



View

Query

Edit

Analyse

Publish

Boosting your capabilities

Introduction

MiraMon is a Geographic Information System (GIS) and Remote Sensing software. It allows visualization, query, edition and analysis of raster (remote sensing images, orthophotos, digital terrain models, conventional thematic maps with raster structure, etc), vector (topographic and thematic maps that contain points, lines or polygons), and WMS layers.

Some parts of the code were written from 1988, but was in **1994** when MiraMon started to become a Windows application to be used in scientific, educational and environmental management. MiraMon project, located at the Center for Ecological Research and Forestry Applications (CREAF) at the Autonomous University of Barcelona (UAB), seeks to provide a low cost, powerful and rigorous software. To date is a general purpose GIS, used by around **200,000** people in **37** countries. Developed to satisfy the most common user needs it has behind a team of expert developers in GIS and Remote Sensing working together with final end users to improve the program daily.

Day to day

MiraMon was chosen by the Environmental Information System in Catalonia to distribute geographic information data on the Internet. Its website receives around 40,000 visitors a year and was awarded a Special Mention to the Best Science and Technology application of the 2000 year International Internet Möbius Award. In 2007 MiraMon team was awarded the Environmental Prize by the Department of Environment and Housing (DMAH) of Catalonia in the form of "Research, innovation and development."

The team members publish in the best journals of their field and are present at the major symposiums on GIS and Remote Sensing. Concerned about the quality mapping they are involved in defining protocols that must shape the national cartographic scenario: they participate in the discussion group of the Catalanian Cartographic Plan, are editors of the Interoperability Framework of Catalonia, collaborate in the definition of the National Remote Sensing Plan, etc.. Internationally, they are an active member of the Open Geospatial Consortium (OGC) where collaborate in the drafting and revision of new standards such as WMTS of its own creation.

Most of Catalanian cartographic information is provided in MiraMon format, among it all the official maps produced by the Cartographic Institute of Catalonia, ICC (1:5000, 1:25000 and 1:50000 vector format topographic).

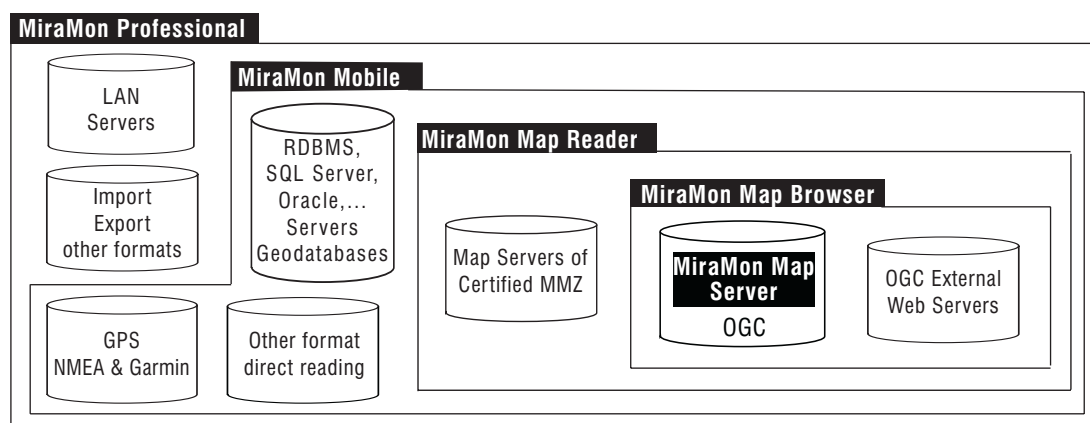
The use of MiraMon GIS software it's highly widespread in several instances of the Catalan Administration: Environment and Housing Department (GIS system used since 1998, all the maps distributed in MiraMon format), Agriculture, Food and Rural Action (GIS system of the DG Fisheries and Maritime Action since 1999), Health (Sanitary Map of Catalonia, 2006), Catalan Water Agency (quality and quantity water station network, calculation of nival surface), Meteorological Service of Catalonia (risk weather situations advice maps), several county councils, town councils (the browser of Urban Architectural Barriers of Sabadell), museums (Museum of the History of the City of Barcelona, Natural Science Museum), etc and in many other regions: in the Institute of Biodiversity of Andorra (Environmental Information Server), in the Ministry of Environment of Andorra, in the Doñana National Park, in the Monitoring of the Protected Areas of Spain (EUROPARC), in the Government of Aragon (the Climatic Digital Atlas Server),...

It is used in many universities, research centers, private consultancies, NGOs, secondary schools, etc, as well as in the management of several natural parks. Is part of the core software in main master and postgraduate courses in remote sensing and GIS and it is used by over 2,000 students.

MiraMon map servers provide massive amounts of data to the Internet or intranets. An example is the satellite image server (SatCat), located in the Documentation Center of the DMAH that offers a free public consultation and extraction of satellite images.

And much more existing on the way!

Applications and access to data



powerful

Because you can open any number of layers and type and of any size supported by the operating system. The complexity supported in vector is, for all practical purposes, unlimited.

MiraMon manages and supports a variety of **raster** data (bit, byte, short and long integers, real, 24 bit color, extracompressed, JPEG, JPEG 2000, SID, TIF, BMP, etc.) and builds real **vectorial topology**.

inexpensive

Because the price of a license is not much more expensive than any university manual and runs on virtually any current PC. Network licenses are even cheaper. Includes free upgrades through Internet.

fast

Because it is entirely written in C language, achieving maximum performance and optimal control program resources of the machine. It runs very fast on network environments.

awarded

MiraMon Professional, MiraMon Map Reader and MiraMon Map Browser/Server have received numerous national and international awards.



courses

They are performed periodically at CREAf and offer different levels (see website). Specific courses can be also organized aimed to a group of people of the same institution or company.

MiraMon Professional

It's the desktop application and the most powerful of them all. Here are described some aspects of basic settings such as display, query and print, a variety of tools for exchanging data between formats, some topics in geometry and geodetic mapping, spatial analysis, remote sensing tools, documentation and cataloging metadata, use of GPS and automatic creation processes.

Visualization

For raster, vector and a combination of both, as well as with requests from OGC WMS Layers (WMS, WMTS, WFS and WCS). It also enables 3D visualization perspectives.

Raster. MiraMon own file formats include bit, byte, integer, real, long, extracompressed or plans files, as well as RGB combinations of any of them. You can directly open JPEG, JPEG2000, JPC, J2C, MrSID, GeoTIFF, ECW, BMP, RLE, DIB and import/export PGM or PPM, CEOs or NDF, TIFF + DIMAP of SPOT, HDF, ASCII, E00, RST, LAN / GIS, GRD, CTL, RF, etc formats. MiraMon treats BMP, JPEG, MrSID and JPEG2000 files as an own format with their complete metadata.

Vector. MiraMon own file formats may have topological structure with the advantage that this represents: speed, connection to databases, more complex analysis, maintaining topological relationships (connection of islands groups, knowledge of gaps within polygons, etc). MiraMon vector formats are: PNT, ARC, NOD, POL and VEC. You can directly open SHP, DXF, DGN, GPX and KML format files and tables containing x and y fields. These files can be 3D and multi-Z for each coordinate.

Geodatabases. MiraMon allows reading and import ESRI ArcSDE geodatabases to MiraMon structured files preserving the Z for each coordinate, the attributes, relational databases, etc.

Query

It allows to perform queries by location (what's in here? what's this?) and by attributes (where is such thing? How many items meet these criteria?) on raster and vector layers, retrieving information directly from dBFS or from a relational database through ODBC on MS-Access, MS SQL Server, Oracle, Informix, etc. Any field of the database can be linked to an unlimited number of physical tables, views, or SQL queries. WMS layers can also be interrogated by location.

Any statistical summaries can be obtained from a query by attributes. You can choose interactively with the mouse clicking, transects, circles, polygons, etc., and combine these selections with queries by attributes to obtain new statistics. The selected objects in a query can be exported generating new specific raster or vector layers or can be used as new selector items against another layer.

Digitizing and topological structuring

Allows on-screen digitizing over raster and vector layers. Can generate layers of points, arcs and polygons. Graphic objects from other layers can be copied directly (with or without their attributes) in the layer being digitized.

MiraMon has several editing vector tools for connecting vertices and segments (SNAP), partition, union, and elimination or displacement of vertices, and the possibility of changing the attributes with a simple click or dragging attributes from the legend.

Permits construction of a real topology on points, arcs and polygons layers that are saved as structured binary vector. While other software force the user to stop scanning whenever an intersection of lines is produced, MiraMon calculates these intersections on the fly and creates new nodes if necessary. It also allows, if desired, dynamic topological structure digitization!

Different polygon limits in multiple layers can be defined in a single layer of arcs, drastically reducing the space in disk and contributing to the consistency of the database.

It has also advanced topology tools allowing the possibility of using tolerances: micropolygons elimination, shorten or lengthen arcs, pseudogeneralization of lines, removal of end nodes and arcs, etc.

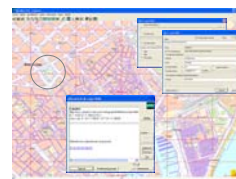
GPS

Data from the GPS receiver can be acquired in two major ways: in real time, acquiring, visualizing track and showing various parameters of the acquisition, or later connecting the GPS receiver to the computer.

Browse in real time with the GPS connected to the computer, allows to be located on maps in an opened session of MiraMon and draw a phenomenon while on the terrain. The other option allows loading and unloading items in the case of Garmin GPS receivers (contact us for the availability in other well-known displays). MiraMon also directly read and import GPX format files.

reading standards

MiraMon Professional and MiraMon Map Browser allow direct reading of **OGC-WMS**, **WMTS**, **WFS** and **WCS** standards. The desktop version also supports connections with **ECWP** protocol.



Spanish Cadastre Virtual Office WMS service over MiraMon Professional or MiraMon Map Reader.

MiraMon maps

Are files that can open unlimited raster, vector and WMS layers with all their properties of display and print. They can be stored in a compressed format (MMZ): all the information related (palettes, DBs, symbology, etc.) into a single file!

ODBC

MiraMon Professional and MiraMon Map Server can run on Microsoft's Open Database Connectivity technology. By this way, you will be able to access different data sources such as Oracle, Infomix, Access, Excel, dBase, text files, etc.

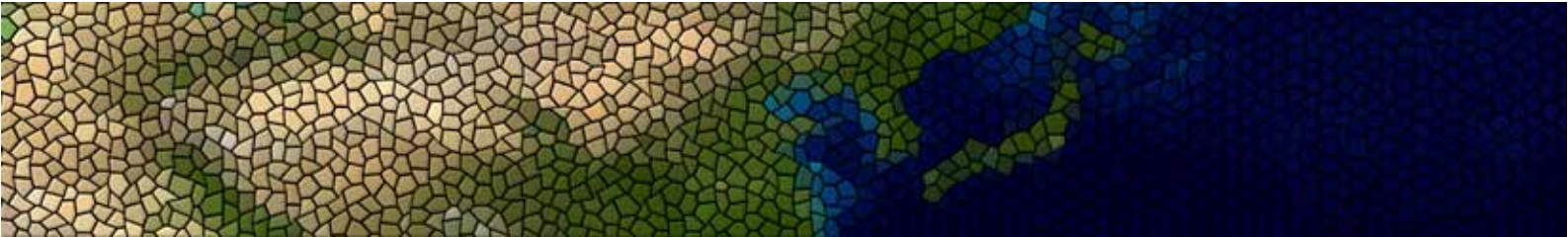
automatization

Batch processing applications (BAT) can run on a command line, building processes to execute time-consuming tasks, or they can be called up from one of your own applications.

buffers



Distances to boundaries of natural reserves to obtain security zones.



Cartographic geometry and geodesy

MiraMon can support and carry out conversions (of single coordinates or whole layers) between the most common cartographic projections, as well as datum transformations (Molodensky and Bursa-Wolf). It can also visualize the Cartesian coordinates of the projection (UTM X, Y, etc) and/or latitude/longitude coordinates, reference networks and tics. It is possible to personalize new projections and the most accurate geodesic aspects are respected thanks to its complete model.

Satellite images and aerial photographs can be converted into orthophotomaps using Digital Elevation Models and accurate algorithms by means of an easy-to-use interface. The resulting orthoimages displayed have a high degree of coincidence among themselves and with other graphic layers. It is ideal for time series studies based on old or recent aerial photographs or on satellite images. These algorithms are also used to geometrically correct digital maps scanned from paper originals.

Analysis

There are two basic tools: the **layer calculator and reclassifier** includes reclassification and mathematical and logic operations in a single expression and environment. The **analytical layer combination** allows you to combine layers and obtain new layers or tables with crossed statistics. All these tools accept raster and/or vector layers.

Other MiraMon tools include size pixel changes, scaling and translating, *buffers* and distance maps, mosaicking and clipping layers, 2D and 3D point or arc interpolation (trend surfaces, inverse distance splines, kriging) to generate maps of variation (elevation and bathymetry, temperature, pollution, etc) and terrain analysis (elevation, slope, orientation, lighting, shading, solar radiation, etc.), vector network analysis according to distance and travel time, analysis of friction and travel costs, calculation of multiple regression models, geostatistic analysis of the variogram, geometric elementary transformations, cartographic generalization, contour line generation, and much more. Most of these tools can work simultaneously with raster and vector layers and take in consideration the existence of NODATA values.

Remote sensing

Remote sensing is present in MiraMon since the beginning. It has specially designed tools: orthorectification of satellite images and aerial photographs, radiometric correction, standard metadata for sensor and platform, multiband support, unsupervised classifiers and mixed classifiers (supervised and unsupervised), confusion matrices generation, selective filters, calculations of emissivity and surface temperature, and much more.

Metadata Manager and Catalogue

MiraMon incorporates two tools to ensure maximum documentation of layers. The Manager (GeMM) which allows you to generate, edit and save metadata, the description of the data model and relationships between databases from a layer or a cartographic series. GeMM conforms to INSPIRE ISO 19115 and FGDC standards. This makes it possible to export metadata in HTML or XML format (IDEC, ISO 19139). Unlike others, purely documentary applications, GeMM maintains consistency by checking coherence with the datasets.

Once the map is well documented, access is easy and quick via the Metadata Catalogue (CaMM). This is perfect when one has a large number of maps in different locations. CaMM consists of an application which is designed to conform with Core ISO 19115 layout schemas and provides elements and a web interface that allows you to carry out queries. This can be customized by means of HTML and XML templates and is easy to use (it is not necessary to know SQL), without losing potentiality: searches by geographical area, by hierarchy, sensitive or not to capital letters and accents, etc. Moreover, the creation of partial or total updating of the catalogue can be carried out automatically.

Printing

High-quality maps of any size (A0, A1, etc) can be created interactively and easily while maintaining total and strict control of the map view (scale, extension, etc). Finished maps can be printed on paper, on Enhanced Metafiles (EMF), Windows Metafiles (WMF), high-resolution bitmaps (BMP, JPEG) or can be copied to the windows clipboard as an EMF or WMF formats so that maps can be added to a report.

Once they are on the clipboard, they can be pasted perfectly into other applications (maintaining the original scale, colors and quality of the vectors and rasters). Once a map has been composed, it can be enlarged or reduced to fit any paper size.

Using the printing assistant, it is possible to quickly create maps with all the most common elements (graphic and numerical scale, north arrow, legend, date and time, etc). You can increase productivity if you have templates created in your own style. With advanced printing parameters and selecting personalized paper sizes for your computer, it is possible to create large wallmaps.

planimetry

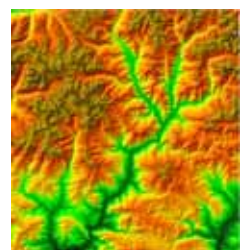
- Conversions of angular magnitudes between degrees, minutes, seconds and radians.
- Geodesic calculator, which allows you to convert the coordinates of one point from a coordinate reference system to another coordinate system.

orthoimages



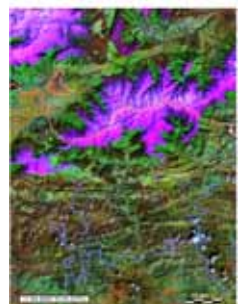
Orthophoto generated from aerial photographs represented over a topographical vector sheet.

terrain models



Digital Elevation Model made by fusing and interpolating vector contour lines, 3D lines (rivers, thalwegs,...) from the ICC topographic sheets, being shaded later on.

aplicability



Snow accumulation studies by remote sensing monitoring.

Internet, Intranet and CD-DVD Publication

With MiraMon you can publish your maps following one of these technologies:

MiraMon Map Server and Browser

With this technology you can publish your maps on the Internet and users will be able to access them via their usual web browser. It is extremely user-friendly and makes high-quality maps available even for very large areas. It has been developed to strictly conform to the standards established by the Open Geospatial Consortium (formerly known as OpenGIS).

It currently complies with Web Map Service and Web Coverage Service standards. It allows the user to view, zoom, pan, query by location, go to a specific place in a predefined list, download, access metadata, situation, create animations, etc, from one or more MiraMon servers or from other manufacturers who support standard WMS and WCS requests. This technology comprises a map browser, a server application and an application to enable you to create and manage your website.

The **browser** is a set of HTML files which are wholly configurable for position, fonts and colors etc. It includes JavaScript code that is compatible with the majority of existing browsers (Internet Explorer 5.0 or later versions, Netscape-Mozilla-Firefox 1.0 or later versions, etc).

The **server application** is a CGI-type executable which can be directly installed on a web server for Windows (Internet Information Server, Apache, etc). It is a very light and fast executable (most requests are answered in less than a second). This allows for a large number of simultaneous users.

The **configuration application for the browser and the server** make it possible to set most of the browser properties through a pleasant visual environment. It is also possible to control the layers that the server offers.

This application is being successfully used on servers of orthophotos, satellite images, topographical maps, thematic vector maps, point sample maps, etc. It is also possible to access these data via MiraMon Professional and the MiraMon Map Reader with this technology.

WMS servers can also be used as providers of complete, real GIS datasets, in MMZ or other formats, but using the area indicated, with the original resolution and desired layers.

This project was initially supported by the Supercomputing Centre of Catalonia (CESCA) as a Project of Advanced Communications. Several digital cartography servers that use this technology can be visited on the Internet. Other servers are part of Intranets or are available in documentation centres.

MiraMon Map Reader

The Map Reader is a **free** program that allows you to view, query and print maps published on the Internet or on CD-DVD. The maps must have been generated by MiraMon Professional with a specific certifying licence called **MiraMon Internet Map Publisher**.

Information is supplied in compressed format (MMZ), generated using the most advanced data compression algorithms, which may contain MiraMon maps and/or other documents. The maps, which are in digital format, can be queried by location (clicking on any place tells us what there is there) or by attribute (you can ask the map to find a feature, such as a wastewater treatment plant, or a phenomenon such as all the meteorological stations with a mean temperature of below 5°C in January). They may be linked to other kinds of related information, such as text documents, spreadsheets, images, graphics, sound, HTML pages, websites or even other maps. These may in turn be linked to other microcosmos of information.

Works with data in both **raster** and **vector** (with or without topology) and **WMS** formats.

In contrast to many other GIS available on the Internet, the philosophy of the Map Reader does not consist in giving a simple screenshot or a limited selection of data. It allows the data themselves to be accessed so that the user may query and make full use of them as often as necessary. Using this compressed format permits a saving of both time and money, which is to the advantage of the user and the organisation providing the data.

The Map Reader allows you to access all this information through a simple, though not simplistic, click, which is based on a high-performance product: the MiraMon Professional.

Data security is guaranteed by the certification included with the compressed files (MMZ format) by the entity supplying the information. The Map Reader checks for this certification before displaying the data and provides the user with the name of the certifying entity.

features

Compatible HTML pages with JavaScript code (open source).

Coordinates for current position and area. Cartesian (m) and geographical (°) coordinates.

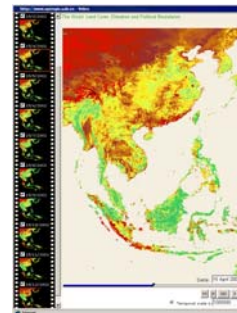
Layer control from legend. Automatic hide layers by range of scales.

Links to different servers of different versions of WMS.

Transparency and semitransparency support.

Downloading of the view area in different formats.

Query by location and query by list.



Animation of temporal series

And much more...

standards development

MiraMon team actively participates in the development of international standards of the OGC, as the Web Map Tile Service (WMTS), and in the review of some of them.



Active member of the Open Geospatial Consortium

WMS-WMTS servers

www.opengis.uab.es/WMS/educacio/index.htm

www.opengis.uab.es/WMS/europarc/index.htm

www.opengis.uab.es/WMS/thalassa/index.htm

www.opengis.uab.es/wms/iberia/index.htm

www.creaf.uab.es/mcsc/mms/index.htm

www.sigma.ad/sma/www/index.htm

www.opengis.uab.es/WMS/world/index.htm

MMZ servers

Cartografia oficial de l'ICC: www.icc.cat

www.creaf.uab.cat/mcsc/index.htm

www.mediambient.gencat.net/cat/el_departament/cartografia/inici.jsp

www.gencat.net/darp/sigpesca.htm

http://magno.uab.cat/atles-climatic

www.sigma.ad/cartosig.htm

www.meda-corpus.net/eng/index.asp?op=403000

Some news

MiraMon Mobile

MiraMon Mobile is an application for mobile devices (PDA, GPS and new generation mobile phones) on Windows Mobile and Windows CE, downloadable at www.miramon.uab.cat/mm_mobil.

Currently it allows you to read maps locally (in memory card devices) or as WMS clients (via WiFi, 3G telephony, etc.).

If the phone has a GPS device, its recordings can be used to control the position of the map. The itinerary can be saved as a route and the position always appears on the screen (as a square or an arrow depending on the speed of movement).



New intuitive starting interface: the collections of favourite maps.



Geographic Information Search Engine

MiraMon new version incorporates an Internet Geographic Information search engine among the available main data servers (MMZ, WMS, WMTS, WFS, SHP, ECWP, etc.). Users can search by means of geographic area, thematic category, keywords, dates, etc.

The new version allows MiraMon to start the session in the favourite mode where the user can select a map from MiraMon default map collections or from user made collections (for instance typical maps of a study area, a project, etc).

Reading and importing ArcSDE geodatabases

MiraMon allows accessing ArcSDE servers. Each server may contain one or more databases (geodatabases) that can be accessed through the corresponding username and password. To facilitate the use of ArcSDE geodatabases, you can structure the information in layers containing a single type of object linked with an homogeneous attribute table (the same type of attribute for each object layer).

System requirements

Operating system:	Microsoft Windows 9x /Millenium Edition / NT / 2000 / XP / 2003 Server / Vista / 7
Hardware:	A Pentium processor, 16 MB memory, 300 MB hard drive, a monitor of 800x600 pixels and 256 color graphics card is sufficient for work. This shows that MiraMon is really small and fast: it works in old computers and flies! in today's PCs.
Net:	Runs under Microsoft, Cytrix and Novell environments.

Our coordinates

MiraMon

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Note: This leaflet was completed in October 2009 and has a limited extent. MiraMon is continuously growing. So do not assume it doesn't have that functionality you are looking for: write us or visit our website!



Please, recycle

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without division

One of the most attractive aspects of WMS specification is that it can offer Geographic information as a continuum, without divisions into sheets.

import/export

MiraMon can easily convert between most popular GIS formats, apart from its direct-reading: SHP, DGN, DXF, MrSID, TIFF, JPEG2000, GPX, KML, ArcSDE, and many more.

users profile

MiraMon allows the creation of different user profiles, specially useful in large corporations, teaching classrooms, etc.

direct access

Users accessing MiraMon from individual personal computers or local area networks (LAN) who have access to directories (files) where there is a catalogue of data in MiraMon-WMS format will, if they wish, be able to access this data directly, without having to go via an http protocol.

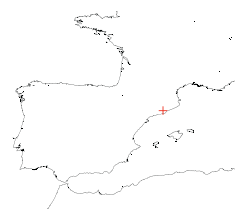
Plus:
· Higher speed
· Top-quality printing
· Semitransparencies and styles
· Less work for the client computer.

recommended

processor: Pentium IV
Operating system: XP
memory: 512 Mb
hard disk: 80 Gb
monitor: 1024x768 pixels
graphic cards: 16 · 10⁶ colors

(Orthophotos of 100 Mb and mosaics of dozens of topographical maps)

location



Longitude - Latitude

λ: 2° 06' 34" E
φ: 41° 30' 2" N
Datum: ETRS89
Ellipsoid: GRS 1980