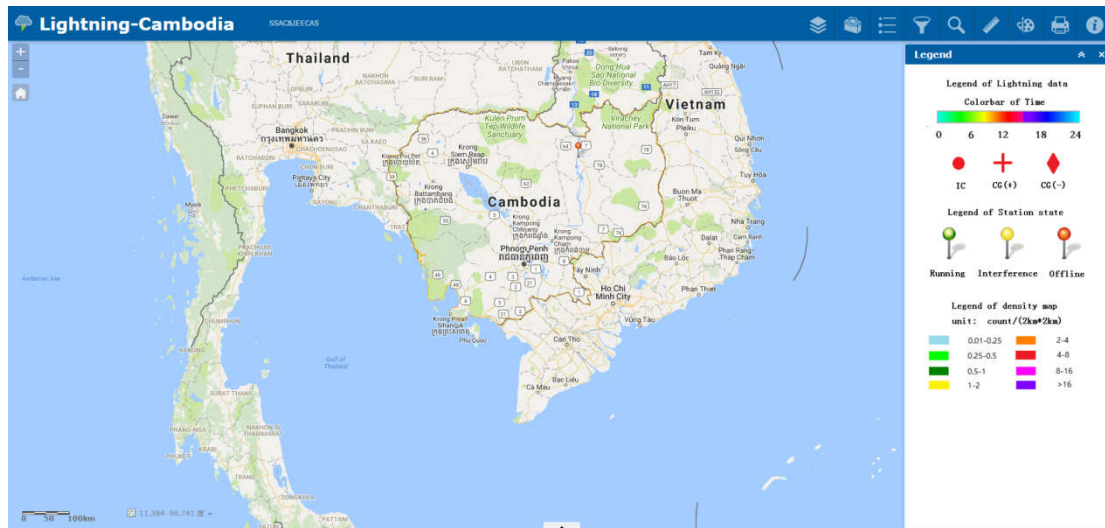


3D Lightning Monitoring and Warning Defense System



User's Guide
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ABBREVIATIONS AND ACRONYMS

CG	Cloud to ground lightning
IC	Intracloud lightning
PL	Positive lightning
NL	Negative lightning

Table of Contents

1 Introduction.....	4
1.1 Target.....	4
1.2 Function.....	4
2 Environment for Web.....	4
2.1 Hardware requirements.....	4
2.2 Web requirements.....	4
2.3 Software requirements.....	5
3 Contents of 3D lightning monitoring and warning defense system.....	5
3.1 Initialization of 3D lightning monitoring and warning defense platform.....	5
3.2 Layout Introduction.....	5
3.2.1 Menu in Top-Left.....	6
3.2.2 Menu in Top-Center.....	6
3.2.3 Menu in Top-Right.....	6
3.2.4 Menu in Bottom-Left.....	15
3.2.5 Menu in Bottom-Center.....	15
3.2.6 Menu in Bottom-Right.....	17

1 Introduction

1.1 Target

The software platform for 3D lightning data application is based on the 3D lightning monitoring network software, combined with the new demand for lightning measurement and the new technology for the development of the Internet. the construction goal are as follows:

- (1) 3D lightning monitoring and warning, data sharing, lightning product processing and production services, and lightning disaster monitoring analysis;
- (2) Provide a network for lightning monitoring and warning, lightning disaster investigation and analysis.

1.2 Function

The functional framework of the 3D lightning monitoring and warning defense system is shown in Figure 1.1.

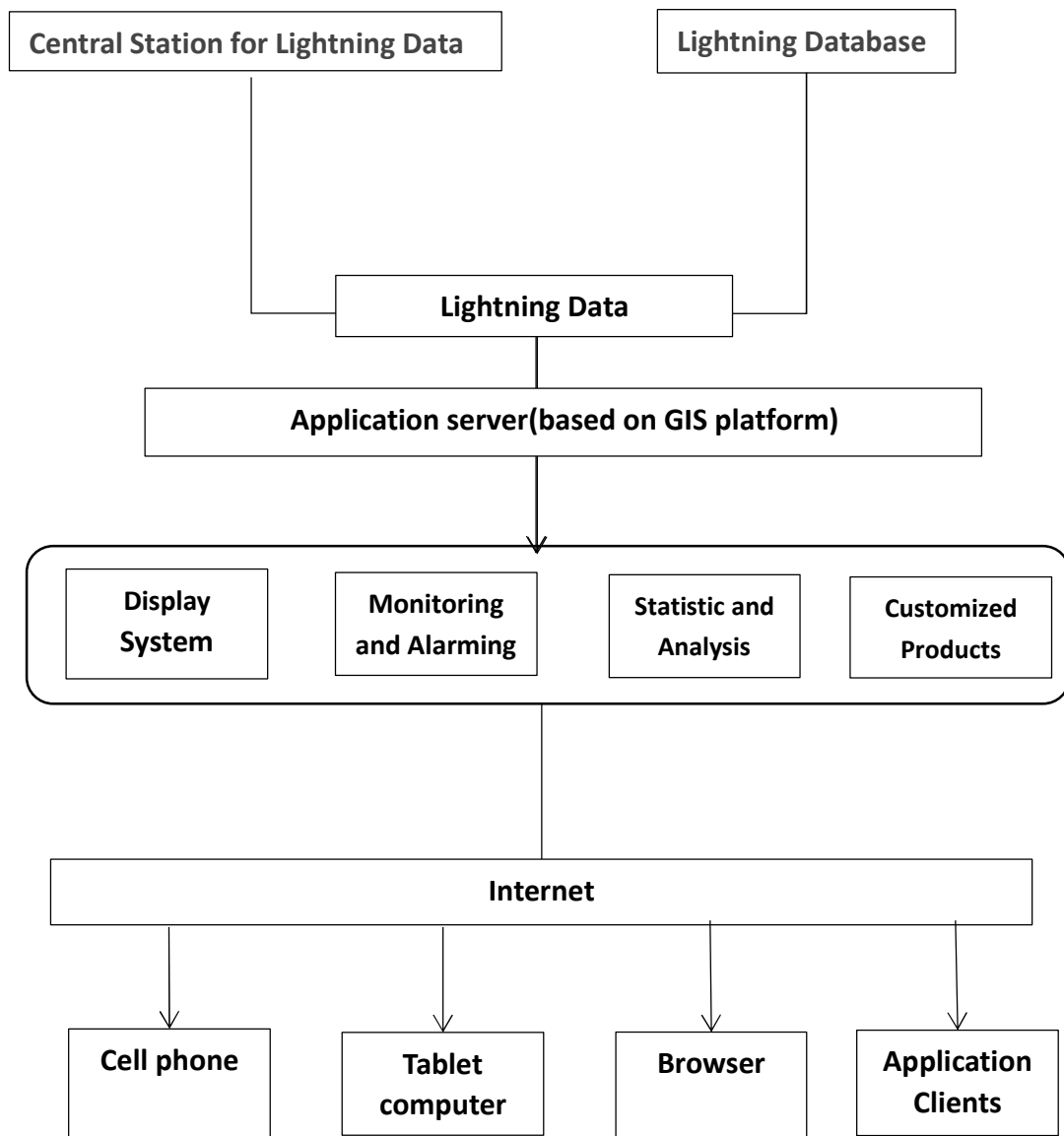


Figure 1.1.The functional framework

2 Environment for Web

2.1 Hardware requirements

Support for computer, notebook and mobile phone.

2.2 Web requirements

To loading the network map, you need to connect to the network environment.

For using the 3D display function, you need to download data into a KML file and then open the file on the computer which is connected to the network.

2.3 Software requirements

A browser is needed for the 3D Lightning platform. It is recommended to use Chrome browser, **360 speed browser**, Sogou browser, but IE browser is not recommended. If the browser does not display properly in compatibility mode, use the high speed mode or speed mode instead.

To display a 3D KML file, you need to install the Google Earth client.

The data is exported to a CSV file, and the Office is required to open the CSV file.

3 Contents of 3D lightning monitoring and warning defense system

3.1 Initialization of 3D lightning monitoring and warning defense platform

Open the browser with the URL (intranet IP) to entering the login page.



Lightning Detecting System-Cambodia

☐ Auto Login

[Register](#)

[Login](#)

[Forget password?](#)

Figure 3.1. Login page

Click the 'register' button to entering the register page.

Lightning Detecting System-Cambodia

3-12 letters

Please Enter Username !

Must contain numbers and letters

Please enter your email

Register Clear

Figure 3.2. Register page

Then click the login button to entering the 3D lightning platform. The intensity of lightning, the location of lightning, the status data of the 3D lightning sensor and the list of layer components are displayed on the home page.

3.2 Layout Introduction

The control button menu are distributed in top-left, top-centre, top-right, bottom-centre and bottom-right of the platform.

3.2.1 Menu in Top-Left



Figure 3.3.Menu in Top-Left

As shown in Figure 3.3, the buttons for zooming in and resetting the map are located in the upper left corner, which can control the map zoom in (click "+"), zoom out (click "-"), and restore the initial view (click the "HOME" button).

3.2.2 Menu in Top-Center



Figure 3.4.Menu in Top-Center

As shown in Figure 3.4, the links to other website will be distributed directly above. URLs of different web pages can be placed according to the requirements of different user.

3.2.3 Menu in Top-Right

The upper right corner is an important part of the platform, which contains the functional sub menus that are needed in the platform.

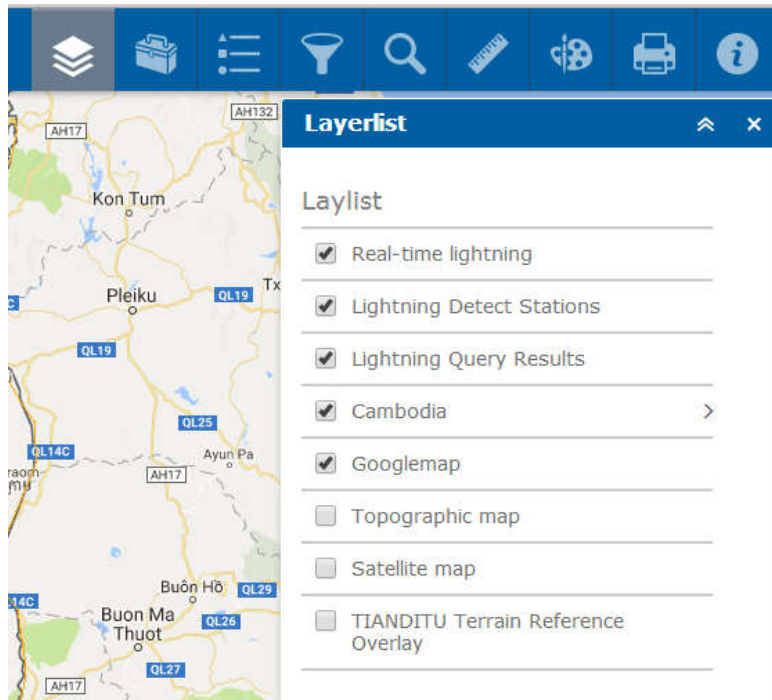


Figure 3.5.Menu in Top-Right

Figure 3.5 shows the layer list control. The business layers and map layers are displayed in the list. The layer can be turned on/off by the check box in front of the layer name. The real-time lightning display layer, the lightning detect stations layer, the lightning query results layer, and the map layer are displayed by default. Lightning query results will be displayed after historical data query.

The top right corner of the control menu is the minimize and close buttons (all buttons on the menu bar follow the description)

Real-time Lightning



Time set

☒ 10min ☐ 20min ☐ 30min ☐ 40min ☐ 50min
☐ 60min ☐ 4hours

Type

☒ Scatter and Density ☐ Scatter ☐ Cluster ☐ Density

Lightning statistics in current period

Total lightning 20 counts; IC 0 counts, CG 20 counts, Ratio of IC 0.0%; PL 18 counts, NL 2 counts, Ratio of PL 90.0%; The maximum height of IC *-Infinity*km, The minimum height of IC *Infinity*km, The average height of IC *NaN*km

Statistics of all day

Total lightning 176 counts; IC 1 counts, CG 175 counts, Ratio of IC 0.6%; PL 169 counts, NL 7 counts, Ratio of PL 96.0%;

Time Distribution

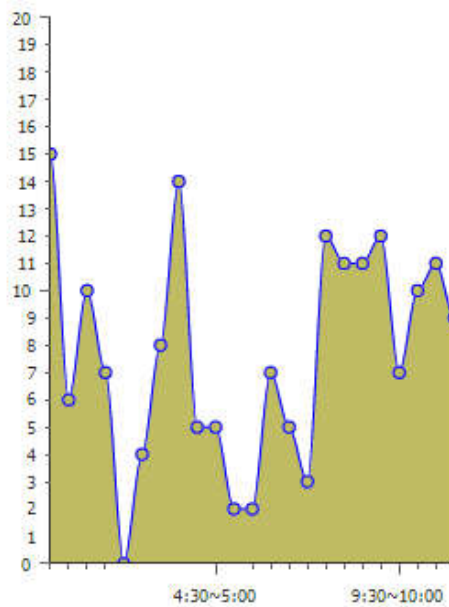


Figure 3.6.Menu in Top-Right

As shown in Figure 3.6, the lightning display and quantity statistics

menus are used to set up the lightning real-time display layer and lightning information statistics. You can set the display period, display type, and statistics the number of lightning for the corresponding period. Half-hour scatter density data is displayed by default, as shown in Figure 3.7.

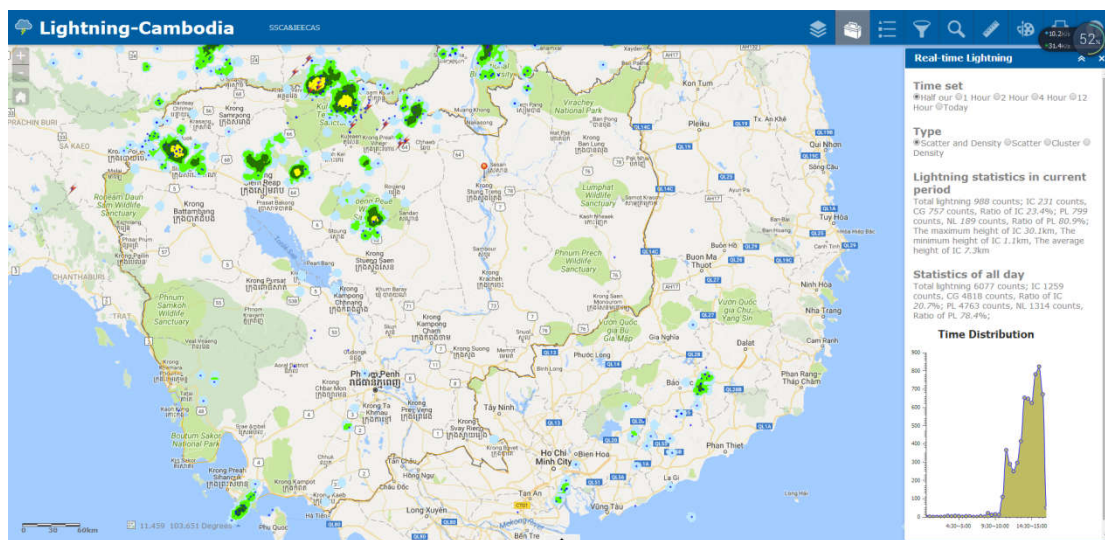


Figure 3.7. Half-hour scatter density data

Scatter plots and density plots are used to separately display the distribution of 3D lightning and density map production.

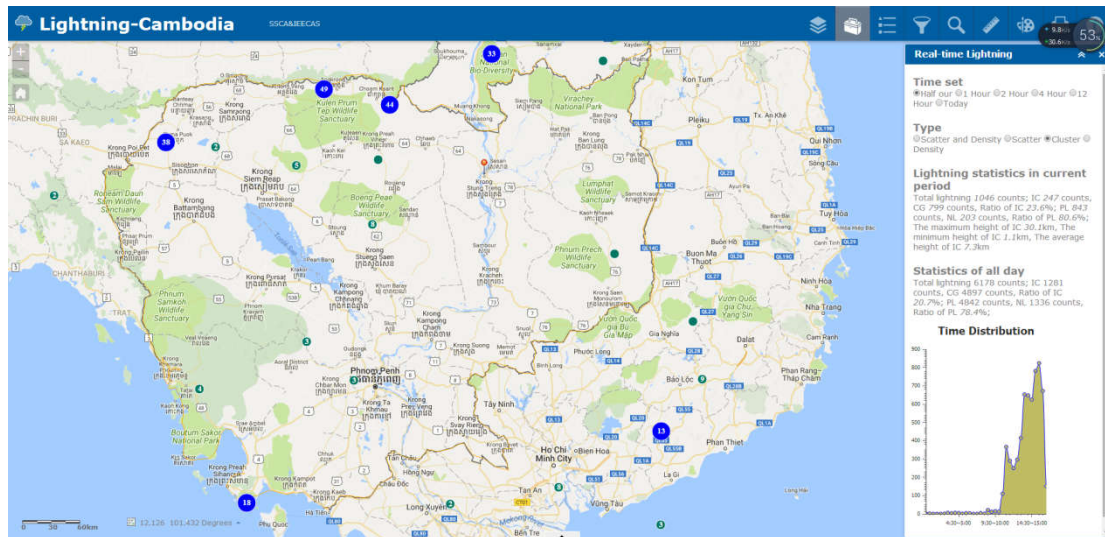


Figure 3.8. The clustering gram of 3D lightning

By using the number of points to represent the lightning, the clustering graph can speed up the user browsing speed when the number of lightnings is large; the density map shows the density of lightning in the current time period.

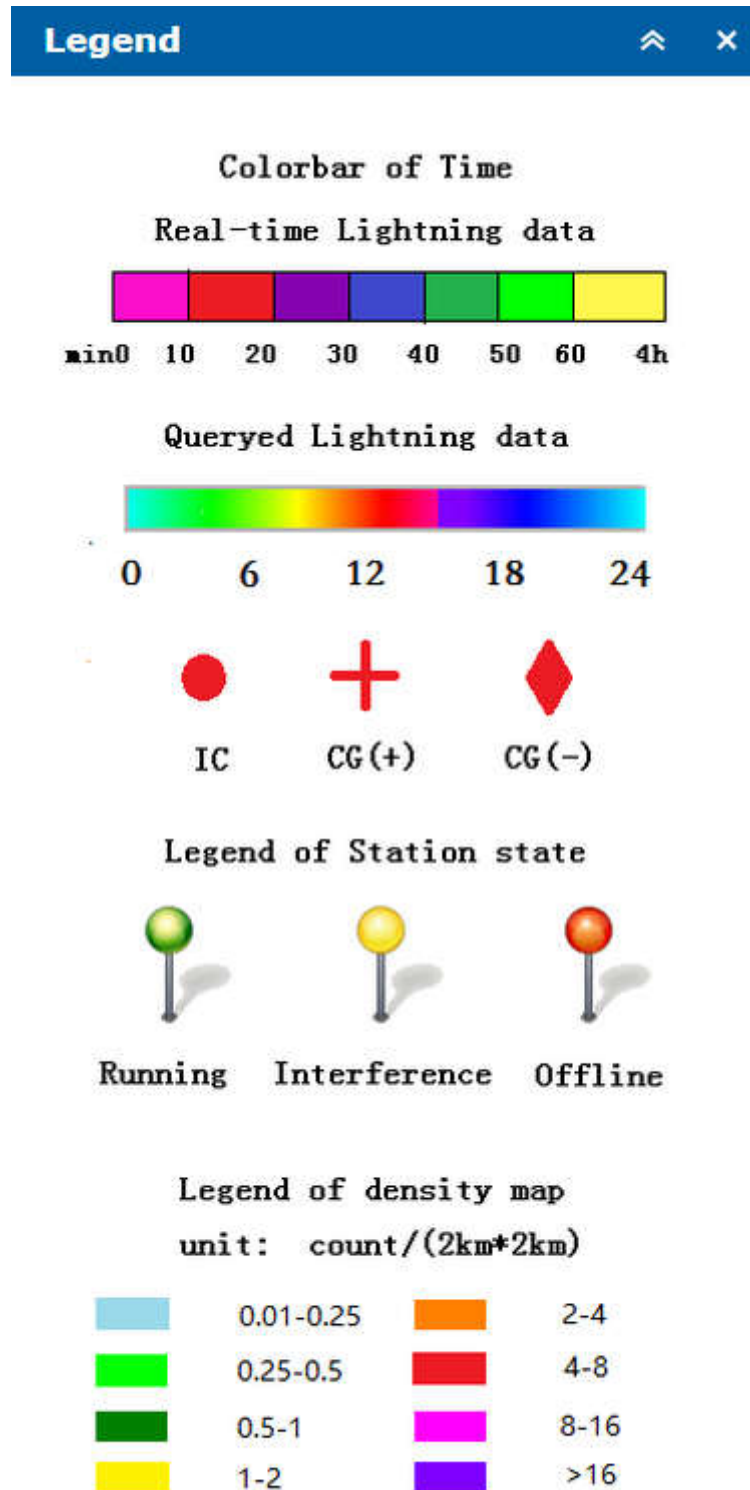


Figure 3.9. Legend panel

Figure 3.9 is the legend panel. The first color bar on the top of the panel shows the occurrence time of real-time lightning, the second color shows

the occurrence time of historical query data. The green, yellow, and red symbol indicates the state of lightning detection station, and on the bottom of the panel is the density map legend which shows the quantity of the lightning event in the map.

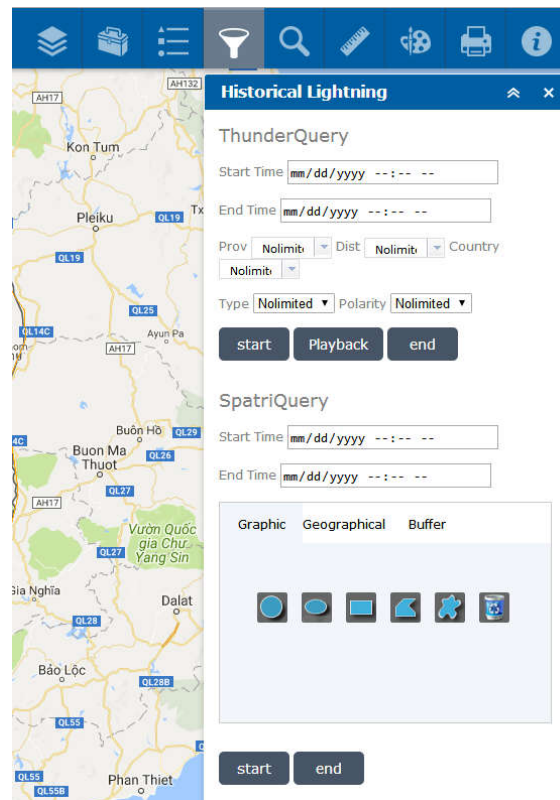


Figure 3.10. Historical data query control

As shown in Figure 3.10, historical data query controls can be used for disaster investigations and risk assessments. Attribute and space query are supported to users.

1. Attribute query need to input time (Note: you need input year, month, day, hour and minute), provinces, cities, counties, lightning type and polarity.

- After clicking on the query, you can see the displayed points on the

web page and look at the query data in the bottom of the menu.

- Click on Playback to see the lightning playback.
 - Ending query request or starting a new query, click the end Query button.
2. Spatial query need to input time (Note: you need input year, month, day, hour and minute) and space conditions (with graphical conditions, space circle selection or buffer analysis).
- After clicking on the query, you can see the displayed points on the layer and see the statistics of the query data in the bottom of the menu.
 - End the query or start a new query, click the end button.
 - Spatial query does not support lightning process playback.

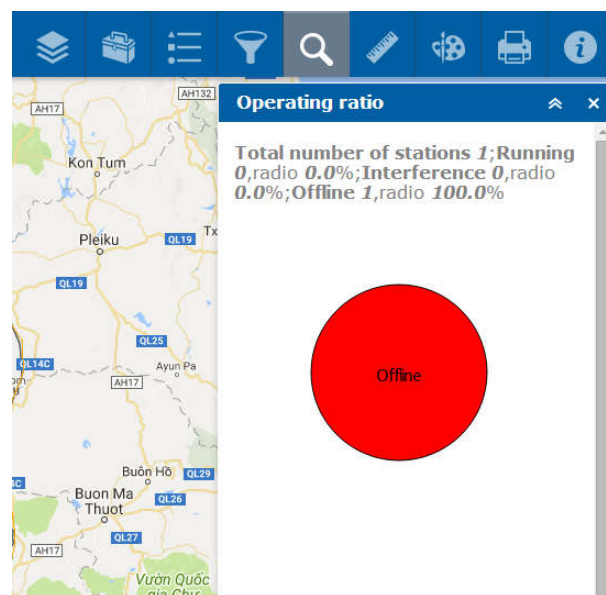


Figure 3.11. 3D Lightning Locator Status Statistics Control

Figure 3.11 shows the latest site status information acquired by counting the real-time working status of the lightning locator in the 3D lightning monitoring network. Users can close the panel with the close button in the upper right corner of the panel. Users can also query the running status of a site through the status query function, as well as download the query status results to CSV file.

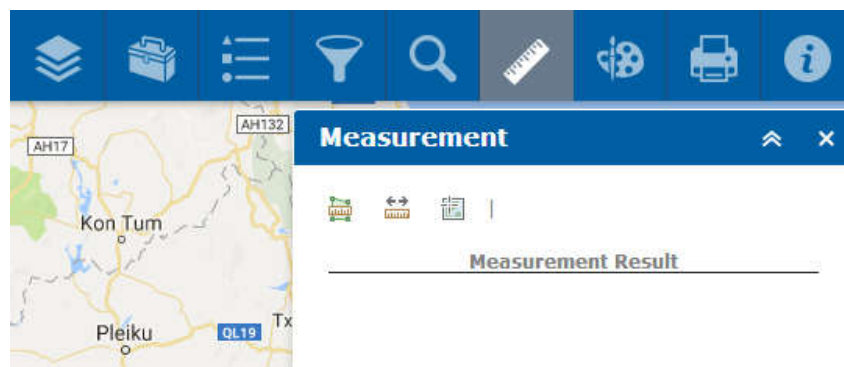


Figure 3.12. Measurement Control

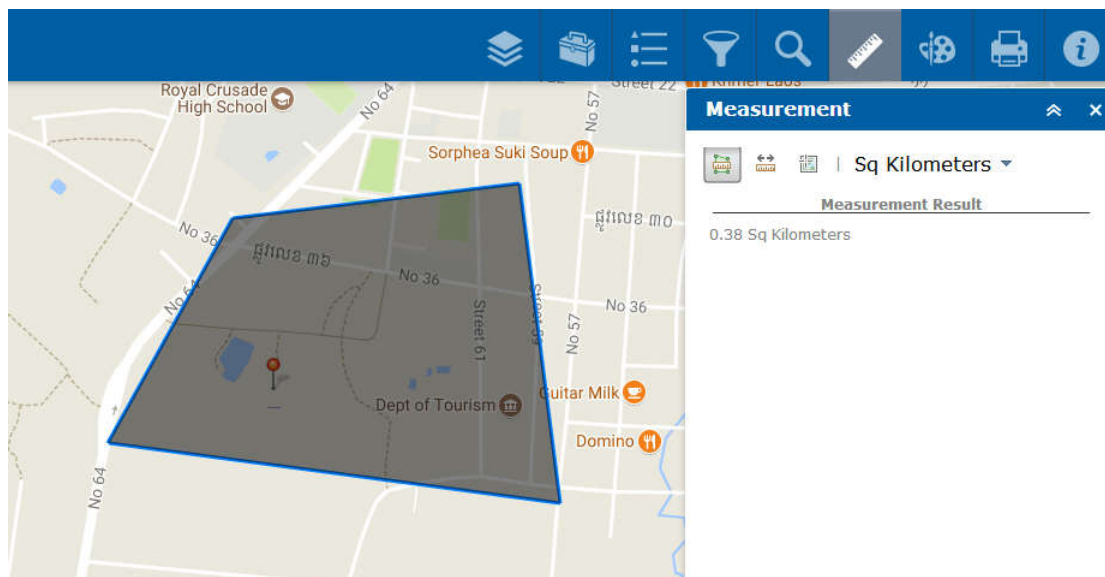


Figure 3.13. Measurement Control

Three types of measurements are supported.

1. The first type is polygon area measurement. You can draw polygons on the map and select the measurement area.
2. The second type is to measure the line distance. You can draw line on the map and measurement distance.
3. The third type is point coordinates, you can select points on the map and select the point coordinate unit.

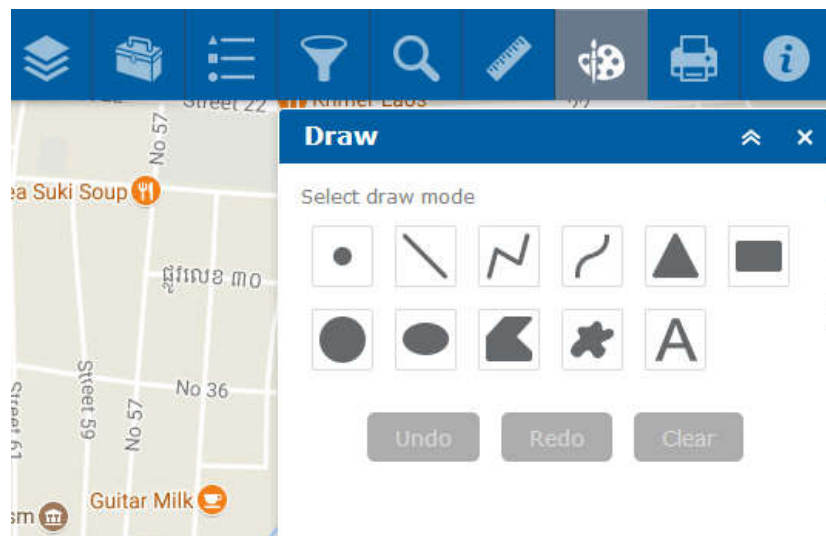


Figure 3.14.Drawing tool

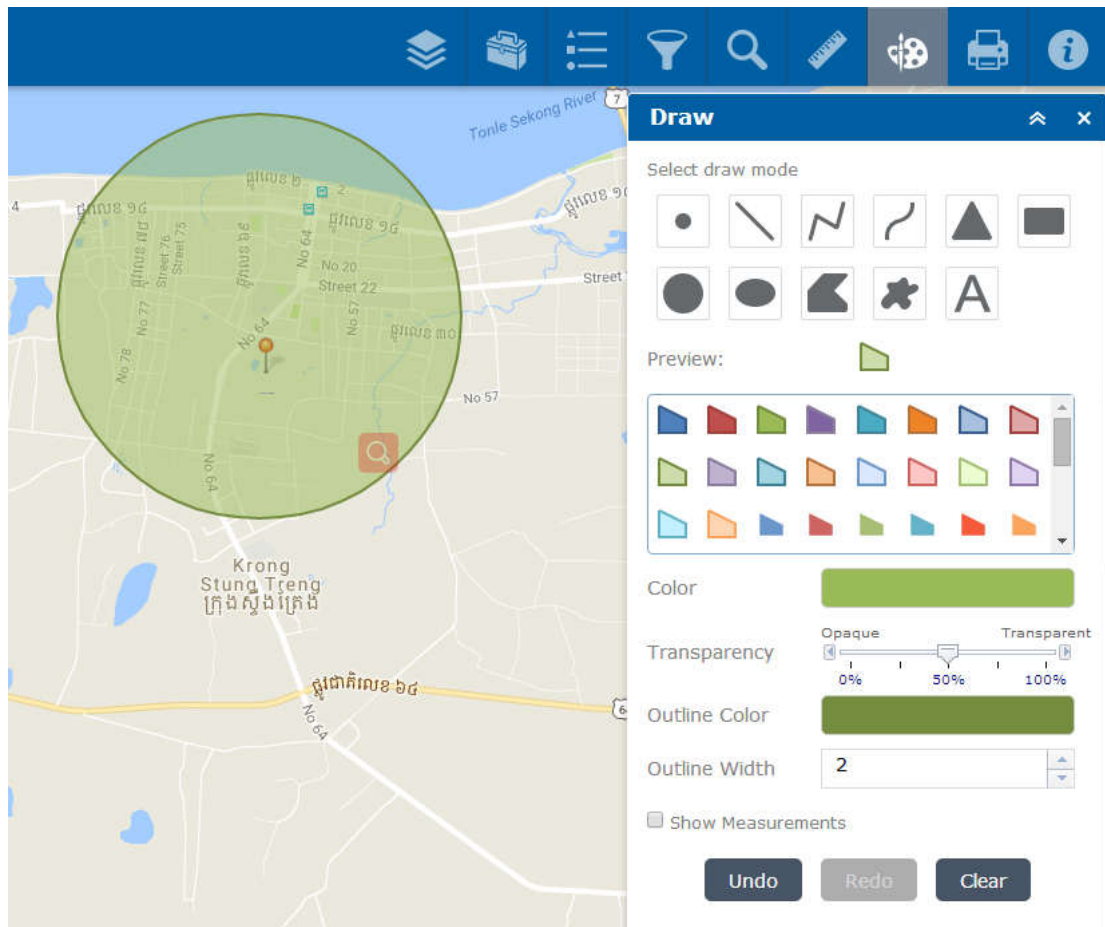


Figure 3.15. Drawing tool

Figure 3.14,3.15 is the drawing tool. The function of the menu is to draw and write on the map. Users can choose the filling color, transparency, outline color, and outline width of the text. On the bottom of the panel, there are buttons that can be used to undo the last drawing, restore the most recent drawing, or clear all text drawn using the menu.

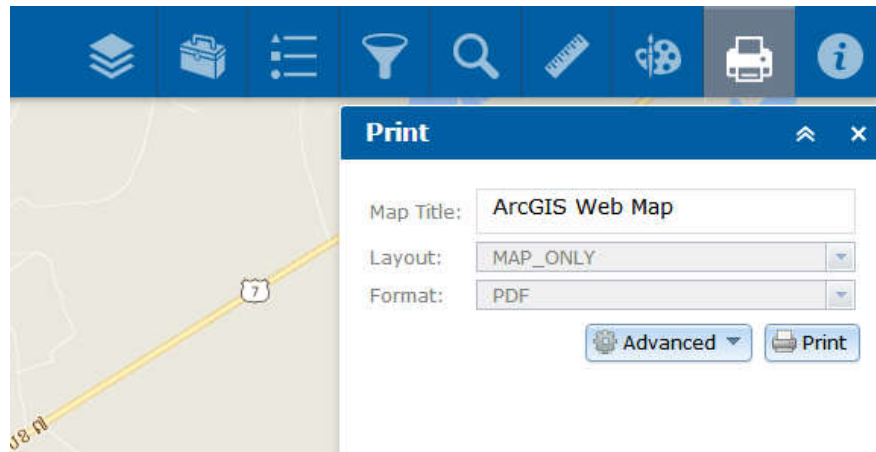


Figure 3.16. The map print control

As shown in Figure 3.16, the map print control is used to print the map and graphic file, users can set the title, the layout mode and the drawing format of the map.

- The layout supports map mode only, A4 paper mode, etc.
- The format supports PDF, JPEG, PNG format, etc.

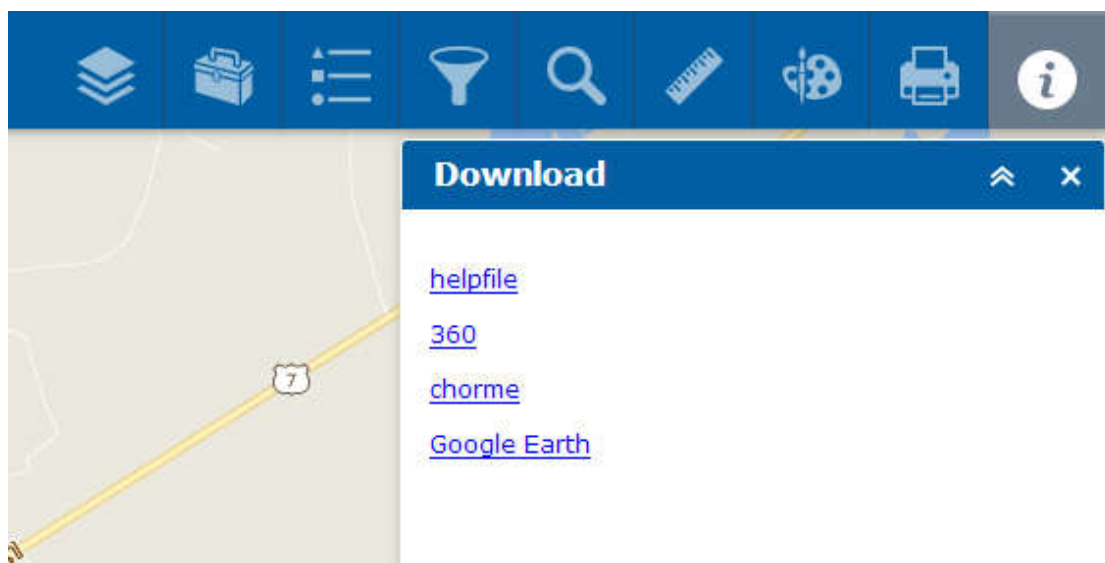


Figure 3.17. Developer's introduction

The menu is used to describe the developer's introduction and copyright description, as well as download the software product manual, users can download the installation files of the browser and the Google Earth.

3.2.4 Menu in Bottom-Left

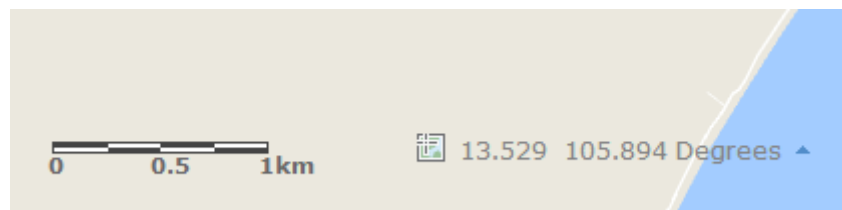


Figure 3.18. Scale and coordinate display control.

The 3D lightning platform is distributed in the lower left corner, scale control and coordinate display control.

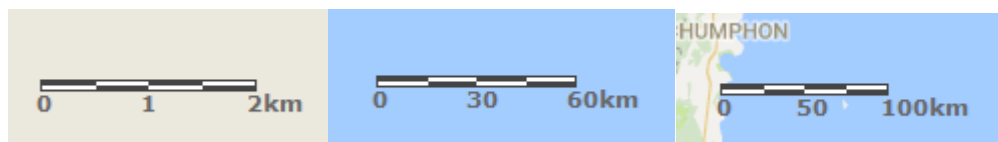


Figure 3.19. Scale control

Figure 3.19 shows the scale control. The scale is the kilometer scale, and the proportion of the map is fed back to the user by the distance scale.

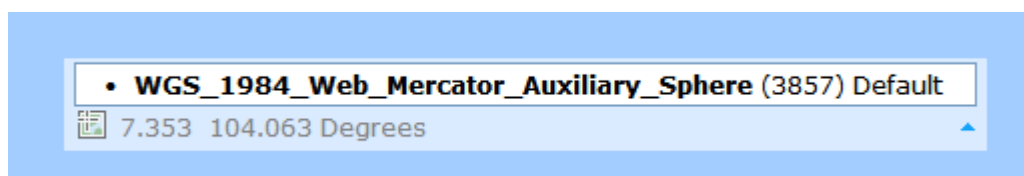


Figure 3.20. coordinate display control

Figure 3.20 shows the coordinates display. The coordinate display control can display the latitude and longitude of the moving mouse, users can click the triangle in the tail to switch to the "click map to get coordinates" mode.

3.2.5 Menu in Bottom-Center

The menu directly below contains a chart control, and the control is displayed/hidden by the buttons in Figure 3.21.

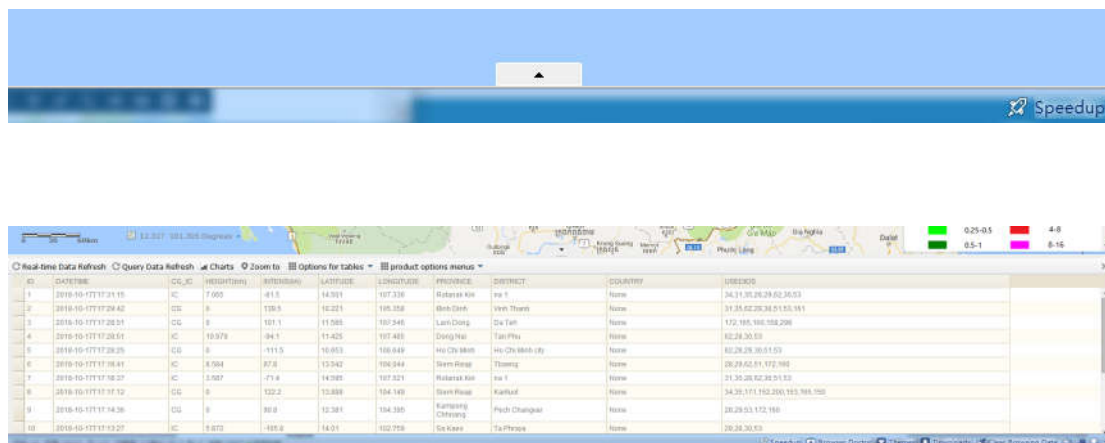


Figure 3.21. Data display menu

The default display is lightning real-time details. It can be hidden by the close button in the upper right corner of the chart control.



Figure 3.22. Function menu

The chart control options are shown in Figure 3.22, they are divided into Real-time Data Refresh, Query Data Refresh, Charts/Tables, Zoom to,

Options for tables, and product options menu.

The Real-time Data Refresh button can refresh the lightning in the lightning real-time display layer. The varies according to the time period which was set in the display settings in Figure 3.6, divided into 10 minutes, 20 minutes, 30 minutes, 40 minutes, 50 minutes, 60 minutes and 4 hours.

Query Data Refresh button can show the historical data after query, click this button to switch the real-time lightning data to the queried data.

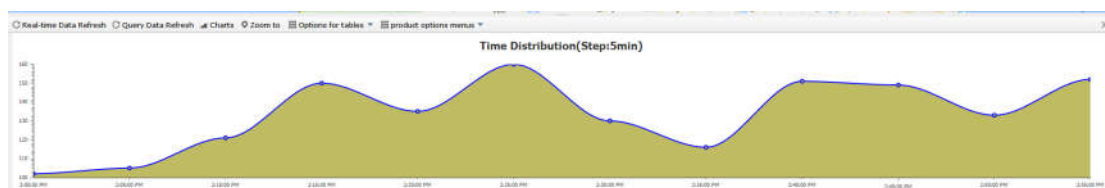


Figure 3.23. Time distribution of lightning events

The charts button shows the time distribution of the lightning events, as shown in Figure3.23. When the control view is a table, click on the mouse to select a row of data, click the Zoom to button, the map will automatically zoom in on the lightning.

The Options for tables option is the action when the control view is a table. Display the selected records and clear the selection. What's more data can be export as CSV files or 3D display files.

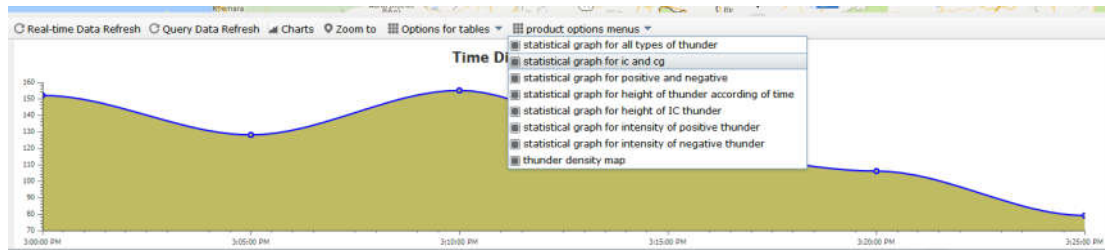


Figure 3.24.The lightning product options button

As shown in Figure 3.24, the lightning product options button show the lightning products such as statistical graph for all types of thunder, statistical graph for IC and CG, statistical graph for the positive and negative, statistical graph for height of thunder according of time, statistical graph for height of IC thunder, statistical graph for intensity of positive thunder, statistical graph for intensity of negative thunder and thunder density map.

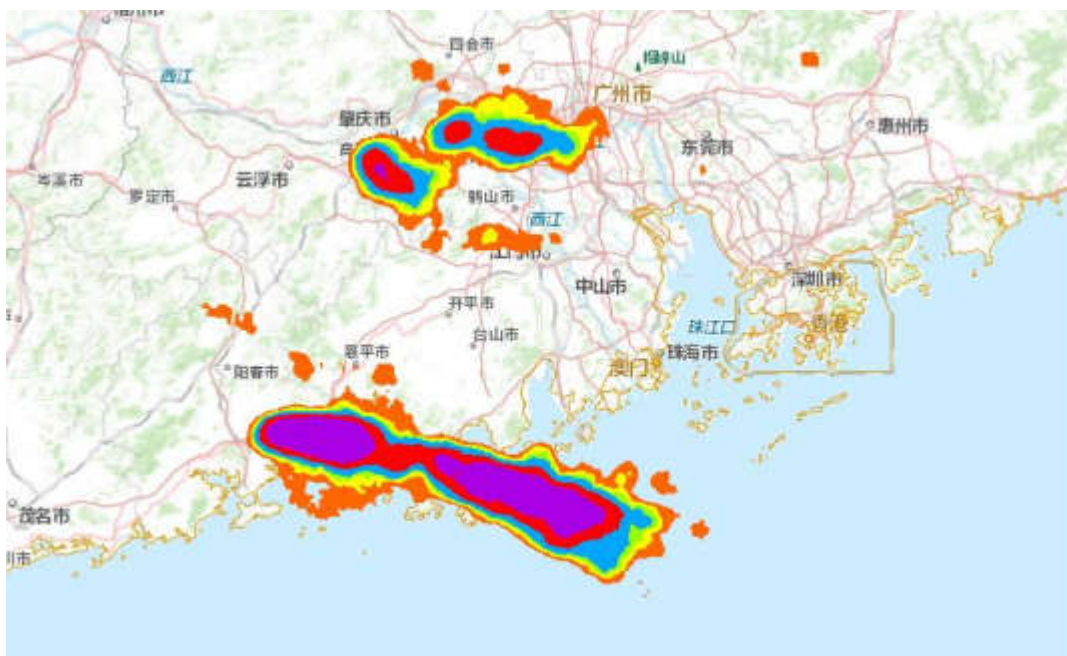


Figure 3.25Thunder Density Map

As shown in Figure 3.25, clicking the Lightning Density Map button and

the density map will appear on the page. The legend control has a legend information for the product density map, which is the number of lightning events within an area of 4 square kilometers($2\text{ km} * 2\text{ km}$).

3.2.6 Menu in Bottom-Right

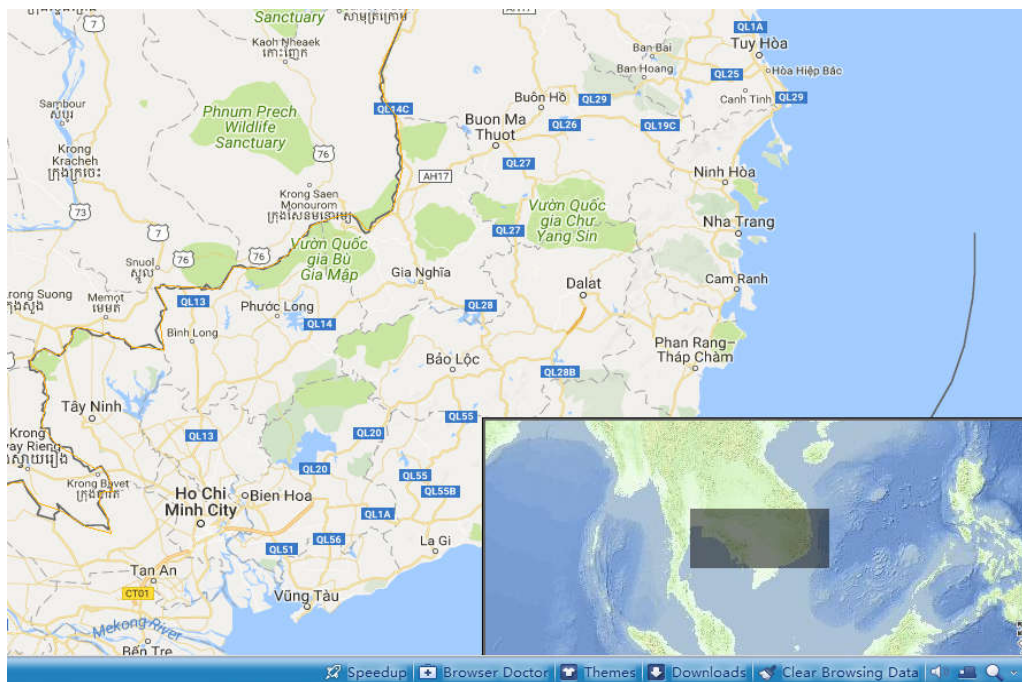


Figure 3.26 menu in bottom-right

The menu in bottom-right of the website has an eagle eye map control button. Click the button to show/hide the eagle eye map.