

GidasADM

(Calculation and monitoring of odor dispersion)

User Guide

Release 2013-06-20

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1. Introduction

GidasADM is the LSI LASTEM program developed in collaboration with Maind S.r.l., for the calculation of odor dispersion.

The program uses the data measured by LSI LASTEM instruments and stored into *Gidas* database and implements a simplified version of the stationary Gaussian model *WinDimula* for the monitoring of odor dispersion.

The program allows to perform calculations in automatic mode over a pre-defined period of time or to select customized time periods in order to make a history of assessments.

The main purpose of the program is to provide a simple instrument for the monitoring of the odors produced by a plant: it should be noted that the program cannot replace the complex models used for regulatory calculations.

1.1. Calculation Model

The model used in the calculation is a simplified steady-state Gaussian plume model developed on the base of the WinDimula (<http://www.maind.it>) and ISC (<http://www.epa.gov>) models. WinDimula was developed by Maind S.r.l. and ENEA, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development.

The WinDimula model is included in the list of recommended models by APAT (Italian Agency for Environmental Protection and Technical Services for the assessment and management of air quality <http://www.smr.arpa.emr.it/ctn/scen2.htm>).

The Gaussian models are based on an exact analytical solution of the equation of advection and diffusion in the atmosphere derived under certain simplifying assumptions.

$$C(x, y, z) = \frac{Q}{2\pi u \sigma(x)_y \sigma(x)_z} \exp\left[-\frac{y^2}{2\sigma(x)_y^2}\right] \cdot V \cdot D$$

where:

C : concentration (mass/m³);

Q : emission rate in mass per unit of time (mass/s);

V : vertical term;

D : decay term;

$\sigma_y(x)$, $\sigma_z(x)$: lateral and vertical dispersion coefficients (m);

u : air speed at the height of the release (m/s);

x : downwind distance between the source and the receptor with respect to the wind direction (m);

y : perpendicular distance to the wind direction between the receptor and the plume axe (m);

z : height above the ground of the receptor (m).

In the case of areal sources, the equation is modified to take account of the specific characteristics of this type of source (for more information see the original documentation that refers to the models *WinDimula* or *ISC*).

The calculation is performed on an hourly basis and the result shows the calculated average value over the whole period selected.

If the user knows the source emission in odorimetric unit it is possible to define a peak value (Peak To Mean Ratio) used to multiply the hourly values calculated by the models, as suggested for example by the Guideline of the Italian Lombardy Region; in case it is not possible to provide an accurate assessment of the emission the model will present the results as a percentage of the maximum value that typically occurs near the plant.

This program is not suitable for regulatory application but for a preliminary monitoring of odor emissions. To perform regulatory application you must use more complex models such as CALPUFF puff model (<http://www.maind.it>).

2. System Requirements

Personal computer

- Processor at 600 MHz operating frequency or higher. 1 GHz recommended;
- Display: SVGA res. 1024x768 or higher;
- Operating system (*):
 - 32 bit: Microsoft Windows 32 bit XP SP3/Vista/Seven/2003 Server
 - 64 bit: Microsoft Windows Seven;
- Microsoft .NET Framework V.3.5 (**);
- *LSI LASTEM 3DOM* program (updated to the last available version) previously installed to communicate with the instrument;
- *LSI LASTEM Gidas* Database for data recording (***).

(*) Operating systems **must be updated with the latest update released by Microsoft** and available through *Windows Update*; for operating systems not listed is not guaranteed correct and complete operation of programs.

(**) The *Microsoft .NET Framework 3.5* setup is included in the *LSI Lastem* product DVD issued after March 2011 and, if necessary, is automatically installed during the installation process starts from the DVD. If you do not have the updated version of the DVD you can download the installer for the *Microsoft .NET Framework 3.5* directly from the Microsoft Download Center at <http://www.microsoft.com/downloads/en/default.aspx> inserting in the search field. the term ".NET".

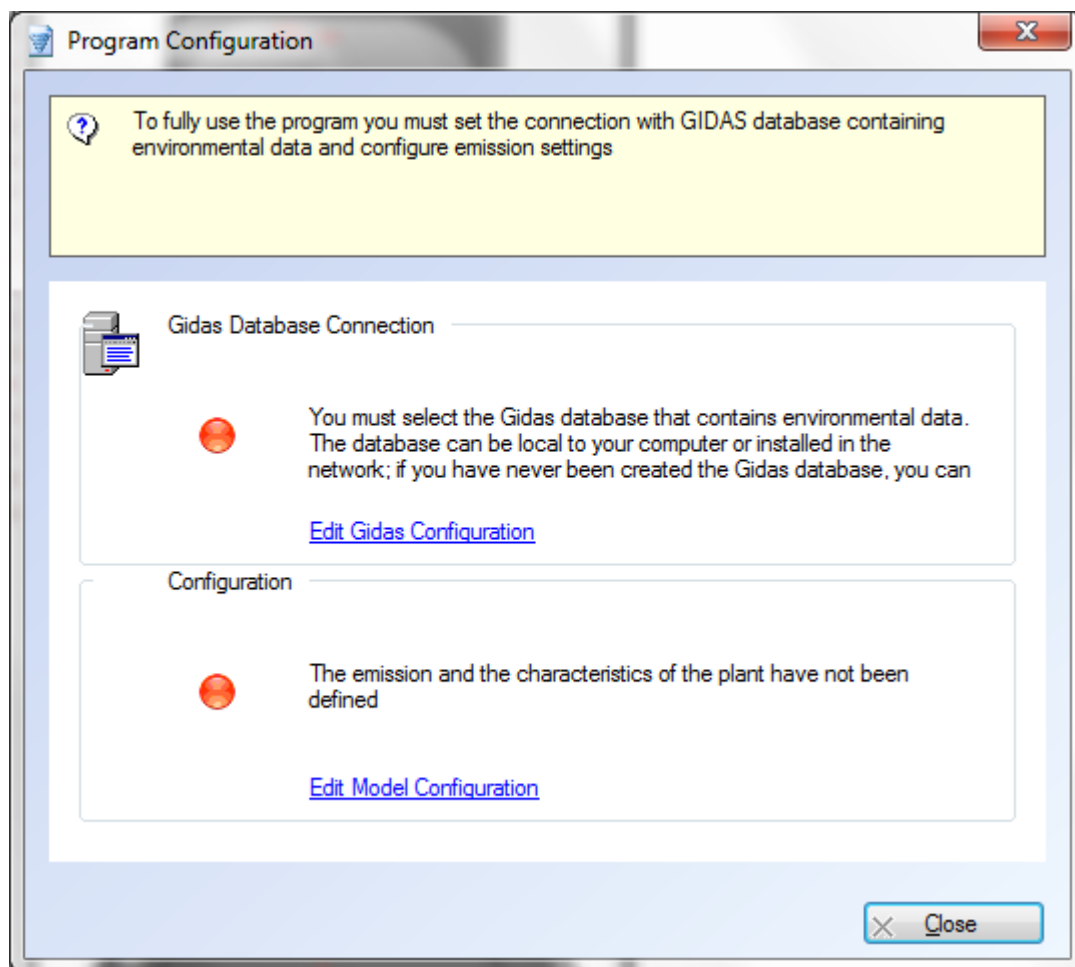
(***) *Gidas* database is installed with *GidasViewer* program and requires *SQL Server 2005 Express* or higher. *GidasTEA* can also be connected to *Gidas* database installed on SQL Server remote instance. For the system requirements of *SQL Server 2005 Express*, see the documentation of the *GidasViewer* program or the official Microsoft site [http://technet.microsoft.com/en-us/library/ms143506\(SQL.90\).aspx](http://technet.microsoft.com/en-us/library/ms143506(SQL.90).aspx)

3. Configuration

When the program is started for the first time, the following operations are to be performed:

- Select and configure the *Gidas* database containing environmental data; the program can use either a local database or a database installed in the network; in addition, a new *Gidas* database can be created in your local computer, if it was never created before (§ 3.1). If a *Gidas* database has been created during the installation process, this operation is no more necessary.
- Configure plant emission characteristics (§ 3.2).

This window appears when launching the program only if the configuration operations have not been completed, even if configuration settings can always be changed.



Once configured the program, it is no more necessary to perform the operations described in the following paragraphs.

3.1. Configuring Gidas database

GidasADM program uses the environmental data stored in *Gidas* SQL Server database (2005 or higher version) used to store the data measured by LSI LASTEM instruments.

In order to save data on *Gidas* database, you must install *GidasViewer*, the program for the creation of the database, and ask for an activation license for each acquisition instrument (*datalogger*). *Gidas* database needs SQL Server 2005 or a higher version to be installed: if the user doesn't have this app, the *Express* free version of SQL Server 2005 is installed during database installation. See *GidasViewer* program manual for more details.

To configure the database you need to:

- Select the Gidas database to be used.
- Select the acquisition instrument that measures the environmental data used by the program.
- Associate the variables used for the calculation to the quantities acquired by the instrument.

These operations are handled in *Gidas Configuration* window, which is opened by selecting the link *Edit Gidas Configuration* in the *Program Configuration* window (§ 3).

The screenshot shows the 'Gidas Configuration' window with the following sections:

- Gidas Database:** A status bar shows 'Connected'. Below is a table with the following data:

Item	Value
Data source	STEFANONB64\LSIDB2
Database name	Gidas
Database current version	Version 2.11.0 (3/4/2013 12:00:00 AM)
Authentication	SQL Server authentication(LSI.Gidas.Writer)

 An 'Edit' button is to the right of the table.
- DataLogger Settings:** A warning icon and text state 'It is necessary to select the datalogger with environmental data'. Below is a table:

Item	Value
Serial Number	
Configuration Date	

 An 'Edit' button is to the right of the table.
- Measure Settings:** A warning icon and text state 'Measure variables association not defined'. Below is a table:

Item	Value
Temperature (°C)	
Air Speed (m/s)	
Air Direction (°)	
Air Direction Std. Dev. (°)	
Net Radiation (W/m2)	
Global Radiation (W/m2)	

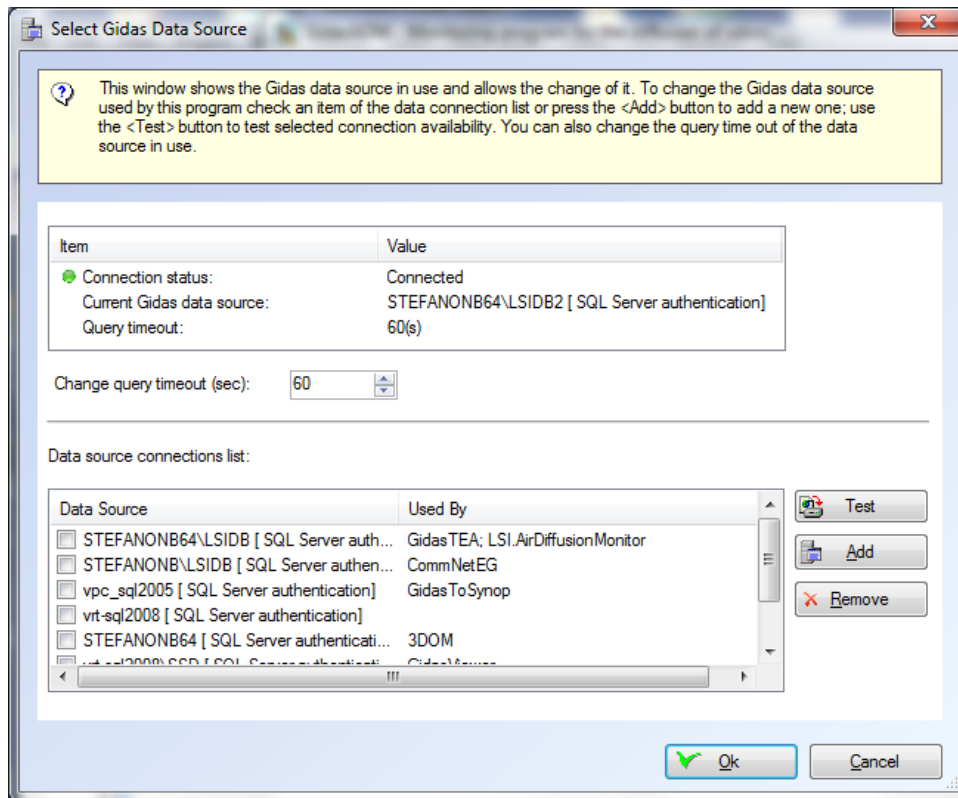
 An 'Edit' button is to the right of the table.

At the bottom right is a 'Close' button.

To configure the database select the <Edit>. button.

3.1.1. Connecting to a Gidas database

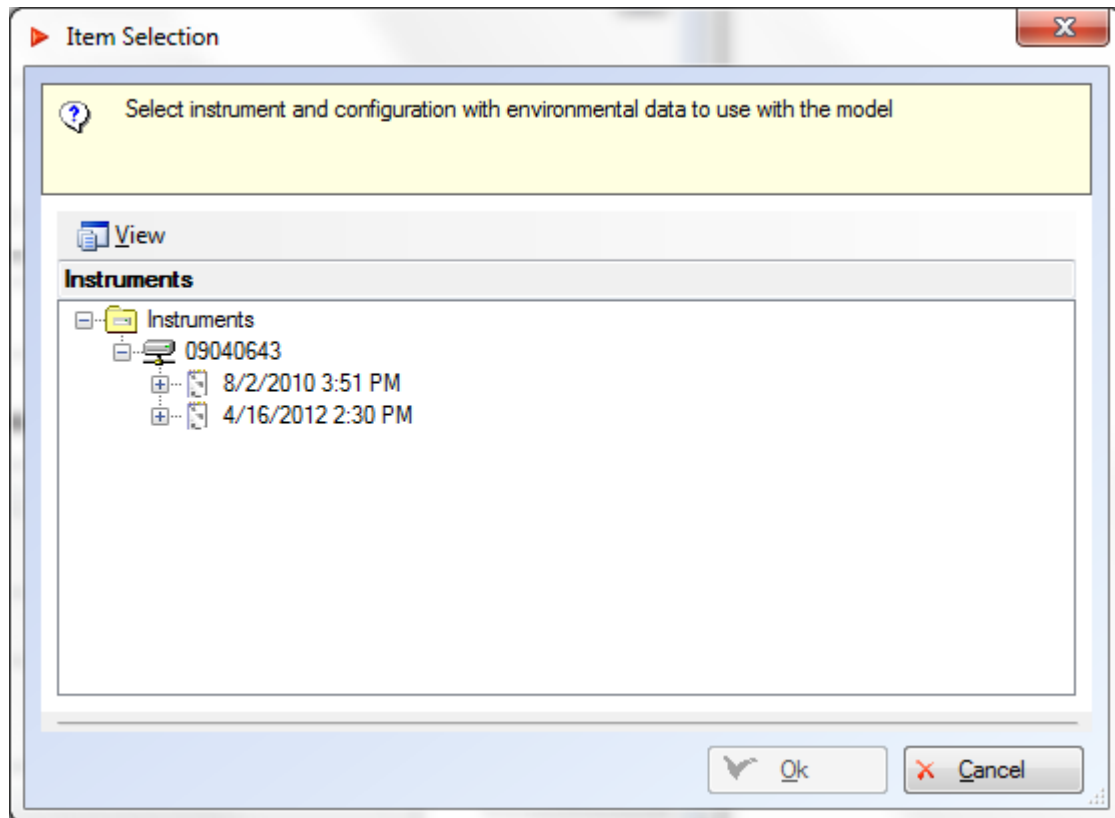
When *GidasADM* program is started for the first time, it automatically connects to the *Gidas* database created during the installation process of *GidasViewer* program. The program can also connect to a *Gidas* database that is on another network-accessible computer; pressing the <Edit> button in *Gidas Configuration* window (§ 3.1) opens the data source selection window:



This window displays the *Gidas* data source in use and allows modification. To change the data source, select an item in the list of the available data sources or add a new one using the <Add> button; use the <Test> button to test its availability. Generally, only the local computer connection will be present. See *GidasViewer* program manual for further analysis.

3.1.2. Selecting the instrument

Once selected *Gidas* database, the data acquisition instrument can be selected: pressing the <Edit> button in the *Gidas Configuration* window (§ 3.1) opens the selection window:



This window shows all instruments with a valid license available in the selected database. If the instrument has been reconfigured, the selection window will display the different available configurations. Select the configuration containing the data to be used in calculations; if you are going to use the program in automatic mode, the last valid configuration has to be selected.

ATTENTION

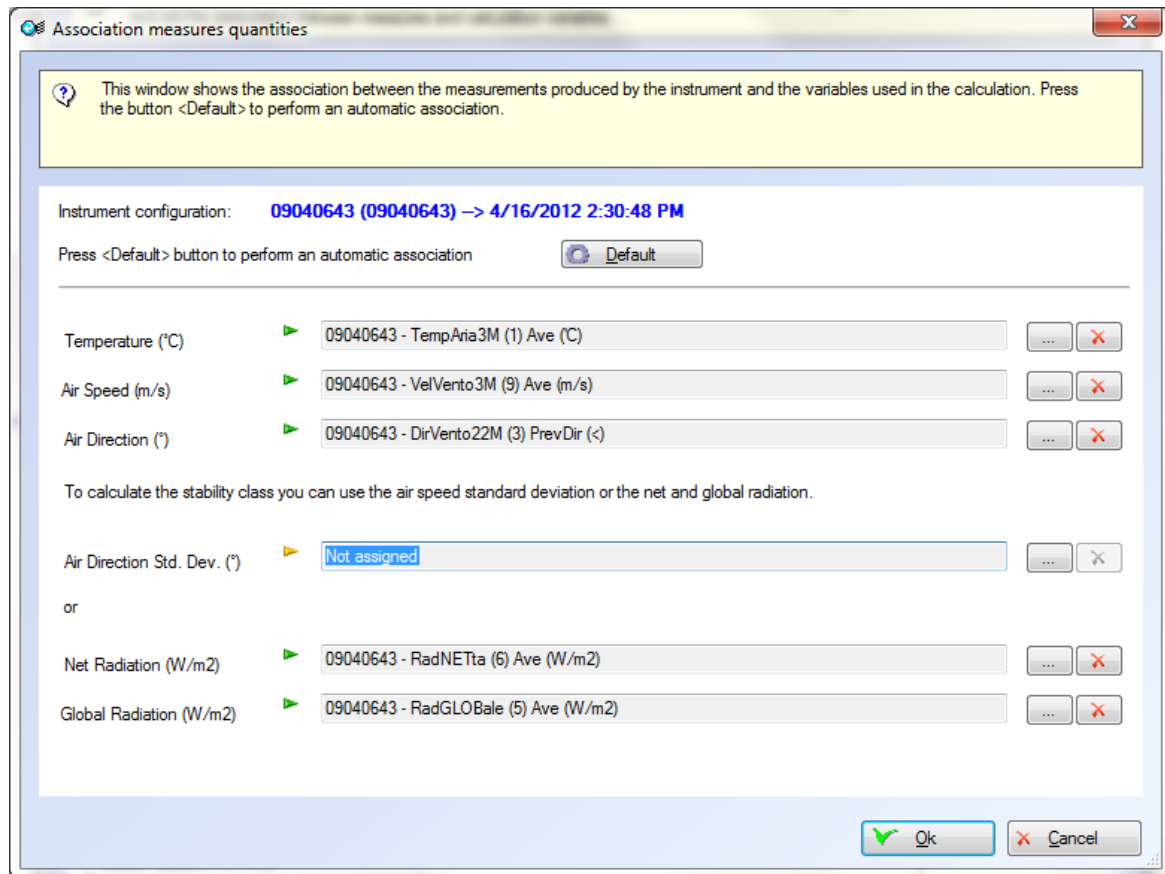
If you reconfigure the measuring instrument, you should also reconfigure the program.

ATTENTION

The data used by the model are in any case averaged on a hourly basis.

3.1.3. Associating measurements for calculation quantities

After selecting the measuring instrument, you should select the measurements that correspond to the quantities used in calculation: pressing the <Edit> button in the *Gidas Configuration* window (§ 3.1) opens the selection window:



The button *<Default>* starts a guided procedure for choosing the best possible association based on the characteristics of the instrument configuration; for each quantity, the connectable measurements ordered according to a compatibility score expressed as a percentage are listed; the association is proposed automatically when the score reaches 100%; for lower scores, it will be for the user to decide the possible association; if it is not possible to associate a quantity to a measurement, then the default value will be used.

In particular:

- For the wind direction, it is recommended to use the quantity prevalent direction.
- It is recommended to use the mean value as elaborated value of quantities.
- To calculate the stability class (a necessary parameter for calculations), the standard deviation of wind direction or net and global radiation data can be used alternatively.

The button  allows to select the association manually, while the button  removes it.

NOTE

The association between measurements and calculated quantities should be performed only once for each instrument configuration.

3.2. Configuring the emission plant

To configure the emission plant you need to:

- Set its geometry and location.
- Set emission values.
- Select the image to be used as background for the calculated values.

These operations are handled from the window *Plant Configuration* that is opened by selecting the link *Edit Model Configuration* of the *Program Configuration* window (§ 3).

Plant Configuration


This window displays the configuration settings of the plant: change the items and press <Ok>, it will open the window for the selection of the background image to be used in the graphical display of the results of the calculations.

General

Plant Name:

Plant Description:

Geometry and Location

Plant Center Point (UTM): X(m): Y(m):  Zone:

Plant Radius (m):

Domain Extension (m): ☐ 2 km ☒ 4 km ☐ 6 km ☐ 8 km ☐ 10 km

Average height of the surrounding buildings (m):

Emission

Emission Type: ☐ Defined Emission Rate (produces actual concentration) ☒ Undefined Emission Rate (produces concentration in term of percentage of the maximum concentration)


Emission Rate (ou): Peak to Mean Ratio (default 1):

Hourly Emission Rate (from 0 to 1):

	0	1	2	3	4	5	6	7	8	9	10	11
▶	1	1	1	1	1	1	1	1	1	1	1	1

	12	13	14	15	16	17	18	19	20	21	22	23
▶	1	1	1	1	1	1	1	1	1	1	1	1

Ok Cancel

The coordinates of the plant center must be expressed as UTM coordinates; if they are available in a different format, you can press the button  to open the coordinate conversion window:

Coordinate Conversion

Original coordinates format to convert to UTM

☒ Decimal Degrees ☐ UTM diverso fuso

☐ Degree Minutes Seconds

☐ Force destination zone:

Latitude: ☒ North

Longitude: ☒ East

Reference Ellipsoid:

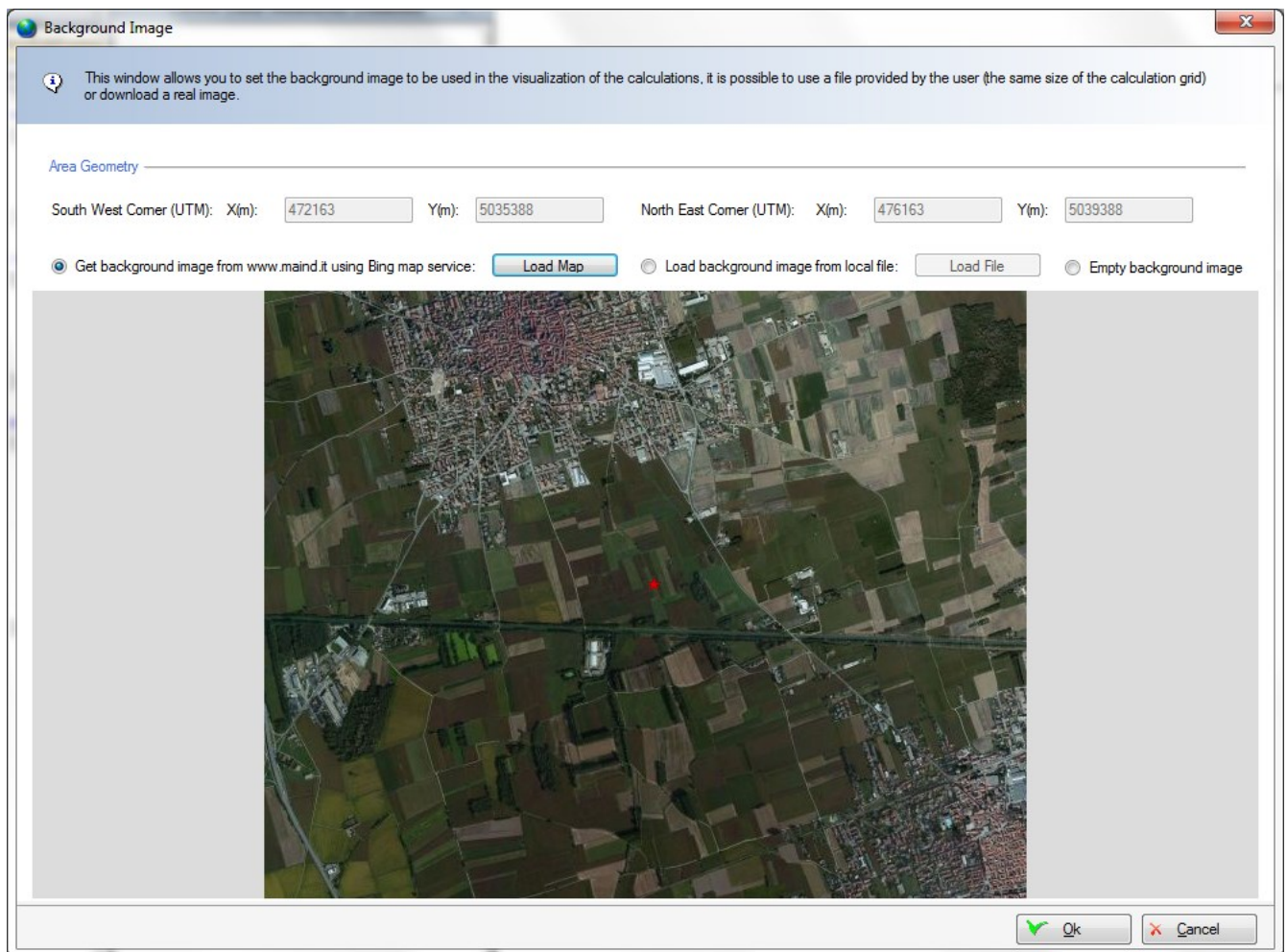
Convert 500000.0 X(m); 505325702.4 Y(m) 175N

Ok Close

As for the emission data, the actual emission data, expressed as odorimetric units and relating to the emission of the entire plant area can be set; otherwise, the model will calculate the results as a percentage of the maximum value generally located in the plant. If the actual emission values are available, you can also set 24 hour modulation coefficients and the *Peak To Mean ratio* parameter value, used to pass from hour concentrations to perceived values.

3.2.1. Selecting the background image

By closing the plant configuration windows, you access the last configuration phase, the configuration of the image to be used in the visualization of the calculations.



This window allows three choices:

- Not to use a background image (select *Empty background image*).
- Use a background image provided by the user (select *Load background image from local file* and press the <Load File> button).
- Use an image loaded from Bing map service (select *Get background image from using Bing map service* and press the <Load Map> button)

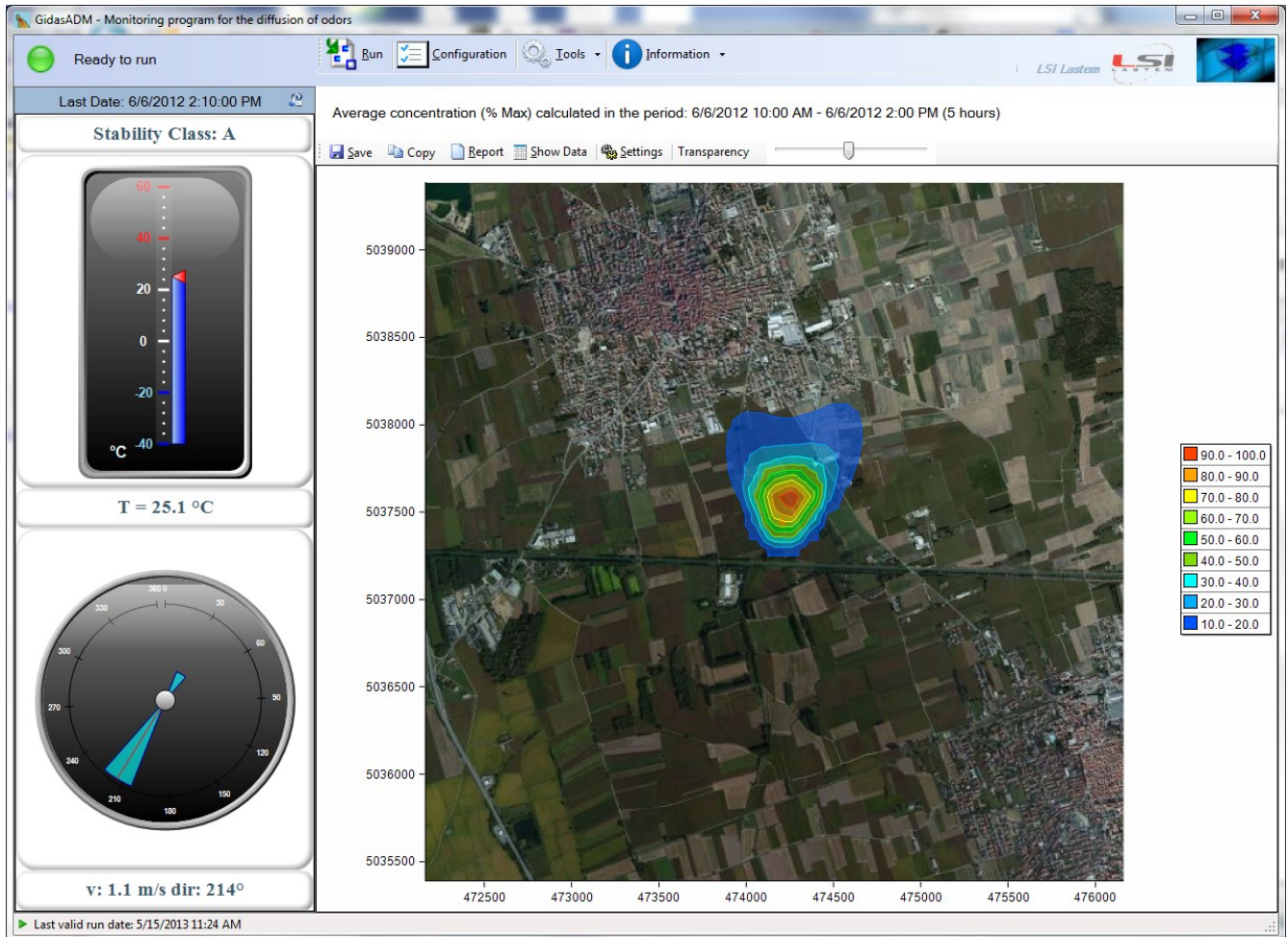
If the user uses his/her own map, he/she will have to make sure that the map size coincides exactly with those set for the calculation domain (§ 3.2) and that the plant is located in the center.

BING service is the map service of Microsoft. For more details, see link <http://it.bing.com/maps/?FORM=Z9LH5>.


4. Using the program

4.1. User interface

This is the appearance of the program after configuration and after a calculation.



On top left of the window there is the indication of the current, automatic or manual, calculation mode (§ 4.3) while the main menu is in the center (§ 4.2).

The window with the indicators of the last available meteorological data is on the left side: stability class, temperature, wind intensity and direction. This window can be reduced by pressing the button  on top right. The data in this window are updated every 10 minutes.

In the center of the screen there is the image of the last calculation that was run with the aid of the option buttons (§ 4.4)

4.2. Main menu

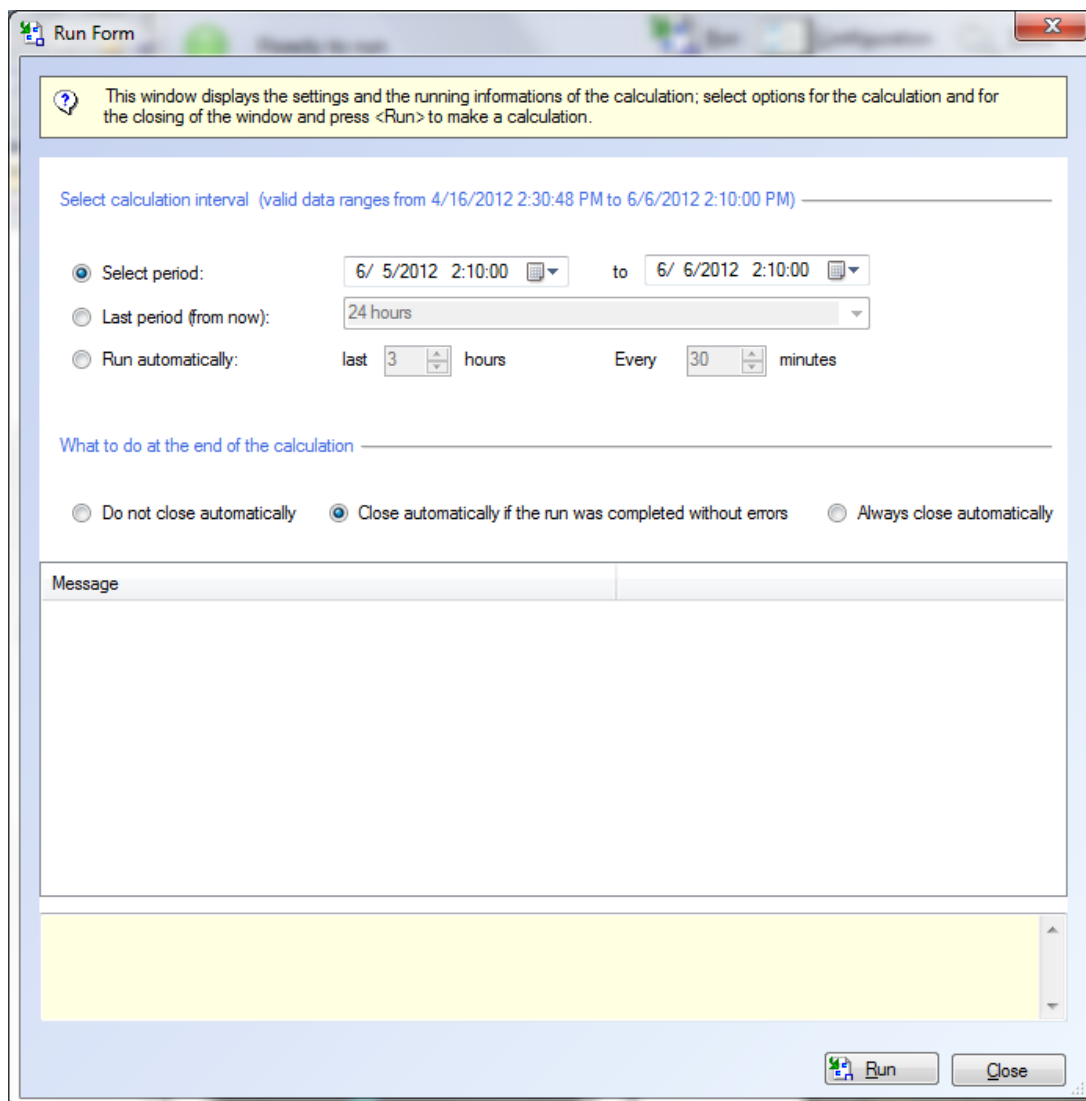
These are the main menu items:

- *Run*: makes the calculation (§ 4.3)

- *Configuration*: displays the window handling the configuration of database and plant (§ 3)
- *Tools*: allows to manage licenses (§ 5.1), check for update availability (§ 5.2) and display calculation logs (§ 5.3)
- *Information*: allows display of this guide, info on the selected Gidas database and on the program version; allows connection to the site <http://www.maind.it> for more details on atmospheric diffusion models.

4.3. Calculation monitoring window

To make a calculation or change calculation settings, select the *Run* menu: this menu displays the calculation monitoring window:



The upper part checks the time interval to be used for calculations and sets the automatic mode. The available options are:

- The complete selection of a period from ... to...
- Select the last n hours, where n can assume a predefined series of values.
- Set automatic calculation.

The central part monitors the management of the window closing after completing the calculation. In particular, if you select the mode *Run automatically* the program will automatically set the option *Always close automatically*.

To make a calculation, press the button <Run>: the bottom part of the window will display the messages generated by the calculation model during the run.

If the calculation has been successfully completed, the image of the isolines of results is automatically updated.

ATTENTION

Set automatic mode only if the data measured by the acquisition instrument are saved in the database in real time or within one hour delay.

4.4. Displaying results

The last made calculation displays the results in the central part of the main window: if the user has selected a map for the calculation background, then the result will be similar to the following:



The available options are as follows:

- *Save*: saves the image in a file.
- *Copy*: copies the image in Windows memory to be pasted in the applications supporting Windows Copy and Paste modes.
- *Report*: displays a short report of the calculation in html format (§ 4.4.1).
- *Show Data*: opens the window for the visualization of the calculated numeric data (§ 4.4.2).
- *Settings*: checks the settings of contour lines (§ 4.4.3).
- *Transparency*: by moving the *Transparency* control command you can check the transparency of contour lines.

4.4.1. Calculation Report

By selecting the button *<Report>* the program creates a short report in html page format. The logo in the report can be changed by replacing the file:

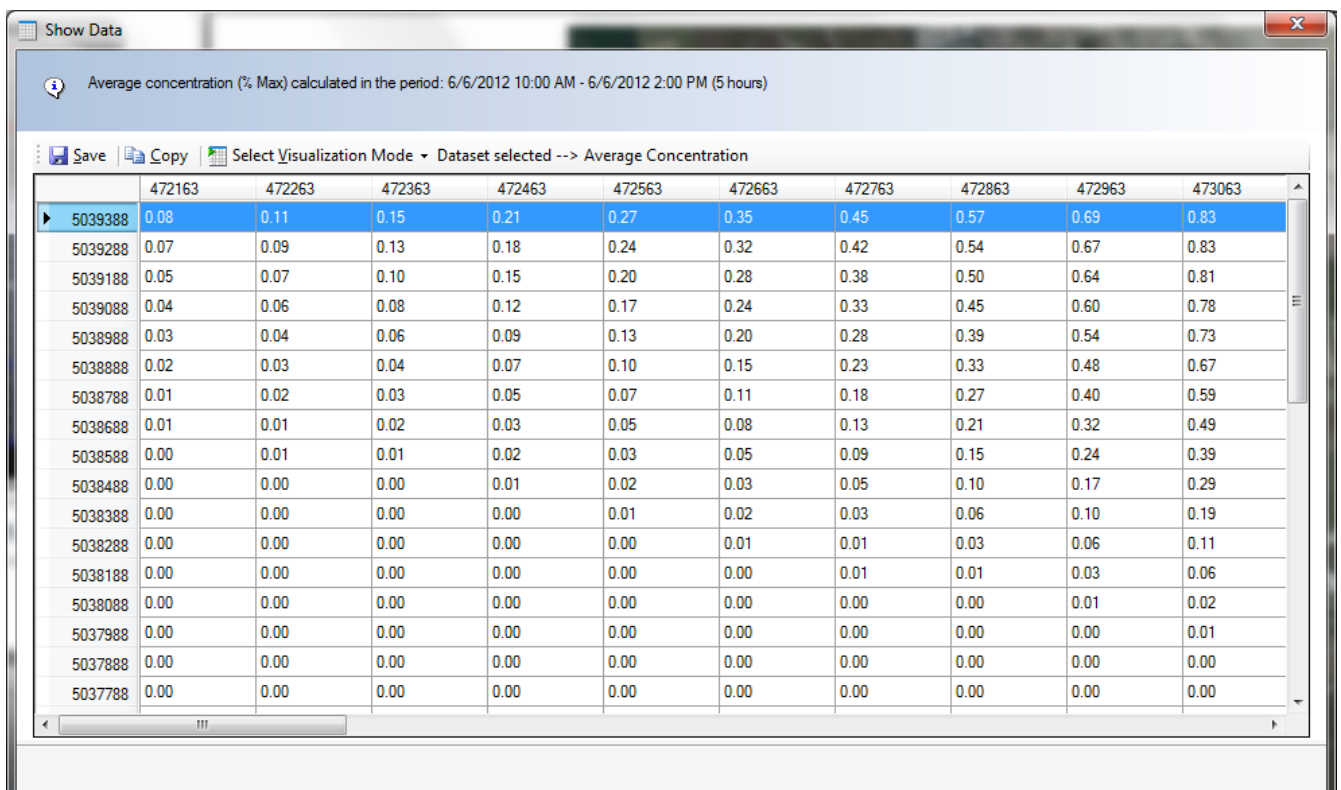
C:\ProgramData\LSI-Lastem\GidasADM\Report\files\logo.png

ATTENTION

It is recommended not to change the Report template.

4.4.2. Displaying data

Selecting the *<Show Data>* button opens the window displaying the numeric data of the last calculation.



The screenshot shows a window titled "Show Data" with a toolbar containing "Save", "Copy", and "Select Visualization Mode". Below the toolbar, a status bar indicates "Dataset selected --> Average Concentration". The main area displays a table of data. The table has 11 columns representing different locations (472163, 472263, 472363, 472463, 472563, 472663, 472763, 472863, 472963, 473063) and 17 rows representing different time periods (5039388 to 5037788). The data values are numerical, representing average concentration in % Max.

	472163	472263	472363	472463	472563	472663	472763	472863	472963	473063
5039388	0.08	0.11	0.15	0.21	0.27	0.35	0.45	0.57	0.69	0.83
5039288	0.07	0.09	0.13	0.18	0.24	0.32	0.42	0.54	0.67	0.83
5039188	0.05	0.07	0.10	0.15	0.20	0.28	0.38	0.50	0.64	0.81
5039088	0.04	0.06	0.08	0.12	0.17	0.24	0.33	0.45	0.60	0.78
5038988	0.03	0.04	0.06	0.09	0.13	0.20	0.28	0.39	0.54	0.73
5038888	0.02	0.03	0.04	0.07	0.10	0.15	0.23	0.33	0.48	0.67
5038788	0.01	0.02	0.03	0.05	0.07	0.11	0.18	0.27	0.40	0.59
5038688	0.01	0.01	0.02	0.03	0.05	0.08	0.13	0.21	0.32	0.49
5038588	0.00	0.01	0.01	0.02	0.03	0.05	0.09	0.15	0.24	0.39
5038488	0.00	0.00	0.00	0.01	0.02	0.03	0.05	0.10	0.17	0.29
5038388	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.06	0.10	0.19
5038288	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.11
5038188	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.06
5038088	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02
5037988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
5037888	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5037788	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

This window displays two data sets:

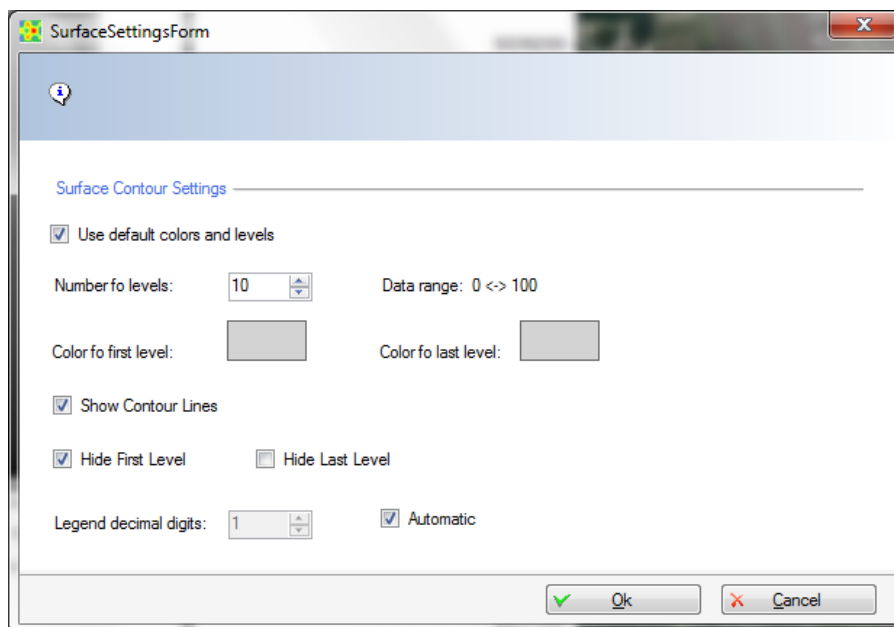
- The mean concentration in every point of the calculation grid expressed in odorimetric units or percentage of maximum.
- The meteorological data used for calculation.

The available options are:

- *Save*: saves the data set displayed in a text file.
- *Copy*: copies the data set displayed in Windows memory.
- *Select Visualization Mode*: changes the data set to be displayed.

4.4.3. Contour lines settings

Selecting the <Settings> button opens the window for the configuration of contour lines.



This window allows to monitor some settings for the representation of contour lines.

5. Tools

Tools menu allows to access the License Manager program and to check for available updates.

5.1. License Manager

To make a calculation you need the license file associated to the serial number of the instrument used for environmental measure.

Use menu *Tools* → *Licenses Manager* to run the program *LSI License Center* that manages the LSI programs licenses installed on the local computer.

The *LSI License Center* program is one of the components of the *LSI Support Center* program that can be directly installed from the LSI LASTEM products DVD or from the Licenses files CD. You can also download the installer file from the LSI LASTEM FTP site. The *LSI Support Center* also contains the component that verifies the availability of the new versions of the LSI LASTEM programs installed in the computer (§ 5.2).

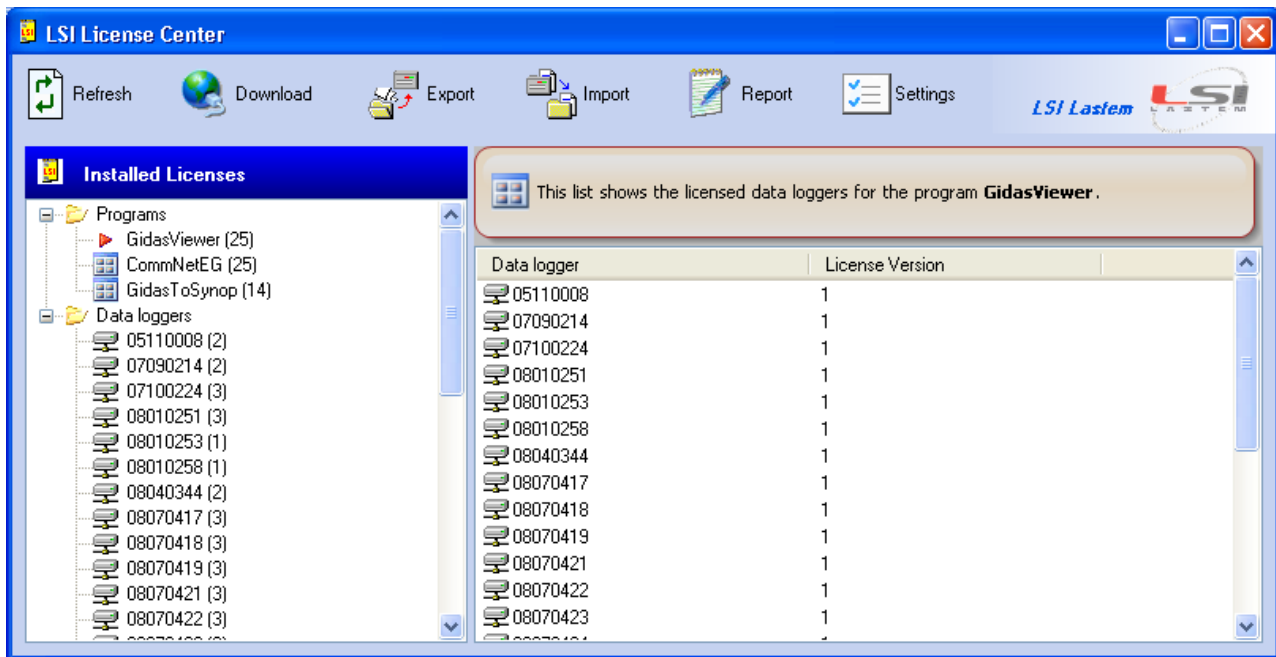
5.1.1. Installing the program from the FTP web site

If the license management program is not installed on your local computer, you can activate its installation by downloading the installation file from the FTP web site; at the end of download, the installation will be automatically activated and the license management program will be started.

5.1.2. Program use

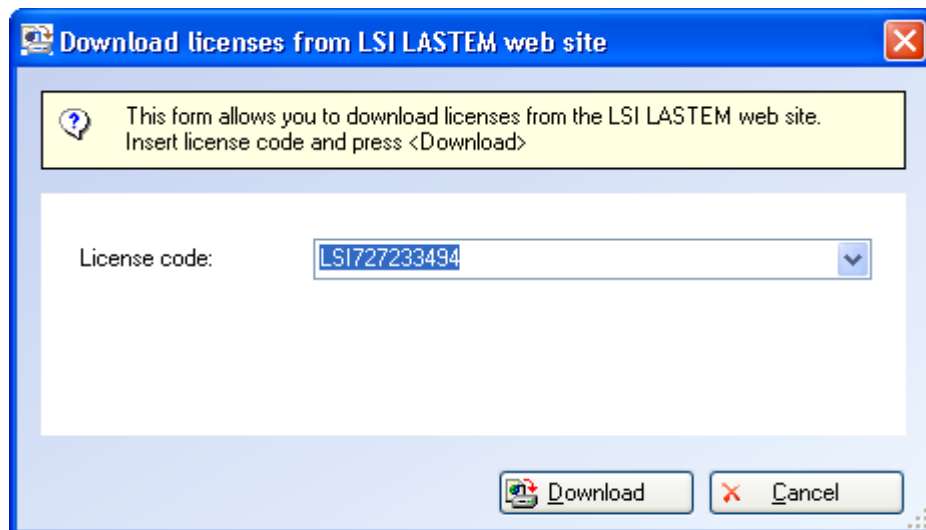
The program displays all the licenses installed on your computer, divided in single programs or single instruments. Through this program you can:

- Export the licenses selected from an archive;
- Import on your local computer all the licenses contained in an archive;
- Generate a simple report on a text file containing the list of the licenses installed on your computer;
- Download the licenses directly from LSI LASTEM web site;



The license archive consists of a single zip file having *lsilic* extension, that is the format for the distribution of LSI LASTEM licenses.

Each license archive can be downloaded from the LSI LASTEM site by entering the License code supplied by LSI LASTEM at the time of the programs purchase.



If there is a server proxy installed, you can set Internet communication parameters through the <Settings> button.

5.2. Program update

Use menu ? → *Check for updates* to run the program *LSI Update Center* that verifies the availability of the new versions of the LSI LASTEM programs installed in the computer.

The *LSI Update Center* program is one of the components of the *LSI Support Center* program that can be directly installed from the LSI LASTEM products DVD or from the licenses files CD or

downloading the installer file from LSI LASTEM FTP site. The *LSI Support Center* also contains the component that manages the licenses of the programs installed on the local computer (§ 5.1).

5.2.1. Installing the program from FTP site

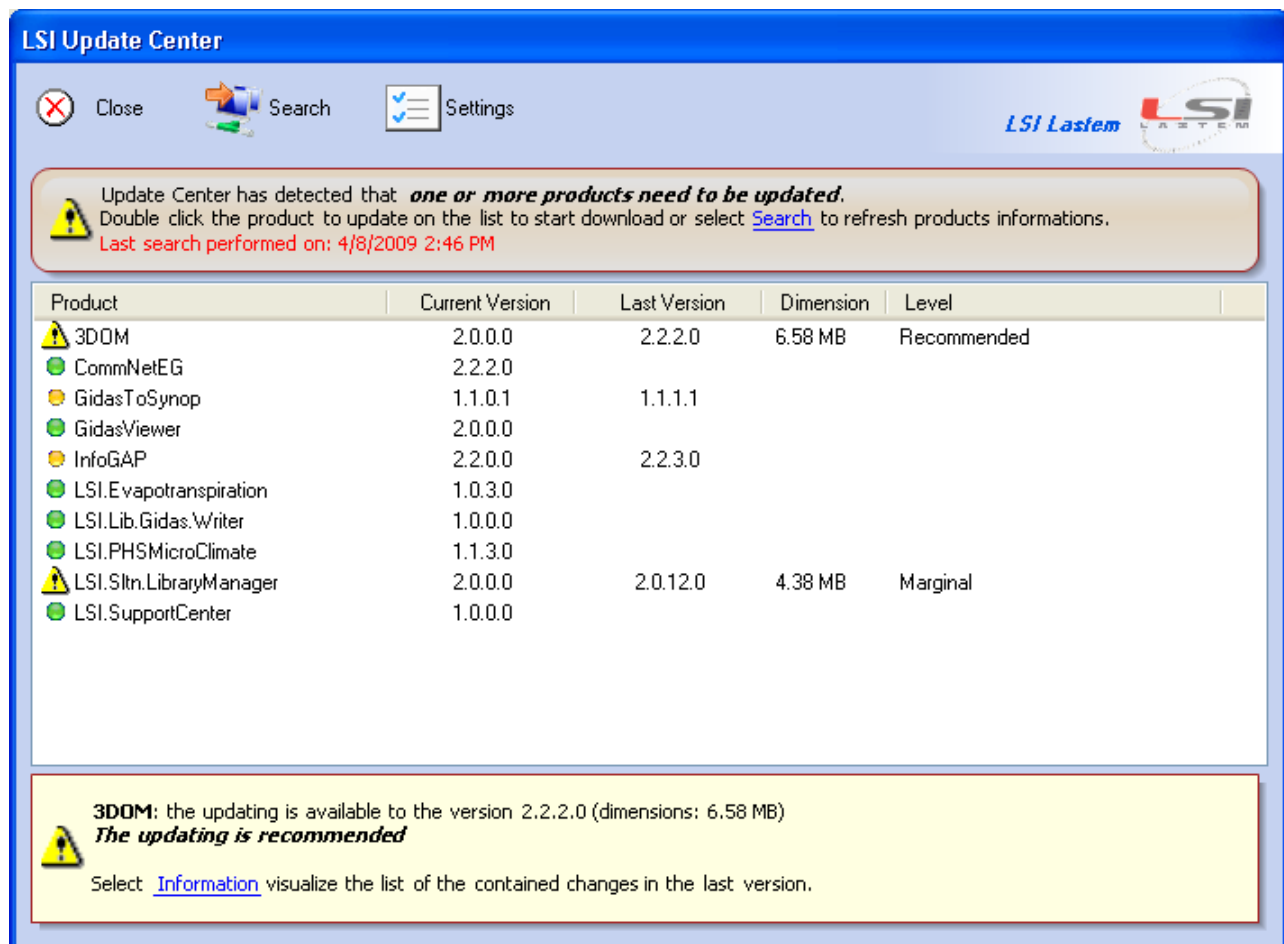
If the program *LSI Update Center* is not installed in the local computer you can download the installation file from the LSI LASTEM FTP site. At the end of the downloading the installation will automatically starts; at the end of the installation the program will be started.

5.2.2. Program use

The *LSI Update Center* program is composed from two modules:




- the program *LSI Update Center Monitor* that is started in automatic with the operating system and that verify periodically the available updates for all the LSI LASTEM programs installed in the computer;
- the program *LSI Update Center* shows the state of the available updates and, if the case, downloads from the LSI LASTEM web site the files of installation and starts the upgrade.

The program *LSI Update Center* shows the state of the LSI LASTEM programs installed in the local computer:



For every program the installed run version and the last available version is displayed.

A program can be:

-  Updated;
-  Not updatable: a new version exists but the product is not updatable;
-  Updatable: double click the product to update on the list to start download the installer file.

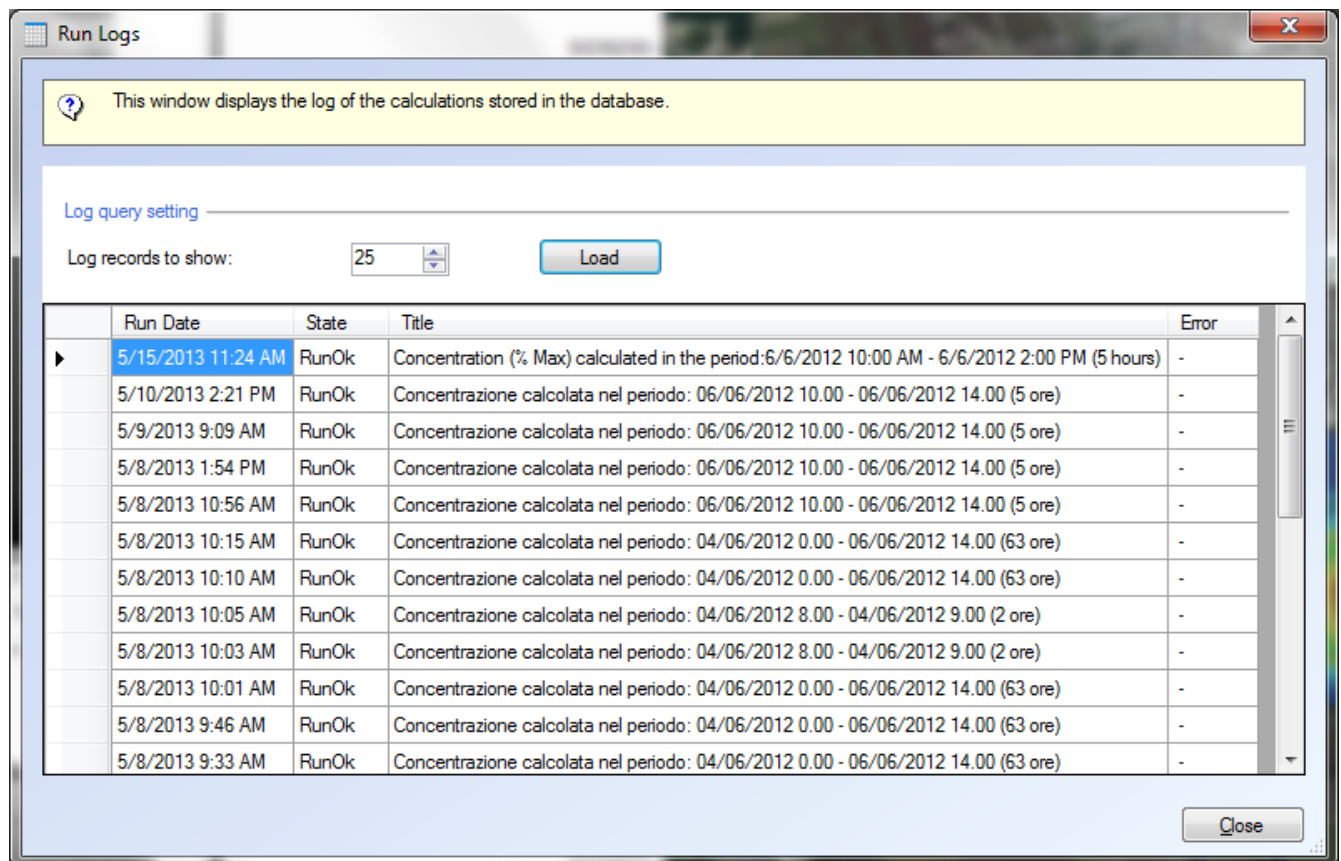
Selecting *Information* you can visualize a web page containing the list of changes of all the versions of the selected program.

Through the button *<Search>* is update the search of the updates while through the button *<Settings>* are modified the connection properties, if a proxy is used, and the temporal interval used by the monitor for the automatic search for updates.

Remind that when this program is started by the menu *Start → Programs* of Windows or from the contextual menu of the monitor, the program visualizes the results of the last automatic search operated by the automatic monitor visualizing the date of the search. To update the data press the button *<Search>*.

5.3. Displaying calculation logs

The window displaying the calculation logs stored in Gidas database is opened through *Tools → Show Run Logs* menu.



5.4. Program configuration file

The GidasADM's configuration file is called *GidasADM.exe.config* and it is contained in the program's installation folder. It is an *xml*-format file containing some settings of the application operation. In particular, the program operation can be adapted to run with a language other than the default one, by changing the value of the property *UserDefinedCulture*:

```
<setting name="UserDefinedCulture" serializeAs="String">  
  <value></value>  
</setting>
```

To change the computer language from Italian into English, enter the value *en-us* in value (`<value>en-us</value>`); to change the computer language from a foreign language into Italian, enter the value *it-it* (`<value>it-it</value>`); no other localizations are available.



Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.



UK Office

Keison Products,

P.O. Box 2124, Chelmsford, Essex, CM1 3UP, England.

Tel: +44 (0)330 088 0560

Fax: +44 (0)1245 808399

Email: sales@keison.co.uk

Please note - Product designs and specifications are subject to change without notice. The user is responsible for determining the suitability of this product.