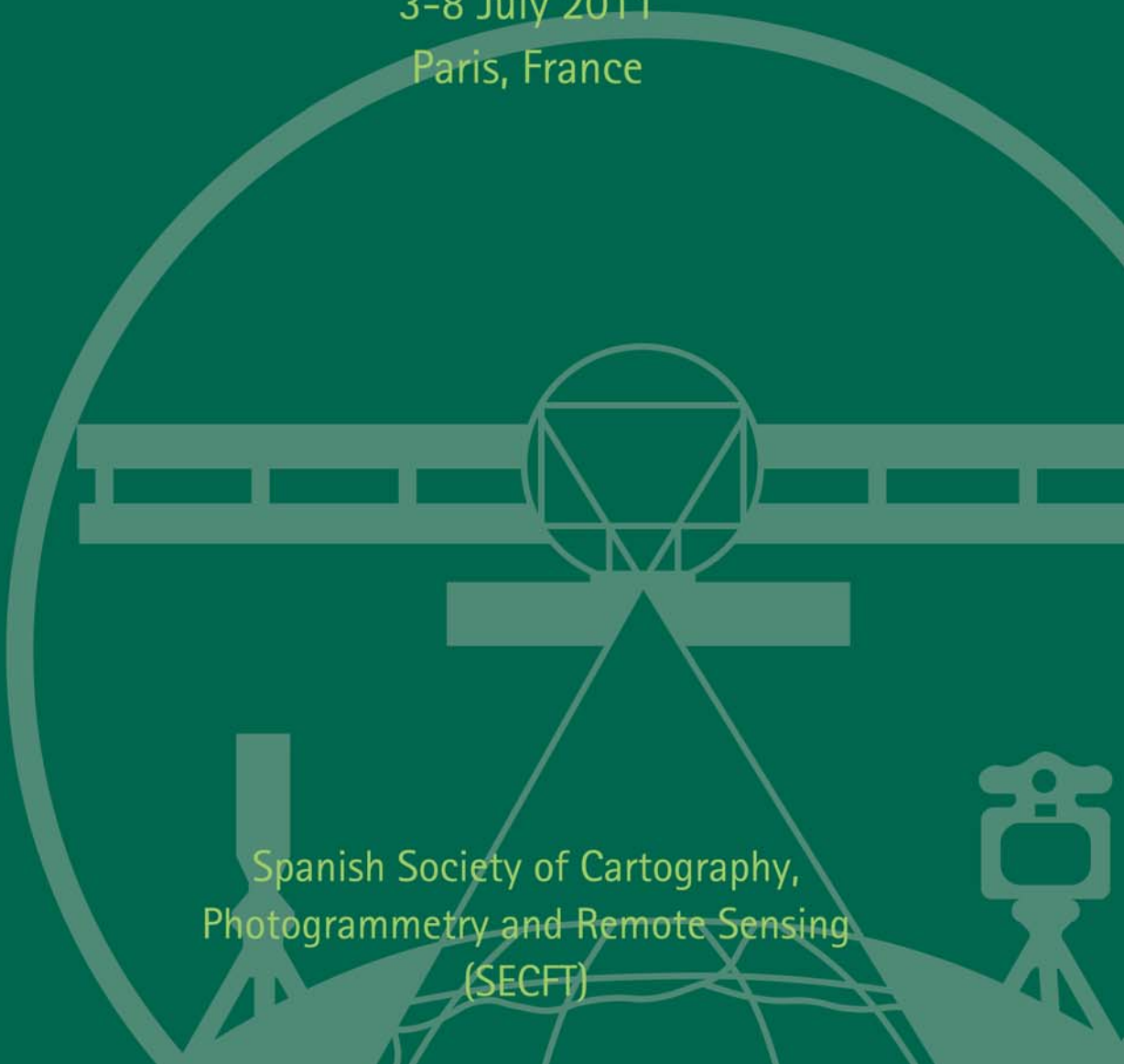
NATIONAL REPORT
SPAIN

2007-2011

XXV International Cartographic Conference
International Cartographic Association. ICA

3-8 July 2011
Paris, France



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

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National Report Submitted to the XXV International Cartographic Conference
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1. Introduction

Ramón Lorenzo Martínez
President of SECFT

Over time the celebration of the International Cartographic Conference, convened by the International Cartographic Association, is an event of global significance to which the Spanish Society of Cartography, Photogrammetry and Remote Sensing (SECFT) provides a great interest. On this occasion in Paris we want to present this Spanish National Report as a good example of that interest. With it we want to present the most important achievements of the Spanish activity both in geographical information and in cartography.

Moreover as President of the SECFT, and on behalf of our members, I also want to show our appreciation for the organization of the International Exhibitions and Barbara Petchenik Children's Map Competition. These are important initiatives for the ICA and National Members. In fact, from Spain we see both initiatives as essential and indispensable reference for Conference attendants to complete their knowledge in connection with mapping activities in different countries and continents. Therefore we have presented a large number of maps in this Exhibition, more than 50 cartographical products and maps. All this maps, from different Spanish organizations may serve as essential reference in order to get a clear idea of the Spanish cartographic activity.

As we reported at the previous Conference, National Geographic Institute has achieved one main goal in coordination of Spanish cartographical activities through the new administrative regulation. Greater efficiency in producing and management official cartography making it compatible with a reduction in public spending by coordinating national mapping projects with those of the different autonomous communities. To do this we have incorporated the most modern technologies in geographic information.

Cartographic activities in Spain between 2007 and 2011 have been characterized by the increased production of large-scale maps, topographical and thematic maps, and orthoimages at different scales. A positive example of that is the National Plan for Aerial Orthophotography (PNOA), also we can mention Land Cover & Land Use Information System (SIOSE) and the GIS for Land Cover & Land Use in Spain.

Within the field that concerns the IGN we would like to highlight the National Topographic Database 1:25,000 (BTN25). Database and the Spanish Spatial Data Infrastructure (Infraestructura de Datos Espaciales de España, IDEE). Our approach 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/DVD (47) and in paper books (6 volumes) and has more than 2,000 pages with more than 4,000 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 and DVD)
— Atlas on Internet.

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

In accordance with the strategic framework defined by the Directorate General of the National Geographic Institute, the CNIG is likewise tasked with the planning and management of the geographic information infrastructure for Spain, as well as the harmonization and standardization, within the framework of the National Cartographic System, of official geographic information. It is also in charge of planning and developing value-added services and new geographic information systems and applications.

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 (IHM) 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. 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

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

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 a Integrated Geoscientifical Cartography using the Continuous Geological Map (GEODE) of Spain as a basis. It's about delivering analytical map symbolized information, in other words, normalized Geocientifical 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.

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 (Multibeam Cartography Group), where it is developing systematic cartographic projects of the Exclusive Economic Zone and adjacent coastal areas.

Program ESPACE has published 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.

From the very beginning, the Cartographic Institute of Catalonia (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.

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.

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

In May of 2011, the ICA initiates a new stage, for economic reasons, efficiency, effectiveness and compatibility their competences have been transferred to the Regional Ministry of Economy, Innovation and Science Office and merger them to those developed in statistics, a fact that has given birth to the Institute of Statistics and Cartography of Andalusia (IECA).

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 Technical Topographic Engineering —currently, there are 9 centers in Spain— (Extremadura, Jaén, Las Palmas de Gran Canaria, Oviedo, Salamanca, País Vasco, Cataluña, Madrid y Valencia).

The SECFT is very proud of the awards received in previous Cartographic Conference and shared with total satisfaction with the event organizers earlier successes. If the International Cartographic Association (ICA) is considered to excellence in the world of cartography, the prizes awarded by the ICA to the best maps have to have the highest regard for the winning countries. Spanish cartography has been rewarded with several 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-Mediterráneo1:5,000,000 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 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 Topogràphic 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 Orienteering map".
  - Map and Guide of Garajonay National Park 1:25,000 National Center of Geographic Information of Spain.
- 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 Egual World For All"
Samuel Zúñiga Vélez (9 years).

ICC SANTIAGO DE CHILE 2009
INTERNATIONAL MAP EXHIBITION
XXIV INTERNATIONAL CARTOGRAPHIC CONFERENCE

- Award for excellent in cartography, selected by Official Jury in the category "Digital Products-Maps and Digital Images".
  - National Atlas of Spain (1986-2008). Thematic Groups-Facsimile Digital version National Geographic Institute of Spain
- 2nd Award for excellent in cartography, selected by Official Jury in the category "Thematic Map".
  - Pyrinees Geologic Map1:400,000 Collaboration between French (BRGM) and Spanish (IGME) Geological Surveys.
- Award for excellent in cartography, selected by the Delegates in the category "Thematic Map".
  - Les Cartes Portolanes Cartographic Institute of Catalonia.

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

In the category 9-12 years
Drawing "Globalized World"
Beatriz Borroso Gstrein (12 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

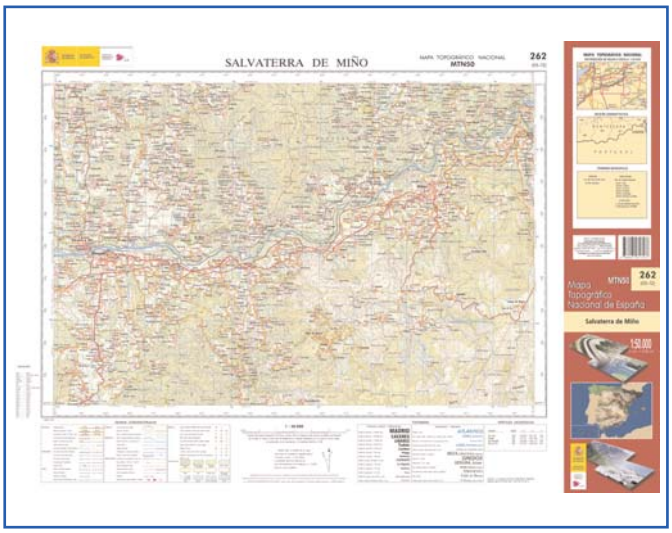
2.1. National Geographic Institute

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28003 Madrid - Spain
Phone: +34 91 5977000
Fax: +34 91 5979765

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 steroplotting 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: it is fully finished and continuously updated.

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 throught 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 an 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). It is a multipurpose geographic information system that stores topographic and thematic data. The essential features of the current BCN200 are that it is a continuous SIG, not divided bt sheets, there is a table for each geographic phenomenon and explicit geometry. National coverage and yearly updated.
- Digital Terrain Model (MDT200) of 200 x 200 m grid. National coverage continuously updated.

Serie of Camino de Santiago. The serie has been created using the MTN50 as a highly detailed and precise geographic base. It consist of 38 stages (10 sheets) of the entire Way of St. James.

- 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 1:1,2500,000 scale in paper and digital format
- 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.



Way of St. James (Spain)

Data capture: PNOT (PNOA, PNT, SIOSE)

The National Plan for Land Observation (PNOT) must be highlighted within data capture activities.

Geographic data is captured through national plans for territory observation, thanks to the use of photogrammetry and remote sensing, as well as the production, updating and operation of digital terrain models from aerospace images. Territory observation is a primary and essential activity in any project requiring basic or thematic geographic information. Since 2004 this activity revolves around the National Plan for Territory Observation (PNOT), in which the general state administration, via various ministerial departments, and all of the autonomous communities participate. It is thus a cooperative plan that pools technical, logistical and economic efforts through complex mechanisms of inter-administrative coordination led by the IGN/CNIG. This Plan is divided in three different phases.



City of Toledo, Spain

In the first phase, the objective of the PNOT is to obtain aerial image coverage from satellite and

digital elevation models for multidisciplinary applications, with economically optimized resolution and updating periods, as well as to develop applications in which these images are going to be used. This coverage is organized into various levels of spatial resolution and time frequencies, which are materialized into specific plans:

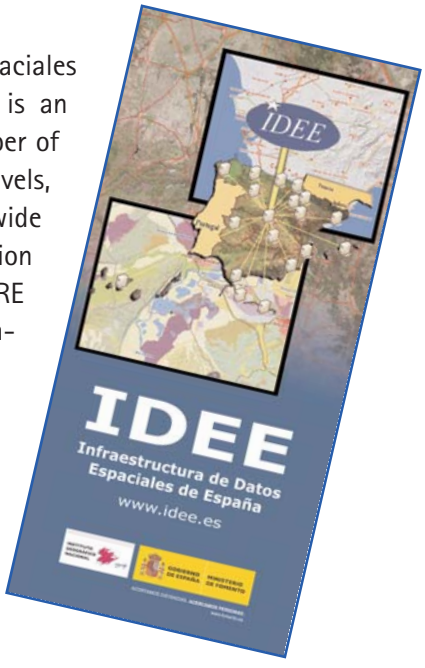
- **National Plan for Aerial Orthophotography (PNOA),** which provides, among other photogrammetric products, periodic coverage (from two to four years) of the entire national territory via very high resolution aerial orthophotography, PNOA25/50 (25/50 cm) and PNOA10 (10 cm).
- **National Remote Sensing Plan (PNT),** which provides periodic coverage (annual, monthly and weekly) of the entire national territory via medium- and low-resolution satellite images (2.5 to 100 m).

The second phase of the Spanish National Plan for Land Observation takes in the coverage of the PNOA and PNT in cartographic, environmental and land-cover operations by the various participating organizations. It produces basic and thematic geographic information for carrying out service and development activities.

It is noteworthy that in 2009 the first coverage of the **Spanish Land Cover/Use Information System** (SIOSE) was completed. This project includes information from the land-cover data bases (urban, agricultural, forested, natural, and wetland areas), generated by the autonomous communities and the general state administration, with a precision equivalent to a scale of 1:25,000 and updated each two years.

The third phase (also included in the service and development activities) of the PNOT takes in the dissemination of all information at an institutional as well as user level. It uses the Iberpix image server for this, which enables the display, consultation and downloading of geographic information generated and managed in the PNOT environment.

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 sinergically. It offers a wide

range of 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 photogrametry, 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 updating 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 steroplotting, 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 finished.

DERIVED AND THEMATIC MAPS

The National Geographic Institute produces and updates the following derived cartography based on edition processes or topograghical 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 onceprovincial 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/DVD (47) and in paper books (6 volumes) and has more than 3,000 pages with more than 5,000 maps.

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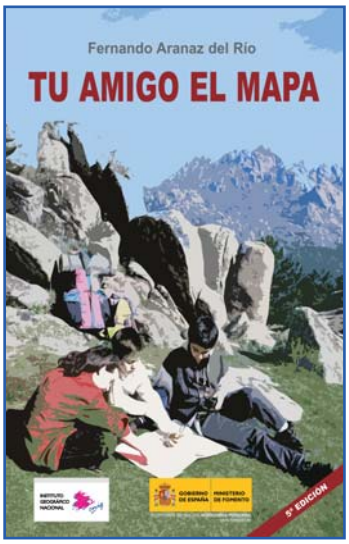
Among the products, it highlights the publication of several thematic groups such as electronic books (in PDF format, CD); Compendium series, which brings together some summary content of the National Atlas of Spain to meet the needs of a specific segment of users; and Monographs Series.

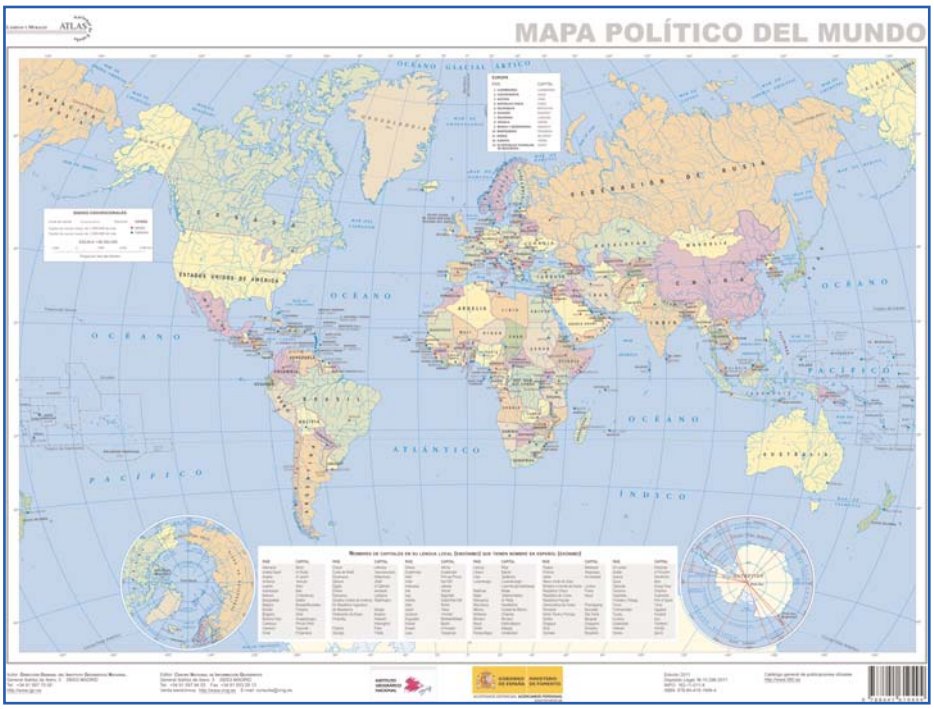
The National Geographic Institute is actively involved in training activities and dissemination of geographic culture. So in this line it has been designed, developed:

And taught several editions of e-learning courses: Geography for ESO (secondary school) and Thematic Cartography (basic and advanced level).

An specific web called «Educational Cartography» with:

- Educational projects: «Mi amiga la Tierra» (My friend The Earth); "España a través de los mapas" (Spain in maps) made in collaboration with the Spanish Geographers Association (www.ign.es/espmap), "La Población en España" (Population in Spain) made in collaboration with the University of Zaragoza (www.ign.es/pobesp/); «Atlas didactico de America, España y Portugal» (Educational Atlas of America, Spain and Portugal) ,ade in collaboraton with the Pan American Institute of Geography and History).
- Educational materials: «Conceptos cartograficos» (Cartographic concepts)- flash application- and the book in pdf format «Tu amigo el mapa» (Your friend the map).
- Blank maps and puzzles of Spain, Europe and World.





— Other resources from elearning courses related with educational community in Spain.
— 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).

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 SIANE is subdivided into the following subsystems:

— Data entry subsystem. Involves the activities and tasks for introducing information into the system. It centers on the development of ETL (extract, transformation, load) tools to load data from data bases provided by supplier bodies.
— Processing subsystem. Involves the activities and tasks for generating the objects to be published from the data entered into the system.
— Publishing subsystem. Involves the activities and tasks for publishing objects on display screens or to integrate them into the composition of dummy publications. It centers on the development of computer applications that act as "connectors" between the various publishing tools (applications for page layout, content management, Web page development, for developing multimedia and CD/DVD and Web screen applications) and the processing subsystem.

Until now, work has focused on developing the processing subsystem and the publication subsystem. Tools that facilitate the entry of data from supplier bodies have also been created. Currently there are:

— A document management system that enables:

  • Storage of different types of resources (images, texts, illustrations, maps, etc.), taking into consideration the variable *time*.
  • Processing and storing of thematic variables used in drawing statistical maps.
  • Drawing and sharing of first prints from printed publications.
  • Editing metadata for each resource.
  • Automatically publishing any resource via the Web (as a catalog).

— A map editor that enables:

  • Drawing statistical maps of Spain, Europe and the world, using any thematic variable stored in the content manager.
  • Semi-automatically updating statistical maps.

In 2009, the following aspects of SIANE were developed:

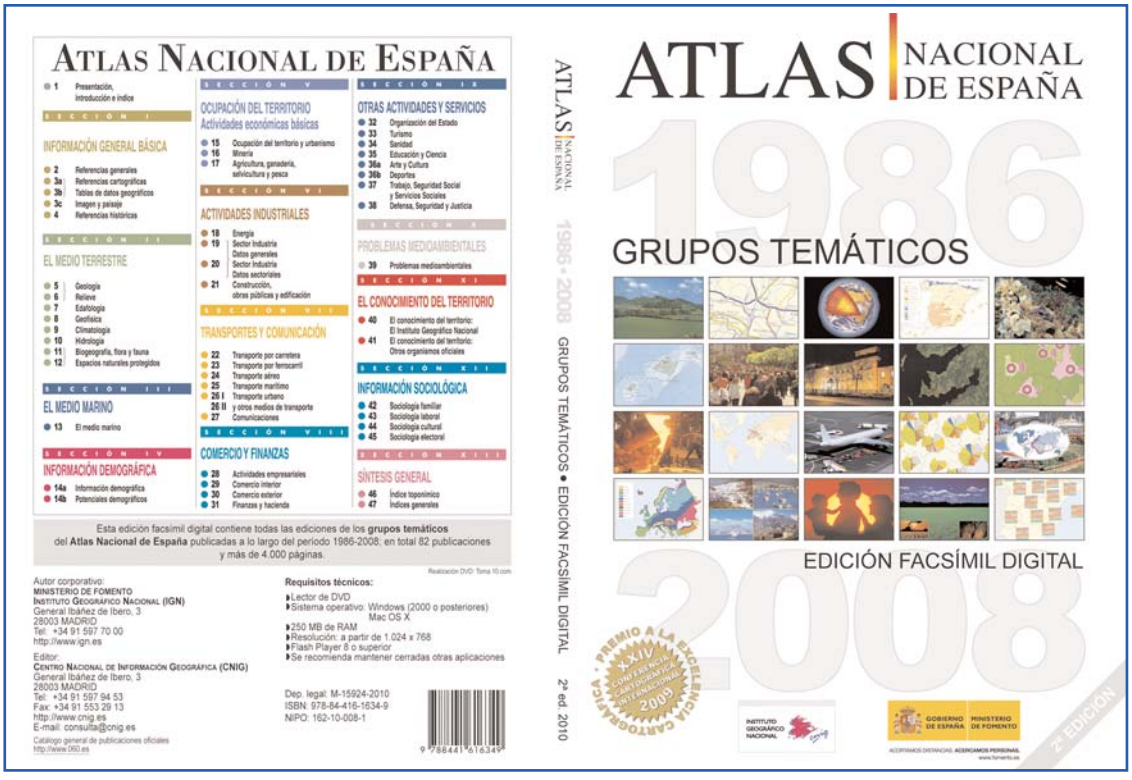
- Its own developments and the validation of external developments.
- Installation and first start-up of SIANE. Creation of facility documentation.
- Preparation of different data, metadata templates and uploading them into SIANE; system documentation.
- Creation of new resources through the use of SIANE. Thirty definitive maps with 50 associated thematic variables and their corresponding metadata have been created.

This means that new products and services derived form 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.

Facsimile digital version (1986-2008)

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 (http://www.ign.es/ane/ane1986-2008/).

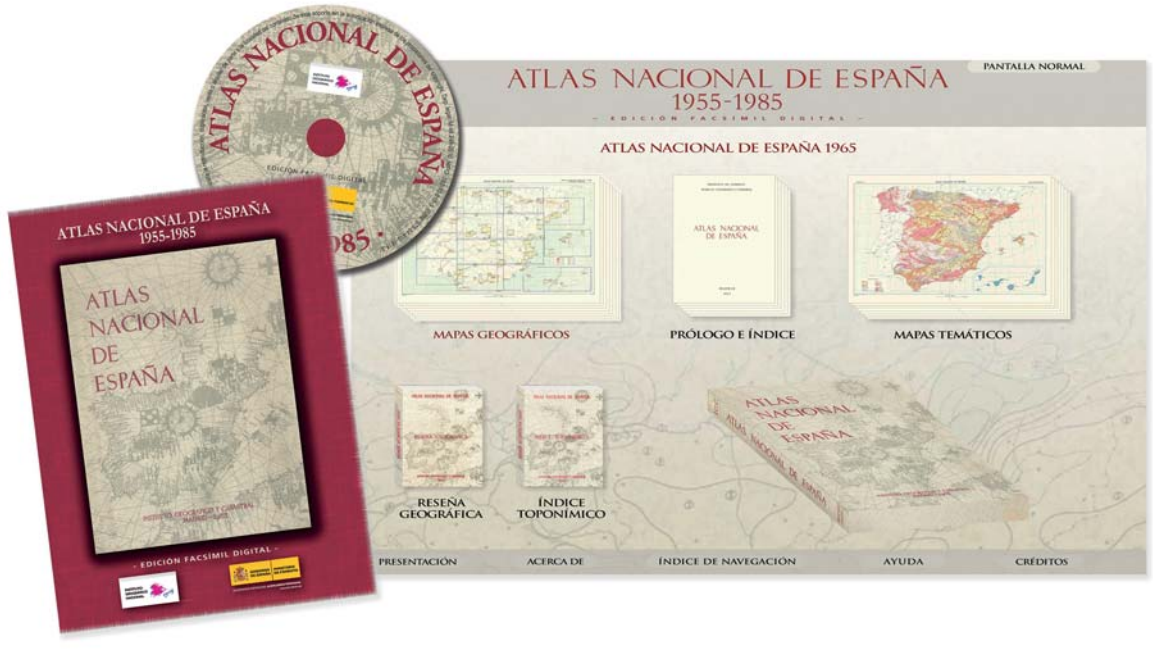


Facsimile digital version (1955–1985)

During 2010 to make available the rich heritage of this National Atlas produced from 1955 to 1985 (considered as the first National Atlas of Spain), the IGN decided to produce a digital facsimile edition of this atlas, on CD and web (http://www.ign.es/ane/ane1955-1985/)

This first National Atlas was commissioned by the Geographic and Cadastral Institute (now IGN) in 1955 and led by Dr F. Vazquez Maure involving the most prominent Spanish geographers and cartographers of the time, and different institutions of greater importance. The initial project included the completion of 100 sheets of maps (28 geographical and other thematic sheets). The main achievement of the project was the production of a map of the country at a scale of 1:500,000.

The Atlas was published in a large box material lined containing the sheets (28 geographic and 24 thematic pages), the books of the geographic review and the toponymical index.



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 Toponimy). 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 proyects with diferent organisations international:

- Association GSDI (Global Spatial Data Infrastructure).
- International Cartographic Association ICA/ACI.
- EURADIN (EURopean ADdress INfrestructure).
- 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 Tesearch).
- 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 24rd International Cartographic Conference held in Santiago de Chile (Chile) in November 2009, gave an award to the IGN for excellent in cartography, selected by Official Jury in the category "Digital Products (Map and Digital Images)". National Atlas of Spain (1986-2008) Thematic group. Facsimile digital version, National Geographic Institute of Spain.

- 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 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

General Ibáñez de Ibero, 3
28003 Madrid - Spain
Phone: +34 91 5979514
Fax: +34 91 5351713

The National Centre for Geographic information (CNIG), an independent agency attached to the Ministry of Infrastructure and Transports through the General Directorate of the National Geographic Institute, is responsible for producing, developing and distributing the geographic work and publications demanded by society. In particular and according to the CNIG statute, approved by Royal Decree 663/2007, dated May 25, it is tasked with the following functions:

- To market and disseminate the products and services of the Directorate General of the NGI.
- To guarantee the quality and distribution of official geographic information.
- To support the development and use of national mapping.
- To develop products and services on demand.
- To maintain a territorialized system of public information and manage the operations of the regional services of the Directorate General of the NGI and, if needed, of its territorial dependencies, as well as the organizational and functional management of the network of *Casas del Mapa* (sites that provide geographic information).
- To provide specialized technical assistance in the field of geographic techniques and sciences, and for the operations established in the Statute and those indicated by the High Geographic Council for government departments integrated into the National Cartographic System.

In accordance with article 17.1.j) of Royal Decree 30/2011 and within the strategic framework defined by the Directorate General of the National Geographic Institute, the CNIG is likewise tasked with the planning and management of the geographic information infrastructure for Spain, as well as the harmonization and standardization, within the framework of the National Cartographic System, of official geographic information. It is also in charge of planning and developing value-added services and new geographic information systems and applications.



The National Centre for Geographic Information has published the following between 2009-2011:

- Serie "Parques Nacionales" (National Parks Map & Guide):
  - Cabañeros. National Park Map & Guide. 2010. 1:25,000 scale. Spanish.
  - Archipiélago de Cabrera National Park Map & Guide. 2010. 1:25,000 scale. Spanish.

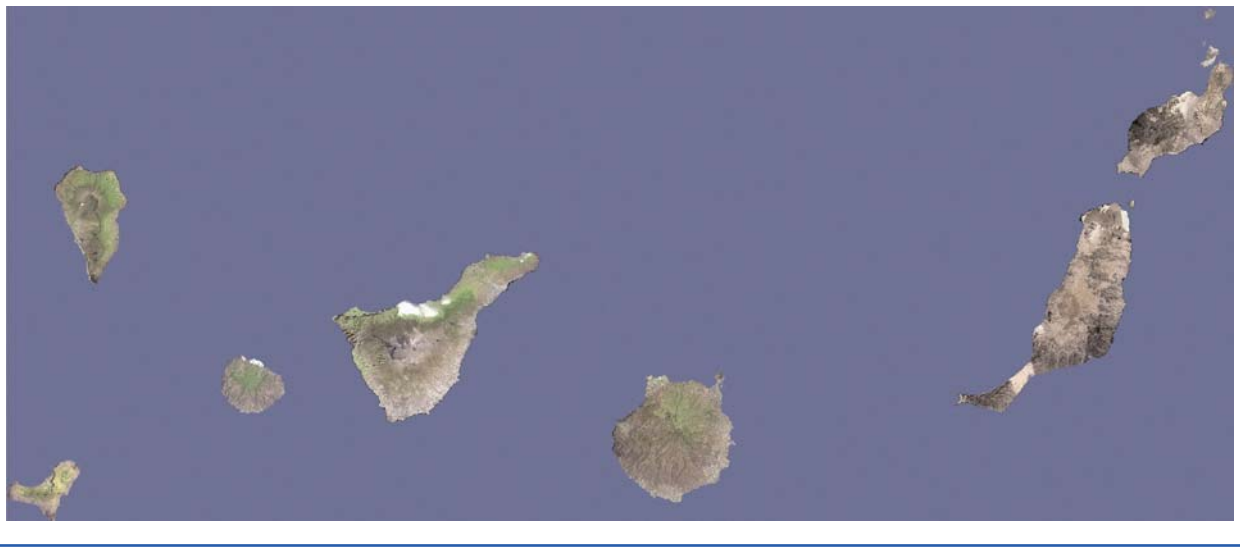
- Islas Atlánticas de Galicia National Park Map & Guide. 2010. 1:25,000 scale. Spanish.



– "Mapa del espacio OTALEX. Extremadura-Alentejo" 1: 600,000 scale. Spanish.
– Mapa del Estrecho de Gibraltar, 2011 1: 100,000 scale. Spanish.

Satellite image serie with shaded relief of the Autonomous Comunities (Regions) (Published with Universidad Autónoma de Madrid):

– Islas Canarias.
– Castilla-La Mancha.
– Galicia.
– Castilla y León.



Stellite image. Islas Canarias

WEB SITES OF INTEREST

National Geographic Institute: *www.ign.es*
National Center for Geographic Information: *www.cnig.es*
Spatial data infrastructure of Spain: *www.idee.es*
NGI server for images and maps: *www.ign.es/iberpix/*
Official street directory of Spain: *www.cartociudad.es*
Information system on land cover in Spain:*www.siose.es*
Central government geoportal of spatial data: *www.ideage.es*
National Astronomical Observatory: *www.oan.es*

2.3. Publications Office. Ministry of Development

Paseo de la Castellana, 67
28071 Madrid - Spain
Phone: +34 91 5978267
Fax: +34 91 5978470

ROAD MAP

The new edition of the Official Road Map of Spain for 2011 maintains the basic criteria that allow complete graphical description of the road network in Spain and the calculation of routes and interactive access to associated thematic information databases. Digital and interactive version of the map allows for continuous updating via the Internet by downloading the continuous changes taking place in the road network. The features of this edition are:

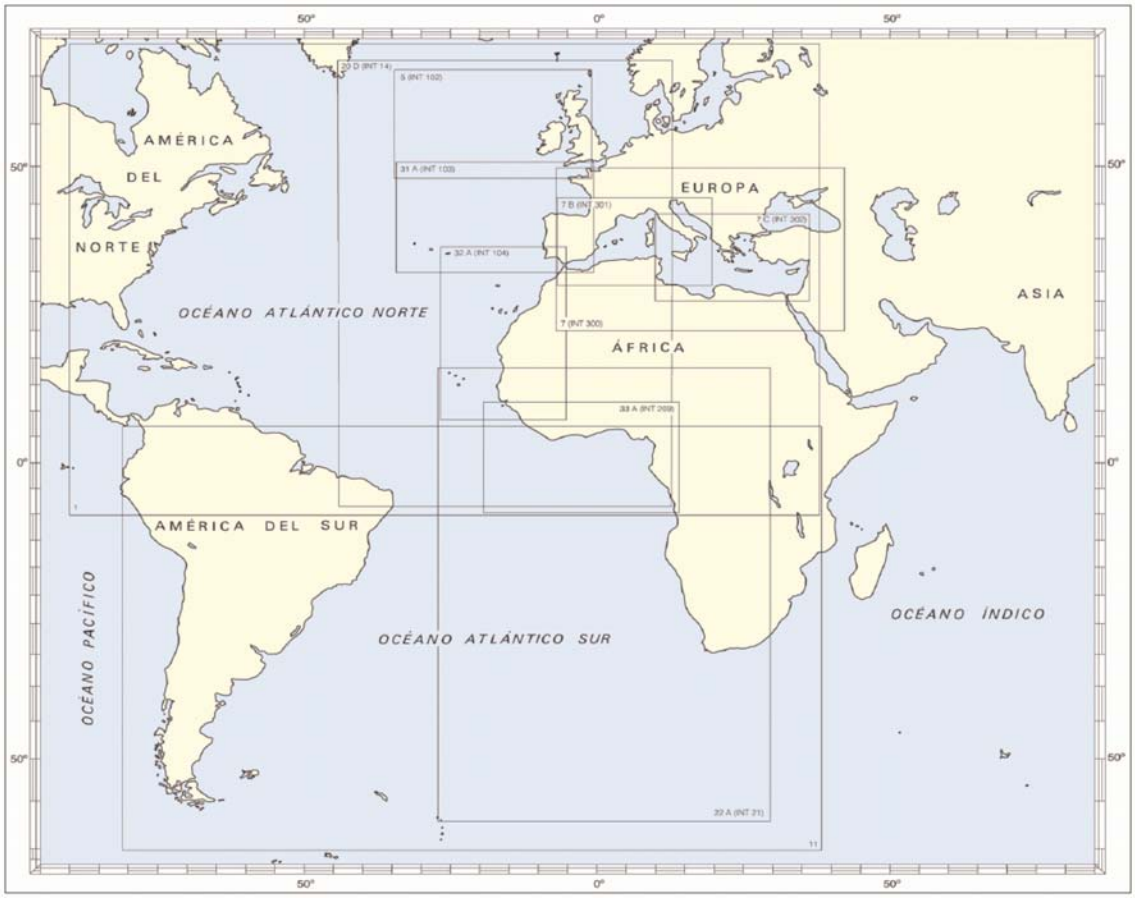


- 1:300,000 scale maps. Includes the Ways of pilgrims to Santiago de Compostela.
- Interactive CD-ROM updated via WEB. In Spanish and English.
- 20,000 towns and villages with basic data on population and geographical features.
- Selecting routes with alternative options and reports of characterization of the route.
- Displaying 152 tourist routes with recommendations on more than 1,000 points of interest to the user.
- 974 Protected Natural Areas landscaping information, flora and fauna.

2.4. Spanish Navy Hydrographic Office

Plaza San Severiano, 3
11007 Cádiz - Spain
Phone: +34 956 59 94 05

The Instituto Hidrográfico de la Marina (IHM) 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.



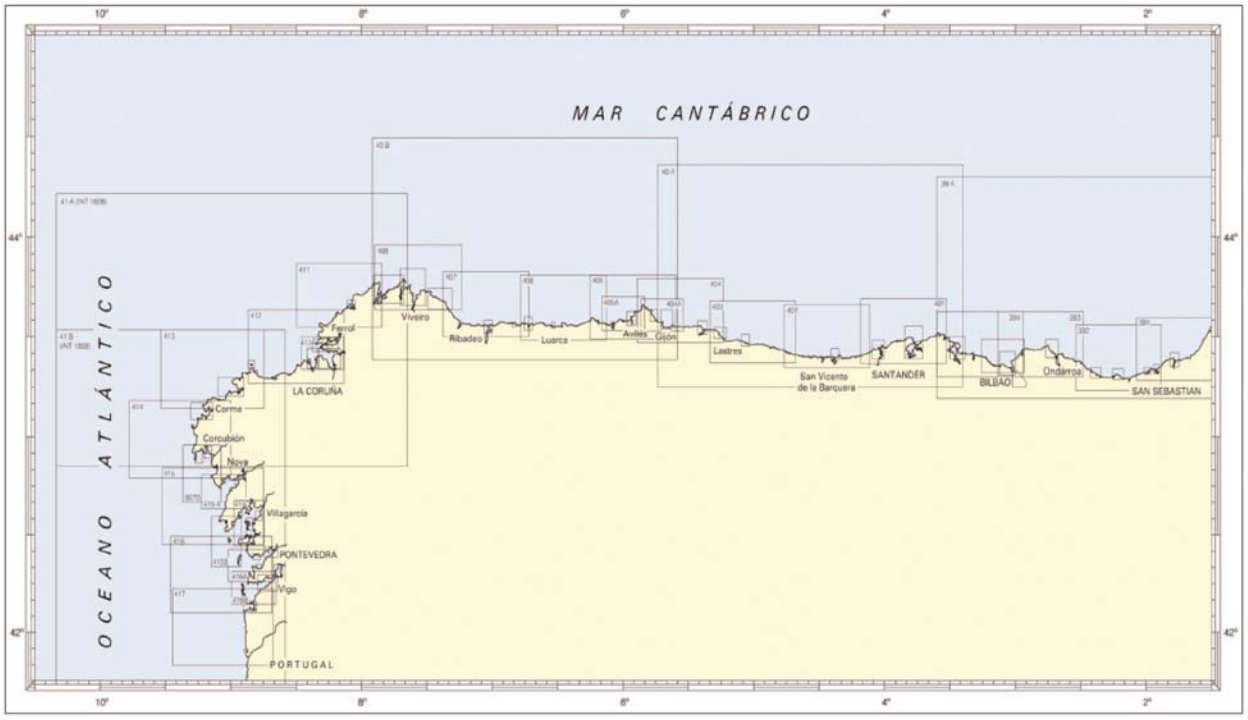
Furthermore, in response to requests for geographic information from areas unrelated to navigation and considering the concepts of Spatial Data Infrastructure, both at the national level and inside the IHO, requirements are being considered to satisfy this new demand.

During the last four years the production of New Charts and Editions on paper is considered as adequate, as the average age of published cartography is 7,5 years, which compares favourably with neighbouring Hydrographic Offices.

It was finished the revision of the "Cartographic Project" with the aim of improving cartographic coverage of ports and harbours not adequately represented because of their relevance or recent building.

Also, as a part of the Cartographic Project, a new production plan of Electronic Nautical Charts (ENC) has been established after the previous one was completed in early 2011. 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 increases the number of ENCs, from 118 to 267.

During 2010 this IHM provided the Central Registry for Cartography under the National Geographic Institution with the coastline for Spain, derived from the base chart series at scale 1:50000.



CARTOGRAPHIC PRODUCTION

Paper Charts

64 nautical charts were published, as follows:

- 47 New Charts and New Editions.
- 17 Reprintings.

Electronic Nautical Charts (ENC)

103 ENCs have been produced, as follows:

- 22 New Charts.
- 81 New Editions.

Currently the overall amount of available ENCs is 120, which can be classified by their navigational purposes as follows:

- General 4
- Coastal 21
- Approaches 45
- Harbour 50

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:

- 1365 Notices updating paper charts, 89 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.
- 1230 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.
- 4 Leisure charts, D210, D489, D105 & D443 were published.
- New printings of the Training Chart and Plotting Sheet (0B).
- IHO Document "Facts about Electronic Charts and Carriage Requirements" was translated into Spanish.

MILITARY CARTOGRAPHY

AML Project

This project involves a number of digital geospatial data products designed to cover all requirements of NATO maritime defense not related to navigation.

One AML layer production project has been developed at the national level including co-production with NATO (Permanent AML) as well as production-on-demand of Dynamic AML Layers requested by different branches of the Navy in support of tactical or strategic planning of operations or 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.

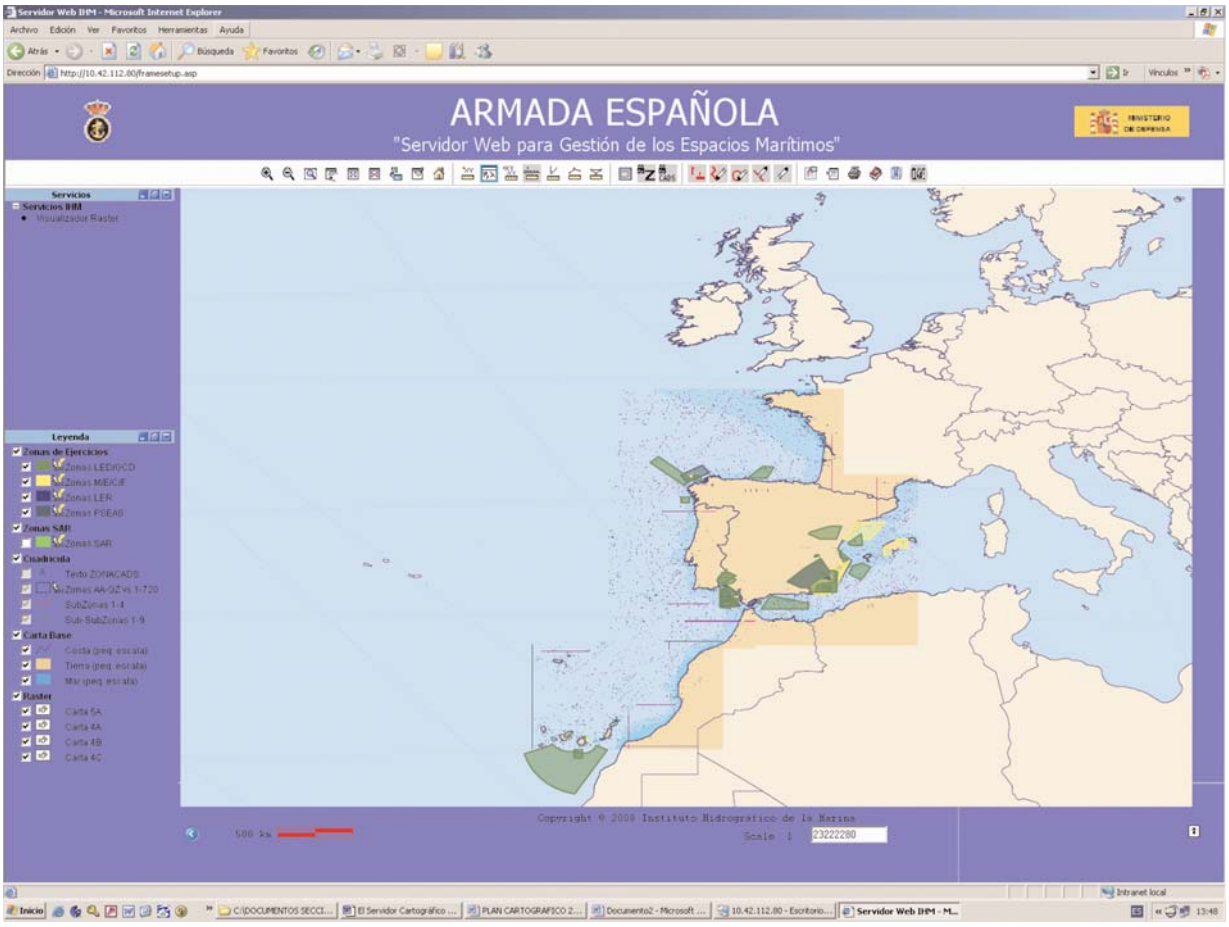
Cartographic Server

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

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.

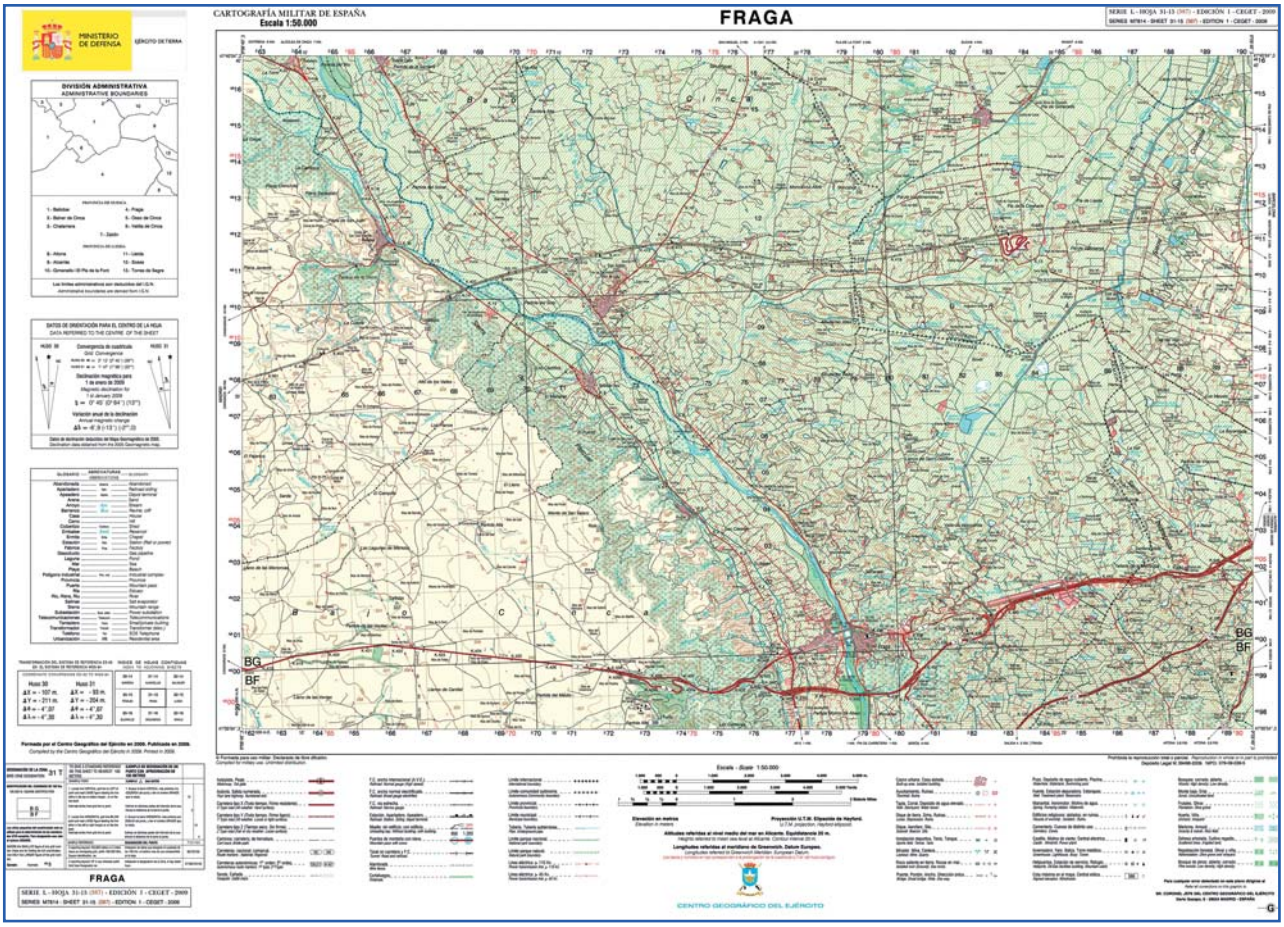
We keep on going with the update works of getting data and publication of the small-scale general-purpose map of Spain (1.000K) and series 1404 and 1501 (500K and 250K). These series are updated every 4 years.

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.



Data collection on ground

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 the battlefield), the flow of maps mak-



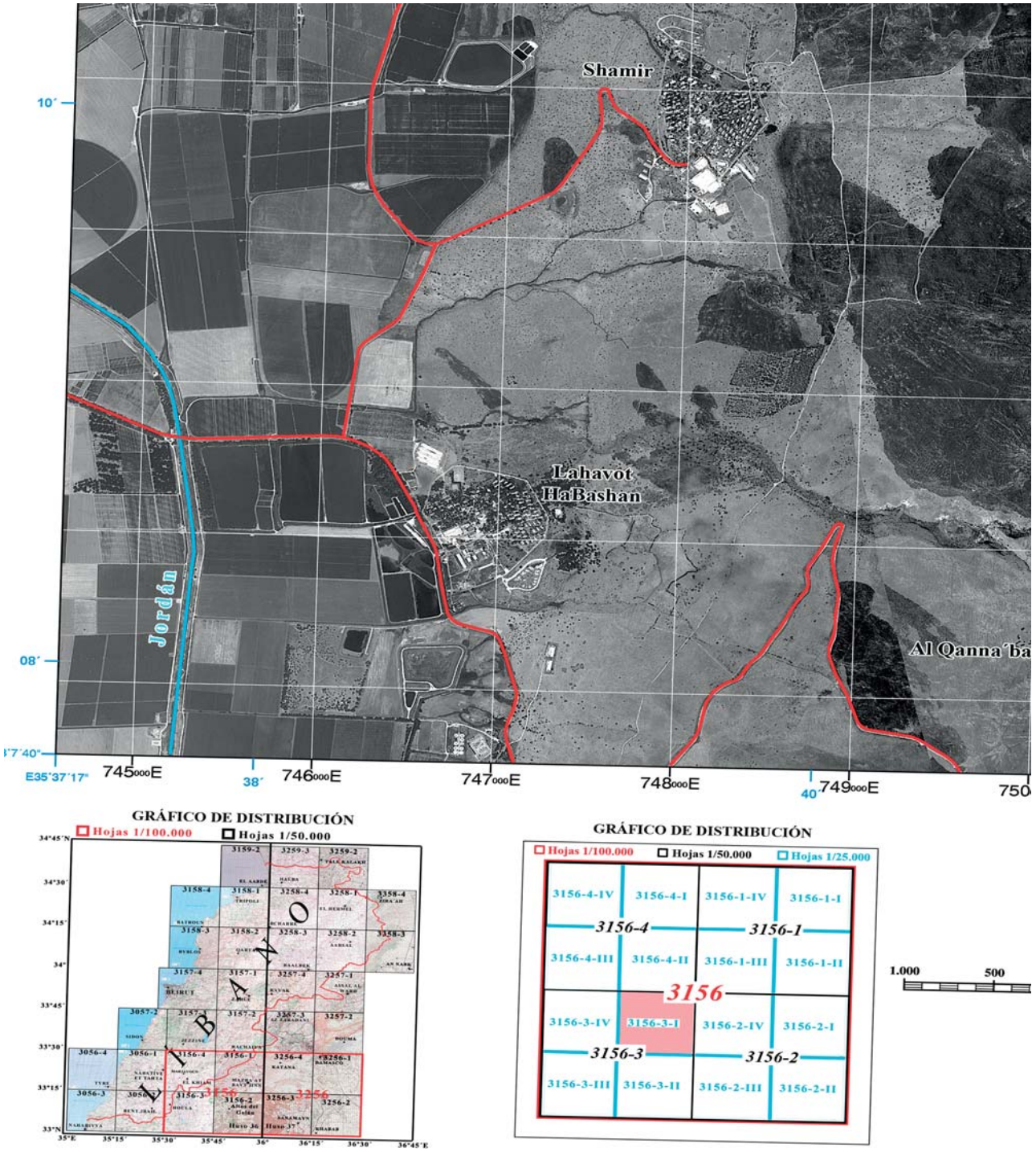
Map of Serie L "Fraga" at scale 1:50,000

ing, 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).

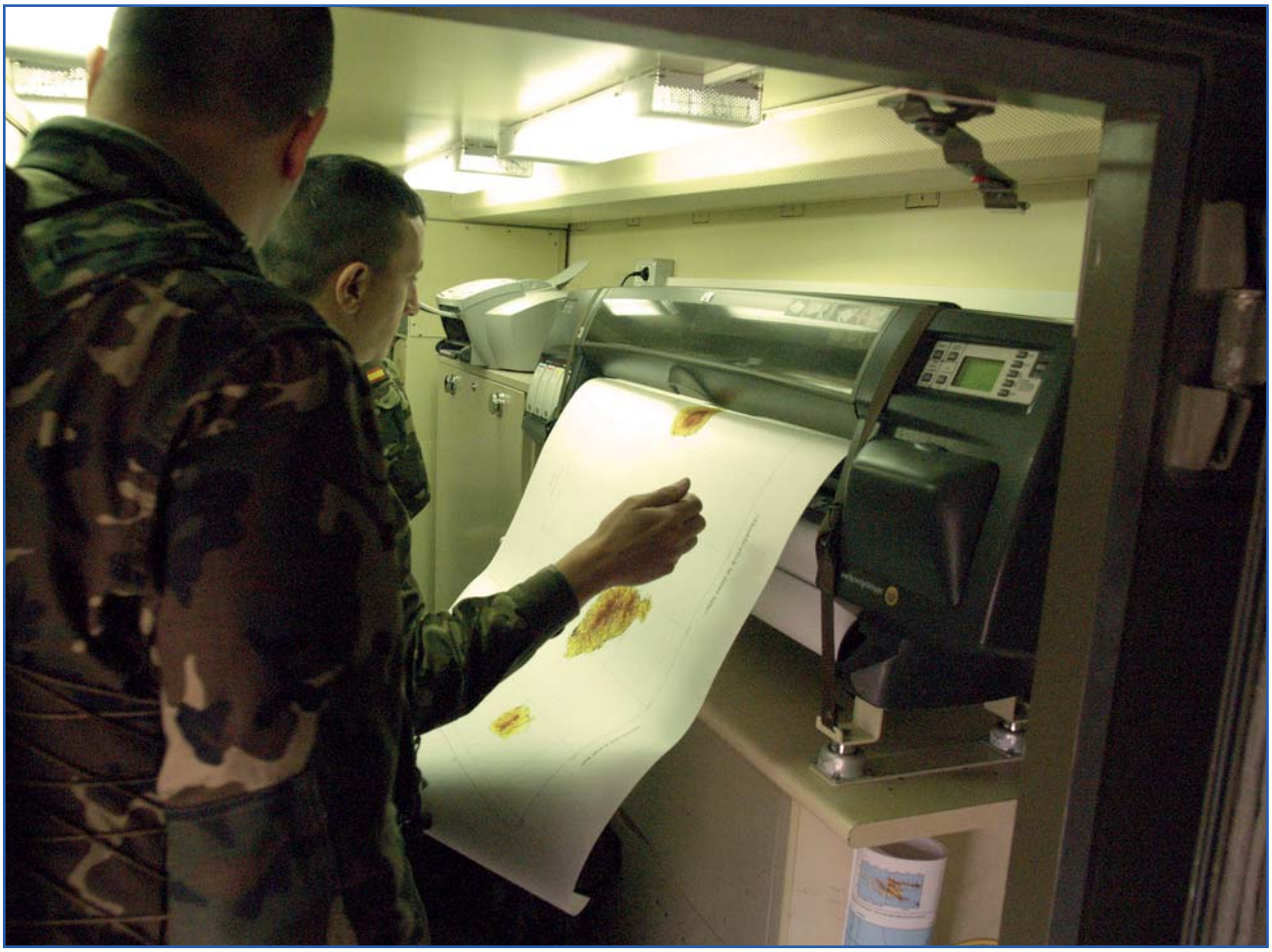
Spanish Army Geographic Centre takes part in the Spanish National Geographic High Board Council and its committee meetings, in the technical and steering meetings of Digital Geographic Information Working Group (DGIWG-TC and DGIWG-SC), in the meetings of Interservice Geographic Working Group (IGEOWG)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



Orthophotomap-Distribution graphic

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

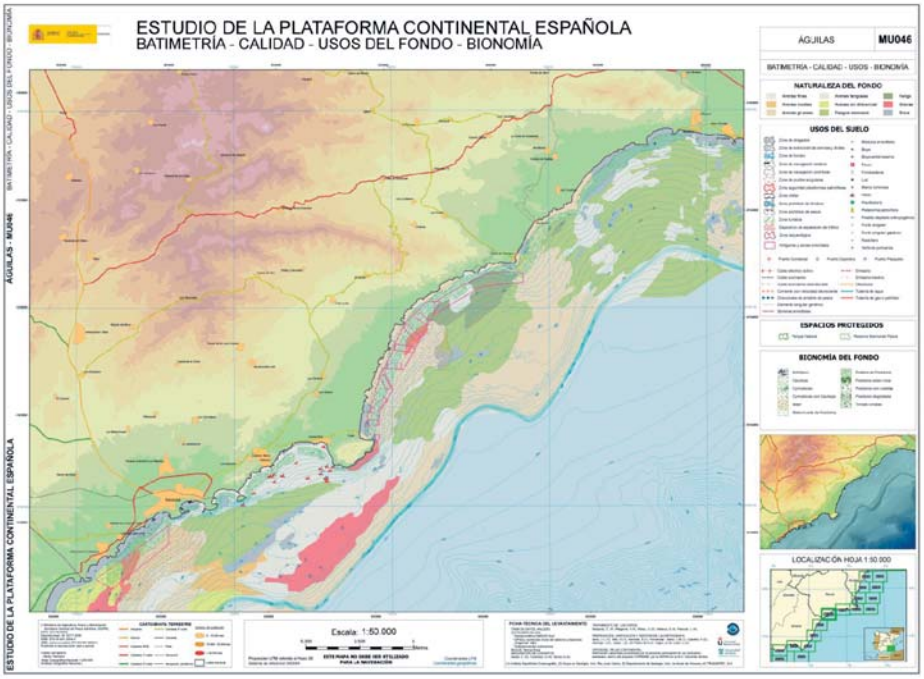
2.6. Spanish Institute of Oceanography

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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 (Multibeam Cartography Group), where it is developing systematic cartographic projects of the Exclusive Economic Zone and adjacent coastal areas.

RESEARCH ON SPANISH CONTINENTAL SHELF (PROGRAM ESPACE)

Program ESPACE has published 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.).

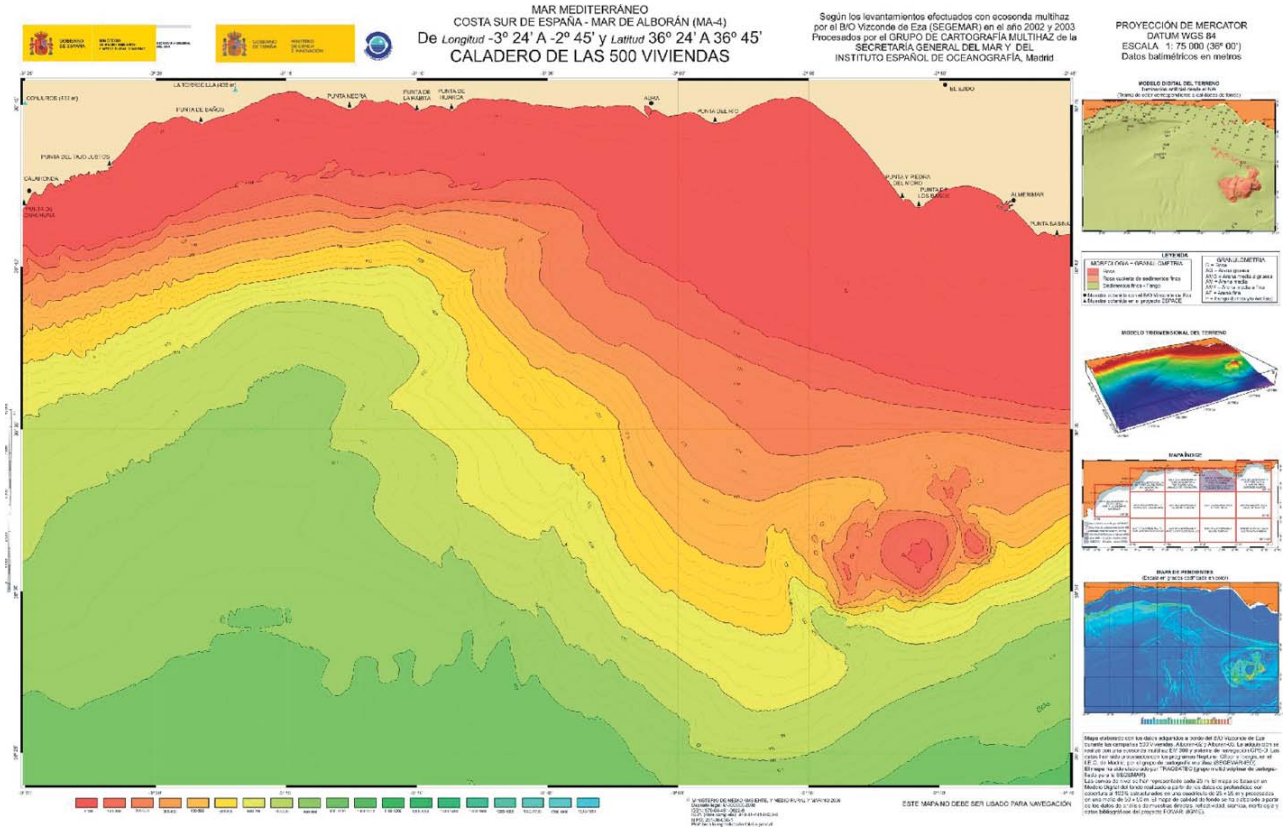


Bathymetry, sea-floor character, sea-floor uses and bionomy. Program ESPACE

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).

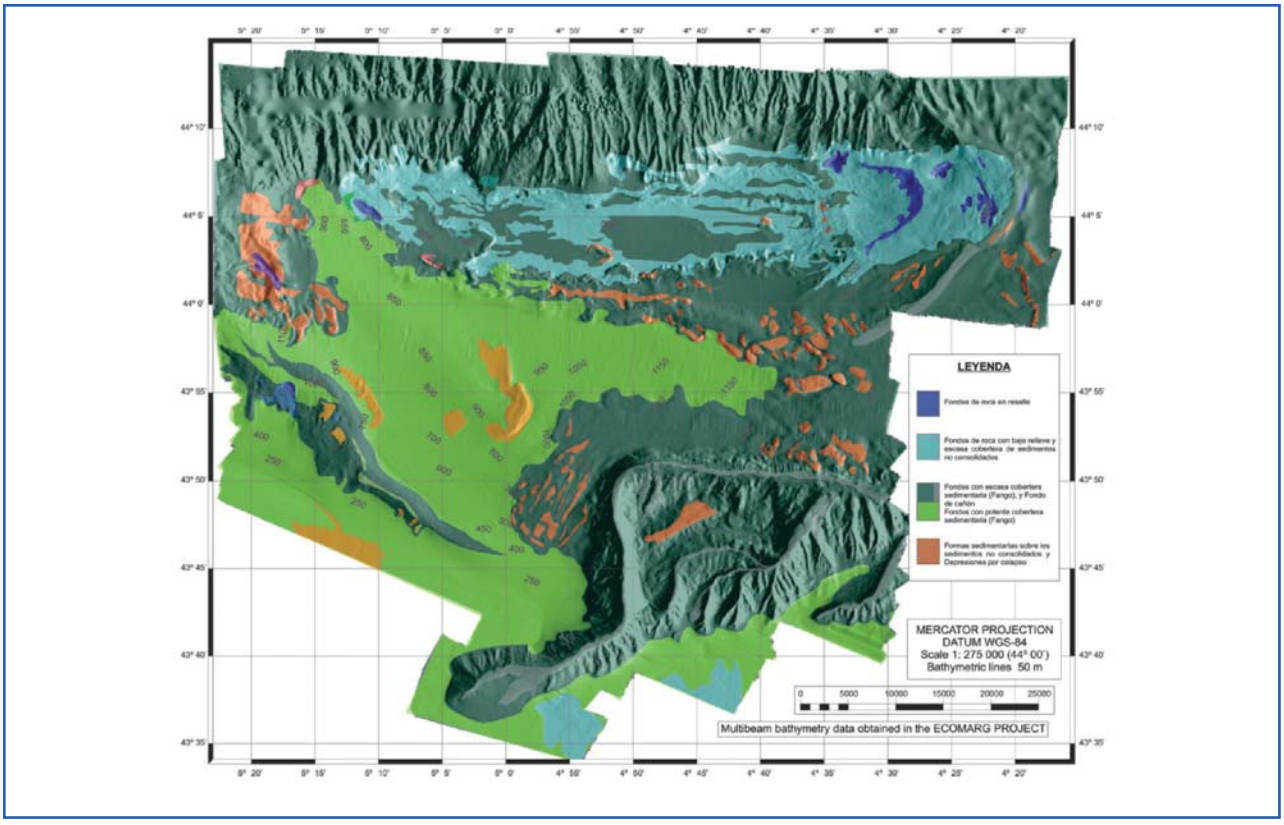


Fishing chart of Alboran Sea. "Caladero de las 500 viviendas"

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



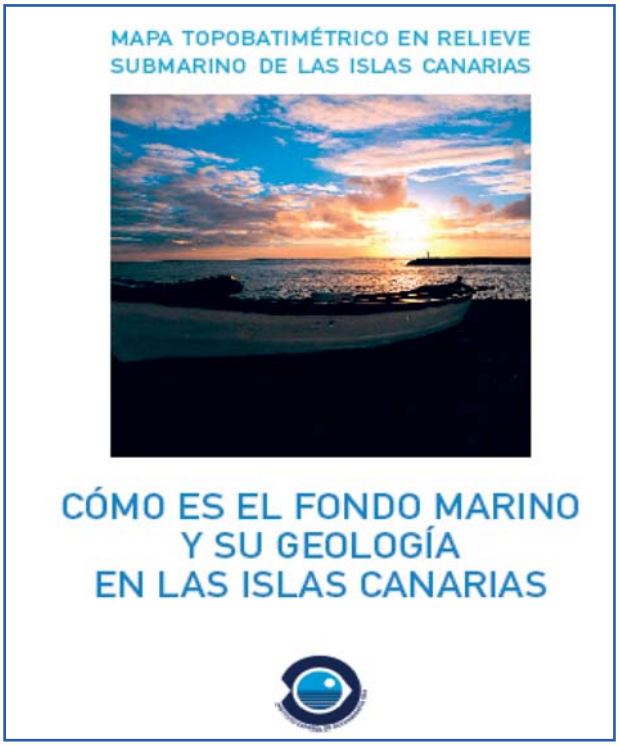
Morphosedimentary map of El Cachucho marine Protected Area

CARTOGRAPHIC DIVULGATION AND OUTREACH

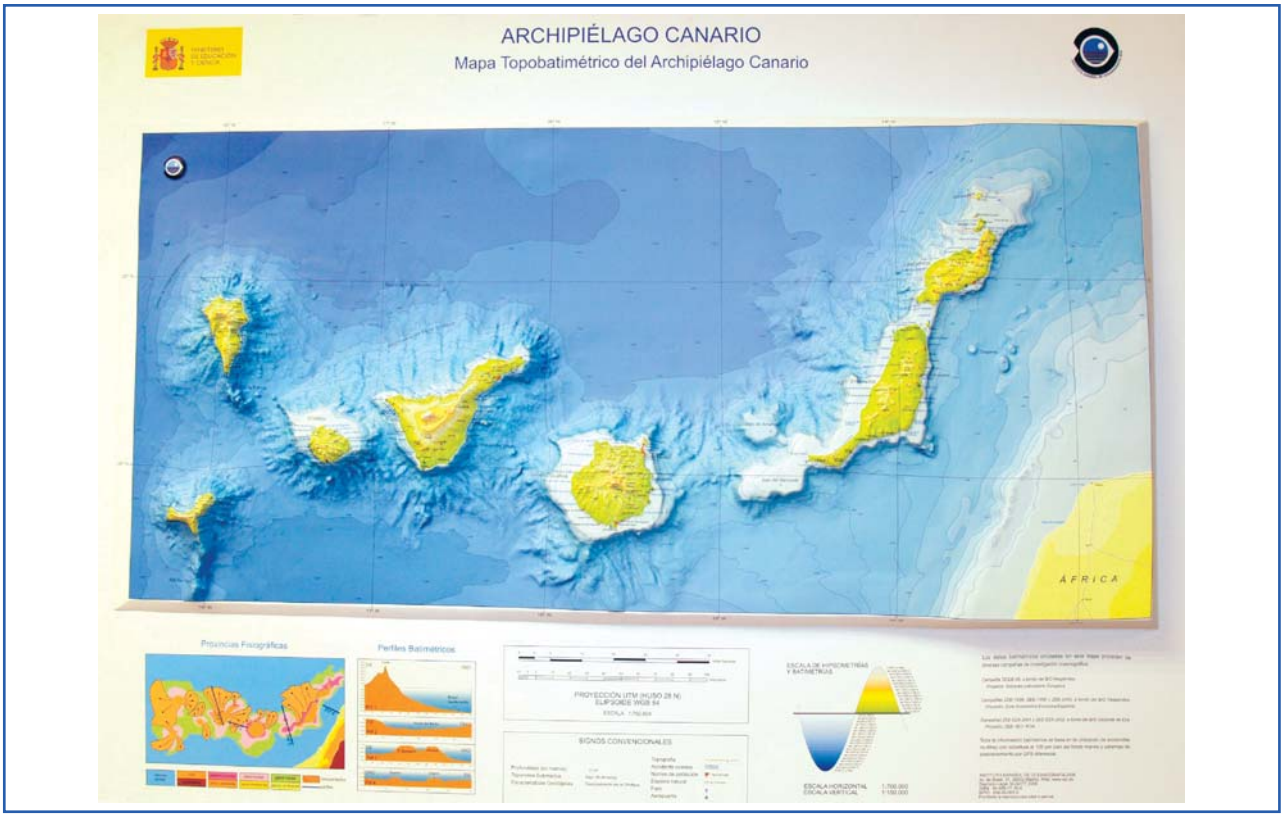
The Spanish Oceanographic Institute aim to divulgate and present to the general society the results of the cartographic research carried out in Spanish EEZ.

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.

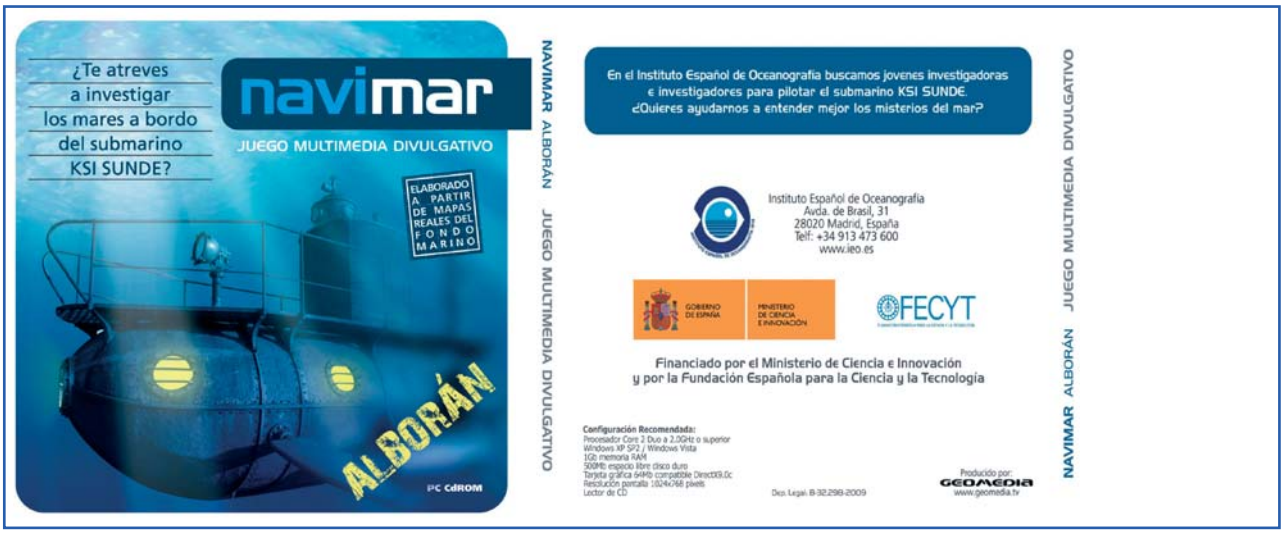


First page of the explicative leaflet of the Canary 3D Map



Relief 3D map of the Canary island Archipelago

As an educational complement, and for scientific spreading for young men an 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 –trough 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

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28003 Madrid-Spain
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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 his 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 (2 nd 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 1:1,000000 and 1:2,000000 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 hidrogeological, 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 Geoscientifical Cartography using the Continuous Geological Map (GEODE) of Spain as a basis. It's about delivering analytical map symbolized information, in other words, normalized Geocientifical 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, they are:

GEOLOGICAL MAP OF SPAIN (MAGNA)

After 35 years, the second series of Geological Map of Spain (MAGNA) at 1:50,000 (or 1:25,000) scale is finished, but the edition works be continued today. Each sheet has two maps: a geological and a geomorphologic one (since 1991) and an explanatory report. As well as complementary documentation with paleontological, petrological and sedimentological works, photographs, geological sites, etc. (IGME Documentation Center).

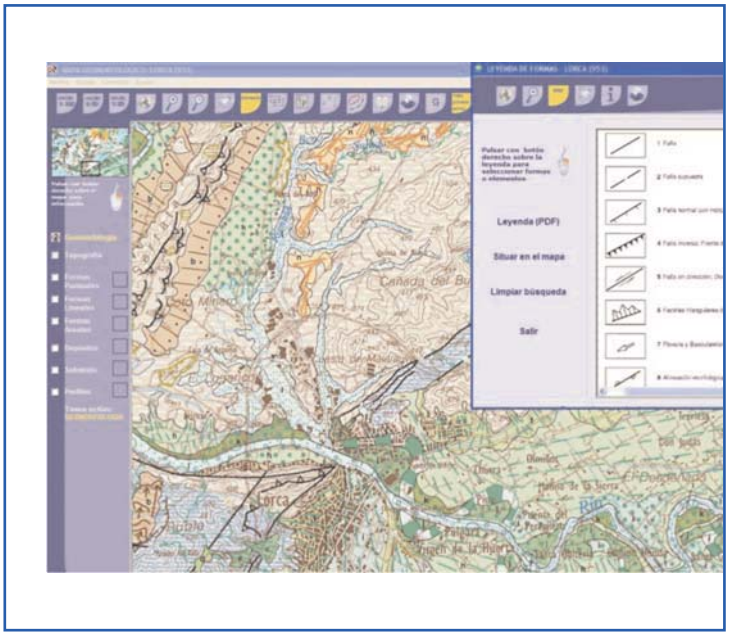
37 sheets of the Geological Map of Spain at 1:50,000 scales (MAGNA Series) with Geological and Geomorphological map and Memoir, have been published in 2009 and 2010.



New Geological Map of Spain at 1:50,000 (or 1:25.000) in Digital Edition

In order to pick up more complete information, a new Program of the Geological Map at 1:50,000 scale (or 1:25,000) is going on. It tries to update MAGNA and takes account of the surface geology and underground information. Every sheet of the new Geological Map of Spain at 1:50,000 scale in Digital Edition that contains Geological, Geomorphological map, Active Process and Memoir.

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.

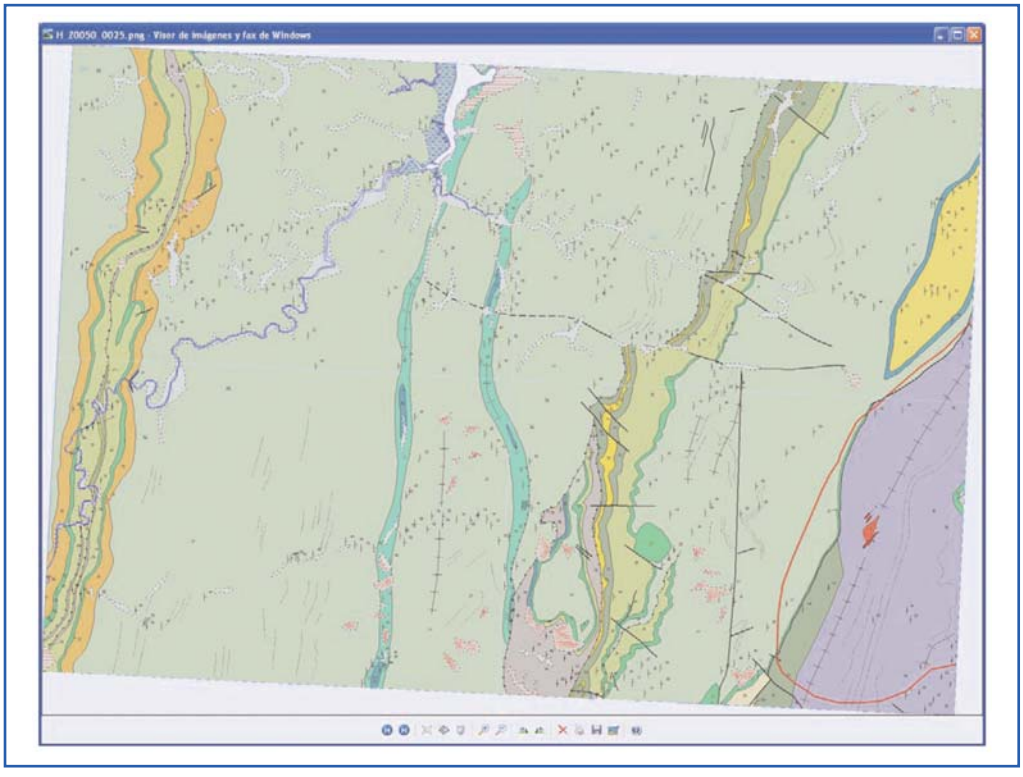


9 interactive CD of the new Digital Edition of Geological Map of Spain at 1:50,000 scales was published in 2009-2010

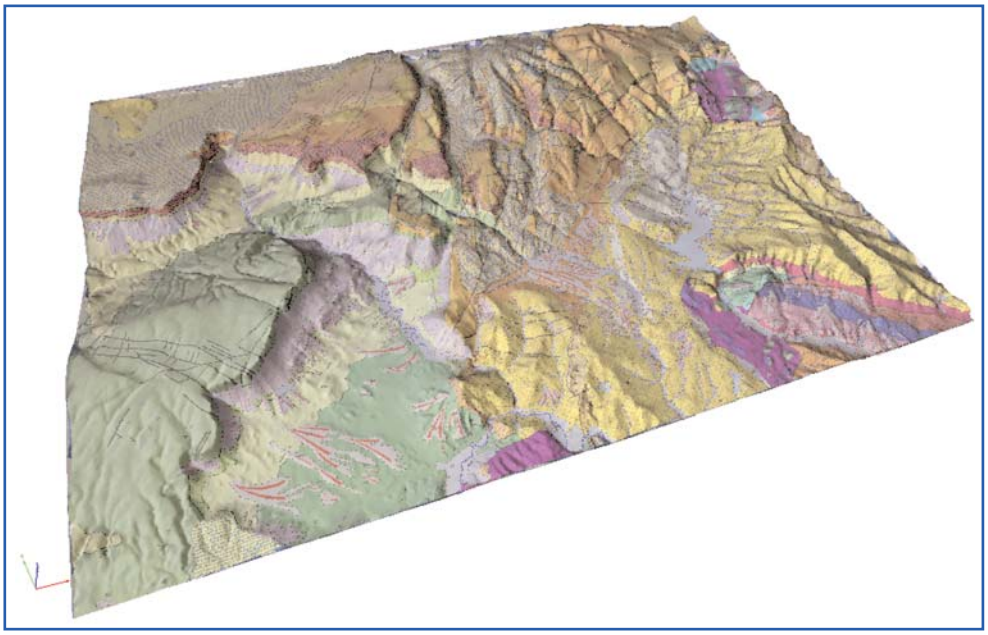


DIGITAL CONTINUOUS GEOLOGICAL MAP (GEODE)

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 20 regional units. Also It can be used as a geological base reference for other geotematical maps.



This map is also available in a 3D topographic support

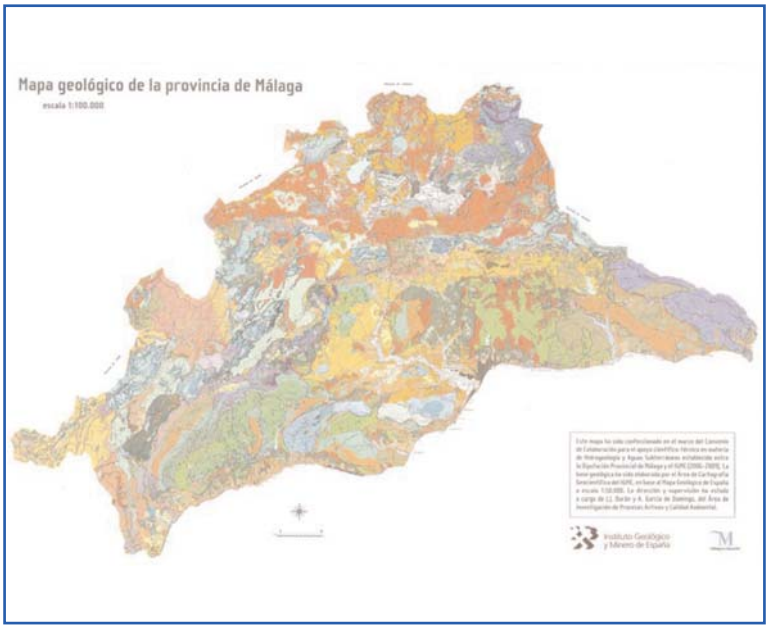


REGIONAL SYNTHESIS AND MURAL MAPS

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.

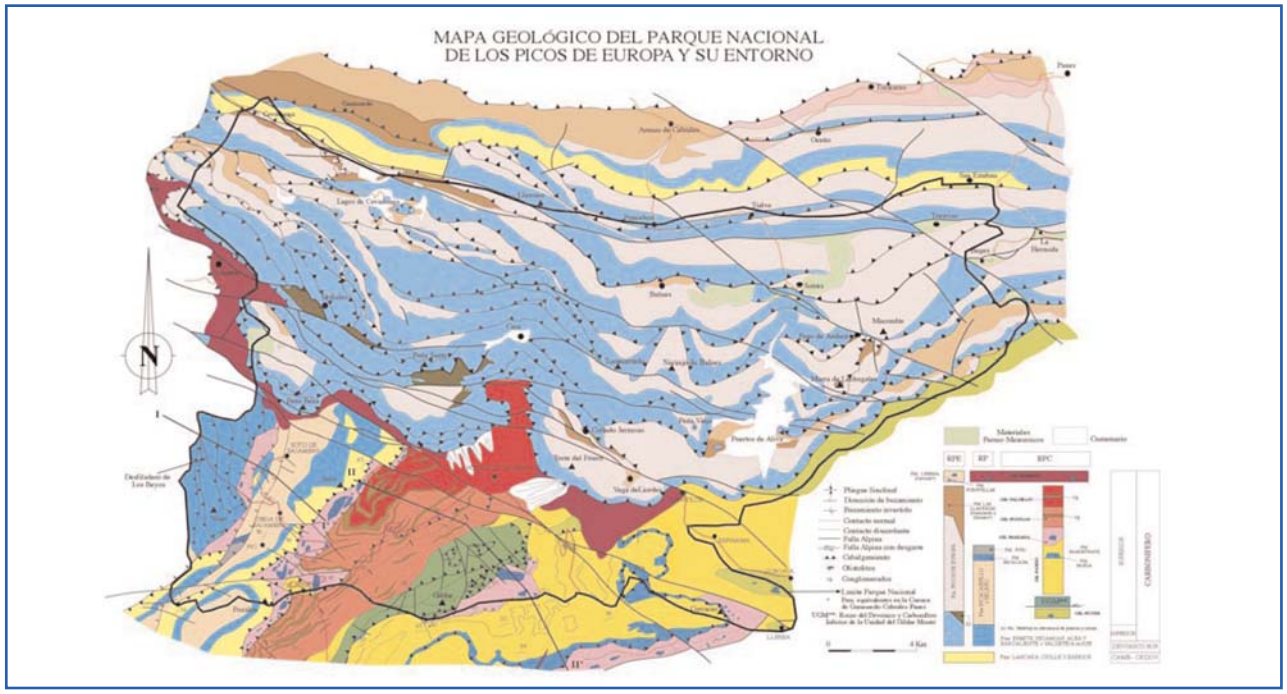
During 2009 y 2010 IGME published the following regional map of Málaga province.

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 .

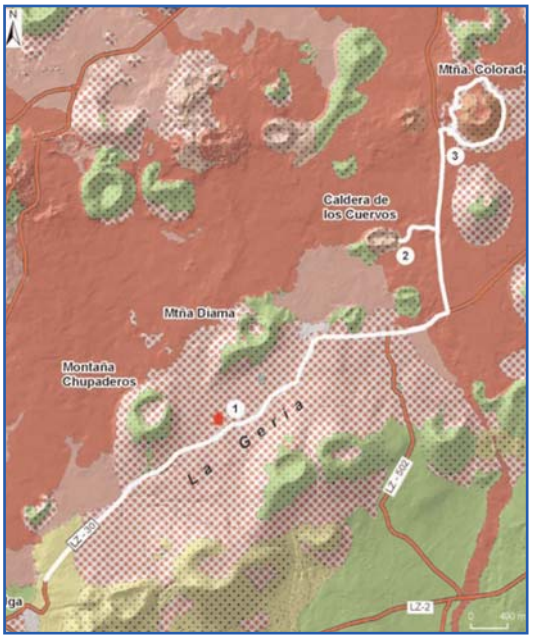


GEOLOGICAL GUIDES OF NATIONAL PARKS

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 Marin Geological Database (SIGEMAR).

GEOMORPHOLOGY, ACTIVE PROCESSES AND GEOMORPHOLOGICAL UNITS

The Geomophological 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 2009

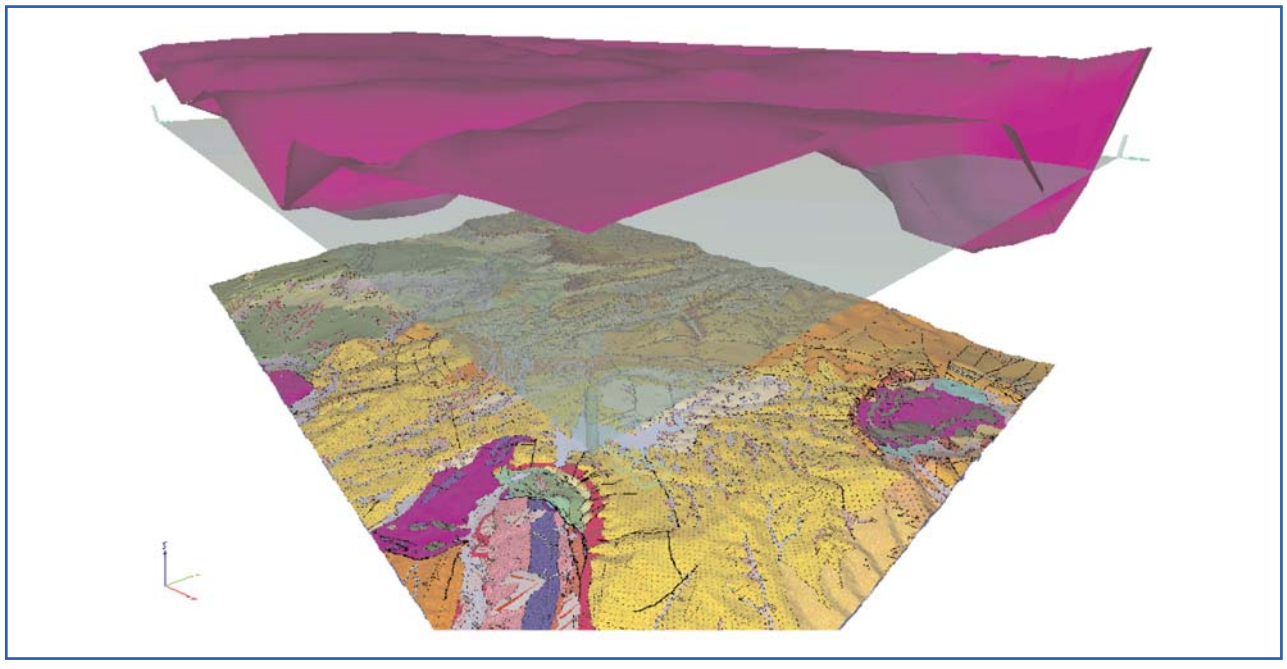


GEOLOGICAL HAZARD

Research, forecast, prevention and mitigation of hazards generated by natural processes of geological origin is an IGME commitment. 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 radiomagnetic 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).



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

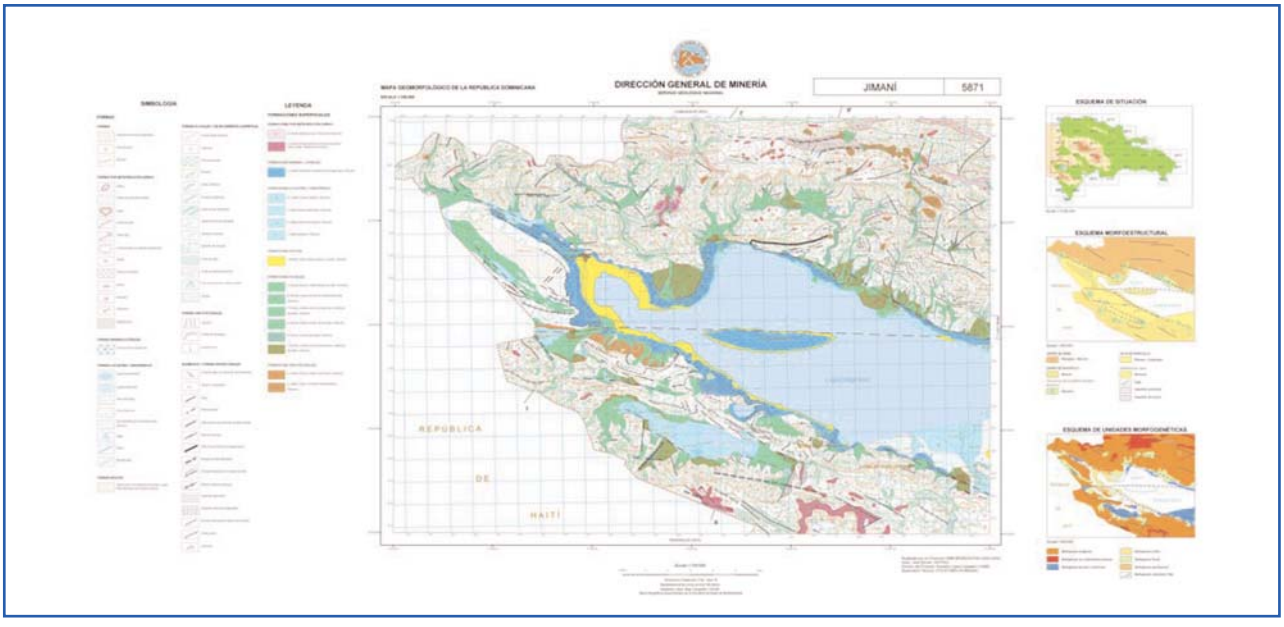
Metallogenical Maps are essential tools to know potential mining of an area. They display metal, non-metal and energy mineralization evidences on a geological base. Publishing scale is usually 1:200,000 or regional and provincial layouts (1:100,000/1:400,000).

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.

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
www.icc.cat

The Institut Cartogràfic de Catalunya (ICC-Cartographic Institute of Catalonia) 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.

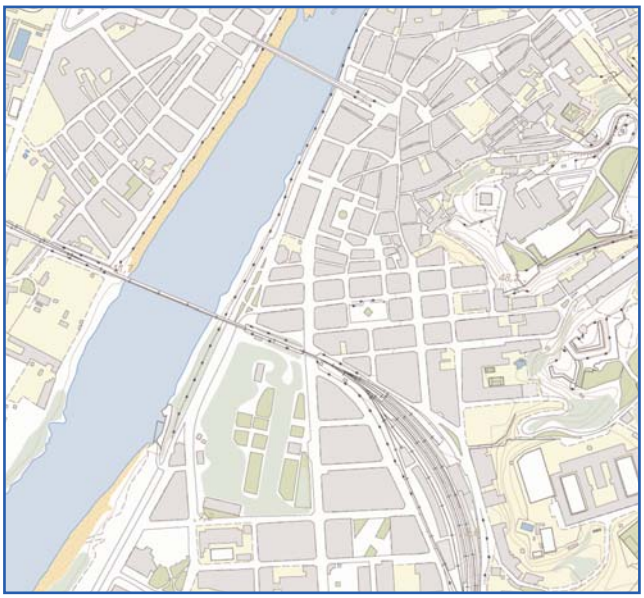
The four principal areas of operation of the ICC are: cartographic production, technological support and research, infrastructure, and training and research. Law 16/2005 stipulated the establishment of two Support Centers within the organic structure of the ICC to promote the Special Data Infrastructure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

1. Cartographic production

Topographic cartography

- Continuous production of the second version (3rd and later editions) of the Topographic database of Catalonia 1:5,000 (BT-5M) (4 275 sheets). As at December 2010, the second version was completed.
- Continuous production of the Topographic map of Catalonia 1:10,000 (2nd edition) (1 121 sheets). In December 2010, 698 sheets were available (62% of the series).
- Continuation of the special project Topographic database of Catalonia 1:25,000 (304 sheets). As at December 2010, 280 sheets were available (92% of the series).
- Continuous production of the 2nd version of the Topographic map of Catalonia 1:25 000 (77 sheets). As at December 2010, 8 sheets were available (10% of the series).
- Continuous production of the Regional map of Catalonia 1:50 000 (41 sheets). As at December 2010, 20 sheets of the 5th version were available (49% of the series).
- Continuous production of the Regional map of Catalonia 1:100,000 in relief (41 sheets). As at December 2010, 13 sheets were available (32% of the series).
- Publication of the 9th edition of the Topographic map of Catalonia 1:250 000.
- Publication of 2 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).



Topographic map 1:10,000. Tortosa

Large scale cartography

- Continuous production of the cartography for specific projects at 1:1,000 scale.
- Continuous production of the special project Urban map of Catalonia 1:1,000. 372,954 hectares of the v.2.1 (2002-2010) have been completed.



Urban map 1:1,000. Lleida

Orthophotographic and orthoimage cartography

- One year updating frequency achieved on the orthophotomaps 1:5,000 and 1:25,000 for whole territory of Catalonia.
- Production of the first orthophotomap at 1:2,500 for the whole territory of Catalonia.
- Continuous production of orthophotographic and orthoimage cartography series for specific national and international projects.



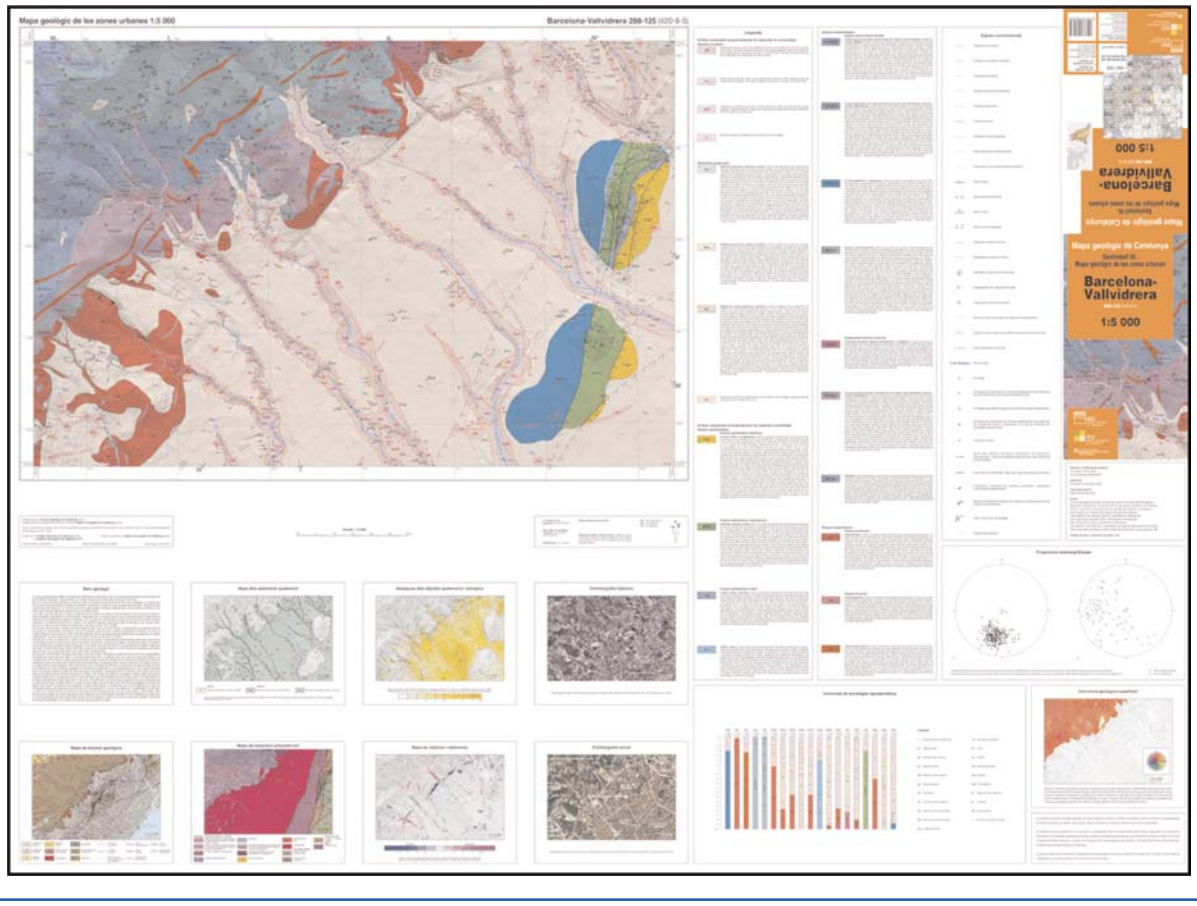
Orthophotomap 1:25,000. Deltebre

Integrated Geodetic Positioning Service of Catalonia (SPGIC)

- By the end of 2010, the utilitarian geodetic network of Catalonia contained 3,935 points.
- 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 and distribution of information in ED50 and ETRS89 systems.
- Disconnection of the RASANT service.
- Completion of the measurement of Catalonia's 100 most emblematic peaks.

Thematic cartography

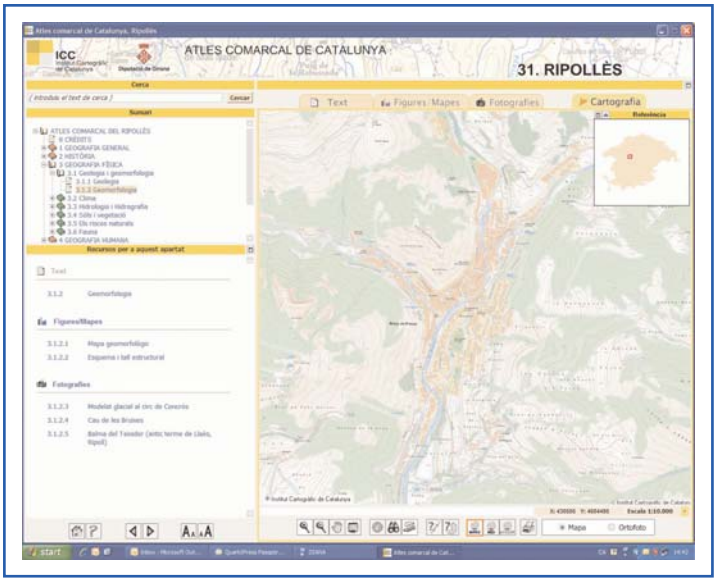
- Publication of various small and large scale thematic maps: hiking, administrative, tourist, geological, vegetation, land use, road, fire maps, etc.
- Continuation of the special project Geo-works (geological maps). As at December 2010, 70 sheets were available.



Geological map (urban zones) 1:5,000. Barcelona-Vallvidrera

Atlases

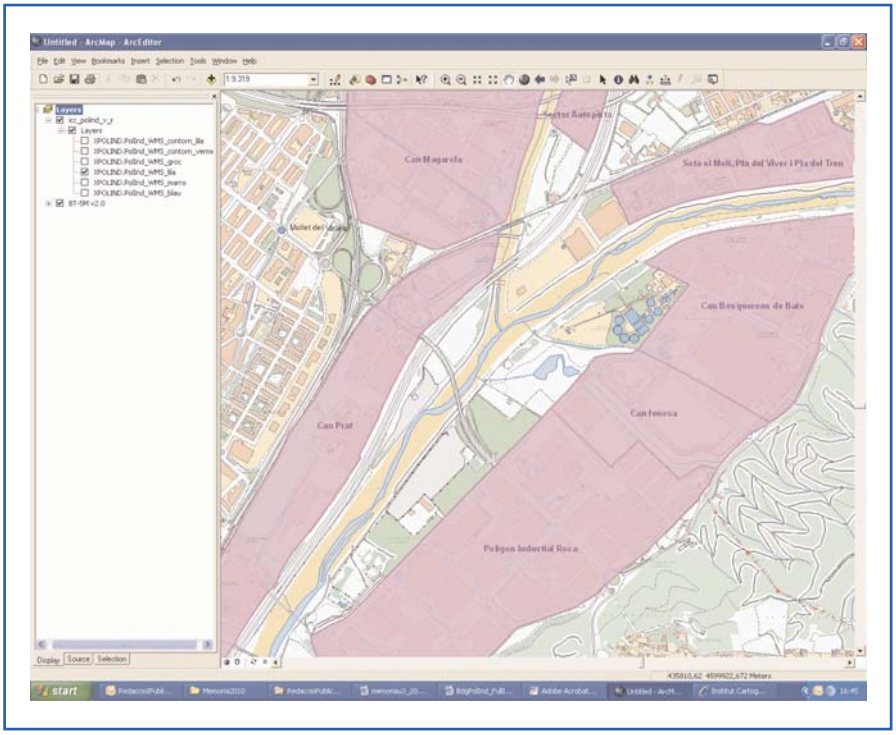
- Completion of the collection Regional atlas of Catalonia (on CD), made up of 7 atlases.
- Publication of 4 atlases (2 Universal atlas –2nd edition–, Topographic atlas 1:50,000 –4th edition– and Geological atlas –1st edition–).
- Publication of Official gazetteer of toponymy of Catalonia (2nd edition).



Regional atlas. 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 (2 282 332 ha generated by year-end 2010).



Industrial parks database

Laser altimetry applications

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



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.
- Beginning operation with the TASI multispectral thermal sensor.
- The total number of flights made in the period 2007-2010 was 1 194 which correspond to 4 006 flight hours.

Territorial boundary marking

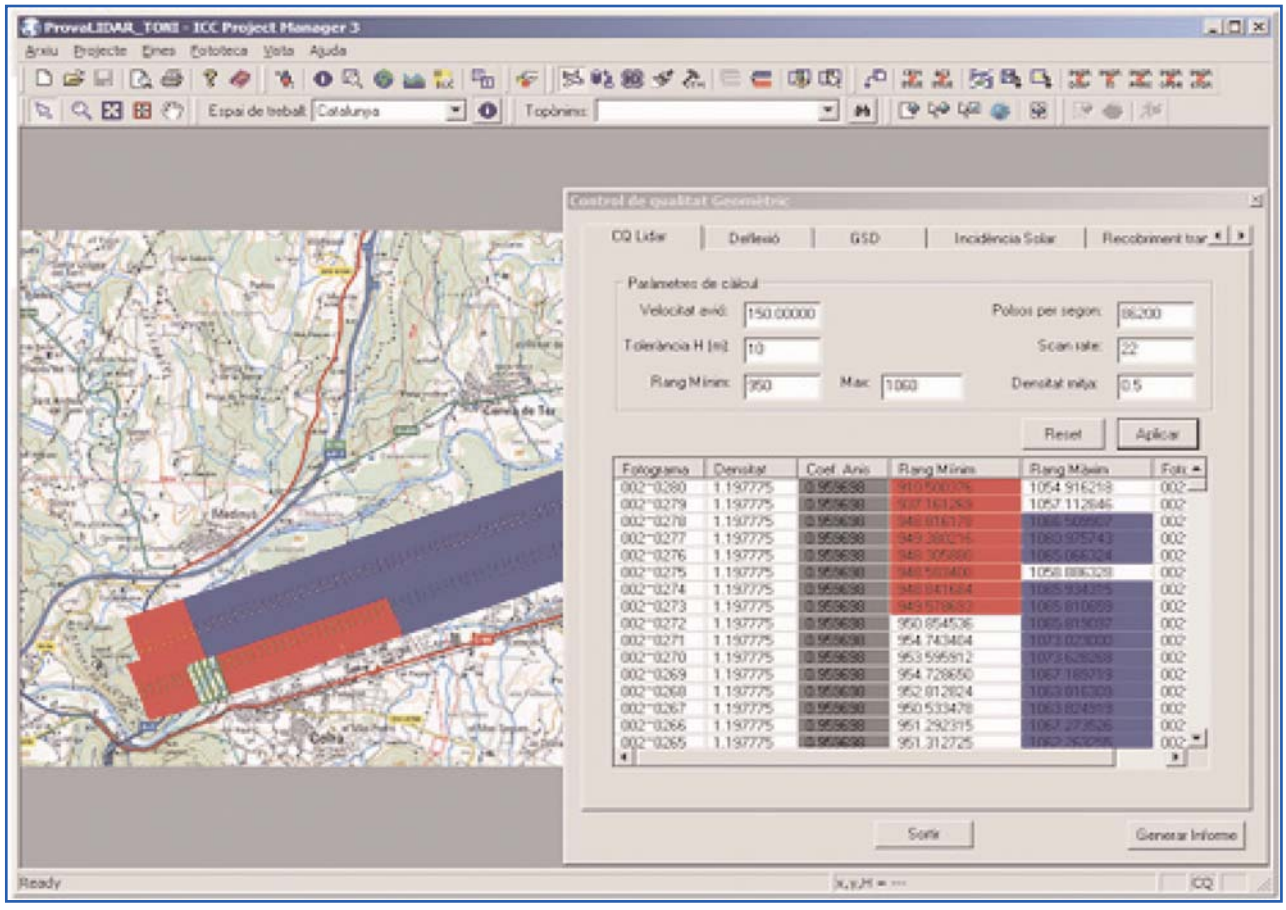
- Technical advice for the Direcció General d'Administració Local (Local Administration Head Office) and preparation of the delimitation proceedings and certifications for private parties and municipal councils.

- 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 2010, 1,774 had been completed (the 93% of the project).

Technological support and research

Photogrammetry and geodesy

- Support to the transition from (the coordinate reference system) ED50 to ETRS89.
- 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.3.3 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.



ICCProjectManager v.3.3

Cartographic edition

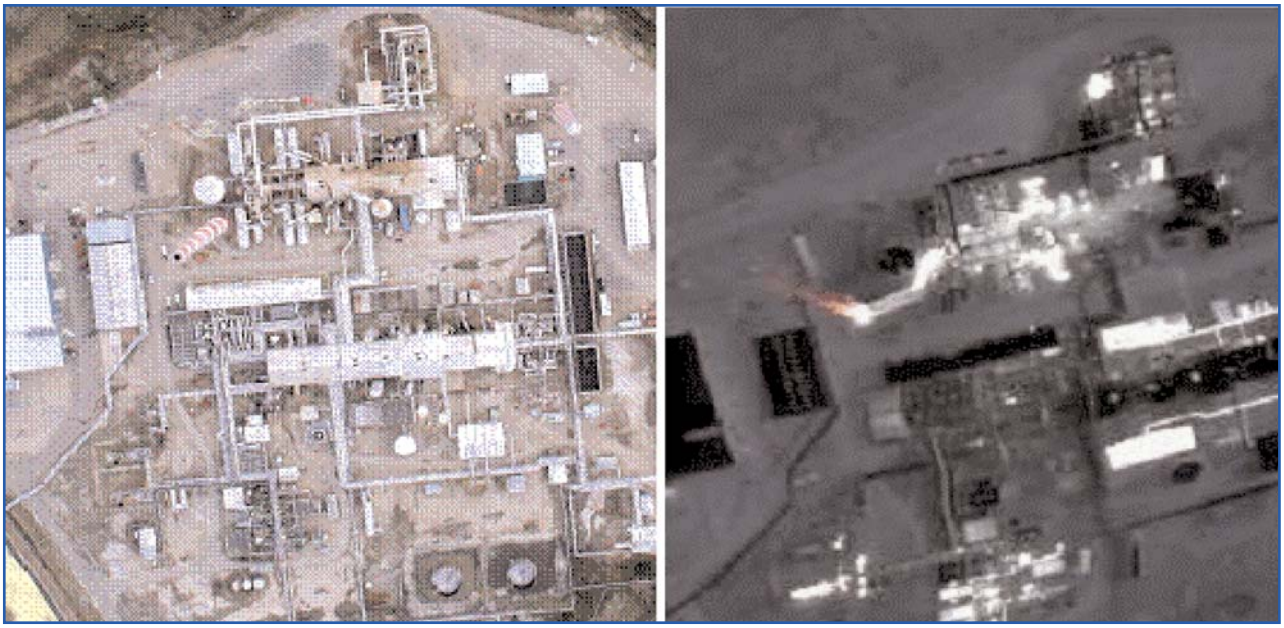
- Support for the new MiraMon format.
- Completion of the methodological study to update the IGN's BCN25-3D based on the ICC's database of the same scale.
- Improvement of distribution processes of digital data and plotters output applications.
- Development of the JobManager50 application which will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

Information systems

- Delivery of city models in KMZ format starts.
- 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), and search of punctual geographical names from the BT-5M and downloading of ICC cartography at 1:1,000 start.
- 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.
- Design of the new data model for BT-5M v3.
- Completion of the GIS4EU European Project, focused on methodologies for the establishment of INSPIRE data models.

Remote sensing and image processing

- Improvement of atmospheric correction algorithms for hyperspectral remote sensing images.
- Development of TASI geometric model.
- Implementation of new geometric models for the TerraSAR-X sensor images.
- Extension of the process software for ALOS-PALSAR and TerraSAR-X images.
- Completion of the Banyoles campaign sponsored by EuroSDR for calibration of digital photogrammetric cameras.
- PISAR project, involving the evaluation of different radar systems in test areas, finishes.
- Studies on lighting pollution with a CASI sensor and DMSP-OLS satellite images finishes.
- Performance of various projects for automatic obtaining of thematic information and land use, and lidar application projects through aerotransported remote sensing techniques.



Two images of a sulphur recovery plant emitting gases through its chimney.
The gases are invisible in the optical range, but are identifiable in the thermal interval

Infrastructure

Distribution of cartographic products

- In the period 2007-2010, the total number of downloads of digital cartography via the Internet was 2,750,000 aprox.
- Maintenance of the ICC website and incorporation of new content, and new products available for downloading.
- During the period 2007-2010, the web received more than 6,870,000 visits.
- 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 ortoXpres service for near-immediate on-line publication of images taken on photogrammetric flights.



Topographic map 1:50,000. Garraf

Map Library

- Continuous increase of the resources of the Catalonia Map Library (308,405 maps; 63,866 books, 3,312 journals; 44,609 photographs, 220 historic cartographic instruments and 17,600 microforms).
- Completion of cataloguing of the Gonçal de Reparaz and Pau Vila Archives.
- Digital atlas of Ptolemy, which is a reproduction of the atlas original in paper form, published in the web.
- Production start-up of an in-house digitalization unit to scan large-format maps and historic documentation.
- By December 2010, 31,414 images were available for downloading from the digital map library. The number of on-line documents has increased in 2010 by 528% over 2007.



Ptolemy's Geographia: *now in digital format*

Documentation center

- Acquisition of photograms that cover Catalonia from the so-called "American" photogrammetric flight in 1956-1957.
- Data loading of digital flights from 2005 to 2009 finishes.
- Images of photogrammetric flights from 2010 at resolutions 25 cm and 10 cm available in ortoXpres.

Training and research

- Undertaking of various experimental projects related with internal development topics and programs.
- In the period 2007-2010, 120 communications were presented at national and international congresses, and 76 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 244,565 visits, and 1,273 metadata were downloaded.
- A new sectorial spatial data infrastructure, based on web sensors, has been configured.
- Three thematic IDE projects (IDE Local, IDE PlanUrb, IDE Univers) and one European IDE project (Aware) have been carried out.

SC of the Catalan Earth Observation Program

- Knowledge transfer and training seminars have been held.
- Technological studies, research proposal, and viability studies have been performed, and research projects have been participated in.
- 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 Topografía —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 International 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.
- The Official Committee of the International Cartography Association (ICA/ACI), in the course of the 24th International Cartographic Conference held in Santiago de Chile in November 2009, gave an award to the ICC for the book *Les cartes portolanes.La representació medieval d'una mar solcada* (Portolan charts. The medieval representation of a ploughed sea), by Ramon J. Pujades.
- An international jury distinguished the DEC as one of the 'best European practice' between 135 initiatives.

3.2. Cartographic Institute of Andalusia

Junta de Andalucía
C/ San Gregorio, 7
41004 Sevilla-Spain
Phone: +34 955057607 - Fax: +34 955057603

The Cartographic Institute of Andalusia (ICA), assigned to Departmental Secretariat of Public Works and Housing of the Andalusian Government, it is the agency responsible for 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 ICA works in the coordination and normalization in this matter. Also, the ICA is working in the diffusion, innovation and investigation of the cartography, tasks reinforced by Ordinance 141/2006 of 18 of July.

This latter decree that applies and develops the Directive 2007/2/EC of 14 March 2007 on Spatial Data Infrastructure (INSPIRE), is approved to order the public cartographic activity, within the competence of the Autonomous Communities of Andalucía. This has become the region one of the first Regional Government to acquire a policy instrument that places the cartographic activity at a higher level and integrated production, management and diffusion of spatial information which is necessary to coordinate with all producing organisms.

In this sense, in recent years, progress has been made in cooperation with the eight Provincial Delegations and the State Administration (AGE), in particular, with the National Geographic Institute (IGN). Projects have also been developed with local councils and universities and have driven the establishment of an organization for cooperation with the rest of the Autonomous Communities.

This lays the groundwork for setting the Cartographic System of Andalusia, which is built based on: a set of participation and coordination bodies (Cartographic Commission of Andalusia, Andalusia Council Cartographic, Cartographic Unit, Working Groups), instruments planning (Cartographic Plan of Andalusia 2009-2012, Annual Programs) and the development and commissioning of infrastructure and geographical reference equipments; case of the Andalusian Network Positioning, Spatial Data Infrastructure of Andalusia, the Andalusian Gazetteer, Corporative GIS of Andalusia, the Andalusian's Cartographic Registry and the Geographic Information Repository of Andalusia.



In May of 2011, the ICA initiates a new stage, for economic reasons, efficiency, effectiveness and compatibility their competences have been transferred to the Regional Ministry of Economy, Innovation and Science Office (Decree 6/2011 of 9 of May), and merger them to those developed in statistics, a fact that has given birth to the Institute of Statistics and Cartography of Andalusia (IECA).

The following are the main activities developed in the programming of the Institute of Cartography of Andalusia between 2007 and 2011:

PHOTOGRAMMETRIC FLIGHTS

Throughout these years there have been several photogrammetric flights (territorial and urban) for the preparation and updating of both orthophotograph and cartographic series, and to support urban policy, land management, infrastructure, and other sectoral policies (agriculture, environment, culture, emergencies, etc...).

Territorial photogrammetric flights

In 2007, through an agreement with the Cartographic Institute of Catalonia, a survey flight was conducted with a GSD of 90 cm. of Andalucia for updating color digital orthophotographs with a resolution of 1 meter. Also covered the NW quadrant of the Autonomous Communities with a flight (GSD of 28 cm)

In the framework of cooperation of the National Digital Orthophoto Program (PNOA) in 2008, flew the southern half of Andalusia (GSD of 45 cm) and in 2009 the northern half of the Region to the same resolution.

In summer 2010 he blew the southern half of the region, and in 2011 is scheduled to fly the northern half of the Autonomous Communities

Urban photogrammetric flights

This cartography becomes at the request of the city municipalities that apply for their planning efforts. For the realization and updating of the urban cartography has carried out the following photogrammetric flights:

- Flights on scale 1:5,000: 30 towns in 2007, 27 towns in 2008 and 15 towns in 2009.
- Flights on scale 1:8,000: 110 towns in 2007, 93 towns in 2008 and 65 towns in 2009.

Result of these flights is a set of urban maps which, between 2007 and 2009, 72 towns have been mapped at 1:1,000 scale, and 268 to 1:2,000 scale.

Because of budget cuts motivated by the economic crisis in 2010 not done this activity mapping.

ORTOPHOTOGRAPHS AND DIGITAL TERRAIN MODEL (DTM)

In this period the ICA, along with the Regional Ministries of Agriculture and Fisheries and Environment of the Andalusian government has joined the National Digital Orthophoto Program (PNOA), which is an effective instrument of cooperation between the AGE and the Autonomous Communities that has fructified in the production of two complete coverings of the region with 50 cm orthophotographs resolution.

- In 2008 a new DTM of 20 x 20 m. of the Andalusian territory was elaborated.
- In 2009 the ICA have published the edition of the Digital Ortophoto of Andalusia (colour) derived of the flight to 1:60,000 scale carried in 2007.

Also in 2009 has been published the "Historical Digital Ortophoto of Andalusia 1956-2007. Half century of changes in Andalusia". This orthophotographs has realised whit a flight done between 1956-1957 by the American Army. It is also a joint publication with the Regional Ministries of Environment and Agriculture and Fisheries.

In 2010 a rigorous orthophoto 2008-2009 (precision 0.5 m) of the Andalusian territory has been published, and his DTM 10 x 10 m.

Also another ortophoto has been finalized, of historical character, from a flight 1:18,000 done by the IRYDA in the middle of the seventy (1977-1978, in the case of Andalusia).



BASIC TERRITORIAL CARTOGRAPHY

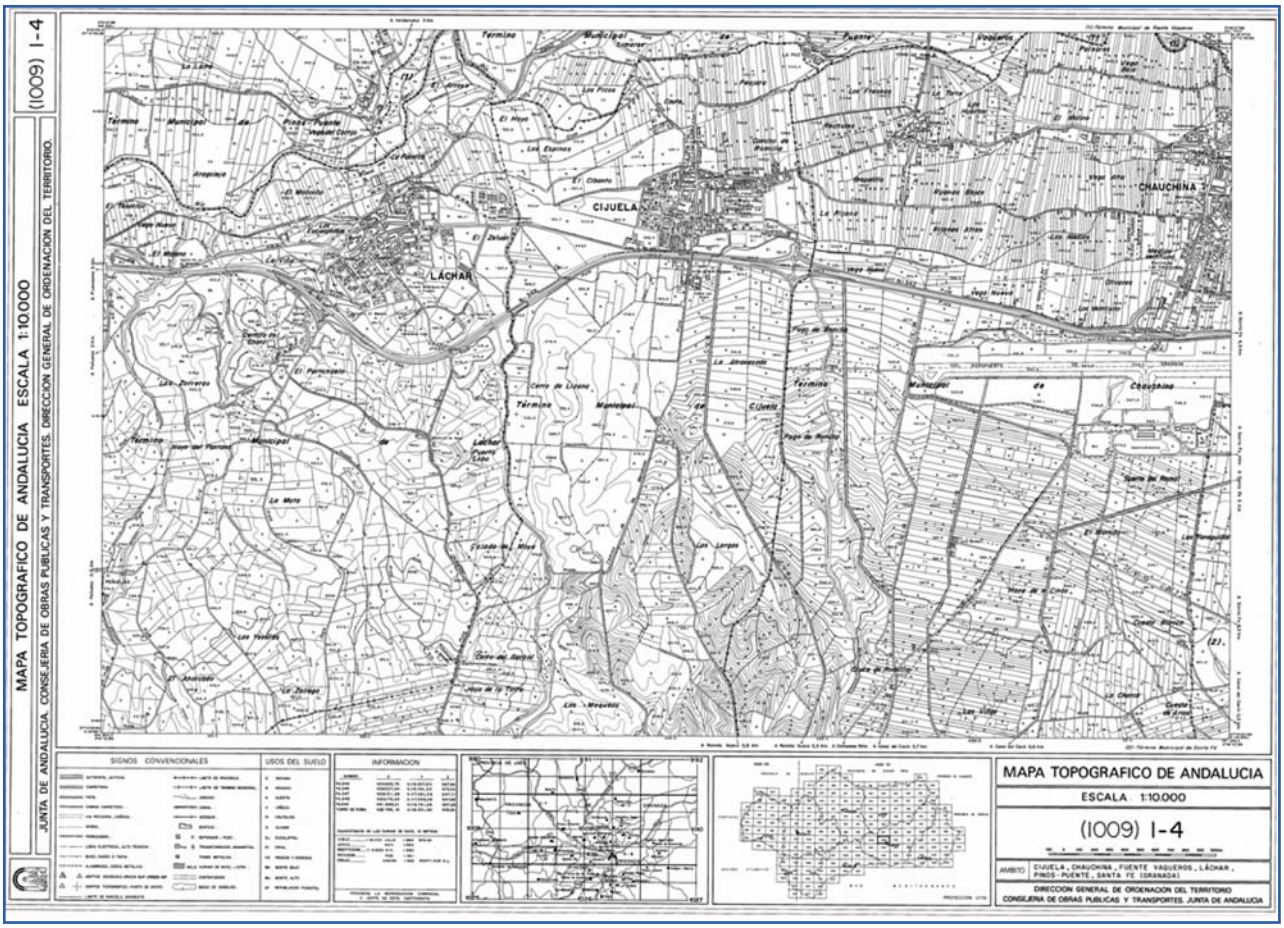
The main series of basic cartography that produces the ICA are:

Cartography on scale 1:10.000 (MTA10)

Culminated the process of vectorization of the MTA10, that makes possible have a complete and continuous cartography of Andalusian territory in diverse formats (shp, dxf, etc), it has been come to his conversion in one geodatabase and its update with the ortophoto of flight 2006-2007, work that finished in 2010.

In parallel it has been developed, *"Parapanda"*, a tool of cuts to improve the diffusion of this geodatabase.

The versatility of new technologies has also enabled the development of a new product: the «Andalusian Photomap" that combines MTA10 information and color orthophoto of Andalusia.



Map Base of Andalusia (MBA)

It is a new multiscalar and vectorial cartographic base (1:10,000 for all the territory and 1:5,000 for urban scopes and the coast). It supposes a novel process of production when incorporating the information in 3D in continuous and present a model of object-oriented data.

Finished methodological design, and the applications developed for quality control and its operation began production process, having restituted and produced the cartography for the SW quadrant of the Autonomous Communities.

For budgetary reasons and the high cost involved in its implementation, in 2010 it was decided to stop its production.

Program of municipal boundaries

In 2007, in collaboration with the Regional Ministry of Government, which is competent in matters of territorial delimitation, started a program that aims to achieve a official and accurate definition of the 22,000 km of municipal boundary 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 century XIX). Each year are review around 2,000 km

Toponymy

Concluded the elaboration of the Toponymy Database (BTA10), the ICA have a complete, and homogeneous database of Andalusian Toponymy conformed by 150,000 records (205,000 localizations) classified by subjects (administrative areas, entities of population, hydrography, orography, patrimony, infrastructures, industrial, extractive activities, services and equipment) and georreferencied by municipalities and 1:10,000 cartographic sheets. In 2007 he began the adaptation of the BTA10 to the Spanish Model of Nomenclature.

In 2008, launched a search web service of Geographical Names, and in 2009 it provides an interoperable service (WFS) Gazetteer.

Work is currently in the data model of the Geographic Nomenclature of Andalusia that will have a place name reference corpus.

DERIVED AND THEMATIC CARTOGRAPHY

The production of cartography derived and thematic of the ICA is wide and varied. The main series currently produced are:

Guide Maps of Natural Parks

In this series, begun in 1990, about 25 maps have been published in collaboration with the Regional Ministry of Environment. This Guide Maps are currently under 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
	El Estrecho 1:25,000
2011	Sierra de Aracena y Picos de Aroche 1:75,000
	Sierra de Cazorla, Segura y las Villas 1:75,000
	Sierra Mágina 1:30,000
	Sierra de Hornachuelos 1:50,000
	Doñana 1:75,000

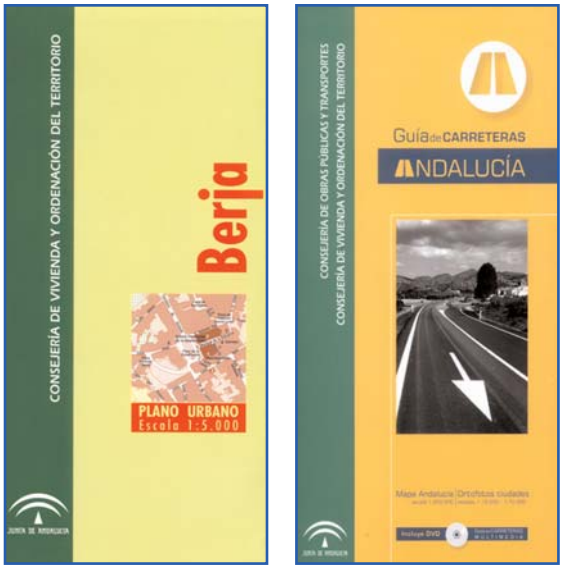
Towns Streets Maps

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

Since 2007 have been published twenty-five street maps. In all cases it has counted on the cooperation of local councils, which have provided the required information on place names, unique buildings, and other aspects.

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

Year	Street Guides
2010	Cabra
	Andujar
2011	Archidona
	Vélez Málaga
	Huéscar



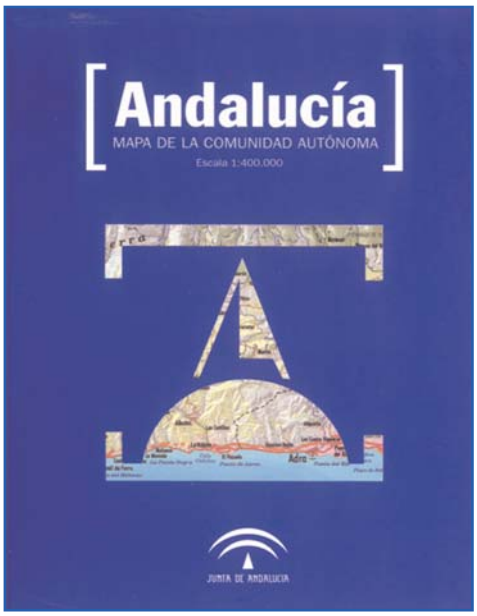
Road maps

In 2008 the ICA published a «Road Interactive Guide of Andalusia" on CD. This guide includes an application for navigation, measuring distances, calculating routes, search for place names, management information layers and 3D visualization.

Also, in 2008, has published the "Guide of Roads of Andalusia" in paper that includes cartography on scale 1:200,000 and details on orthophoto to scale 1:70,000, of the metropolitan areas and to 1:15,000 of the main towns. The guide includes annexes on interesting subjects (protected areas, heritage, greenways, cultural routes, etc).

In 2011 it will launch a new edition of provincial road maps 1:200,000, in collaboration with the Regional Ministry of Public Works and Housing.

General maps of Andalusia

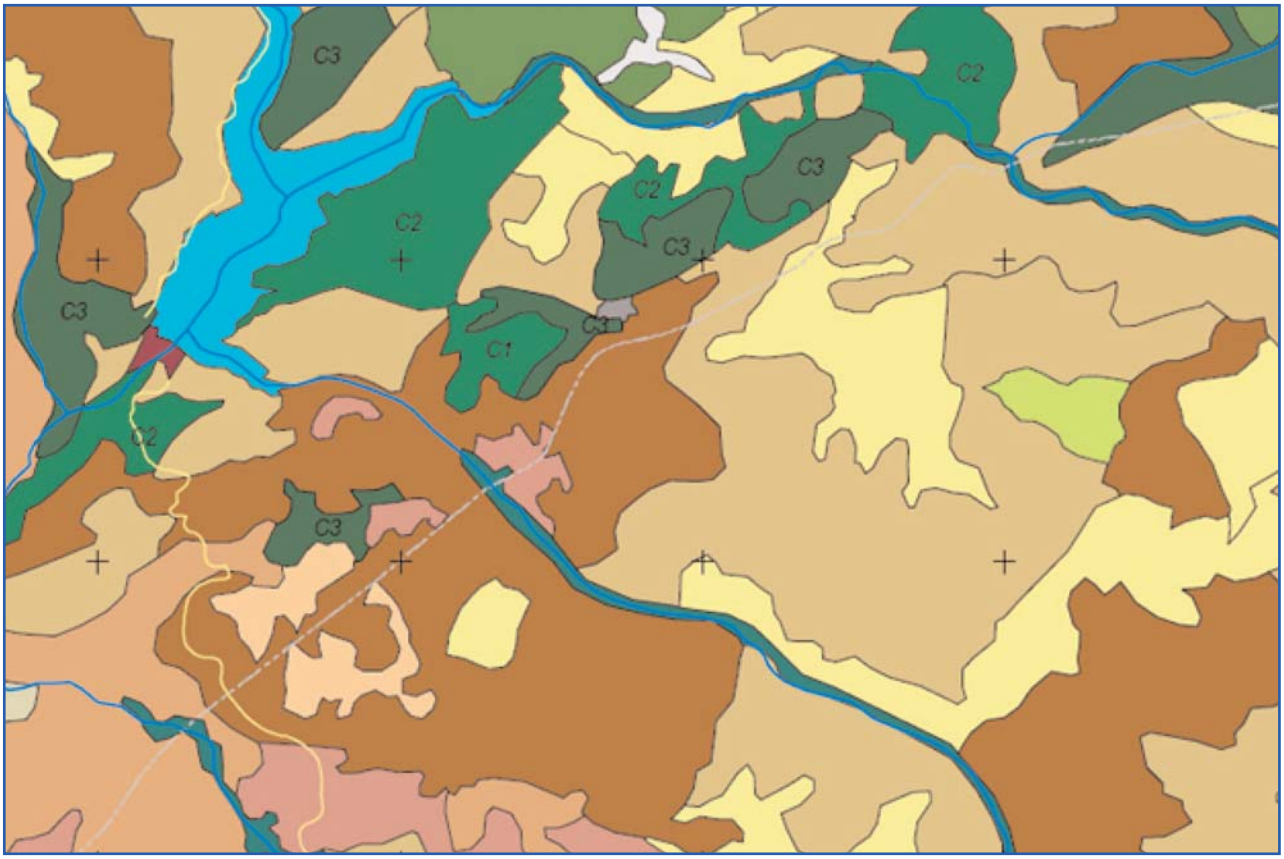


- "Andalusia. Map of the Autonomous Community, 1:400,000". This map, published in 2008 in paper format (100x146 cm), intends to spread a single image of Andalucia by incorporating the key elements for territorial recognition (administrative limits, towns, road of communication, relief, hydrograph, etc). It comes with a CD which is collected geographic bases that have served for their preparation and various outputs in the most common image formats (jpg, tiff, pdf, etc).
- "Spatial data of Andalusia for intermediate scales (DEA100)". With 152 layers of information, it is cartography in vector format, for the information it contains, is useful for the production of thematic maps of different types. The third edition, published in 2009, has changed his philosophy a bit from previous versions because it has increased its thematic content adapted to the changing

needs of users and administration, since that product feed both the SDI (IDEAndalucia) as much of Geographic Information Systems operating in the Junta de Andalucía. In 2010 was a reissue of the product.

Land use map

ICA participates in the Information System of Land Occupation of Spain (SIOSE), driven by the IGN. This base map is an essential tool for many applications of territorial, environmental and agricultural planning. Its 1:10,000 scale surveys began in 2006 and completed in 2010.



Provincial cartography

In 2011 a cartographic series has begun, in collaboration with the Provincial Goverment, in order to publish provincial maps on scale 1:200,000. Until the moment the province of Jaén has been published and are quite advanced the works corresponding to Seville.

Cartography of the metropolitan areas of Andalusia.

This is a thematic cartography aims to provide a unified image of the main urban areas of the Autonomous Community. Edition consists of a printed paper version sided: the main face 1:30,000 scale mapping and its back side a recent orthophoto area. It also publishes a CD which contained both the geographic bases that have served for their preparation and various outputs in the most common image formats (jpg, tiff, pdf, etc).

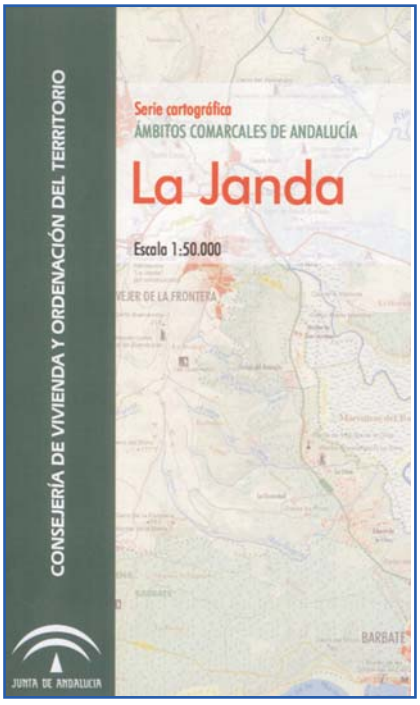
Year	Metropolitan Areas
2007	Málaga
2008	Almería Huelva
2009	Bahía de Algeciras Córdoba y su entorno
2010	Granada Jaén
2011	Bahía de Cádiz-Jerez Sevilla



Cartography of local scopes of Andalusia

In 2008 started a new map series to cover easily identifiable areas on which there was no mapping unitary. In this case, the reference scale is 1:50,000 and the edition contains a paper version and a CD which contained both the geographic bases that have used for the preparation of each of the maps, as different outlets in the most common image formats (jpg, tiff, pdf, etc).

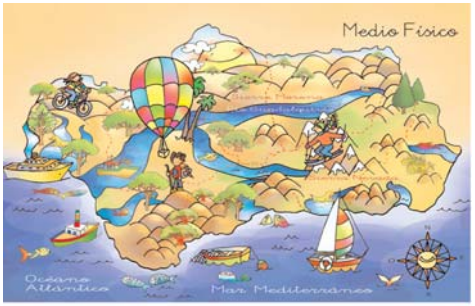
Year	Local Scopes
2008	La Janda (Cádiz) Valle del Almanzora (Almería)
2009	El Condado de Jaén (Jaén) Sierra Suroeste (Sevilla
2010	Sierra de Tentudía (Huelva-Badajoz) Montes Orientales (Granada)
2011	Bajo Guadiana (Huelva-Portugal) Antequera (Málaga) Costa Tropical (Granada) Sierra Sureste (Sevilla) Levante Almeriense (Almería) Valle del Guadiato (Córdoba)



Didactic-and educational material

Continuing with the editorial line started in 2006, ICA has designed some products aimed to the school community. To reinforce this line of work, in 2007, signed a cooperation agreement with the Regional Ministry of Education. Among the products to be highlighted:

- **"Digital map of Andalusia. School version"**. Published in 2007 includes basic information for the study of Andalusia. It is a simple application that provides schoolchild make their own maps of the region and obtains graphs and statistical data content.
- **"Geographical Gymkhana of Andalusia"**. Publication aimed at children and youth allows understand and learns the main features of Andalusian geography through various games.
- **"I know Andalusia. Digital Puzzle".** This simple





puzzle approaches, in a pleasant and funny way, the image of Andalusia to the children between 6 and 12 years.

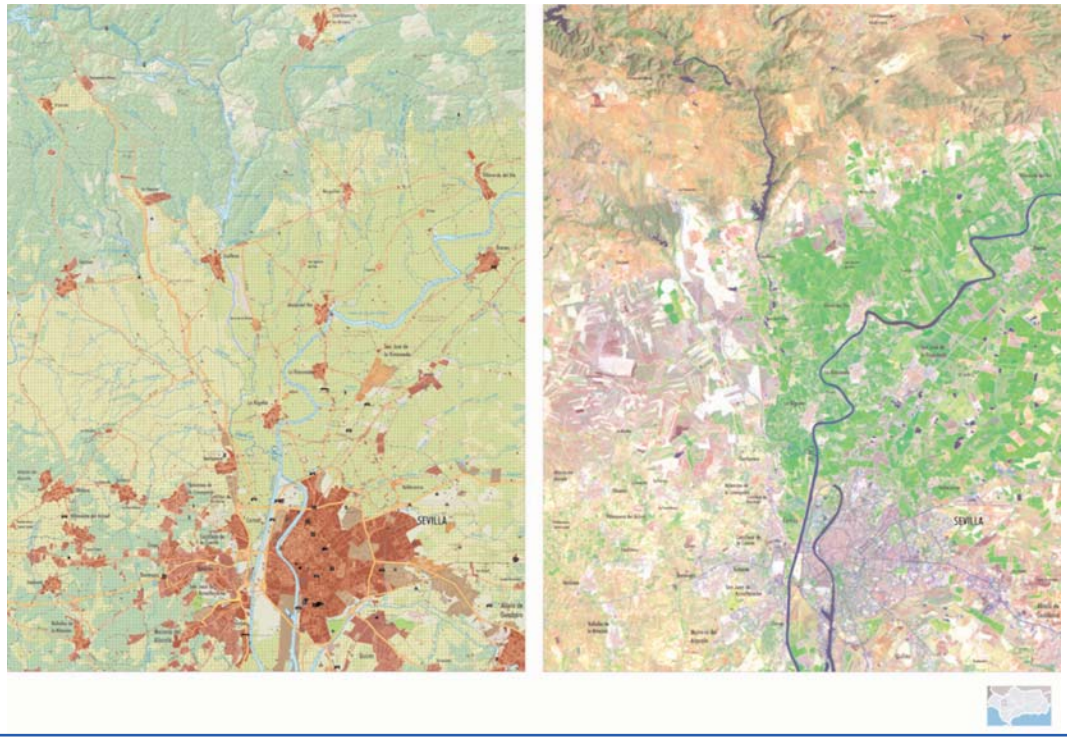
- **"My city in the maps".** It is a didactic book directed to the teachers of primary and secondary level that propose numerous activities to know the cities through use of maps.
- At the start of 2007 was held the 1st School Competition **«Andalusia on a map»** that has since been repeated every year with great success of participation and high quality works.
- In 2010 **"Didact-ICA"** was created, a section on the website where one finds all the contents mentioned above.

ATLAS OF ANDALUSIA

In 2007 it became an updated reissue of Volume I of «Atlas of Andalusia» dedicated to general mapping (1:100,000). This editorial project, comprising four volumes, has led a great deal of data integration and public diffusion of geographic information available about the Andalusian region.

In 2009 this work has been completed by the publication of «Atlas of the history of the territory of Andalusia.» This is an unknown vision on how the territory of Andalusia has been reshaping throughout the time. This publication puts special emphasis on the footprints and territorial impacts of historical processes.

In 2010 it has been published a new edition of «Interactive - Multimedia Atlas of Andalusia", an digital encyclopedia that incorporates a wide and varied repertoire of contents (aerial photographs, texts, statistics, historical maps, animated maps, etc).



HISTORICAL CARTOGRAPHY

Throughout the period in question, the work of the Historical Map Library of Andalusia has continued with the cataloguing and digitization of collection. Following table shows the tasks and the number of queries handled by this service.

	2007	2008	2009	2010	2011
Catalogued maps	9,586	7,620	5,261	0	0
Digitized maps	5,665	6,854	8,298	0	0
Queries	629	625	332	239	327

In 2007 the ICA, in collaboration with the IGN. published *"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 the same line, in 2007, the ICA released a DVD compilation of the sheets corresponding to Andalusia 1:50,000 mapping developed by the German government before World War II (1940-44).



The ICA, in 2008, completed published the *«Catalogue of Historical Cartography»* with the collection for the province of Malaga. It also launched a new DVD collection of *«Digital Historical Mapping"*, have been published the DVD corresponding to the province of Sevilla.

In 2009 was released the DVD of *"Digital Historical Cartography"* corresponding to Malaga, and a digital edition of a map (scales 1:50,000 and 1:250,000) carried out between 1943 and 1951 by the U.S. Army Map Service.

In 2010, the ICA has been published *"Andalusia The cartographic image until the late XIX century"* an ambitious and meticulous collection of maps of the region, destined to become a reference work.

GEOGRAPHIC INFRASTRUCTURES AND EQUIPMENT

Andalusian Global Positioning Network (RAP)



In 2007 the RAP works to total yield, that is a conformed by 22 ground stations, 2 mobile teams and a center of control that will lend services of differential correction in real time and GPS data.

The service of GPS offered by the RAP will permit the creation of a geodesic frame of unique and stable reference for cartographic and topographic 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, the ICA was relocated 2 stations and is in study the possibility of increasing the number of ground stations.

Spatial Data Infrastructure of Andalusia (IDEAndalucía)

It is the corporative geoportal access to geographic information produced by the Junta de Andalucía (Regional Government). Since its creation in 2006, has been proceeded to create the Geographical Information catalog with corresponding metadata and to improve the search interface and web services offered

IDEAndalucía currently offers searches and discover services, as well as of visualization and consultation services for orthophotographs; basic, territorial and derived cartography from Andalusia.

Also, it is possible the visualization and combination of multiple services of maps from other administrations and organisms.

In the last year IDEAndalucia has been had 433,263 visits from 195,897 different users who have consulted 56,526,637 views and have realised 67,706,294 requests of information.

Finder of Space Information of Andalusia (Line@)

It is a eGoverment service of consultation and access to all products offered by the ICA. The user defines (graphically or by a place name) the area for which it needs cartography (basic, derived, thematic, orthophotographs, etc). For each product can make a display, analyze the metadata and proceed to download or its purchase.

	2009	2010	2011
Descargas	52,544	148,747	74,221
Correos	25,569	74,330	36,407

Unified Digital Street Map of Andalusia (CDAU)

From year 2006, in collaboration with the Innovation, Science and Enterprise Regional Ministry, the ICA through the Web has created a street map service that since then stays in process of permanent update.

The importance of the street map is to maintain a location addresses service, official offices and equipments, and provide a reference basis for planning and management of public services.

Viewer for mobile devices (SITÚATE)

In 2008, after starting the SITUATE project, whose goal is the diffusion of official cartography of the Junta de Andalucía for use in all types of mobile terminals with GPS navigation functionality.

Since then, it has been developing the application and test different versions until a final version in operation since early 2009



DIFFUSION

Internet

The website has become the main diffusion channel for the ICA's products, so that, is making a special effort to renew its contents and keep them updated.

In 2009 it changed the interface and in late 2010 were further revised both the content and appearance of the site, currently expected to be the progressive integration of their contents to the new site of IECA.

Currently you can access to the website from the following address:

http://www.juntadeandalucia.es/obraspublicasyvivienda/portal-web/web/areas/cartografia

Exhibitions

Throughout these years, the ICA has organized numerous exhibitions of different content. The main ones are listed below:

2007

- 27 March10 April, the exhibition "Andalusia on a map" in Seville.
- 3-12 May, exhibition "Andalusia in a map" in Ayamonte (Huelva).
- 3 to12 June, in collaboration with the Institut Cartogràfic of Catalonia, the exhibition "The maps in the Civil War" in Seville.
- 4 to 15 June, exhibition "Andalusia in a map" in Arahal (Seville).
- 30 November-21 December, in collaboration with the Institut Cartogràfic of Catalonia, the exhibition "The maps in the Civil War" in Granada.



2008

- January 14 to February 3, in collaboration with the Institut Cartogràfic of Catalonia, the exhibition "The maps in the Civil War" in Malaga.
- February 12 to March 6, exhibition "The maps and the space information" in Jaén.
- March 26 to April 10, exhibition "The maps and the space information" in Cordova.
- June 2 to 10, exhibition "Andalusia in a map" in Ayamonte (Huelva).
- September 4 to the 28, exhibition "50 years of territorial transformations in Almeria. 50 anniversary of the American flight (1957-2006)" in Almeria.

2009

- March 3 to 24, exhibition "The maps and the space information" in Almeria.
- April 24 to May 15, exhibition "The maps and the space information" in Cadiz.
- May 20 to 22, Expogeomática, in Malaga.
- September 18 to November 22, co-produced with the Centro de Estudios Andaluces, exhibition "Andalusia, the cartographic image from the Antiquity to the present time", in Coria del Río (Seville).

2010

- March 19 to April 19, exhibition co-produced with the Centro de Estudios Andaluces, exhibition "Andalusia, the cartographic image from the Antiquity to the present time" in Granada.
- May 11 to 14, Expogeomática, in Merida (Badajoz).
- September 8 to the 26, co-produced with the Centro de Estudios Andaluces, exhibition "Andalusia, the cartographic image from the Antiquity to the present time" in Seville.
- October 8 to November 9, co-produced with the Centro de Estudios Andaluces, exhibition "Andalusia, the cartographic image from the Antiquity to the present time" in Jaén.

2011

- April 26 to 29, Expogeomática, in Jaén.

Days of encounter, seminaries and conferences

Between 2007 and 2011 the ICA has organized or sponsored the following activities:

2007

- March 22 to 23, Days of encounter "Spatial Data Infrastructures" in Seville.



2008

- April 16, Workshop "Geocoding".
- April 29, Day ESRI "Generation, design and completed from maps of quality".
- May 13, Day ESRI "Storage, management, operation and analysis raster".
- May 27, Day ESRI "Corporative systems".
- June 10, Day ESRI "Photogrammetry and remote sensing with tools of Leica".
- June 17, Workshop "Metadata".
- November 12, Workshop "OGC services".
- December 10, Workshop "Control and securing of quality in the cartographic production".

2009

- February 24. Workshop "Norms: The normalization of products and services".
- April 15, Workshop "Access to the information".
- April 21, Day ESRI, "GIS and mobility".
- May 6 to 9, II Days of encounter of the "Organization for the Cooperation in Cartography of Autonomous Communities" (OCCA), in Seville.
- May 26, Day ESRI, "Applications in Internet".
- June 16, Workshop "Interoperable services".

– June 25, Day ESRI, "Geoportals".
– November 10, Workshop "Urban cartography".

2010

– February 10, Workshop "Geographic Information for the management of emergencies".
– March 27, Day ESRI, "Internet Web 3.0: Diffusion of attractive contents and quality in Internet".
– May 11, Day ESRI. "How to approach the geographic functionality all the organization".
– May 27, Workshop "Corporative GIS".
– November 8 to 10, Workshop "Free information and tools: perspective of producers and users", in Jaén.

2011

– March 29, Day ESRI, "ArcGIS Server 10".
– April 13, Day ESRI "ArcGIS desktop: the key of the GIS".
– April 15 to 17. Mini Mapping-Party Baeza, in collaboration with the Jaén Delegation, Open Street Map and the Jaén University. In Baeza (Jaén).
– May 10, Day ESRI "Mobility and development".

FORMATION AND INVESTIGATION

Between the 2007 and 2011 ICA it has organized or sponsored the following formative activities:



2007

– March 26 to 30, Course "Microstation". In collaboration with the Andalusian Institute of Public Administration (IAAP).
– May 7 to 11, Course "SIG ArcGIS v9". In collaboration with the IAAP.

2008

– March, 3 to 5, Course "Photoshop 9". In collaboration with the IAAP.
– March 13-14, Course "Spatial Data Infrastructures".
– June 2 to 5, Course "Spatial Data Infrastructures".
– June 12 to15, Course "GPS". In collaboration with the IAAP.
– 2008 October to 2009 July, I Course of "University Expert in management of Geographic Information". In collaboration with the Seville University.

— Order of 16 of December of 2008, for which they settle down the regulating norms for the concession of scholarships for de formation of technical personnel as regards cartography, systems of geographical information and presentation of geoservices through the web.

2009

— March 23 to 26, Course "Taking of data with GPS. Validation and correction differential". In collaboration with the IAAP.
— March, Course "Statistical treatment and GIS of SSPA". In collaboration with the IAAP and the Andalusian Service of Health.
— Order of 20 of April of 2009, for which the regulating bases of the concession of help to the investigation as regards geographical information
— Settings in progress of the `Aulasca' a virtual learn with two courses: one from "Introduction to gvSIG" and another of "Advanced gvSIG", developed between April and June.
— May to June, Course "New Technologies of Satellite Navigation and Procedures of Location" In collaboration with the IAAP and the Environment Department.
— 2009 October to 2010 May, II Course of "University Expert in management of Geographic Information". In collaboration with the University of Seville.
— October, Course "Tools GIS applied to the SIGPAC". In collaboration with the IAAP and the Agriculture Department.

2010

— May 3 to 5, Course "Taking of data with GPS. Validation and correction differential". In collaboration with the IAAP.
— May 18 to 21, Course "Access to Geographic Services in the Web of the CVOT". In collaboration with the IAAP.
— Course "SIG Mercator as tool of support to the decision making in Planning". In collaboration with the Health Department.
— Course "New Technologies of Satellite Navigation and Procedures of Location" In collaboration with the IAAP and the Environment Department.
— Course "Basic topography". In collaboration with the Andalusian Agency of the Water.
— July 14 to 16, Course "The geographic Web: of Google Earth to SDI". In collaboration with the University the International of Andalusia.
— September-December, Virtual learn `Aulasca', 2 new editions of the courses "Introduction to gvSIG (basic)" and "Spatial Data Infrastructures".
— November 2 to December 21, Course "Geocoding and modeling of sociodemographic data. In collaboration with the Seville University.

2011

— May-June, Course "Spatial databases". In collaboration with the IAAP.

4. Other Cartographical Centers

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