Water measurement project

WaterVis manual

Thomas Schneider, Petra Eibl

02.06.2009

Overview

The following document is a manual of the WaterVis client. The WaterVis client is part of the water measurement project.

The primary function of the Watervis client is to visualize the fingerprints of the s::can system. A fingerprint shows the original measurements of the spectrometer probe. The spectrometer probe flashes at equidistant time intervals and measures the extinction of the light on wavelengths between 200 nm and 750 nm. The parameter values are derived from the fingerprint. Examples of parameter values are, for example, the mass of NO2-N in the water or the pH value of the water. In other words, the parameter values are the interpretation of the fingerprints.

In the user interface, Watervis provides three different views of the fingerprints:

- Visualization of one fingerprint at a specific moment. Normally, the latest measurement is shown, but the user can also go back in time.
- A surface view where the measurements are visualized as the surface of many measurements within a specified interval.
- The analysis view provides the means to filter fingerprints by parameters.

You can access the different view by pressing on the appropriate tab page (Live View, Surface View and Analysis View).
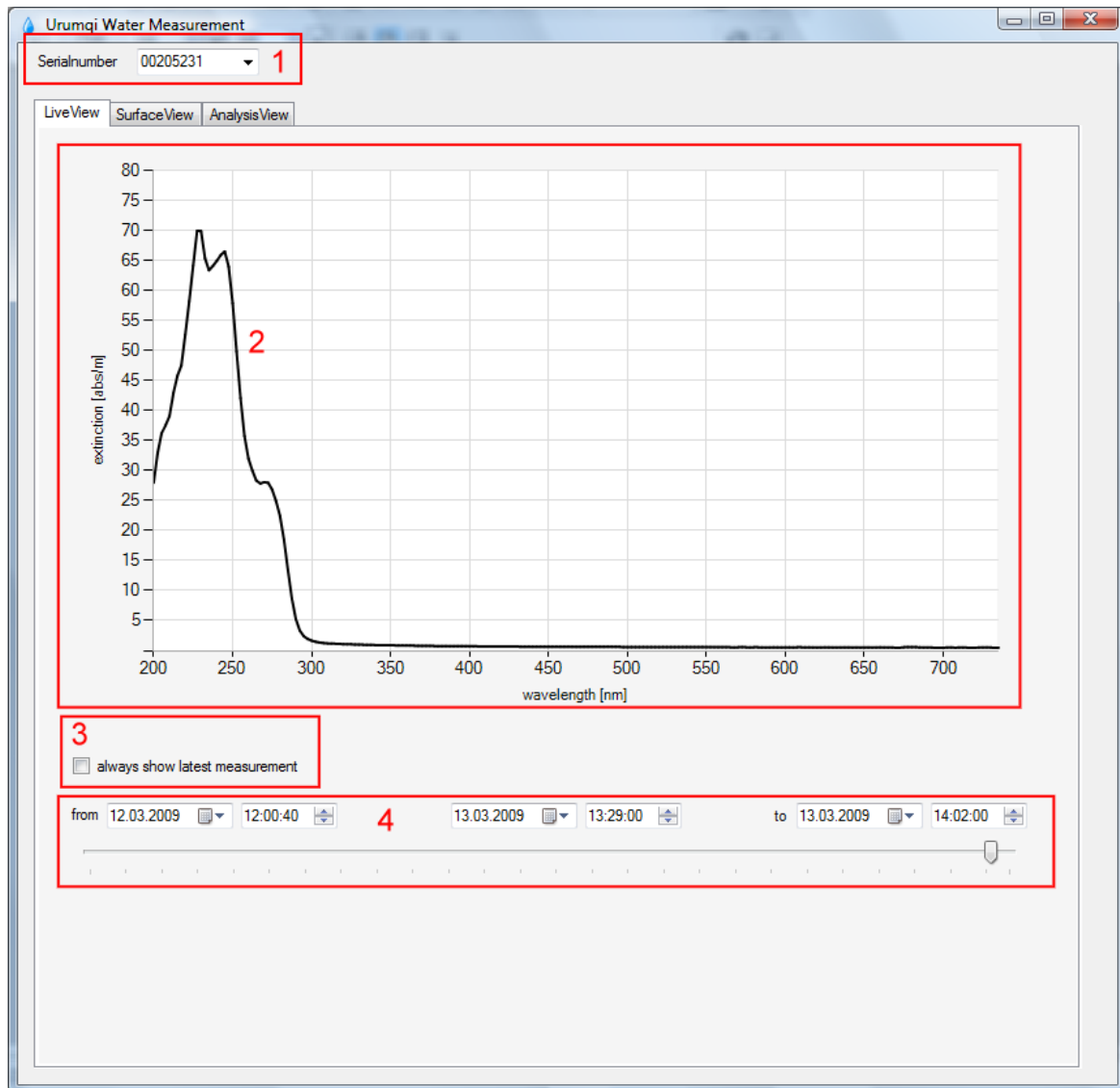
Live View

Figure 1 Live View in WaterVis

Live View is the standard view in WaterVis. After program start WaterVis shows in LiveView the latest measurement in the database. In Figure 1 you can see Live View in action. The following function (marked with the read boxes in Figure 1) can be handled:

1. Select the Serialnumber of the s::can spectrometer probe you want to examine.
2. The graph shows the fingerprint of a specific moment.
3. If you check the checkbox "always show latest measurement", WaterVis will automatically show the latest measurement in the database. This option is checked by default after program start.
4. With these controls you can choose the fingerprint. The "from" and "to" input fields set the intervals for the slider positioned under the input fields. You can select a point in time by moving the slider. Alternatively you can enter a time for the fingerprint in the input fields in the middle between "from" and "to".
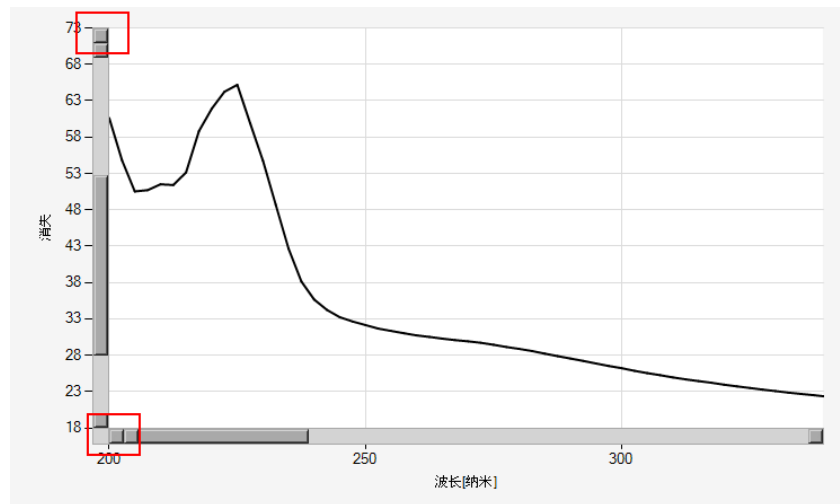
Zooming

Figure 2 Zoom function in Time View

As shown in Figure 2 you can use the zoom function of the chart to look at a special part of the curve in detail. Zoom into the graph by pressing the mouse button and moving the mouse while you are holding the mouse button down.

Use the scroll bars at the axes to move your zoom window. To reset the zoom, press on the buttons next to the scroll bars (red boxes in Figure 2).
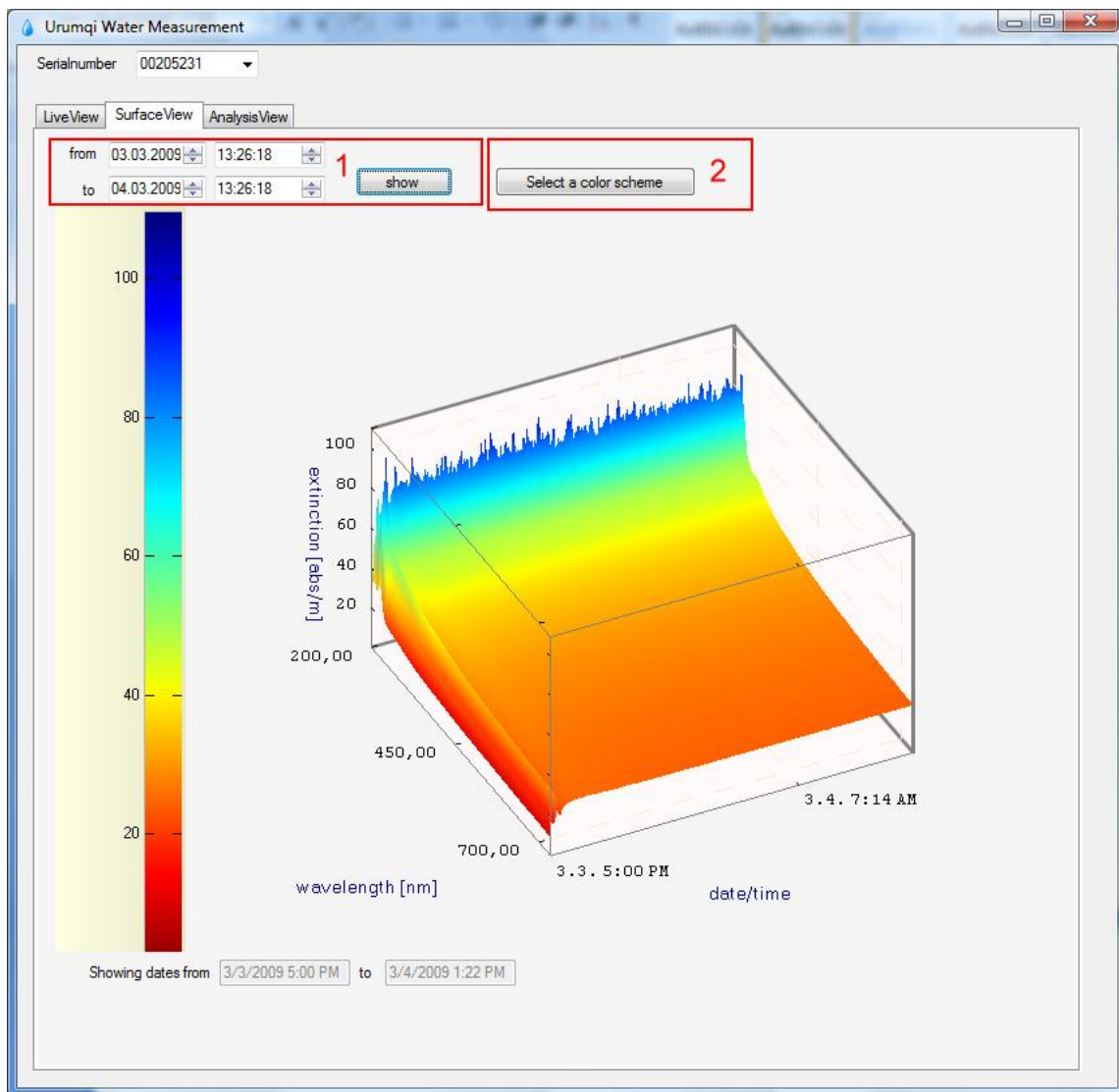
Surface View

Figure 3 Surface View in WaterVis

Figure 3 shows the Surface View in the WaterVis application. The surface view shows the same data as the Time View. In addition, the time is added to the diagram as a new axis. The result is a 3D surface of fingerprints over the time period. The select an appropriate time interval enter the "from" and "to" dates and press the "show" button (red box 1 in Figure 3). By pressing the "Select a colour scheme" button (red box 2 in Figure 3) you can choose different colours for the visualization.

By pressing the mouse button and moving the mouse while you are holding the mouse button down, you can change the view point. If you make a double click on the graphic, you can go to a from above view of the graphic (Figure 4).
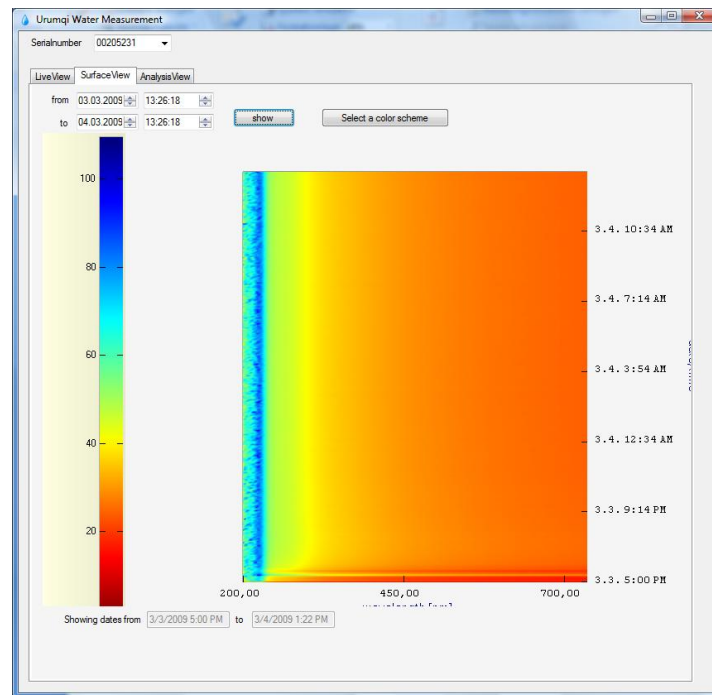
Figure 4 From Above View

Analysis View

In our last view, the user has the opportunity to filter the fingerprints interactively by varying the intervals of parameter values allowed. The view is set up as a combination of a parallel coordinate plot and an array of curves.

The parallel coordinate plot in the WaterVis application visualizes the given parameters from s::can and statistical calculations for the given fingerprints. These statistical calculations are the average value of the fingerprint, the variance of the fingerprint, and a Nalimov test compared to a given reference curve. The Nalimov test is a statistical outlier test. For every curve the Nalimov test is calculated. The test values the distance of every curve compared to the reference curve.

The select an appropriate time interval enter the "from" and "to" dates and press the "show" button (red box 1 in Figure 5). By pressing the "set reference" button (red box 2 in Figure 5Figure 3) you can choose a reference curve for the calculation of Nalimov test.
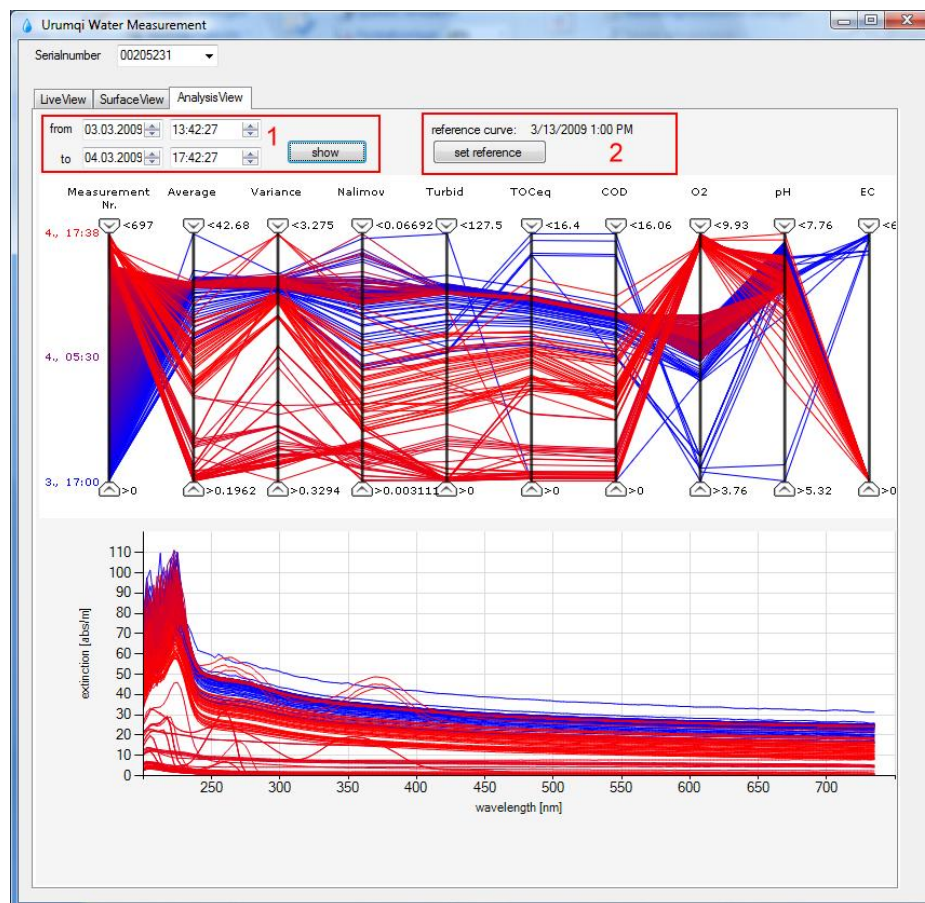
Figure 5 Analysis View

In the parallel coordinate plot you have sliders for every axis. The sliders limit the range of values for every axis. By operating the slider you can filter the lines you want (Example in Figure 6).
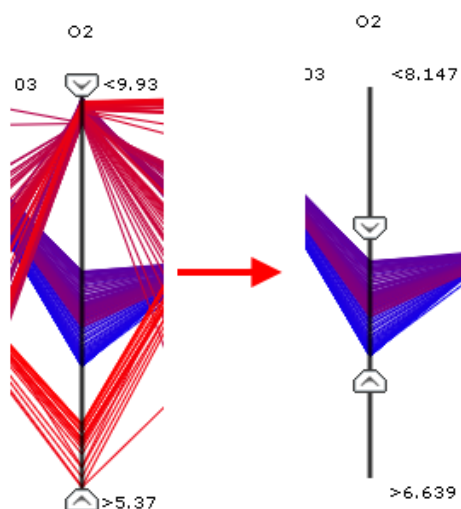

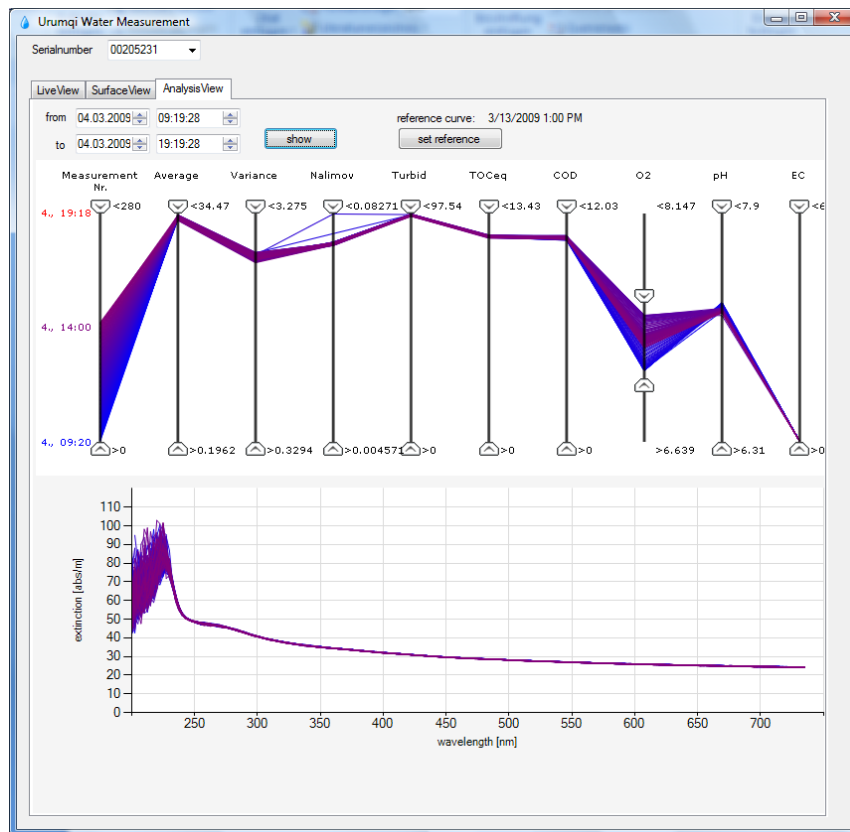**Figure 6 Filtering in the parallel coordinate plot**

Figure 7 Corresponding fingerprints for the parallel coordinate plot

The parallel coordinate plot in the upper area is linked with the array of curves. If you limit the lines in the parallel coordinate plot (as in Figure 7), only the corresponding fingerprints are shown in the lower diagram.

A further opportunity to look at one fingerprint in detail is shown in Figure 8. The user can select on line in the parallel coordinate plot with a mouse click. Afterwards the line becomes black and only the corresponding fingerprint for the line is shown. To show all lines again click into the empty room (where no lines are shown) in the parallel coordinate plot.
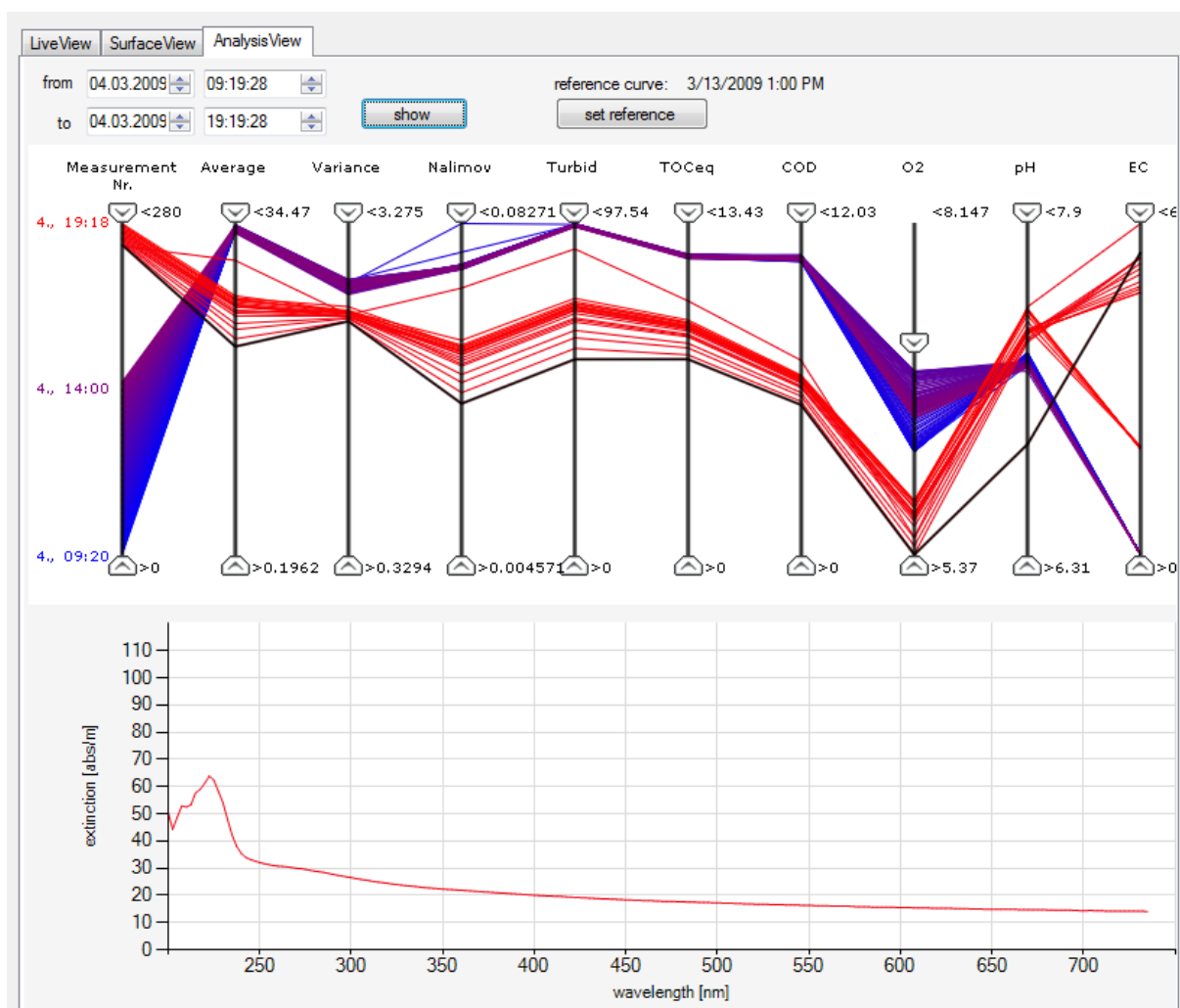
Figure 8 Selecting one line with mouse click

Changing the order of the axes

Sometime it makes sense to change to order of the axes in the parallel coordinate plot (compare Figure 9 and Figure 10). To do this, right click on an axis and move the mouse while you are holding the mouse button down. After you release the mouse button, the axis is on the new position.
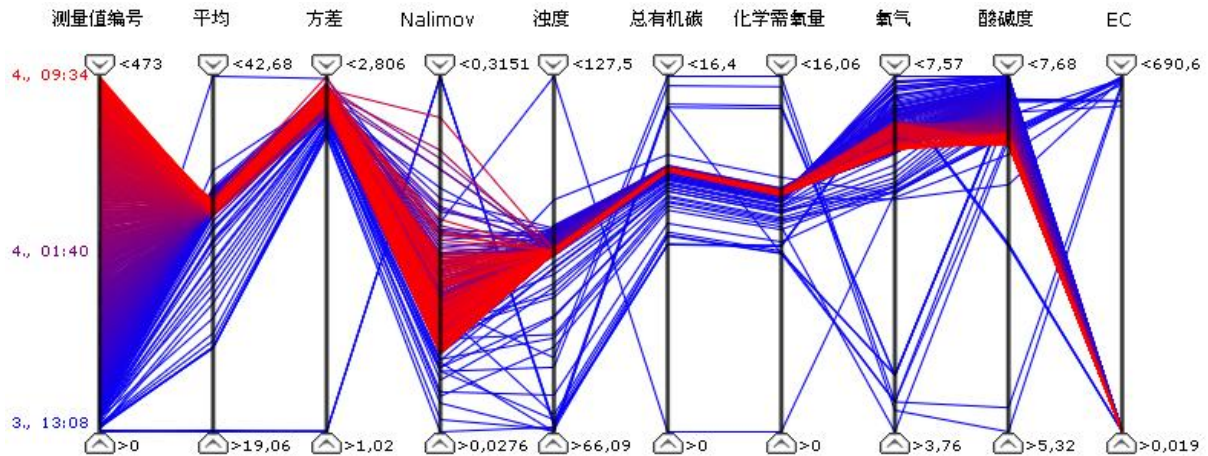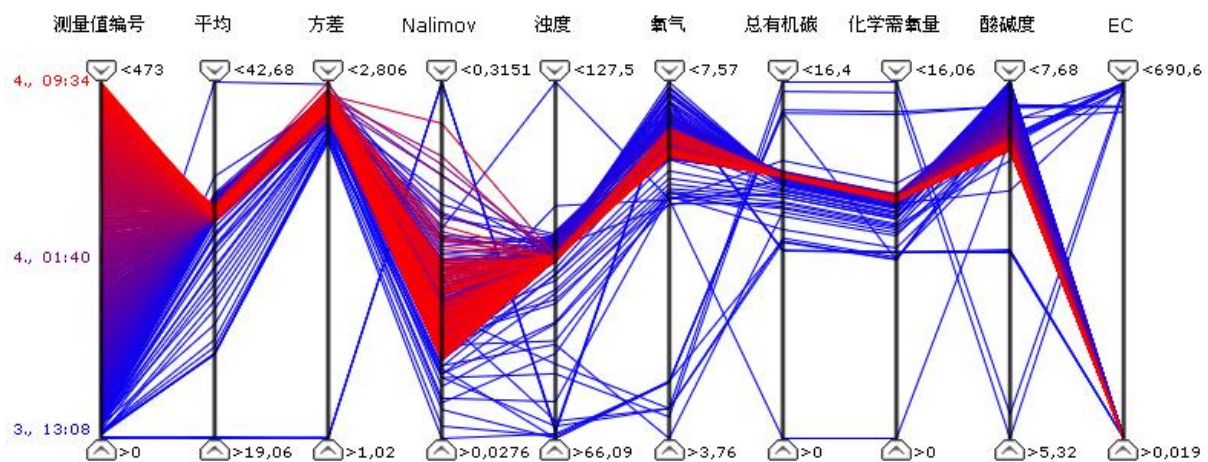

Figure 9 Parallel coordinate plot before moving an axis

Figure 10 Moving axis nr. 8 to position 6 (from left)