New Features in MiraMon, v.5

1. Introduction

This document describes the main new features in MiraMon, v.5, a computer program for Cartography, Geographical Information Systems (GIS), Remote Sensing and related disciplines. This summary also introduces the latest improvements in version 4 which are consolidated in version 5. The most advanced features are in smaller font since they are only of interest in a second reading or for expert users. Likewise, features in *Not yet implemented* paragraphs are expected to be developed briefly.

In this document, **MM** refers to the MiraMon software package, whereas **MM32** refers to the main application module used for displaying, querying, printing, digitizing, graphic editing, etc. On the other hand, "MiraMon Professional" refers to the complete MiraMon package (with license), as opposed to the "MiraMon Map Reader" and to the "MiraMon Map Navigators" described in section 17.

The following illustration shows the main ways of accessing geographical information from the different MiraMon applications. As it is shown, since version 5.1 of the Professional MM it is possible to access **corporate** databases located in **LAN servers** (including access to databases such as MDB, Oracle, MS-SQL Server, etc,), **import and export from other formats, communicate with GPS receptors** in real time or in post-process, **access in a transparent way to MMZ maps** published by other organizations, or **to browse through maps offered in servers of any producer using the Open Geospatial Consortium (OGC) standards**. In the latter case, MiraMon servers offer advantages such as a much faster access than other vendors, download of the actual data, etc.

MiraMon Professional

LAN
Servers

Import
Export
other formats

GPS
NMEA andGarmin

MiraMon Map Reader

MMZ certified Map
Servers

MiraMon Map Navigator

MiraMon
Web Servers OGC

External OGC
Web Servers

Production and Analysis   Internet-Intranet and CD-DVD publication
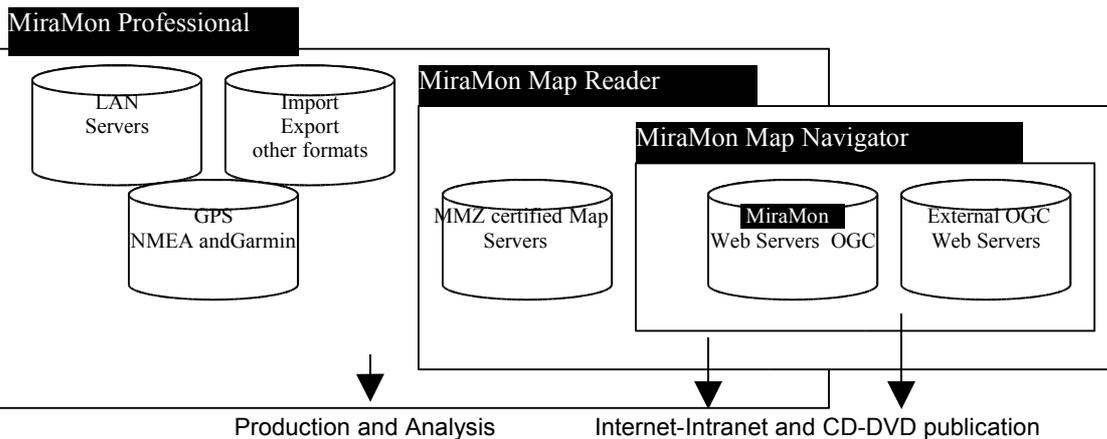
2. Help

Help, in Windows-CHM format as in version 4, has searching capacities, is hierarchic and can be partially or completely printed. Its whole content has been updated, restructured and enriched with numerous print screens.

3. Main user interface

A **new cursor** is available to query both raster and vectors. This is now the default cursor. F9 key switches between the 3 types of cursors (raster/vector query, raster query, vector query).

The option "Tools | Metadata Manager..." in the MiraMon menu changes its behaviour and now offers a list of all the opened layers. The user can now choose whose metadata wants to be displayed. The dialog box has a "More layers..." button which allows exploring the file system in order to open the metadata of any layer, as in previous versions.

The button bar of MM32 incorporates a new element with the same functionality as the option "Tools | Metadata Manager..." of the MiraMon menu.

The button bar of MM32 incorporates a new element that allows accessing the new dialog box of interactive selection of objects (see below).

The legend now has checkboxes that allow activating/deactivating layers, so that it is now not necessary to go to the layer manager dialog box to determine if a certain layer is **visible** or **querable**. Also, there is a new button with the icon of the Metadata Manager (GeMM) which allows to directly accessing the metadata of the layer.

4. New object selection mode: Interactive Selection

Version 5.1 includes a new mode of object selection: the **interactive selection.** It allows to select and unselect objects with a mouse click as well as using a transect, ellipse/circle, rectangle/square or polygon. This mode is accessible from the button of the button bar and also via the right mouse button. The new dialog box replaces and gathers all the functionalities of the old 6-button dialog box that appeared when clicking the right-button of the mouse. Besides, the new box is a floating-box (it allows to interact with the principal functionalities of MM32 while open).
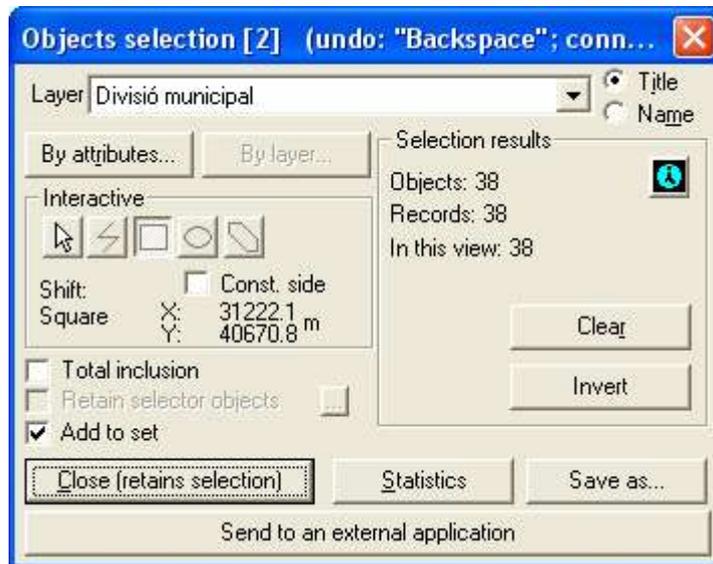
This new mode allows selecting some of the objects that we have in the graphical base. The **Selection of graphical objects** can be useful in several situations, as for example:

- To calculate some statistics for the selected elements (e.g. how big is the area of 5 property plots).
- To export the elements into a smaller layer (e.g. to create a layer with only the 5 previous property plots).
- To perform some operations on the subset of elements (e.g. changing the attributes of all the selected objects (assigning, for example, the same owner to all the previous property plots), or even to delete them (in version 5.2).

With MiraMon, since version 5.1 **Selection of graphical objects** can be carried out in two different ways: **Interactive selection** and **Query by attributes** (already available from the button).

The **Interactive Selection** offers the most intuitive and visual way to carry out selections in vector files (in a future release it is thought to be available also for raster files).

In the dropdown list at the top of the dialog box you can choose the layer on which you will carry out the selection (this layer is called, sometimes, active layer).

The group of buttons called "Interactive" allows choosing how to interact with the graphical objects of the chosen layer in the top dropdown list. In all cases you can connect to vertices of previous objects (of any of the layers declared as connectable in "Modify layer order and properties" dialog box) by pressing the

F3 key, as well as **entering the exact coordinates using the keyboard** after choosing the option "Edition | Coordinate entry via keyboard " in the menu:

- Selection by click : The first one of the buttons (arrow) allows selecting the objects by simply clicking on them with the cursor. The objects are selected if they are partially or completely inside the circle that will appear in the top of the cursor. A second click unselects the object.

- Selection by transect : It allows to draw (digitize) a line that selects all objects below its path. Every click establishes one of the vertices of the line or transect; by pressing the key **Back Space** (←) you can undo the introduced vertices. When at least 2 vertices have been clicked you can end the line by clicking the right button of the mouse.

- Selection by rectangle/square : It allows drawing a rectangle that selects all objects contained within it (the button "Whole inclusion" allows to decide whether objects have to be completely inside the rectangle or not in order to be selected). The first click establishes one of the vertices of the rectangle and the second click establishes the opposite vertex (you can also use the F3 key for a geometric connection of this second vertex or to end the figure by clicking on the right button of the mouse). While drawing the rectangle, its X and Y dimensions appear in the dialog box in map units. By keeping the SHIFT key (⇧) pressed a **square** instead of a rectangle is drawn. If you want to draw squares of a constant size you need to activate the button "Constant side" and indicate, in the corresponding checkbox, the side length. In this case, the first click establishes the top left vertex of the square and it is not necessary to do a second click.

- Selection by ellipse / circle : It allows drawing an ellipse, centered where the first click is done, which selects all objects contained within it (the button "Whole inclusion" allows to decide whether objects have to be completely inside the ellipse or not in order to be selected). The first click establishes the center of the ellipse, while the second click establishes the other two radiums (you can also use F3 for a geometric connection of this second vertex or end the figure by clicking on the right button of the mouse). While drawing the ellipse, its X and Y dimensions appear in the dialog box in map units. By holding the SHIFT key (⇧) pressed, a **circle** is drawn instead of an ellipse. If you want to draw a circle of a constant size you need to activate the button "Constant radio" and indicate the radium size in the corresponding checkbox. In this case, the first click establishes the center of the circle and it is not necessary to do a second click.

- Selection by an irregular polygon : It allows to draw (digitize) an irregular polygon that selects all objects contained within it (the button "Whole inclusion" allows to decide whether the objects have to be completely inside the polygon or not in order to be selected). Every click establishes one of the vertices of the polygon. By pressing the **Back Space** (←) key you can undo the introduced vertices. When at least 3 vertices have been clicked the polygon can be automatically closed by clicking on the right button of the mouse. The polygon can be convex if it is convenient. On the other hand, if you make the lines that draw the polygon cross
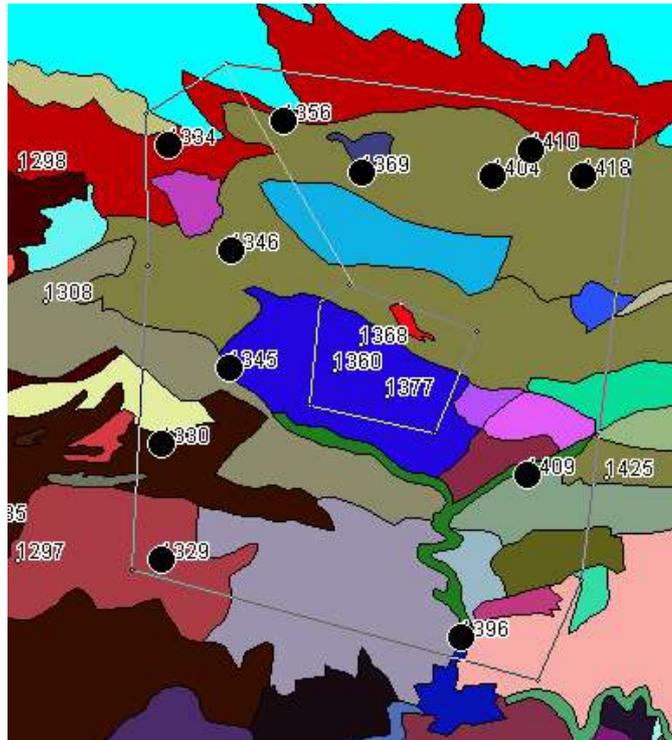
each other (for example, if you draw a five-spike star) MiraMon will apply a criterion of inclusion of alterning inside-outside (in the star of 5 spikes, the objects of the interior pentagon are not considered "inside" of the star; this allows to generate interior polygons of exclusion by drawing a connecting line from an external polygon to an interior one (see the following figure):

The button "**By attributes...**" allows you to get access to the classic query-by-attributes dialog box , which selects the objects according to a logical selection on the attributes of the database.

The button "**By layer...**" will allow in a future release to carry out a selection based on the inclusion or contact of the objects with the objects of another layer.

The button "**Select all...**" is only available when no object is selected and allows, as its text indicates, to select all objects (it is equivalent to an interactive selection with a polygon that includes everything, or to a query by attribute such as ID_GRAFIC> =0).

The "**Reverse**" button is available when there is at least one object selected and allows performing the "negative" selection, that is to say, every object not selected becomes selected and every object selected becomes unselected. It is useful, for example, whenever we want to select all plots of a cadaster except for one. In that case, we will select that object and, later, reverse the selection.
Note: The reverse of the selection acts at the object level, not at the database record level: the selected objects will contain all records and unselected objects will be completely so, regardless of the number of associated records that had been selected by a query by attribute.

The "**Total inclusion**" checkbox, available when the object selector is of zonal type (ellipse, rectangle or polygon) establishes whether the entity to be selected should completely fall within the selecting zone or only a part of it is enough so as to be selected.

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The "**Clear**" button cancels the current selection.

The checkbox "**Add to set**" determines whether new selected objects have to be added to the ones already selected. This can be done interactively or through a selection by attributes.

The "**Send to an external application**" button is meant to coordinate MM32 with other applications, either conventional executables (EXE) or in Internet servers or intranet (CGI, ASP, etc).

The rest of the buttons were already present in the old "right button" dialog box. Note that the "**Statistics**" button has improved the presentation of results: now the statistics dialog box presents a field list in its left part while in its right part it presents the statistics of the selected field in the list of the left side:
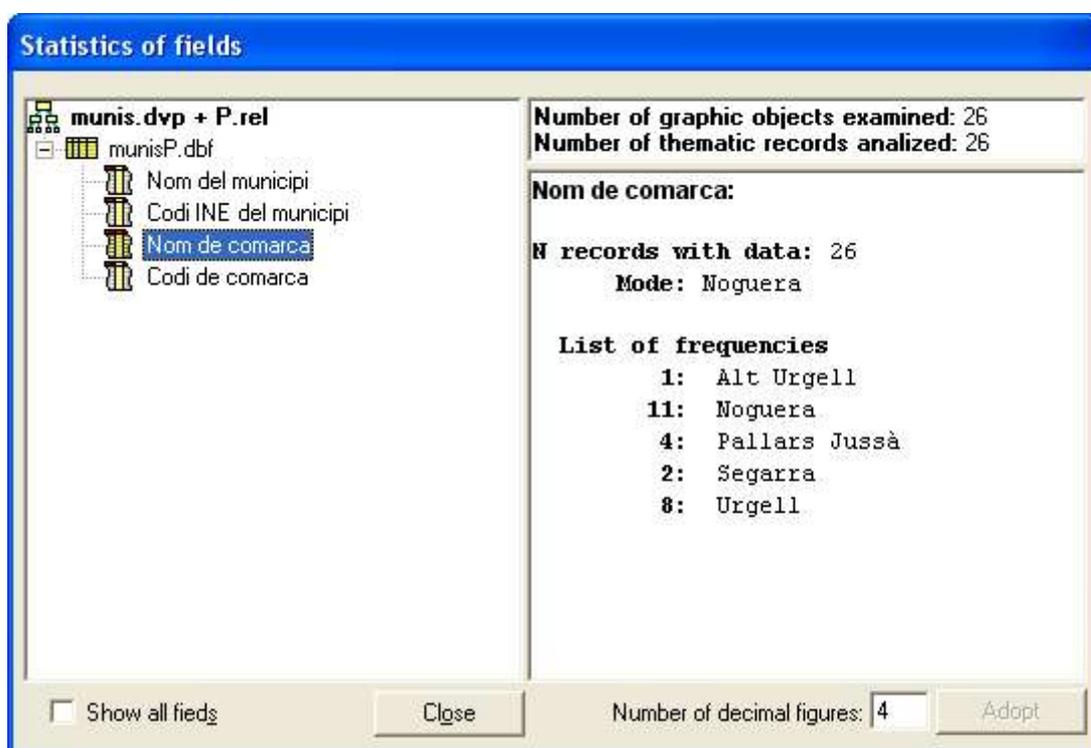
Besides, the new **CenterSelection** key of the [METRIC] section in the MiraMon.par file allows, when doing a zoom to selection, configuring that the selected objects get centered on the screen instead of being shown in the conventional way in MiraMon (adjusted to the screen's top left angle). This new mode becomes the default mode. This parameter can also be interactively changed from the "View | Special" menu option.

By adequately configuring the new **PercentPantallaSeleccio** key of the [METRIC] section of the MiraMon.par file, it is now also possible, when doing a zoom to selection, to give "air" around selected objects instead of showing them adjusted to the top and left sides of the screen. The default value is 1 (without "air"). It can be lowered down to 0.5 (only the central half of the screen will be used). This parameter can also be changed interactively from the "View | Special " menu option.

As a new feature in version 5.1, when saving a selection of a POL file, its topological holes are added to polygon 0.

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5. Improvements and/or new features in data types

5.1. Raster data

Full support to **multiband rasters**. The same file of relations (REL) aggregates several images in a group managed from the Metadata Manager. This is useful for remote sensing multiband images, for land use time series meant to monitor changes, to show a shaded relief model while obtaining other information when clicking (such as height, slope, etc. (see section 12).
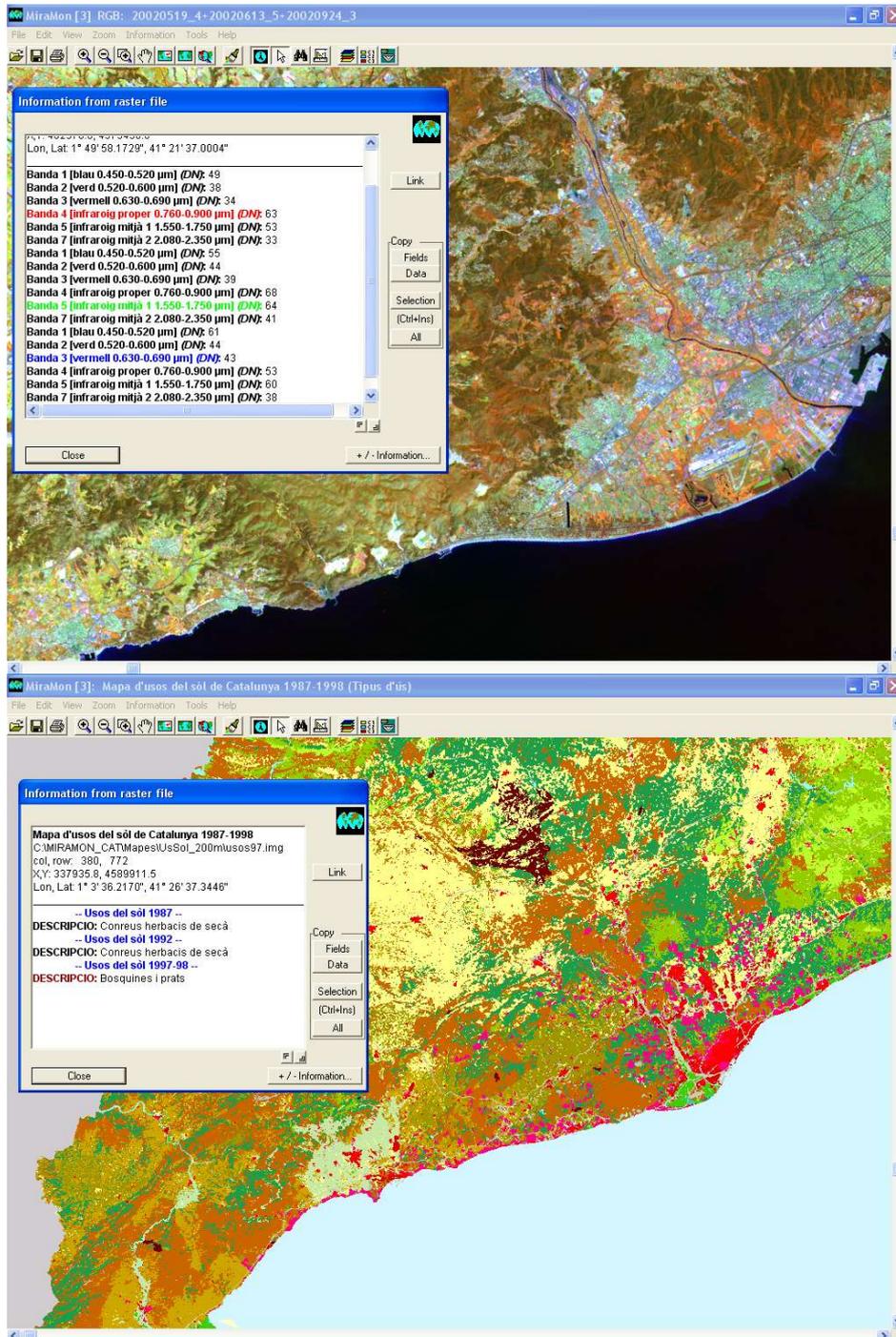
The RLE-type compressed file formats (used in categorical images such as maps or land use) are now generated with **internal indexation by default**, which makes them extraordinarily faster when reading them. This improvement is completely compatible with older versions of MM and it practically means no increase in file size.

With regard to rasters that store images, note that historically there have been important file size reductions while preserving their quality. This has been accomplished by using RGB-> 8bits and RGB-> JPEG (where RGB is a set of three IMG images or of images coming from a 24-bit file such as in BMP, TIFF, etc.) reductions. It is now posible to make the 8-bit -> JPEG conversion and to convert to the new WMS format (see below). In version 5.2, and thanks to an agreement with Lizardtech, **MrSID** format will be supported. Besides, **JPEG2000** will also be supported.

Apart from this and with respect to the raster import modules, several issues need to be highlighted:

- TIFFIMG allows extracting multiband information from TIFFs of more than three bands (for example SPOT 4 spectral bands), to read *tile* models, to import channels of 16 bits per pixel, etc. In the case of GeoTIFF, its reading functions have been improved. Now, apart from importing coordinates, they also import information on the reference system when present in the original file.
- Several applications that read remote sensing formats such as CEOSIMG (from ESA), NDF (NLAPS Data Format, from USGS), SPOT-DIMAP (XML), QuikScat, AMSR-E (Aqua satellite), etc., have been improved and consolidated. Now they also read and import metadata.

5.2. WMS layers

WMS is the acronym for Web Map Service, a standard specification of the Open Geospatial Consortium (OGC) aimed at standardizing the access to cartography by means of browsing or navigation systems based on the Internet protocol (Map Browser Systems). A client (typically an Internet browser) with capacities of WMS navigation (through Javascript, for example) can access cartography servers that conform to the WMS specification, regardless of the cartography provider and the technology developer.

At present there are browsing systems and servers based on the WMS Standard specification. These are accesible in the Internet, as in:

http://www.creaf.uab.es/mcsc/mms/index.htm
http://www.sigma.ad/sma/www/index.htm
http://opengis.creaf.uab.es/wms/world/index.htm
http://www.geoportal-idec.net/gestor/mapawms/

From version 5.1 on, this technology is also available to the user of MM32. In other words, the available Internet layers in format WMS are browsable both from MiraMon Profesional and from the MiraMon Map Reader. With this important new feature, MM **can read any available Internet cartography that conforms to the WMS standard**, anywhere in the world, in any type of server (MiraMon and others). In the figure below you can see MM32 showing a WMS layer offered from the DMAH[1] server. You can know the list of loaded WMS layers through the "**Information | Opened WMS layers**" menú option.

One of the most attractive aspects of the WMS specification lies in the fact that the geographic information is presented in the form of a continuous layer, **without sheet divisions**. Therefore, a MiraMon user may browse through any WMS layer without worrying about opening or closing sheets and without worrying on having to mosaic several sheets to obtain a certain extension.

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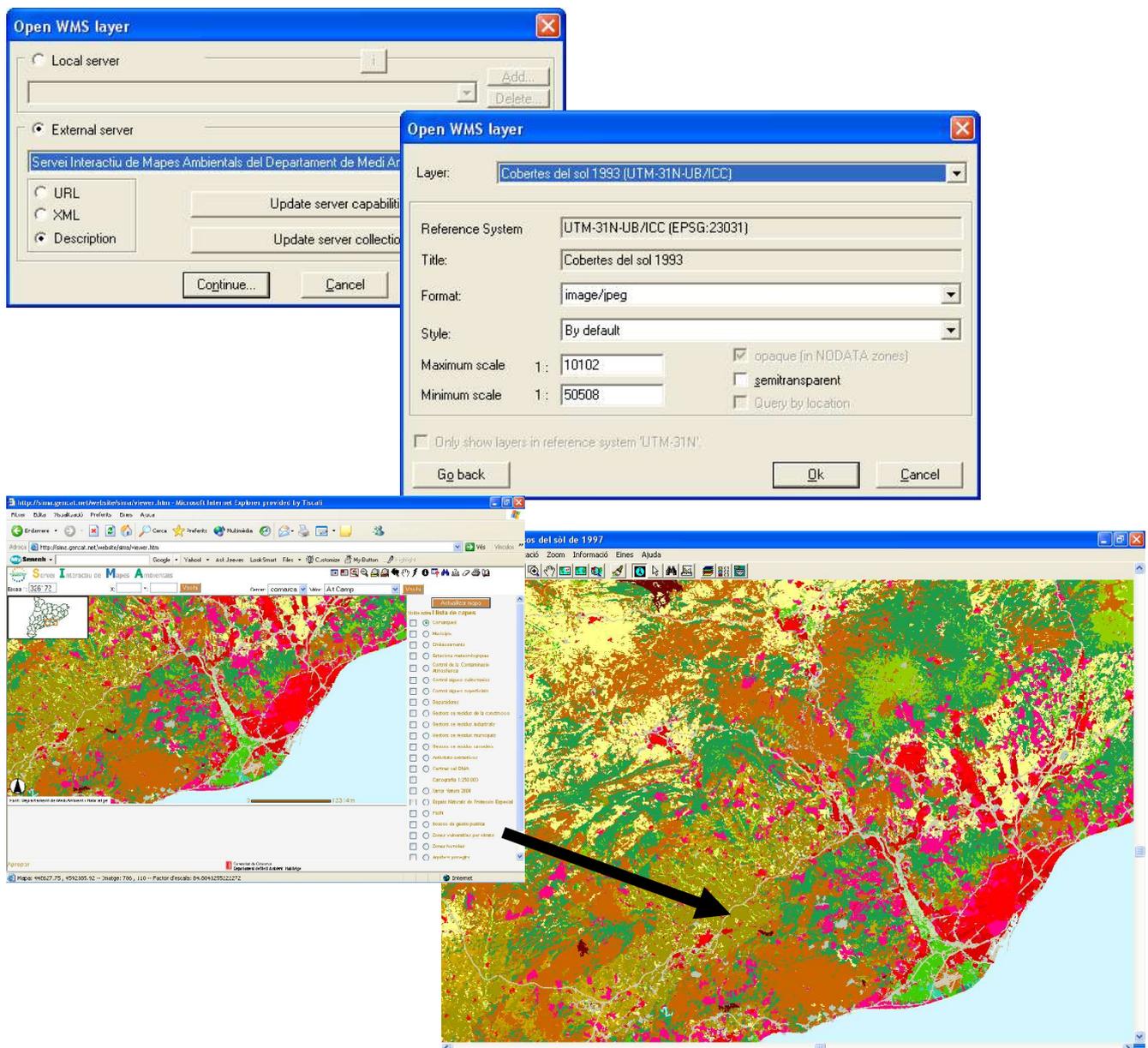
[1] Department of the Environment of the govenrment of Catalonia

The MiraMon implementation is not limited to showing views as in a conventional WMS client. It presents several additional improvements that make it specially appealing. Among these, several improvements regarding symbolization (**semi-transparencies** and **styles**, which you will see below in the section on "Symbolization"), capacity of **direct access to local servers** and **printing quality** (described later) can be highlighted.

Direct access to data in local servers

MiraMon users located in individual personal computers or in local area networks (LAN) with access to directories (folders) containing a catalog of data in MiraMon-WMS format will be able to access these data directly without having to go through the *http* protocol. In other words, a directory with a catalog of cartographic information in MiraMon-WMS format (typically in a server and aimed at being offered through the WMS protocol to *http* clients accessing from Internet or from an intranet) **can be seen by the clients of the local area network directly from a MiraMon session.**

The main advantages of directly accessing WMS data located in local servers are:

- **Faster access** than accessing to the same Server using *http* (due to the fact of not having to change the protocol of communications, not having to initialize a second system of view preparations, etc).
- **Decrease of workload in the Server since it** only acts as a disk server with practically no data processing tasks. These tasks are done at the client side on the raw data coming from the Server. This is most suitable in environments with many users.
- Possibility of browsing data in completely local mode (CD, DVD, local hard disk). This gives great flexibility for **information distribution** (note that neither the client computer nor the server need any server or Internet client installed). As an example we can cite the detailed 1993 Land Use Map of Catalonia (32000 km^2) (CREAF), at 10 m resolution and with a minimal polygon size of 500 m^2, and a map size of only 35 Mbytes and the 1993 1:25000 color orthophoto series (ICC[2]), at 2 m resolution, whose size is only 4.6 Gbyte (only 1 DVD).

On the other hand, the main advantages of accessing the WMS information via *http* are:

- **Data can be provided by any developer of GIS servers,** not only MiraMon.
- **Less workload for the client computer** (only relevant for old computers).

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[2] Cartographic Institute of Catalonia

It must be noted that the network speed (or that of the local bus in case of a disk in a given computer) does not translate into important differences between one or the other strategy (direct access on a local server or access to the same server via *http*) since in both cases it is necessary to transfer the map data.

Quality printing

Users of WMS data in the Internet know that one of the most frequent shortcomings is the lack of quality when trying to print in a relatively big area of paper (A4, A3, etc). This is due to the fact that the WMS specification is essentially thought to satisfy the needs of on-screen information for Internet users.

The MiraMon implementation offers **a print of maximum quality** since it requests to the WMS Server (either MiraMon or another provider) the needed resolution in order to be able to attain the highest output from the original data given the resolution of the printing device..

Important: Due to the fact that many WMS servers limit the scales in which layers can be seen, it is possible that on screen or on the printed map the WMS layers are not visible. In order to solve this problem you may need to contact the WMS Server administrador asking for a relax on the scales at which data can be requested.

WMS **layers are incorporated into MMMs when created**. Due to the special nature of WMS layers (often huge in size, accessed from URL paths, etc), when compressing a MMM into a MMZ WMS layers will be referenced in an indirect form and not incorporated into the MMZ file.

> *Not yet implemented*: Make the MMZ application to do the adequate replacements of local paths to URL paths in case of local servers and to give advice in function of the compression mode selected (Internet publishing, exchange with other users or backup copy).

Please refer to the "Symbolization" section to read about symbolization aspects in WMS layers.

If you are a user of WMS layers and access them via an external route (http protocol, Internet or intranet) it will not be necessary for you to know any technical details of their internal structure and you can skip this paragraph. On the other hand, if you are the administrator of a MiraMon Map Server you need to know that the process used to create and prepare WMS layers is done with the CreaMMS application. This application prepares the layers in a very optimized structure in order to obtain a quick access to data at any geographical extent and scale of work. You also need to bear in mind that the files that form the layer, its relation model and its characteristics are defined in files in **REL5** format (see below) and that the system of files can be organized in a customized way by the WMS manager. However, it is recommended to follow some scheme of organization such as that of the "environmental tree" of the *Departament de Medi Ambient i Habitatge de la Generalitat de Catalunya*[3] (SIWeb).

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[3] Department of the Environment and Housing of the government of Catalonia

5.3. Vector data

With respect to the modules for importing vectorial information, it can be noted that **DGNMM** has been improved and sophisticated in many and diverse aspects.

6. Databases

Database fields of character type (C) may now be defined as "Hyperlink". This extraordinarily accelerates the compression and decompression of MMZ files while preventing from erronously interpreting by chance some strings as links to files or Internet resources. In old REL files the old criterion is still in use in order to guarantee descending compatibility, but with the new files, when a text field contains hyperlinks we will need to define it as such in the "Thematic Information" tab of the Metadata Manager by checking on the "Is Hiperlink" checkbox.

Several improvements have been introduced in the access to databases via ODBC, as for example:

- Whole support to SQL statements of type UPDATE, INSERT, DELETE, CREATE, DROP, ALTER, etc (before, only SELECT statements were possible).
- Support to aggregation queries in ORACLE, SQL Server, etc., such as those of type COUNT, SUM, etc.
- Improvemens in performance for the function that allows retrieving the number of records of a table or of an SQL query.
- Improvements in the performance of queries by attribute.
- Improvements in the performance of reading functions for REL files which have connected tables via ODBC.

It is now posible to establish the type of relation between tables (1$\rightarrow$N, N$\rightarrow$1, N$\rightarrow$N) as well to indicate if the referred table acts as a thesaurus, that is to say, if it is necessary to require that linkages be solved (in this case it is accepted to connect NODATA$\rightarrow$NODATA). This allows for, among other things, defining what to do when applying a change of attributes during digitalization. The associated tables are treated as dictionaries (before it was the only possible behaviour) or as associated tables.

Also in v. 5.2, besides the **field statistics module** a new **module for group statistics** is available.

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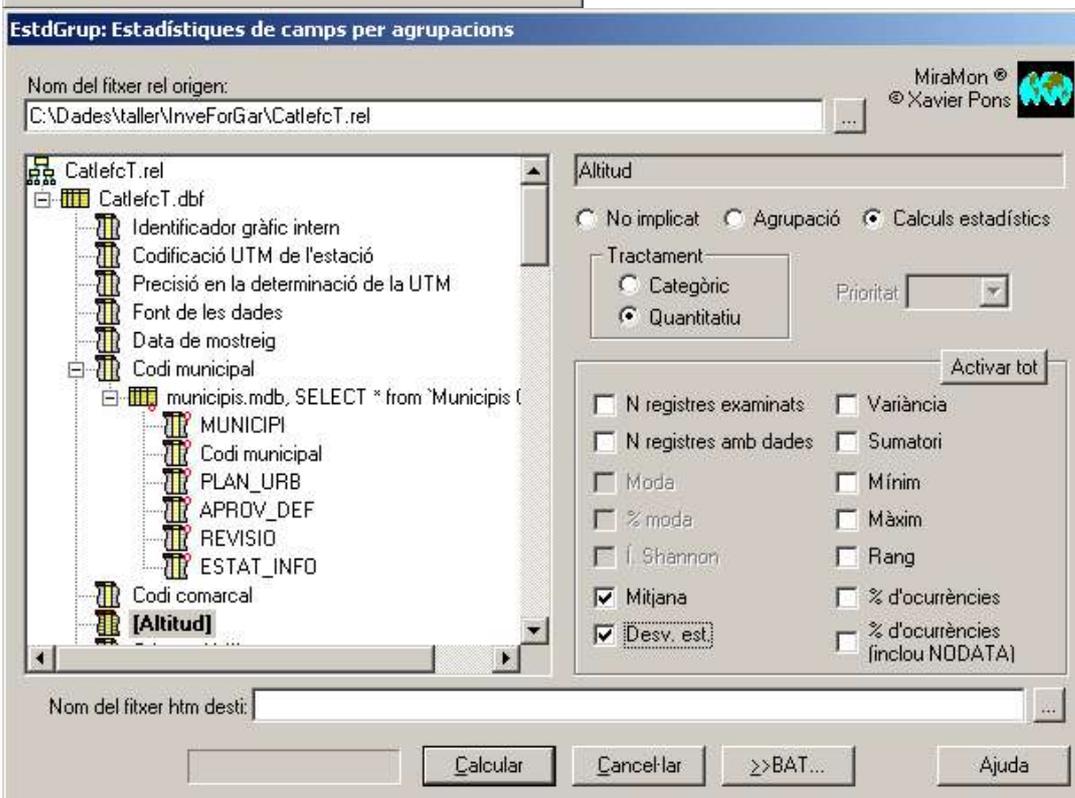
7. The REL5 format: footbridge and hyperlayer

As mentioned before, the REL4 format can be a **multiband REL** file. In 2003, the possibility of defining particular REL files for branches of the relations tree of databases was consolidated. This was a major improvement in the easiness of managing large corporate databases since properties (metadata) and relations for this part of the tree can be documented and a REL file for this branching can be created and reused (pointed to) from other databases. Then, a REL4 file could also be a **distributed REL**. At the same time, the preparation of server functionalities in MiraMon for Internet environments of Web Map Server type (WMS) has forced to extend the uses of the REL file as a relations catalog.

The REL5 format contributes two new important features. On the one hand it is a specification that allows using, if convenient, the REL file as a footbridge to several components: **REL footbridge**. On the other hand it also allows referring to several layers simultaneously, of simple type or even of multiband type. Therefore the REL5 format can be named as **hyperlayer REL.**

The extension of the possibilities of the REL5 format, which at present is being exploited in the context of the WMS layers of MiraMon, goes beyond what is intended for this document. If interested, you can ask us at suport@miramon.uab.es for the document ***EspecificationsREL5.doc***, which facilitates technical details and discusses the philosophy behind.

8. NODATA values

Its support is extended in symbolization tables: when the CLAUSIMBOL field of one of these tables is an empty string it will be considered a NODATA value. Nonetheless, in the interpretation of the table the program gives priority to the literal string "%NODATA%", which is the recommended value.

In queries by location, when there are several connected tables (join), the linkage might get broken because of a NODATA value in the relation string. In these cases, it is possible to show one of the following aesthetics for fields that **have not been solved** due to a broken link:

() To inform about the field that contains the NODATA value that caused the broken link
() To show them as blank

The first option was the one applied in the previous version. However we thought that since the aesthetics of the second option is often the most desired one, it is justified to make this one as default. In any case, from the "+-- Information" button of "Information | Advanced Options" or from the query-by-location dialog box it is possible to change this behaviour to the most verbose, which is useful when we are polishing a base and are not expecting to find a blank field but want to see which field originates this lack of data.

It is allowed to activate, in query-by-atributes, the option "**Include NODATA values in the query**" in case of vectorial layers, which allows to differentiate between searching for a blank string and considering it as NODATA.

> ***Not yet implemented***: To allow defining NODATA values that are not blank strings in fields of tables of alphanumeric information.

9. Symbolization

9.1. Rasters

Sections [COLOR_TEXT] and [VISU_LLEGENDA] in IMG rasters with a REL file are supported, for the time being as an experimental form. These sections can contain all available symbolization for these raster files (color symbolization table, expansion of the histogram, reverse of the presentation of the legend, etc). If the raster is multiband all bands take the symbolization of these sections, but if a band has to have a different configuration (to use another color symbolization table, a different expansion of the histogram, etc) it is possible to

indicate it in the [COLOR_TEXT:NOM_CAMP] and [VISU_LLEGENDA:NOM_CAMP] sections, where NOM_CAMP corresponds to the text indicated in the NomCamp_xxx = key for the field (band) in question (the same logic used to describe the details of the fields is used, where the section relative to every field is indicated by writing [ATTRIBUTE_DATA:NOM_CAMP]). If sections [COLOR_TEXT] and [COLOR_TEXT:NOM_CAMP] are not present for the band to be displayed the color palette is prompted for as in previous versions. In practical terms, the most immediate consequence of this is that if we have a small section of content defined in the I.rel file:

<div align="right">

[COLOR_TEXT]
Simb_Vers=4
Simb_SubVers=5
Color_Paleta=

</div>

the file will be opened with a double click from the Windows explorer (or launched from an external application) without prompting for the color palette and applying a grey scale. If a given color palette is desired, the name has to be given after "ColorPaleta= ". It is highly recommended to specify it as a relative path.

BMP files with color palette and saved as IMG from MiraMon are now also associated to the palette saved in the created REL. Thus, a double click on the IMG opens the file with the color palette automatically.

9.2. WMS layers

MM has incorporated three significant progresses to the proposals of symbolization of OGC for WMS:

1. From MiraMon Map Servers (MMS) it is possible to offer, following the normative possibilities already anticipated in the OGC proposal, variations of symbolization, such as true color and different combinations in false color for remote sensing images. Due to the fact that this is done with the use of private parameters, non-MiraMon clients work equally well with the default symbolization, while MiraMon clients (even MiraMon Map navigators for HTML (MMN) or MM32) can get the benefits of these possibilities (see section 17). In the case of MM32, the "*Styles*" dropdown list allows to apply the symbolization possibilities in the server.
2. **Semitransparency** for any WMS layer, regardless from which server provider (MiraMon or another one) the layer comes from. In the case of MM32, a checkbox of activation in the layer symbolization dialog box allows to activate semitransparency.
3. **Symbolization** change for any open WMS layer

9.3. Vectors

The option to display the direction of arcs or lines with an **arrow top** has been added.

Lines with a thickness greater than 2 pixels in the output device (screen, printer) can now be of any of the possible type (continuous, hashed, etc).

The possibility of **multifield symbolization** for a single layer is consolidated. Thus, we can indicate, for example, the color with which to fill the polygons for a land use that is stored in a field of "Land Use" in the polygons database, and simultaneously specify a different type of hatching to represent the content of another field in the database such as property (public, private or communal). For polygons, the multifield symbolization can be applied to the filling color, to the color and thickness of their outline and to hatching type and color, although rarely a map with all possibilities shown simultaneously will be chosen (or understood). For arcs and lines, the multifield symbolization can be applied to color and thickness (in pixels or in map units, for example in m), while for points it can be applied to symbol type and size. Remember that the symbol (color, pattern, etc) assigned to NODATA values can be defined in an individualized way both for rasters and for vectors, and that it is possible to define a transparent color for any color of a color table (stored as RGB: (-1,-1,-1)).

> *Not yet implemented:* Allow establishing pattern symbolization to polygons and lines; allow establishing semitransparencies to polygons.

The presence of the **multifield symbolization in the legend** is consolidated. It is automatically merged when all symbolization criteria are identical.

Texts can be located at any point around the insertion point, and not only at the NE. For the moment this cannot be done interactively. It must be written in the MMM FontMM= key using / POS##, where ## can be C if we need to center the text, NE for North-East (default option), W for west, etc.

> *Not yet implemented:* Allow doing this task interactively and, simultaneously, implementing an independent format for the different texts of a given layer.

10. Printing

A large improvement of many aspects has been done, for example:

"**Show printable area**" and "**Show extent of the elements**" can now be chosen in the printing dialog box.

The printing dialog box allows drawing a **reference grid** to help in map design. Objects can be automatically **snapped to the grid**.

There are two new types of boxes: "**GraphicScale**" and "**NorthArrow**", both accessible from the new wizard and from the normal box editing dialog box.

When the requested extent exceeds that available in the printer an automatic solution is offered for the proposed value.

The **reference frame of the map, the map face, the legend or any box** can now be selected with a mouse click. Once selected, the object can be **moved** or **resized with the mouse**.

The name assigned to boxes can be edited in the box properties dialog box.

A contextual menu pops up when pressing the right button of the mouse on the map previsualization. This menu gives access to applying several functions on the selected element, such as centering it horizontally or vertically (with respect to the paper, to the map, to the legend or to any box) and, in the case of boxes, to duplicate them, to delete them or to change their order of overlaying.

When resizing the map you can **change the scale** (same extent) or maintain the scale (**different extent**).

When resizing a box with text or the legend you can choose to **resize the font** or not, both in vertical and in horizontal.

Inside boxes of text type two subtypes are allowed: "**User text**" and "**Special text**". In the first case, text is free, as up until now, whereas in the second case it is possible to choose predefined texts that MiraMon manages dynamically, for example "Title", "Numerical scale", "Printing date", etc. In these cases, MiraMon will print the title of the map (the one that appears in the top title of the program), the scale used, etc. Thus, we can forget whether we are changing the title, the scale, etc. MiraMon will always update these concepts accordingly. (this is useful, for example, when printing different sheets of a cartographic series since each sheet title will be printed automatically). The new special subtypes are marked by MiraMon with a special name for the box (CaixetiMM_Titol, CaixetiMM_EscalaNumerica, etc).

In text boxes, **left, centered or right justification** and the font of special texts are decided by the user. Besides, it is possible to define a distance between the **text and the reference frame of the box** so as to give some air between the text and the frame.

A **PRINTING WIZARD** has been created to allow users to generate a map that is practically ready to be printed (or needs just a few adjustments) out of templates default to MiraMon or custom for each corporation.

Printing wizard - Step 1 of 4: PRINTER and PAPER

EMBED   PBrush
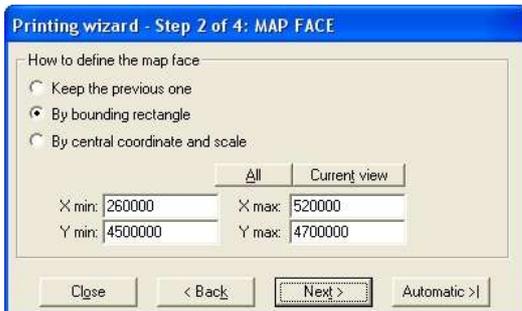
The printing wizard includes, among other things, the reading of the new keys PlantillaHoritzUsuari and PlantillaVerticUsuari from the MiraMon.par file. In order to generate a new template you need only to save the map, typically in the subdirectory "Plantill" of the MiraMon directory; the box for saving maps has a new checkbox "Save as printing template" to facilitate the creation of MMM that act as printing templates. Besides, the activation of this checkbox forces all positions and dimensions to be saved in paper coordinates (given the fact that if in map coordinates there would be no way to know where to place them since a template does not have a Map Face). There is a new button which differentiates the position of the legend on the screen and in the printed page. We recommend saving only the following concepts:

- Reference frame and font for the legend
- Reference frame for the printed map
- Printing boxes

Besides, when MiraMon reads an MMM treated as a printing template, the keys MostrarLlegenda and PosicioDimensioLlegenda of the section [LLEGENDA] are ignored.

The left, right, bottom or top part of any element of the map composition can be aligned with respect to the left, right, bottom or top part of any another element, including the paper.

Before deleting a box, confirmation must be given.

In the printed scale of special boxes of type "Numerical scale", the **number of decimal figures that are shown becomes sensitive to the scale**, so that

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decimal numbers which would imply differences in size smaller than 0.1 mm are hidden. Nonetheless, you can still keep control of the exact value of the scale by using the "Map" button.

When using the **mouse's right button on elements of the composition** a new box in the same position can be created or the handling of the resizing of boxes, fonts, maps, etc., can be decided in a way sensitive to the type of the selected element.

There are new buttons in the printing module:

- **"Undo"** button. This button allows undoing the last moving or resizing action of an element of the print composition.
- **"Zoom +"** button. This button allows increasing the zoom for the zone of the printing sheet on which there is a mouse click. By pressing the right button of the mouse, the functionality of zoom can be cancelled and the normal edition of printing elements is reestablished. If you press the "SHIFT" key (⇧) while pressing the left button of the mouse, the zoom acts as "**Zoom -**".
- **"Zoom -"** button. This button allows decreasing the current zoom with every click.
- Direction buttons: 8 buttons that allow moving sideways once a certain level of zoom (different from x1) has been established. The percentage of movement per click can be defined in a textbox located next to these buttons.
- **"General View"** button. This button allows returning to the global view.

The printing box also allows the use of keyboard shortcuts of the main MiraMon window (F1 for help, + and - for Zoom, F5 for redrawing, "Del" for deleting, the corresponding keys of the mouse's right button, etc).

11. Vector digitizing and editing

It is possible to **directly** edit the attributes of any vectorial object (in order to change the contents of any field in the layer's main table) as well as doing it **from the symbolization expressed in the legend**. In the latter case it is necessary for the layer to be symbolized with the same database field that is to be edited. The process is as easy as to do a simple click with the right button of the mouse on a symbol of the legend and then select all objects on which you want to assign the attribute associated with this symbol.

Direct editing and digitizing of PNTs and of 2D and 3D ARCs is now supported (before only available for 2D PNTs). In all cases, coordinates can be entered via keyboard or mouse. Digitalization of new files (from scratch) is now offered to be either 2D or 3D.

When initiating the digitalization of a new structured layer, the edition of its metadata (field units, link the fields to thesaurus, etc) is now offered.

A symmetrical treatment has been given to the digitalization and edition of ARC and VEC files of line type:
- It is allowed to **reverse the direction of an arc/line.**
- It is allowed to **break an arc/line** not only "in a vertex" but also in a **new intermediate vertex** that you can create.
- It is allowed to **join several consecutive arcs / lines**.
- It is allowed to **insert and eliminate vertices**.

The digitalization of already structured PNTs still **guarantees their topology.** Non-structured point vectors are maintained as such and tolerances are not evaluated. The digitalization of new PNTs (from scratch) is done with the criterion of guaranteed topology.

There are new functionalities implemented for PNT and ARC files of point, line and polygon type: "**Move vertex**" and "**Move / edit vertex by coordinates**". If the file is 3D, the movement is 3D. It is possible to add more than one Z value per vertex and to change Z values. The keyboard mode ("Move / edit vertex by

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coordinates") allows to send the coordinate to be moved to a coordinate entered by keyboard, while the interactive mode ("Move vertex") allows to do it with the mouse. In the latter case it is possible to move the vertex to a position of "connection" with the normal functionality of connecting to previous vector (F3). If the vertex to move is 3D, it will inherit the X, Y and Z positions of the vertex to which it is connected unless it has no Z value. In this case, it will have the Z value that it had before being moved (to make its value as NONDATA you can move it via keyboard and simply delete it). If in the selection square there is no vertex but a segment, the vertex to be moved will be decided upon the criteria of vertex of closest proximity within the segment. This is useful when deciding to which line the vertex corresponds to when there are two or more lines that converge on the same vertex. In this case, instead of directly selecting the vertex (which is difficult since there exist more than one vertex belonging to different lines in the same position), you select the arc that contains the vertex to be moved, and do it (using the zoom if needed) to a position close to the vertex to be moved (closer than the position of the previous vertex of the same arc).

The "Move vertex" operation in ARC files presents the following behavior: if you press on a node, the node itself is moved (all arcs converging to the node continue to do so, and all is moved as in a web), whereas if you press on the segment close to the node (on the close half), MiraMon will interpret that only the vertex of the chosen arc is to be moved.

12. Query by location

The query-by-location informative box can be made bigger and smaller in intervals proportional to normal screen resolution, thanks to two buttons located at the bottom-right corner of the results box. The "MidaCaixaConLoc= " key of the MiraMon.par file allows to control the default value.

The query-by-location boxes for rasters and structured vectors are now unified.

In **thematic rasters** that are associated to an alphanumeric table that acts as a dictionary of categories, MiraMon shows the content of the query by location as if they were vectors, showing two fields: a numerical field that acts as the index of the category (and which has a value that is the same as the value found in the cell of the raster) and the field of text that contains the description of the category. In JPEG files MiraMon gives the RGB values in the file. From the Metadata Manager it is possible to indicate to make any of these informations not visible.

In queries by location on **multiband rasters** with only one band displayed (for example, band 4 of a Landsat-5 TM multiband image with 7 bands) **all values in all bands are shown** (except for those marked as non-querable in the Metadata Manager). The indicated description in the metadata will be the name of the field or the file name in case it is empty (in color JPEG files R, G and B names are given). As it used to be with vectors, the "Copy fields" and "Copy data" buttons allow carrying out very quick extractions of data to spreadsheets and statistical packages by a simple "copy and paste". This will be possible when the volume of information does not make necessary to apply an analytical combination of point layers and the layer of interest. Additionally, and in order to clarify which is the value in the **band that is displayed,** the text of this field is shown in **deep red color**. Please note that this property is useful for applications other than those of remote sensing:

- ***Example 1***: We can have a **Digital Terrain Model (MDT)** multiband raster composed **by a Digital Elevation Model, a Digital Slope Model, a Digital Solar Radiaton Model, etc** and, also in the same multiband raster, 3 bands in a single JPEG format file which represents dyed height bands which have been shaded so as to show a better terrain perception. We can declare these 3 bands of the JPEG file as non-querable (provided its values are irrelevant from an informative point of view since they simply are color intensities) but be visible in the DTM. Thus we can have a very attractive chromatic visualization and when clicking on a given point we get different fields of information such as height, slope, solar radiation, etc.

- ***Example 2***: We can have a multiband raster that contains different maps of land uses obtained by classification of remote sensing images at different times (for example, 1987, 1992, 1997 and 2002). We set the visible map to be the most recent one and to get the information of those four points in time when clicking on the map. A variation of this example would be to use an image in JPEG format obtained by shading the most recent one with the use of a DEM.

- ***Example 3***: We can have a multiband raster that contains the rasterization of a conventional digital topographic sheet (or a simple scanning and georeferencing of the sheet in paper format), and which is not meant to be queried but only displayed. Other bands with additional information of interest are displayed, as for example to which municipality and county does the clicked point belongs to or whether it lies within a protected area, etc.

With queries by location on rasters displayed in RGB mode the value of the pixel for the three bands is given and not only the 3 selected for visualization. This means that if we do an RGB combination of 3 bands belonging to 3 different multiband images we will obtain, when querying by location, **information on all the bands** of the multiband files to which the bands used for visualization belong to. Additionally, when presenting the information for the **RGB visualization**, it appears in **red** (R), **green** (G) and **blue** (B), respectively.

The information given when making queries (both for singleband and multiband rasters and vectors) can be **formatted with separators** which can include texts of different size, color, bold face, etc.

We have kept on adapting the opening of files referenced in database fields and accessible through the query-by-location dialog box. This has been necessary due to changes of criterion in the MS-Office applications and due to the presence of formatted texts (bold fonts, etc).

13. MiraMon Metadata Manager (GeMM)

A new tab gives access to editing the configuration of the GeMM (show mandatory fields in bold or not, etc.). It is now possible to copy metadata between layers, import/export metadata in XML format, and export metadata in **HTML format according to custom user's templates**. "**Core ISO**" metadata have been completely adopted and have been extensively complemented with other metadata.

Other relevant new features of the GeMM are:

GeMM configuration:

- It is now possible to visualize the mandatory metadata in bold.
- The set of mandatory metadata can be defined by:
    - The GeMM, mandatory defined by the standards
    - The user, who can modify the mandatory characteristics of metadata and save these changes in a permanent file. This can be useful when adapting to the specifications of other profiles.

Tools to transform dates and hours between hours of different types:
When defining a date and hour it is necessary to define the type of date and hour used: local, official local (with correction), UTC or solar. In most circumstances, and with the knowledge of other parameters, it is possible to calculate the different values of date and hour as a certain type of date and hour. For example, if the official local date hour and how to correct them are known, it is possible to transform them to an UTC hour. This is important when sharing international information, when automating models (as in radiometric image correction), etc.

HTML exports of metadata: It is possible to export the metadata of a layer to an HTML file. The contents and aesthetics of the final HTML file can be customized. The program provides three templates for a summary vision, a complete vision and an ISO Core vision. The aspect and aesthetics of the three templates offered by MiraMon are similar to those shown in the Summary, Complete and ISO Core tabs of the Metadata Manager. In these tabs of the manager and in metadata exports it is possible to show or hide empty metadata fields. Types of exports:

- One-time exports: The file is created just once and nothing is documented in the metadata.
- Exports defined in the metadata: It is possible to relate a layer to a metadata HTML file which will be overwritten whenever the metadata are saved, thus keeping the file always updated.
- Command line exports: GeMM InputFile and:
    - /h: Exports are performed following the indications given by the metadata (the output file, the template to be used and whether or not to show empty fields can be defined). If there is a predefined export in the metadata but which was not updated last time metadata were saved, then the file will not be created (see general description of exports for further details). Unless otherwise indicated by the metadata there are three modes of operation:

- If there is no additional parameter a window which allows to define this information and save the options in the REL file for a future execution is opened.
- With the /MUT parameter the given HTML files in the metadata are generated. In the case the metadata indicates nothing, then no file is generated (the MUT parameter makes the application not to inform nor prompt for information (you may refer to the general syntax parameters)).

- With the /SAC parameter the HTML files indicated in the metadata are generated. In the case that metadata say nothing, a metadata file according to the default values (HTML name equals to the REL name, Complete template for metadata and Empty fields not shown, as explained below) is not generated.

- h=FitxerHTMLSortida: all export parameters are defined in the command line. FitxerHTMLSortida is the file in HTML format that will contain the metadata of the base. If no file is specified behind the equal symbol then, by default, a file with the same name as the metadata and relations file will be generated, for example RasterJ.htm or PointsT.htm. Metadata option on exports is not used. Additional parameters:

  - /pl=FitxerHTMLPlantilla: A file in HTML format that indicates which metadata fields are to be written in the FitxerHTMLSortida. For further information on the use of templates please refer to the section on export templates generation. In case that no file is specified after the equal symbol or that this parameter does not exist at all, the complete metadata template, provided by the program, will be used by default.

  - /b: If this parameter is given, then all metadata fields will be shown (including empty ones). Commands SiNoBuida and FiSiNoBuida of the templates will not be used. By default, if this parameter is not present it is considered that you do not want to show the empty metadata fields and, therefore, the SiNoBuida and FiSiNoBuida commands of the templates will be used.

The export templates distributed by MiraMon are looked for by the program in the directory specified in the MiraMon.par file ([MiraMon], PlantillaDir =, NomIPathMiraMon_PAR_Global =) and, ultimately, in the templates subdirectory of the program.

XML exports of metadata: It is possible to export the metadata of a layer to an XML file. The generated XML file uses the same XML elements and attributes as those generated by the version 2.1.1 of the IDEC[4]'s MetaD. Before generating the export, the program checks that all mandatory metadata defined by the ISO IDEC profile are defined.

System of hierarchical and standarized keywords: The user can add new keywords and relations to the 12200 items (14300 if synonyms are counted) which were introduced in collaboration with the Library Service of Barcelona University (8400) and with the IDEC (the rest of keywords come from thesauri of the IDEC project).

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[4] Spatial Data Infrastructure of Catalonia
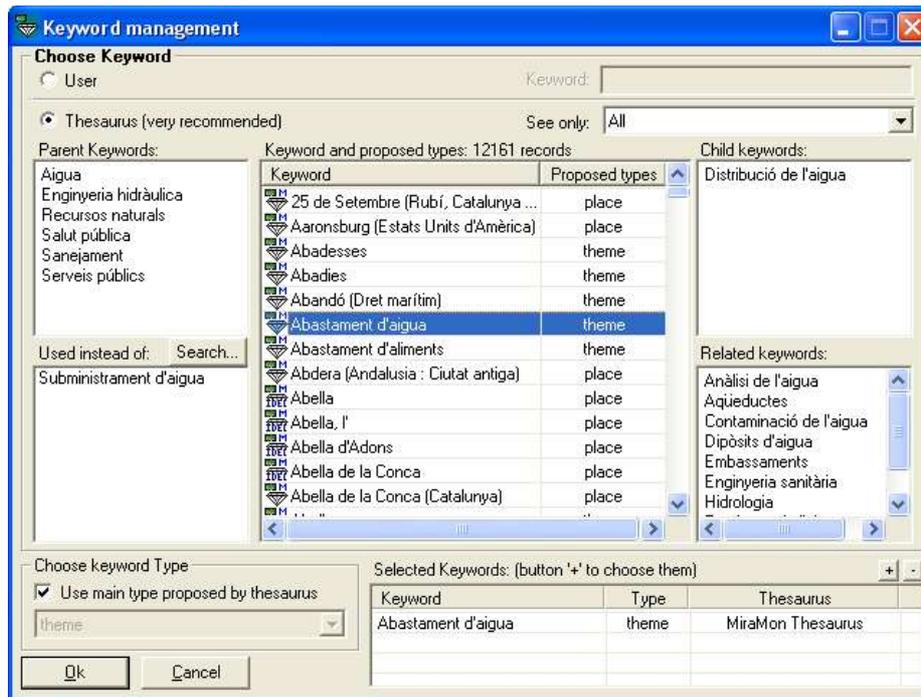
Location of files not found: In case that when linking to a REL file the corresponding file can not be found a file browser box is opened so that the user can search for the file. *Not yet implemented:* Finish the implementation for DBF and DSN.

Metadata inputs: Many new keys have been incorporated, as for example those which relate to scanning X and Y resolution, to an image principal point and other camera characteristics, to processing dates (as intervals), to organizations related to metadata and layer (ISO style), to multiple dates of layer updates, to the person or organization who processed the modifications (quality), etc.

Relation with the documents database: If we have a documents database with articles, books, grey literature, etc, we can link the metadata to these references. It will be necessary to define the name and path to the database and the document identifier. Metadata that may be recovered from the documents database (and if the link is kept it may be necessary to modify it from the documents database manager) are: base title, alternative title, summary, size of the user's layer and organizations related to the base that act as publishers or as authors.

Organization management dialog box: The dialog box for managing organizations (related to metadata, to the base or to a quality process) has been unified and standardized. Organizations can be added, edited, etc.

Possibility of changing band order in a multiband file: When clicking with the mouse's right button on the generic fields the option to modify bands order is offered: "To the top", "Up", "Down", "To the end".

Parameter to specify which tab will be shown when opening the manager. The command line parameter "/OBRIR_A = " allows to choose which tab of the manager will be open. It can take the following values: *METADADES* (for METADATA), *IDENTIFICACIO* (for IDENTIFICATION), *PRESENTACIO* (for PRESENTATION), *SISTREFERENCIA* (for SPATIAL REFERENCE SYSTEM), *EXTENSIO* (for EXTENT), *INF_TEMATICA* (for THEMATIC INFO), *and QUALITAT* (for QUALITY).
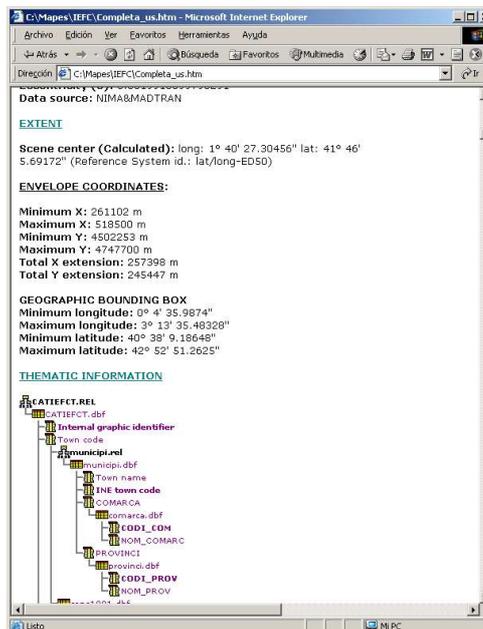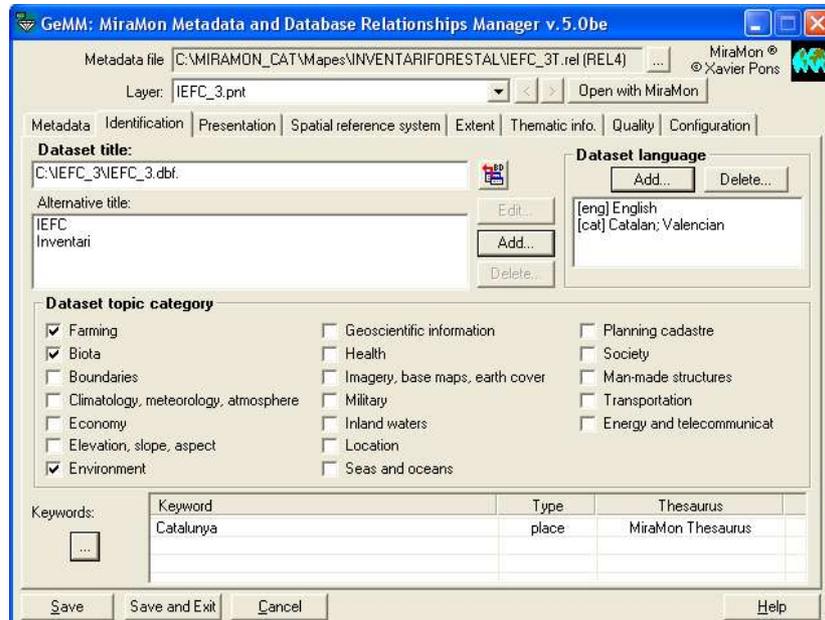
14. MiraMon Metadata Catalogue (CaMM)

We can classify metadata catalogs as public or private according to their scope and functionality. Private or internal metadata catalogs classify geographical information of a corporation and provide access to this information to its members (for example, the catalog of the DMAH[5]). Public catalogs group geospatial data information of different corporations, organizations and institutions for public use (for example, the IDEC catalog).

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[5] Department of the Environment and Housing of the government of Catalonia

A corporation often has a large volume of geospatial information located at different places and which needs to be accessible to a great number of users. This makes the organization and location of the information a difficult task. To solve these problems and to allow an easy access to the information a tool for cataloguing information, the **Metadata MiraMon Catalogue (CaMM)**, has been designed and implemented, along with a user interface which allows performing queries on the catalog in an easy way.

The use of these cataloguing tools is useful to information administrators for:
- Quickly accessing the filtered information
- Locating and correcting mistakes and gaps in metadata
- Locating redundancies and gaps in the geospatial information
- Determining, after checking and polishing the geospatial resources of the corporation, if some of the elements can be considered for public use. If this is so, and by using the metadata export tool, documents can be generated in XML format according to the standard ISO 19139, and, thus be able to introduce the information of a corporation into a public catalog of an IDE.

The MIRAMON METADATA CATALOGUE, CaMM, is an application with the following **characteristics**:
- It is a Windows executable application (Win32)
- It can create a database designed according to the scheme and elements of the Core ISO 19115
- It can create and update private digital catalogs in different database formats (ORACLE, MS Access, etc) via ODBC
- It can automatically locate the geospatial information to be catalogued, which avoids the need to insert metadata in the catalog layer by layer
- It can make partial updates of the catalog
- It can automate the processes for metadata creation and update
- It gives information on the process of cataloguing
- It can connect metadata with the exported metadata documents in XML and HTML format, according to ISO 19115 and ISO 19139 standards.

On the other hand, the *SEARCHER OF THE MIRAMON METADATA CATALOG*, CercaCaMM, is an application with the following **characteristics**:
- It is a CGI application that configures a Web service which allows to perform searches from different elements of the metadata which have been included to the catalog by CaMM
- It internally searches via ODBC by means of SQL sentences
- Externally, the searching conditions are established using a natural and simple language so that the final user does not have to be an expert in database query languages such as SQL. This language though still allows us to perform complex searches which are also case-sensitive and sensitive to characters with accents
- It allows customizing the results content and form of display.
- It allows to access the complete Metadata information in different formats: XML, HTML, REL-GeMM (internal format of MiraMon

metadata) and to access with the MiraMon GIS the layer to which the metadata refers to

15. A selection of aspects improved in some modules

COMBICAPA: A new mode which allows calculating and adding fields to a polygon layer with statistics from its overlay with another layer has been developed.

BUFDIST: When the target objects of the *buffer* are of vectorial type (points, arcs or polygons) **buffers are calculated in a completely vectorial way** (v. 5.1). As in previous versions, it is supported to ask the application for one or two distances (a *buffer* between two distances). The result will always be a polygons file and the interior zones excluded from the *buffer*, if present, will be added to the universal polygon for a better thematic consideration ("non-*buffer*" zone unified).
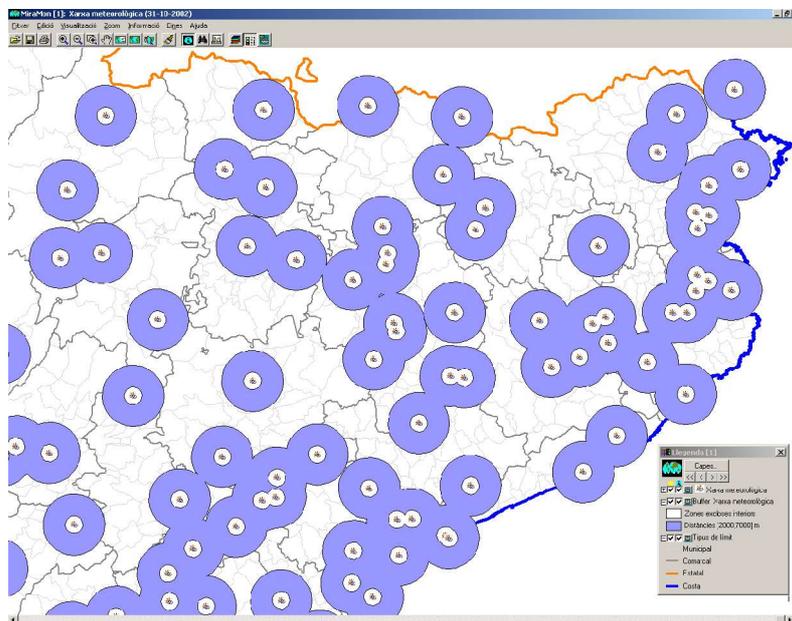
RETALLA AND MOSAIC: Clipping and mosaicking of vectors now supports **3D layers**.

ISoMDE: 3D breaklines are now supported (in addition to the already supported 3D and 2D lines defining ridges and/or channels).

OMBREJAT The "Tools | Terrain interpolation and analysis" menu option now incorporates the functionality to generate hillshaded maps. This module can be used both to shade a DTM and to shade a thematic map on top of a DEM.

Visible: The new module of visibility analysis (v.5.1) allows determining which **zones are visible** from certain points of observation.

Perfils: The new module for drawing profiles (v 5.2) allows drawing transects on a layer and derives **graphs out of the attributes crossed along its path.**

CanviPrj: The number of supported cartographic projections has been increased and the content of geodesy tables has been extended to give better
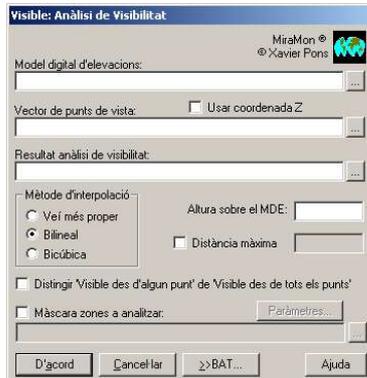
support to users of France, Mexico, Nicaragua, Argentina, Mozambique, etc.

CorrGeom: It is now possible to specify the position of the metric chamber and/or the attitude. Thus, orthophotos can be generated **without the need of control points** when using chambers with GPS systems and with INS precision.

Filtres: New filters have been added: variability, minimum, maximum and laplacian for contour intensification in photographic images.

GPSMM: Real-time reading and navigation through locations provided by a GPS has been consolidated in MiraMon. **3D structured vector files** are generated when the adequate parameters on datum, projection, etc., are given. Support for Garmin GPSs (the whole **eTrex, GPS 72, Geko, eMap**, etc., family) has been extended. Also, all models are automatically detected.

With regard to real-time **navigation with MiraMon and a GPS**, please note that now you may **connect via WMS** to external or local servers (the whole 1:25000 orthophoto and 1:50000 topographic bases of Catalonia perfectly fit on any disk of a current laptop computer, as well as those bases at 1:5000 scale for the extent of a county, for instance).
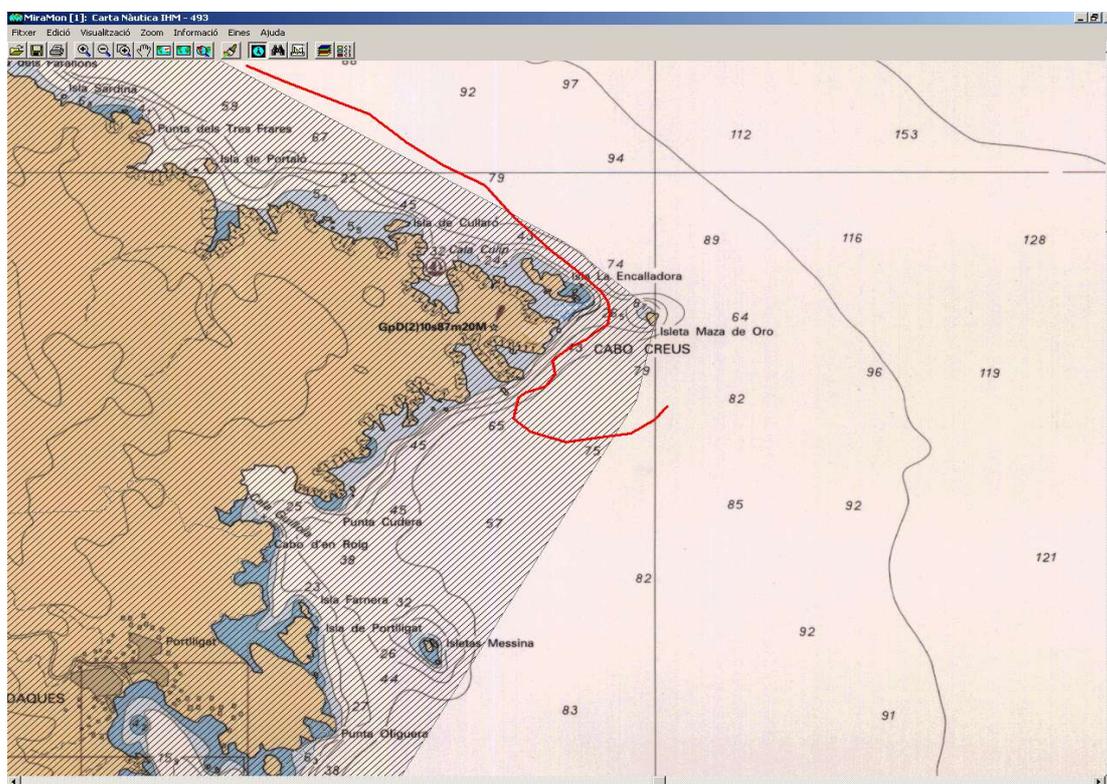
16. Comunications between MM and other applications

A new comunications system has been developed to **coordinate MM32 and other aplications,** be those conventional executables (EXE) or Internet or intranet executables (CGI, ASP, etc). Functionalities and specifications of available parameters are being increased as administrations and/or companies need it. For example, an application can ask MiraMon to **verify if a point is inside a certain municipality** or **to return a set of objects interactively selected** with the new tool described in the paragraph 4. Given that this is a very technical documentation, it has not been included here but you may ask for it at suport@miramon.uab.es.

17. MiraMon Map Navigator and Server

The **MiraMon Map Navigator (MMN)** allows reading WMS cartographic layers from MiraMon servers or from other developers who provide the information according to the specifications of OGC (see more above). This is done from an Internet browser and without needing any type of plug-in or additional resource. On the other hand, the **MiraMon Map Server (MMS)** allows to prepare and to serve layers according to the same WMS specification so that they can be read by any application that follows the specification. Additionally, the **MM32**

Professional application and the **MiraMon Map Reader**, besides being capable of acting as navigators on WMS servers of any provider, they are especially efficient when acting as clients of MMS servers in local area network environments (LAN).

Additionally to what has already been commented at different points in this document, the following characteristics, added recently, can be added:

MMN: Based on an HTML portal and the Javascript (JS) standard, fully consolidated since 1990, it has been accomplished to build a unified portal that provides all the characteristics requested by users. For instance, for the DMAH and its remote sensing images server of its Documentation Center a client that requests Web Coverage Service (WCS) and which allows to **change layers' styles** (false color, real color) has been developed. On the other hand, for the server of social and demographic data of the National Institute of Statistics of Spain, a system of film animations has been developed to visualize sequences of temporal information. This service has also benn incorporated to other MiraMon navigators, for example orthophotos navigator at the CREAF intranet or the remote sensing images navigator mentioned above. Finally, MiraMon navigators can be multilanguage.

MMS: As previously mentioned, the **CreaMMS** module allows to **prepare layers**, initially as cartographic series or as single layers, of raster type (with continuous quantitative or categorical information) and of vectorial type (points, lines or polygons). Layers maintain their **link to** the original alphanumerical **databases** (in the usual DBF, MDB, Oracle, MS-SQL Server, etc., formats) and allow, given the administrator's permission, to **serve downloads** of files in MiraMon format (MMZ) or other formats (GeoTIFF, georeferenced JPEGs, etc) according to the **WCS** specification of the OGC. The portal of IDEC at the ICC has adopted this system for the distribution of its 1:25000 orthophotos for the whole extent of Catalonia.

It has been proven that the special characteristics of MiraMon servers succeeds at providing certain geographical extents up to **only a 6% of the waiting time** required by other commercial servers.
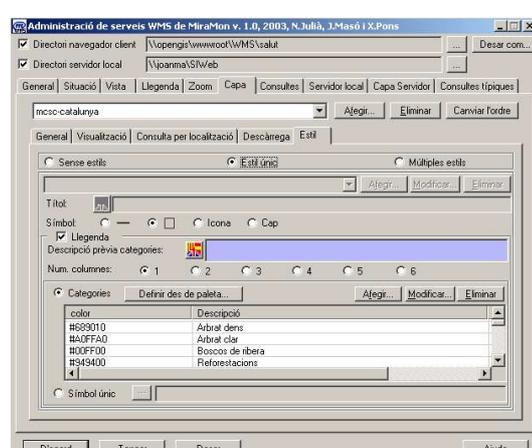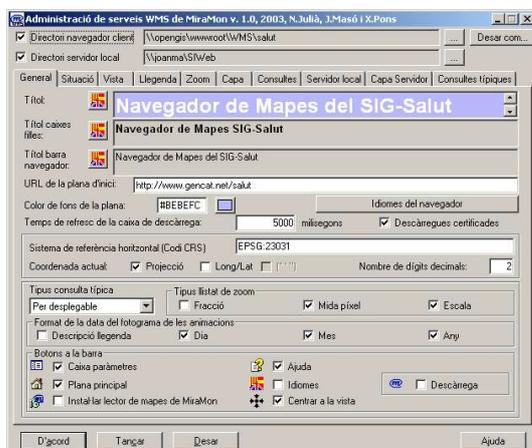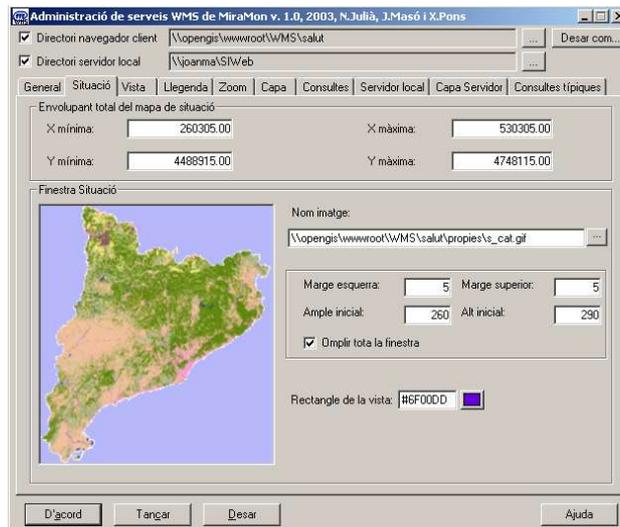
Also, the administrative tool for the **management of the navigators** and servers allows to define the general presentation and that of the layers included in the navigator. It also allows to **administer the map servers** (define which layers will be served and the general properties of the service) It must be noted that it has **multilanguage** support (even in legends).

Please note that this application not only can be used to generate Internet or intranet applications, but it can also be used to **prepare layers in MiraMon-WMS format that can be read from MM32 in personal computers and in local area networks without the need of any type of Internet server.**

18. Cartographic series

When changing, from the layers manager dialog box, the state of "**visible**", "**querable**", "**unify visible/querable**", "**copyiable**" or "**connectable**" in a layer that belongs to a series, the change will automatically **propagate** to all the open sheets of the series.

When changing, from a visualization dialog box, the minimum and maximum **scales** at which a layer can be displayed for a layer that belongs to a cartographic series, these changes automatically **propagate** to all the open sheets of the series.

MM32 maintains cartographic series in the same "plane" of layer order, that is to say, when a layer or a map with layers belonging to a series is opened, open layers are rearranged so that they **are consecutively displayed** with those of the same series that were already opened. This is aesthetically better and is also useful since layers of the same concept (series) are all grouped in the layer manager. If the user changes the order of a given layer, MiraMon automatically adjustes itself so that the rest of layers of the same series appear consecutively displayed in the general order of layers.

19. Miscellanea

F5 now performs a "**Redrawing**" (equivalent to " View | Redraw"), which is more standard in Windows. This changes the old functionality of F5 ("End digitazing-editing") to F2. F2 is now used to start and stop a digitizing-editing session.

MiraMon Maps (MMM) can specify the position and size on the screen for the MiraMon window. This is done in the [VISTA_GENERAL] section by the *esq* (left)*, sup* (top), *Ample* (width) and *Alt* (height) keys. The keys for the "left" and "top" position of the window are in screen pixels, assuming origin is at (0, 0). The "width" and "height" keys are also in screen pixels.

When printing to BMP or JPEG files, these get **georeferenced** by their corresponding B.rel and J.rel files. This allows reusing the MiraMon digital prints as rasters to work with (for instance, a background as visual reference cartography can be generated).

Whether an object interactively selected or selected by attributes needs to be hidden (set off) when it belongs to a layer that is not displayed at the given scale can now be controlled. This can be controlled from the MiraMon.par file with the key *EscalaApagaObjectesSeleccionats*, located in the [MiraMon] section, or interactively from the " View | Special " menu option.