

Using Exupéry web GIS

Version 0.1

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Abstract

This paper describes a decision support system that we use in Exupéry mobile volcano response system (VFRS) to visualize the most relevant information describing the state of volcano activity. The GIS-based graphical user interfaces forms the top-level gateway of the early warning chain being used by decision makers. It enables also experts that are currently not at the volcano to look at the data and share their opinion with the decision makers. The user interface is designed as a geo-data portal, offering tools to decide on the threads of a possible disaster, data querying and functionality to integrate further data sources.

Section 1. Access the Exupéry web GIS

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Access the Exupéry web GIS

Our interface supports various web browsers – we tested it using Mozilla Firefox, MS Internet Explorer and Google Chrome. It is also required that Flash is installed. To enter the interface, open the following page: <http://www.exupery-gis.org/> []

Choose your project, enter the username and password and click Login! You can also take a look at the video describing the login:

<http://www.exupery-vfrs.de/3-Using-the-interface.954.0.html>. []



Section 2. User environment management

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User environment management

Once you are logged in, a GIS interface is in front of you. It consists of four main parts. On the top of the window is a toolbox for user environment management, on the left are controls for visualization purposes, data are shown in the main window and additionally there are some pop up windows such as dialog boxes or windows for showing additional information.

In this section we concentrate merely on user environment toolbox located above right. It consists of eight icons. We describe all of them from left to right.



The first one - **Load Session Data** - loads the state of the interface that was saved in the past into the project. This makes possible to a scientist to prepare a view containing some important datasets that makes drawing a decision in a crisis situation easier.

Save Session Data saves the current settings (geographical extent, selected layers shown in chosen styles) to the server within the current project. See above Load Session Data.

Clear Chace - the third icon - deletes all the files that are were temporally saved to the local computer. Chace is used to optimize the data transfer – once the data have been downloaded is the visualisation faster because there is no need to download them again. The quantity of downloaded data might be large thus one has a chance to delete them by this icon.

Setup opens global settings where we can choose which controls are visible on the left side of the interface.

Information opens a new window containing the links to the Exupéry (<http://www.exupery-vfrs.de> []) and Centauron (<http://www.centauron.de> []) web page.

Show Log is useful tool mainly for system administrator who needs all the possible information to remove a possible bug. If you have a problem with the GIS interface, click the icon, a new window containing log opens and you can send it to the Centauron with a button in the bottom of the window. Your problem will be then considered by the system administrator.

Toggle Fullscreen Mode is a useful option especially on smalled displays because clicking it we can hide the "skeleton" of the browser software. The interface covers the whole screen and provides the largest possible working space.

Log Out exists the active session.

You can also take a look at the video describing the user environment toolbox:

<http://www.exupery-vfrs.de/3-Using-the-interface.954.0.html>. []

Section 3. Visualization controls

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Visualization controls

Visualization controls are located on the left side of the interface. They consist of navigation,

overview, time filter, alert level, seismic data, base layer and layer controls. Each control can be exlated using a button on the right of its title bar. You can turn on/off the chosen controls using Setup icon in the environment toolbox (previous section).

Navigation control makes possible to select the geographical extent of interest. You can move around using the arrows in the navigation command. You can also use **plus** and **minus** icons to zoom in or out. Clicking on **100%** you zoom to the whole world.

As an alternative to this navigation is using a left mouse button on your mouse; by click and hold you can move the position. It is also possible to zoom by using the mouse wheel. This two options function only if the icon **drag to move map** (below right in the navigation control) is on.

If the icon **drag to define view bound** (left from the **drag to move map** icon) is on then it is possible to zoom in by defining the extent - with the first mouse (left button) click you define the first corner point, and then you release the button on the second corner point.

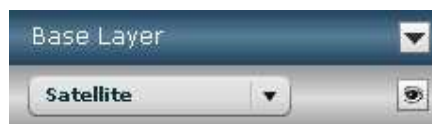
It is also possible to go to previous view selecting the icon **undo** (below left). Right form this icon is situated **redo** that takes you to the extent you used before clicking "undo".



Overview control is simple. It shows which extent is currently chosen on the world map. If the extent is small it shows only a point and a cross.



Base layer gives gives us possibility to show a background layer (if the visibility icon on the right is checked). You can choose among satellite, physical, streets and hybrid layer. All of them are a property of Google™.

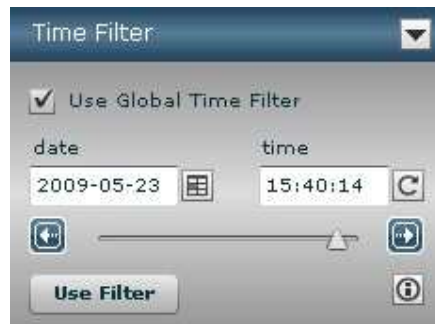


You can also take a look at the video describing the navigation in the interface

<http://www.exupery-vfrs.de/3-Using-the-interface.954.0.html>. []

Time filter control gives a possibility to use a global time filter (if the this option is selected). This means that all the open layers will correspond to the date-time (selected by the nearest possible

data) defined by this command. It is possible to set the time by a slider (clicking the **i** icon it is possible to define, how the slider acts), by its corresponding icons, by writing it down to the input box or by choosing the date icon. Once you define your date-time you have to confirm the setting by clicking **use filter**.



You can also take a look at the video describing the time filter control:

<http://www.exupery-vfrs.de/3-Using-the-interface.954.0.html>. []

Alert level control shows level of activity in three stages and also its probability. It is the easiest way to assess the activity of the volcano for a non-volcanologist. Once the date and time are chosen the control colours according to its alert level (1 - green, 2 - orange, 3 - red). If the Info tool is on, then a pop-up window is shown with some more information and link to two XML files. By downloading XDSL resource file (at the bottom of the pop-up window) it is possible to interactively reassess the alert level in the GeNIe software. This might be useful for the experts to re-assess the weights in the Bayesian belief network manually if some weights act strange. For more information see the on-line manual of the alert level or take a look at the video showing the alert level control.

<http://www.exupery-vfrs.de/3-Using-the-outputs.1147.0.html> []

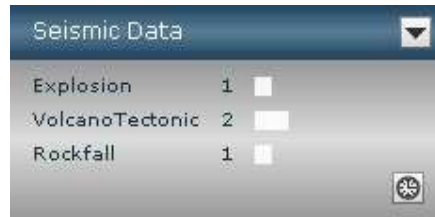
<http://www.exupery-vfrs.de/3-Using-the-interface.954.0.html>. []



Seismic data control shows the number of events of distinct seismic event types. Since different event types are associated with different physical processes it gives information on the activity status of the monitored volcano. After choosing a specific time range the event types recognized within that

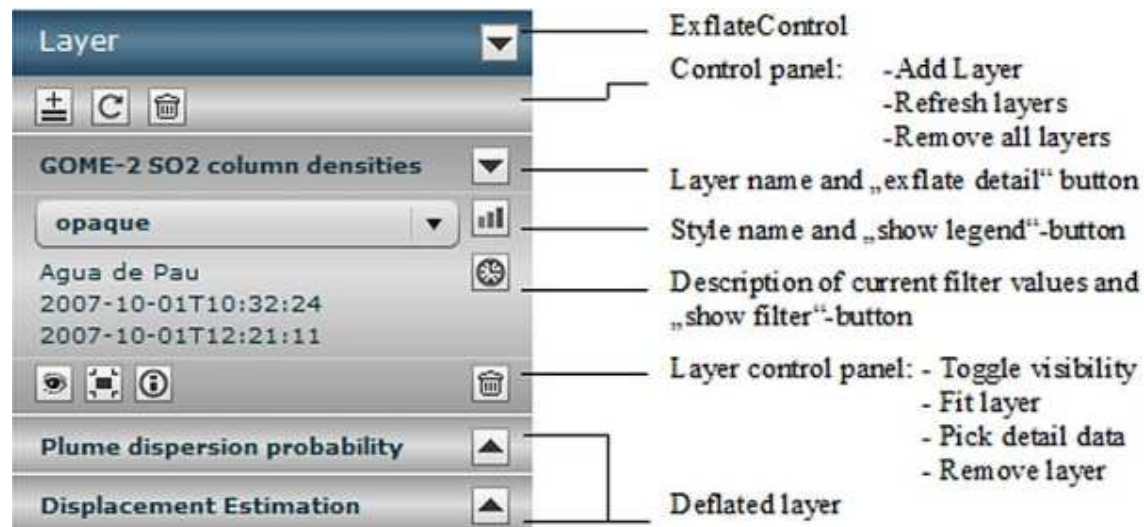
window are shown in the seismic data control along with the corresponding number of classified events for each type. The number of events is additionally displayed by a histogram. For more information on the classification algorithm please visit the Exupery website and see the online manual of the classification system.

<https://www.exupery-vfrs.de/Event-Classification.231.0.html> []
<https://www.exupery-vfrs.de/WP5-classification.940.0.html> []



The most complex control is layer control. If no layers are loaded, only three icons are visible: **adding layer to map**, **refresh map** and **remove all layers**. By adding a new layer you should be careful to choose the appropriate layer and also the desired date-time option that is given in the dialog window. Some metadata can be seen in this dialog in order to provide the basic information about the layer to be added. Once a layer is added more icons are shown. It is possible to:

- exflate each layer, change its (predefined) style (if more are available),
- change the date-time for this layer (if the global time filter is not on),
- show the corresponding legend,
- describe the current filter values,
- toggle visibility (added layer is visible or not),
- fit the current extent to the layer,
- show detail for a layer (by clicking on the map (it works for vector and raster layers),
- remove the layer from the list.



There are some more controls available but not on every layer. In the image below, you can see them (from left to right): time series from a point, show description (general metadata with also a link to the original XML), and legend.



The easiest way to understand how the layer control works it to look at the videos:

<http://www.exupery-vfrs.de/3-Using-the-interface.954.0.html>. []