape and the careful use of symbols and colour, there is an immediate association with the actual territorial elements represented. Further support is provided by the toponymy, which is clearly legible.

The atlas may either be consulted using the page layout guide maps, which ensure the quick general siting of a place, or with the help of the index of toponyms, which enables a specific place to be located.

In summary, this cartographic document offers users everything that they may wish to look for: updated world cartography, homogenous scales of representation and the principal thematic characteristics relating to the entire globe. Nor should it be forgotten that this is a user-friendly publication in a manageable format.



Partial image of the geological map of the Catalan Regions, 1:2 000 000

TOPOGRAPHIC DATABASE OF CATALONIA

After the first version of the *Mapa topogràfic de Catalunya 1:5 000* (topographic map - MTC 5M) was completed in 1995, updating tasks were started to obtain the second version of the Topographic database of Catalonia 1:5 000.

From the database, the MTC 5M is the printed map generated applying automatic symbolization during the plotting process.

Besides updating the existing data, the new version of the database offers a new data structure, hydrographic and road networks, polygons of some areas, the incorporation of new concepts and a more detailed classification of elements.

"Version 2.0 of the database is totally 3D"

The database is updated with information compiled by photogrammetric data capture and, in some areas, using recent cartography at larger scales. The database does not include information to be added at a later stage following desk and field work.

Photogrammetric stereoplotting is carried out using aerial photography at variable flight scales: in some urban areas the scale is 1:15 000, while for areas that are not very complex it is 1:32 000. This process uses digital photogrammetric stations, which permits superimposition of vector data on stereo raster images.

Automatic and interactive processes are employed to create polygons, to recode the connection sections of the hydrographic and road networks, and to generate contour lines from the digital terrain model captured during stereoplotting.

Partial image of the Sabadell sheet

Together with the data, the database provides reference and positional elements, such as geodetic vertices and toponymy.

The database is documented by a dictionary that gives information about the objects used to represent the topographic elements of the land surface. For each element, the geometric

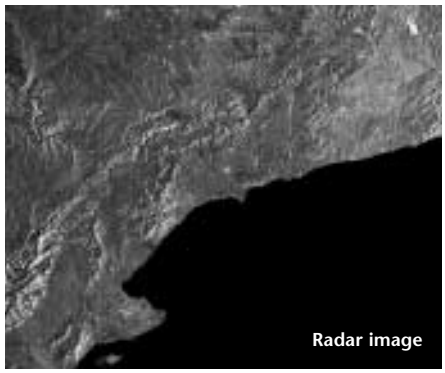
RESEARCH AND

RADARGRAMMETRY

SAR sensors use their own source of light to illuminate the terrain. Since they are active sensors, it is immaterial whether it is day or night, and because they can pass through clouds without any difficulty, they are not affected by nebulosity. These characteristics make them very suitable for use in cartographic applications in areas where the light is poor (as in the case of high latitudes in winter), or where there is considerable cloud cover.

To take advantage of these characteristics, the ICC has developed tools to exploit the stereoscopy of the SAR on board the Canadian satellite Radarsat, which is achieved by varying the angle of inclination of the antenna. This sensor has obtained pairs of images of Catalonia (100 km x 100 km), captured with both ascending and descending orbits, with a difference in angle of some 20° for each pair. The processing of these images involves the following:

– Geometric modelization of the sensor. A model has been established that defines the geometry of the imaging process. This model has some free parameters that have to be adjusted by means of a set of control points of a position known to Earth and pairs of homologous points between images. In this case, the doubts are basically associated with the orbit of the satellite.
– Incorporation of the model into the automatic image correlation program. The base program constructed to exploit the stereoscopic capacity of the SPOT satellites has been adapted to this geometry with excellent results.
– Use of the images in the environment of the digital photogrammetric stations. Tests have been conducted on the implementation of the Radarsat geometry at the photogrammetric station through the use of rational functions. This has made it possible to use the tools offered by the digital station, particularly stereoscopic visualization, manual stereoplotting and the correlation program for the automatic calculation of elevations.



Radar image

A 1:5 000 v. 2.0

representation defines the spatial component (point, line, polygon), and the conditions of connectivity and the priority define relations with other topographic elements. Information is also given relating to the definition of each element and its attributes, the classification criteria, how the information is collected and the selection criteria, how complex elements are composed, the possible combination of attributes, and the relationships established between elements.

Relief is represented by contour lines, spot heights at significant points and taluses. Contour lines show variations in altitude of 5 m, with master contour lines every 25 m. In extremely flat areas, the variations in altitude are 2.5 m.

Planimetric data include hydrography (making a distinction between the linear hydrographic network and water masses, and between natural and artificial waters), communication routes (motorways, surfaced and unsurfaced roads, paths, footpaths, railways and cable transport), population (buildings, sports fields, walls, urban elements, and hydrographic and communications infrastructure) and vegetation (woods, rocks, marshland, beaches, sandy ground, floodable watercourses, visible smallholdings and groups of trees).

At the quality control stages, the semantic and topological coherence of the elements is checked, and it is also verified that the data are complete.

As at June 1999, the database has 360 000 hectares that have been updated. The information is distributed into altimetric and planimetric layers, which can be acquired together or separately.

"THE DATABASE IS DISTRIBUTED IN DGN, ARC/INFO, DXF AND DWG FORMATS"

The database includes metadata, with information about the main characteristics of the base, the method of elaboration, technical data, contents, etc.

DEVELOPMENT

NEW ALTIMETRIC DATABASE

The ICC has a software package for the management of grid elevation databases, which is used to store, among others, the Digital Elevation Model (DEM) of Catalonia. The height information of this DEM comes from the first version of the *Mapa topogràfic de Catalunya 1:5 000* (topographic map). This software package was developed in 1987-88, and it has continuously been maintained and improved since then.

The regular network data model, which in our case models the terrain by means of a squared grid, is insufficient for certain applications. For this reason, we have analysed and designed an altimetric database with a more complex data model and it is now under development.

The new elevation database is supported by a triangular irregular network (TIN) and can therefore store geomorphologic information, such as characteristic points and break-lines. We plan to load the new database with all the altimetric information from the second version of the Topographic database of Catalonia 1:5 000, which constitutes a huge amount of data: approximately 300 million points. The basic elements to build the model are the triangle vertices and edges. The vertices carry the geometric information (coordinates of the measured points) and the edges provide the combinatorial information, that is to say, how the vertices join in edges and how the latter join with their neighbours to form the triangles.

Programming is done in C++ using the O2 database manager (object-oriented). The use of object-oriented technologies means that the model can easily be refined and gives the design great flexibility. Thus the initial polyhedral surface model can be improved at a later stage; for example, the surface may be made smoother introducing curved triangles. In order to improve the location time of the triangle that contains a point, the vertices are stored in a region quadtree. Furthermore, this enables the data within the database to be partially sorted and reduces the number of disk accesses.

The software is currently in the final stages of development and testing. It is planned to extend the TIN model in order to model multivalued surfaces, such as bridges or buildings, where it is necessary to have a topographic surface for the generation of contour lines and a visual surface on the top to perform image rectification, rendering, etc. It will also be possible to use the quadtree to store generalised models at different resolutions.

NEW

ANTOON VAN DEN WIJNGAERDE

The ICC, in conjunction with the Fundación Carlos de Amberes, has published the book by Montserrat Galera i Monegal, Head of the ICC's Map Library of Catalonia, entitled Antoon van den Wijngaerde, a painter of cities and feats of arms in 16th century Europe. The book appears in both Catalan and Spanish editions.

This publication contains a detailed map bibliography of drawings and engravings, and an essay that provides a documentary reconstruction of the works of Van den Wijngaerde, a Flemish painter and sketcher of the 16th century, who, through his art, has left us very valuable evidence of incidents that occurred during wars in the period of Carlos V and Felipe II, and in the field of topography, illustrations of cities of his period in England, the Netherlands, Italy and Spain.

The book presents the life and work of Van den Wijngaerde, including both his work that has been preserved –the drawings made on paper– and the pieces that have not survived –the paintings that decorated the royal palaces of El Alcázar and El Pardo, which were destroyed by fire–. For the first time, all the artist's work that has survived to the present day has been gathered together, including all the drawings preserved at the Austrian National Library, the Victoria & Albert Museum in London, the Sutherland collection at the Ashmolean Museum in Oxford, the Antwerp Municipal Museum of Engravings and the Albert I Royal Library in Brussels, as well as pieces from other collections in Germany, Belgium, the Netherlands, Sweden, France and the United States.

"THE BOOK SHOWS THE 242 DRAWINGS OF VAN DEN WIJNGAERDE THAT HAVE BEEN LOCATED AND CATALOGUED"

The ICC's interest in presenting the entire known work of one of the most prestigious artists of cities in the 16th century lies in the value that it places on cartographic knowledge from the past, in terms of both its intrinsic worth and its bearing on present and future cartography.

Antoon van den Wijngaerde, pintor de ciudades y de hechos de armas en la Europa del Quinientos. Cartobibliografía razonada de los dibujos y grabados, y ensayo de reconstrucción documental de la obra pictórica

Montserrat Galera i Monegal
Institut Cartogràfic de Catalunya and Fundación Carlos de Amberes
1st edition: Barcelona, December 1998
30 x 21 cm. 272 pages. 4 000 PTA incl. IVA (24.04 euros)

BRIEF NOTES

GIS FOR INDIA

The ICC is taking part in the project "Measuring, monitoring and managing sustainability: the coastal dimension", which is directed by Office XII of the European Commission within the framework of the latter's program of cooperation with third-world countries and international organizations. Besides the ICC, public organizations from Portugal, Italy and India are also taking part.

The project is to last four years and its objective is to complete a multidisciplinary study of sustainable development in a group of test areas on the west coast of India, taking account of hydrological, geological and biological considerations, as well as socio-economic and cultural aspects. The ICC will participate in the synthesis of the study model and in the construction of monitorization tools based on GIS technology.

AGROECOLOGICAL ZONING IN NAMIBIA

Agroecological zoning is a method that has been developed by the FAO with a view to looking for solutions to the problems of evaluation of natural resources as a basis for sustainable agriculture. This method seeks to define zones that have similar combinations of climate and soil characteristics, and to create groups of areas with similar biophysical potentialities and limitations with regard to the development of agricultural production.

The participation of the ICC in this cooperation project consists in producing the cartography of Namibia at 1:1 000 000 scale (615 000 km^2), the NE region of the country at 1:250 000 scale (190 000 km^2) and three areas of special interest at 1:100 000 scale (20 000 km^2), as well as introducing the data obtained into a GIS.

The cartography will be produced through the interpretation of Landsat-TM satellite images and aerial photographs. In order to locate control points for the adjustment of the image correction model, the ICC's Map Library has acquired the topographic cartography of the country at 1:50 000 scale.

MAP TUTOR

The International Institute for Aerospace Survey and Earth Sciences (ITC) in Holland has contracted the ICC to develop a CD-ROM designed to provide interactive tuition of the methodology and tools required for the production of image cartography based on satellite observation images. The recipients of this course will be the operators and users of the European Union Satellite Center.

The contribution of the ICC will include the images that illustrate the process and the methodological observations that guide the work flow.

MAP SERVER (http://www.icc.es/mapserver/)

Through the application of the most advanced technologies that are currently being incorporated into the field of cartography, users of the ICC's Website will be offered the opportunity to browse interactive map catalogues online.

In June 1999, it will be possible to consult the large-scale cartography catalogue and the flight catalogue.

The first catalogue contains the specific projects undertaken by the ICC at 1:500, 1:1 000, 1:2 000 and 1:5 000 scales. Each project is linked with a graphic index that shows the distribution of the sheets of the territory, a record in the alphanumeric database that contains the basic data relating to the project, and the stage of completion.

The second catalogue provides information about the flights undertaken by the ICC. It consists of a brief description of the resources and some examples of photograms with different dates, scales and emulsions, and it offers graphic display of the flights on a cartographic base and a graphic search option for aerial photographs. Further information will be added to the catalogue relating to the runs of each flight and the number of photograms per run.

Furthermore, through the Map Server, it is possible to interactively consult the ordnance-survey maps of the second version of the *Mapa topogràfic de Catalunya 1:5 000* and the *Ortofotomapa de Catalunya 1:5 000*. These ordnance-survey maps are updated on a weekly basis.

Both the catalogues and the ordnance-survey maps have a set of graphic layers distributed according to scales and types of cartography, which can be viewed in their totality or selected individually. They are also equipped with a set of tools that make it possible to view specific areas, identify geographic features and make alphanumeric searches on the ICC's cartographic base 1:50 000. In order that the inquiry should prove satisfactory, a detailed explanation of the information given, a description of the application and a further description of the layers of information are all provided.

In the new future, new catalogues will be added to the Website and the existing ones will be extended, so that it will be possible to consult the ICC's cartographic information on the Internet.

CATALONIA 1:250 000 ON CD-ROM

The ICC now offers a new way to learn more about the cartography of Catalonia. This innovative application, which runs under Microsoft Windows, provides a digital display of the *Mapa topogràfic de Catalunya 1:250 000* (MTC 250M) and supports different levels of inquiries.

The CD-ROM shows the vegetation cover, bathymetry, orography and vertices, hydrography, toponymy and communications of Catalonia. Furthermore, this product offers a number of interesting options, including activation and deactivation of administrative boundaries, enlargement of a particular area, changes of colour, searches by toponym (there are more than 3 000), personalization of areas of interest and printing or copying these onto other applications.

The MTC 250M CD-ROM is the first product of its kind to be distributed with the special viewing application developed by the ICC, and it is planned to make the majority of the cartographic products developed by the Institute available to the public in this same format.

"AVAILABLE AT THE ICC DISTRIBUTION AND SALES CENTERS"

Mapa topogràfic de Catalunya 1:250 000 v. 2.0
ICC. 1 665 PTA incl. IVA (10 euros)

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