Hazard Prediction Model (HPM) 1.0.0.0 User Manual

This user manual will quickly guide you through installation and use of HPM version 1.0.0.0 on your computer. HPM version 1.0.0.0 is available on the CD Rom provided with this booklet.

HPM version 1.0.0.0 installation

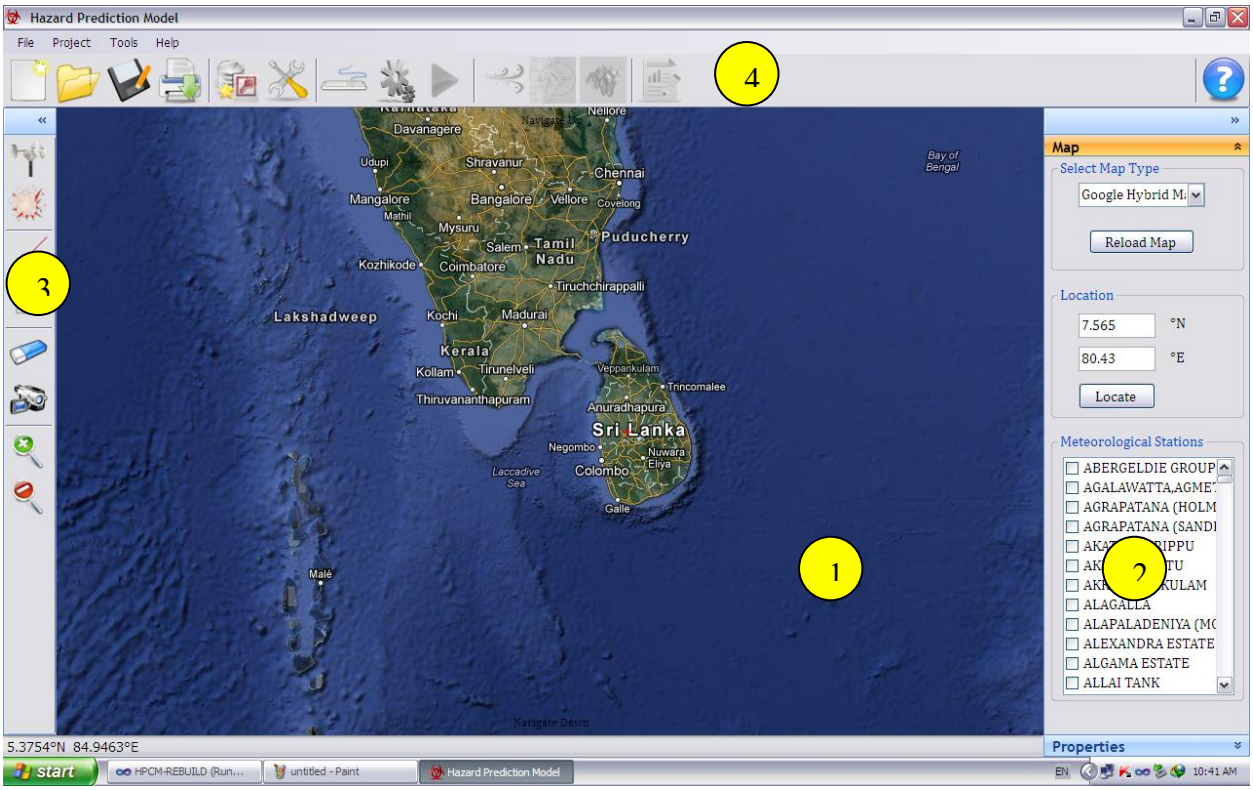
1) Insert HPM version 1.0.0.0 CD Rom in to your computer and allow setup file to automatically run. Otherwise locate “setup.exe” on the disk and open to continue.
2) HPM installation wizard is quick and easy. However, it may take some time to complete if .Net Framework 4 is not already installed on your computer.

HPM version 1.0.0.0 user guide

I. When the installation wizard has been completed, start the program using “Hazard Prediction Model” icon on the desktop or start menu.

II. HPM requires an internet connection to obtain satellite maps from Google server. If active internet connections are unavailable at the program startup, a message will be prompted and the program will be switched in to cache mode. In cache mode, you can only access satellite images which have previously been obtained by HPM while you were navigating.

III. When the program has been loaded, the main window of HPM appears and following elements can be found.



1. Map Viewer

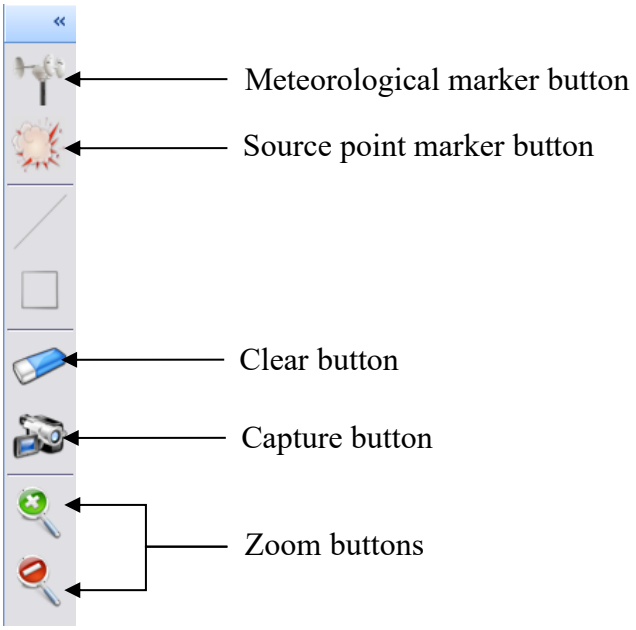
   Map viewer allows you to navigate and locate a position on satellite maps. You can use navigation buttons located near the borders of navigation panel to move through. Alternatively, arrow keys of the key board and map dragging with right mouse button can also be used. To zoom in or out, use mouse wheel or magnifying buttons located in the tool box. (See details of Panel 3)

2. Property panel

   Property panel contains two main tabs; Map viewer properties and other properties. Map properties tab can be used to change the map type of the Map viewer or to set map center position to a given latitude and longitude in decimal degrees.

3. Tool box

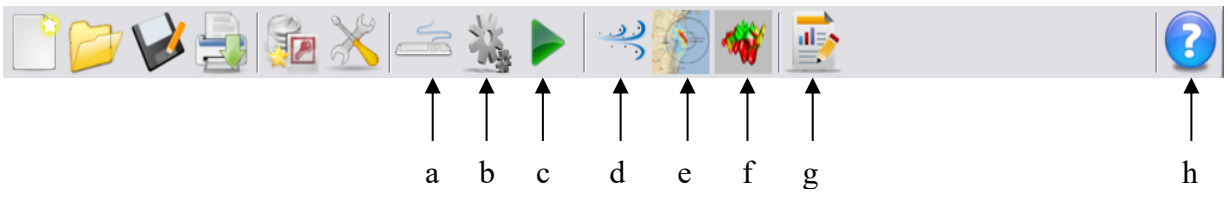
   Important tools located in the tool box are depicted below.



   You can use Meteorological marker button to add markers on to the satellite map. Similarly, use the Source point marker button to mark a release location on the map. Clear button removes all the markers from the map viewer. Capture button can be used to obtain screenshots of the current map view.

4. Action panel

   Important buttons located on the Action panel are shown below.



a) Data input
   - *Pops up Data Input Form where you can insert data from meteorological stations and source details*

b) Project options
   - *Opens the project options window*

c) Run project
   - *Runs the project; computations are performed and predictions are made (Note that the button is inactivated unless you have inserted data.)*

d) Simulate wind on the map
   - *Opens up a window for the wind simulation options (Note that the button is inactivated unless the project has run successfully.)*

e) Visualize dosage levels on the map
   - *Opens up a window for the dosage visualization options (Note that the button is inactivated unless the project has run successfully.)*

f) Visualize 3D terrain of the disaster area
   - *Opens up a window and visualizes the terrain in 3D form (Note that the button is inactivated unless the project has run successfully.)*

g) Create report
   - *Creates a report with dosage color map and presents in a new window (Note that the button is inactivated unless the project has run successfully.)*

h) Help
   - *Contains user guide and demos*

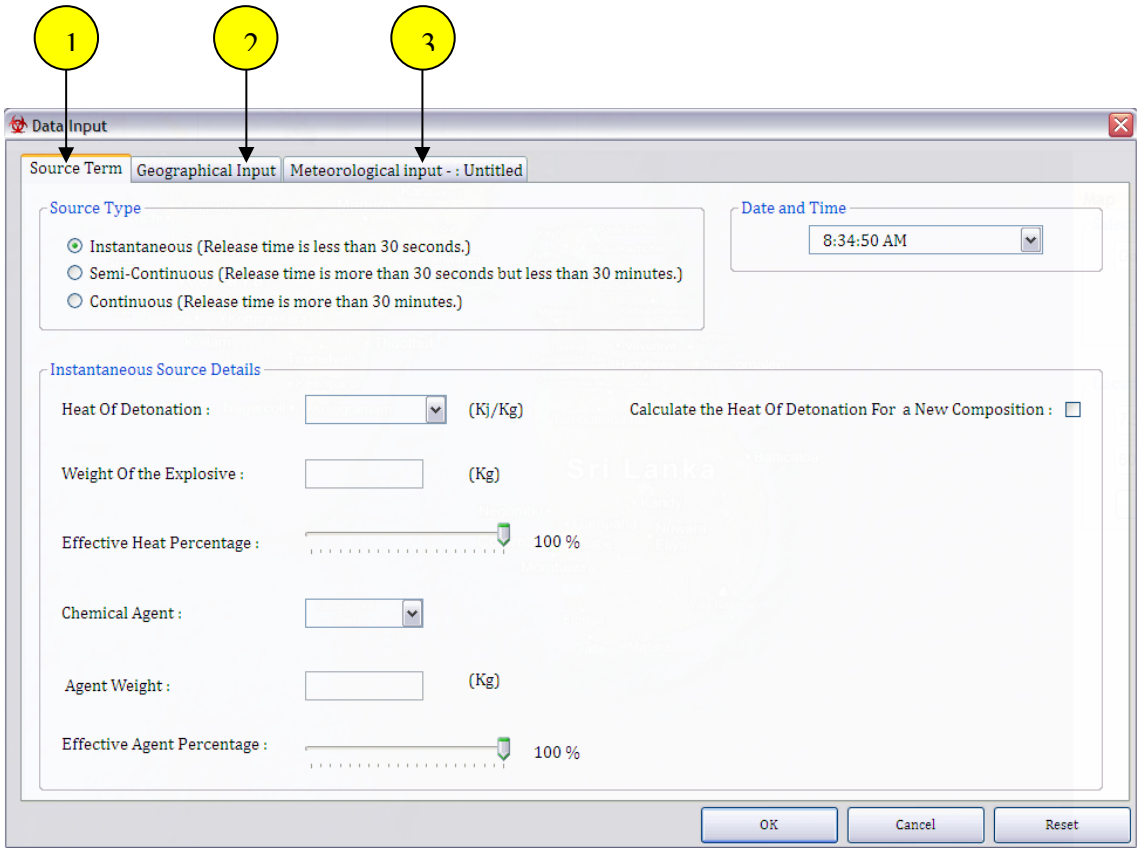
Note that the actions in the action panel can also be performed using main drop down menu of the program.

IV. In order to predict the hazard following an immediate disaster, one should run a HPM project. The user should first navigate to the disaster location in smart map viewer of the HPM.

V. Identify the release location and add “Release Point Marker” on to the map by clicking the relevant button in the tool box. (Note that the markers can be moved by drag and drop on map surface. Right clicking on the marker will open up a drop down menu, which allows you to delete the marker or edit marker properties.)

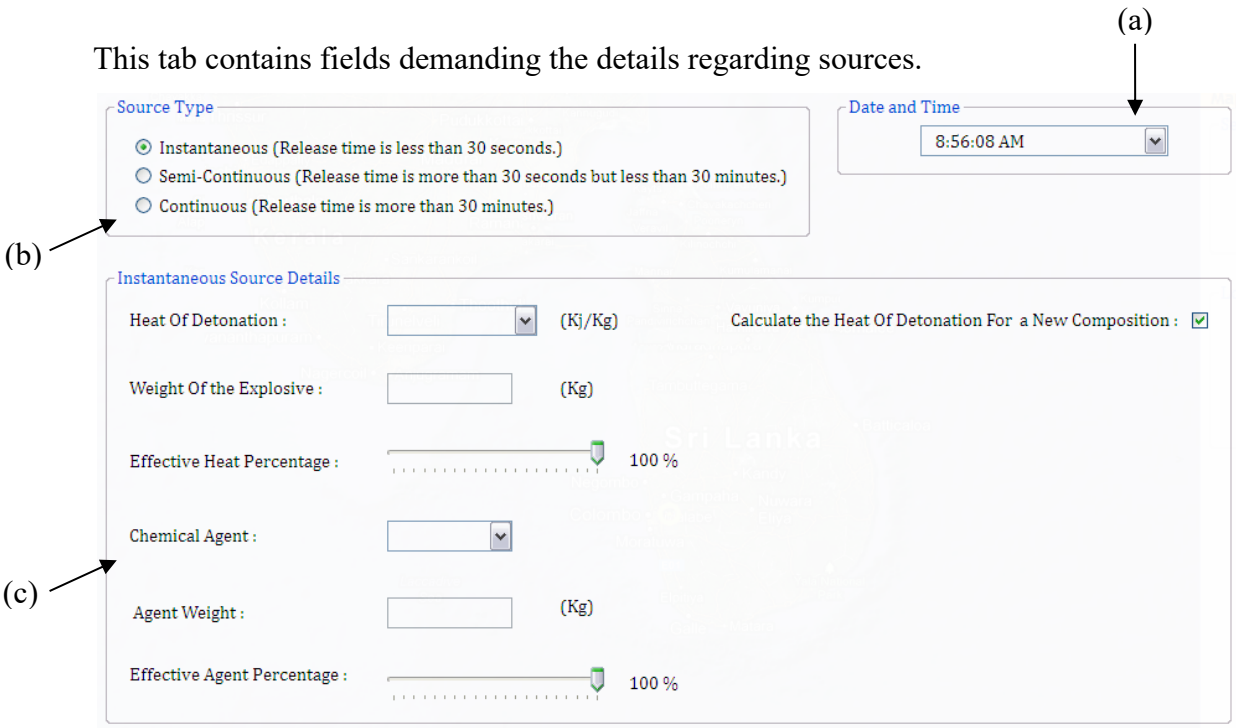
VI. Identify the nearest meteorological stations to the disaster location. Simply mark each of the meteorological stations using Meteorological Marker button in the tool box. Move markers or change properties if necessary.

VII. Click “Insert Data” button to open the data input window. (Note that the data input window will not open unless you have marked a release point and a meteorological station on the map.) Main elements of data input window are shown below.



1. Source Data Input Tab

This tab contains fields demanding the details regarding sources.



Pick date and time of the disaster from Date Time Picker (a). Select type of the source from "Source Type" group box (b). Insert source data into "Source Details" group box (c). Fields in this box may vary depending on the type of the source. Mainly, following elements can be found as required source details.

Heat Of Detonation – *The type of explosive to calculate the heat of detonation of explosive used for the explosive dissemination. If a mixture of explosive has been used for the detonation, click the checkbox named "Calculate Heat of Detonation for a New Composition" and select appropriate explosives and amounts from the resulting window.*

Weight of the Explosive – *The weight of explosives used for the explosion*

Effective Heat Percentage – *The percentage of heat effectively involved in the dissemination*

Chemical Agent – *Type of the chemical agent*

Agent weight – *Weight of the chemical agent employed in the dissemination*

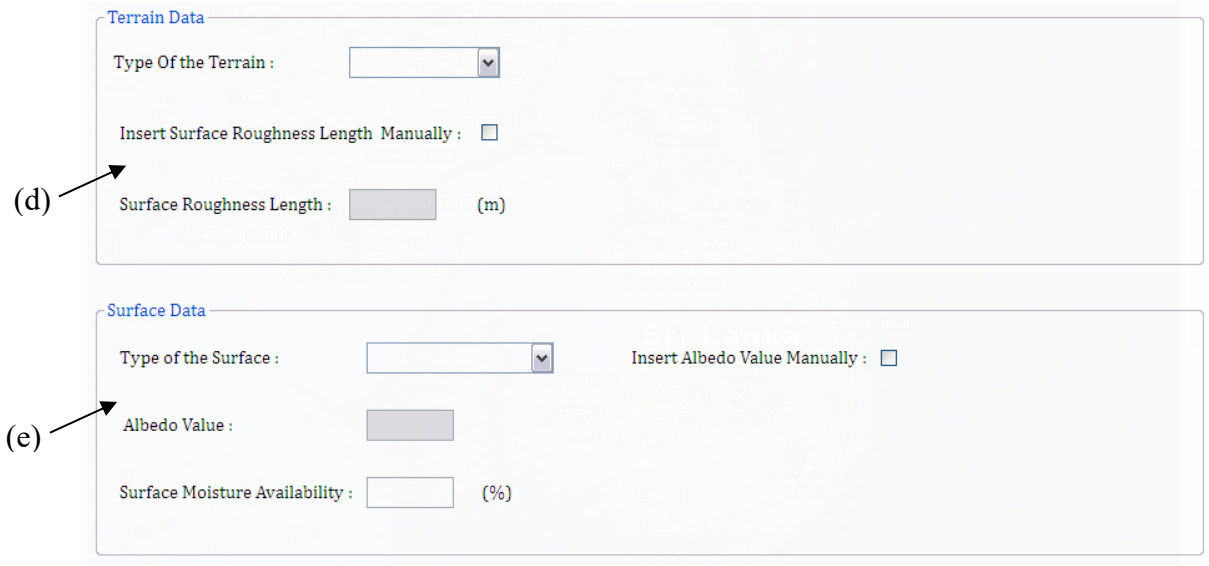
Effective Agent Percentage - *The percentage of agent effectively involved in the dissemination*

Source Temperature – I*nitial temperature of the source material (If the dissemination is semi-continuous/Continuous)*

Release rate – *Rate of the release of material* (*If the dissemination is semi-continuous/Continuous)*

Source radius – *Radius of the source assuming a circular source region* (*If the dissemination is semi-continuous/Continuous)*

2. Geographical Input Tab



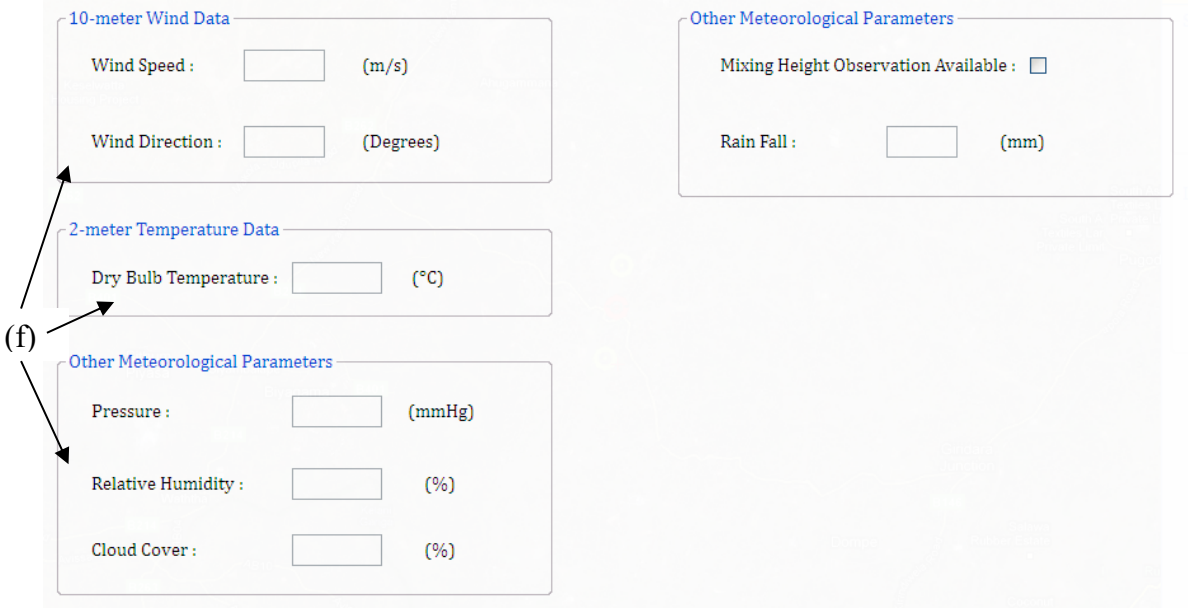
Insert terrain and surface data in to fields in group boxes (d) and (e) respectively. In the "Terrain Data" group box (d), the type of the terrain should be chosen to calculate the surface roughness length which is a widely used weather variable. Alternatively, one could insert the surface roughness length manually.

In the "Surface Data" group box, information regarding two surface parameters called Albedo value and surface moisture availability should be inserted. For the first, the type of the surface should be selected from the combo box, or insert the value manually. Surface moisture availability should be inserted as a percentage.

3. Meteorological Data Input Tab

One or more meteorological data tabs can be found in the data input depending on the number of stations you have marked on the map viewer. The typical view of a meteorological tab is depicted below.

(g)

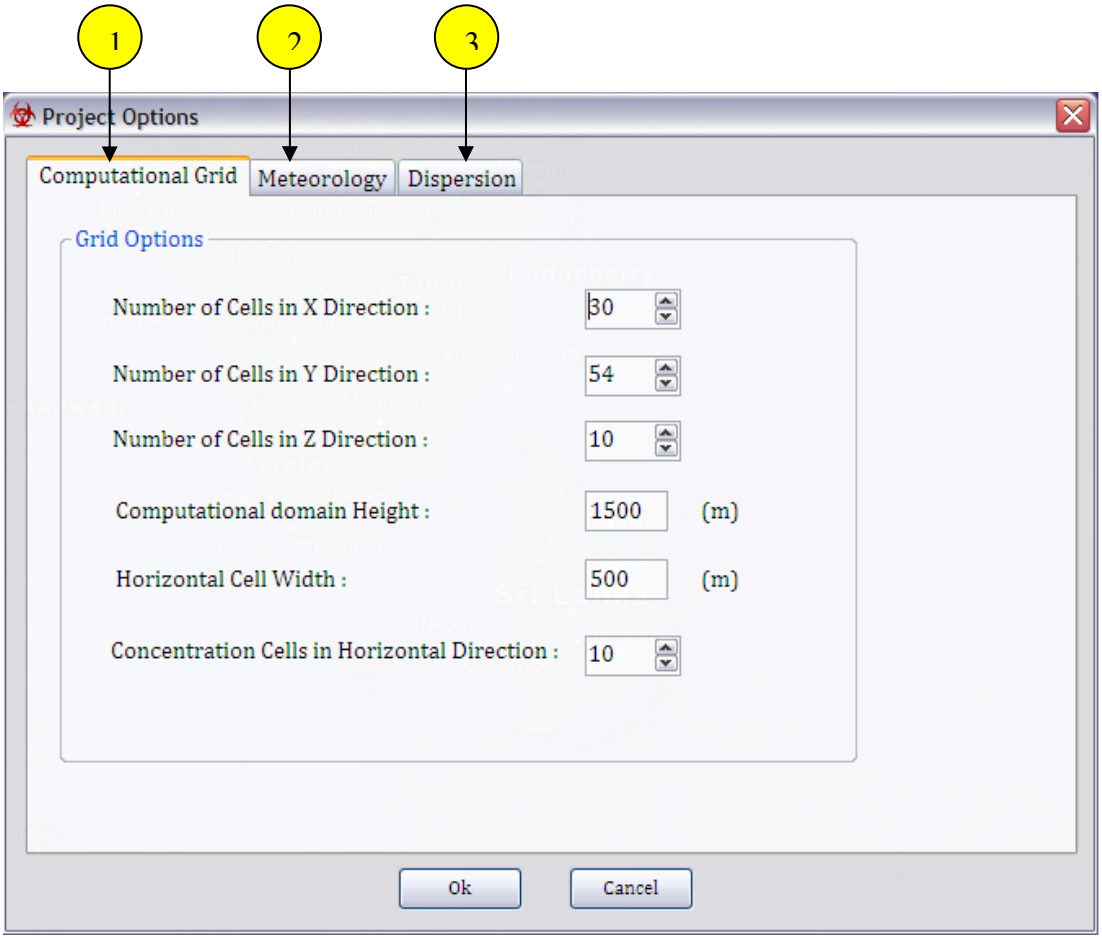


Primary data fields (f) require information from a surface level weather station. They include Wind data (at 10 m height), Temperature data (at 2 m height), Atmospheric pressure, Relative humidity and cloud cover. Optional weather input (g) includes two main fields. If a weather station reports estimations for the mixing height, tick "Mixing Height Observations Available" check box and insert the value into resulting field. Insert Rain Fall data if available.

VIII. When you have finished inserting data, click Ok to continue. If you have left null fields or invalid data, a message box will be appeared with a relevant message. A red colored balloon will also popped up near the problematic field.

IX. When the data input is over, click the "Project Options" button in the Action Panel if you need to change any of the project options.

The project options window mainly consists of three tabs; Computational Grid options, Meteorology options, Dispersion options.

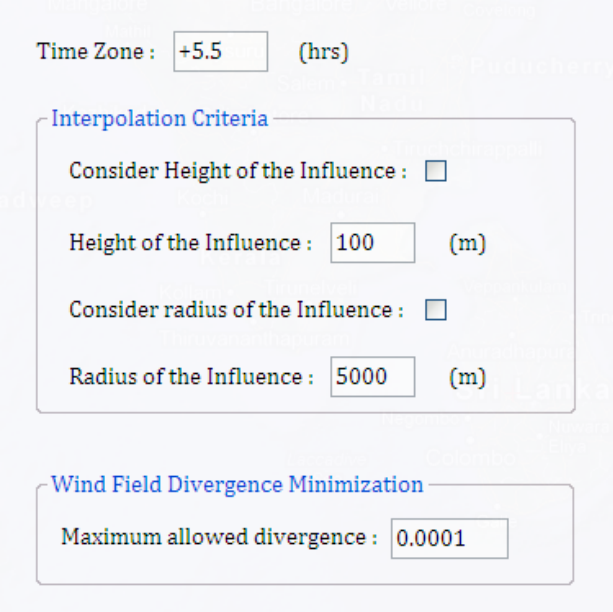


1. Computational Grid Options

   HPM works on an equally spaced nested Cartesian grid system in the horizontal direction and a terrain following height coordinate system in the vertical direction. To calculate concentrations the inner grid is formed by dividing the horizontal Cartesian grid into a smaller parts. Computational gird options tab allows you to change the number of cells in each direction, width of a cell of the Cartesian grid, height of the grid in vertical direction. Furthermore, the number of parts which divides a horizontal cell to form the inner grid can also be adjusted.

2. Meteorology Options

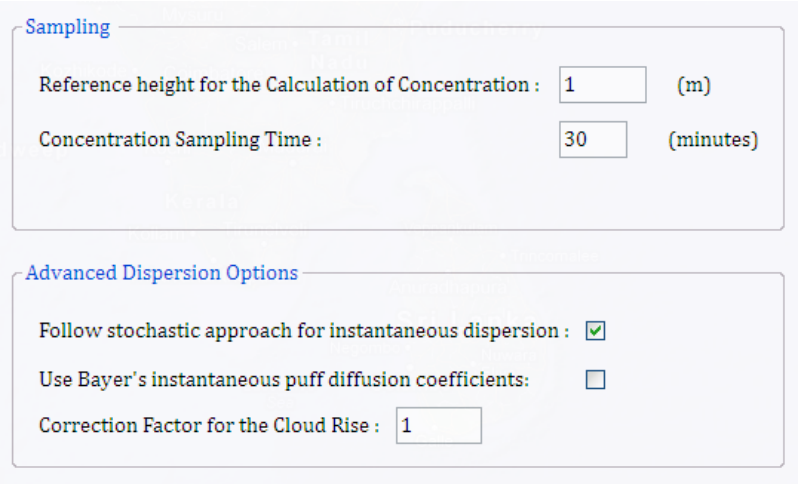
   This options tab contains adjustments related to meteorology of the project.



Meteorology options allows you to change the time zone where the disaster has taken place, options related to meteorological variable interpolation and wind field divergence minimization. HPM interpolates meteorological measurements from surface stations throughout vertical and horizontal grids. For this purpose, the maximum height and the influential radial distance from a station can be adjusted. Furthermore, the maximum allowed divergence required to establish a mass consistent wind field can be adjusted.

3. Dispersion Options

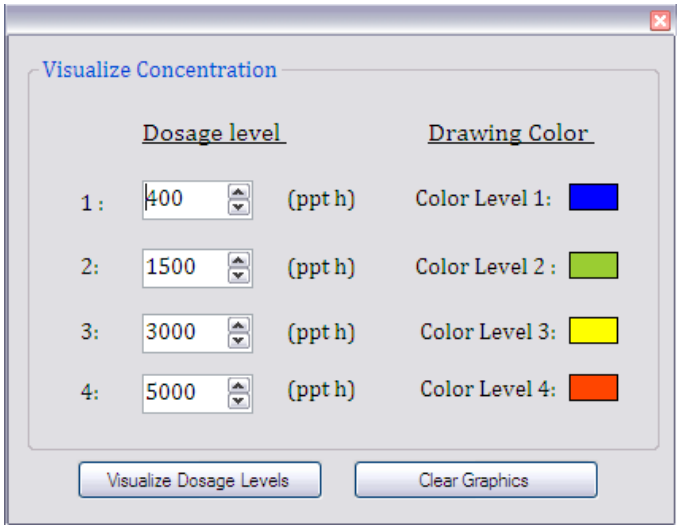
This tab allows you to change several options related to atmospheric dispersion prediction.



The basic optional fields (Sampling options) include the reference height at which concentrations are calculated and sampling time. Advanced dispersion options allow you to change several model preferences.

X. When you are done with changing project options, click Ok to proceed. Then click “Run” button on the action panel to perform computations and predictions. The project will run until a message box appears confirming that the project has completed successfully.

XI. Click “ Visualize Dosage Levels” button on the Action panel and the following window will appear.



XII. Adjust dosage levels and color levels if necessary and click “Visualize Dosage Levels” button. The hazardous areas will be visualized on the map.

XIII. To capture the view of the map and prepare a report, adjust zoom levels and click “Create Report” on the Action Panel.

XIV. The report will be created and opened up in a report viewer. You can export the report into Word, Excel or PDF formats.

XV. You can also visualize the wind field using a set of arrows by clicking “Visualize Wind Field” button on the Action Panel. Change the drawing color from resulting window if necessary. Click “Draw Wind” button. To remove the drawings from map viewer, click “Clear Wind Field” button.