



## RADIA software · electromagnetic pollution

**Electromagnetic pollution modeling software.** Software for analysis of electromagnetic pollution in environment: environmental modeling, environmental impact assessment, environmental engineering, environmental consultancy service and environment simulation.

RADIA is a electromagnetic pollution modeling software. The program calculates the electromagnetic pollution in each point of the air considering each one of the antennas in mobile phone towers. The system of simulation of processes of pollution that RADIA has, offers to the beginner and the expert programmer, a quick and practical system to evaluate the pollution in the air. The program is based on the operating system Microsoft WINDOWS where one works intensively with the mouse and the graphic windows. We can say, with a certain security that the software RADIA is one of the best tools, to carry out numeric simulations of electromagnetic pollution processes.

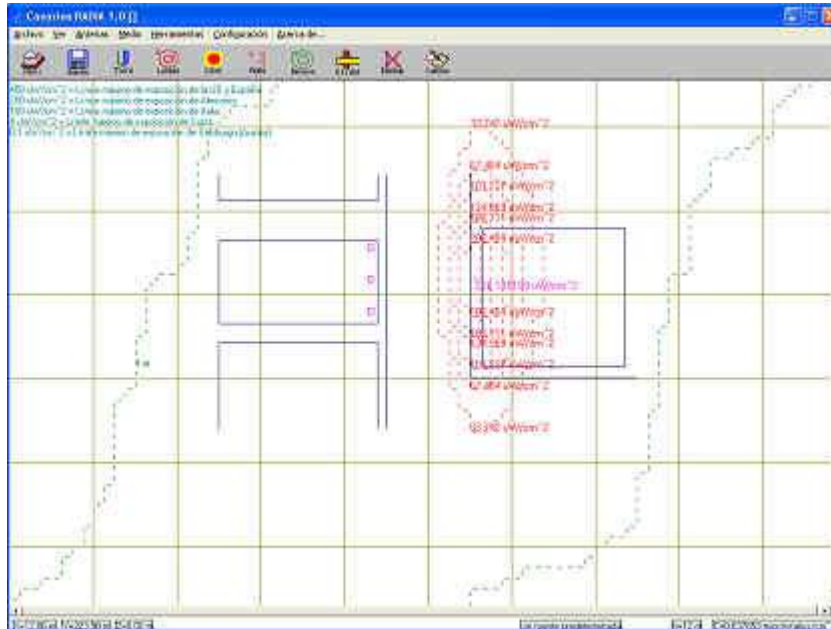
### RADIA SOFTWARE Solutions:

It is ideal for environmental impact assessments, environmental consultancy services and environmental engineering.

With this application you will be able to import images and pictures (previously saved BMP files) and Google maps. These images will be background pictures and images for your program window. Many programs and computer applications (AutoCad, 3d Studio, ArcView,...) export BMP files. You will be able to load pictures and images generated by these programs.

This software can also be used for risk studies and safety in cities.

At the present time, numerous universities and study centers use this program for teaching and education.



RADIA Software: electromagnetic pollution map with three different antennas in three different mobile phone towers.

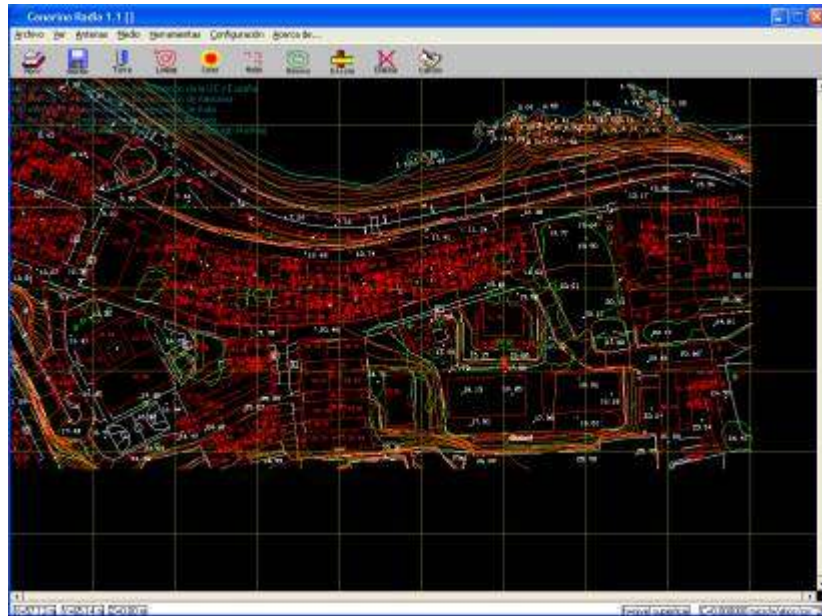
## RADIA SOFTWARE Advantages:

Without considering the experience that the user possesses in programming languages or in the use of simulation tools, in few minutes he will be able to have the first results.

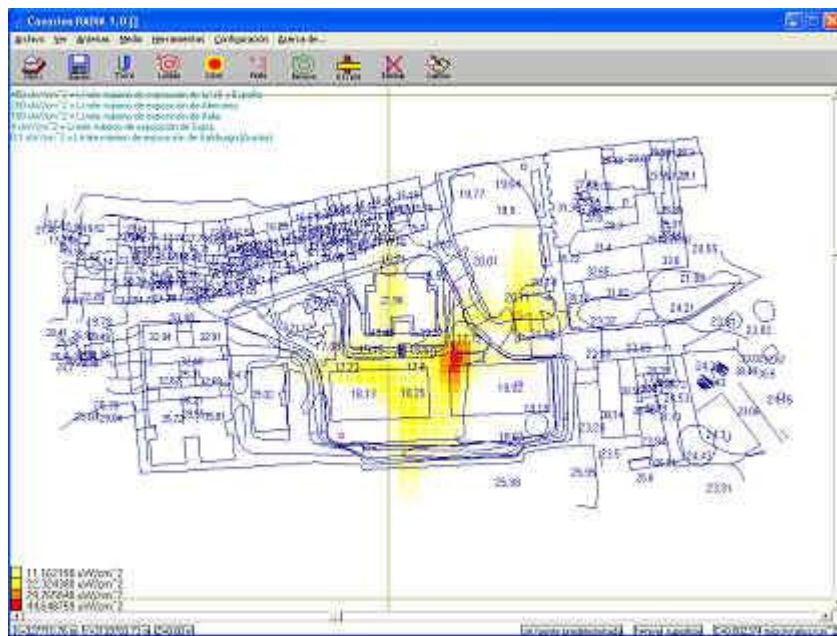
With this application you will be able to export your simulation results (BMP files). These images will contain the background picture (map) and your simulation results. Many programs and computer applications (AutoCad, 3d Studio, ArcView, MS Power Point, MS Word,... ) can import your saved BMP files.

It works in cartesian and geographical coordinates and the results can be exported in Microsoft EXCEL csv files. It is possible to import the CUSTIC generated data in GIS systems, as ArcMap or ArcView.

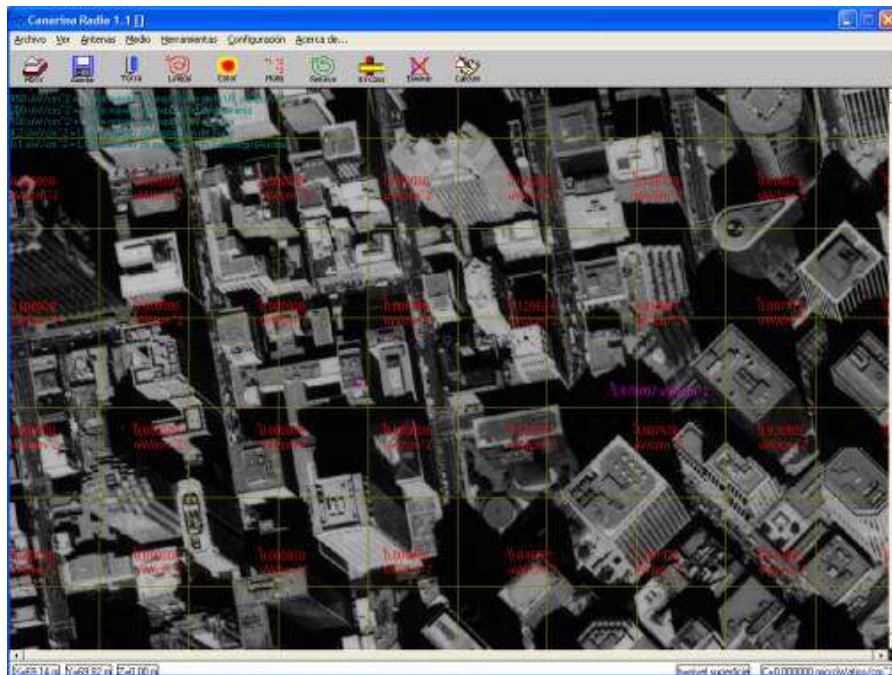
It is possible to obtain XY and XZ electromagnetic pollution maps.



RADIA Software: electromagnetic pollution map with different antennas with an AutoCAD map.



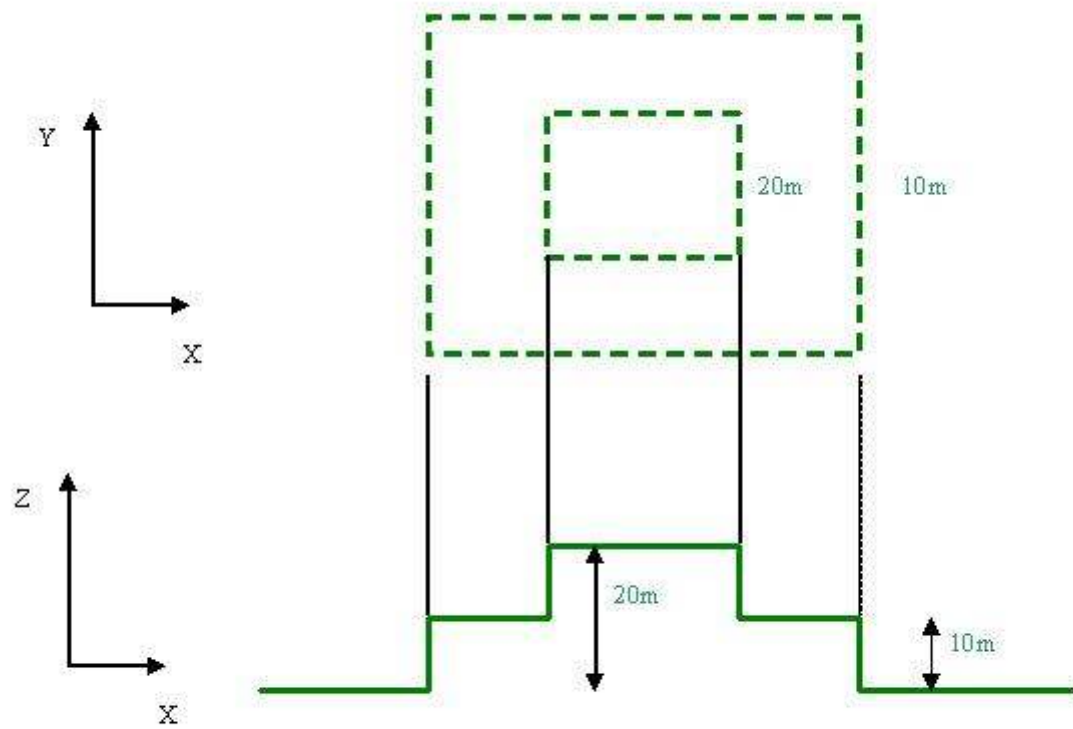
RADIA Software: electromagnetic pollution map with different antennas with a background image.



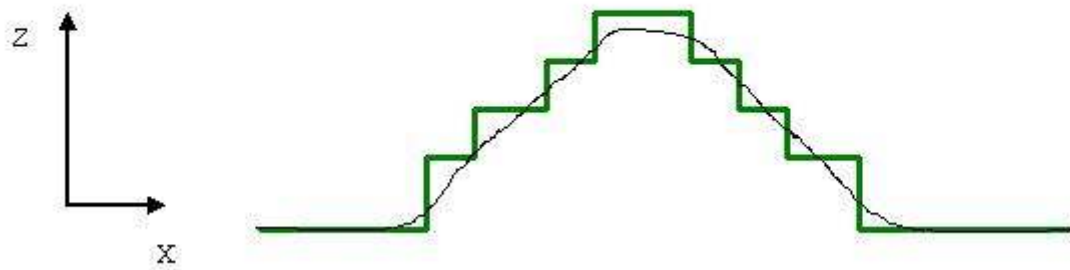
RADIA Software: electromagnetic pollution map with different antennas with a background image.

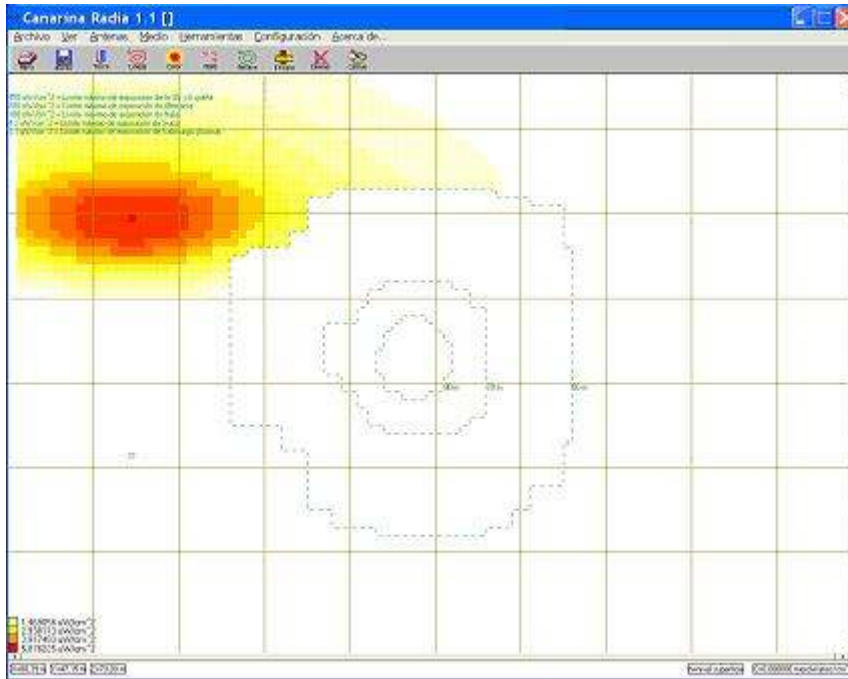
## Topographic effects

A rectangle elevation could be represented by the program in the next way:



To draw a small mountain, we can use a lot of small rectangles.

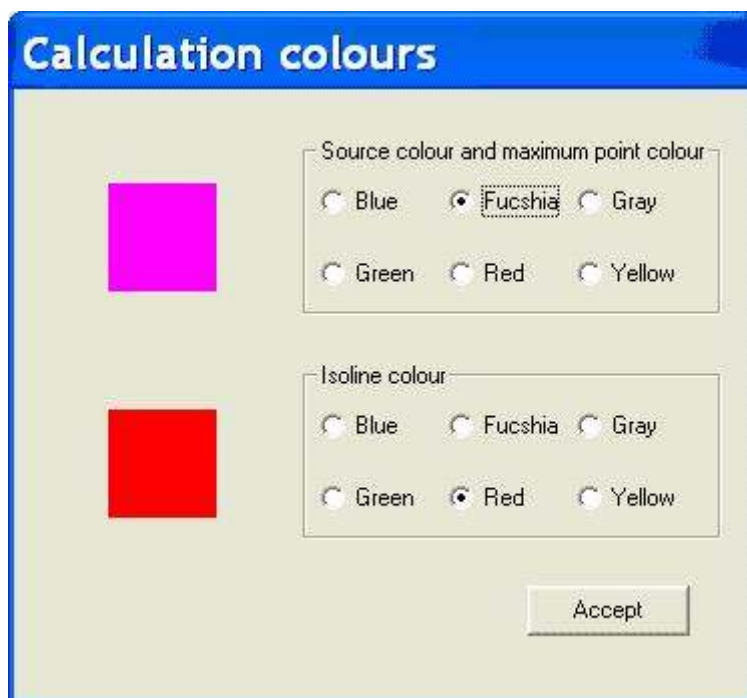




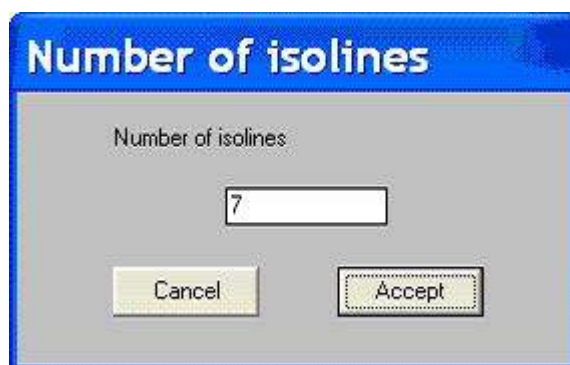
Electromagnetic pollution map. Mobile phone tower and a mountain.

## Commands · for obtained data:

Calculation colours. - By means of this command, we will be able to change the colors of the isolines, of the maximum point and of the point sources.

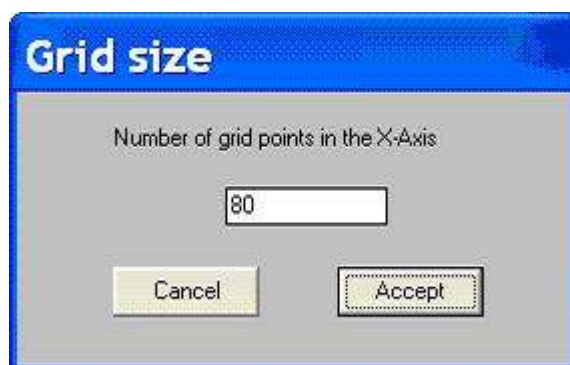


Number of isolines. - This command is an auxiliary tool for making the maps of noise pollution. We will decide the number of isolines in the screen that we will take to make the representation. In certain situations, it can be interesting to have a high number of isolines for a better visualization. We will use this command before using the calculation command because this parameter should be perfectly defined before running the simulation. If you click the Number of isolines button, the next program window is shown:



In this window we will be able to choose the number of isolines that we want to have in our computer screen. To calculate the lines, the program also considers to the maximum point as a line.

Grid size. - The grid size is an important parameter in the configuration of the system. We will decide the number of calculation points in the grid that we will take to make the simulation. As we increase the number of points, the computer will take much more time in carrying out the calculation but the result will be much more exact. If you click the Grid size command, the next program window is shown:

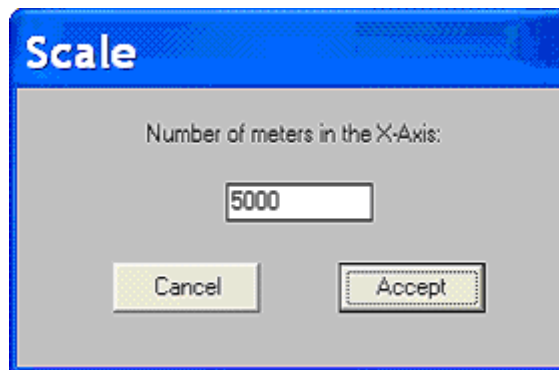


In this window we will be able to choose the number of grid points (calculation points) that we want to have in the X-Axis. The number of points to calculate will increase quadratically with the number of grid points along the X-Axis  $N$ , that is to say, it will increase as  $N^2$ .

## Import pictures · RADIA software:

Picture size. - The displayed image size will depend on the size that had when it was saved. If it is necessary, modify the picture size before loading the image (for example, you can use windows Paint, Adobe Photoshop,... ). You will be able to load BMP maps generated by AutoCad.

Scale command. - Bitmaps and scanned maps must be loaded into memory and then adapted to the program scale (we will make use of the Scale command). The X-Axis width (meters) in the program window can be easily changed to be able to compare both images (simulation results and background maps). Then, the X-Axis width (in meters) of the imported map and the X-Axis width (in meters) of the program window match together. The imported images are not stored physically in the simulation process. Terrain elevations (represented on the imported map) don't interact in the simulation process. We haven't the possibility to zoom an imported map with the Zoom command. This command only acts in the calculation process. If it is necessary, zoom the map before loading the image.



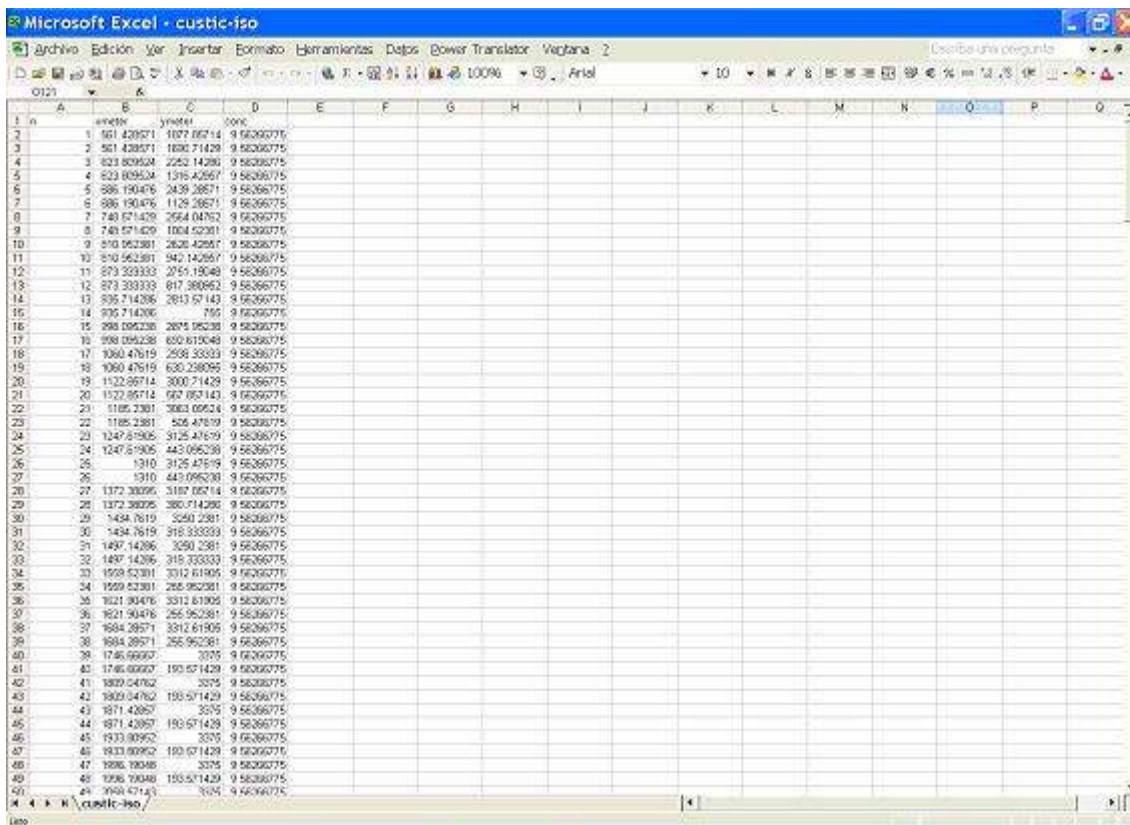
Zoom command. - We have the possibility to zoom a part of the program window with the Zoom command. However, we won't be able to enlarge background pictures with this command. If it is necessary, zoom the map before loading the background image. This command only acts in the calculation process. This way, we can place a point source in a side of the computer screen and we can calculate the concentrations in another different detailed region.



# Export results · RADIA software:

With the Export Picture command you will be able to export images and pictures (BMP files). These images will contain the background picture and the simulation results. Many programs, computer applications and word processors (AutoCad, 3d Studio, ArcView, MS Word,...) import BMP files. You will be able to load images generated by RADIA.

[Export isolines , sources, maximum point, concentration values in geographical and cartesian coordinates commands.](#) - These commands are to export data to EXCEL CSV files. After that, you can import the files with Microsoft EXCEL, Arcview and other graphical programs.



The screenshot shows a Microsoft Excel spreadsheet with the following data:

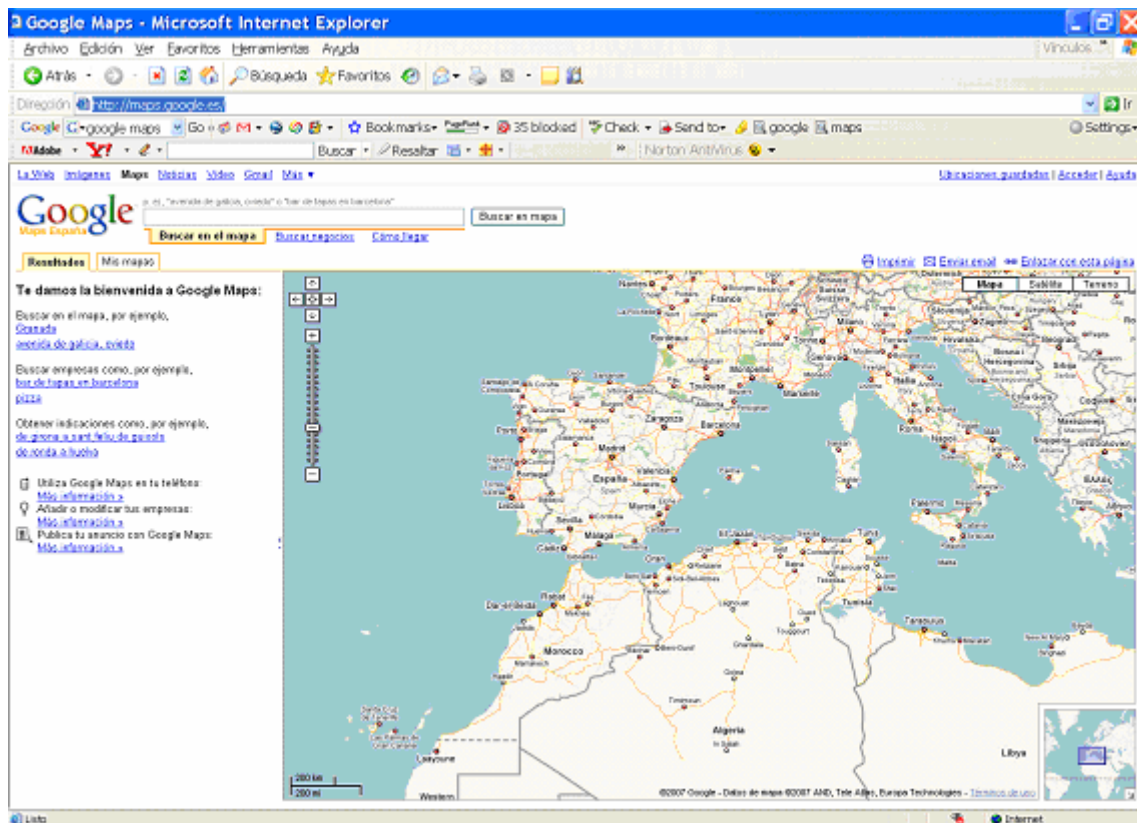
ID	X	Y	Z
1	501.429571	1827.86714	9.58366775
2	501.429571	1830.71429	9.58366775
3	623.809524	2252.14286	9.58366775
4	623.809524	1316.42957	9.58366775
5	886.190476	2439.28571	9.58366775
6	886.190476	1129.28571	9.58366775
7	740.671429	2654.04762	9.58366775
8	740.671429	1004.42957	9.58366775
9	810.962381	2826.42957	9.58366775
10	810.962381	940.14286	9.58366775
11	873.333333	2751.19048	9.58366775
12	873.333333	817.380952	9.58366775
13	935.714286	2613.67143	9.58366775
14	935.714286	756	9.58366775
15	998.095238	2875.95238	9.58366775
16	998.095238	620.619048	9.58366775
17	1060.47619	2938.33333	9.58366775
18	1060.47619	630.280952	9.58366775
19	1122.85714	3000.71429	9.58366775
20	1122.85714	562.857143	9.58366775
21	1185.2381	3063.09524	9.58366775
22	1185.2381	526.47619	9.58366775
23	1247.61905	3125.47619	9.58366775
24	1247.61905	443.062381	9.58366775
25	1310	3125.47619	9.58366775
26	1310	443.062381	9.58366775
27	1372.38096	3187.85714	9.58366775
28	1372.38096	380.714286	9.58366775
29	1434.7619	3250.2381	9.58366775
30	1434.7619	318.333333	9.58366775
31	1497.14286	3290.2381	9.58366775
32	1497.14286	318.333333	9.58366775
33	1559.52381	3312.61905	9.58366775
34	1559.52381	285.952381	9.58366775
35	1621.90476	3312.61905	9.58366775
36	1621.90476	256.952381	9.58366775
37	1684.28571	3312.61905	9.58366775
38	1684.28571	256.952381	9.58366775
39	1746.66667	3312	9.58366775
40	1746.66667	193.671429	9.58366775
41	1809.04762	3312	9.58366775
42	1809.04762	188.671429	9.58366775
43	1871.42857	3312	9.58366775
44	1871.42857	183.671429	9.58366775
45	1933.80952	3312	9.58366775
46	1933.80952	183.671429	9.58366775
47	1996.19048	3312	9.58366775
48	1996.19048	183.671429	9.58366775
49	2058.57143	3312	9.58366775
50	2058.57143	183.671429	9.58366775



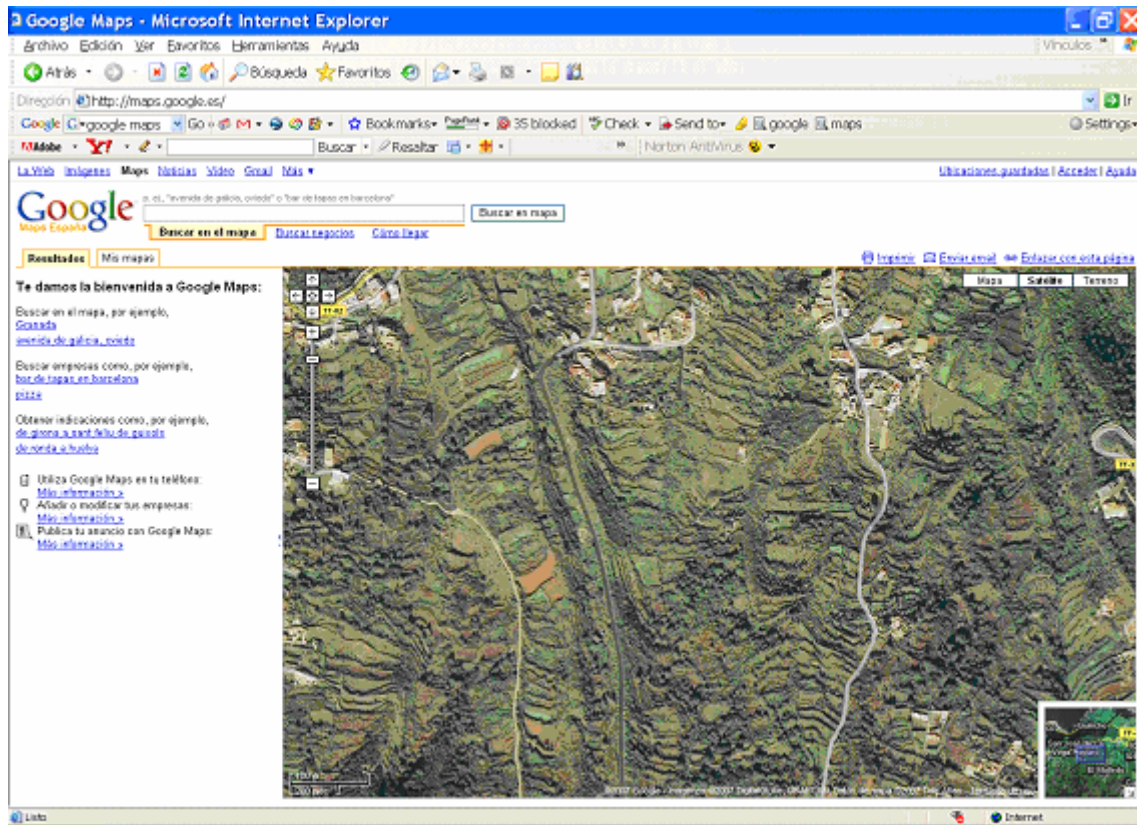
## Working with google maps

1. Firstly you can navigate to Google maps web.

<http://maps.google.com/>

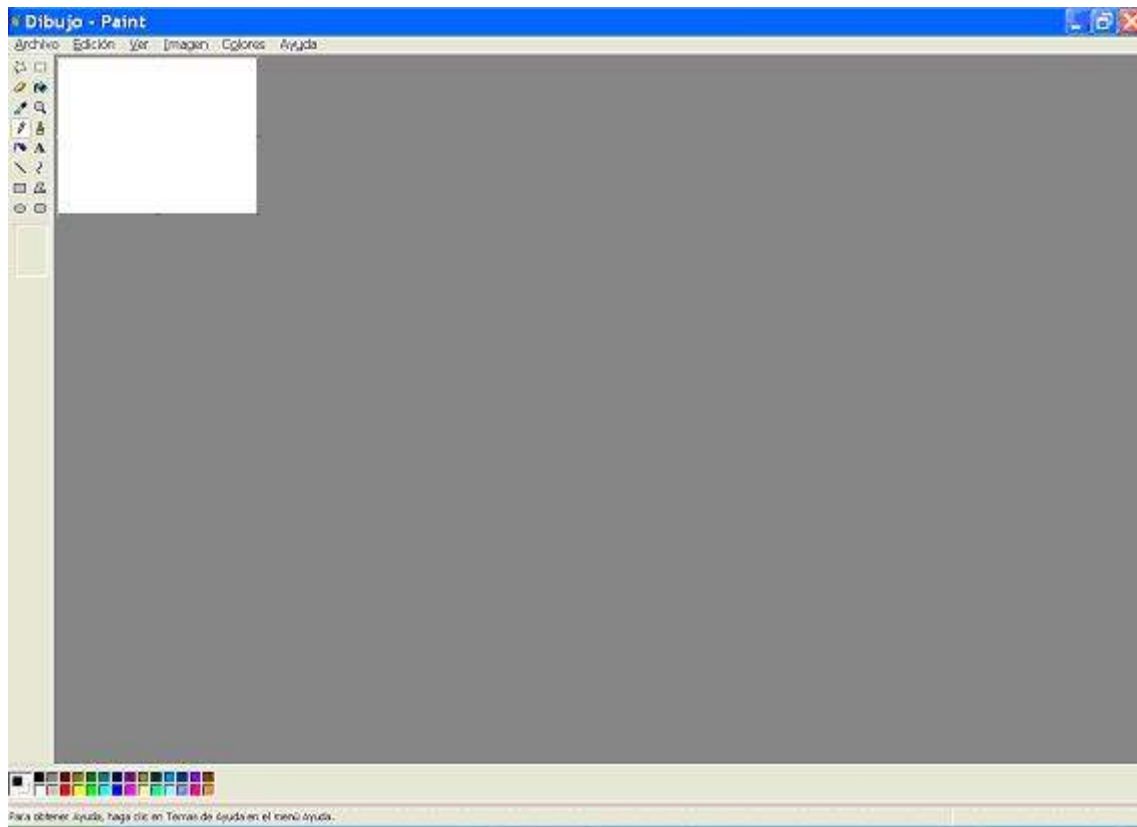


2. Using the screen arrows move to the map area that you want to watch. For example, we can watch *Garachico* in *Tenerife* North.

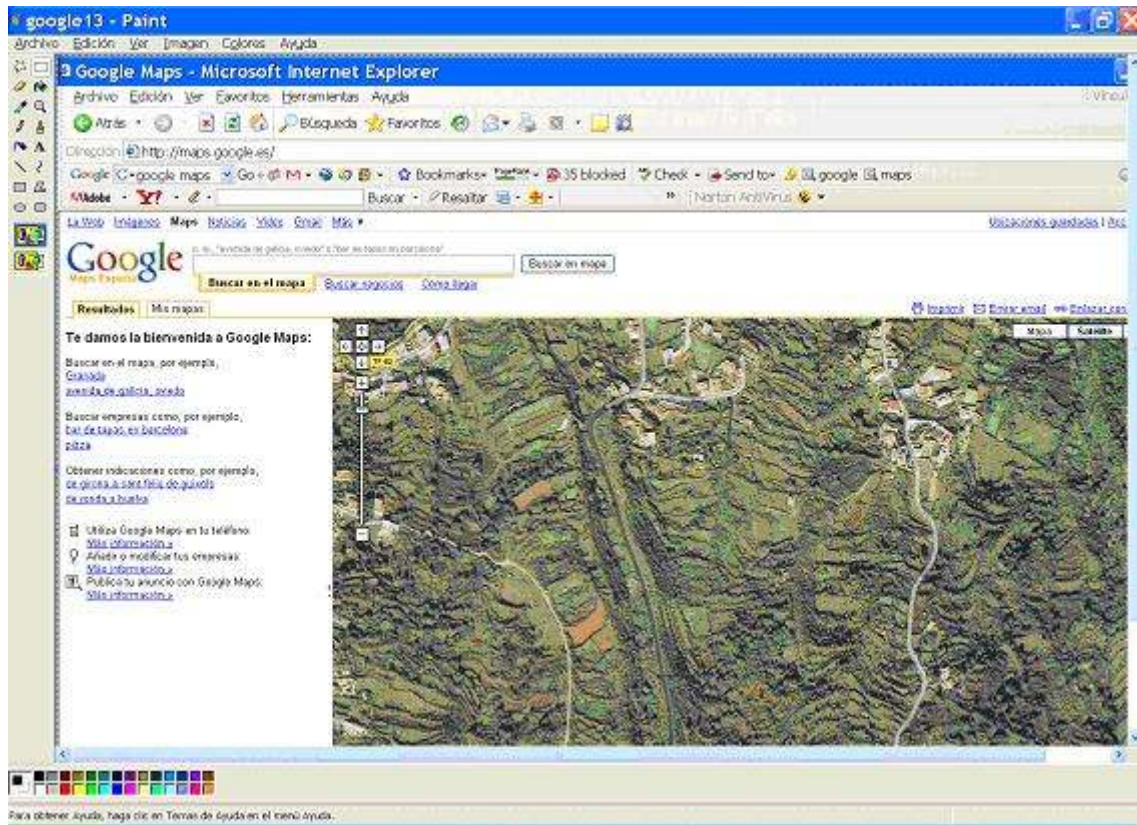


3. For the image capture, it is possible to use in the keyboard *Ctrl+Alt+PrtSc*). In the keyboard you can push at the same time (*Ctrl+Alt+PrtSc*). In that way, the screen image is copied by the computer memory.

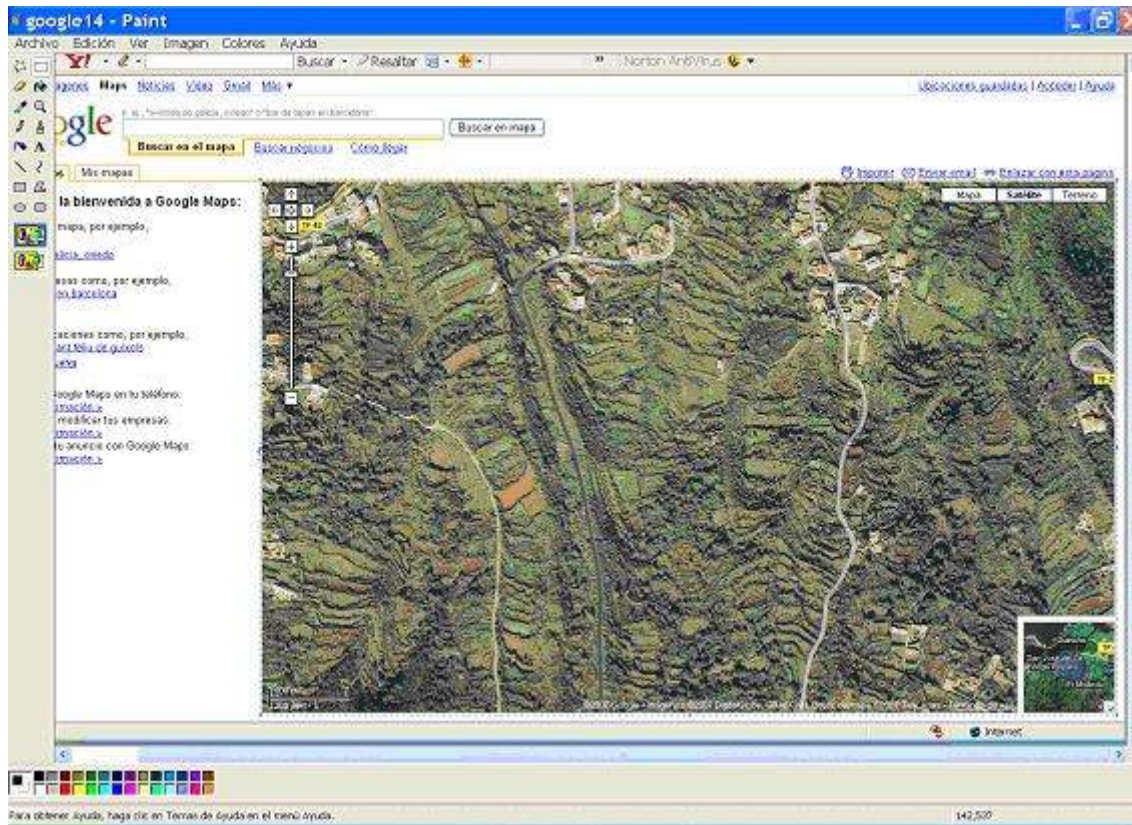
4. Open the windows PAINT program (*Windows >> Start>> Programs>> Accessories >> PAINT*).



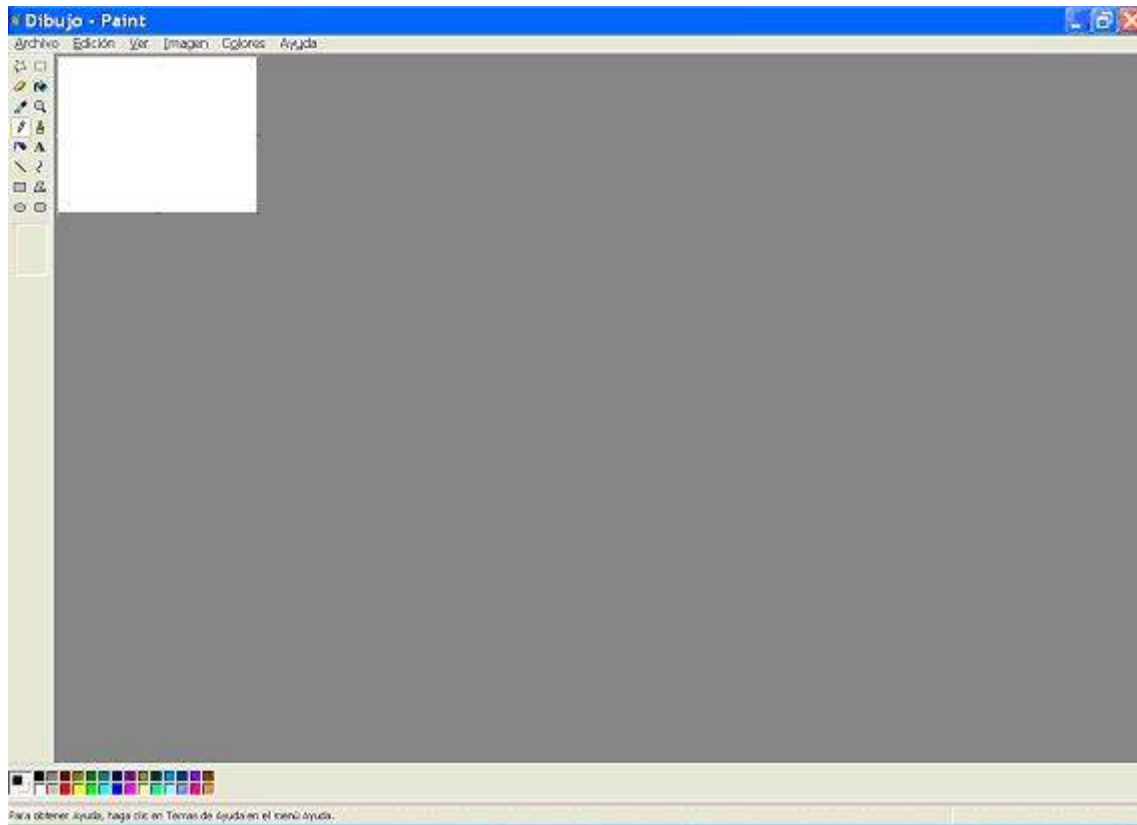
**5.** To paste the image that has been previously copied in the computer memory, you can use the commands (*Edit >> Paste* in the *PAINT program*) or (*Ctrl+V*). You can watch now the copied image from the Google maps web page.



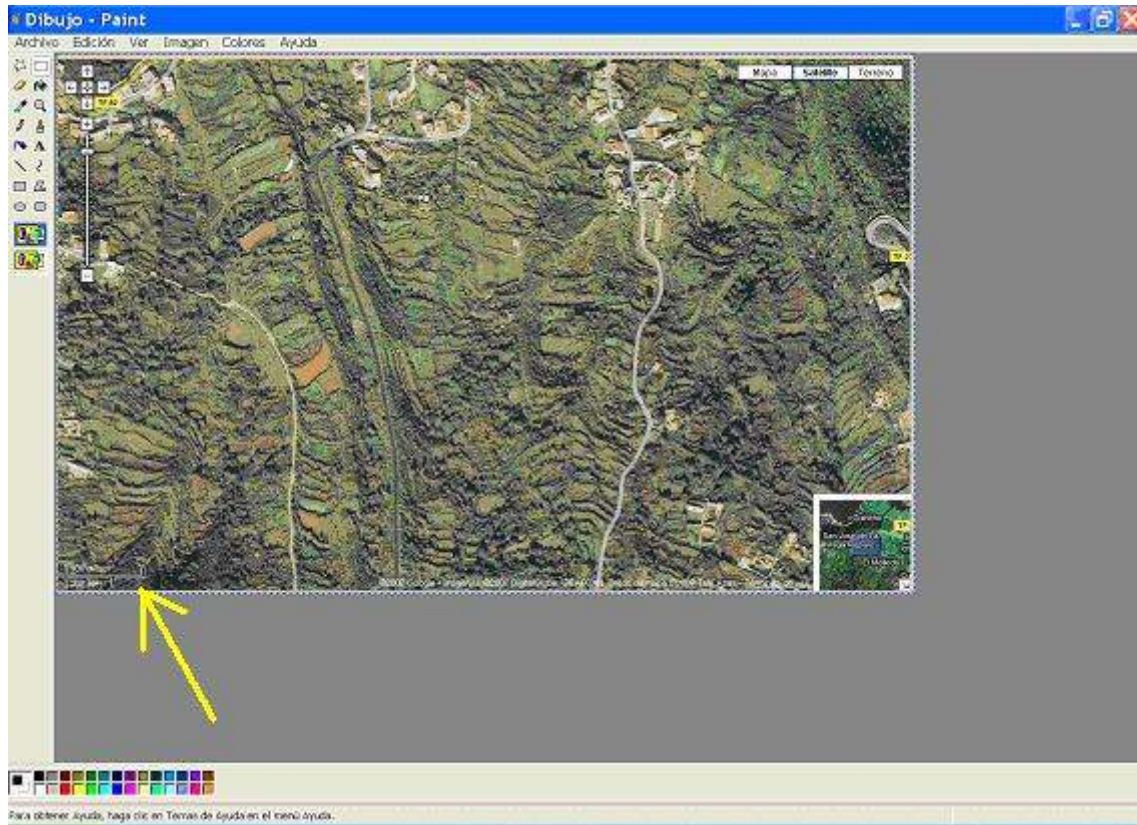
**6.** It is obvious that you don't want to watch the navigator bars that appears in the screen. Use the arrows of the PAINT program to center the image, that you are interested for, in your computer screen. In the toolbar of PAINT, you can use the icon SELECT (it is on top of the toolbar and at the right in the last picture). Drag the mouse arrow selecting the screen area that you are interested for. For our case, it is the rectangle where the picture of the terrain appears.



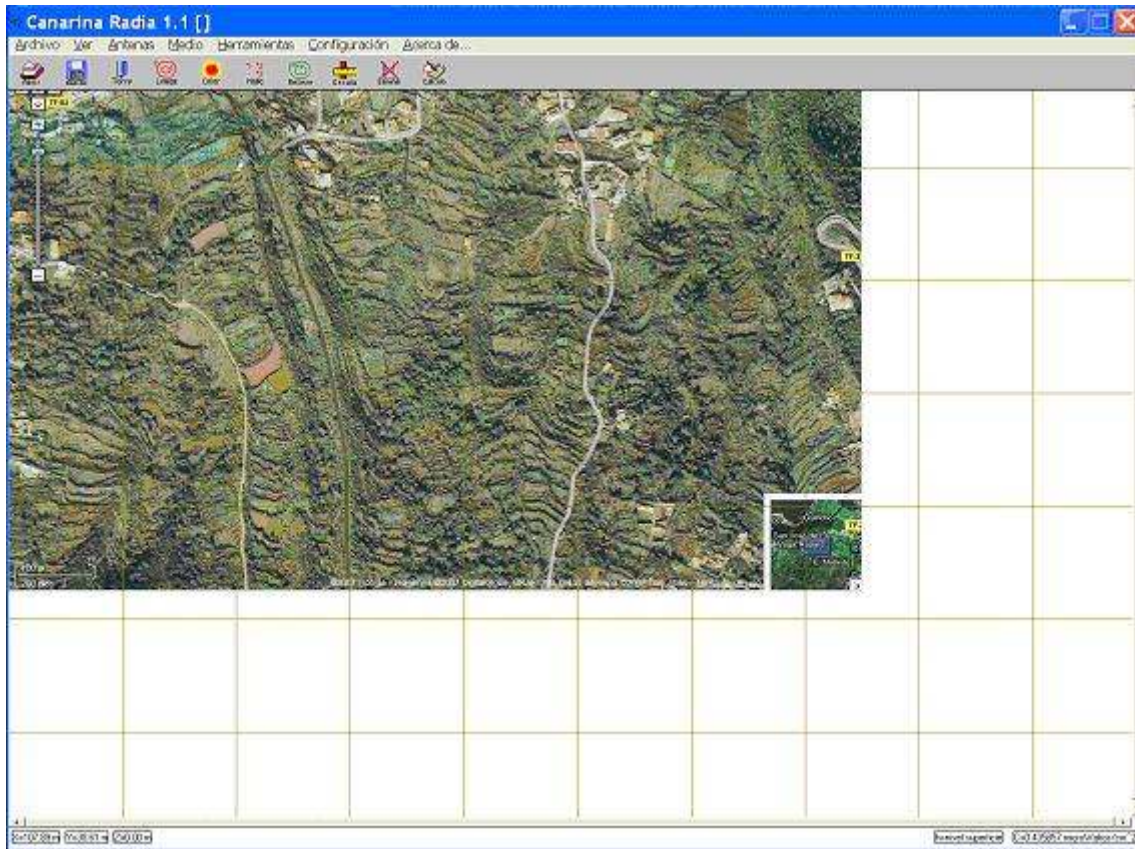
**7.** Copy now the selected area by the rectangle in the last image using (*Ctrl+C*) or the command (*PAINT Edit>>Copy*) in the PAINT program. Then, you can use the command (*File>>New*) in the PAINT to have a new and clear screen



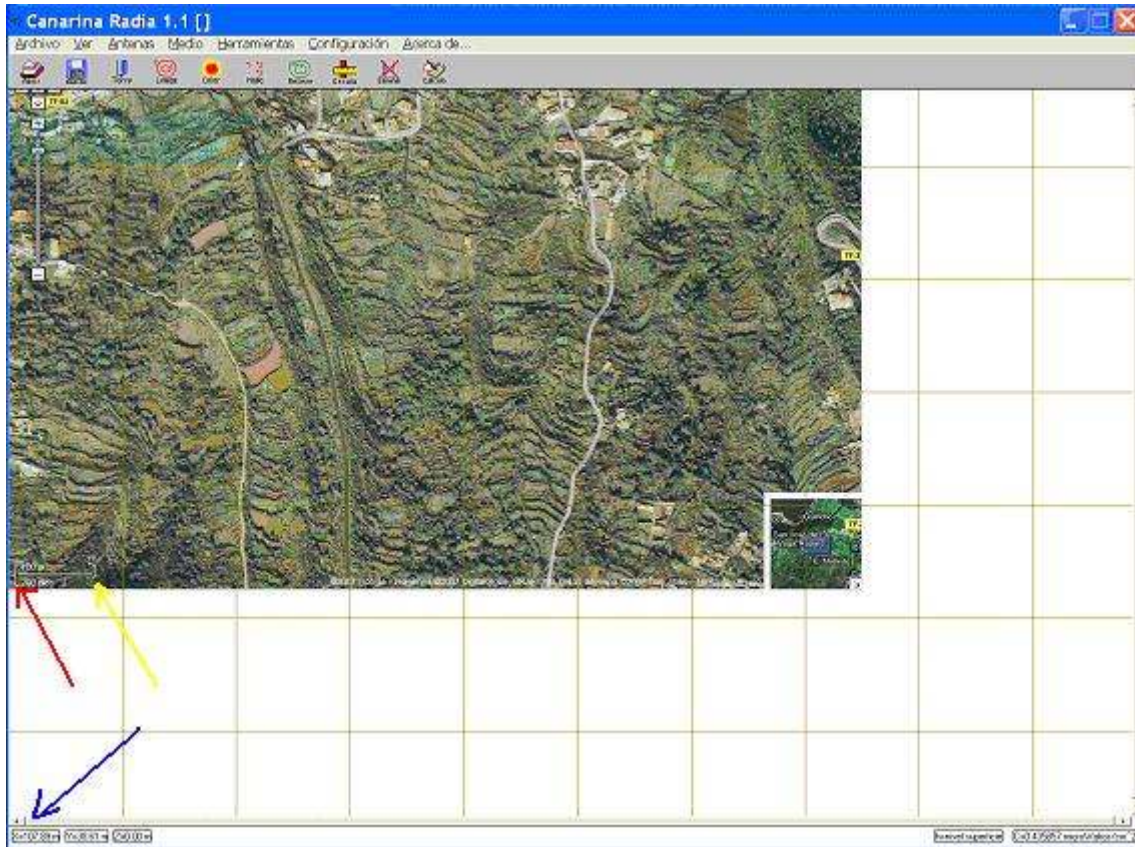
**8.** Use (*Ctrl+V*) command in the keyboard, or (*Edit>>Copy*) in the PAINT program to paste the selected rectangle. The copy of the image appears now in the PAINT screen. The scale of the map imported from Google maps appears now in our screen (marked by a yellow arrow). This will be of great interest in a near future. It is important to have this scale in the image that you have selected.



**9.** Save the file using BMP format using the commands of the PAINT program (*File*>> *Save as. . .*). Then, you can open the previously saved BMP file using the Canarina program.



**10.** To work in the correct scale, we need to check the scale bar width in the Google map. The Google scale bar is between the red and yellow arrows (in the next picture). The Google bar width is in meters. When we put the mouse pointer in the point of the red arrow we can see the X-Coordinate value in the box marked by a blue arrow. If we put now the mouse pointer in the point of the yellow arrow, we will obtain a new value for the X-coordinate. The difference between both values in meters must be the same that the original Google bar width in meters to be in the correct scale.



When we put the mouse pointer in the point of red arrow, it is found 7 m in the X-Coordinate box (marked with a blue arrow). If we do the same with the yellow arrow, we obtain 75 m in the box marked with a blue arrow. Then, and in our actual scale, the bar width have 75 m -7m = 68m. However, the correct value in the original Google scale is 100 m. The correcting ratio is

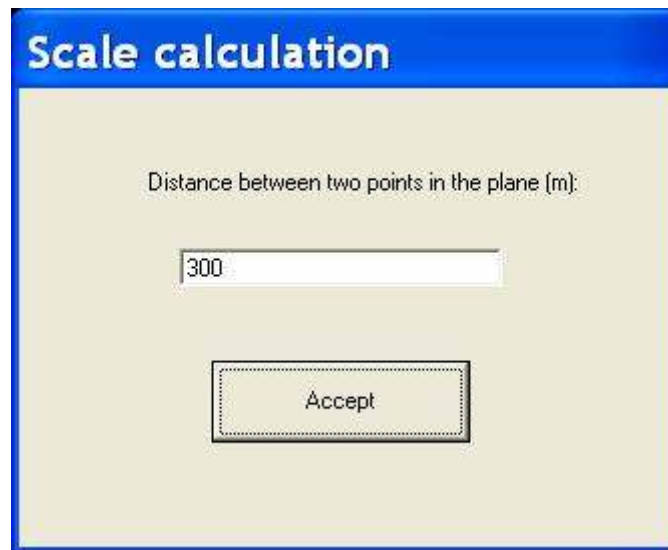
$$P = 100/68 = (\text{real value})/ (\text{our value}).$$

$$P=100/68=1.47$$

**11.** To work in the correct scale, we have two methods:

**METHOD A:**

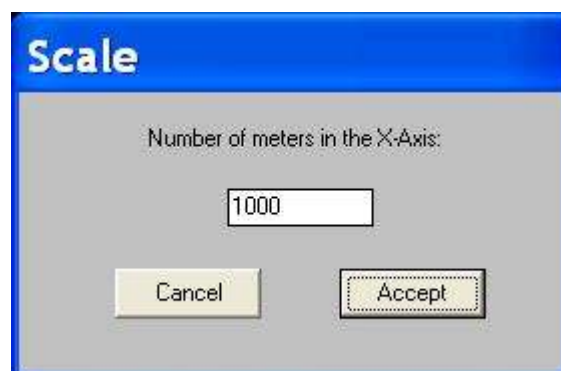
We go now to *Canarina program*>> *GIS* >> *Scale calculation* in the program and we get



We replace the 300m value that appears in the last picture by 100m (the original Google bar width in meters) and 'click' *ACCEPT*. Then we click firstly in the left extreme of the original Google scale bar and secondly, we click again in the right extreme of the original Google scale bar (both points in the screen were marked with red and yellow arrows in the last step 10). The imported Google map is now in the correct scale and we can check it. When we put the mouse pointer in the red arrow, we get an X-Coordinate value equal to 10 m (in the box marked with a blue arrow). We can also get 110 m for the position marked with the point of the yellow arrow. The difference is now  $110 - 10 = 100$  m. Such a value coincides with the original value of the Google map bar. So, the program scale is correct now.

### METHOD B:

We go now to *Canarina program* >> *Tools* >> *Scale* in the program and we get



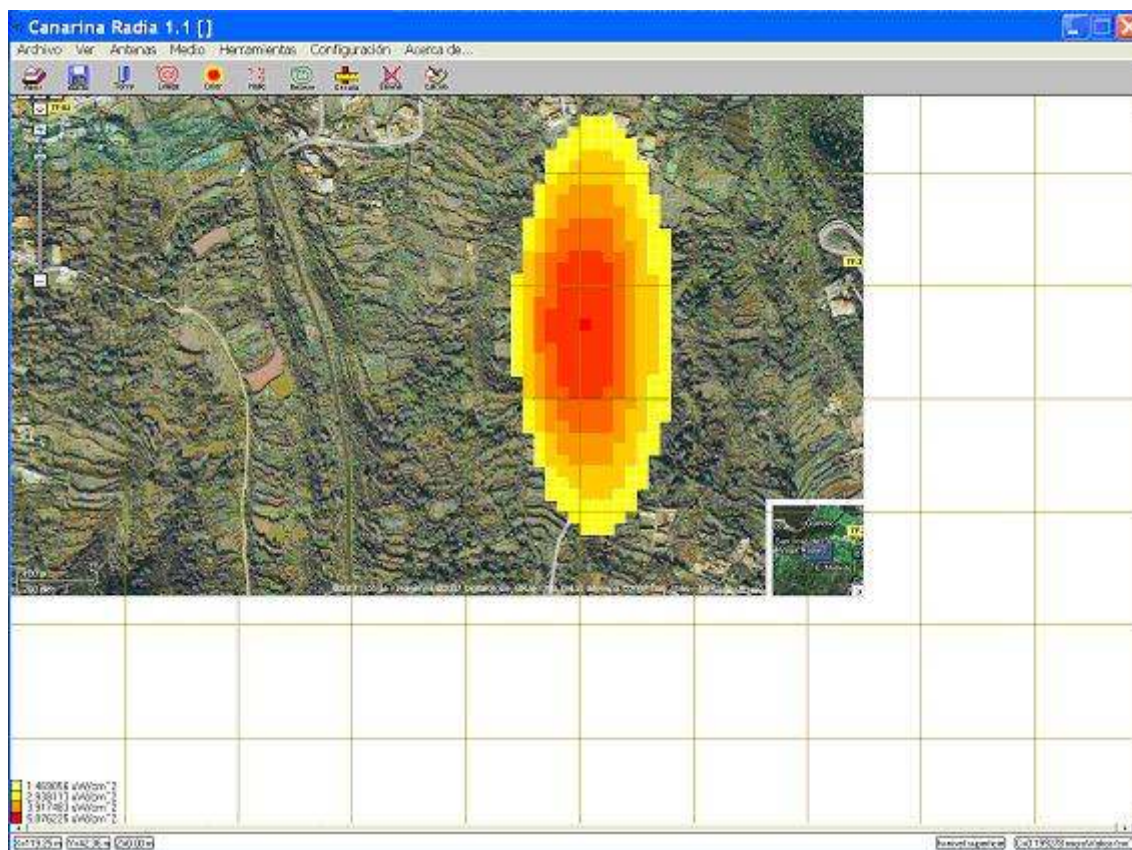
Now we multiply (our actual X-Axis width) by P to get the correct X-axis width,

$$(\text{correct X-Axis width})=P \times (\text{X-Axis width})$$

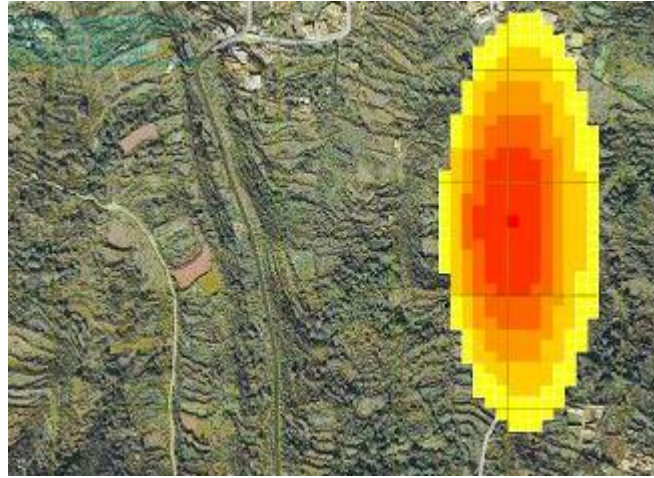
$$(\text{correct X-Axis width})=1.47 \times 1000=1470\text{m}$$

And we introduce the new X-Axis width and click *ACCEPT* in the last window. The imported Google map is now in the correct scale and we can check it. When we put the mouse pointer in the red arrow, we get an X-Coordinate value equal to 10 m (in the box market with a blue arrow). We can also get 110 m for the position market with the point of the yellow arrow. The difference is now 110 m -10m = 100 m. Such a value coincides with the original value of the Google map bar. So, the program scale is correct now.

**12.** Now we introduce a mobile phone tower and we make the simulation. The result can be exported to a BMP file using the Canarina software.



**13.** We can repeat the 6-7-8 steps 'in order to eliminate not necessary parts in the picture. At the end we have a clean image with both the Google map and the simulation process results.





## GIS

GIS. - In this option it can be found all necessary to work with geographical information system. Coordinates of the origin: With this command we can choose the value for the origin of coordinates. It is initially in the left bottom corner of the program window. It is possible to work with geographic and Cartesian coordinates.

The image shows a software dialog box titled "Origin coordinates". It contains two sections for inputting coordinate values:

- Cartesian coordinates:** X: 0.00, Y: 0.00
- Geographic coordinates:** X: 63.00000000, Y: 64.00000000

An "Accept" button is located at the bottom right of the dialog box.

Reference points. - With this command we can decide the coordinate values of a point, that we previously know, in the map in order to have a referenced system. It is possible to work with geographical and Cartesian coordinates. After that, it will be possible to export the results to a GIS system.

### Reference point

Cartesian coordinates

X:  Y:

Geographic coordinates

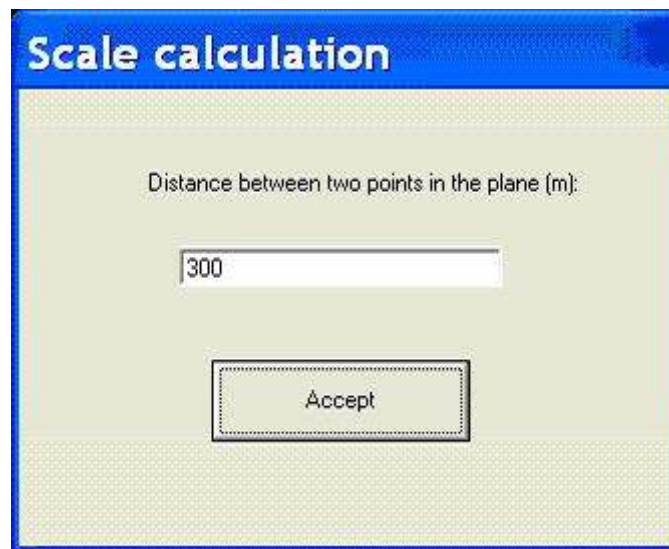
X:  Y:

Radius of curvature. - By means of this command, you can choose a value for the Earth radius. This radius can be slightly modified to adjust the reference system with the available data. The program considers the Earth as a perfect sphere with an exact radius. We know that this is not exactly true. This option is to correct this kind of effects.

### Curvature radius

m

Scale calculation. - With this command it is possible to estimate the map scale that corresponds to a background image, that has trees previously imported by the user. It is necessary to know the distance between two different points in the map. After introducing the distance data, you can click consecutively both points, and the scale will be automatically calculated.



## Software · characteristics

- System requirements: Windows 95, 98, 2000, XP, Vista or higher
- CD-ROM drive
- RAM Memory: 16MB or higher



## Order and pricing · RADIA software

### Software order and pricing information

Price: RADIA Software.....590 Euros

Licence: The software licence is for life. Once you buy the software, you will be able to use it at any time and forever.

Software update policy: Habitually we make good offers for the software upgrade (50 euros).

Refund policy: Refunds are not granted. Before buying, you will have to consult all the doubts on the software. Send us an email for further information.

To Order RADIA Software: To place an order for RADIA software, choose from the following

1. Complete the order form :

RADIA Order form: (Please complete all items that apply)

First Name: \_\_\_\_\_

Last Name: \_\_\_\_\_

Title: \_\_\_\_\_

Company/Affiliation: \_\_\_\_\_

Fiscal Identity Number(\*): \_\_\_\_\_

Address: \_\_\_\_\_

City/State/Region: \_\_\_\_\_

Country: \_\_\_\_\_

Zip/Mail Code: \_\_\_\_\_

E-mail: \_\_\_\_\_ Telephone: \_\_\_\_\_

(\*) or analogous

2. Email the completed form to: [info@canarina.com](mailto:info@canarina.com)

Canarina Algoritmos Numericos, S.L.

3. We will contact you soon for the payment method

Payment methods: After you send us the completed form, please choose from the following:

1. Payment by international wire transfer

2. Payment by WESTERN UNION

We will contact you soon.

Shipping and handling expenses: Shipping and handling expenses are included in our posted prices. Orders will be sent first class by Postal Express (Spain).

Estimated Delivery Date:

	Europe	East Europe	North America	Asia	Africa
Estimated Delivery Date (Business days)	7 days	15 days	15 days	15 days	15 days

Canarina Environmental Software



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