
Arktis CAS 2

Operating Manual

Table of contents

1 Central Alarm Station.....	4
1.1 Introduction.....	4
2 The User interface.....	4
2.1.1 Login.....	5
2.1.2 Main menu.....	6
2.1.3 Map.....	7
2.1.4 Map History.....	12
2.1.5 Scan history.....	14
2.1.6 Health history.....	16
2.1.7 Change password.....	17
2.1.8 User Management.....	18
2.1.9 About.....	20
3 Miscellaneous.....	20
3.1 Storage.....	20
3.2 Automatic reconnect.....	21
Figure 1: Login page.....	5
Figure 2: The menubar.....	6
Figure 3: Live Map.....	7
Figure 4: List view (1).....	8
Figure 5: List view (2).....	9
Figure 6: Zoom control.....	9
Figure 7: Map history.....	12
Figure 8: Scan table.....	14
Figure 9: Filter options.....	15
Figure 10: Filter options health history.....	17
Figure 11: Change password.....	18
Figure 12: User management.....	19
Figure 13: About page.....	20

History

Rev.	Modification	Expert
01	Draft	HAR, 01.05.2022
02	Added Map History	HAR, 18.03.2024

1 Central Alarm Station

1.1 Introduction

This manual describes the use of the CAS - the Arktis Central Alarm Station application. It allows the operative CAS user to become acquainted with the application and thus make the best use of it. This manual does not cover installation and configuration of the CAS server.

The CAS is a centralized Web application, which aggregates data from multiple Arktis Radiation Portal Monitors (RPM), generally found at multiple sites, as well as data from mobile system, including 3rd party products, such as the Kromek ID (D3SID)

Data is displayed continuously for monitoring purposes. This includes radiation values (counts, dose rate) and optionally also video streams. More detailed data from measurements are stored as *scans* in the CAS database for post processing and analysis.

The CAS implements the following main features.

Monitoring – Live Data from individual RPMs is retrieved and presented to the user in near real time. This includes current levels of radioactivity measured as count rate (cps) and dose rate (nSv/h). Events such as Occupancy, Radiation Alarm as well as various system related warnings (collectively known as “system health”) are prominently displayed with indicative icons. Video streams may optionally be included in the monitoring. The monitored values, state and video streams, are positioned on a map reflecting the geographical position of the RPMs. For mobile RPMs the position is updated as the RPM moves. The view (section of map and position and size of video streams) may easily be adjusted for a particular task and screen size.

Storage – A CAS database stores measurements (scans) made on all connected RPMs and allows simple browsing and filtering of stored scans. Selected scans may be immediately displayed or may be downloaded in PDF or N42 format for local storage on the user’s computer.

RPMs push data to the CAS database during a scan and the transfer is finalized shortly following the scan’s completion, making scan data available on the CAS user with minimal delay.

User management – The CAS is a multi user system allowing multiple user simultaneous sessions. A CAS user with administrator rights can easily create new account and assign appropriate permission, grant access to certain RPMs etc.

Load balancing – The CAS may be used with an application load balancer, for improved performance and high availability. This setup comprises a two-node cluster in an active-active configuration, with identically configured and fully redundant servers in which the databases are synchronized by bi-directional replication.

2 The User interface

The CAS is accessed through a web-based user interface, the GUI, and requires no installation of software on the user’s computer. All major modern browsers are supported. The GUI supports more languages, such as English and Arabic, as chosen on the login page.

2.1.1 Login

The CAS user points his web browser to the name of a CAS server (or load balancer if applicable) and provides his credentials to log in. The session's language is chosen before login. The language choice is stored and becomes the default language for following sessions (in the same browser).

If the login fails, e.g., upon entering wrong credentials, the reason for the failure is shown as a short message below the login button. Note: The message disappears after a few seconds.

Below the possible failure messages – in all cases, the CAS server's internal log provides more information to help an administrator if trouble shooting is necessary.

<i>Wrong credentials</i>	<i>Either the username or the password is wrong (or both).</i> Following traditional security measures, the user is not informed of which. The CAS server's log however does contain this information.
<i>Database outage</i>	<i>The database is stopped</i> This may be for maintenance reasons.
<i>Connection Refused</i>	<i>The CAS API server did not accept the connection.</i> This means the CAS server is not operational; possibly due to maintenance. Note: This is <i>not</i> caused by wrong credentials. Note: If the physical server is unreachable, the login screen will not appear.
<i>Account not open yet</i> <i>Account expired</i>	<i>The account is defined, but is currently not available</i> The account has been created with a restricted period of validity.

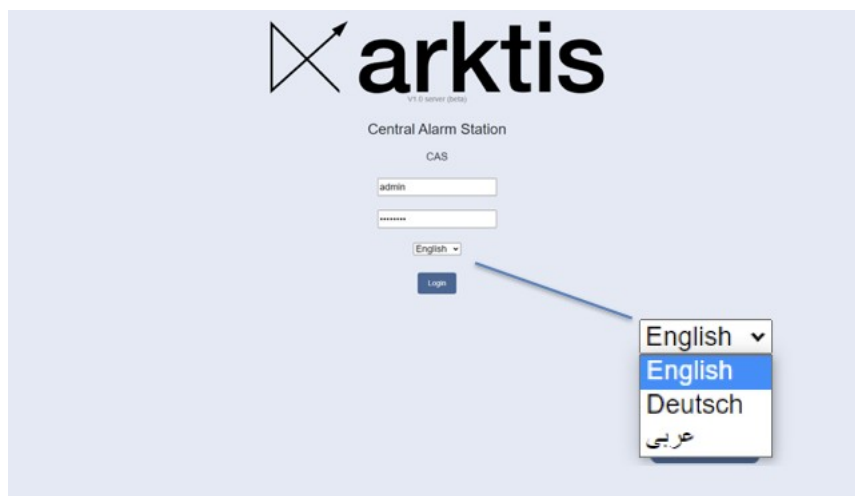


Figure 1: Login page

2.1.2 Main menu

Upon login, a menu bar appears on the top of the page. Below the menu bar the currently active page is shown. The menu bar is always visible and allows to switch between pages rapidly, change the sound level and also shows progress during certain operations such as downloads.

The last active page, along other settings, is stored and becomes the starting page in the next session.

The GUI is updated automatically to reflect changes on the CAS server, such as a new scan or an alarm. There is never a need to manually refresh a page – in fact, a refresh will take you to the login page.

In addition to a visual indication, an acoustic alarm is also heard in the event of a radiation alarm. The volume is adjusted from the main menu – including muting it altogether. It is thus possible to set an agreeable sound level, taking other sound emitting applications into account, possibly while adjusting the computer's sound system volume as well. If shift is pressed adjusting the level, the alarm sound is activated for a short time.

The Menubar

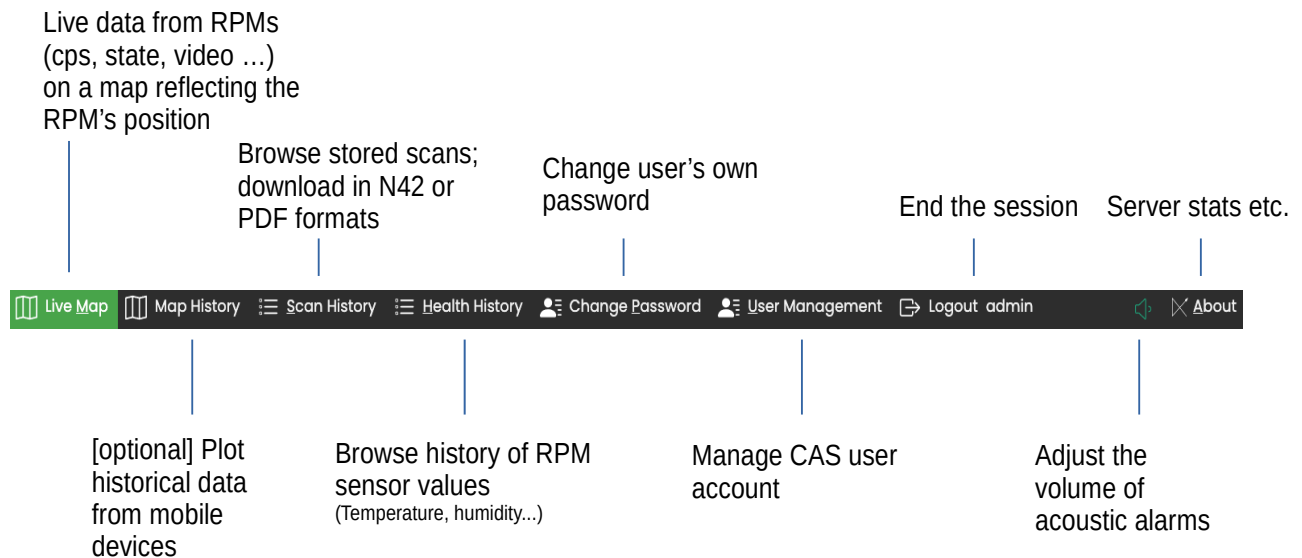


Figure 2: The menubar

2.1.3 Map

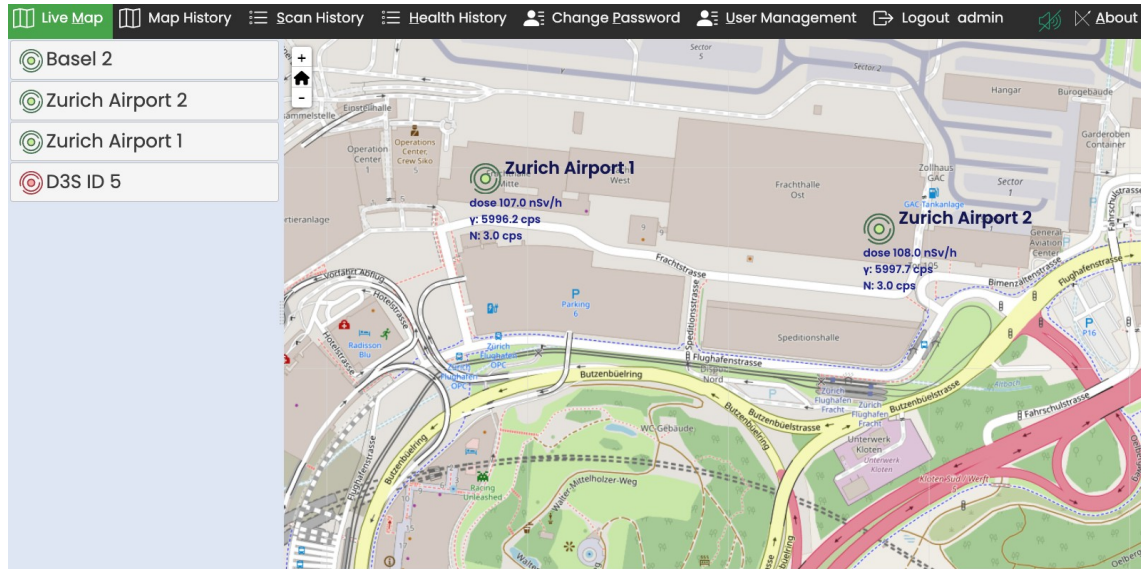






Figure 3: Live Map

As shown in Figure 3, the map page is split into two columns, the left column showing a list of all RPMs (left-to-right reading direction) and the right column showing a map. The columns may be adjusted by dragging the handle on the column separator, e.g., to allow for longer names.

The list view and the map view include only RPMs, which are available to the current user.

List view

The order of RPMs in the list may be changed (by drag'n'drop) for instance to make more important RPMs appear at the top. In the case where not all RPMs can be visible at the same time, the list may be scrolled. The icon to the left of the name shows the RPM state, as follows:

	<p>OK – CAS is receiving data from the RPM. During a scan the icon is rotating.</p>
	<p>Missing data. The connection to the RPM is established, but the CAS server is not receiving the expected data from the RPM</p>
	<p>The CAS has no connection to the RPM</p>
	<p>Radiation Alarm</p>

Click to *reposition* the map to the stored preferred position of this

Select and drag to change position in list

Shift-click to *store* the current map position as the preferred position of this

Click to open and show incident details of RPM

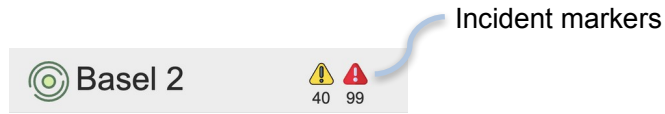
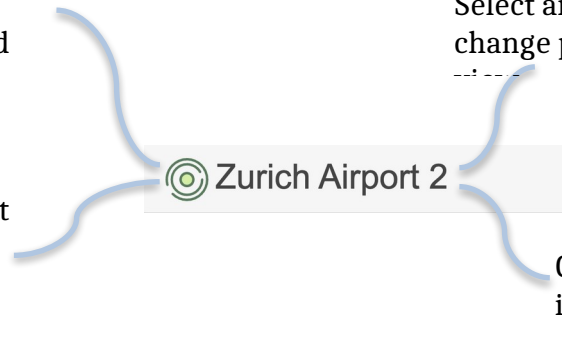






Figure 4: List view (1)

Incident markers appear if incident(s) occurred within the last one hour (configurable) on a particular RPM. A number below the marker indicates the number of occurrences. By selecting (click on name) an RPM, the list expands to show details.

	Warning	<ul style="list-style-type: none"> A sensor values is outside of its normal range, but this is uncritical. An example is a temperature or humidity value.
	Error	<ul style="list-style-type: none"> A sensor value is critically outside of the its normal range. Lost connection to the RPM
	Alarm	<ul style="list-style-type: none"> Radiation alarm Note: Clicking on the icon is a short-cut to open the scan report
	OK	<ul style="list-style-type: none"> A previous error is no longer active

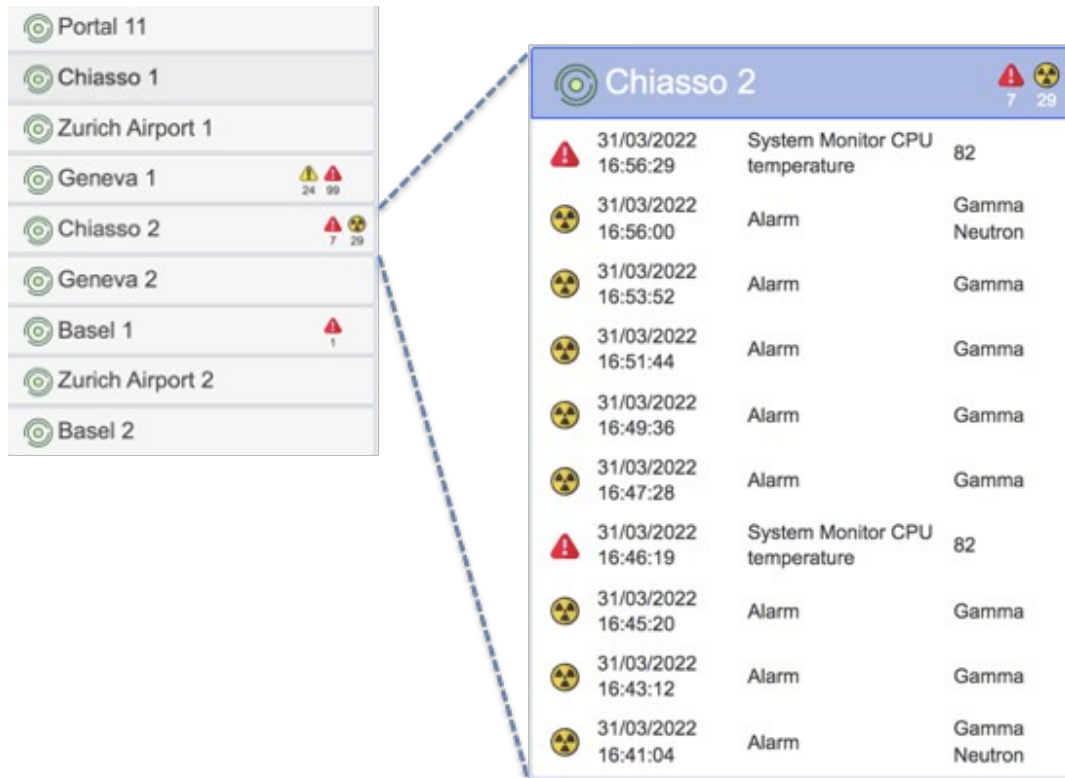


Figure 5: List view (2)

Map view

The map view shows the RPMs on a map along with their measured radiological values and optional video stream(s). The values are updated (configurable) once a second.

The map may be moved and zoomed to include RPMs of interest. The map is moved with the mouse or trackpad by select-and-drag anywhere on the map. The map may also be moved using the arrow keys on the keyboard. Use shift-arrow keys to move in larger steps. To zoom in/out on the map, use the scroll gesture (such as the scroll wheel on a mouse) or by the clicking the icons in Figure 6.

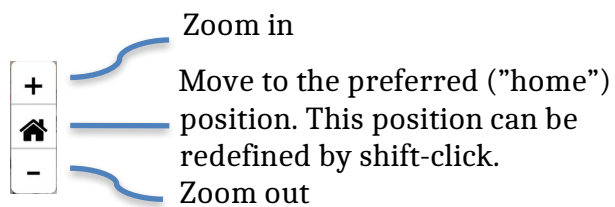


Figure 6: Zoom control



At a certain zoom level individual RPMs may appear so close to each other that they would overlap. To avoid cluttering, the “cluster” icon is used to indicate a “more than one RPM” – the number on the top indicating the actual number of RPMs.

The cluster icon will appear in yellow or red if one or more RPMs are in yellow or red state. Likewise, if an alarm occurs on any one RPM, a larger radioactive icon appears.

All changes made during a session, such as resizing, defining preferred map positions etc. are automatically stored in the browser for that particular user. Another CAS user, using the same browser will have his own settings.

By right-clicking on an RPM icon in the map view, the RPM submenu appears:



Opens the RPM's GUI in a separate browser tab.

An automatic login as the *cas user* takes place

Activates / deactivates video stream(s) from this RPM. The option only appears if the RPM indeed supports video *and* the user's permissions include video access

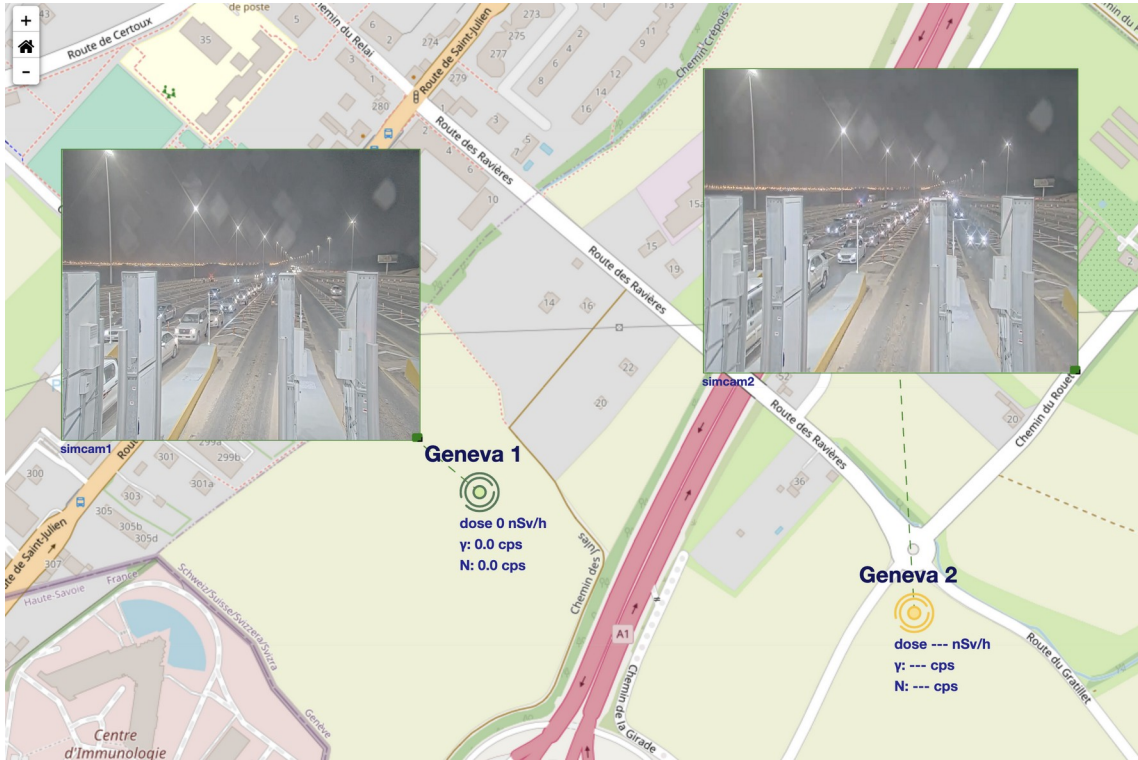
The position of a video stream is modified by click-and-dragging within the video area. A dotted line from the PRM icon to the video helps keeping track of which stream belongs to which RPM. This may be particularly helpful when more RPMs are placed in close proximity (e.g., adjacent lanes) and/or an RPM has more video streams.

Video areas can be placed freely, including overlapping with the RPM icon.

The size of a video area is adjusted by click-and-dragging the green marker in the lower right corner of the video area. A certain minimum size and keeping the aspect ratio are enforced.

When changing the zoom level, the size of a video area in *world coordinates*, remains unchanged. In other words, regardless of zoom level, the video covers the same area on the map. It follows, that the video area in *screen coordinates* does change with the zoom level. As expected, when zooming in, video areas increase in size on the screen.

At a certain zoom level the screen size of a video area becomes too small and therefore is not shown.



2.1.4 Map History

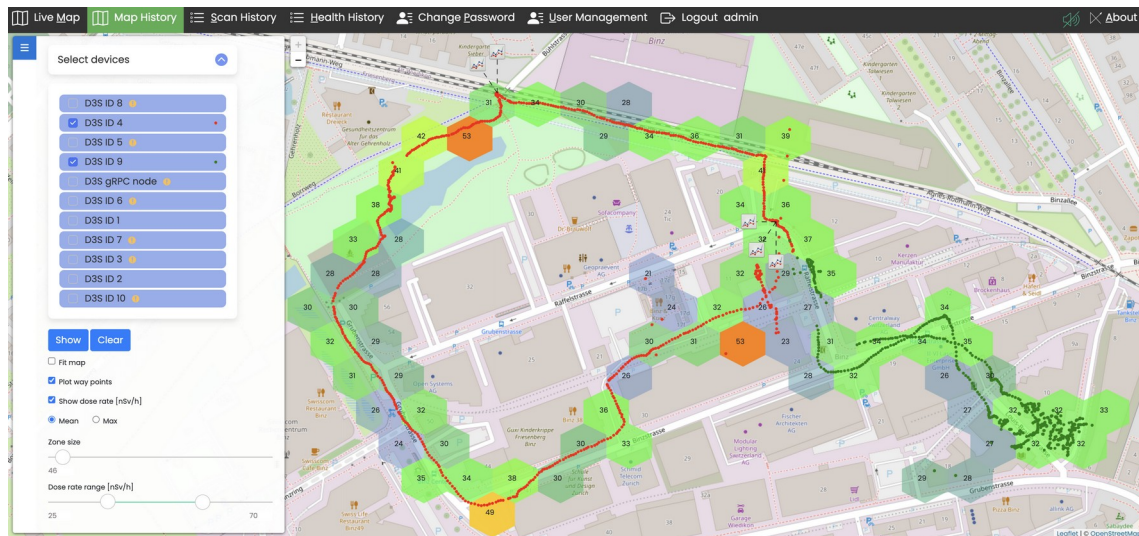


Figure 7: Map history

This page is available only for a CAS system with mobile devices.


The Map history page is used to visualize radiological data previously acquired with mobile devices. Visualization is done by plotting the data on a map, comprising:

- Way points – the geographical position and time
- Point dose rate - the dose rate measured at the way point
- Aggregated zone dose rate – A zone/area, colored to reflect the dose rate calculated from the mean (or max) value of the way points in the zone.
- Markers for scans taken along the route

To visualize data one does:

- select the start and end time of a period (one contiguous period)
- choose the devices to include
- click the “Show” button

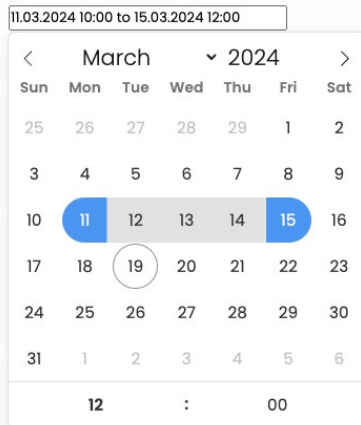
By default the map is adjusted to frame just the plotted data. The usual zoom/pan operations may then be used to better visualize a part of the data.

The plot includes markers for scans, which were made device within the selected period, displayed at the position where the scan was taken: 

Clicking on the icon opens the scan report in a separate tab. The scans are also available on the scans page.

On the D3SID scans are made in *Confirmation mode*.

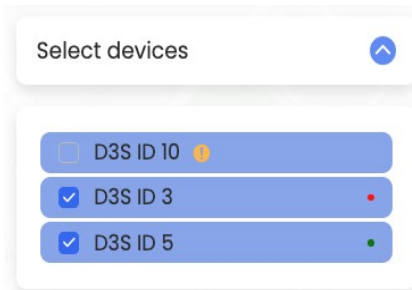
This page shows historical data; it is not updated with live data.



The period (full days, midnight to midnight) is chosen simply by clicking on two dates. For a period straddling a month, the top left/right arrows or the dropdown may be used. For a period of *one* day, the day is clicked twice, so that the marker becomes a circle.


The time of day may also be set. First select the start date, then choose the start time. Select the end data, then choose the end time.

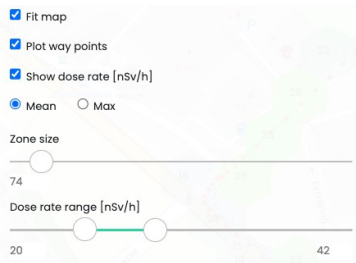
Today's date is marked with an open circle.



The device list contains *mobile* devices only; F-RPMS are not included.

Each selected device having data in the selected period is marked with a differently colored dot. The way points of the device are plotted with the same color to help distinguish way point “trails” of different devices.

A marker appears for those devices *without* data in the period: 



By default “Fit map” is enabled and clicking “Show” changes the map to best fit the plotted data. Disable this setting to keep a fixed map position.

When “Plot way points” is enabled, a colored point is plotted for each measurement received from the mobile device.

“Show dose rate” displays the dose rate in each zone (selectable: mean or maximum)

The zone size is the approximate width in meters of the zone. All measurements within a zone are aggregated and their mean (or max) value determine the color of the zone.

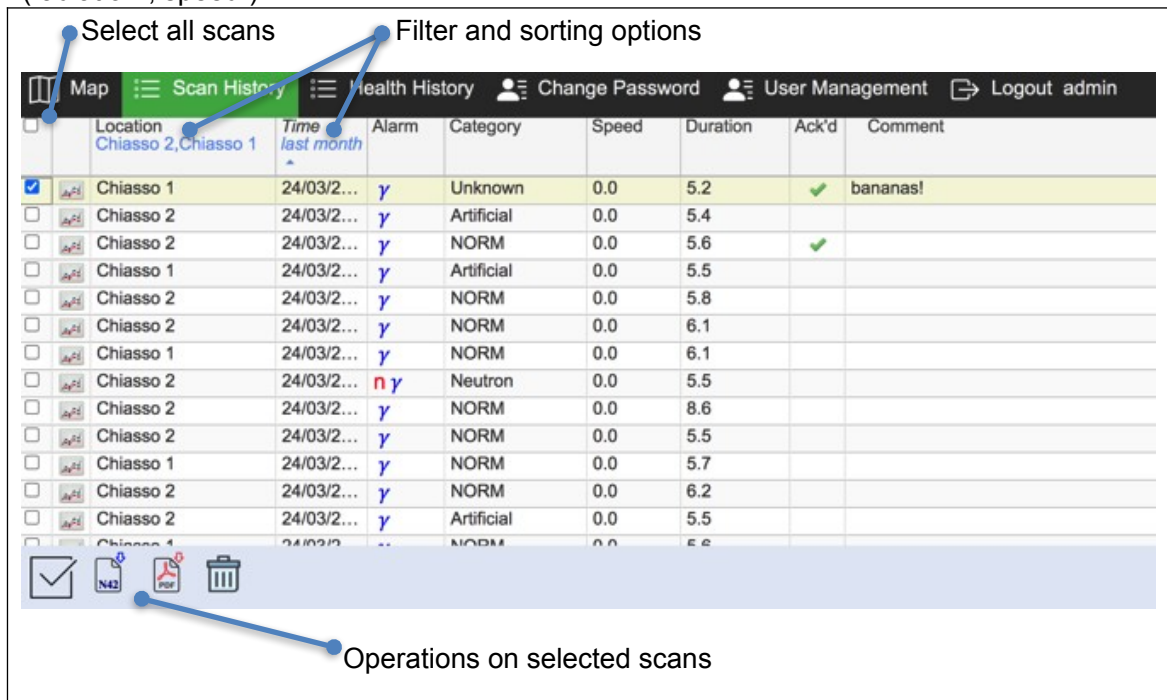
The dose rate range affects how the color range is applied. The range between the lower and upper boundary is considered “the normal” range. Values in within this range are plotted with as shades of green, intensifying with the dose rate. Depending on the geographical location the range may differ which is why is is adjustable. Values below the lower boundary are plotted with. Value exceeding the upper boundary are plotted on color scale from yellow to red with increasing intensity.

To display time and dose rate at a way point, let the mouse hover over the way point.

2.1.5 Scan history

This page provides access to stored scans. The table shows the most important data, such as location, time and alarm status directly and gives access to scan reports comprising more technical information, such as energy spectra and images (where applicable). To help locating particular scans a search criterion may be set, e.g., to “show only yesterday’s scans from portal A and portal B with gamma alarm”.

The CAS database contains scans from all configured RPMs. When a scan is stored on an RPM, it also is stored in the CAS Database. The criterion for when a scan is stored is thus set on the individual RPMs. Typically the setting is to store scans in the event of an alarm (radiation-, speed-).



	Location	Time	Alarm	Category	Speed	Duration	Ack'd	Comment
<input checked="" type="checkbox"/>	Chiasso 1	24/03/2...	γ	Unknown	0.0	5.2	✓	bananas!
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	Artificial	0.0	5.4		
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	NORM	0.0	5.6	✓	
<input type="checkbox"/>	Chiasso 1	24/03/2...	γ	Artificial	0.0	5.5		
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	NORM	0.0	5.8		
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	NORM	0.0	6.1		
<input type="checkbox"/>	Chiasso 1	24/03/2...	γ	NORM	0.0	6.1		
<input type="checkbox"/>	Chiasso 2	24/03/2...	n γ	Neutron	0.0	5.5		
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	NORM	0.0	8.6		
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	NORM	0.0	5.5		
<input type="checkbox"/>	Chiasso 1	24/03/2...	γ	NORM	0.0	5.7		
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	NORM	0.0	6.2		
<input type="checkbox"/>	Chiasso 2	24/03/2...	γ	Artificial	0.0	5.5		
<input type="checkbox"/>	Chiasso 1	24/03/2...	γ	NORM	0.0	5.6		

Figure 8: Scan table

Filter

The header row of the table allows a search filter to be composed, comprising filter options set on one or more values (columns). When the mouse enters the header of a column, a drop-down option appears. Selecting this, opens a drop-down menu containing filter options for the particular column, such as the date. Upon dismissing (closing) the drop-down the filter becomes immediately applied and the table is updated to reflect this. If the search filter is composed of filter options of more columns, it will be applied with an implicit logical “and” – only scans for which all filter options are true will be shown.

The table may be sorted on a value, by clicking on the header, for instance on *time*. An arrow will appear to show, which value the table is sorted on and if sorted in ascending or descending order. For the time column, descending means “most recent first”. For the comment field sorting is lexicographical and descending means “A” before “B”.

Figure 9 below shows all filter options exposed.

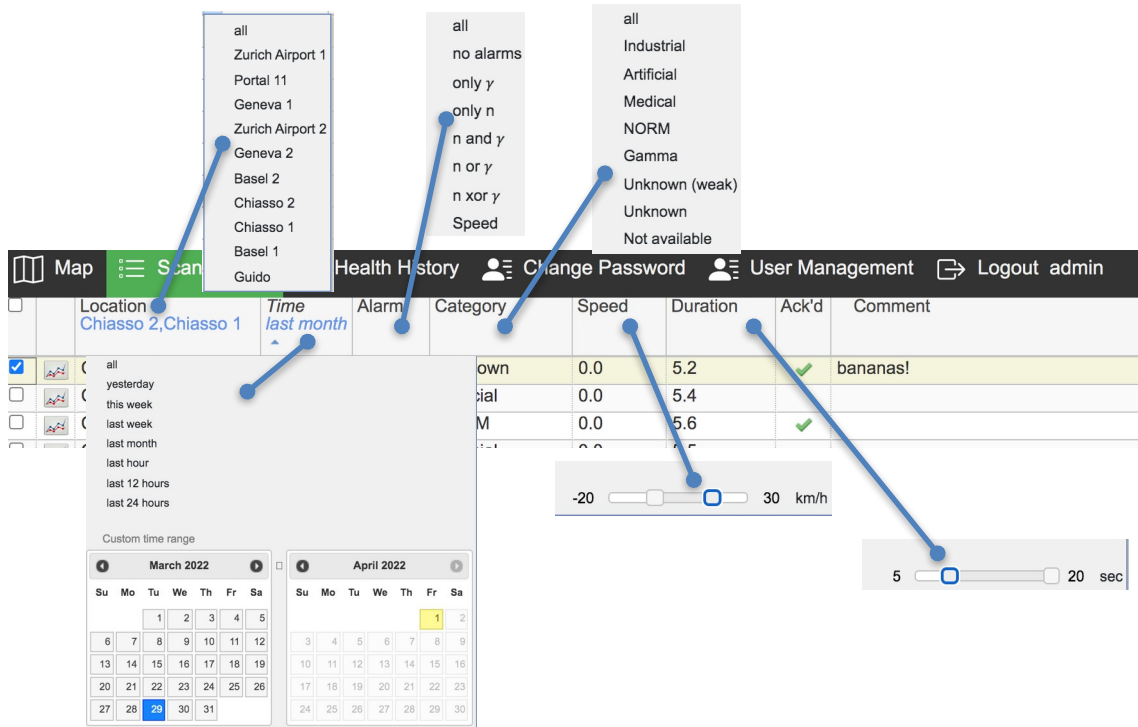


Figure 9: Filter options

Scan report



By clicking this icon in a row, a scan report is generated and appears in a *new browser tab*. This makes it possible to open more scan reports at the same time. Depending on the browser, the user may be asked to allow the operation.

A scan report contains a visualization of the radiological data and images acquired during the scan. The length of the data may exceed the actual scan time to include a few seconds before and after the start/stop events (e.g., as registered by occupancy sensors).

The contents of a scan depend on the RPM configuration, mainly on the number of (groups of) detectors. It consists of a header with general info (time, location, alarm status etc.) followed by a number of "parts". Each part contains graphs of counts-per-second and of accumulated energy spectrum (gamma only). A typical RPM with a two-pillar with top/bottom sections contains a part for each section and one part for accumulated values. The latter gives a quick overview of the total level of radiation, while individual sections can help position the radioactive source.

Operations on scans

The first column of check boxes allows scans to be selected and subsequently operations to be applied on all, as follows:



Mark the scan as acknowledged – The criterion for acknowledging should be part of the operator’s site policy. This is not enforced by the software, except for the following rules:

- Acknowledging is final - a scan cannot be un-acknowledged
- Only users with “operator” permissions can acknowledge.



Export a scan in N.42 format – an industry standardized format (XML) for storing radiological data



Export a scan in PDF format



Delete a scan – this is irrevocable.

Exported files are stored on the user’s computer, typically in the user’s “Download” folder (subject to a browser setting). The operation may take a while to complete, particularly if more scans are selected. A progress indicator appears in the menu bar and the GUI remains functional, while the download continues in the background. Switching to another GUI page does not affect the download. Closing the browser application, however, does cancel the download.

Update

The table is updated to reflect changes in the database as they occur. This happens when a new scan is generated – or if changes to an existing scan are made in another session, such as if another user deletes a scan, sets or changes a comment or deletes a scan. When a row is updated it will briefly flash red.

Layout

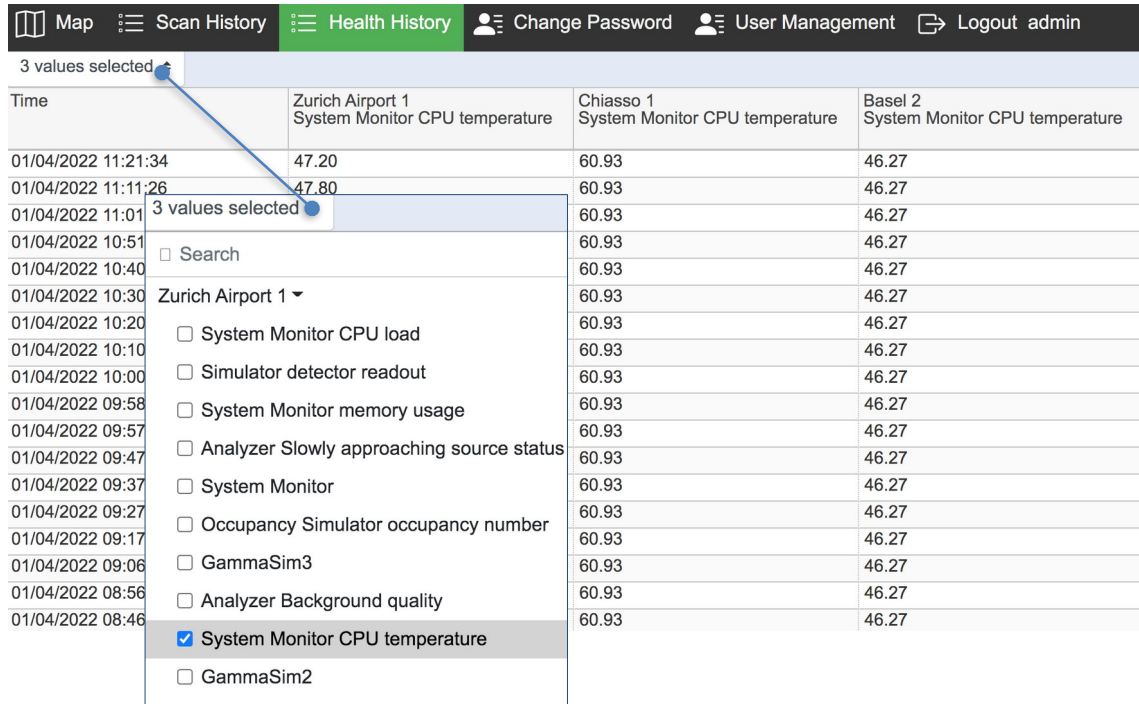
The size and order of the columns may be changed. By select-and-drag in the header of a column, the column may be re-positioned. By select-and-drag of the delimiter line in the header the size of column is modified. Table changes, including the search filter are automatically stored and applied in a next session.

2.1.6 Health history

The CAS collects various sensor values from all RPMs. The values can be used to assess the “health” of the system. Which values to include in the table is user selectable. A filter akin to the filter option described in 2.1.5 Scan history may be applied here as well.

Hint: When choosing values to include (columns), like values from more RPMs may be easier selected by entering a search string, as this reduces the length of a potentially long list. Typing “Monitor” for instance, reduces the list to display only System Monitor values (such as CPU temperature) for all RPMs.

The values are acquired on the RPM at a relatively high frequency, but in order to reduce the storage need, are only stored when exceeding a certain threshold.



The screenshot shows a web interface with a navigation bar containing 'Map', 'Scan History', 'Health History', 'Change Password', 'User Management', and 'Logout admin'. Below the navigation bar is a table with 4 columns: 'Time', 'Zurich Airport 1 System Monitor CPU temperature', 'Chiasso 1 System Monitor CPU temperature', and 'Basel 2 System Monitor CPU temperature'. A dropdown menu is open over the table, showing a search bar and a list of filter options under the heading 'Zurich Airport 1'. The options include 'System Monitor CPU load', 'Simulator detector readout', 'System Monitor memory usage', 'Analyzer Slowly approaching source status', 'System Monitor', 'Occupancy Simulator occupancy number', 'GammaSim3', 'Analyzer Background quality', 'System Monitor CPU temperature' (which is checked), and 'GammaSim2'. A blue arrow points from the '3 values selected' indicator to the dropdown menu.

Time	Zurich Airport 1 System Monitor CPU temperature	Chiasso 1 System Monitor CPU temperature	Basel 2 System Monitor CPU temperature
01/04/2022 11:21:34	47.20	60.93	46.27
01/04/2022 11:11:26	47.80	60.93	46.27
01/04/2022 11:01		60.93	46.27
01/04/2022 10:51		60.93	46.27
01/04/2022 10:40		60.93	46.27
01/04/2022 10:30		60.93	46.27
01/04/2022 10:20		60.93	46.27
01/04/2022 10:10		60.93	46.27
01/04/2022 10:00		60.93	46.27
01/04/2022 09:58		60.93	46.27
01/04/2022 09:57		60.93	46.27
01/04/2022 09:47		60.93	46.27
01/04/2022 09:37		60.93	46.27
01/04/2022 09:27		60.93	46.27
01/04/2022 09:17		60.93	46.27
01/04/2022 09:06		60.93	46.27
01/04/2022 08:56		60.93	46.27
01/04/2022 08:46		60.93	46.27

Figure 10: Filter options health history

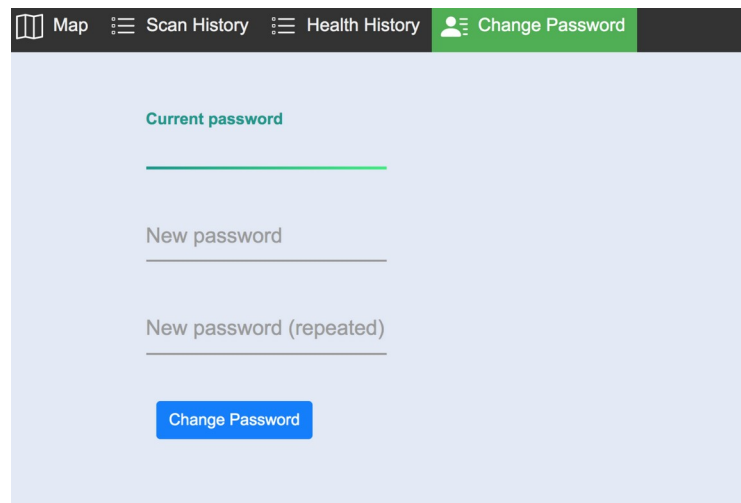
2.1.7 Change password

This page lets a user change his/her password. The current password must be entered followed by the new password entered twice.

The password will be changed only if:

- The current password is correct
- The new password meets the password constraints (minimum length, ...)
- The repeated password matches

The user's current session remains valid after changing the password – a new login is not required.



The screenshot shows the 'Change Password' page. It has a navigation bar with 'Map', 'Scan History', 'Health History', and 'Change Password'. The main content area contains three input fields: 'Current password', 'New password', and 'New password (repeated)'. Below the input fields is a blue 'Change Password' button.

Figure 11: Change password

2.1.8 User Management

This page lets a user with administrator rights manage the accounts of other CAS users.

Note: This menu point is not available (absent from menu bar) for users without administrator rights.

Operations include:

- Add new users
- Delete users
- Setting permissions, access to RPMs, validity period etc.
- Change a user's password

Deleting a user immediately terminates the user's sessions

Also, a user cannot delete his own account.

Permissions

The permission system is based on roles of which one or more may be assigned to a user.

<i>Role</i>	<i>Permissions</i>
<i>Observer</i>	Allows only read access, e.g., precluding acknowledging and commenting of scans.
<i>Operator</i>	Allows write access, e.g., acknowledging and commenting of scans
<i>Administrator</i>	Allows complete access, including user management
<i>Export</i>	Allows download of scans.
<i>Video</i>	Allows access to video streams

While the actual definition of roles is indeed configurable, this is not possible through the GUI.

Active Directory [optional]

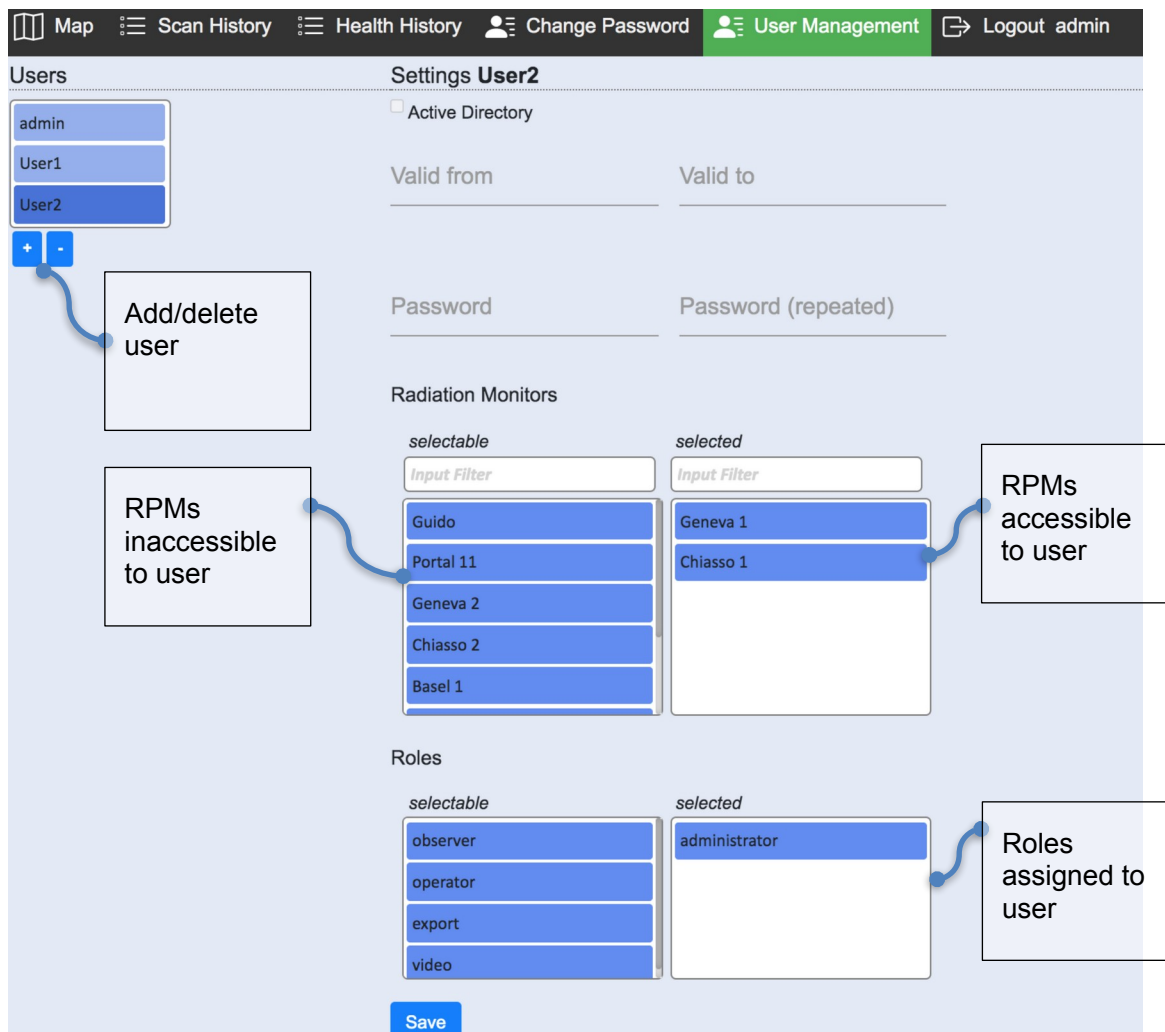
Selecting the active directory check box indicates that a user's credentials are stored on an Active Directory server – not on the CAS server. In this case the validity period and password are *not* to be set on the CAS, while permissions and RPM access (see below) do need to be set.

Validity period

A user account may be defined to be valid only for a specified period; outside of this period, the user will not be able to log in. This makes it easier to create temporary accounts ahead of time (setting “valid from” to a future date) and also automatically terminates an account (at the “valid to” date). Either may be left unspecified, to mean “open ended”.

RPM access

A user may be granted access to a particular subset of all available RPMs, such as access only to RPMs at a particular site. By clicking on an RPM in the “selectable” column the RPM becomes selected, as indicated by it moving to the “selected” column. Likewise, RPMs may be deselected by clicking in the “selected” column. The user has access only to selected RPMs, that is, only selected RPMs will appear on the map and the scan- and health-history pages.



The screenshot shows the 'User Management' interface for 'User2'. The top navigation bar includes 'Map', 'Scan History', 'Health History', 'Change Password', 'User Management' (highlighted), and 'Logout admin'. The main content area is divided into several sections:

- Users:** A list of users: 'admin', 'User1', and 'User2' (highlighted). A '+ -' button is below the list, with a callout box labeled 'Add/delete user'.
- Settings User2:**
 - Active Directory
 - Valid from: _____ Valid to: _____
 - Password: _____ Password (repeated): _____
- Radiation Monitors:**
 - selectable:** A list of RPMs: Guido, Portal 11, Geneva 2, Chiasso 2, Basel 1. A callout box labeled 'RPMs inaccessible to user' points to this list.
 - selected:** A list of RPMs: Geneva 1, Chiasso 1. A callout box labeled 'RPMs accessible to user' points to this list.
- Roles:**
 - selectable:** A list of roles: observer, operator, export, video.
 - selected:** A list of roles: administrator. A callout box labeled 'Roles assigned to user' points to this list.

A 'Save' button is located at the bottom of the interface.

Figure 12: User management

2.1.9 About

This page shows information pertaining to the CAS server



Figure 13: About page

When accessing the CAS through a load balancer, the user does not know, which CAS server he is connected to. This is by design. However, if nevertheless needed, the field server name on the about page does provide this information.

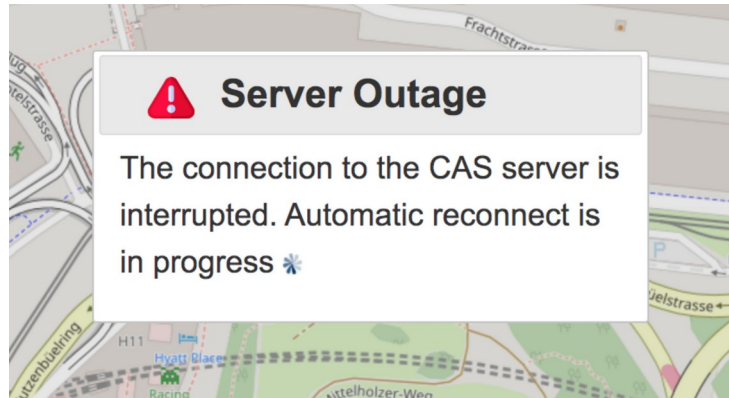
3 Miscellaneous

3.1 Storage

An Arktis RPM is a self-contained system, which stores all data on the RPM itself. The CAS database stores a copy of all data aggregated from all configured RPMs. This takes place during normal operation. If the CAS is temporarily disconnected from an RPM, the RPM remains fully functional. Once the connection is re-established, The CAS is automatically updated with the data acquired during the outage.

3.2 Automatic reconnect

If the connection to the CAS is lost due to network outage or maintenance on the CAS server, a connected user will see the following:



At this time, the browser automatically is in reconnect mode and when the CAS server is available again, the session is resumed. There is no need to refresh the page.

Considering an active-active configuration with two CAS servers and a load balancer: If one CAS server becomes unavailable, the browser automatically reconnects to the available server.