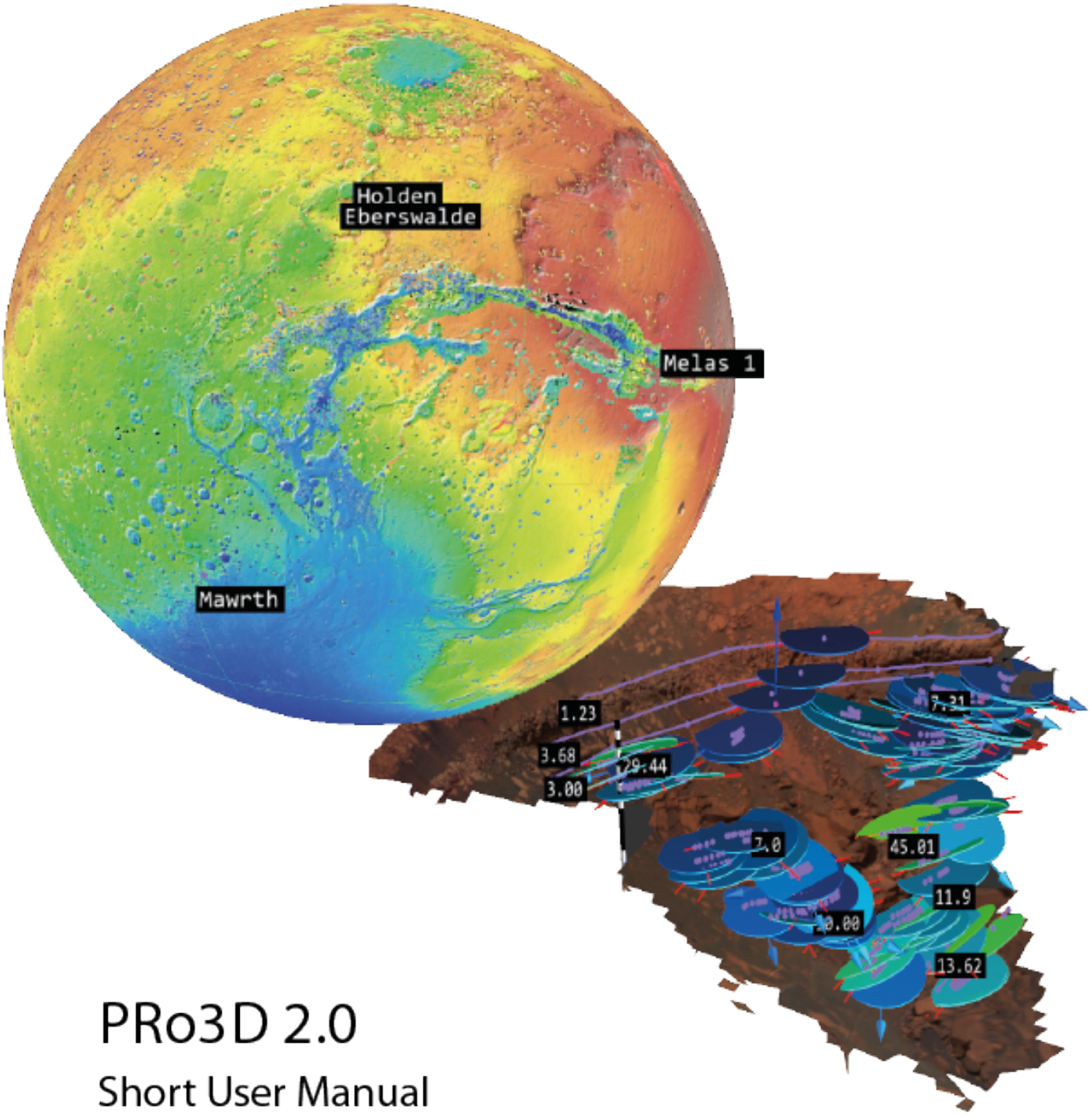

PRo3D 2.0

Short User Manual

Written by: Thomas Ortner, Laura Fritz
Verified by: ...
Approved by: ...

Contents

1 Start

Start the viewer by clicking the PRo3D.exe and open the Scene Menu in the top left of the window shown in Figure 1.

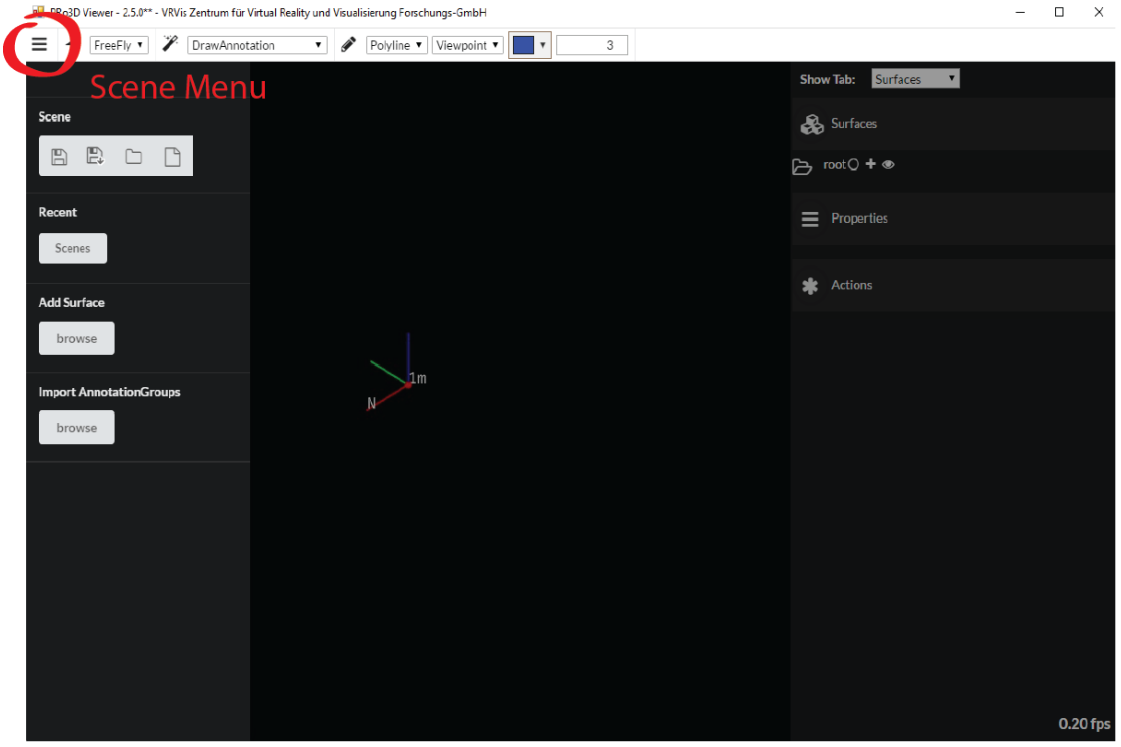

Figure 1: Open Scene Menu.

You have two options to start:

- Add one or more surfaces and create a new scene as described in the next Section 1.1.
- Load an existing scene described in the Section 1.2.

1.1 Add Surface

To add a new surface click the “Browse” button in the **AddSurface** section in the scene menu (Figure 1). This opens the “Select Folder” window where you can choose the surface folder as shown in Figure 2. Click the “Select Folder” button to confirm your selection. The surface is loaded into the viewer and listed in the right part of the window as shown in Figure 5, part A. You can add more surfaces in the same way.
Each surface has a little context menu below the surface’s name in the list (Figure 5, B). Click the “FlyTo” button to see the surface in the main window. To see the surface’s properties click on the appropriate name in the list (Figure 5, C).
Finally, click “SaveScene” in the scene menu, name the scene and press the “Save” button (Figure 3) to save the surfaces and your settings. The PRo3D viewer will load the scene automatically next time you start the viewer.

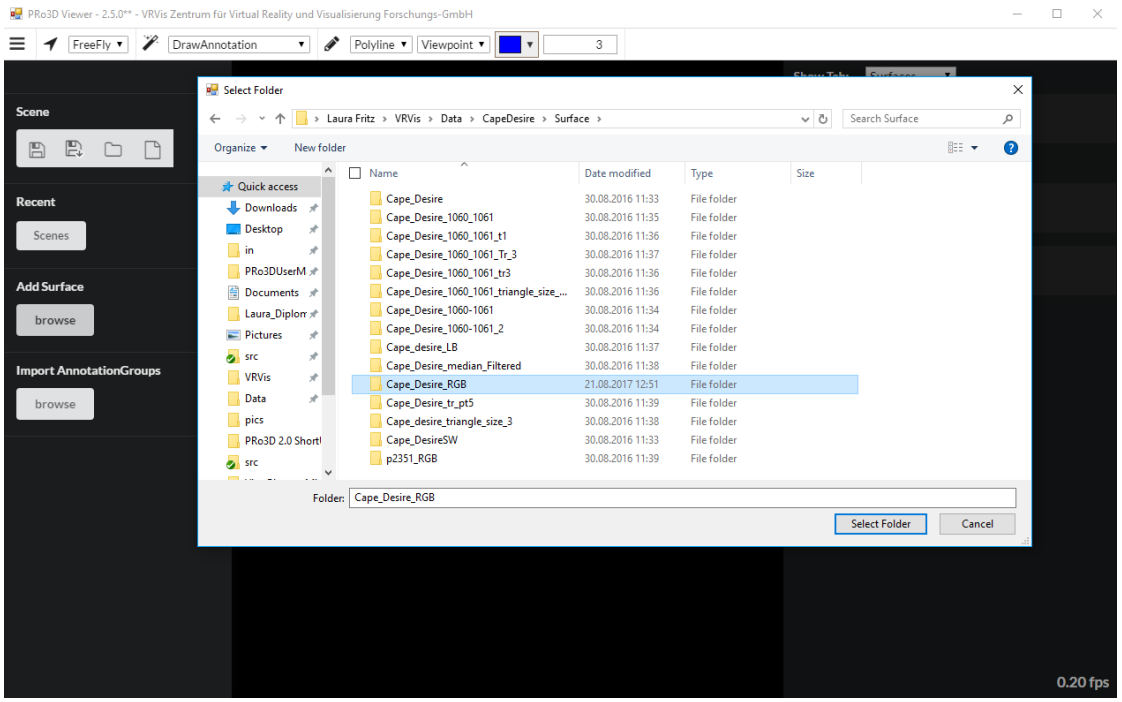

Figure 2: Add a new surface to the scene.

1.2 Load Scene

Load an existing scene by selecting “Open Scene” in the **Scene** section in the start menu (Figure 1). Select the scene xml file in the directory of your choice and confirm your selection (Figure 4). Then the scene is loaded (Figure 5).

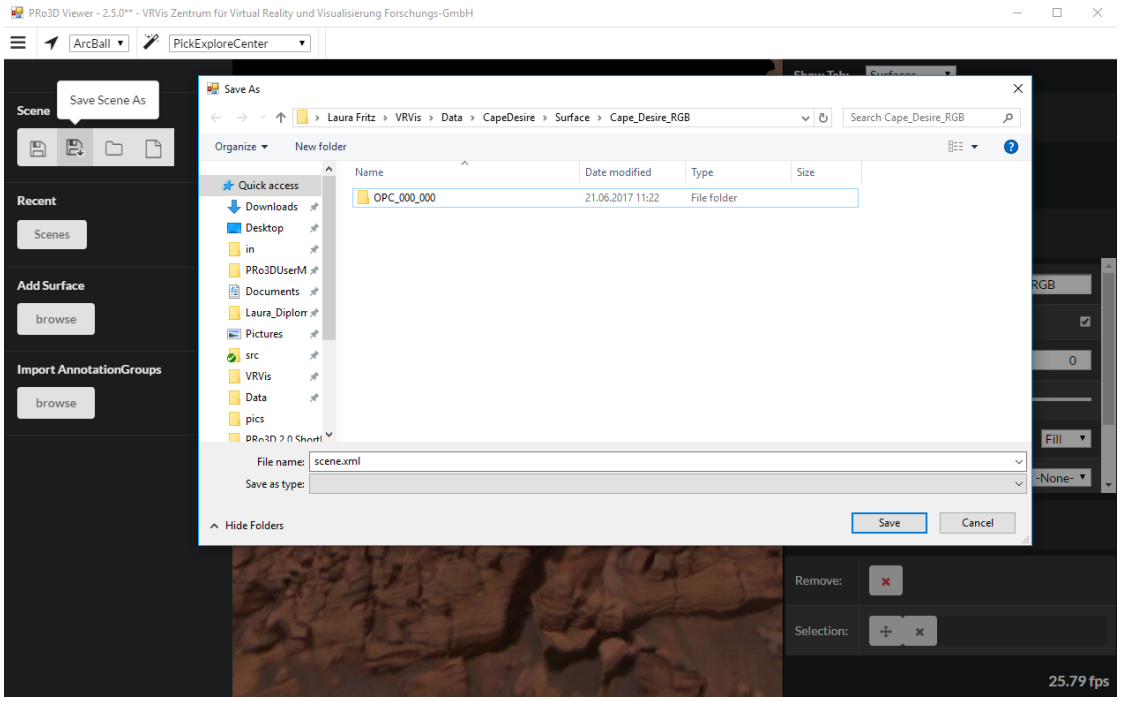

Figure 3: Save the surfaces and settings as scene.

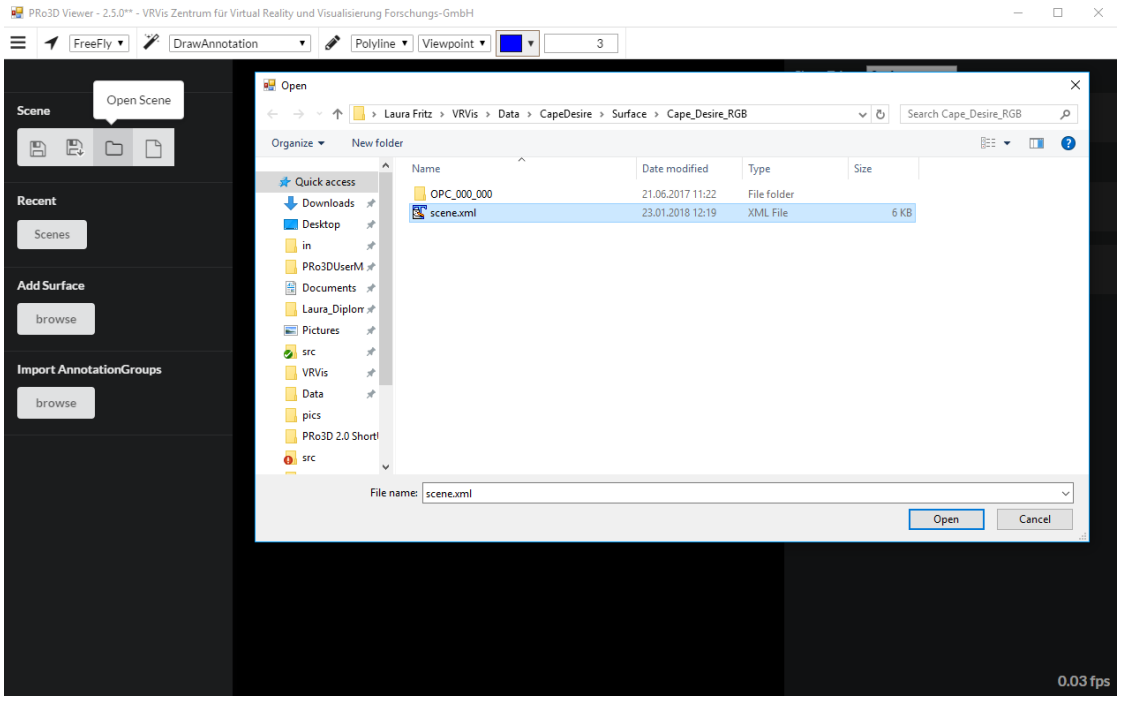

Figure 4: Open a scene.

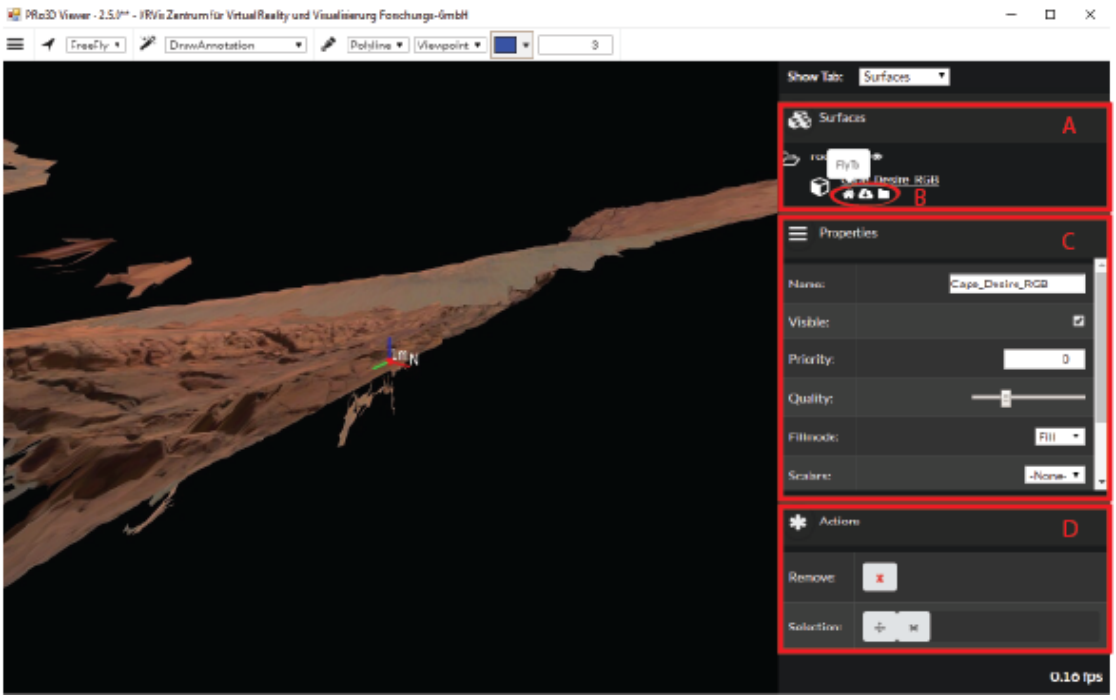

Figure 5: Loaded surface with open surface features (right).

2 Viewer Actions

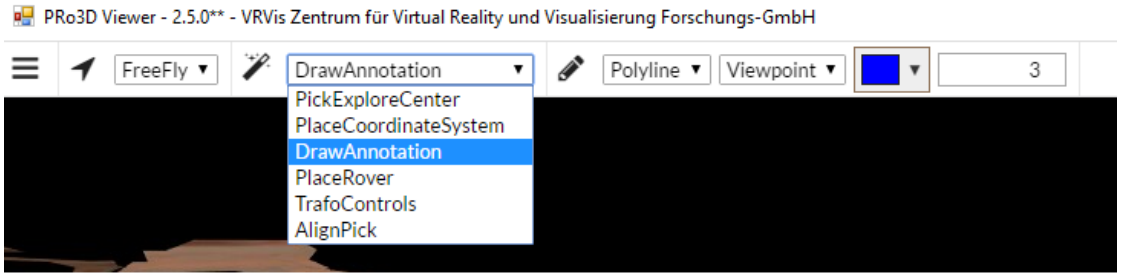

Figure 6: Viewer Actions.

Once the surface is loaded there are different actions to choose (Figure 6).

2.1 Pick Explore Center

The “PickExploreCenter” action concerns the **ArcBall** navigation mode. There are two navigation modes (Figure 7):

- **FreeFly** and
- **ArcBall**.

2.1.1 FreeFly

The Free Fly Mode is the standard 3D fly-through navigation, as for instance, in terrain visualization. WASD controls forward/backward and strafing movement, while the user can change the camera’s orientation by holding the LMB. Zooming in and out (forward/backward movement) is performed by turning the mouse-wheel or holding down the RMB. Additionally, the camera can be panned by holding down the middle mouse button.

2.1.2 ArcBall

When the viewer is in ArcBall mode the camera can be rotated around the explore center by holding down the LMB. Panning and strafing as possible as described above, but be aware that this moves the explore center (otherwise panning would break the view matrix of the camera). To set a new explore point, make sure the “PicExploreCenter” action is active (as shown in Figure 7) and press CTRL + LMB on the surface. The explore center is indicated by a pink dot. Forward and backward movement is performed either by the keys W/S, rotating the mouse wheel, or clicking RMB.

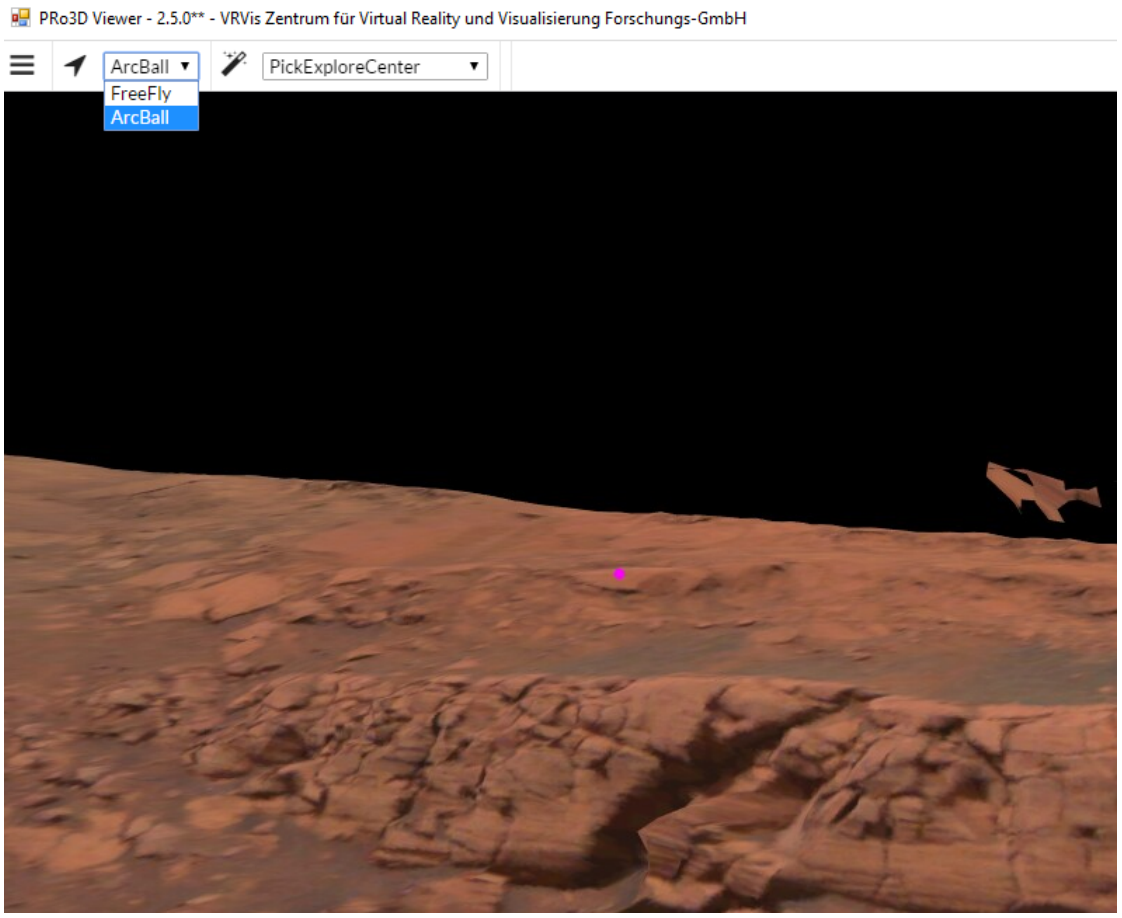

Figure 7: ArcBall navigation. Explore center is set with CTRL + LMB and indicated by a pink dot.

2.2 Place Coordinate System

To set the coordinate system pick “PlaceCoordinateSystem” in the actions drop down menu, select a unit of measurement and press CTRL+LMB to pick a point on the surface. This marks the position as shown in Figure 8. Initially the Up Vector’s (blue) direction is set in the positive z-direction and the North Vector’s (red) in the positive y-direction. But you can manipulate them manually for different data. The Up- and the North Vector are used for the projection measurements. The north vector is further relevant for bearing measurements and the rover placement in the View Planner. The values for Position, Up- and North Vector are shown in the Viewer Configuration described in Section 3.4.

2.3 Draw Annotation

Figure 9 shows the settings for drawing annotations. First set “DrawAnnotation” in the actions menu (A in Figure 9). Then you can choose one of the following annotation modes (B in Figure 9):

- *Point*: A single point measurement on the surface.

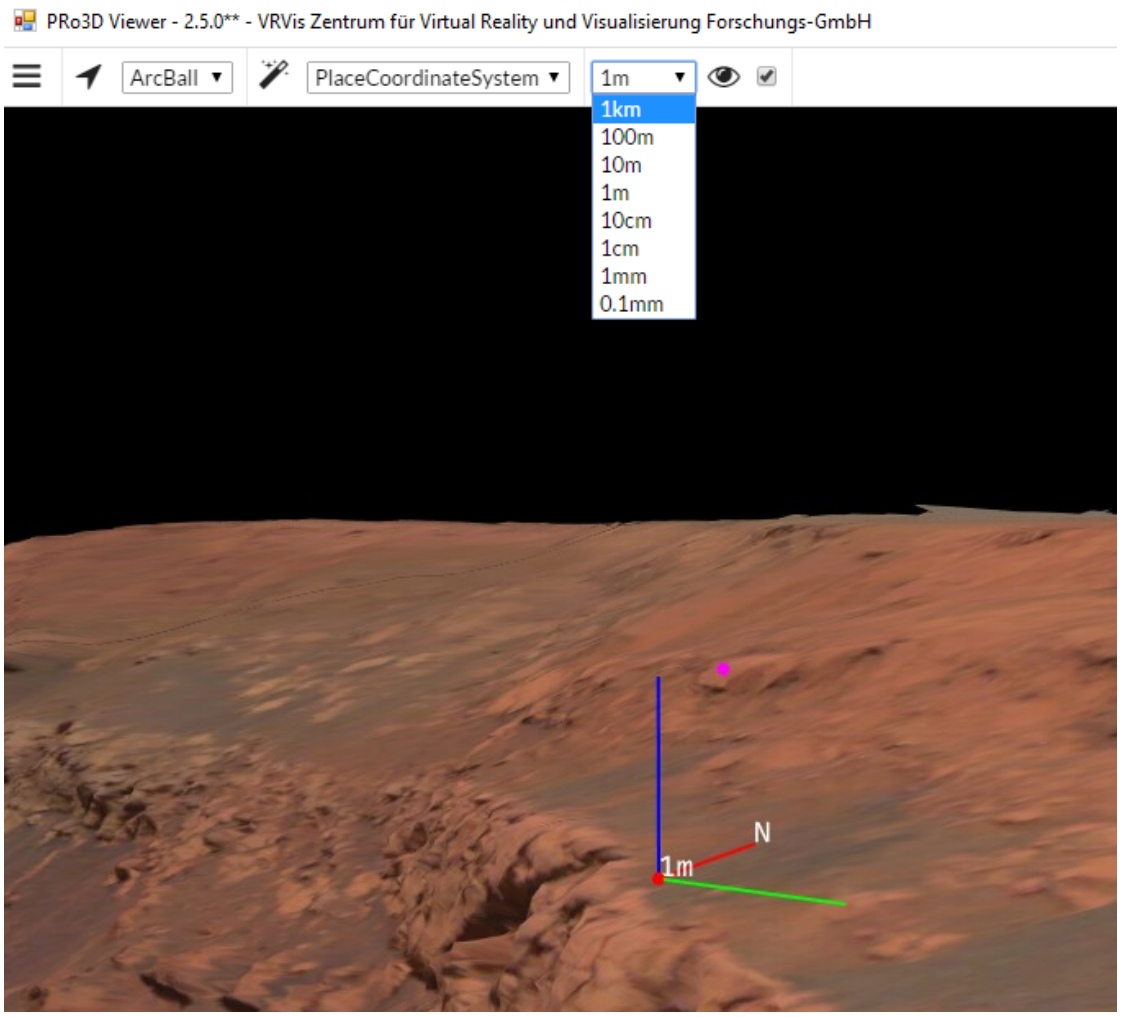

Figure 8: Coordinate System with scale bar functionality.

- *Line*: You can pick two points on the surface. The connecting line depends on the projection mode explained in the table below.
- *Polyline*: An arbitrary number of points on the surface can be picked. The connecting line segments depend on the projection mode. The polyline is finished by pressing Enter.
- *Polygon*: An arbitrary number of points on the surface can be picked. The connecting line segments depend on the projection mode. The region of interest is closed and finished by pressing Enter.
- *DnS*: A polyline onto a surface, e.g. alongside a rock layer can be picked. After clicking Enter, a plane is fitted (least squares) to this polyline (blue), which is then intersected with a horizontal plane, which gives us the so-called strike vector (red). This vector represents the direction within the plane with the least inclination and orthogonal to it is the dip vector (green) which shows the direction of highest inclination as shown in Figure 9.

To pick an annotation point on the surface press CTRL+LMB.

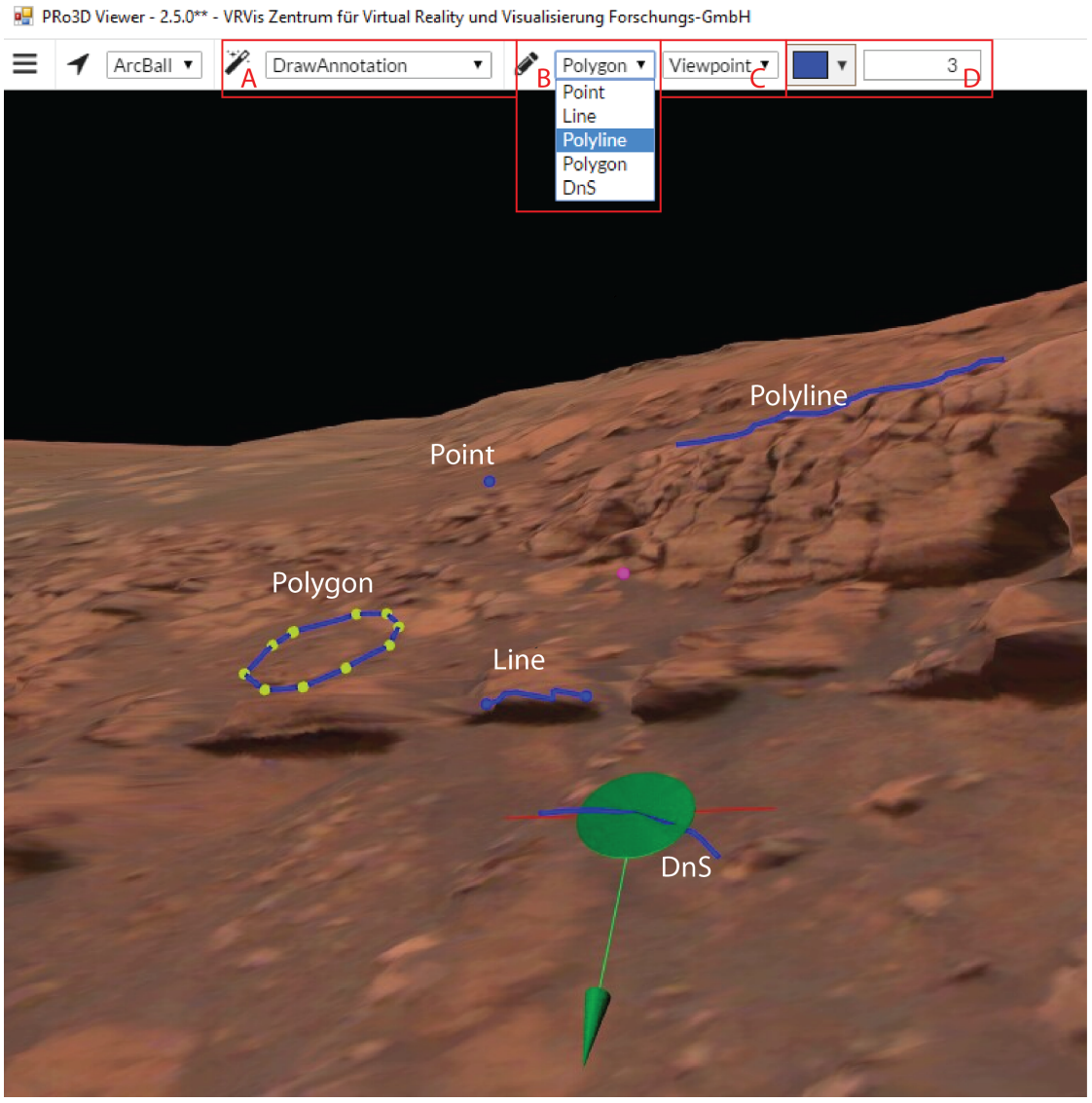

Figure 9: Annotation settings: **A**: set viewer action to “DrawAnnotation. **B**: select annotation mode. **C**: select projection. **D**: choose color and thickness.

For all annotations (except Point) you can choose between “Linear”, “ViewPoint” and “Sky” projection which determines the direction of the picking ray (C in Figure 9):

- *Linear*: produces straight line segments as point-to-point connections with linear interpolation between them, no actual projection is performed (Figure 10, blue line). This is practical for line-of-flight distance measurements or measuring the height of a cliff or determining its slope.
- *ViewPoint*: between two points we sample the space by shooting additional rays to intersect with the surface, in this case along the view direction (Figure 10, green line). This is helpful to measure details in nooks and crannies of a rough surface and is the typical way to go for geological measurements.

- *Sky*: the same sampling happens as for the viewpoint projection but this time the rays are shot along the scenes up-vector (Figure 10, pink line). This mode is useful for geographical measurements to estimate the length of a path through a crater.

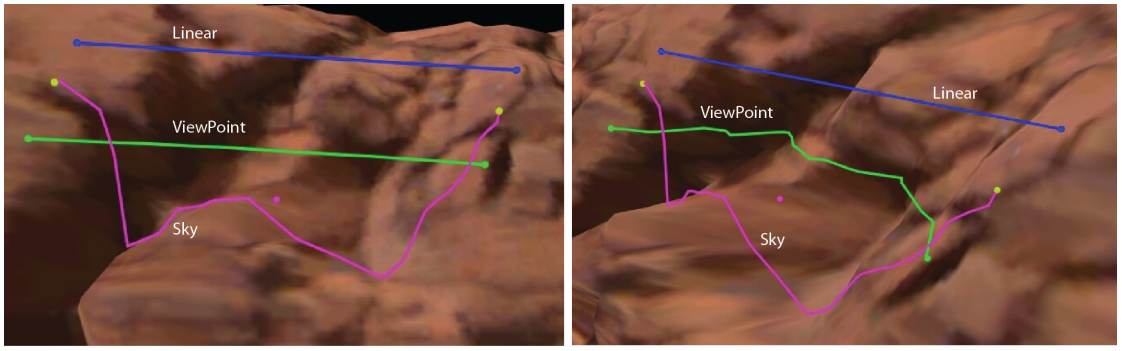

Figure 10: Three Lines taken from the same camera position (left) with the same camera settings but with different line projections.

Finally you can set the color and thickness of the annotation (D in Figure 9). Section 3.2 shows how to maintain, group and edit existing annotations.

3 Viewer Features

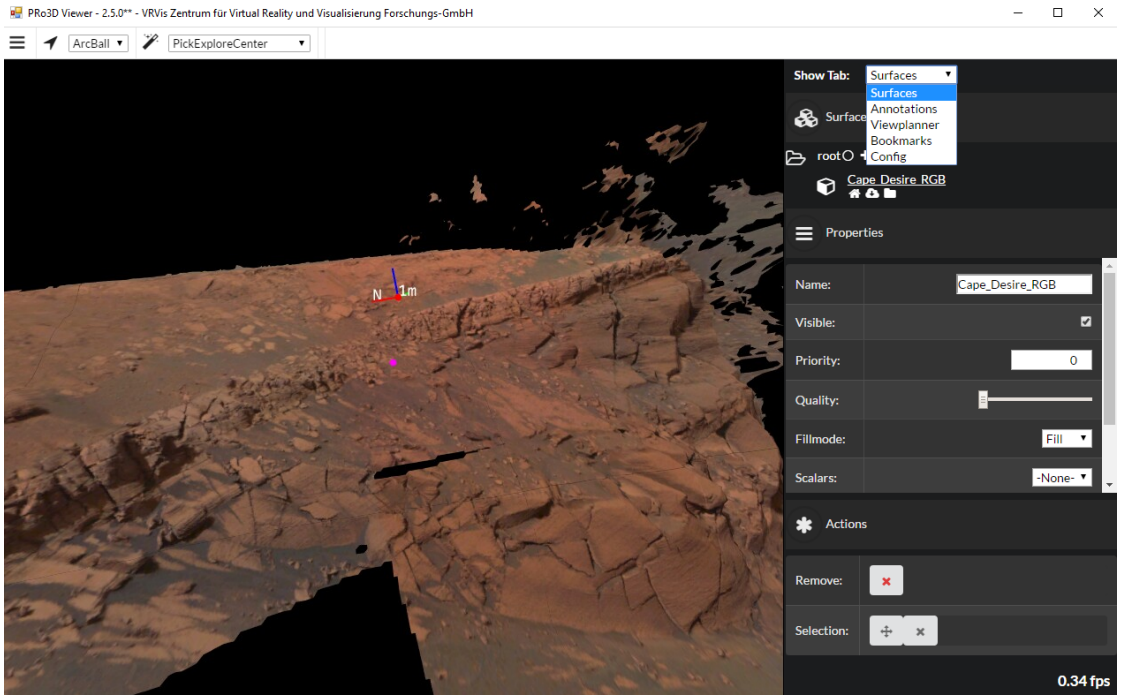

Figure 11: There are menu tabs (right) for each feature in the viewer.

The feature tabs show a list of the respective features, the properties of the selected feature from this list and some actions for this feature. For surfaces, annotations and bookmarks it is possible to group them, as described in Section 3.5.

3.1 Surfaces

3.2 Annotations

The annotations tab consists of four parts (Figure 12):

3.2.1 Annotations Menu

In contrast to all other viewer features, the annotations are NOT saved in the scene file! There is a separate menu on top of the annotations tab:

- *Save Annotations*: Opens a “Save As” window. Give your annoations xml file a name and click the “Save” button.
- *Load Annotations*: Select the annotations xml file and press the “Open” button.
- *Clear Annotation List*: This clears the whole annotation list.

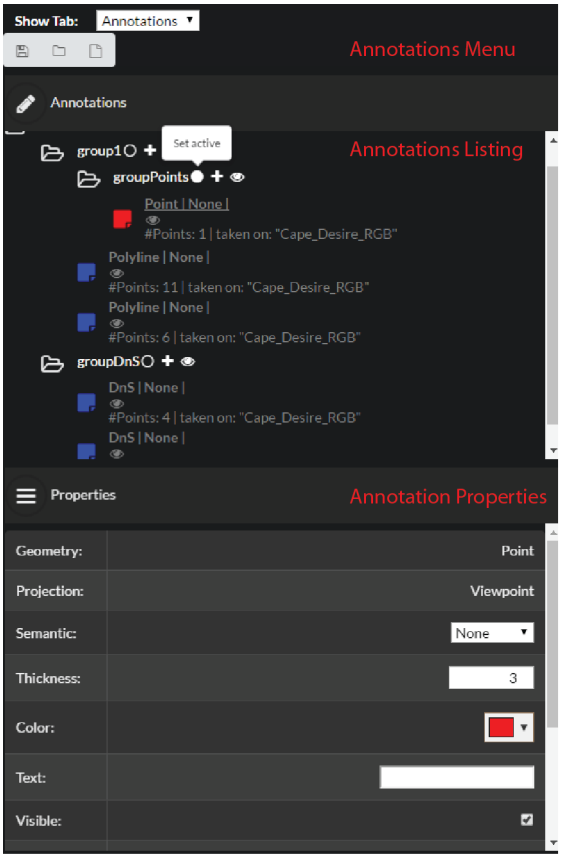

Figure 12: The annotations tab.

3.2.2 Annotations Listing

The listing shows all annotations in the scene. You can classify them in any group and subgroups, described in Section 3.5. You can select one annotation by clicking on the annotation's name. Then you can see the annotation's properties in the properties panel and use the actions in the actions panel. It is also possible to select more annotations by clicking the square icon in front of each annotation. The selected annotatios have a green color in the viewer and a green square in the list. The multiselection is used to move one ore more annotations from one group to the active group.

3.2.3 Annotations Properties

The properties of the selected annotation (click on annotation's name) are shown. There you can get some information and change the settings.
The annotation actions are described in Section 3.5.2.

3.3 Bookmarks

Bookmarks enable the user to record a certain camera viewpoint. To add a new bookmark click the "+" button on top of the tab (Figure 13). The new bookmark

is added to the active group in the bookmarks listing. To view the bookmark's properties and actions click on the bookmark's name. Clicking the "house" button beside the bookmark's name triggers a FlyTo. For multiselection click on the bookmark's square icons.

3.4 Viewer Configuration

3.5 Grouping

Grouping is possible for surfaces, annotations and bookmarks. The "root" group is the highest level where you can add leafs and subgroups (Figure 14). Each group has a context menu:

- *Set Active*: The active group gets the new leaf. Per default the "root" is active.
- *Add Group*: Adds a new and empty subgroup.
- *Toggle Group*: Sets all leafs in this group and its subgroups invisible.

3.5.1 Group Actions

- *Remove*: Removes the group with all its leafs and subgroups.
- *Clear*: Removes all leafs and subgroups from group but retains the empty group.
- *Selection: Move*: Moves all selected leafs (green squares) to the active group.
- *Selection: Clear*: Clears the selection (the leafs were not removed).

3.5.2 Leaf Actions

- *Remove*: Removes the leaf.
- *Selection: Move*: Moves all selected leafs (green squares) to the active group.
- *Selection: Clear*: Clears the selection (the leafs were not removed).

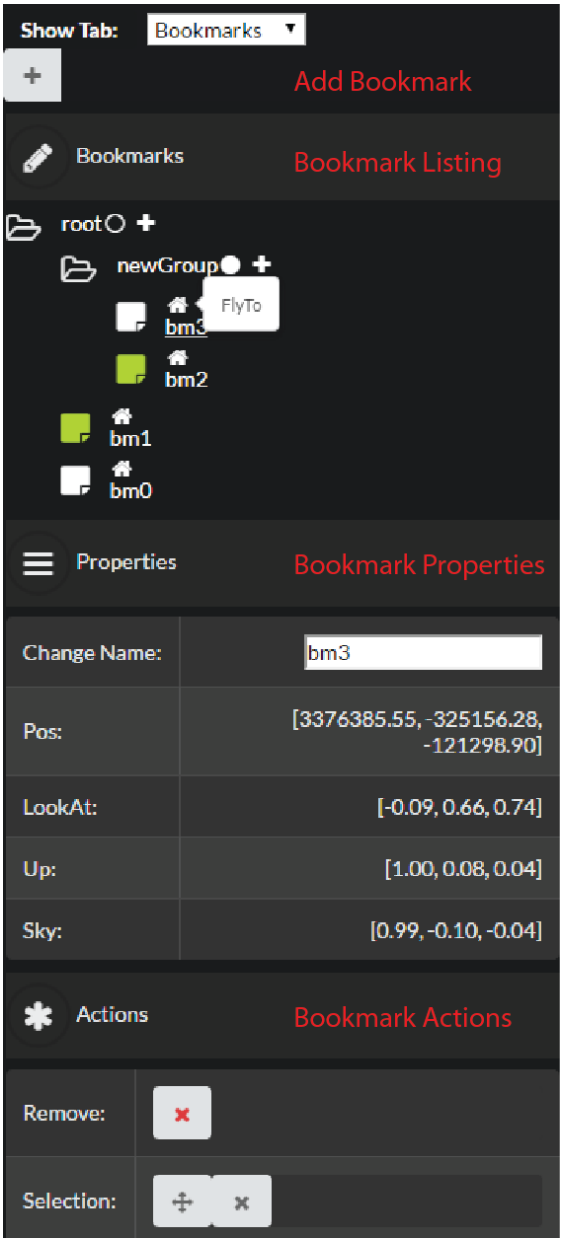

Figure 13: The bookmarks tab.

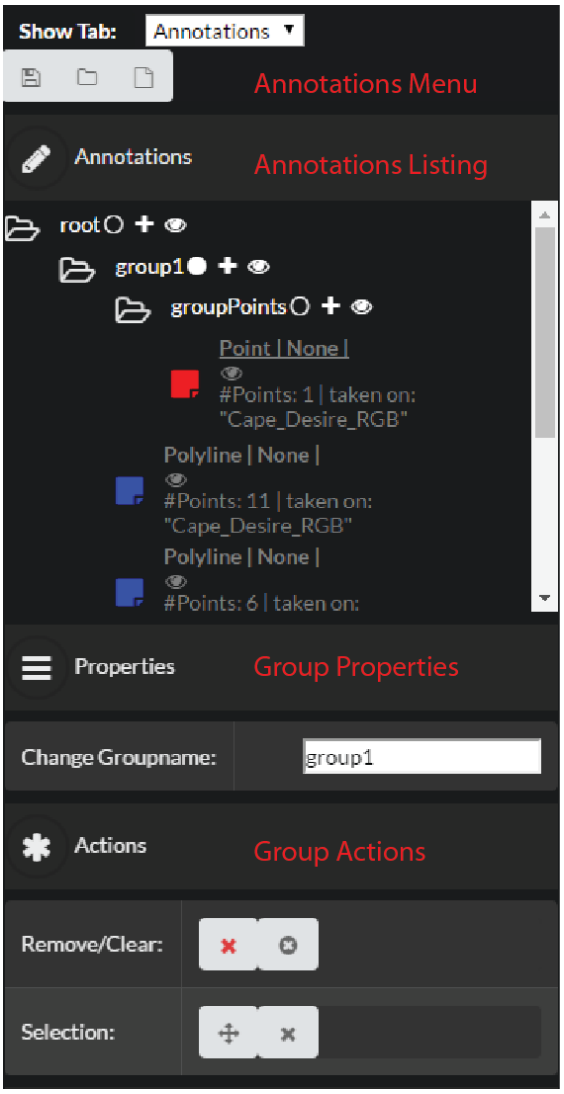

Figure 14: The group properties and actions.