

NATIONAL REPORT

SPAIN

2007-2009

XXIV International Cartographic Conference
International Cartographic Association. ICA

15-21 November 2009
Santiago de Chile, Chile

Spanish Society of Cartography,
Photogrammetry and Remote Sensing
(SECFYT)

A stylized, light blue illustration on a dark blue background. It features a large circle containing a horizontal structure resembling a bridge or a surveying instrument. Below this, a globe is depicted with a grid of lines. To the right, a surveying instrument on a tripod is visible. The overall theme is cartography and geomatics.

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NATIONAL REPORT SPAIN 2007–2009

National Report Submitted to the XXIV International Cartographic Conference
International Cartographic Association. ICA

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1. General

Cartographic activities in Spain between 2007 and 2009 have been characterized by the increased production of large-scale maps, topographical and thematic maps, and orthoimages at different scales. The National Geographic Institute (IGN) has achieved one main goal in coordination of Spanish cartographical activities through the new administrative regulation. A positive example of that is the National Plan for Aerial Orthophotography (PNOA), continuous coverage of Spain with 50 cm or 25 cm resolution colour orthophotography, made jointly in a cooperative way by National and Regional governments under IGN coordination, also it deserves mention Land Cover & Land Use Information System (SIOSE) and the GIS for Land Cover & Land Use in Spain.

Within the field that concern the IGN we would like to highlight the National Topographic Database 1:25,000 (BTN25). Database from digital photogrammetrical stereoplotting, 3 m accuracy, homogeneous and continuous in the national territory and the Digital Terrain Model of 5 x 5 m grid, 2 m accuracy, with national coverage. It is fully completed and continuously updated.

The Spanish Spatial Data Infrastructure (*Infraestructura de Datos Espaciales de España, IDEE*), opened in Internet (www.idee.es), is an example of a collective project based on the cooperation of a large number of actors in Spain: governmental bodies at national, regional and local levels, private companies, universities, citizens,...designed to freely offer a wide range of geographic resources on the Net. Its spirit is based on cooperation and openness through their consensus and experiences according to INSPIRE guidelines, Open Geospatial Consortium (OGC) interoperability specifications and ISO 19100 standards.

The National Atlas of Spain is produced now in two versions, in CD-ROM/DVD (47) and in paper books (6 volumes) and has more than 3.000 pages with more than 5.000 maps.

The National Atlas of Spain is devised as a publication in continuous evolution, its aim is to contribute to understand the changing and complex reality that the Atlas intend to represent, working on the major advances in information technology, an automated system has been designed that makes its production easier and quicker, so that the information is more up-to-date.

According to new information technologies the production of the Atlas has changed its range of products:

- Atlas published in paper, in big formats as well as in reduced formats.
- Atlas on digital format (CD-ROM and DVD)
- Atlas on Internet. Geographic Information System of National Atlas of Spain. SIANEweb.

The National Center for Geographic Information (CNIG) has the commitment of covering the demand of the cartography and geographic information of the Spanish society.

This includes the elaboration of derived and thematic products and international and national distribution, with special dedication to the creation of projects based on advanced technology, research and development programs and the lending of technical assistance in the fields of sciences and geographic techniques.

The Hidrographic Institute of the Marine is a Spanish Navy organization of public and international interest, tasked with the safety of navigation and the capture and dissemination of information on the sea and coast to further nautical sciences. One of its main missions is the production, publication and updating of nautical charts considered of interest for mariners, as well as military cartography. There is one production line in development for naval digital charts designated as Additional Military Layer (AML) for WECDIS workstations.

The Spanish Army Geographic Centre provides accurate geographic information to the national and international forces on the ground including the flow of maps making, presentation and distribution of this information. It is involved in the geographic policy of the NATO. It has produced ortophotomaps of humanitarian aid in different international areas.

The Geological and Mining Institute of Spain is a public research department which has the elaboration and maintaining of geological cartography in our country.

Nowadays, the Geological Institute tries to cope with the increasing demand of information about environment and the technological chances. The target is defining a methodology in order to elaborate an Integrated Geoscientific Cartography using the Continuous Geological Map (GEODE) of Spain as a basis. It is about delivering analytical map symbolized information, in other words, normalized Geoscientific Cartography related with systematic maps at many scales with application in Geological research, underground prospecting combined with geophysical data and test drillings, underground water and aquifer distribution and characteristics, mechanical behaviour of regional materials, origin, location and relationships between mineral resources, land planning, economic and social impact of natural disasters, erosion, desertification, environment and civil engineering.

In the field of regional cartography, we must point out the excellent achievements of the Catalanian Cartographic Institute of Catalonia (ICC), it ensures that high-quality cartography is available to offer planning and support to a wide range of territorial initiatives. The ICC has really sought to position cartographic studies and production at levels of innovation and modernity in keeping with the goals of efficiency and quality that an advanced society needs to approach a range of subjects linked to territorial policies and activities.

The four principal areas of operation of the ICC are: cartographic production, technological support and research, infrastructure, and training and research.

In Topographic cartography it should be mentioned the continuous production of the second version (3rd and later editions) of the *Base topogràfica de Catalunya 1:5,000 (BT-5M)* – topographic map – (4.274 sheets).

The main goals in the field of information systems are: Completion of development for the Internet-based raster image server viewer (VISSIR-v2). The entry into service of the geocoder v.2. This is a web-based service

that facilitates real-time geographic localization of a site and the publication of cartography through the Google Earth Enterprise product.

The Cartographic Institute of Andalusia, also with excellent achievements, facilitates support to the Autonomous Administration in land planning, the city-planning policy, infrastructures, planning, agriculture, environment, culture, emergencies.

One of the main achievements in cartography is Topographic Map of Andalusia at scale 1:10,000 (MTA 10). Culminating the process of vectorization of the MTA10 makes possible that we pruned to have a complete and continuous cartography of the Andalusian territory in diverse formats (shp, dxf, etc). We have turned it into one geodatabase and we are updating it with the 2007 orthophoto. This process will be ended this same year 2009.

In the field of thematic cartography, we must mention the work carried out by the Spanish Institute of the Oceanography, the National Meteorological Institute, and the Ministry of Enviroment on the different aspects of activity.

The Spanish Cadastre is an administrative registry of universal and exhaustive nature. At present, about 74 million real estates are registered. The cadastre has physical, legal and economic data of each of them, like the surface, use, owner or value, as well as those data necessary for the unequivocal identification of the cadastral parcel, the unique alphanumeric code that is assigned to each of them, as well as its obligatory cartographic representation.

Cartography, Geodesy, Photogrammetry and Remote Sensing are taught at most Spanish universities. The largest number of specialist are educated at the Superior Technical Schools for Engineering in Topographic, Geodesy and Cartography —there are 6 centers in Spain (Alcalá de Henares, Extremadura, Jaén, Madrid, Valencia y Salamanca)— and of Topographic Technical Engineering —currently, there are 9 centers in Spain— (Extremadura, Jaén, Las Palmas de Gran Canaria, Oviedo, Salamanca, País Vasco, Cataluña, Madrid y Valencia).

It is very pleasing to remain that the Spanish cartography has been rewarded with several awards in the last International Map Exhibition:

ICC DURBAN 2003 INTERNATIONAL MAP EXHIBITION XXI INTERNATIONAL CARTOGRAPHIC CONFERENCE

- Award for excellent in cartography, selected by Official Jury in the category "Topographic Map".
 - Map of Autonomous Comunicad Valenciana.
 - 1: 300,000, National Geographic Institute of Spain.
 - Guide Map of Sierra Nevada- Las Alpujarras.
 - 1:100,000, National Geographic Institute of Spain.
- Award for excellent in cartography, selected by Official Jury in the category "Relief Map".
 - Relief Map of Península Ibérica, Baleares y Canarias.
 - 1:1,250,000, National Geographic Institute of Spain.

- Award for excellent in cartography, selected by Official Jury in the category "Urban Map".
 - Urban Map of Pamplona.
 - 1: 500, Government of Navarra.
- Award for excellent in cartography, selected by the Delegates in the category "Topographic Map".
 - Guide Map of Sierra Nevada-Las Alpujarras.
 - 1:100,000, National Geographic Institute of Spain.
- Award for excellent in cartography, selected by the Delegates in the category "Relief Map".
 - Relief Map of Península Ibérica, Baleares y Canarias.
 - 1:1,250,000, National Geographic Institute of Spain.
- Award for excellent in cartography, selected by the Delegates in the category "Other".
 - Sísmic Hazard Europa-Mediterráneo.
 - 1:5,000,000, National Geographic Institute of Spain.

ICC A CORUÑA 2005

INTERNATIONAL MAP EXHIBITION

XXII INTERNATIONAL CARTOGRAPHIC CONFERENCE

- Award for excellent in cartography, selected by Official Jury in the category "Relief Map".
 - Relief Map of Sierra Nevada-Las Alpujarras 1:100,000 National Geographic Institute of Spain.
- Award for excellent in cartography, selected by the Delegates in the category "Relief Map".
 - Relief Map of Galicia 1:250,000 National Geographic Institute of Spain.
- Award for excellent in cartography, selected by the Delegates in the category "Other".
 - Submarine Relief Map of of Catalunya 1:250,000 Cartographic Institute of Catalonia.

ICC MOSCU 2007

INTERNATIONAL MAP EXHIBITION

XXIII INTERNATIONAL CARTOGRAPHIC CONFERENCE

- Award for excellent in cartography, selected by Official Jury in the category "Relief Map".
 - Mapa topogràfic de Catalunya 1:450 000, Cartographic Institute of Catalonia.
- Award for excellent in cartography, selected by Official Jury in the category "Topographic Map".
 - National Topographic Map of Campo de Cartagena 1:25,000, National Geographic Institute of Spain.
- Award for excellent in cartography, selected by Official Jury in the category "Recreation and orienteer-ing map".
 - Map and Guide of Garajonay National Park 1:25,000, National Center of Geographic Information.
- Award for excellent in cartography, selected by Official Jury in the category "Urban Map".
 - Urban Map of Pamplona 1:9,000, Council of Pamplona/Iruña.

Special mention to the drawing that obtained the award *Barbara Petchenik Children's World Map Competition*

In the category 9-12 years

Drawing "I Want an Equal World For All"

Samuel Zúñiga Vélez (9 years).

2. NATIONAL MAPPING ORGANIZATIONS

- 2.1. National Geographic Institute
 - 2.2. National Center of Geographic Information
 - 2.3. Publications Office. Ministry of Development
 - 2.4. Institute Hidrographic of Marine
 - 2.5. Spanish Army Geographic Center
 - 2.6. Spanish Institute of Oceanography
 - 2.7. Geological and Mining Institute of Spain
-

2.1. National Geographic Institute

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Since its foundation in 1870, the National Geographic Institute of Spain (IGN) has been engaged in scientific investigations and production activities in the field of mapping. IGN is also engaged in activities related to astronomy, geodesy, geophysics, photogrammetry, remote sensing, mapping, geographic information systems, spatial data infrastructures and administrative boundary lines.

SUMMARY OF IGN CARTOGRAPHIC PRODUCTS AND TOPOGRAPHIC AND CARTOGRAPHIC DATABASE:

National Mapping: National Topographic Map at 1:25,000 and 1:50,000 scales

- National Topographic Map at 1:25,000 scale (MTN25). New version in paper and digital format (vector and raster) in continuous updating.
- National Topographic Database 1:25,000 (BTN25). Database from digital photogrammetrical stereoplottling 3 m. accuracy as initial procedures to produce the national topographic map at 1:25,000, homogeneous and continuous in the national territory and with topological structure.
- Digital Terrain Model of 25 x 25 m grid , 4 m accuracy, with national coverage and fully finished.
- Digital Terrain Model of 10 x 10 m grid, 3 m accuracy, national coverage; it is fully finished and continuously updated.
- Digital Terrain Model of 5 x 5 m grid , 2 m accuracy, national coverage; it is fully finished and continuously updated.
- National Topographic Map at 1:50,000 (MTN50) produced by generalization of 1:25,000 scale.

National Geographical Information System

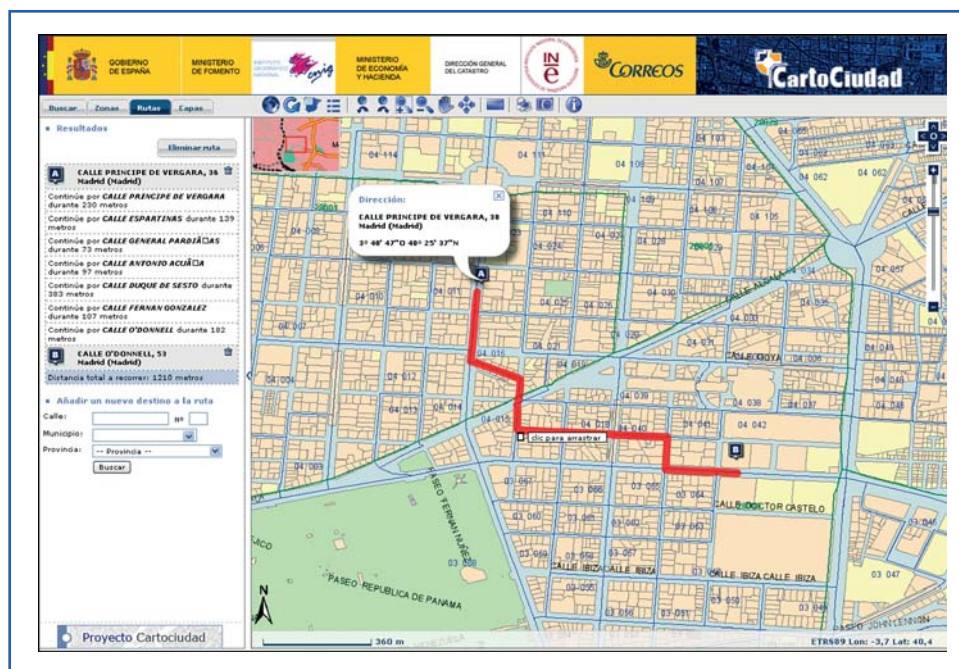
It includes homogeneous, topological structured and continuous topographic data in the national territory from BTN25 and BCN200 produced by IGN Spain.

Geographical Information System on Boundary Lines

It includes the Documentary Information System of Boundary Lines of Spain (SID-DAE).

CartoCiudad

The Spanish official cartographic Database done through data harmonization of national and regional cartographic databases, urban cadastral database, addresses database and post codes databases from national, regional and some local governments, to be used in location-based services, cartographical visualization of urban and non-urban zones with no gaps, spatial analysis and navigation on the Spanish road-street network. CartoCiudad database is managed by the CartoCiudad SDI geographical services (OGC web services).



www.cartociudad.es

Derived and Thematic Maps

- Provincial Maps at 1:200,000:
 - Series of Provincial Maps at 1:200,000 (MTN200). Since 1999 the serie is updated and digitalized from the Numeric Cartographic Database at 1:200,000 (BCN200).
 - Numeric Cartographic Database (BCN200). National coverage and yearly updated.
 - Digital Terrain Model (MDT200) of 200 x 200 m grid. National coverage continuously updated.
- Map of Spain at 1:500,000 scale in paper and digital format (vector and raster).
- Map of the Iberian Peninsula, Balears and Canary Islands at 1:1,000,000 scale in paper and digital format (vector and raster).
- Maps of the Spanish Autonomous Regions.
 - Production of a new version of the several 'multi-provincial' autonomous maps in digital and in a new style format.

Land Cover/Land Use Information System of Spain (SIOSE) and role of IGN as EIONET National Reference Centre in Land Cover and Spatial Analysis

The new Land Cover and Use Information System of Spain (SIOSE) is part of the National Land Monitoring Plan, with the objective of integrate different land cover and land use (LC/LU) data of regional and national administrations, according to the main INSPIRE principles and ISO TC/211 standards. The SIOSE is produced in decentralized and cooperative production model between Spanish administrations.

SIOSE is 1:25.000 cartographic reference scale, with different minimum mapping unit according to the cover observed in the territory (water bodies, forest and natural areas...) from 0.5 to 2 hectares.

The SIOSE harmonized Object Oriented Data Model (OODM) moves from previous hierarchical land cover databases towards a land cover feature data model, able to describe the different land cover classes in the territory, but also their environmental parameters. This OODM has been designed in collaboration with more than 25 institutions interested in LU/LC, organized in "Thematic Working Groups". This community of producers/users of LU/LC information is registered as a SDIC ("Spatial Data Interest Community") for INSPIRE initiative.

IGN collaborates in different European programs and organizes workshops (as INSPIRE-GMES workshop for Land Cover in June of 2009) and takes part in workgroups in order to show the advantages of the interoperability and standardization philosophy of SIOSE (Bottom-up approach) in different European and International Land programs and projects, such as GMES (Land Monitoring Services), INSPIRE (Data Specifications and Implementations rules of Annex I/II) and SEIS (Shared Environmental Information System).



Example of SIOSE data base on SPOT5 image of the city of Ceuta, Spain



Orthophotography of Toledo

IGN, in its role as Spanish National Reference Centre in Land Cover and Spatial Analysis of the EIONET network, also is in charge of producing the Corine Land Cover Database for Spain in its different editions (CLC 1990, Image & Corine Land Cover 2000, and now finishing the Corine Land Cover 2006 Database). Finally, it is necessary to mention also the role of IGN as the National Focal Point for the UNEP Mediterranean Action Plan INFORAC (Regional Activity Centre), and also the collaboration in defining Land Cover / Land Use data modelling standards in ISO TC211 committees.

Spanish National Remote Sensing Program (PNT)

IGN Spain is coordinating this Program, that aims at obtaining shared, systematic coverages of high, medium and low resolution satellite image coverages. These images are acquired with a multi-user license, valid for all Spanish Public Institutions, and processed in a centralised way. In this moment, PNT produces annual coverages with SPOT 5 P+XS images, and a systematic acquirement of every single Landsat 5 TM image over Spain. In the future, Spain will have its own 2.5 m optical satellite, Ingenio, and PNT is collaborating in the user requirements.

Iberpix (www.ign.es/iberpix/visoriberpix/visorign.html)

Iberpix is the Internet image server of IGN Spain. It serves through a friendly interface not only PNOA or- tophotos and satellite images, but also raster cartography, as for example rasterized 1:25.000 National Topographic Map.

National Program for Aerial Orthophotography (PNOA)

Systematic coverage of Spain each 2 years with 50 cm or 25cm resolution color digital orthophotography, and also with Digital Elevation Models, made jointly in cooperative organization by National and Regional governments under IGN coordination. In this moment, all these flights are made with digital cameras, and infrared orthos are also produced. Starting in 2009, a systematic national coverage each 4 years with 0.5 pulses/m² lidar capture is combined with photographic flights. Detailed technical specifications are developed and shared between all participants, through several working groups. Historical PNOA is a "sub-project" of PNOA, that aims at scanning all ancient photogrammetric flights over Spain, disseminating these images, and making orthophotos of the most important dates.

National Spatial Data Infrastructure (NSDI) of Spain (IDEE)

The Spanish Spatial Data Infrastructure (*Infraestructura de Datos Espaciales de España, IDEE*), opened in Internet (www.idee.es) on January 2004, is an example of a collective project based on the cooperation of a large number of actors in Spain: governmental bodies at national, regional and local levels, private companies, universities, citizens, ... designed to freely offer a wide range of geographic resources on the Net. It is spirit is based on cooperation and openness through their consensus and experiences according to INSPIRE guidelines, Open Geospatial Consortium (OGC) interoperability specifications and ISO 19100 standards.

This project run under coordination of the National Geographic High Council, a governmental body, whose Technical Secretariat is the National Geographic Institute.

The IDEE is a distributed, multilingual, internet accessible system in which existing SDIs in Spain cooperates synergically. It offers a wide range of



www.idee.es

services compliant OGC standards: Catalogue Service Web (CSW), Web Map Service (WMS), Gazetteer Service (Gaz), Web Feature Service (WFS), Web Coverage Service (WCS), Web Map Context (WMC), Web Processing Service (WPS), and Web Coordinates Transformation Service (WCTS).

CARTOGRAPHIC PRODUCTION PLAN

On cartographic production the activity of the National Geographic Institute has been focused on the development and modernization of the physical resources and geomatic tools which, as a mapping producer, is using these resources as tools to make numerous cartographic products in the era of geoinformation in which we are immersed. This lead to the development and innovation of the following techniques in the different production phases:

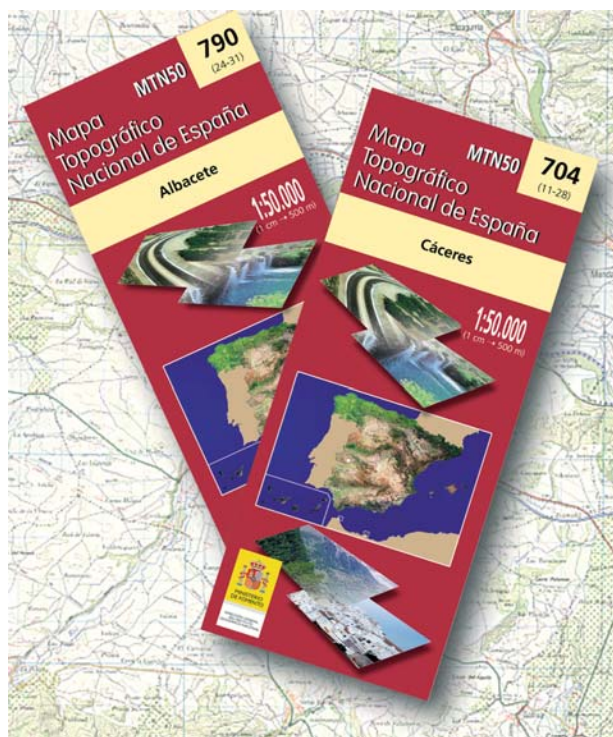
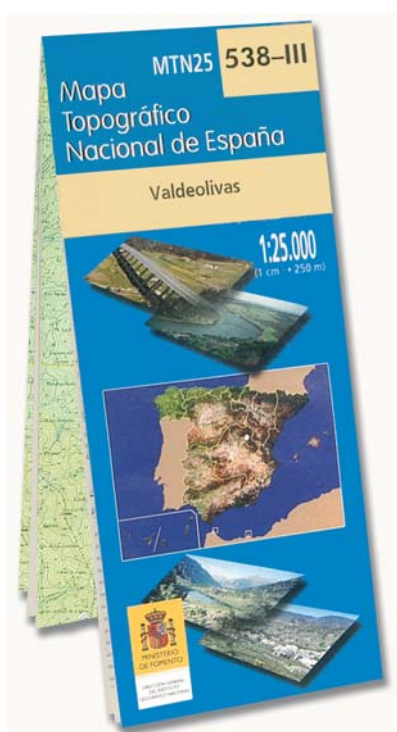
- Data capture techniques, with digital photogrammetry, being the most important as the head of them, together with fast and effective GPS- surveyings (by the displaying of artificial satellites) constitute the best Data Capture Techniques.
- Information processing techniques by means of graphic design and digital edition tools, in continuous evolution.
- Automated design and cartographic production techniques such as the design and digital texts and graphics imposition, the laser plotter offset printing, and folding and finishing process.
- Check of process an implementation of quality system in the different units and production phases that form part of the carrying out of cartographic projects, and in general of the geographic information projects.
- Generalized use of GIS tools and techniques.
- Use of SDI technologies.

On the other hand, the National Geographic Institute, with new and innovative products and the commitment of adapting the services to evolution of market demand, has given place to the incorporation of new lines of cartographic projects, for example multimedia products, 3D viewer or the called image cartography obtained from scenes taken by transported sensors on spacecraft or airborne.

NATIONAL MAPPING

Mapping at 1:25,000 scale (MTN25)

The national mapping serie of Spain covering the whole country in a homogeneous and continuous way is the MTN25 serie. The MTN25 production process began on 1972 and concluded on 2000. Nowadays MTN25 is in updating process, following the quinquennial plan based on photogrammetrical stereoplotting, orthophotogrammetry and some complementary surveying based on GPS techniques.



Cartography at 1:50,000 scale (MTN50)

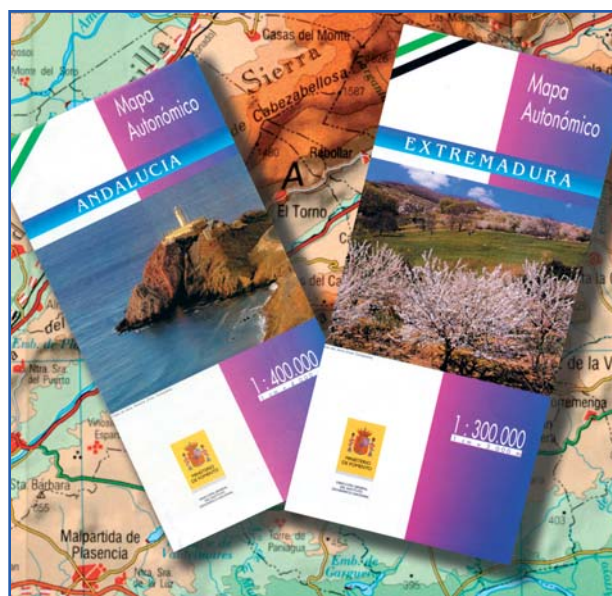
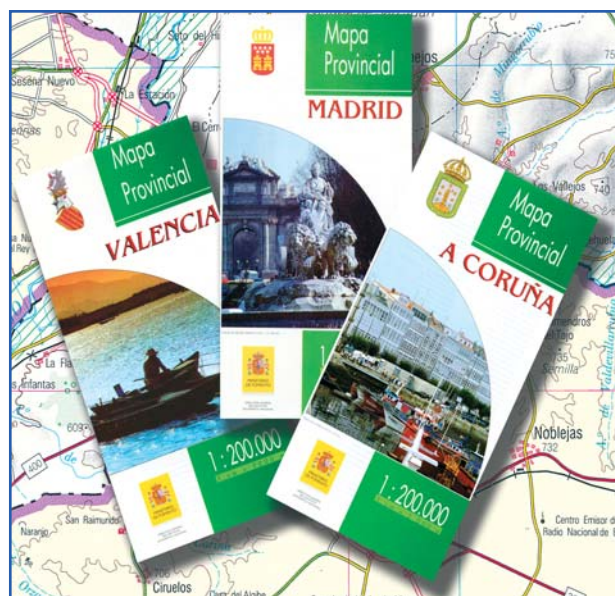
The first edition of the 1:50,000 National Topographical Map (MTN50) production process lasted from 1875 till 1968. But since the MTN25 production process was fully digital and this digital map was covering an important part of Spain, the MTN50 production process was change to be based on computer-aided cartographic generalization techniques from the MTN25. Today the national coverage of digital MTN50 generalized from the MTN25 is almost finished.

DERIVED AND THEMATIC MAPS

The National Geographic Institute produces and updates the following derived cartography based on edition processes or topographical generalization contained in existing basic cartography. Likewise, it produces thematic cartography, using as basic or derived cartography, developing some specific aspect of the geographic information of these, and incorporating specific additional information.

Map series of the Spanish Provinces at 1:200,000 scale

All the Spanish provinces are published (peninsula and islands), as well as the territories of Ceuta and Melilla, on 48 independent maps (the three Basque provinces are featured on one single map) and in spite of their different surface areas, follow fixed formats wich allow all them to have a folded size of 12,5 x 25 cm.



These map series are being updated. Today the production process is fully digital based on the data base BCN200.

Autonomous Map Series

A serie of map of the ten Multiprovincial Autonomous regions are being carried out (the seven once-provincial maps match the provincial serie at 1:200,000 scale. All of them, are made in digital format through provincial maps, changing their scales between 1:200,000 and 1:400,000 according to surface area of each autonomous region.

- Map of Spain at 1:500,000 scale, obtained through scanning and vectorization of positive of the sheets of Atlas. A new version of the Map of Spain at 1:500,000 scale in digital format has been finished.
- 1:1,000,000 data base obtained from BCN200 through generalization and updated from different sources; like the official road map and the nomenclador of National Institute of Statistics (INE).

Relief Maps

From Digital Terrain Model (MDT) and official mapping IGN produces some relief maps. As an example the Map of Iberian Peninsula, Balearics and Canary Islands is produced at 1:1,250,000 scale, has been awarded in the last International Maps Exhibitions.



Map of Iberian Peninsula, Balearics and Canary Islands, 1:1,250,000 (relief)

THE NATIONAL ATLAS OF SPAIN

The first edition of the National Atlas of Spain was finished in 1997. The National Atlas of Spain is produced in two versions, in CD-ROM/DVD (47) and in paper books (6 volumes) and has more than 3,000 pages with more than 5,000 maps.

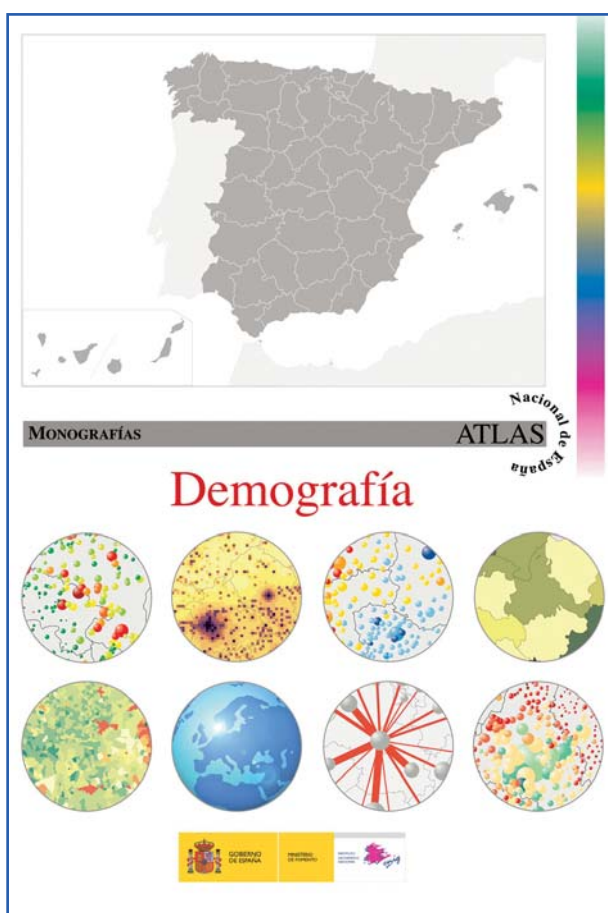
The National Atlas of Spain is devised as a publication in continuous evolution, its aim is to contribute to understand the changing and complex reality that the Atlas intend to represent, working on the major advances in information technology, an automated system has been designed that makes its production easier and quicker, so that the information is more up-to-date.

Among the products, it highlights the publication of several thematic groups such as electronic books (in PDF format, CD); Compendium series, which brings together some summary content of the National Atlas of Spain to meet the needs of a specific segment of users; and Monographs Series.

The National Geographic Institute is actively involved in training activities and dissemination of geographic culture. So in this line it has been designed, developed:

- And taught several editions of e-learning courses: Geography for ESO (secondary school) and Thematic Cartography.
- Two educational projects on the National Atlas of Spain website: "España a través de los mapas" (Spain in maps) made in collaboration with the Spanish Geographers Association (www.ign.es/espmap) and "La Población en España" (Population in Spain) made in collaboration with the University of Zaragoza (www.ign.es/pobesp/).
- Spanish National Atlas Information System (SIANE); an innovative and development project that concerns with a new definition, development and maintenance of National Atlas of Spain. Specific SIANE's applications are: an Excel macro for preparing data before entering the system (if needed), a Content Management System (CMS), a Map Editor and a Web application (*SIANEWEB*).
- The cartographic visualizer called 'Navegador Geográfico 2D/3D'. The visualizer shows, in an interactive manner, topographic and qualitative thematic mapping, digital terrain models, orto-photos and orto-images, and it also allows consulting the associated alphanumeric databases and multimedia resources. This application can access data sources provided by Geospatial Web services; either proprietary or standard services as it is necessary in the case of the SDIs, those that fulfil standard specifications of the Open Geospatial Consortium (OGC): Web Map Service (WMS), Web Coverage Service (WCS) and Web Feature Service (Spanish Spatial Data Infrastructure profile).

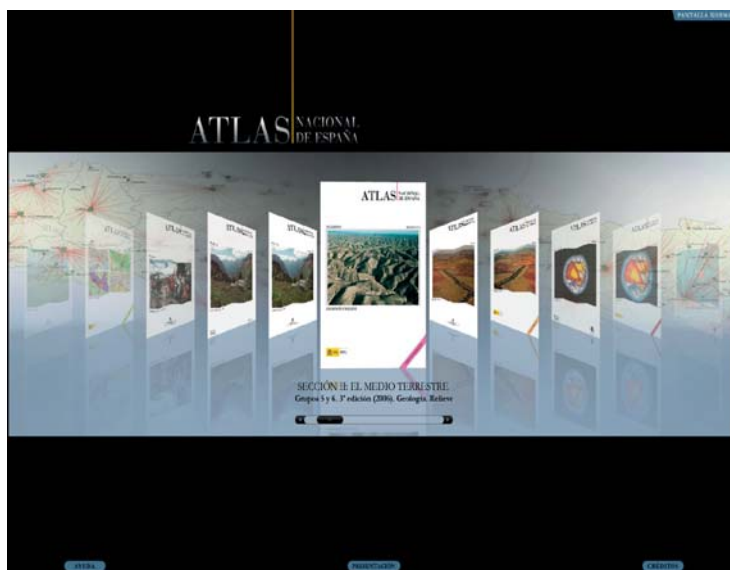
This means that new products and services derived from ANE contents play now an important role (web services for data queries and map creation, elearning courses, educational resources, etc), finding in Internet an important communication channel.



Monograph of Demography of National Atlas of Spain



*The National of Spain 1986–2008.
Facsimile digital edition*



Facsimile digital atlas. Dynamic index

Facsimile digital version

This digital facsimile publication allows the interactive visualization of the documental information of the thematic groups of the National Atlas of Spain included in booklets, published as a print or as a CD version (PDF), from 1986 when the project of the National Atlas began up to 2008.

It is available on DVD format and on the web (www.ign.es/ane/ane1986-2008/).

FORMATION AND TRAINING

In 2009, the National Geographic Institute has organized or sponsored a series of formative activities consistent in the following courses.

Presential courses:

- Introduction to Geographic Information Technologies. In collaboration with the Pan-American Institute of Geography and History (IPGH) in the centers of the Spanish International Cooperation Agency (AECID): Santa Cruz de la Sierra (Bolivia), Cartagena de Indias (Colombia), Antigua (Guatemala) and Montevideo (Uruguay). VIII Course of Digital Process of Satellite Image", in Santa Cruz de la Sierra (Bolivia).

- XII Course of Digital Cartography and Geographic Information Systems. La Antigua (Guatemala).
- Geographic Names (Applications about Toponymy). In collaboration with the IPGH and National Geographic High Council (CSG), in Madrid (Spain).
- Specialised Courses in collaboration with the Spanish International Cooperation Agency (AECID) and Polytechnic University of Madrid (Spain).
- Advanced Course on Navigation Positioning Systems.

On line courses:

- Spatial Data Infrastructure (two editions by year).
- Thematic Cartography (two editions by year).
- Geographic Information Systems.



INTERNATIONAL ACTIVITIES

The international activities of the IGN are planned and coordinated in accordance with a series of projects with different international organisations:

- Association GSDI (Global Spatial Data Infrastructure).
- International Cartographic Association ICA/ACI.
- EURADIN (EUROpean ADdress INFrastructure).
- INSPIRE (Infraestructure for Spatial Information in Europe)
- EuroGeoNames. (Geographical Names' Infrastructure for Europe).
- IPGH. Pan American Institute of Geography and History (IPGH).
- UGI. International Geographical Union.
- EuroSDR (European Spatial Data Research).
- EUROGEOGRAPHICS (Association of the European National Mapping Agencies).

AWARDS AND HONORARY MENTIONS

- The Official Committee of the International Cartography Association (ICA/ACI), in the course of the 23rd International Cartographic Conference held in Moscow (Russia) in August 2007, gave an award to the IGN for excellent in cartography, selected by Official Jury in the category "Topographic Map". National Topographic Map of Campo de Cartagena 1:25,000, National Geographic Institute of Spain.

2.2. National Center of Geographic Information

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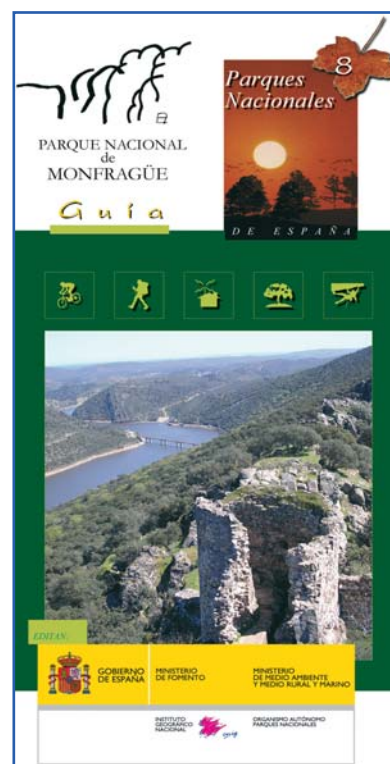
Fax: +34 91 5351713

The National Center of Geographic Information (CNIG), created by article 122 of Law 37/1988 of December 28, of General State Budgets for 1989, with the aim of producing, developing and distributing works and publications of geographic character requested by society. This includes the marketing of works by the General Management of the National Geographic Institute, the elaboration of derived and thematic products and international and national distribution, with special dedication to the creation of projects based on advanced technology, research and development programs and the lending of technical assistance in the fields of sciences and geographic techniques.

The National Center of Geographic Information has published the following between 1999-2009:

- "Mapa de carreteras CAMPSA de España y Portugal" (Road Map), 2000, 2001, 2002, y 2003.
- "Guía turística de carreteras de Castilla y León" (Road Map), 2003.
- Serie "Parques Nacionales" (National Parks Map & Guide):

- Timanfaya National Park Map & Guide. 2003. 1:25,000 scale. Spanish/English/ French/ German.
- Ordesa y Monte Perdido National Park Map & Guide. 2004. 1:25,000 scale. Spanish/French
- Caldera Taburiente National Park Map & Guide. 2004. 1:25,000 scale. Spanish/English/French/German.
- Garajonay National Park Map & Guide. 2004. 1:25,000 scale. Spanish/English/ French/ German.
- Teide National Park Map & Guide. 2004. 1:25,000 scale. Spanish/ English/ French/ German.
- Aigüestortes i Estany Sant Maurici National Park Map & Guide. 2006. 1:25,000 scale. Spanish.
- Picos de Europa National Park Map & Guide. 2006. 1:25,000 scale. Spanish.
- Monfragüe National Park Map & Guide. 2008. 1:25,000 scale. Spanish.
- Sierra Nevada National Park Map & Guide. 2009. 1:25,000 scale. Spanish.
- Doñana National Park Map & Guide. 2009. 1:25,000 scale. Spanish.



- Tablas de Daimiel National Park Map & Guide. 2009. 1:25,000 scale. Spanish.
 - Archipiélago de Cabrera National Park Map & Guide. 2009. 1:25,000 scale. Spanish.
- Satellite image Serie with shaded relief of the Autonomous Communities (Regions) (Published with Universidad Autónoma de Madrid):
- Asturias.
 - Madrid.
 - Cantabria.
 - La Rioja.
 - Navarra.
 - Murcia.
 - País Vasco.
 - Islas Baleares.



Awards and honorary mentions

- The Official Committee of the International Cartography Association (ICA/ACI), in the course of the 23rd International Cartographic Conference held in Moscou (Russian) in August 2007, gave an award to the CNIG for excellent in cartography, selected by Official Jury in the category "Recreation and orienteering map": Map and Guide of Garajonay National Park 1:25,000, National Center of Geographic Information.

2.3. Publications Office. Ministry of Development

Paseo de la Castellana, 67

28071 Madrid - Spain

Phone: +34 91 5978267

Fax: +34 91 5978470

The Official Road Map of Spain is published annually with updated data and distributed as printed map and interactive CD-ROM. More than 160,000 copies are sold every year.

A new project has been created for implementing the Official Road Map in the official web site of the Ministry of Development. The Web version has the added value features of the interactive version in CD-ROM, with route selection and interconnection with 19 databases as population, building works, tourist routes and natural geographic spaces.

It is based on Geomedia Profesional 6.0, Geomedia WebMap Profesional, Map Publisher and Geomedia Objects and supported by Microsoft. NET 2005.

At the very CD-ROM Official Road Map includes a manual online help in that the user will find detailed information on:

- View the map.
- Calculation of routes and tolls.
- Databases, searches and so on.
- Utilities (GPS navigator...).
- Print options.

It also includes automatic update via the network.

In this year the Official Road Map of Spain are celebrating his 50 anniversary 1959-2009.



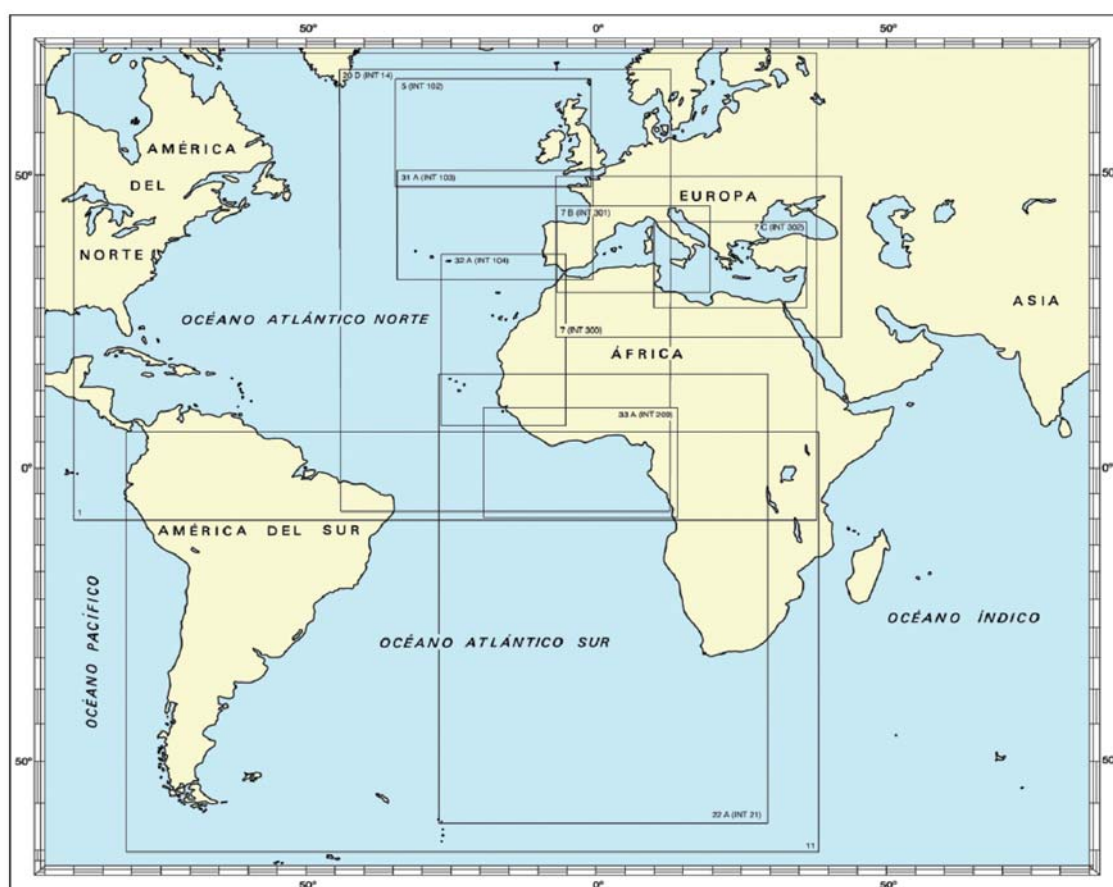
2.4. Hydrographic Institute of the Marine

Plaza San Severiano, 3

11007 Cádiz - Spain

Phone: +34 956 59 94 05

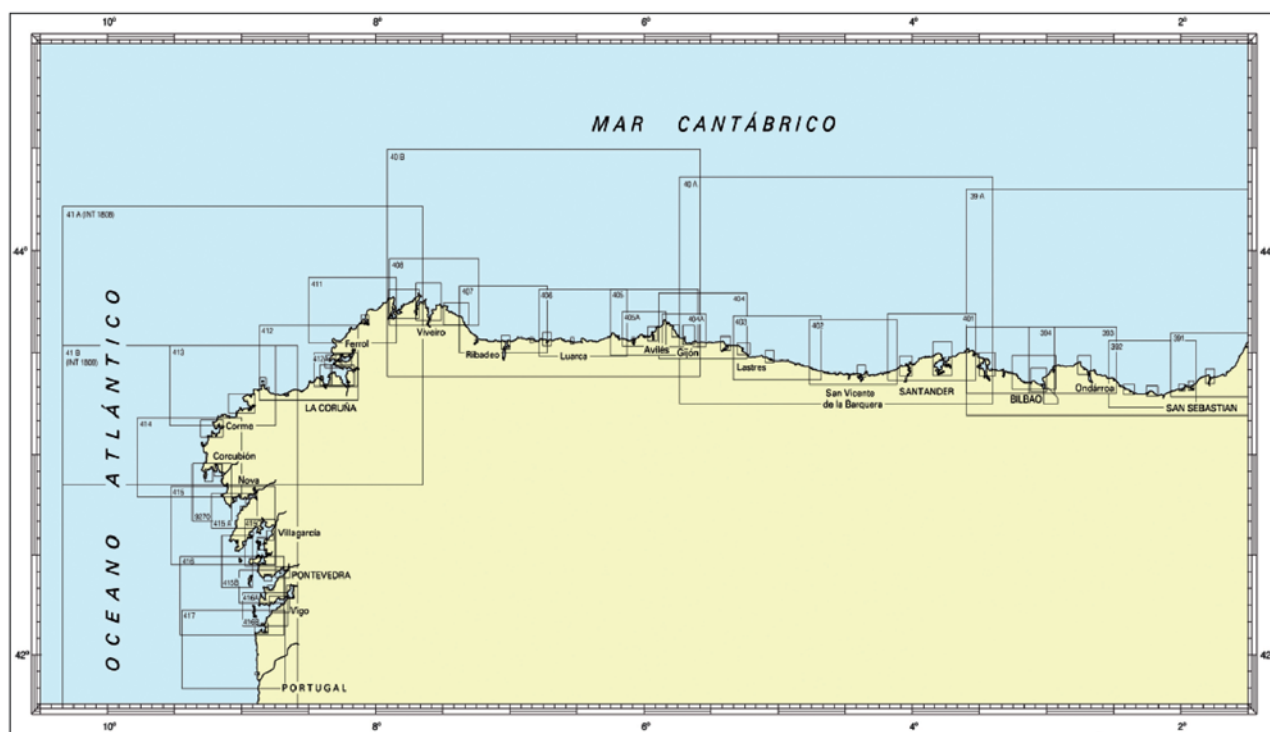
The Hydrographic Institute of the Marine is a Spanish Navy organization of public and international interest, tasked with the safety of navigation and the capture and dissemination of information on the sea and coast to further nautical sciences. One of its main missions is the production, publication and updating of nautical charts considered of interest for mariners, as well as military cartography. There is one production line in development for naval digital charts designated as Additional Military Layer (AML) for WECDIS workstations.



Furthermore, in response to requests for geographic information from areas unrelated to navigation and considering the concepts of Spatial Data Infrastructure, both at the national level and inside the IHO, requirements are being considered to satisfy this new demand.

During the last two years the production of New Charts and Editions on paper is considered as adequate, as the average age of published cartography is 8 years, which compares favourably with neighbouring Hydrographic Offices. The publication of new printings to complement them has been reduced in the recent past, as they have not been as necessary due to the increased number of New Editions including the change into WGS 84.

Revision of the «Cartographic Project» was undertaken with the aim of improving cartographic coverage of ports and harbours not adequately represented because of their relevance or recent building. Special attention was paid to the Antarctic Cartographic Scheme. Also, we intend to include into the Cartographic Project the production plan of electronic nautical charts (ENC) which is to enter into force on 2011, when the current production plan is completed. This new plan aims for full coverage of Spanish seas with navigational purpose 4 ENCs, which correspond to the paper chart basic series at scale 1:50,000, plus the coverage of new national ports. This wide ranging Project will double the current number of ENCs, from 120 to 240.



CARTOGRAPHIC PRODUCTION

Paper Charts

72 nautical charts were published, as follows:

- 58 New Charts and New Editions.
- 14 Reprintings.

Electronic Nautical Charts (ENC)

35 ENCs have been produced, as follows:

- 12 New Charts.
- 23 New Editions.

Currently the overall amount of available ENCs is 112, which can be classified by their navigational purposes as follows:

- | | |
|--------------|----|
| — General | 4 |
| — Coastal | 19 |
| — Approaches | 40 |
| — Harbour | 49 |

Updates

Our chart portfolio is updated using information received mainly from Port Authorities, Hydrographic Commission, Harbour Master and Naval Offices. They are distributed as follows:

- 1180 Notices updating paper charts, 87 of which included a block correction, published in the Weekly Edition of our Notices to Mariners Bulletin.
- Also, the corresponding corrections were applied to the stocks of paper charts at this IHM.
- 523 updates for ENCs.

Other publications

- 3rd Edition of Special Publication No (INT1) "Symbols, abbreviations and terms used on Charts". This is the Spanish version of the official IHO INT1 publication.
- 2 Leisure charts, D210 & D489, were published.
- New printings of the Training Chart and Plotting Sheet (OB).
- IHO Document «Facts about Electronic Charts and Carriage Requirements » was translated into Spanish.

MILITARY CARTOGRAPHY

AML Project

Once NATO has implemented STANAG 4564, covering the considerations from all participating countries in the development of the so-called Warship Electronic Chart Display and Information System (WECDIS), which is a customization of ECDIS performance standards for warships, a CD was produced with several demonstrations following with the stages of a project for AML development (STANAG 7170). These involve a number of digital geospatial data products in a joint presentation to satisfy the requirements of NATO naval defence beyond simple navigational use. AML production follows S-57 specifications, supplemented by some special Product Specifications to cover their specific needs.

A production scheme for 45 products has been designed, prioritizing such layers with updated data available and considering the geographic areas where the Navy carries out major exercises.

DEVELOPMENTS

IDE Infrastructure

Considering technological progress where graphic representation acquires an additional value and becomes a key factor in the dissemination of technical and scientific information, it is necessary to answer the increased requirements for geographic information. These demands are also furthering the standardization of spatial information production and distribution. Both the EC Directive on European Spatial Data Infrastructure (INSPIRE) and our national planning serve as framework for their proper development and implementation in the field of navigational information.

In order to adapt information available at this IHM with aims consistent of the establishment of a SDI, the following tasks have been identified:

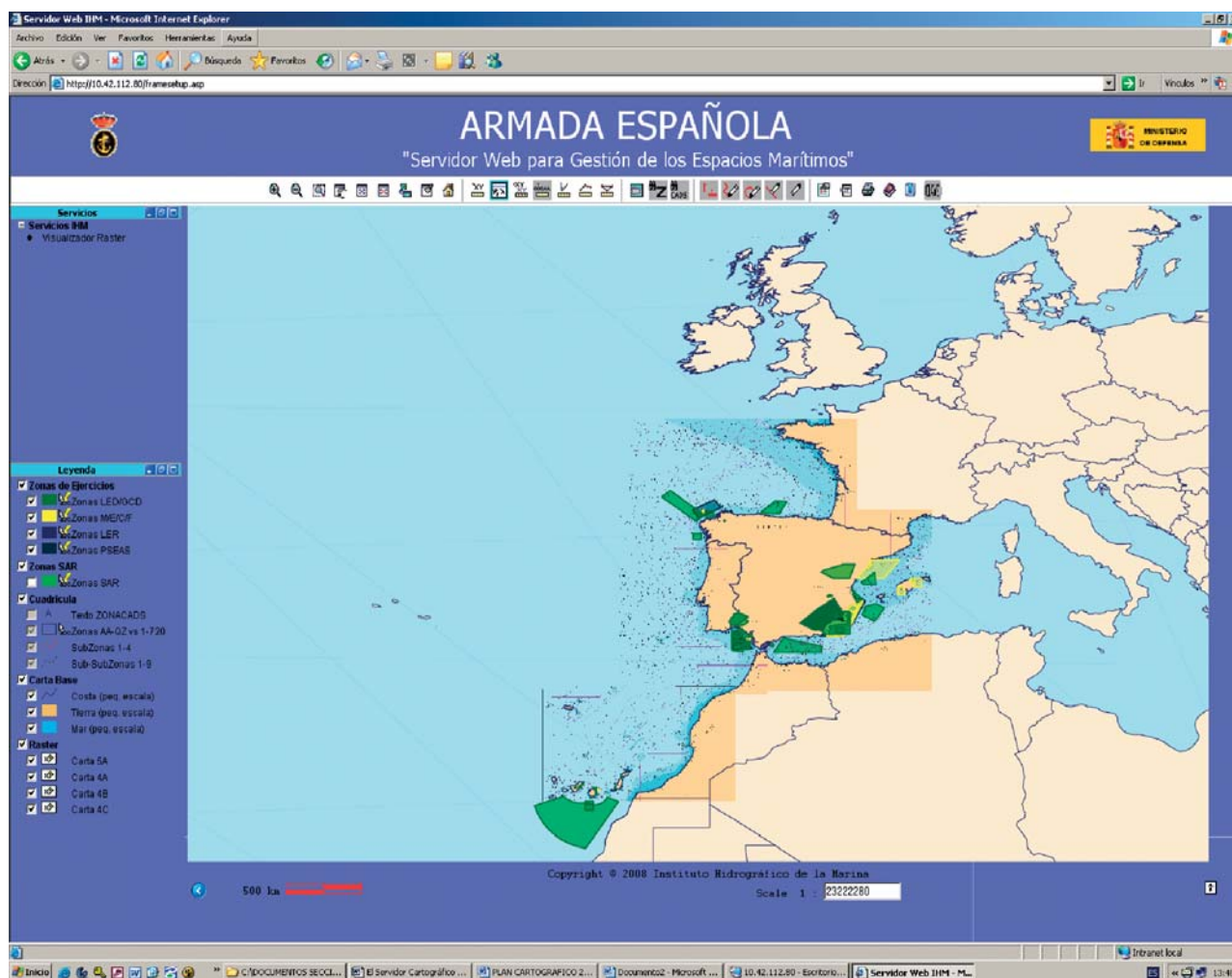
1. Standardization of existing databases containing cartographic features represented in nautical cartography: aids to navigation (lights), wrecks, obstructions, reefs and submarine cables.
2. Update of the Cartographic Database, from its current structure based on digital files to a new geospatial integrated database structure which allows for full interoperation of data used in production of Electronic and Paper Charts. Also, acquisition and development of necessary tools for maintenance, establishing the corresponding workflow for management and interoperation with other Geographic Information available at this IHM.
3. Creation of the basis for a web platform for display and search geographic information available at the IHM. Production of a catalogue of metadata for the information available at the IHM. Elaboration of a database of toponyms used in nautical cartography to assist queries for nautical information. Creation of a display for the Notices to Mariners Bulletin which allows for easier update of nautical cartography by users.

Currently, work on items 1 & 2 above has started, regarding the standardization of databases containing cartographic features, and definition of the structure of an integrated spatial database.

Cartographic Server

Also, development of a «Web Server for Maritime Space Management» was started. This is a web-based tool located in the Spanish Defence LAN created in response to the Navy requirement for adequate cartographic technology to help plan operations and other activities, such as use and reserve of firing exercise areas, both maritime and airborne, and identification of CADS areas.

It features tools designed to help the user access cartography valid for the study, planning and decision making process for operations and routine work at a Navy Staff.



The cartographic reference is composed by raster and vector images of nautical charts, and it provides full coverage for all of the national territory. It is accessible from any computer connected to the Defence LAN.

Its main objective is quick visualization of images and the drawing of small figures (such as circles, lines, polygons, texts...) and calculations (routes, surfaces, distance..). We should note that one of its features allows the user to print or save the images of the drawings so as to be used in the future to complement presentations or reports. These operations take place in the cache of the computer in use, and consequently they are only accessible from the same computer where they were produced.

2.5. Spanish Army Geographic Center

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28024 Madrid - Spain

Phone: +34 91 7115043

Fax: +34 91 7117032

In this year of 2009, the Army Geographic Center has achieved, for third time in its history, to complete the totality of serie L (50K). Series L is based on photogrammetric flights, and also an exhaustive revision on field. As an end product the Army Geographic Center has a continuous Geographic Database, coherent and topologically checked, involving the whole national territory. Also has made a digital terrain model (DTM) with 10 m grid accuracy.

This year, as well , and joint with the works reviewed in the previous paragraph, it is being come to the update of Series L, taking as departure point a new photogrammetric flight of 40K scale. A new production flow has been designed from which, using just one kind of software, the geographic data base and also the DTM (Digital Terrain Model) is updated, and simultaneously maps of 50K and 100K scale have been produced.

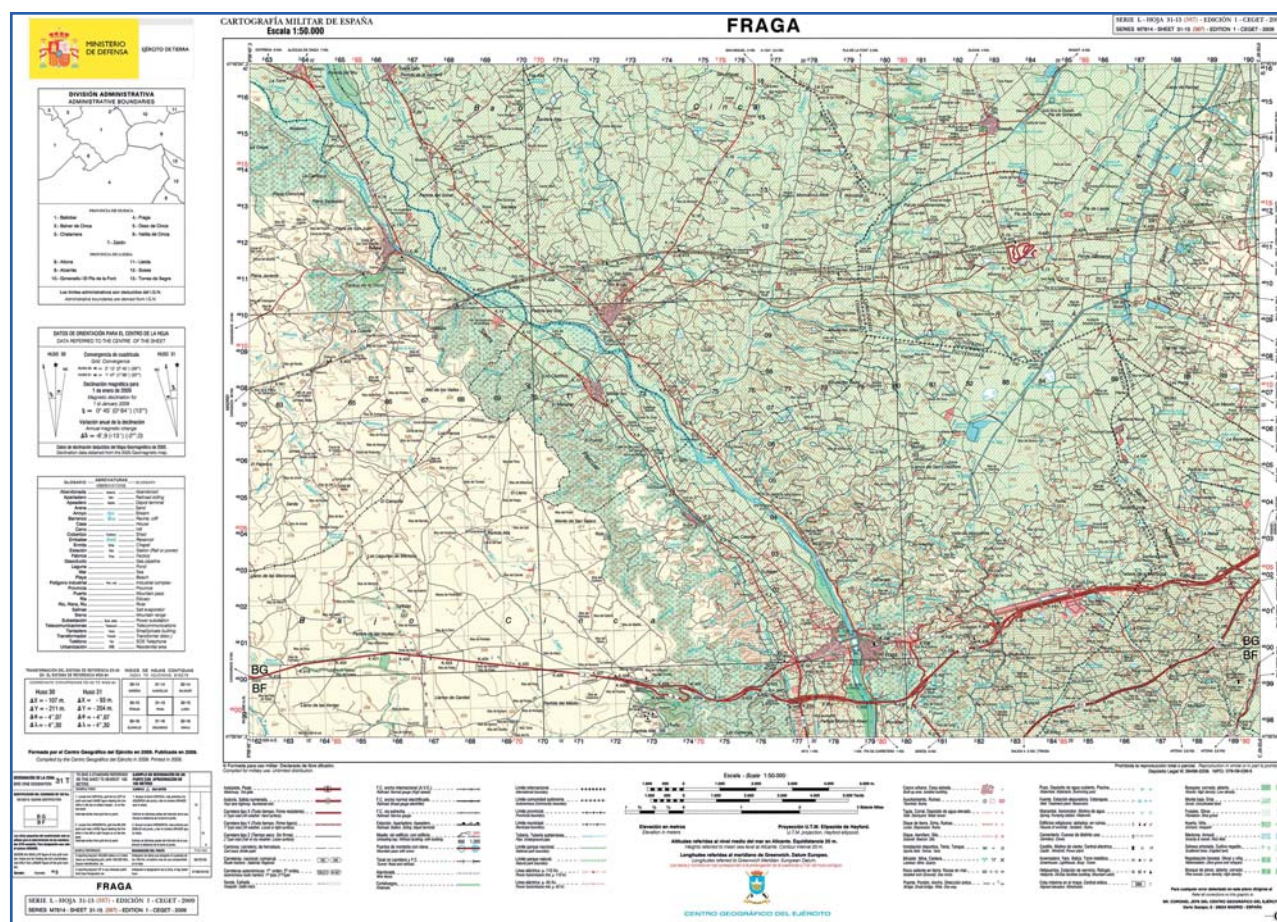
We keep on going with the update works of getting data and publication of the small-scale general-purpose map of Spain (1.000K) and series 1404 and 1501 (500K and 250K). These series are updated every 4 years.

In spite of the Geographic Center of the Army dedicates an important effort to complete the National Cartographic Plan, we must not forget that its main mission is to provide geospatial information to our troops to satisfy its operative requirements. In this direction, Afghan cartography maps of 50K scale has been produced (with data sources coming from program MGCP), Lebanon (from restitution of satellite imagery) and ortophotos wherever spanish troops are deployed.

The Spanish Geographic unit, it is able to deploy to the operations theatre, all these elements that are necessary to provide the accurate geographic information to the national and international forces on the ground in the right time, including IPB (Intelligence preparation of



Data collection on ground



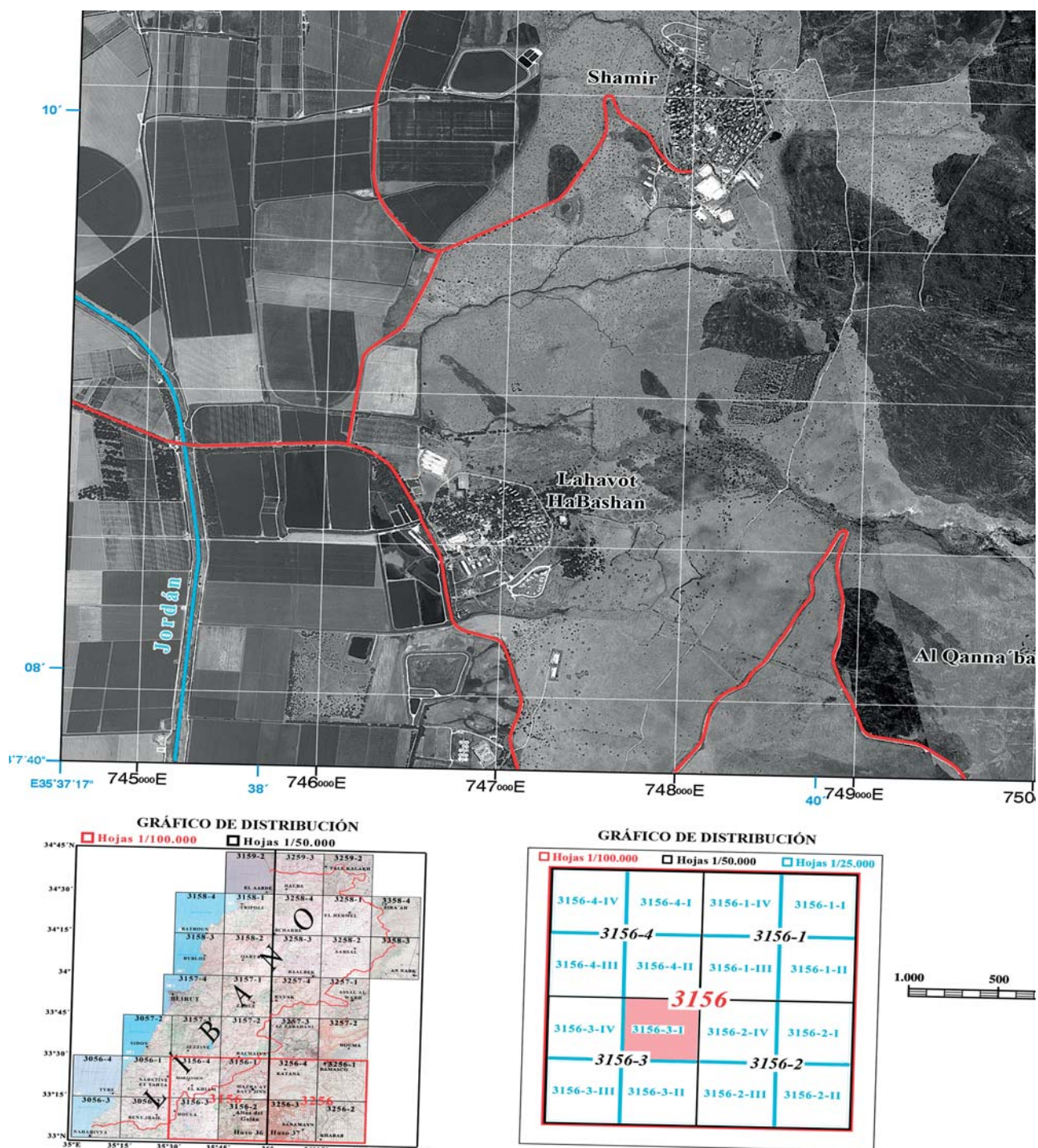
Map of Serie L "Fraga" at scale 1:50,000

the battlefield), the flow of maps making, presentation, distribution of this information. This Unit has taken part in a lot of exercises, and operations all across its four years of living.

In order to make the operation of the geographic information provided by the Army Geographic Center easier, an in house production GIS denominated "Digital Chart" it is available to the units on the ground (the latest version is 4.9). This GIS has powerful tools for viewing, analysis and operation of geographic information, and also the skill of being integrated in our weapon system, and control/simulation tools used by our Army.

Regarding with Multinational Geospatial Coproduction Program (MGCP), the Geographic Center is actively involved as "leader Nation", dealing with the orthorectification of high resolution satellite imagery, extraction of high resolution vector (HRV), and both products quality assurance, not only cells produced in Spain, but also those of third countries (up to 400 cells).

Spanish Army Geographic Centre takes part in the Spanish National Geographic High Board Council and its committee meetings, in the technical and steering meetings of Digital Geographic Information Working Group (DGIWG-TC and DGIWG-SC), in the meetings of Interservice Geographic Working Group (IGEOWG) of



NATO, in the NATO Geographic Conference and its Southern Regional meetings, in the Latin American geographic institutes directors meetings, in the committee for the maintenance of the border meetings, etc.

The SP Army Geographic Center hosts and maintains an Historic Depot (integrated in the State Network of Museums) whose historical funds (previous to 1900) ascend to more than 15,000 maps and planes and more than 250 atlases, and also has a modern funds (subsequent to 1900) with more than 50,000 maps and planes.



Geographic unit of Spanish Geographic Center of the Army

2.6. Spanish Institute of Oceanography

Corazón de María, 8

28002 Madrid-Spain

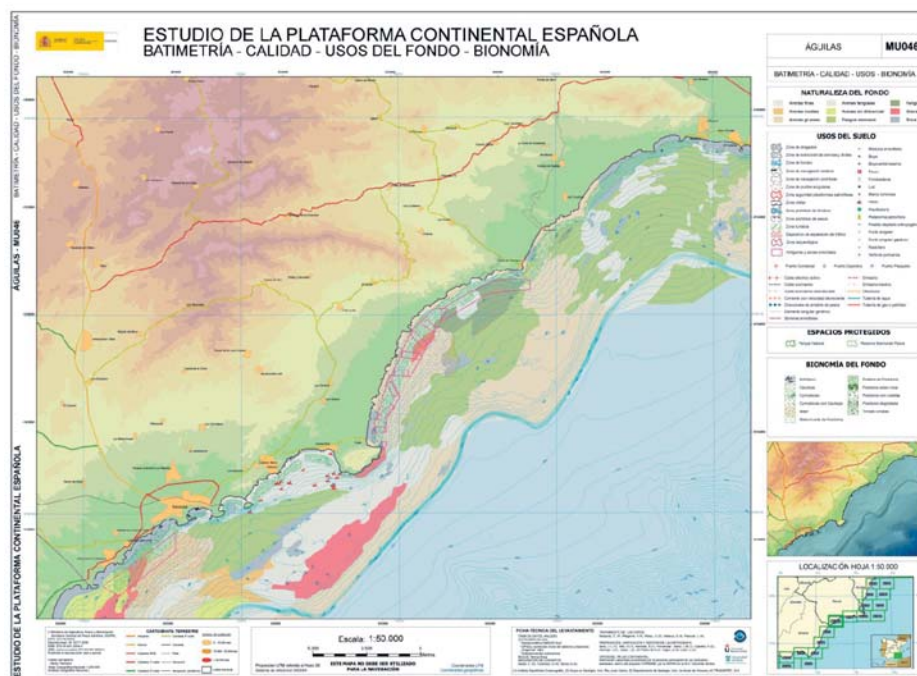
Phone: +34 91 3473619

Fax: +34 91 41355 94

The Spanish Institute of Oceanography (IEO), founded in 1914, is the oldest oceanographic Research Institution in Spain. It develops cartographic activities basically through the marine geology department (Multi-beam Cartography Group), where it is developing systematic cartographic projects of the Exclusive Economic Zone and adjacent coastal areas.

RESEARCH ON SPANISH CONTINENTAL SHELF (PROGRAM SPACE)

In the period 2007-2009 Program SPACE has published two new maps of the Spanish continental shelf. The new maps at Scale 1:50.000 are located in the inner continental shelf, and include bathymetry, bionomic, sea-floor sediment character and different uses of the sea floor (for instance marine protected areas, submarine pipelines or cables etc.).

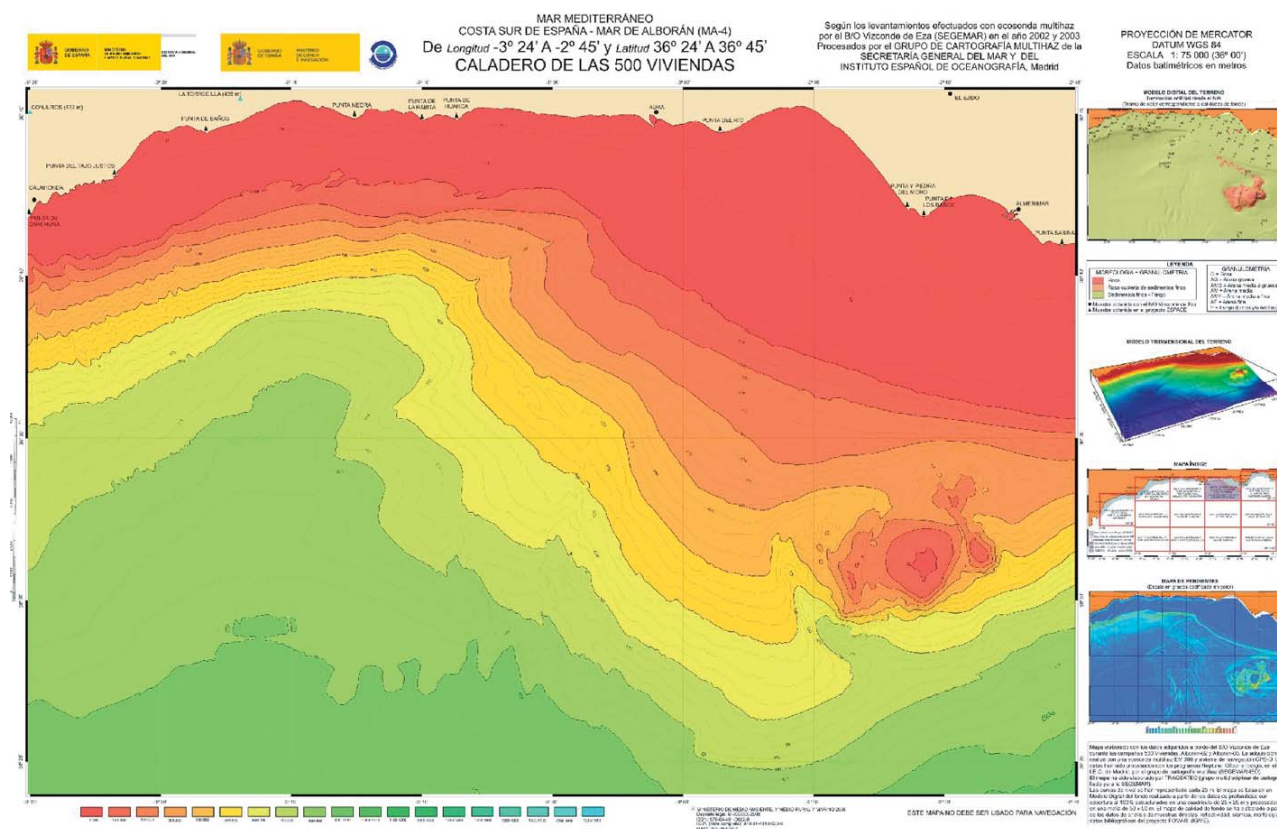


Bathymetry, sea-floor character, sea-floor uses and bionomy. Program SPACE

FISHING CHARTS OF ALBORAN SEA

Four new fishing maps have been edited in the 2007-2009 period, corresponding to Alboran Sea (western Mediterranean); Charts: MA_1, MA_4, MA_10 and MA_13.

Systematic surveying using multibeam echosounders progress towards the east, and next November 2009 a new survey aboard R/V Vizconde de Eza will start from Alicante harbour towards east (Western Mediterranean Sea).

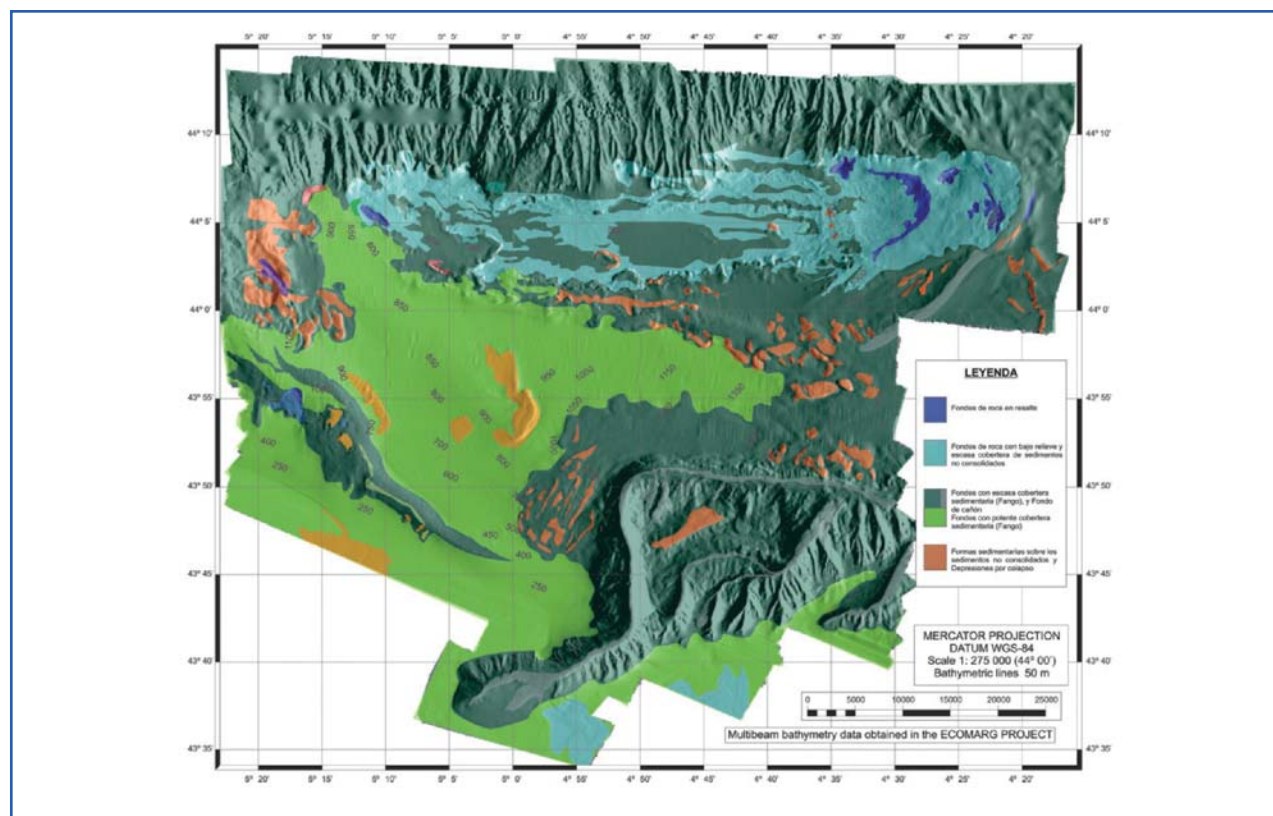


Fishing chart of Alboran Sea. "Caladero de las 500 viviendas"

BENTHIC AND HABITAT CARTOGRAPHY

In recent times, Spanish Oceanographic Institute carried out benthic and habitat mapping in the frame of different scientific programs related with Marine Vulnerable Habitats and Spanish Marine Protected Areas.

The geology and geophysics department worked in the El Cachucho Project, to study and document Vulnerable Marine Habitats. Geomorphologic and seismic character of the El Cachucho seamount has been done. Finally this area has been declared the first Spanish Marine Protected Area



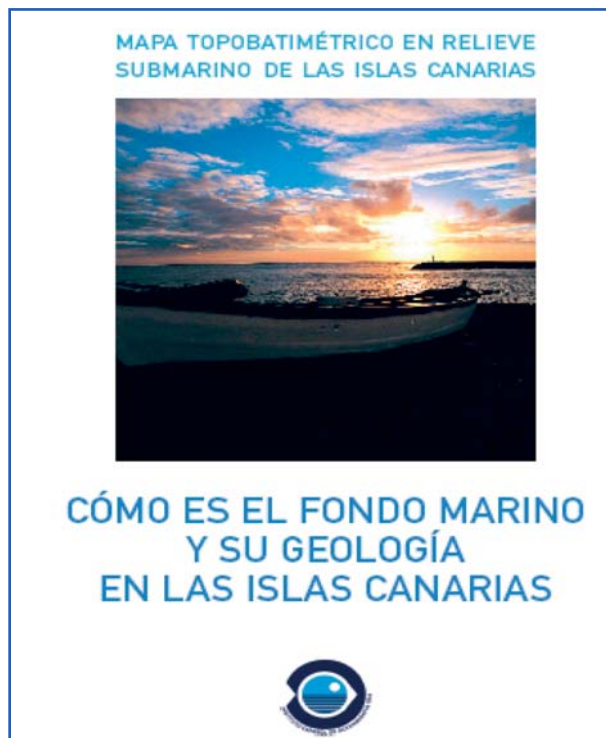
Morphosedimentary map of El Cachucho marine Protected Area

CARTOGRAPHIC DIVULGATION AND OUTREACH

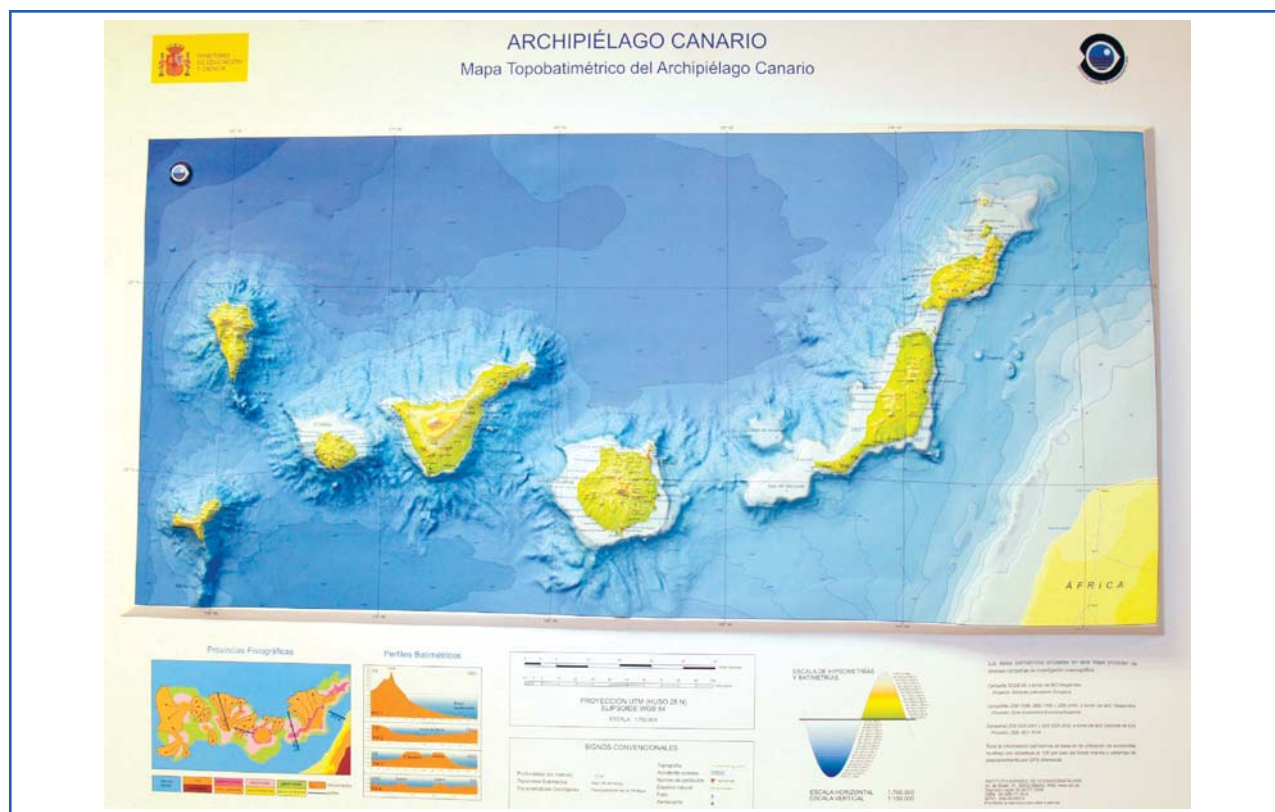
The Spanish Oceanographic Institute aim to divulgate and present to the general society the results of the cartographic research carried out in Spanish EEZ.

For this purpose, and based in multibeam echosounders, with full coverage of sea floor, three relief maps of Balearic Islands, Canary Islands and Alboran Sea has been published.

Every map accompanies on an explanatory leaflet about how the maps was made. Also a explanation of the principal geomorphologic, biological and hydrological characters.

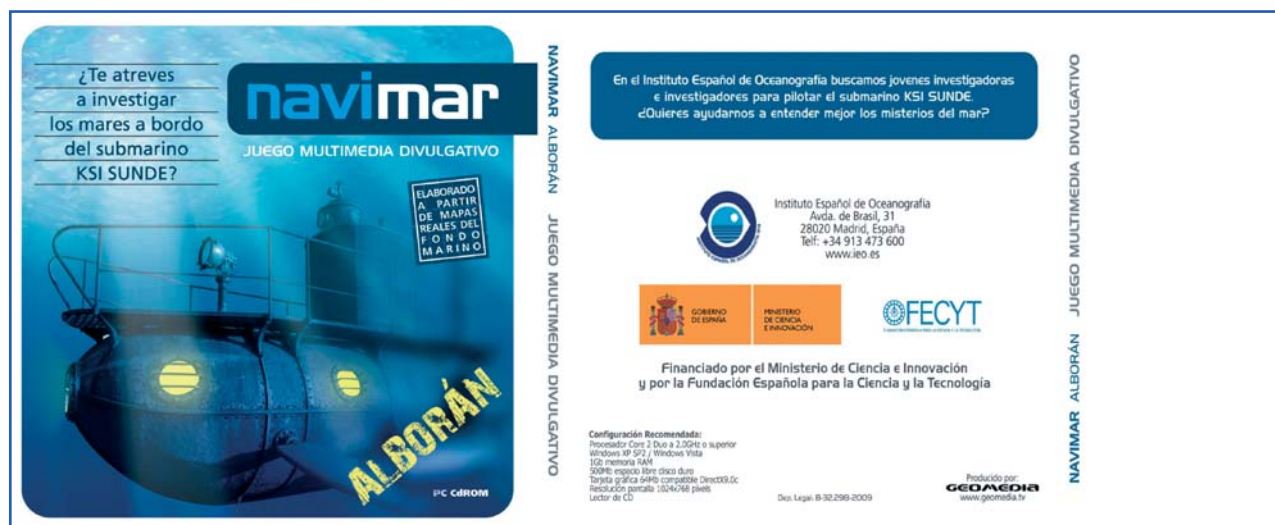


First page of the explicative leaflet of the Canary 3D Map



Relief 3D map of the Canary island Archipelago

As an educational complement, and for scientific spreading for young men and children, an interactive game has been edited for PC. In this game, it joins geological, biological and hydrographic information of the zones represented in the maps in relief in a pleasant and entertaining form, flying –through the real sea floor.



PC Game Navimar. Interactive and Fly-Trough Game on the Submarine Scenario of the Alboran Sea

2.7. Geological and Mining Institute of Spain

Rios Rosas, 23

28003 Madrid-Spain

Phone: +34 91 3495700

Fax: +34 91 4426216

The Geological and Mining Institute of Spain (IGME) is a public research department which has the elaboration and maintaining of country geological cartography among its main commitments. That was the reason of his creation in 1849 under the name "Madrid and Kingdom General Geological Map Commission". IGME is an institution with a wide experience on Earth Sciences. Thus, not only maintain geological mapping in several scales since then but grows his selection across the close and derived products. These are the so-called "Geotematical Maps" devoted to a research, practice or didactic function or to solve specific problems.

Since 1849, IGME develops systematic map series. First as provincial maps until 1914. Later (1927-1970) as the Geological Map of Spain at 1:50,000 (1st Series) but unfinished. Currently the Geological Map of Spain (2nd Series) (MAGNA) is finished. Beginning of MAGNA plan was about 1970. Geological maps at 1:200,000 scale are linked with that program, as well as, marine geology of continental platform and adjacent margins (FOMAR). Since 1863, together with those middle scale cartographies, country broad or mural geological maps have been often published at 1:1,000,000 and 1:2,000,000 scale.

Starting about the middle of the last century, special Geological cartography has been made, preferably related with recent geology: geomorphologic maps, quaternary maps, etc. A most demanded cartography in the last decades. Examples are hydrogeological, geotechnical, metalogenetic and industrial rocks and mineral rocks resources maps. Recently environmental geology maps focused on land uses and planning have been set up. Social and economic impact of natural disasters promotes definitely the making of Geological risk and/or Geological danger.

Nowadays, IGME tries to cope with the increasing demand of information about environment and the technological chances given by computer applications such as spatial information management. Both drive to the need of development of new map products in a systematic way or under user demand. The target is defining a methodology in order to elaborate a Integrated Geoscientific Cartography using the Continuous Geological Map (GEODE) of Spain as a basis. It's about delivering analytical map symbolized information, in other words, normalized Geoscientific Cartography related with systematic maps at many scales with application in Geological research, underground prospecting combined with geophysical data and test drillings, underground water and aquifer distribution and characteristics, mechanical behaviour of regional materials, origin, location and relationships between mineral resources, land planning, economic and social impact of natural disasters, erosion, desertification, environment and civil engineering. Grouped by theme and use, it can be distinguished:

LAND GEOLOGICAL CARTOGRAPHY (DIGITAL EDITION, CONTINUOUS (GEODE), REGIONAL SYNTHESIS, MURAL MAPS AND POPULAR MAPS)

After 35 years, the second series of Geological Map of Spain (MAGNA) at 1:50,000 scale is finished. Each sheet has two maps: a geological and a geomorphologic one (since 1991) and an explanatory report. As well as complementary documentation with palaeontological, petrological and sedimentological works, photographs, geological sites, etc. (IGME Documentation Center)

Continuous Geological Map in digital format is the answer to solve discontinuities between sheets and to deliver information in a quick, modern and efficient way to the user. It's a map and a legend, both unified according to 19 regional units. Also It can be used as a geological base reference for other geotematical maps.

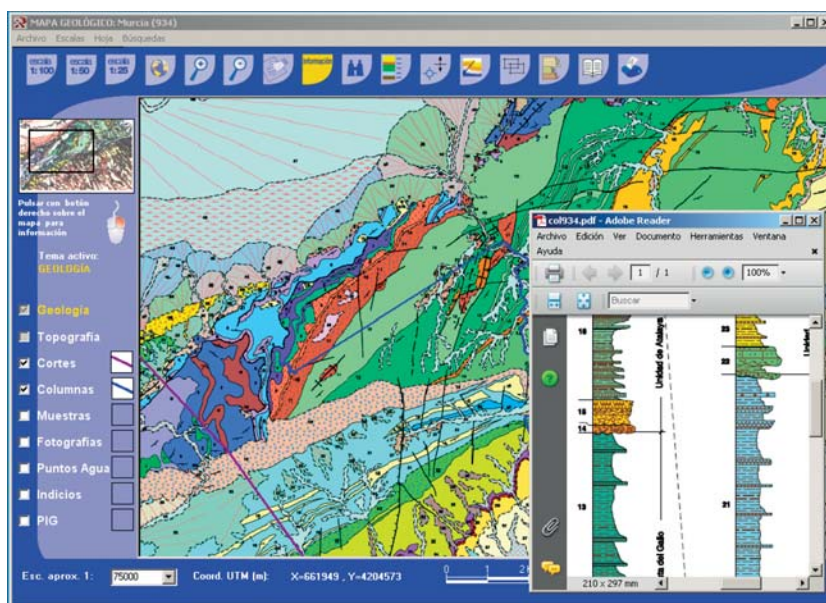
14 sheets of the Geological Map of Spain at 1:50,000 scales (MAGNA Series) with Geological and Geomorphological map and Memoir, have been published in 2008.

1 sheet of the new Digital Edition of Geological Map of Spain at 1:50,000 scale that contains Geological, Geomorphological map, Active Process and Memoir was published in 2008.

In order to pick up more complete information, a Release Program of the Second Geological Map at 1:50,000 scale is going on (MAGNA digital edition). It tries to update MAGNA and takes account of the surface geology and underground information. Medium is an interactive DVD and runs as a GIS client accessing maps, reports and auxiliary information. It's a supplement to the traditional published map because includes all the information generated during the making of the map.

1 interactive CD of the new Digital Edition of Geological Map of Spain at 1:50,000 scales was published in 2008.

There is a systematic Series with discontinuous elaboration at



1:200,000 scale covering 50% of Spain. With the new integrated cartography form GEODE, this scale (between 1:100,000 and 1:400,000) is defined to show regional geological synthesis.

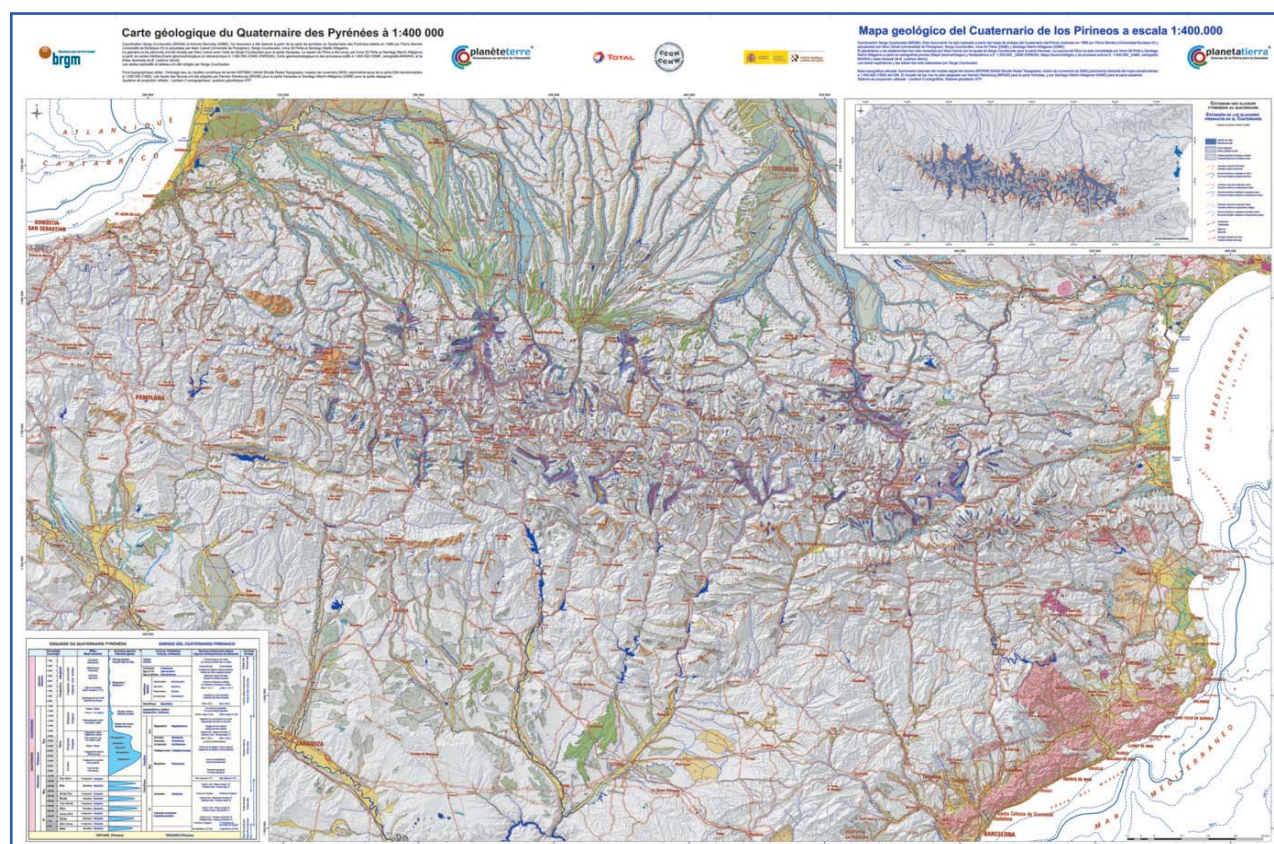
Periodic preparation of mural map showing Spanish country is a traditional activity and a way to show "the state of the art" of broad Spanish geological knowledge. Other special cartographies join this topic at 1:1,000,000 scale or minor scales (i.e: 1:200,000).

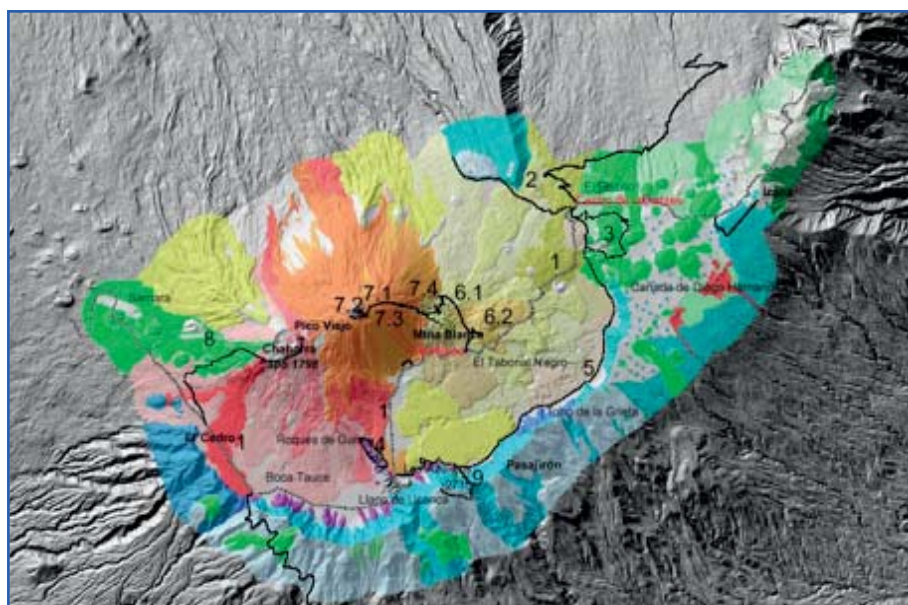
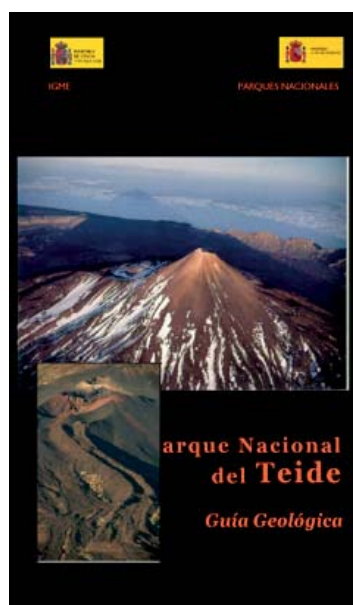
During 2008 IGME published the following big format maps:

The Geomorphological map of Spain, at 1:1,000,000. CD Edition

In collaboration with BRGM (France), Geological map of the Pyrenees at 1:400,000 and Map of the Quaternary of the Pyrenees at same scale

Popular subjects are about maps included in the Geological Guides of National Parks. This Series deals with nature tourism demand of information. It shows relationships between geology, relief and vegetation. Also includes some itineraries of interest.





MARINE GEOLOGICAL CARTOGRAPHY

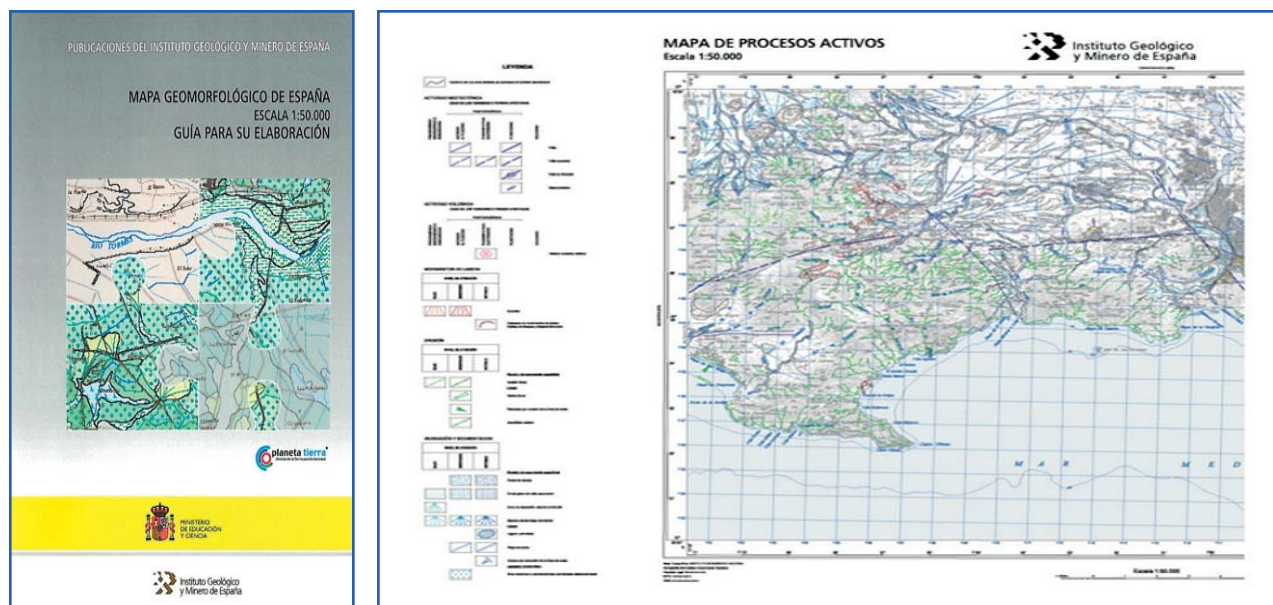
(MARINE PLATFORM GEOLOGICAL MAP AND DIGITAL MAP, GEODEMAR)

The published Marine Geological Cartography of continental platform and margins at 1:200,000 scale covers the 40% of the area.

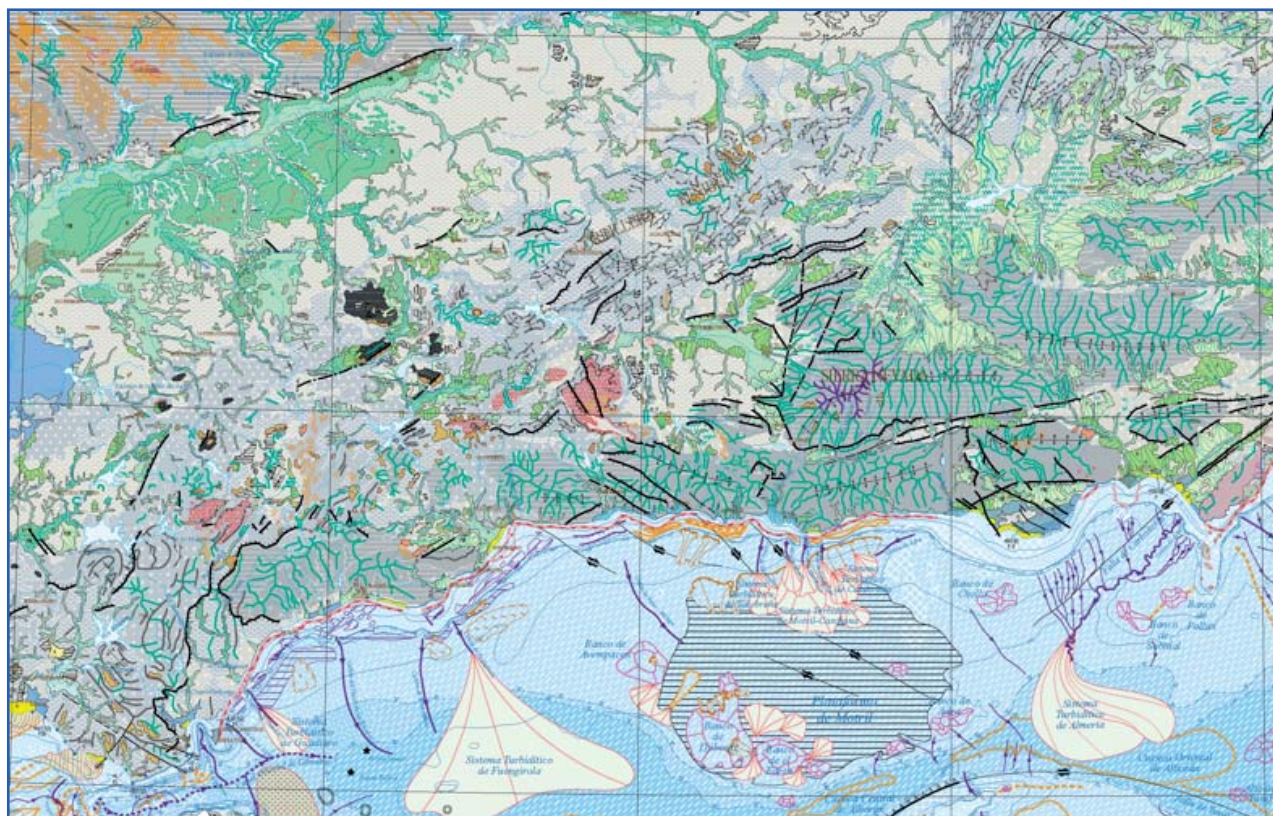
Nowadays a new Digital Cartography is planned (GEODEMAR) in collaboration with other institutions (IEO and CSIC) and structured as a National Marine Geological Database (SIGEMAR).

GEOMORPHOLOGY, ACTIVE PROCESSES AND GEOMORPHOLOGICAL UNITS

The Geomorphological Map of Spain at 1:50,000 scale is a thematic map whose origin is the geological map, adding features related to surfacial geology. In fact, it is divided into three main maps: *Geomorphological map* that delivers information about landforms. *Active processes*, a geodynamic activity inventory (seismic, geotectonics, volcanic, landslides, erosion, floods and sedimentary processes associated with some lithologies and antropic) drawn by the forms that they generate. And last, *Geomorphological Units*. On this map, land is divided in homogenous areas as a resume of previous cartographies.



The Geomorphological Map format is the result of several releases and improvements during three decades. A main source is the Geomorphological Map at 1:1,000,000 scale, published in 2005 and with digital format in 2008.



SOILS

This map, at scale 1:25,000 or 1:50,000 is focused on research and description of polluted soils (general reference levels, environmental indicators, solving, etc.).

Information inside these maps refer to soil typology (Soil Taxonomy/WRB) his geographical distribution and capacity-vulnerability indicators and data about surfacial and subsurfacial aspects, lithology, geomorphology and vegetation.

GEOLOGICAL HAZARD

Research, forecast, prevention and mitigation of hazards generated by natural processes of geological origin is an IGME commitment. Geological Danger Maps are the result. They deal with earthquakes, tsunamis, volcanism, floods, landslides (subsidence and slope), avalanches and those related with coastal processes.

Include field observations, soil samples, digital elevation models and a qualitative and quantitative zoning as a result of the multifactorial analysis using GIS.

Scale varies from regional to 1:5,000/1:25,000 when the study areas are high populated.

GEOPHYSICS

Geophysical Maps (gravimetric, magnetic and radiometric maps) are a main tool to underground knowledge delivering important information about internal structure.

The IGME has gravimetric stations as a result of the geological and mining field exploring during last 50 years. Resulting databases can be managed to produce homogeneous layers (Bouguer Anomaly maps). Also includes magnetic, aeromagnetic and radiometric data as a base to other layers such as potential and radiometric field anomalies, usually at 1:50,000 and 1:200,000 scale. The aim is to develop a map in digital format joining all the resulting data from processing and interpretation (2D and 3D). Anomalies will be coloured combined with a recent vectorial geological base (GEODE).

GEOTECHNICAL CHARACTERISTICS

Geotechnical Maps are displayed usually at 1:5,000 scale covering municipalities, but can be published at smaller scales such 1:50,000/1:200,000) for reference purpose.

Maps shows several zonings: specific related with some geotechnical field feature (subsidence, consolidate layer thickness, etc) or related with geological hazards according to three danger levels.

They are useful as base information to make decisions in land planning assessment.

HYDROGEOLOGY

IGME's hidrogeological maps show regional aquifer features as well as exploitation aspects as a basic information for further detail works.

The Hidrogeological Map of Spain at 1:1,000,000 (1972) is previous to a systematic series at 1:200,000 carried out between 1982 and 1990. Since then hydrogeology is included as a complementary information in the Geological Map at 1:50,000 (MAGNA). Hidrogeological and Hidroenvironmental Atlas are made in collaboration with regional and provincial institutions.

METALLOGENIC GEOLOGY, GEOCHEMISTRY AND INDUSTRIAL ROCKS AND MINERALS

Metallogenical Maps are essential tools to know potential mining of an area. They display metal, non-metal and energy mineralization evidences on a geological base. Publishing scale is usually 1:200,000 or regional and provincial layouts (1:100,000/1:400,000).

Geochemistry cartographies contribute to the knowledge of a wide set of chemistry elements geographical distribution related with superficial formation such as alluvium and soils. 1:100,000 and 1:600,000 are common regional scales. Association or anomalies maps have a more straightforward application with concrete objectives such as mining exploration, land planning or health issues.

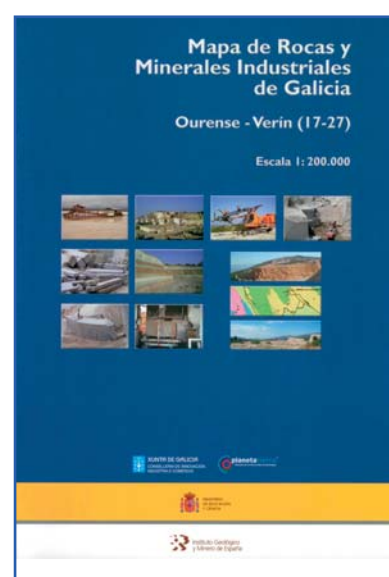
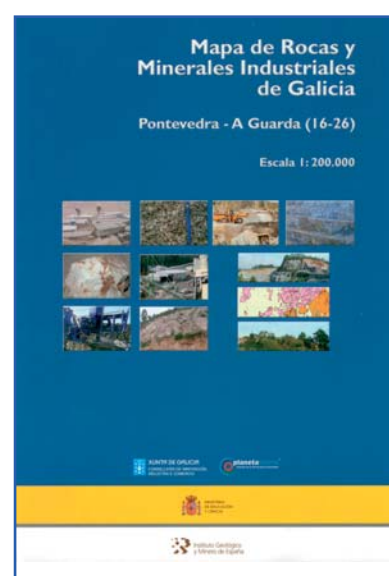
The Industrial Rocks Map at 1:200,000 scale had an old development based on deposits with an associated inventory card. Current proposal, the Industrial Rocks and Minerals Map (MANARMIN) is a geological-mining map that summarizes current knowledge of industrial rocks and minerals mining and its potential use.

Two Industrial Rocks and Minerals Maps of Galicia at 1:200,000 with Map, Memour and CD, published in 2008:

- Ourense-Verin (17-27).
- Pontevedra-A Guarda (16-26).

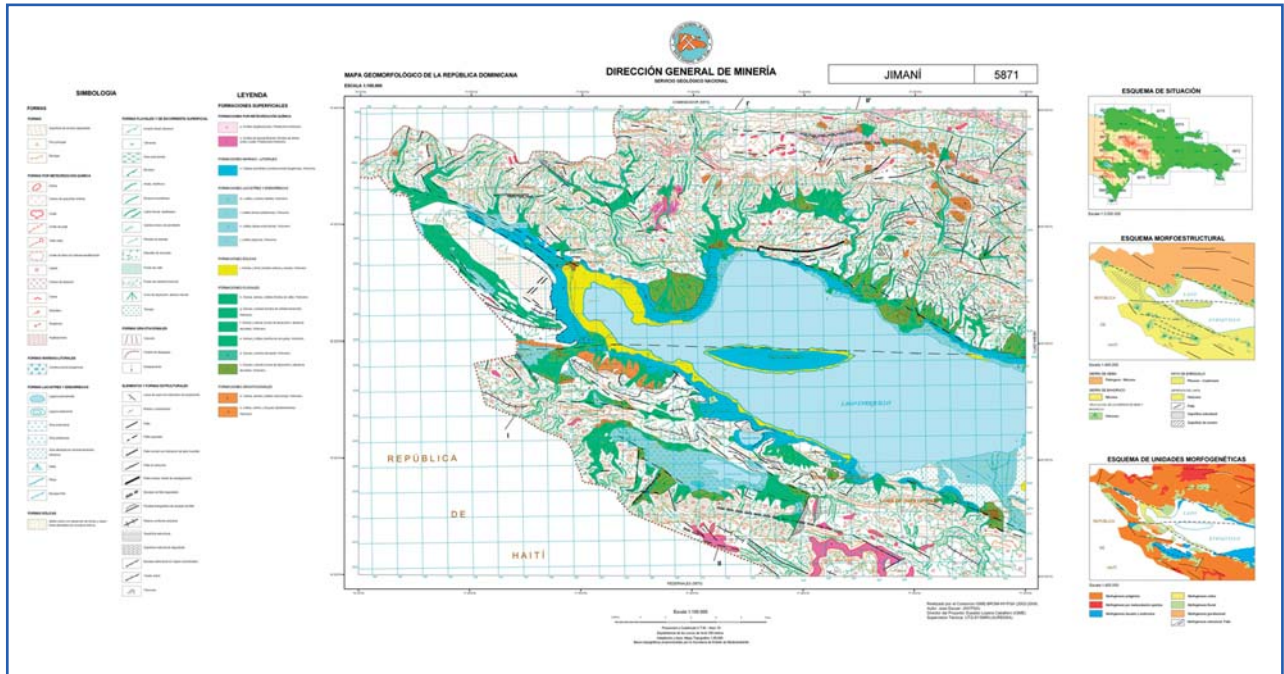
GEOLOGICAL PATRIMONY AND GEODIVERSITY

Domain Geological cartography is a good chance to study geodiversity through geological sites (LIGs) linked to his pedagogical and tourism potential use. Vulnerability is evaluated as well as interest degree, both infers protection priorities.



INTERNATIONAL ACTIVITY

IGME spreads his activities abroad through developing countries, specially those with a geographical or cultural proximity such as Latin America or Maghrib. Joined with European institutions, the IGME carries out his cartographic activity with geological and geothematical maps.



3. REGIONAL MAPPING ORGANIZATION

3.1. Cartographic Institute of Catalonia

3.2. Cartographic Institute of Andalusia

3.1. Cartographic Institute of Catalonia

Parc de Montjuic

08038 Barcelona-Spain

Phone: +34 93 5671500

Fax: +34 93 5671567

The Cartographic Institute of Catalonia (*ICC-Institut Cartogràfic de Catalunya*) was created by Law 11/1982 of 8 October of the Parlament de Catalunya (Catalan parliament) as an autonomous commercial, industrial and financial institution of the Generalitat de Catalunya (autonomous government). On 11 June 1997, in accordance with Law 6/1997 passed by this parliament, it became a public corporation owned by the Generalitat de Catalunya. 8 years later, on 27 December 2005, the Catalan Parliament passed Law 16/2005 relating to geographic information and the Institut Cartogràfic de Catalunya, with the aim of updating the powers of the Institute and extending the regulatory framework from new perspectives. The Parliament also approved the creation of the Institut Geològic de Catalunya (Geologic Institute of Catalonia) with Law 19/2005. It dissociated from the ICC in 2007.

From the very beginning, the ICC has sought to position cartographic studies and production at levels of innovation and modernity in keeping with the goals of efficiency and quality that an advanced society needs to approach a range of subjects linked to territorial policies and activities.

Within this framework, the ICC undertakes cartographic projects of an official nature and of general interest to Catalonia, in addition to studies and projects commissioned or requested by both public and private organizations. The ICC also works as the technical secretariat for the Cartographic Coordination Commission of Catalonia.

ACTIVITIES

The activities of the ICC are planned and coordinated in accordance with a series of short and medium term programs. This means that the initiatives in operation can be systematically monitored, while new projects may be added to the program.

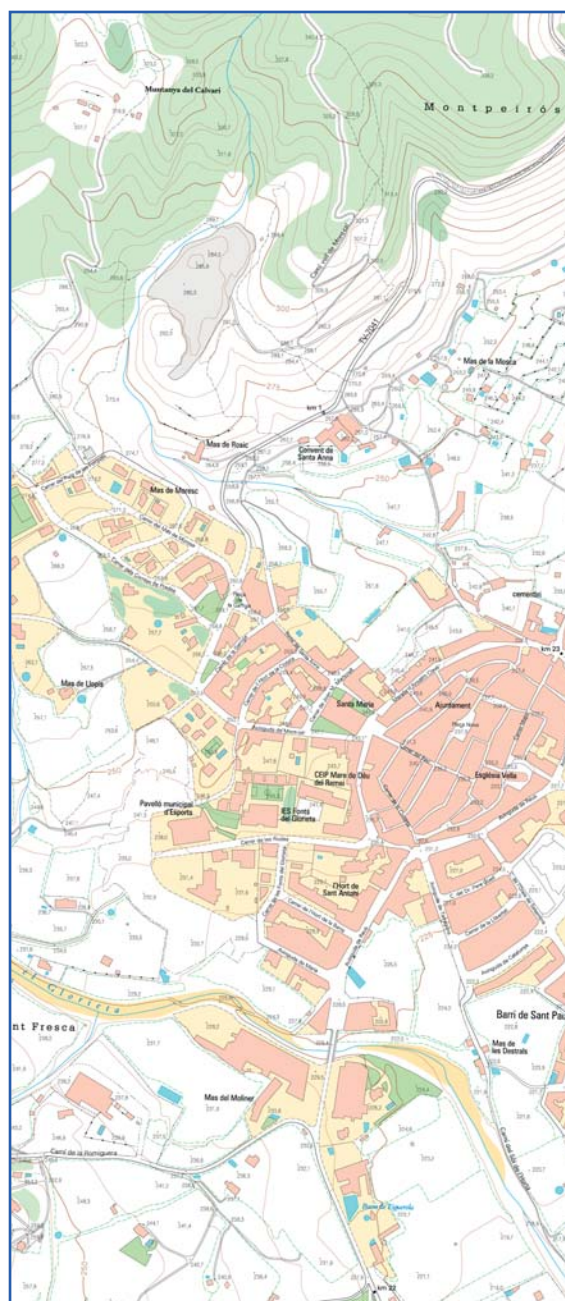
The four principal areas of operation of the ICC are: cartographic production, technological support and research, infrastructure, and training and research. Law 16/2005 stipulated the establishment of two Support Centers within the organic structure of the ICC to promote the Special Data Infrastructure of Catalonia and the Catalan Program for Earth Observation.

Below is a summary of the most important activities undertaken by the ICC in the period from 2007 to 2008:

CARTOGRAPHIC PRODUCTION

Topographic cartography

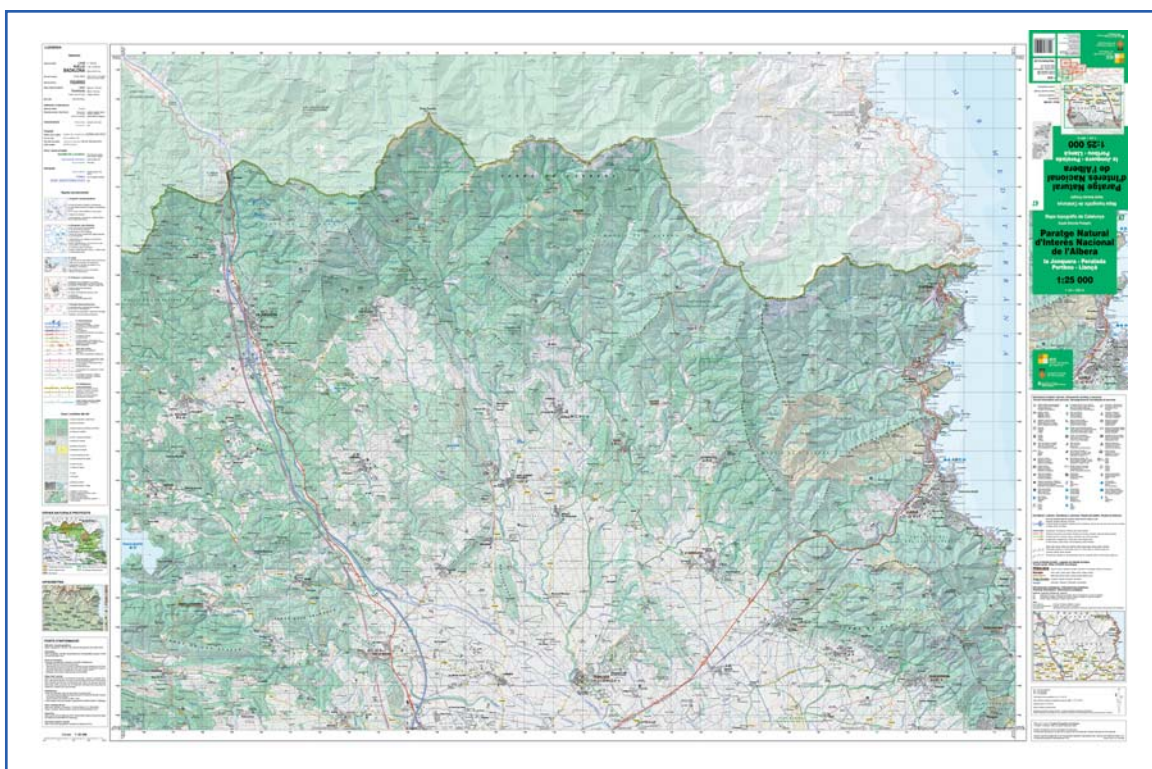
- Continuous production of the second version (3rd and later editions) of the *Base topogràfica de Catalunya 1:5,000* (BT-5M) – topographic map – (4.274 sheets). As at December 2008, 2.555 sheets of the v.2 were available (60% of the series).
- Continuous production of the *Mapa topogràfic de Catalunya 1:10,000* (2nd edition) (1.121 sheets). In December 2008, 284 sheets were available (25% of the series).
- Continuation of the special project *Base topogràfica de Catalunya 1:25,000* (304 sheets). As at December 2008, 205 sheets were available (67% of the series).
- Commencement of the 2nd version (1st and 2nd edition) of the *Mapa topogràfic de Catalunya 1:25,000* (77 sheets). As at December 2008, 3 sheets were available (4% of the series).
- Continuous production of the *Mapa comarcal de Catalunya 1:50,000* – regional map – (41 sheets). As at December 2008, 35 sheets of the 4th version were available (85% of the series).
- Commencement of the *Mapa comarcal de Catalunya 1:100,000* in relief (41 sheets). As at December 2008, 4 sheets were available (10% of the series).
- Publication of the 8th edition of the *Mapa topogràfic de Catalunya 1:250,000* and the 5th edition in relief.
- Final publication stages of two planispheres (1:15,000,000 and 1:22,000,000) with toponymy in Catalan and Spanish.
- Renewal of ISO9000 certification for the line producing the BT-5M and derived products (MTC-5M and terrain elevation models).



Base topogràfica de Catalunya 1:5,000. Alcover

Large scale cartography

- Continuous production of the cartography for specific projects at 1:1,000 scale.



Mapa topogràfic de Catalunya 1:25,000. Paratge Natural d'Interès Nacional de l'Albera

- Continuous production of the special project *Mapa urbà de Catalunya 1:1,000*. 870 projects and a total of 255.000 hectares of the v.2.1 (2002-2008) have been completed.

Orthophotographic and orthoimage cartography

- Completion of the v.5 of the *Ortofotomapa de Catalunya 1:5,000* –orthophotomap– in color and first pages of the v.1 in color-infrared (4.274 sheets). In collaboration with the IGN within the framework of the National Aerial Orthophotography Plan 2004-2007.
- Completion of the v.6 of the *Ortofotomapa de Catalunya 1: 25,000* in color and first pages of the v.2 in color-infrared (304 sheets).
- Continuous production of orthophotographic and orthoimage cartography series for specific national and international projects.



Mapa d'imatge Landsat-5 1:250,000

Integrated Geodetic Positioning Service of Catalonia (SPGIC)

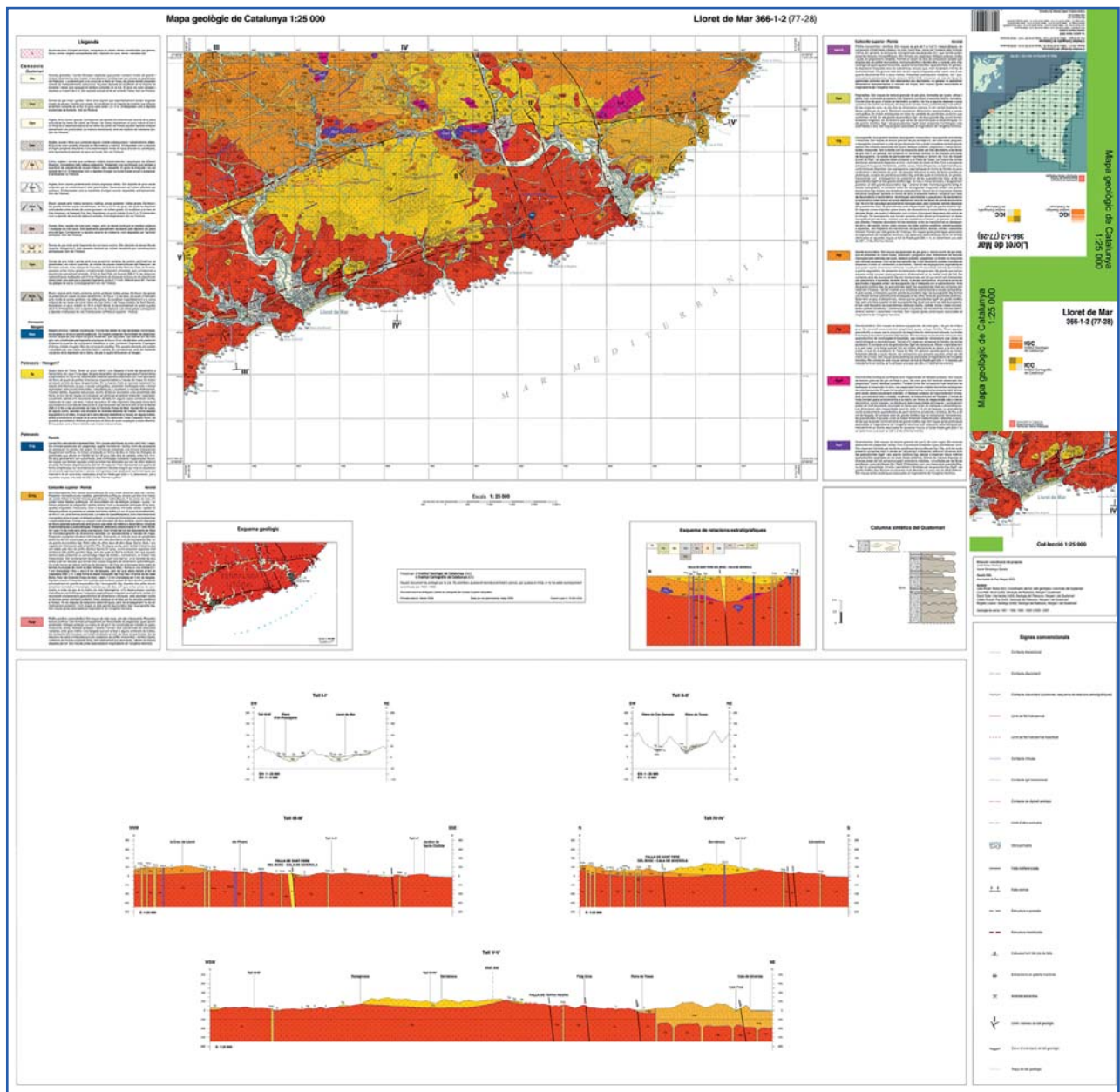
- By the end of 2008, the utilitarian geodetic network of Catalonia contained 3.713 points with a total of 910 registered users in the CatNet web, DGPS, CODCAT and RTKAT services.
- Establishment of the reference stations of Lleida and Solsona, bringing the total number of stations established to 15.
- Support for adoption of the new ETR89 reference system for public and private organizations.



Distribució del Servei de Posicionament Geodèsic Integrat de Catalunya (SPGIC)

Thematic cartography

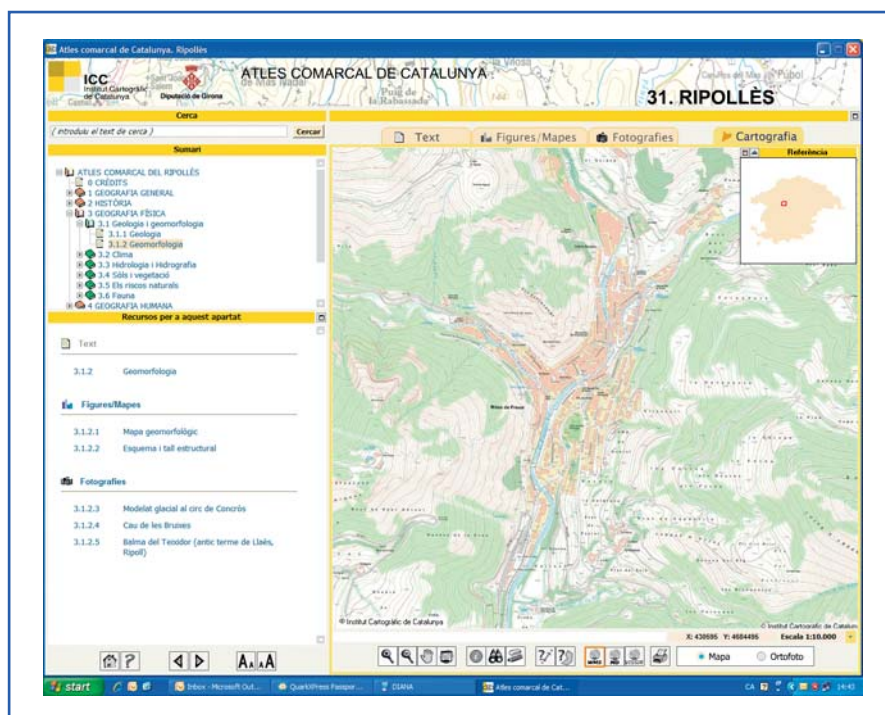
- Publication of various small and large scale thematic maps: hiking, administrative, tourist, geological, vegetation, land use, road, fire maps, etc.
- Continuation of the special project "*Mapa geològic de Catalunya 1:25,000*" (301 sheets). As at December 2008, 46 sheets were available (15% of the series).



Mapa geològic de Catalunya 1:25,000. Llagostera

Atlases

- Completion of the collection *Atles comarcal de Catalunya* (on CD-Rom), made up of 7 atlases.



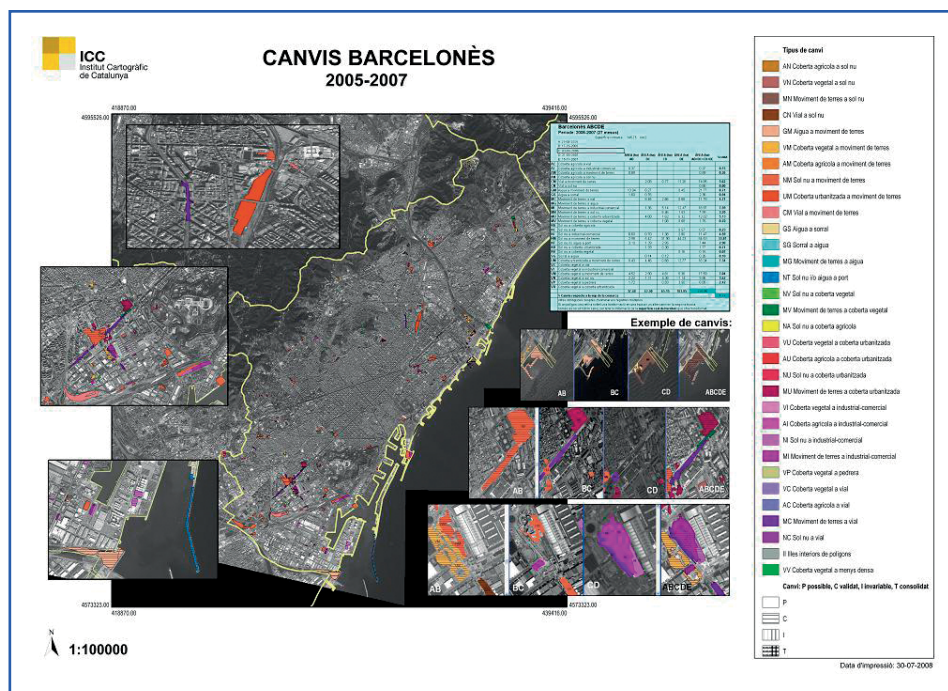
Atles comarcal de Catalunya. Ripollès

Geographic and thematic databases

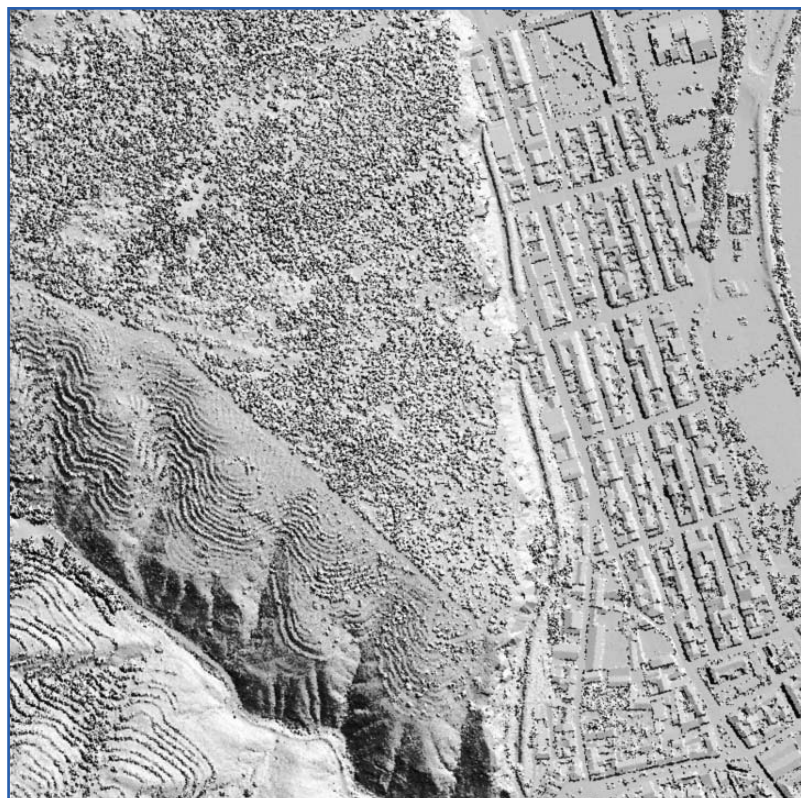
- Maintenance of databases: land use, toponymy, elevations, ground control, administrative boundaries, and thematic bases for specific projects (geocoding of addresses, industrial parks, and streets of Catalonia).
- Completion of the special project "Catalan rural land registry".
- Maintenance of Elevations Database from the re-establishment of the BT-5M and generation of the Elevations Database from lidar data (781 194 ha generated by year-end 2008).

Laser altimetry applications

- Continuation of the special project "Planning of river areas of Catalonia (PEFCAT)".
- 10 projects have been undertaken with the laser altimeter.



Detection of changes in Barcelona



MDS shadows of the Arga and Aragón project

Photogrammetric flights

- Undertaking of various flights to cover specific objectives: planning, roads, towns and villages, and to municipal and urban cartography.
- Undertaking of multispectral flights with the CASI hyperspectral sensor and flights with the laser altimeter.
- The total number of flights made in the period 2007–2008 was 775 which correspond to 1.629 flight hours.

Territorial boundary marking

- Technical advice for the Direcció General d'Administració Local (Local Administration Head Office) and preparation of the delimitation proceedings and certifications for private parties and municipal councils.
- Continuation of the special project "Municipal boundaries of Catalonia" (agreement with the General Directorate for Public Administration, 2005–2011). A total of 1.920 municipal delimitation lines are included in the project. As of December 2008, 1.120 had been completed.

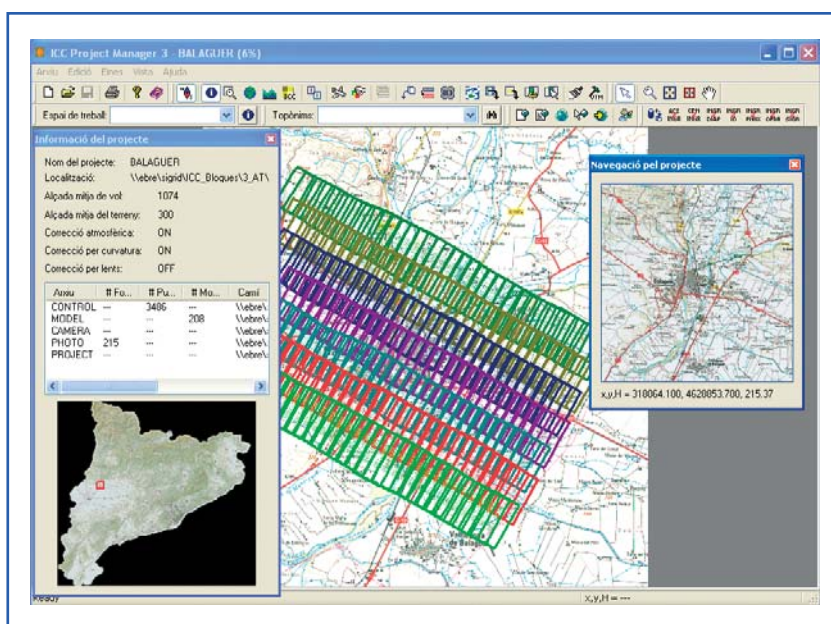
TECHNOLOGICAL SUPPORT AND RESEARCH

Photogrammetry and geodesy

- Measurement of 465 points of the REDNAP network with GPS technology.
- Completion of the SISA-II system, which allows synchronization of various sensors' integrated orientation.
- Production start-up of a new lidar.
- Development of the ICCProjectManager v.3.1 for photogrammetric and georeferenced object project management in the realm of aerial triangulation and flights.
- Production start-up of the ICCGeoView v.2 display tool for the remote sensing control points database. This tool facilitates the marking of control points in correlation-assisted satellite images.
- Development of beta version of the ICCFlowManager which will allow semi-automatic queuing of various photogrammetric processes.

Cartographic edition

- Support for the new MiraMon format.
- Completion of the methodological study to update the IGN's BCN25–3D based on the ICC's database of the same scale.
- Improvement of distribution processes of digital data and plotters output applications.
- Development begun on the JobManager50 application which will allow management, consultation and documentation of the tasks performed with the *Mapa comarcal de Catalunya 1:50,000*.
- Preparation of automatic processes for generation of files in KMZ format.



ICCProjectManager project



City model

Information systems

- Completion of quality control study for stereoplotting of cartography at 1:25,000 scale of the l'Agence Nationale de la Conservation Foncière, du Cadastre et de la Cartographie (ANCFCC) of Morocco.
- Completion of development for the Internet-based raster image server viewer (VISSIR-v2).
- Entry into service of the geocoder v.2. This is a web-based service that facilitates real-time geographic localization of a site
- Publication of cartography through the Google Earth Enterprise product.
- Development of geographic information system applications for internal and external projects.

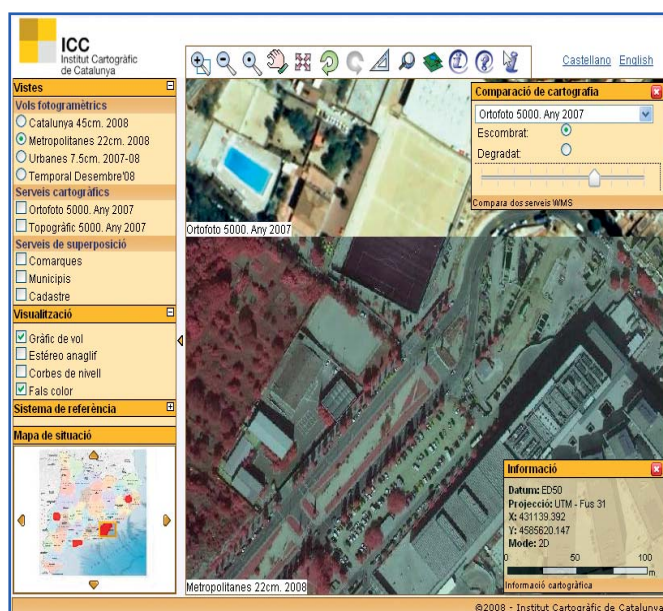
Remote sensing and image processing

- Improvement of atmospheric correction algorithms for hyperspectral remote sensing images.
- Implementation of new geometric models for the TerraSAR-X sensor images.
- Extension of the process software for ALOS-PALSAR and TerraSAR-X images.
- Beginning of the Banyoles campaign sponsored by EuroSDR for calibration of digital photogrammetric cameras.
- Performance of various projects for automatic obtaining of thematic information and land use, and lidar application projects through aerotransported remote sensing techniques.

INFRASTRUCTURE

Distribution of cartographic products

- In the period 2007–2008, the total number of downloads of digital cartography via the Internet was 1.117.003. These downloads increased in 2008 by 66% over the 2007 total.
- Maintenance of the ICC website and incorporation of new content, new applications and new design. During the period 2007–2008, the web received 3.518.067 visits. The number of visits increased in 2008 by 13% over 2007.
- Beginning of distribution over the Internet of the BT-5M in MiraMon (MMZ) and KMZ format, of the BT-25M in DGN format and the BT-50M in DGN, DXF and Export format.
- Beginning of new ortoXpres service for near-immediate on-line publication of images taken on photogrammetric flights.



OrtoXpres project

Map Library

- Continuous increase of the resources of the Catalonia Map Library (296.188 maps; 43.490 books, 3.288 journals; 44.609 photographs, 211 historic cartographic instruments and 17.600 microforms).
- Completion of cataloguing of the Gonçal de Reparaz Archive.
- Production start-up of an in-house digitalization unit to scan large-format maps and historic documentation.
- By December 2008, 8.800 images were available for downloading from the digital map library. The number of on-line documents has increased in 2008 by 43% over 2007.

Documentation center

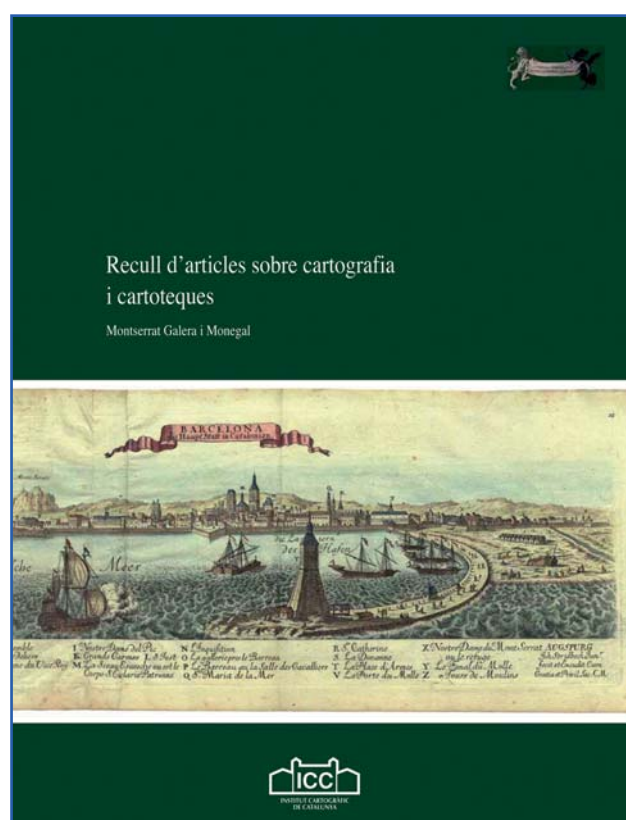
- Acquisition of photograms that cover Catalonia from the so-called "American" photogrammetric flight in 1956-1957.

TRAINING AND RESEARCH

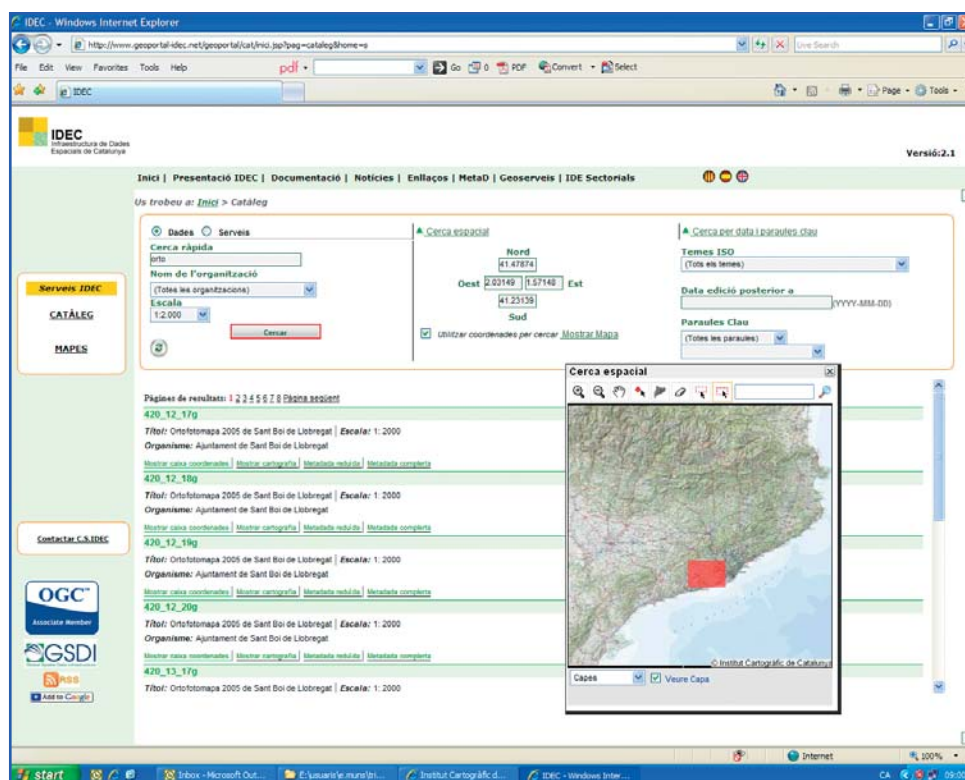
- Undertaking of various experimental projects related with internal development topics and programs.
- In the period 2007-2008, 42 communications were presented at national and international congresses, and 36 articles were published in national and international publications.
- Publication of books and periodic institutional publications designed to publicize the ICC's activities or to complement the information about specific cartographic products.

SC for the Spatial Data Infrastructure of Catalonia (IDEC)

- Throughout 2007-2008 the IDEC Geoportal received a total of 166.048 visits, and 747 metadata were downloaded.
- Three thematic IDE projects (IDE Local, IDE PlanUrb, IDE Univers) and one European IDE project (Aware) have been carried out.



Collection of articles on cartography and map libraries, by M. Galera



Search result from IDEC Metadata Catalogue

SC of the Catalan Earth Observation Program

- Three knowledge transfer and training seminars have been held.
- Two technological studies, one research proposal, and two viability studies have been performed, and two research projects have been participated in.
- Six dissemination activities have been carried out to publicize the PCOT strategic activities.

Organization of international events

- VI Theoretical and practical training course on advanced cartographic techniques: Airborne laser altimeter. Organized by the ICC in collaboration with the Instituto Nacional de Estadística, Geografía e Informática (INEGI) and the Instituto Geográfico Nacional (within the framework of DIGSA). Barcelona, February 2007.
- 7th Geomatics Week and 3rd International Geotelematics Show (GlobalGeo). Organized by the ICC, the Institut de Geomàtica, the Col·legi Oficial d'Enginyers Tècnics en Topografia –Catalonia office–, and the Escola Politècnica Superior d'Edificació de Barcelona, February 2007.
- VII Theoretical and practical training course on advanced cartographic techniques: Processing of radar images. Organized by the ICC in collaboration with the Instituto Nacional de Estadística, Geografía e

Informática (INEGI) and the Instituto Geográfico Nacional (within the framework of DIGSA). Barcelona, June 2008.

- Third ICA Internacional Workshop: Digital Approaches to Cartographic Heritage. Organized by the ICC and the Commission on Digital Technologies in Cartographic Heritage of the ICA. Barcelona, June 2008.

Awards and honorary mentions

- The Official Committee of the International Cartography Association (ICA/ACI), in the course of the 23rd International Cartographic Conference held in Moscou (Russian) in August 2007, gave an award to the ICC for the *Mapa topogràfic de Catalunya 1:450,000* (Topographic Map of Catalonia), in the "Relief and Globes" category.

3.2. Cartographic Institute of Andalusia

Consejería de Vivienda y Ordenación del Territorio
Junta de Andalucía
C/ San Gregorio, 7
41004 Sevilla-Spain
Phone: +34 955057600 - Fax: +34 955057603

The Cartographic Institute of Andalusia (ICA), attributed to the Housing and Spatial Planning Office of Andalusian Government, it is the organism entrusted of the production of the cartographic bases necessary to know the Andalusian territory. From their creation, by the Ordinance 116/ 1993 of 7 of September, the Institute of Cartography of Andalusia works in the coordination and normalization of the cartographic production in Andalusia. Assignments recently reinforced by the Ordinance 141/ 2006 of 18 of July.

This last Decree, applies and develops the Directive 2007/2/CE, of 14 of March of 2007, that it tries one of the of the Spatial Data Infrastructures (INSPIRE), is approved to order the cartographic activity in Andalusia. This has converted Andalusia, in first Spanish Autonomous Communities in having a norm that regulate the cartographic activity in an integrated system of production, management and diffusion of the spatial information. In this context the coordination between the different organisms of production in Andalusia, and between the Andalusian government and other administrations, it is fundamental.

The development of the principle of planning, established by the Decree, began by means of the formulation of the Cartographic Plan of Andalusia (2009-2012), approved by Agreement of 16 of September of 2008, of the Council of Government. This document has put the foundations for the configuration of the Andalusian Cartographic System, that articulates by means of a set of organs of participation and coordination, of technical infrastructures and programming instruments.

The activities ligatures to the development of the Andalusian Cartographic System have concentrated in three aspects:

- Institutional development. At the beginning of 2007 the Commission of Cartography of Andalusia and 5 Work groups was constituted. Also the institutional paper of the Institute of Cartography of Andalusia was reinforced.
- Development and putting in service the infrastructures and geographic equipments of reference, like the Andalusian Network of Positioning, the Andalusian Spatial Data Infrastructure, the Andalusian Gazetteer, the corporative GIS of Andalusian Government or the Andalusian Repository of Geographic Information.
- The collaboration with other administrations, (agreements of collaboration with the 8 Provincial Delegations, and with the General Administration of the State (in particular with the National Geographic Institute). Also it has been collaborated with City councils and Universities and one has advanced in the cooperation with the rest of Autonomous Communities.

In this context, the Institute of Cartography of Andalusia offers support to the Autonomous Administration in: the ordination of the territory, the city-planning policy, infrastructures, planning, sectorial politics (agriculture, environment, culture, emergencies, etc.); and to the citizenship, so much for technical works like for a better knowledge of their territory.

Periodically, Andalusia modernizes their basic cartography on territorial scales (1:10,000 and 1:5,000) and urban scales (1:2,000, 1:1,000 and 1:500), as well as its corresponding fotogrametric flights.

The update of that cartography, the satisfaction of the cartographic necessities of the Andalusian Government, the execution of the vocation of public service, the incorporation of technological advances and the adaptation of the European and national directives, are permanent objectives in the programmings of the Institute of Cartography of Andalusia.

Next the main activities developed in the programming of the Institute of Cartography of Andalusia between 2007 and 2009 are exposed:

PHOTOGRAMETRIC FLIGHTS

Along these years it have been carried out diverse photogrametric flights, territorial and urban, for the elaboration and updating of the different cartographic series and ortophotos, as well as for other diffusion projects.

Territorial Photogrametric Flights

In 2007, by an agreement with the Institut Cartogràfic of Catalonia, a fotogrametric flight (GSD of 90 cm) of all Andalusia was realised for a Colour Digital Orthophoto, with resolution of 1 meter. Also NW quadrant of Andalusia was covered with a flight (GSD of 28 cm). In 2008, the South of Andalusia (GSD of 45 cm) was flight. In 2009 the conclusion of North is predicted.

Urban Photogrametric Flights

This cartography becomes at the request of the city councils ask for planning. For the realization and updating of the urban cartography has carried out the following flights:

- Flights on scale 1:5,000: 30 towns in 2007, 27 in 2008 and 15 in 2009 for the realization of urban cartography to scale 1:1,000.
- Flights on scale 1:8,000: 110 towns in 2007, 93 in 2008 and 65 in 2009 for the realization of urban cartography to scale 1:2,000.

As result obtains a series of urban cartography of, that enters 2007 and 2009, has been realised cartography of 72 towns on scale 1:1,000 and 268 to 1:2,000.

ORTOPHOTOS AND DIGITAL TERRAIN MODEL (DTM)

In this period (2007-2009) the Institute of Cartography of Andalusia, next to the Councils of Agriculture and Fishing and Environment of the Andalusian government has been gotten up to the National Plan of Orthophotos 2004-2007 (PNOA). This plan is an effective instrument of cooperation between the national administration and the Autonomous Communities. The Institute of Cartography of Andalusia have produced two complete coverings of the region with orthophotos of 50 cm. of resolution

In 2008 a new Digital Terrain Model (20 x 20 m) was elaborated.

In 2009 the Institute of Cartography of Andalusia have published the Digital Orthophoto of Andalusia (colour) derived of the flight to scale 1:60,000 carried in 2007. This ortho has been produced from an American flight done between 1956-1957. Also it is a joint publication with the Environment, Agriculture and Fishing Departments.

BASIC TERRITORIAL CARTOGRAPHY

The main series of basic cartography that produces the Institute of Cartography of Andalusia are:

Cartography on scale 1:10,000 (MTA10)

Culminating the process of vectorization of the MTA10 makes possible that the Institute of Cartography of Andalusia pruned to have a complete and continuous cartography of the Andalusian territory in diverse formats (shp, dxf, etc). The Institute of Cartography of Andalusia have turned it into one geodatabase and are updating it with the 2007 orthophoto. This update is predicted that finalizes in 2009.

Base Map of Andalusia (MBA)

The Base Map of Andalusia (MBA), is a multiscalar and vectorial cartographic base (1:10,000 for all the territory and 1:5,000 for cities and the coast). This map incorporates information in 3D and presents a data model guided to objects. The Institute of Cartography of Andalusia have finished the methodology and developed the applications for the quality control and its operation. Now the map is in the heat of production process, the Institute of Cartography of Andalusia have restituted and produced the SW quadrant of Andalusia.

Program of municipal boundaries

In 2007, the Institute of Cartography of Andalusia began a work to obtain an official and precise definition of the 22.000 km of municipal boundaries that exist in Andalusia. The methodology of this work includes field work (territorial recognition, landmark establishment, etc.) and cabinet work (analysis and interpretation of descriptions of property line, notebooks of field and documentation of XIX century). Until the moment the Institute of Cartography of Andalusia reviewed 2.000 km to the year.

Urban street guide

From 2006 the Institute of Cartography of Andalusia offer to the administration and the citizens a service of street guide of the Andalusian cities in the Web.

TOPONYMY

Concluded the elaboration of the Data Base of Toponymy (BTA10), the Institute of Cartography of Andalusia have a base complete and homogeneous of Andalusian toponymy conformed by 149.500 records (190.000 localizations) classified by subjects (administrative areas, entities of population, hydrograph, relief, patrimony, infrastructures, industrial activities, minig, services).

In 2007 the adaptation of the BTA10 to the Gazetteer Spanish Model began.

In 2008, the Institute of Cartography of Andalusia offered a service Web of Gazetteer that allows to look for and to locate the place-names including in the Geographic Gazetteer of Andalusia. In 2009 the Institute of Cartography of Andalusia is working generally to have a corpus of toponyms of reference to the own productions and to the use of the Autonomic Administration and citizen.

Within the framework of collaboration settled down with other institutions, the Chief of the Institute of Cartography of Andalusia, presides the Commission of Geographic Names dependent of the Superior Geographic Council.

ANDALUSIAN POSITIONING NET (RAP)

In 2007 the RAP works to total yield, that is a network conformed by 22 receiving stations, 2 mobile teams and a centre of control that will lend services of correction through UHF, FM, GPRS and Internet.

The service of positioning offered by the RAP will permit the creation of a geodesic frame of unique and stable reference for cartographic and topographical risings, offering services of discharge of files of RINEX observations (FTP service) and of positioning in real time (RTK services, RDS, GSM and IP).

After some years on service, and the works of maintenance, now, the relocation of 2 stations is predicted and is in study the possibility of increasing the number of receiving stations.

SPATIAL DATA INFRASTRUCTURE OF ANDALUSIA (IDEANDALUCÍA)

After the phase of design and definition of standards, coordinated by the Commission of Geomatics of the Superior Geographic Council, in 2006 the implantation of the Spatial Data Infrastructure of Andalusia began.

From that date, the Institute of Cartography of Andalusia have done metadata of digital products of the ICA (territorial and urban cartography, flights, etc) and have improved the interface of consultation and the services that are offered.

Now IDEAndalucia has services of search and location, it allows to see and consult basic and territorial cartography, derived cartography and orthophotos from Andalusia, and also allows to see and use services of maps of other administrations and organisms.

VIEWFINDER FOR MOVABLE DEVICES (SITÚATE)

In 2008 the Institute of Cartography of Andalusia began the project SITÚATE whose objective is the diffusion of the official cartography of Andalusia on movable telephones, by means of navigation with GPS.

Since then, the Institute of Cartography of Andalusia are developing the application and different versions from test until obtaining a definitive product at the beginning of 2009.

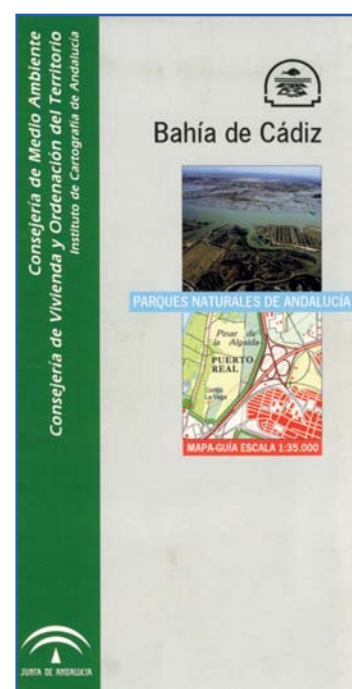
DERIVED AND THEMATIC CARTOGRAPHY

The production of derived and thematic cartography of the Institute of Cartography of Andalusia is ample and varied. The main series that at the moment take place are the following:

Guide Maps of Natural Parks

Of this series, initiate in 1990, 20 maps in collaboration with the Environment Department have been published. Now the Institute of Cartography of Andalusia is updating and publishing new editions of the maps.

| Year | Guide Maps of Natural Parks |
|------|--------------------------------------|
| 2007 | Sierra de Andujar 1:45,000 |
| | Sierra de Cardeña y Montoro 1:45,000 |
| | Sierra Nevada 1:60,000 |
| 2008 | Sierra Norte de Sevilla 1:70,000 |
| | Bahía de Cádiz 1:35,000 |
| 2009 | Los Alcornocales 1:75,000 |
| | Estrecho de Gibraltar 1:35,000 |

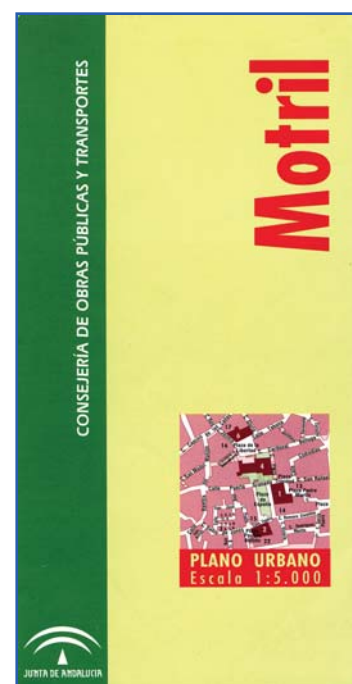


Medium Towns Streets Maps

The elaboration and edition of street guides of cities with historical, tourist or geographic interest began in 1995. It is a product very useful for citizens and the administration.

From 2007 the Institute of Cartography of Andalusia have published 14 street guides with the singular collaboration of the City councils that have facilitated the information required on toponymy, buildings and other aspects contained in the street guide.

| Year | Street Guides |
|------|-------------------------------------|
| 2007 | Almonte |
| | Los Palacios y Villafranca |
| | Fuengirola-Mijas |
| 2008 | Berja |
| | Cazorla |
| | Marchena |
| | Moguer |
| | Motril |
| 2009 | Vejer de la Frontera |
| | Antequera |
| | Archidona |
| | Olvera |
| | Aguilar |
| | El Viso del Alcor-Mairena del Alcor |



Road Maps

In 2008 the Institute of Cartography of Andalusia published Interactive Guide of Roads in CD-ROM that allows navigation, the measurement of distances, the calculation of routes, to look for toponyms and the visualization in 3D.

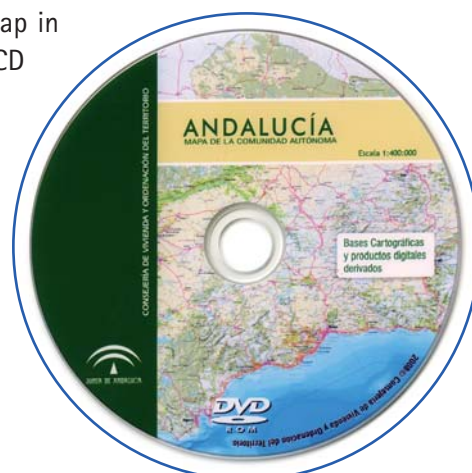
Also in 2008 has published in paper the Guide of Roads of Andalusia that includes cartography on scale 1:200,000 and details to scale 1:70,000, for the metropolitan areas and to 1:15,000 for the main cities. The guide includes Annexes on interesting subjects (protected spaces, historical patrimony, green routes, cultural routes, etc).

General Maps of Andalusia

"Andalusia. Map of the Autonomous Community", 1:400,000. This map discloses an unique image of Andalusia incorporating the fundamental elements for their territorial recognition (administrative limits,

towns, roads of communication, relief, hydrograph, etc. Besides a map in paper the Institute of Cartography of Andalusia have published a CD that picks up the cartographic bases that have been used for their elaboration and different exits in the more usual formats of image (jpg, tiff, pdf, etc).

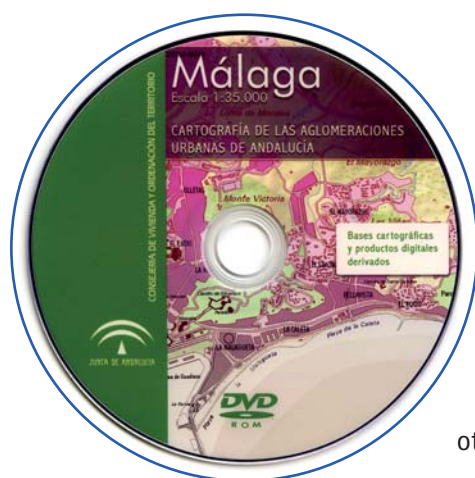
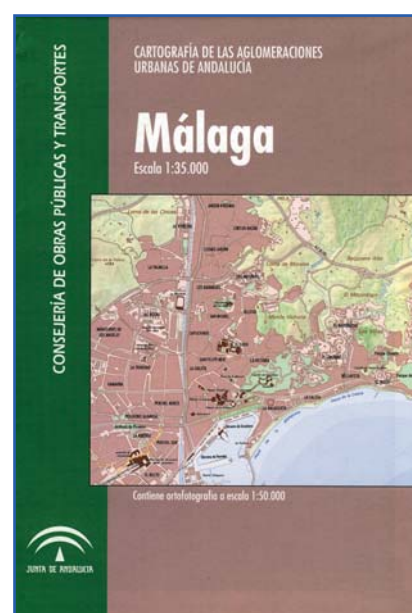
"Spatial Data of Andalusia. Intermediates scales". It is a data base with 150 layers of geographical information in vectorial format.



Cartography of the metropolitan areas of Andalusia

It is a thematic cartography that offers a unitary image of the main urban areas of Andalusia. The map includes cartography on scale 1:30,000 and a recent orthophoto. Also the Institute of Cartography of Andalusia have made a CD that picks up the cartographic bases and different exits in the more usual formats of image (jpg, tiff, pdf, etc).

| Year | Metropolitan Areas |
|------|---------------------------------------------------------------|
| 2007 | Málaga |
| 2008 | Almería Huelva |
| 2009 | Bahía de Algeciras Córdoba y su entorno Granada Jaén |



Cartography of local scopes of Andalusia

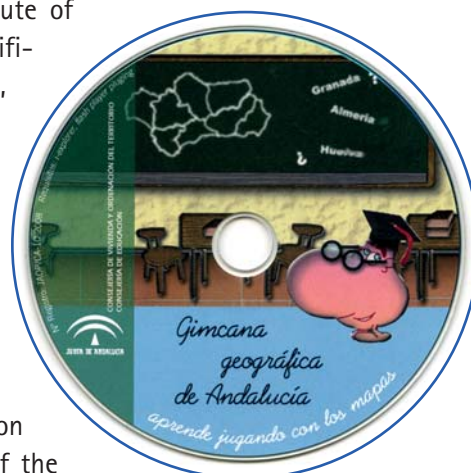
In 2008 the Institute of Cartography of Andalusia began a new cartographic series to cover easily identifiable spaces on which a unitary cartography did not exist. In this case, the reference scale is 1:50,000 and the edition has a version in paper and CD. In order to make these maps the Institute of Cartography of Andalusia have collaborated with cartographic organisms of other Autonomous Communities, like Extremadura, and even with other countries like Portugal.

| Year | Local Scopes |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2008 | La Janda (Cádiz) Valle del Almanzora (Almería) |
| 2009 | El Condado de Jaén (Jaén) Sierra de Tentudía (Huelva-Badajoz) Desembocadura del Guadiana (Huelva-Portugal) Montes Orientales (Granada) Sierra Sur (Sevilla) |

Didactic and educational material

Continuing with the editorial line initiated in 2006, the Institute of Cartography of Andalusia, has designed some products directed specifically to the school community. In order to reinforce this line of work, in 2007, the Institute of Cartography of Andalusia signed an agreement of cooperation with the Education Department. Products emphasize:

- "Digital map of Andalusia. Student version". Published in 2007, it is an adaptation of the contents of the Topographic Map of Andalusia 1:100,000 for its academic use. The essential layers for the study of the Andalusian geography have been selected and incorporated to a single application to best facilities students to make their own cartography of the region and to obtain graphs and data of statistical content.
- "Geographical Gymkhana of Andalusia". It is a publication destined to children that allows to know and to learn the main characteristics of Andalusian geography through different games.
- "I know Andalusia. Digital Puzzle". This simple puzzle approach in a pleasant and funny way the image of Andalusia to the children between 6 and 12 years.
- "My city in the maps". It is a didactic book directed to the teachers of primary and secondary level that propose numerous activities to know the cities through the use of maps.
- "Andalusia in a map". At the beginning of 2007 the Institute of Cartography of Andalusia summoned 1st Drawing Contest for children "Andalusia in a map" (more than 500 drawings collected in 100 educational center). The contest has been repeated in courses 2007-2008 and 2008-2009.

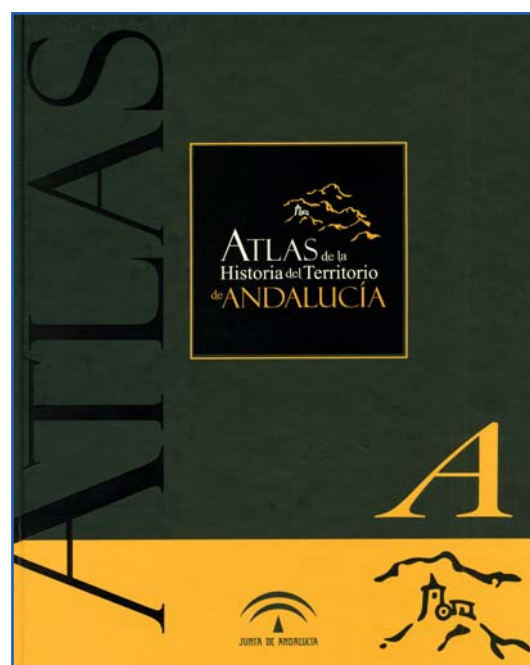


ATLAS OF ANDALUSIA

In 2007, it has been published a re-edition of I Volume of the Atlas of Andalusia dedicated to general cartography (1:100,000). This publishing project, conformed by four volumes, has supposed a concerted effort of compilation, integration and public diffusion of the geographic information available on the Andalusian territory.

In 2009, it has been published the "Atlas of the history of the territory of Andalusia", an unpublished vision of how has been formed the territory of the Autonomous Community of Andalusia.

In 2009 the publication of the Multimedia Atlas of Andalusia is predicted it, is a digital encyclopedia with different contents (aerial photographs, texts, statistical and historical data, animated cartography, etc).



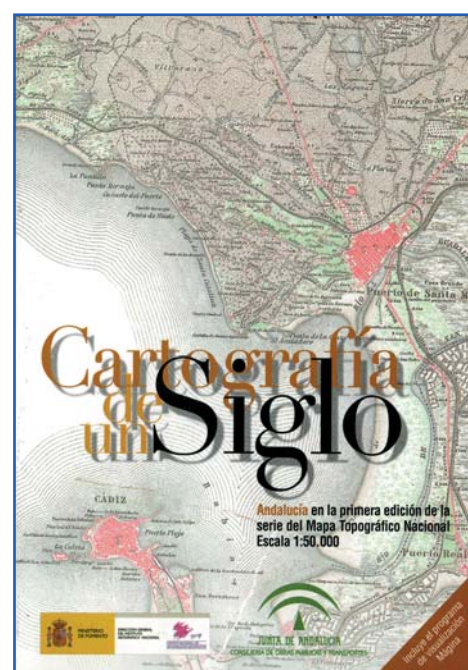
HISTORICAL CARTOGRAPHY

In this period the Historical Cartoteca of Andalusia has continued with the cataloguing and digitalization of funds. The following image shows the conducted operations and the number of consultations assisted by this service.

| | 2007 | 2008 | 2009 |
|------------------|-------|-------|-------|
| Classified maps | 9.586 | 7.620 | 4.998 |
| Digitalized maps | 5.665 | 6.854 | 7.898 |
| Consultations | 629 | 625 | 340 |
| Served copies | | | |
| — Maps | 3.490 | 2.271 | 1.235 |
| — Leaves | 6.720 | 4.369 | 2.370 |

In 2007 the Institute of Cartography of Andalusia published, in collaboration with the National Geographic Institute, "Cartography of a century: Andalusia in the first edition of the National Topographic map 1:50,000", a compilation of cartography of the Andalusian territory.

In this line, in 2007 a DVD was published with the compilation of the leaves corresponding to Andalusia of a cartography



1:50.000 elaborated by the German government before the World War II (1940–44), also have published a similar map (Scales 1:50,000 and 1:250,000) getting up between 1943 and 1951 by the U.S. Army Map Service.

In 2008 the Institute of Cartography of Andalusia finished publishing the Catalogue of Historical Cartography and have begun a new collection of DVD "Digital Historical Cartography".

DIFFUSION

Internet

The web has become the main channel of diffusion of the products of the Institute of Cartography of Andalusia. The ICA is making an effort in order to renovate the contents and maintain modernized the connections, calls, inventories and documents.

In 2009 it has modified the interface of presentation of the Web page and the contents:

- "Andalusian Positioning Net", the services that the RAP renders are the unloading of files of observations RINEX and the shipment of corrections differentials for the positioning with GPS in real time. Besides the services of positioning, the portal includes abundant information on Geodesy.
- "IDEAndalucia, Spatial Data Infrastructure of Andalusia" is the nexus of union between the producers and users of geographic information of Andalusia. IDEAndalucia is a point of contact of the cartographic community, in connection with the rest of users anywhere in the world.
- "Linea". Discharge of maps and photos, If you accede to LINE@ you can consult the planes, maps and existing aerial photographs of a zone, and locate them through corresponding toponyms or of interactive form. Also it is possible to see, to print or download any map.
- "Searcher of Historical Cartography". It offers the possibility of search historical documents request among an important volume of maps and planes (surroundings to the 110.000), and allows to consult existing documents of interactive form.
- "Gazetteer", it allows to look for the toponyms including in the Data Base of Toponyms 1:10,000 (BTA10), that contains more than 140.500 records.
- "Digital Street Guide of Andalusia" is one of the cartographic applications of greater demand and use. It allows the location of directions, services and points of interest of any Andalusian town.
- "Cartographic Product Catalogue", it allows to consult different products made and published by ICA, its characteristics, prices and forms of acquisition.
- "Atlas of Andalusia", it offers cartographic, textual, statistical and graphical contents of the Atlas of Andalusia, as well as some interactive applications.
- "Atlas of the History of the Territory of Andalusia", it shows different aspects from the Andalusian territory in eight thematic volumes (half physical, territorial arrangement of the territory, city, economy, infrastructures, history and patrimony)
- "Guide of highways of Andalusia", With updated cartographic information about the Road network of Andalusian territory.
- "Andalusia in a folio", it offers a map of Andalusia for its free download.
- "Download of programs", it is the access to download programs for the visualizers.

Exhibitions

In these three years, the Institute of Cartography of Andalusia has organized a great number of exhibitions of different content. The main are mentioned next:

2007

- March, 22 and 23, «Spatial Data Infrastructures» in Seville.
- March, 27 to April 10, exhibition «Andalusia in a map» in Seville.
- May, 3 to 12, exhibition «Andalusia in a map» in Ayamonte (Huelva).
- June 3 to 12 exhibition «The maps in the Civil War» in collaboration with the Institut Cartogràfic of Catalunya in Seville.
- June, 4 to 15, exhibition «Andalusia in a map» in Arahal (Seville).
- November, 26 and 27 «I Days of encounter of the Organization for the Cooperation in Cartography of the Autonomous Communities (OCCA),» in Santiago of Compostela.
- December «The maps in the Civil War» in collaboration with the Institut Cartogràfic of Catalunya in Granada.

2008

- February 12 to March 6, exhibition and technical days «The maps and the space information» in Jaén.
- January 14 to February 3, «The maps in the Civil War» in collaboration with the Institut Cartogràfic of Catalunya in Málaga.
- April, 26 to 10, exhibition and technical days «The maps and the space information» in Córdoba.
- June 2 to 10, exhibition «Andalusia in a map» in Ayamonte (Huelva).
- September 4 to 28 «50 years of territorial transformations in Almería. 50 anniversary of the American flight (1957-2006)» in Almería.

2009

- March 3 to 24, exhibition and technical days «The maps and the space information» in Almería.
- April 24 to May 15, exhibition and technical days «The maps and the space information» in Cádiz.
- May, 6 to 9. II Days of encounter of the Organization for the Cooperation in Cartography of the Autonomous Communities (OCCA), in Seville.
- May 20 to 22. Expo-Geomática, in Málaga.

FORMATION, CONFERENCES AND SEMINARS

The Institute of Cartography of Andalusia has organized or sponsored a series of formative activities between 2007 and 2009 consistent in the following technical days and courses.

2007

- Course «Microstation.» In collaboration with the IAAP, 26-30/ 03/ 2007.
- Course «SIG ArcGIS v9.» In collaboration with the IAAP, 7-11/ 05/ 2007.
- Course «Infrastructure of Space Data.» In collaboration with the IAAP. 21-24/ 06/ 2008.

2008

- Course «Photoshop 9.» In collaboration with the IAAP. 3-5/ 03/ 2008.
- Course «Infrastructure of Space Data.» 13-14/ 03/ 2008.
- Technical Conference on Geocodificación. April 16.
- ESRI Day: Generation, design and completed from maps of quality. April 29.
- Course « Spatial Data Infrastructures» 2-5/ 06/ 2008.
- ESRI Day: Storage, administration, exploitation and analysis [raster]. May 13.
- Course «GPS.» In collaboration with the IAAP. 12-15/ 06/ 2008.
- ESRI Day: Corporate systems. May 27.
- ESRI Day: Photogrammetry and remote sensing with tools of Leica. June 10.
- Technical Conference on metadata. June 17.
- Course of University Expert in Administration of Geographical Information. In collaboration with the Seville University. October 2008-July 2009.
- Technical Conference on OGC services. November.
- Technical Conference on control and insurance of quality in the cartographic production. December 10.
- Order of 16 of December of 2008, for which they settle down the regulating norms for the concession of scholarships for the formation of technical personnel as regards cartography, systems of geographical information and presentation of geoservices through the web.

2009

- Technical Conference on technical Norms: The normalization of products and services. February 24.
- Technical Conference on Access to the information. April 15.
- ORDER of 20 of April of 2009, for which the regulating bases of the concession of help to the investigation as regards geographical information.
- Day ESRI. GIS and mobility. April 21.
- Setting in progress of the Virtual learn with two courses one of Introduction to gvSIG and another of advanced gvSIG, developed between April and May.
- ESRI Day. Applications in Internet. May 26.
- Technical Conference on Interoperables services. June 16.
- ESRI Day. Geoportales. June 25.
- Course of University Expert in Administration of Geographical Information. In collaboration with the Seville University. October 2009-May 2010.

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4. Other Cartographical Centers

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