



# **BASEGRAIN 2.0**

## Tutorial 02

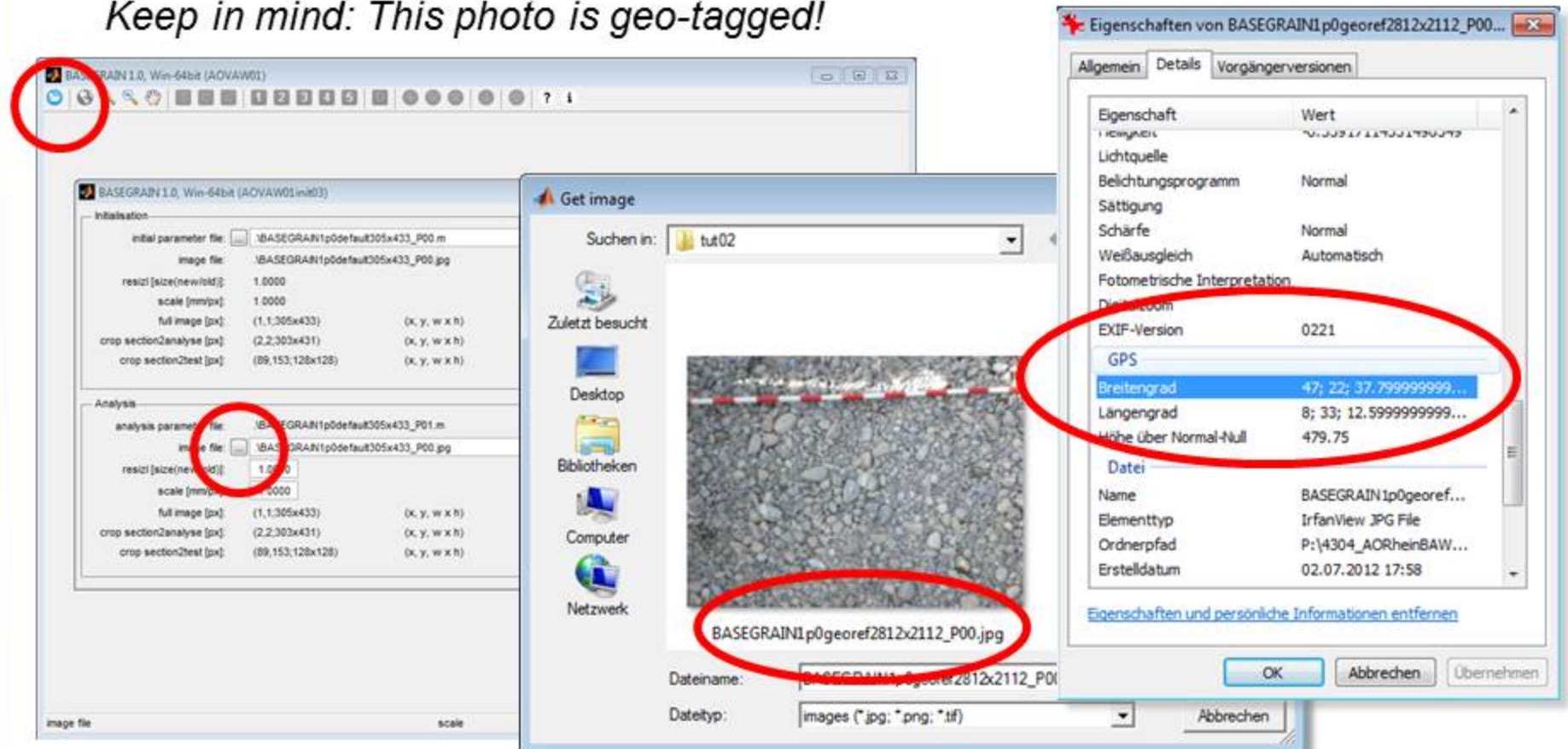
<http://www.basement.ethz.ch/services/Tools/basegrain>

M. Detert, VAW/ETHZ



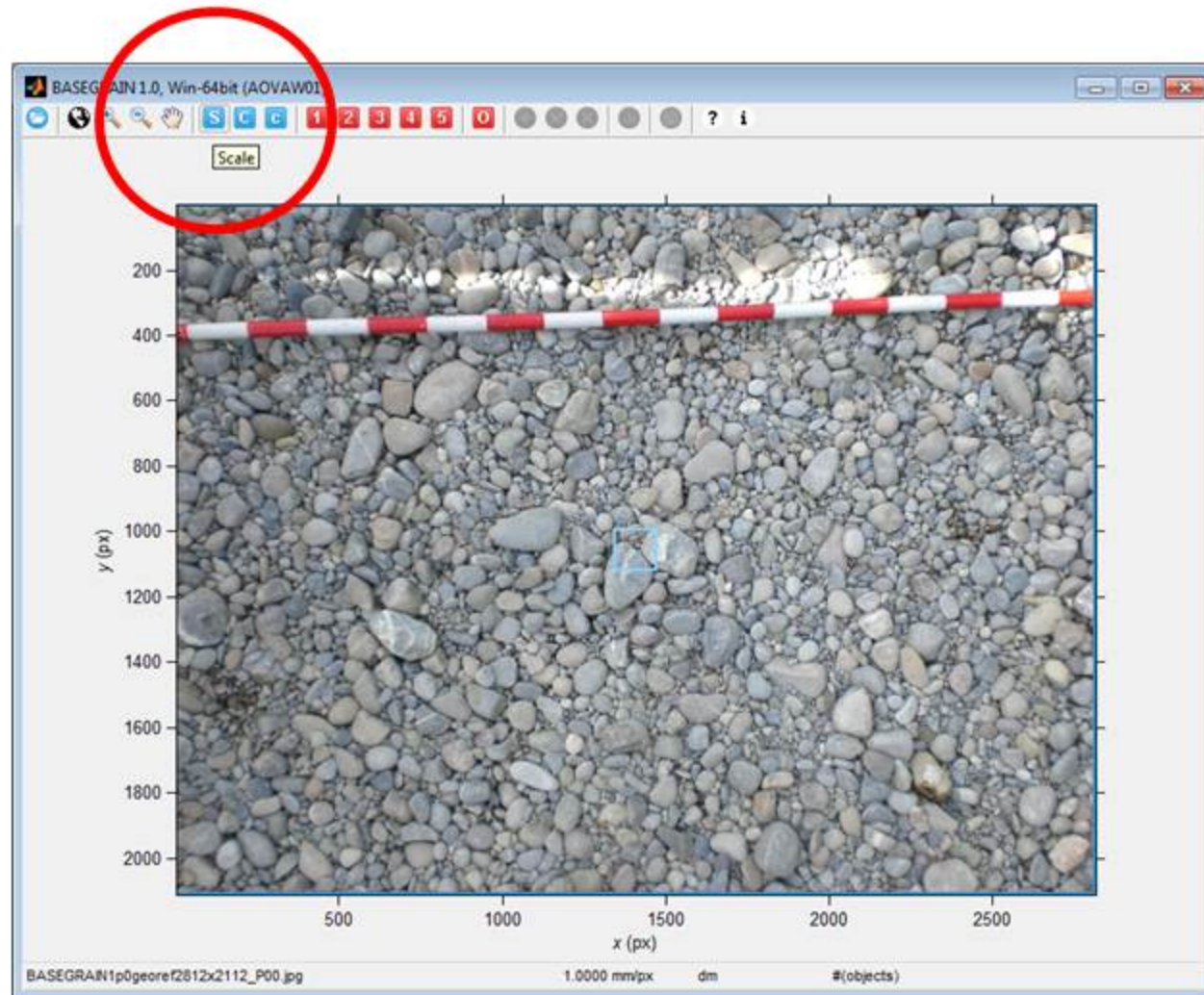
# Start BASEGRAIN 2.0

- Start BASEGRAIN2.0.exe, or, in case you are within a BASEGRAIN-session already, press *ESC* in the main-menu mode.
- Import BASEGRAIN1p0georef2812x2112\_P00.jpg (or similar)  
*Keep in mind: This photo is geo-tagged!*



# Scaling

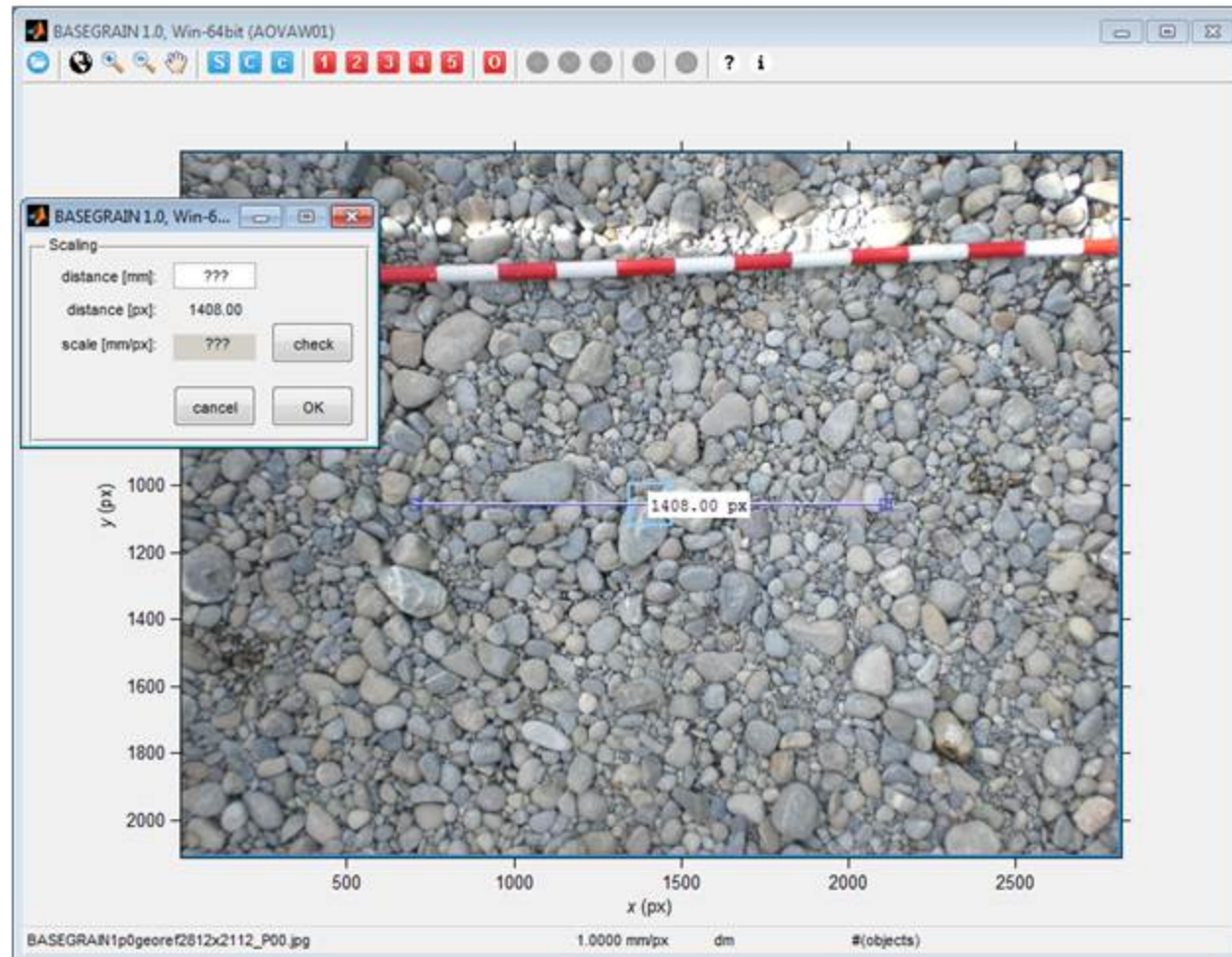
- Click the *Scale* button.





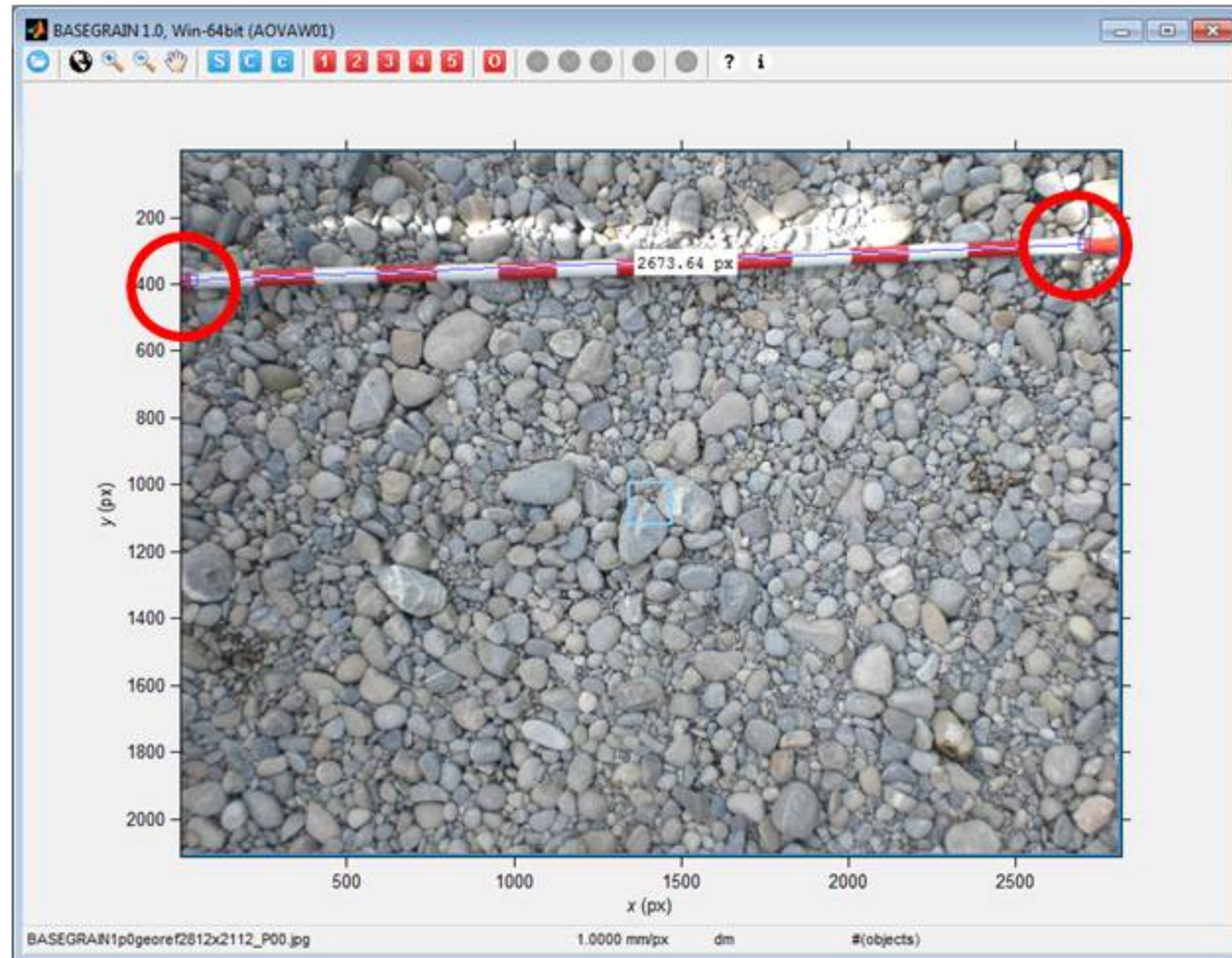
# Scaling

- The *scaling-box* and the *interactive scaling device (ISD)* are popping up.



# Scaling

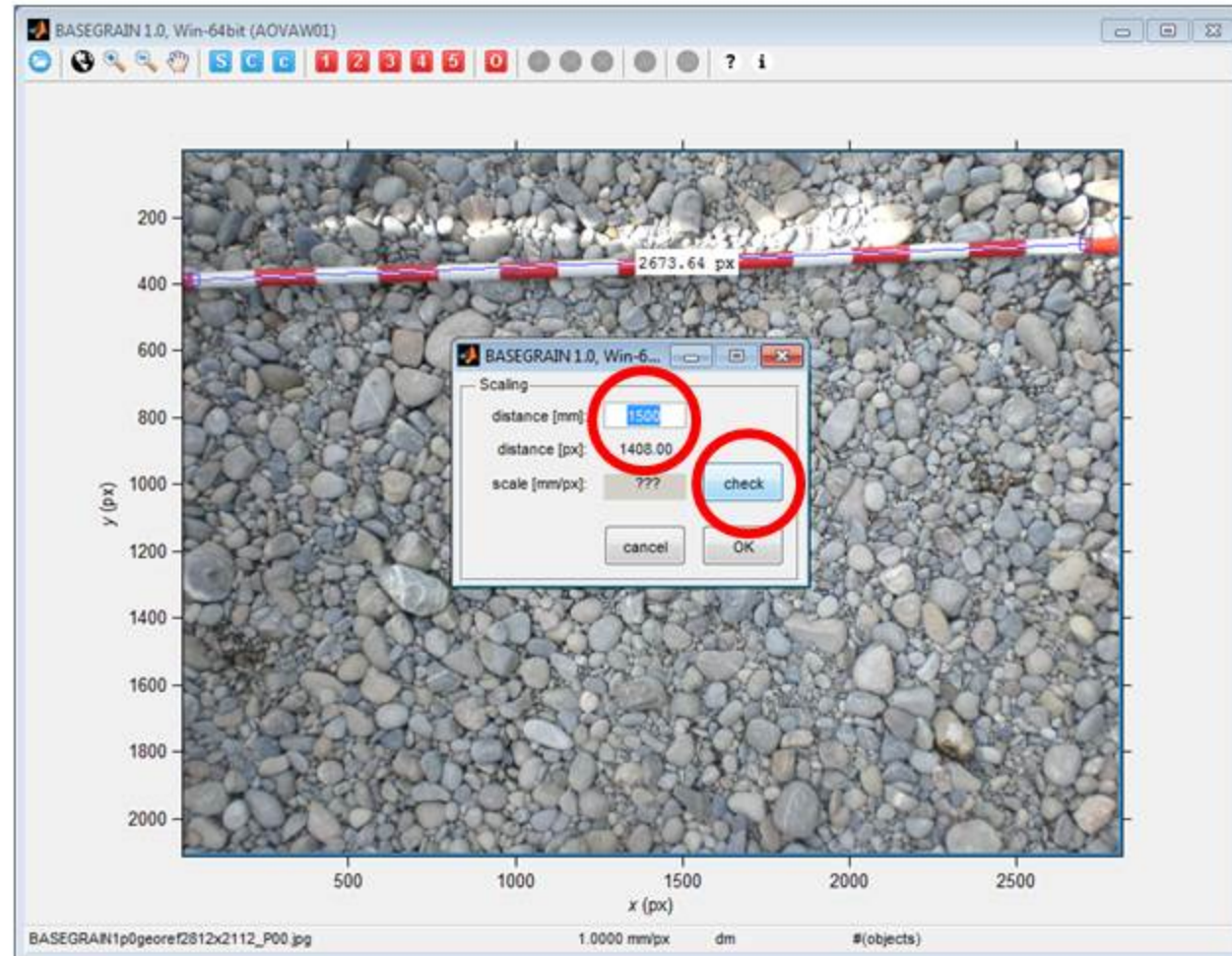
- Shift the endpoints of the *ISD* to known distance points on the photo.  
*Hint: You may use the zoom buttons, but you should switch them off afterwards.*





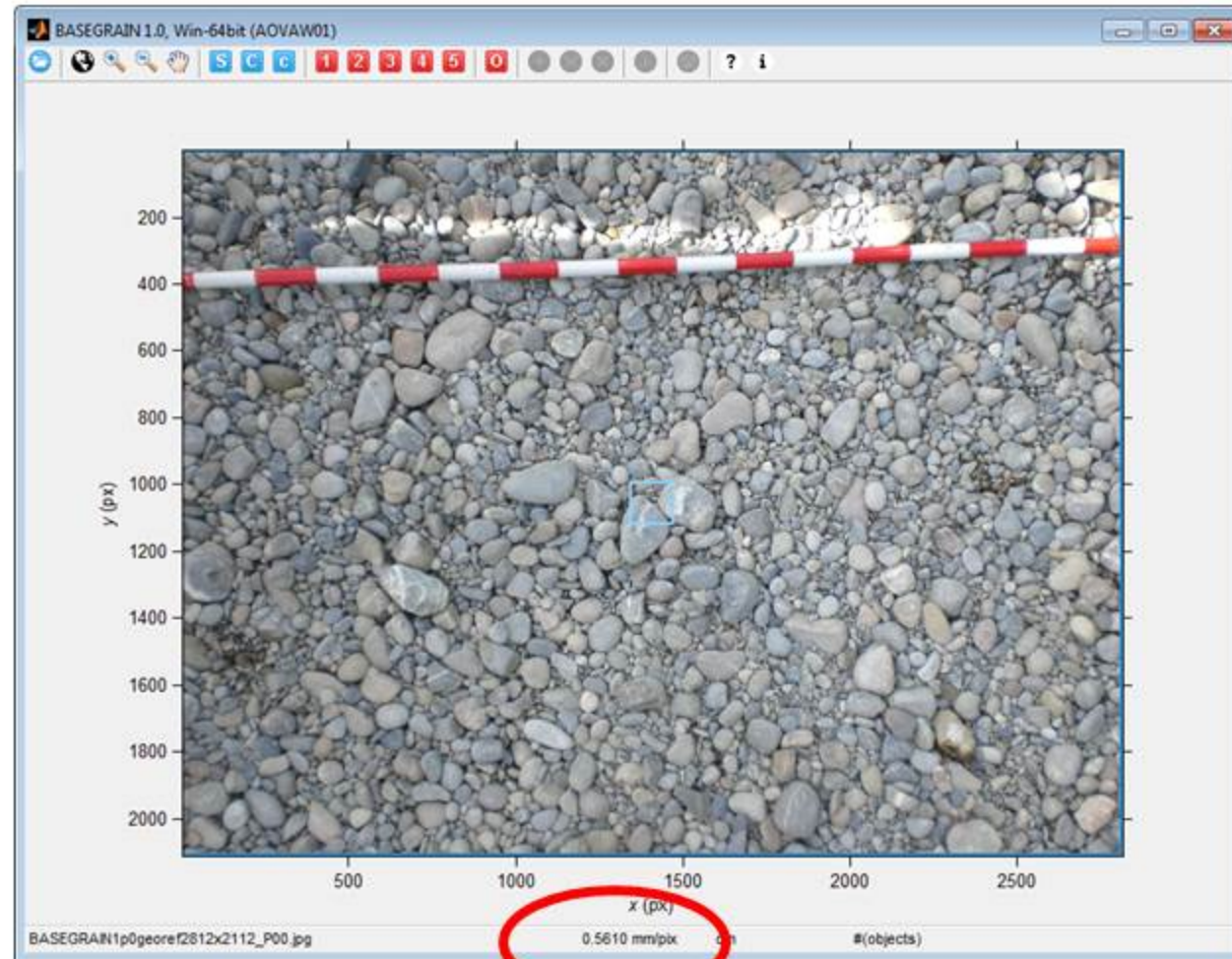
# Scaling

- Bring the *scaling-box* to front.
- Type in the distance in units of [mm] (here: '1500') and click the *check* button.



# Scaling

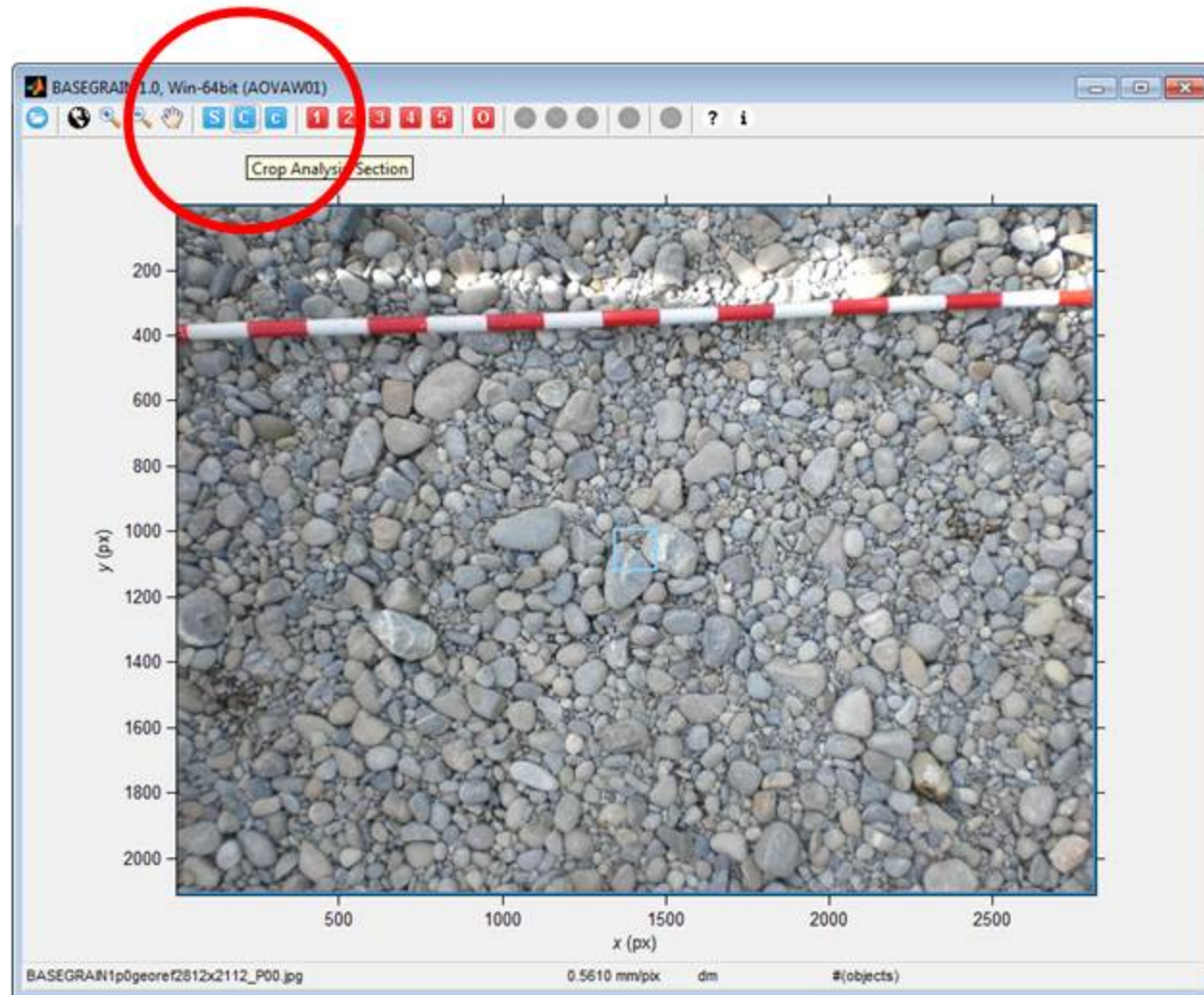
- After you have clicked the *OK* button, the photo is scaled (here: 0.561 mm/px).





# Crop image

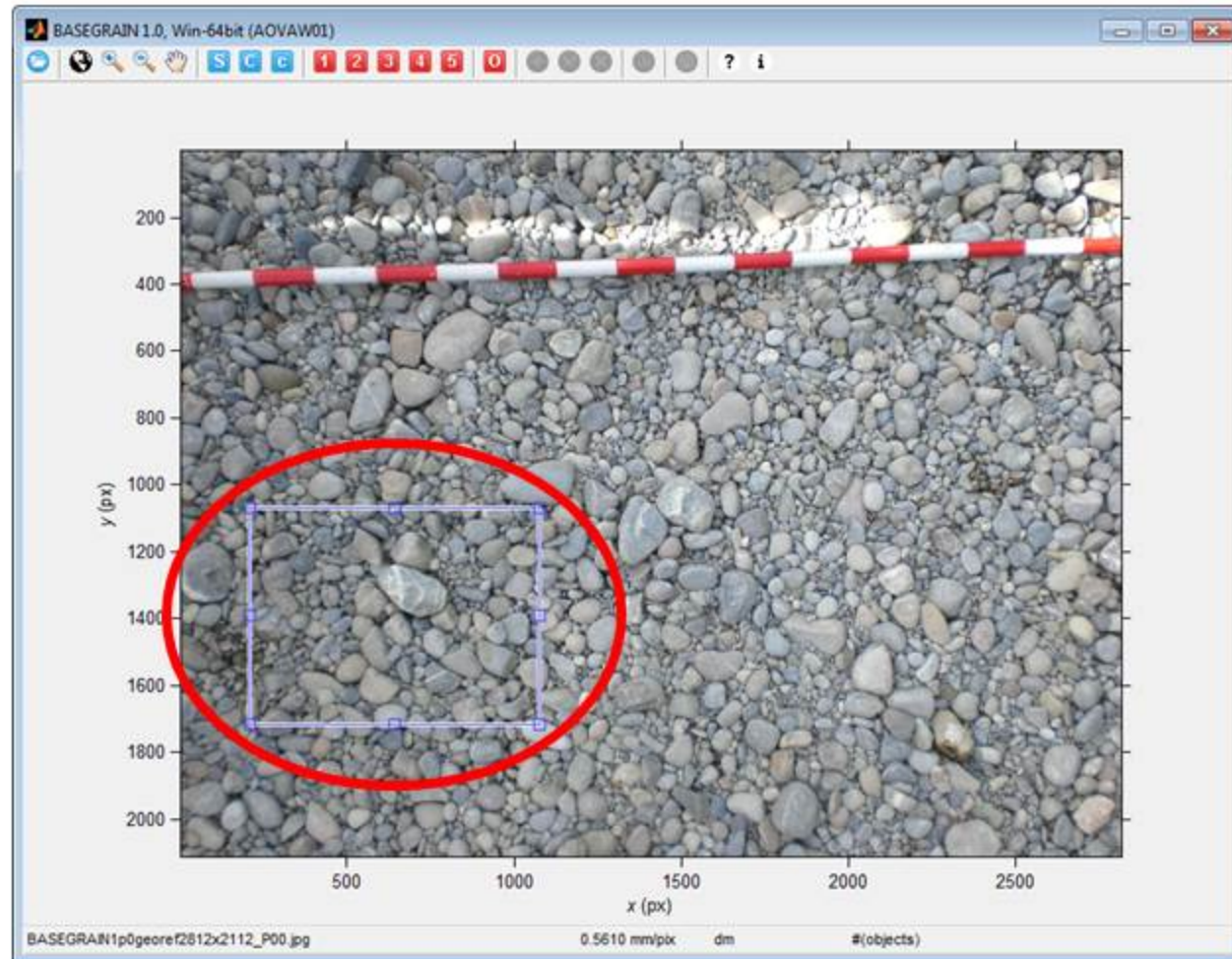
- Click the *Crop Analysis-Section* button.





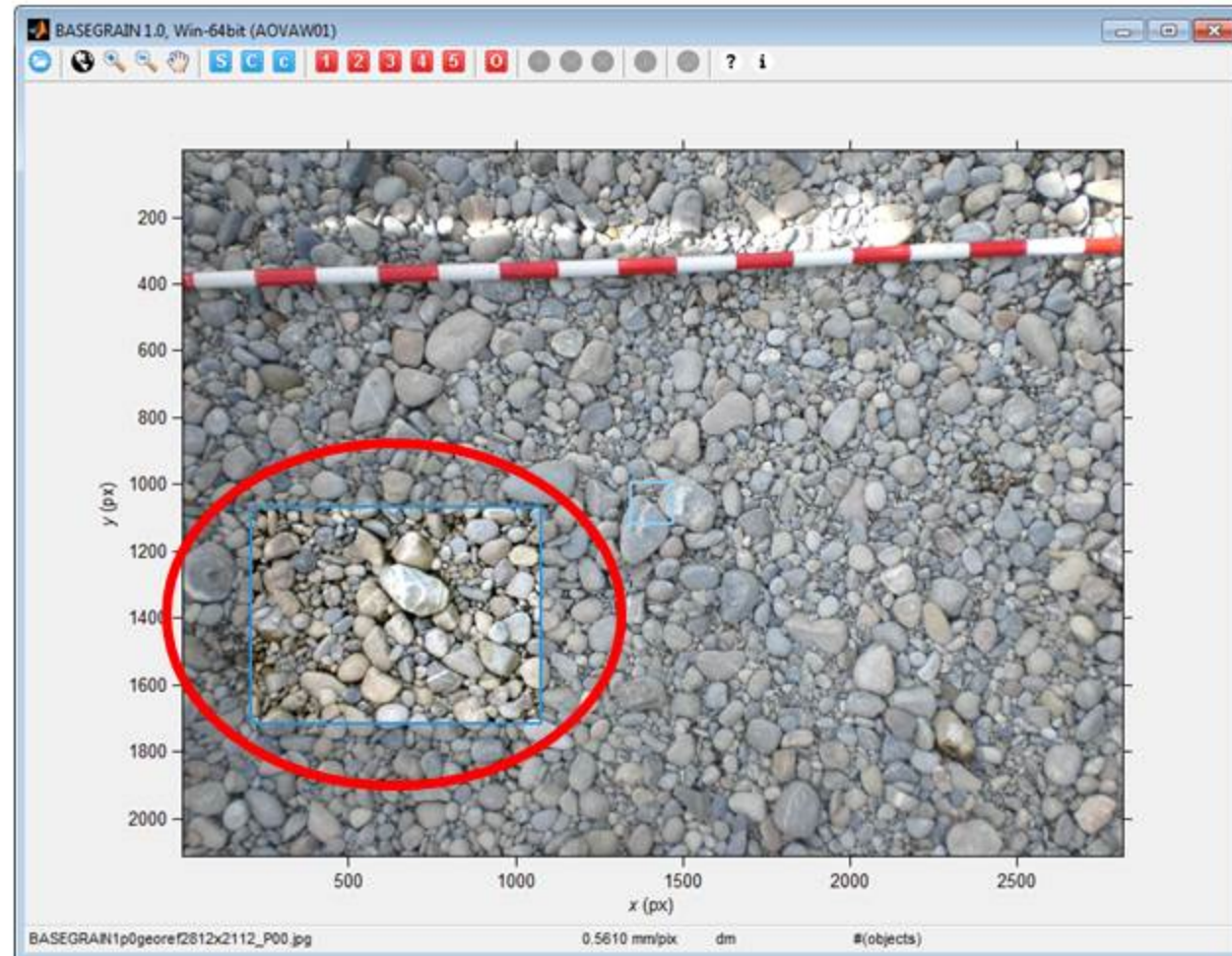
# Crop image

- Define the area-to-analyse by using sensible left and right mouse-clicks.  
*Hint: In BASEGRAIN 2.0, the area should be  $< \sim 2500^2$  px.*



# Crop image

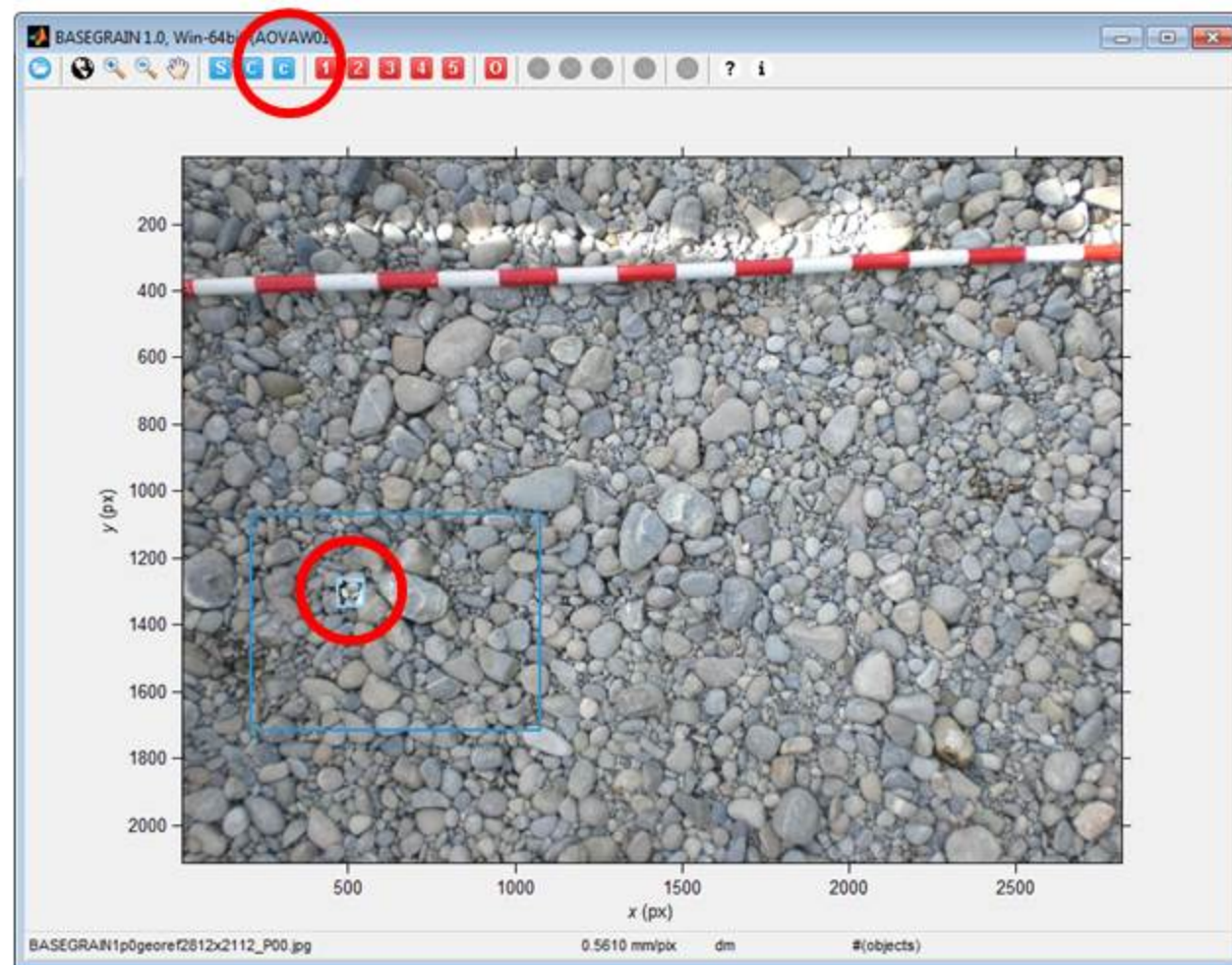
- After a final double left mouse-click the area has been cropped successfully.





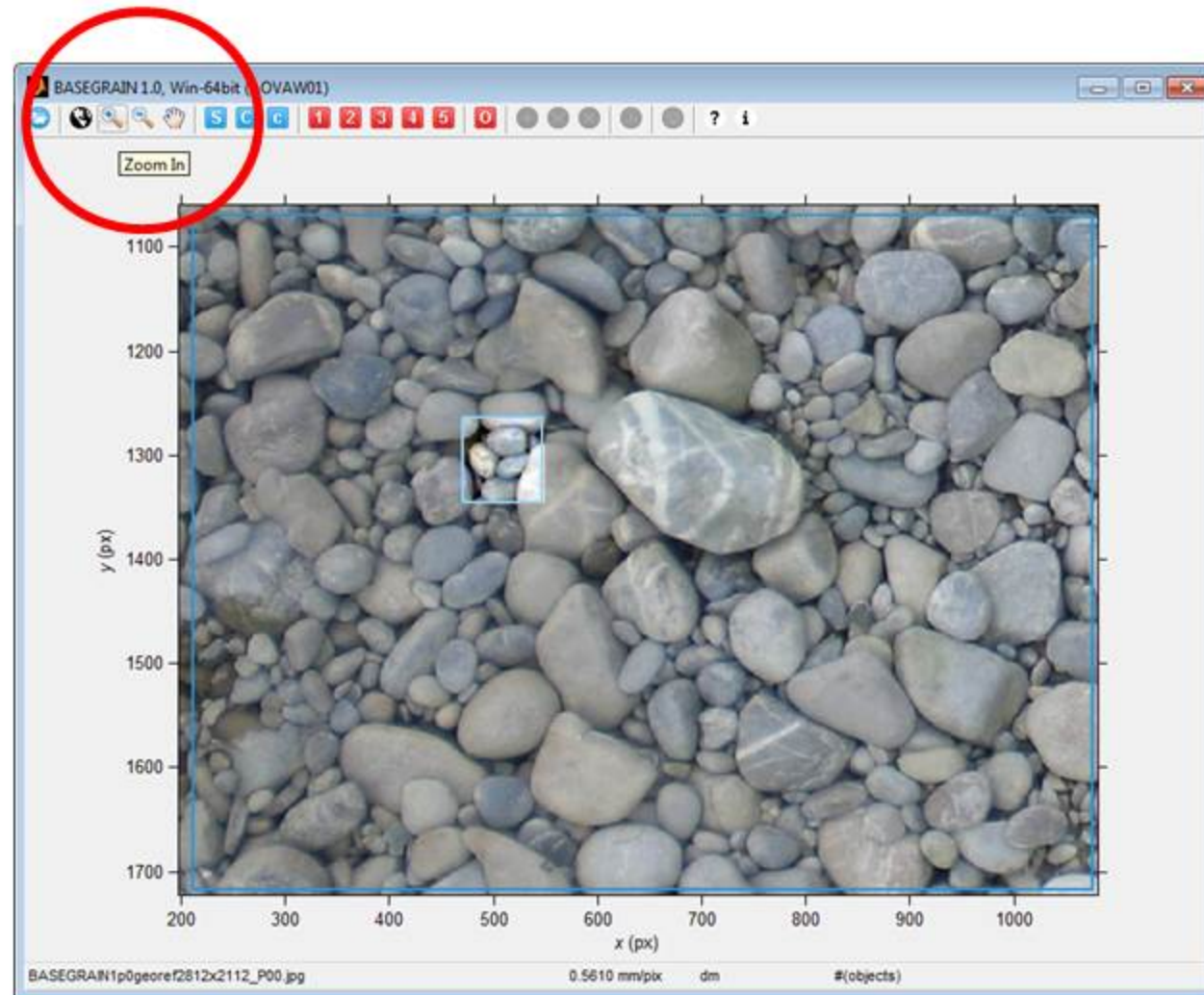
# Crop image

- Click the *Crop Test-Section* button and repeat the previous procedure, where you now define a smaller test-area for tuning the object detection parameters.



# Crop image

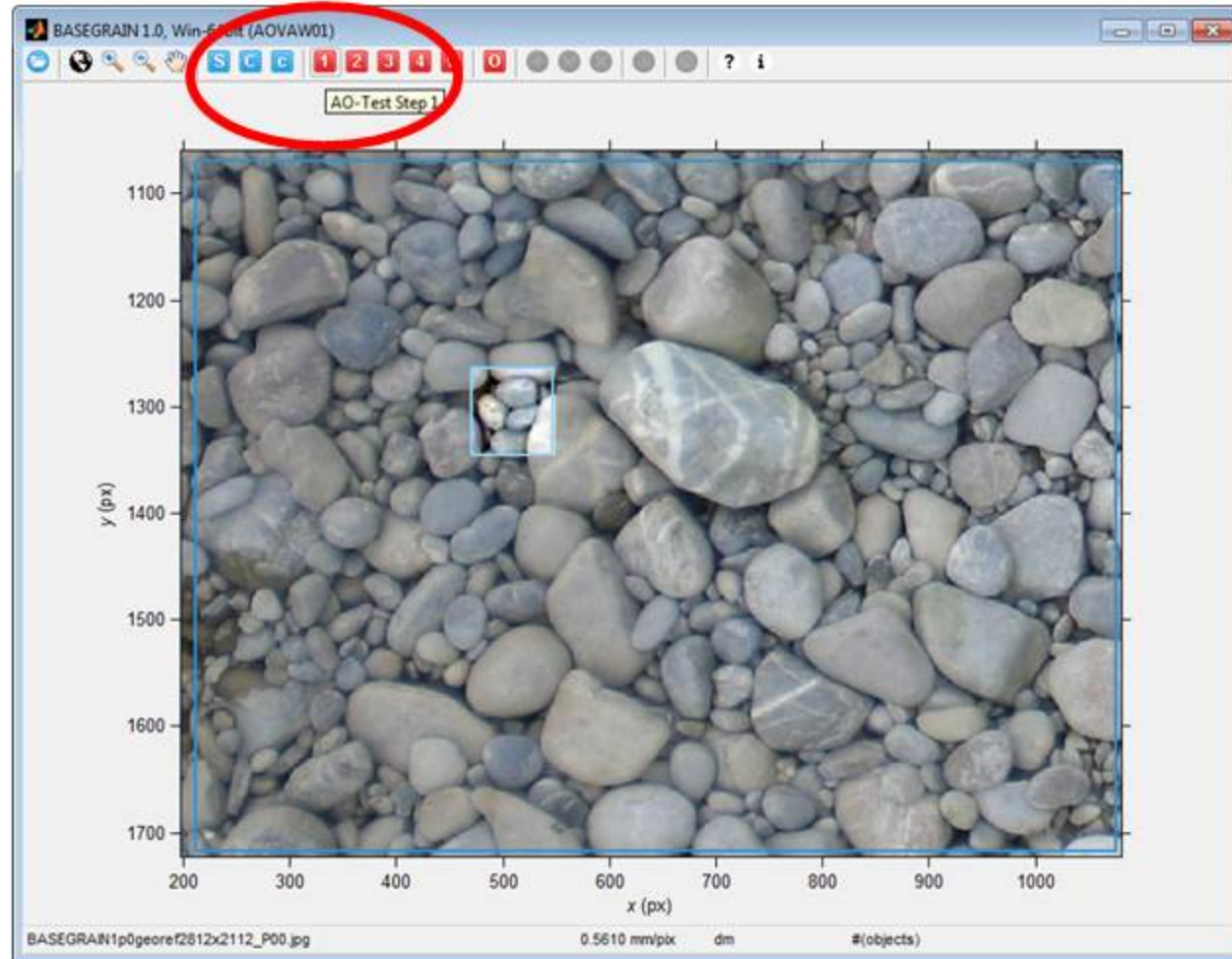
- Use the *Zoom In* button, but don't forget to switch it off afterwards (function end).





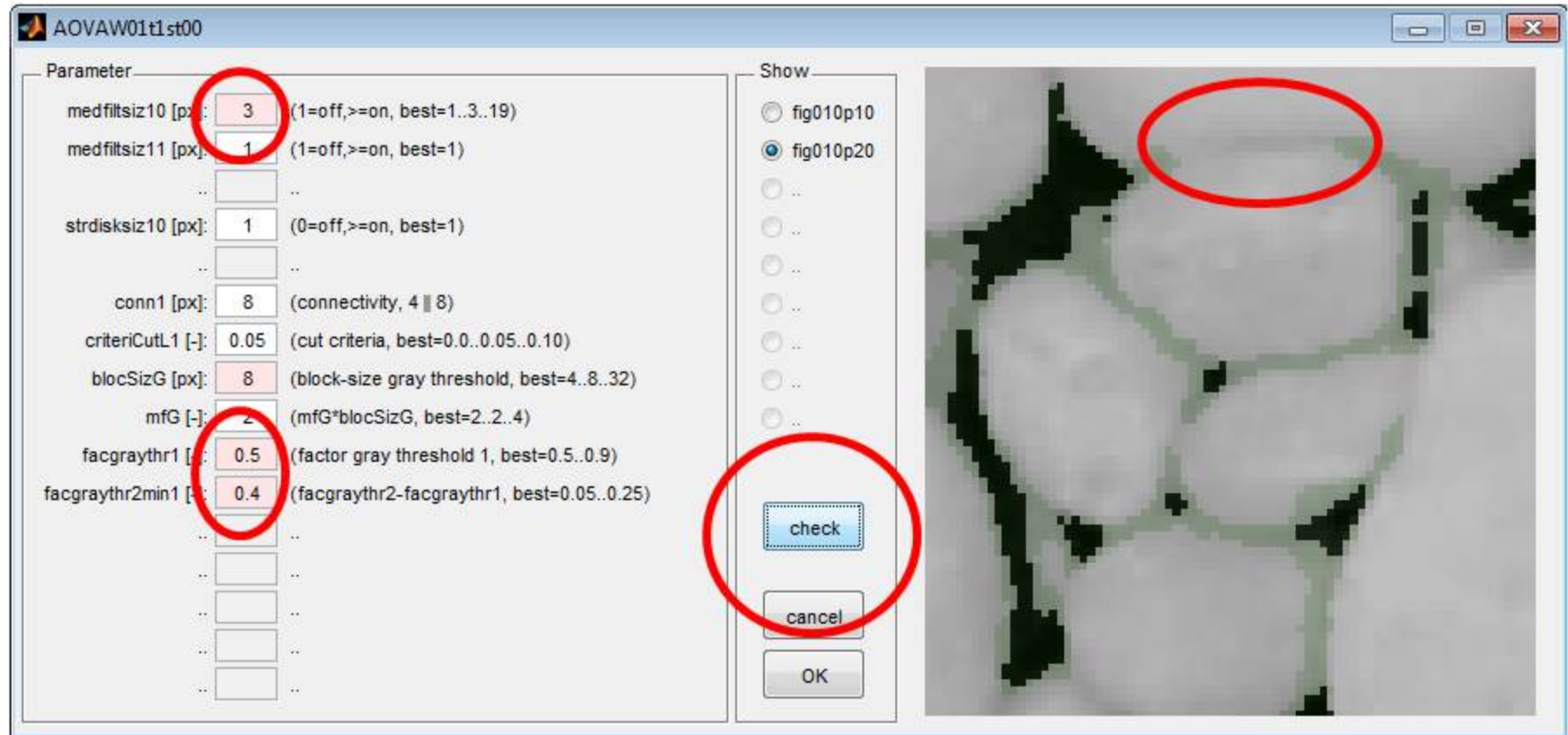
# Parameter tuning

- Click the *AO-Test Step 1* button for tuning the parameters of Step 1 'Interstice detection by double grayscale threshold' (see: Detert & Weitbrecht, 2012).



# Parameter tuning

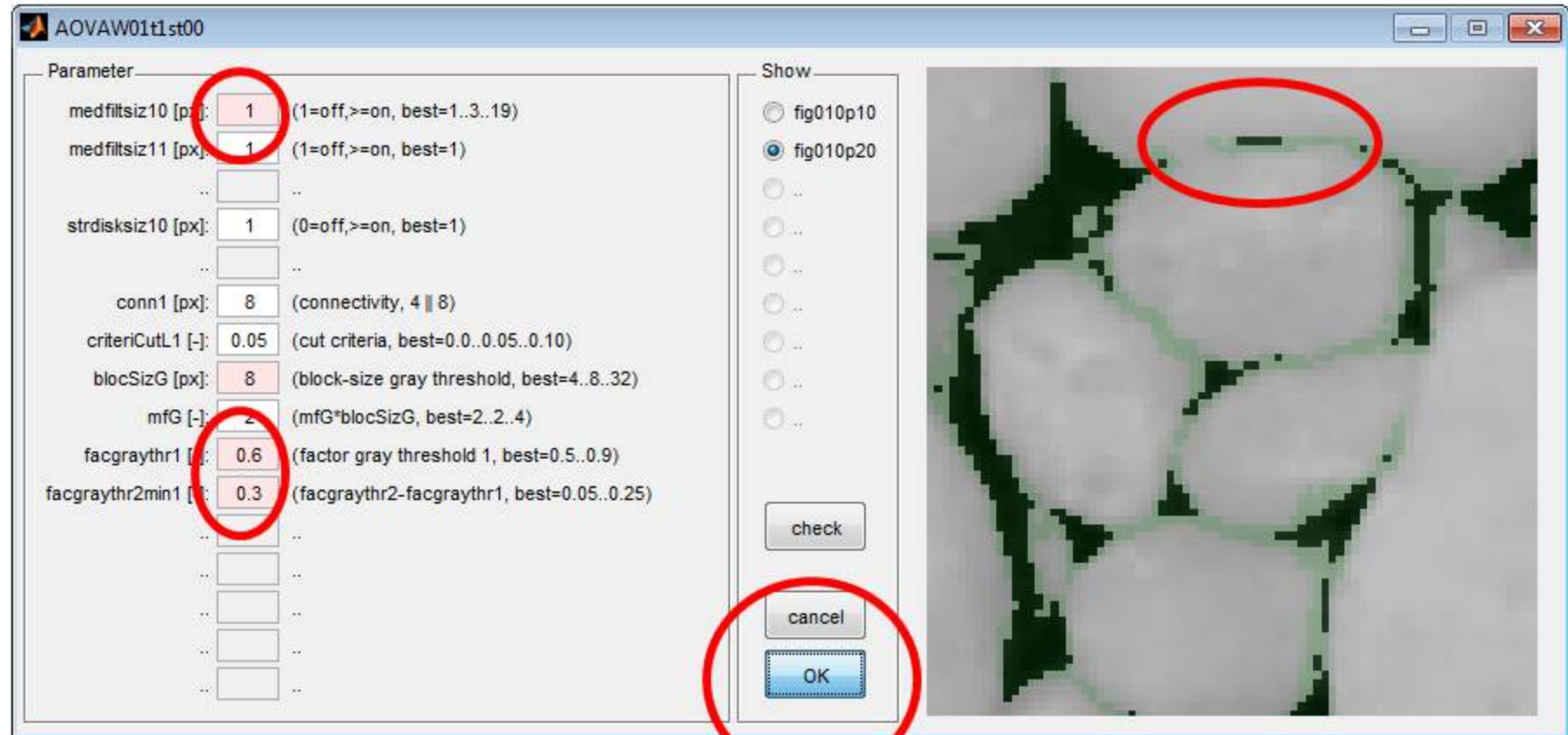
- Click the *check* button to test the results for the actual parameter set.
- Optionally, change single parameters and click the *check* button again.  
*Hint: Suppress intra-granular noise, but pronounce interstices.*





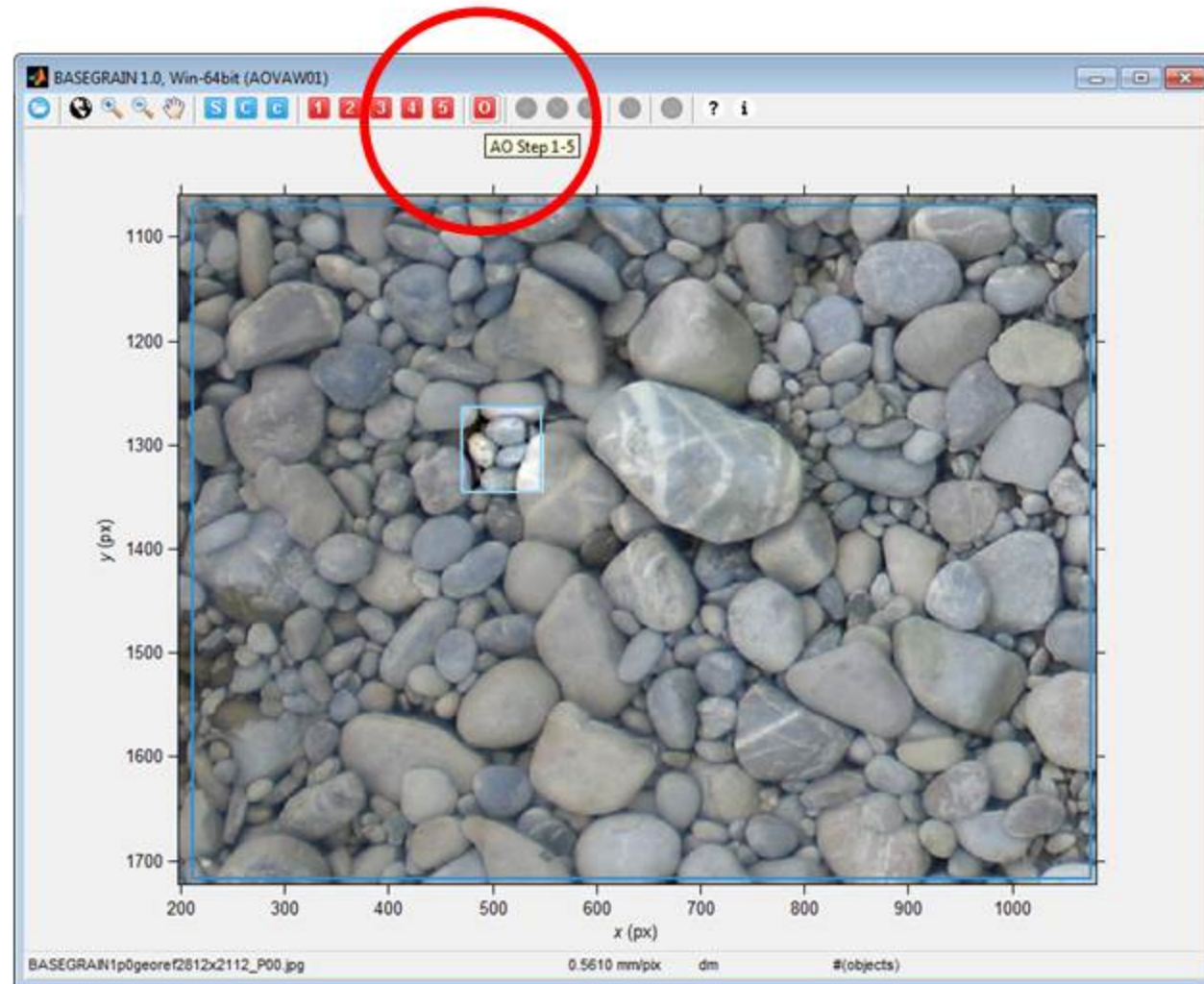
# Parameter tuning

- Once you have found the optimal parameter set, click the *OK* button.
- Repeat similar procedures to find optimal parameter sets at *AO-Test Step 2-5*.



# Automatic object detection

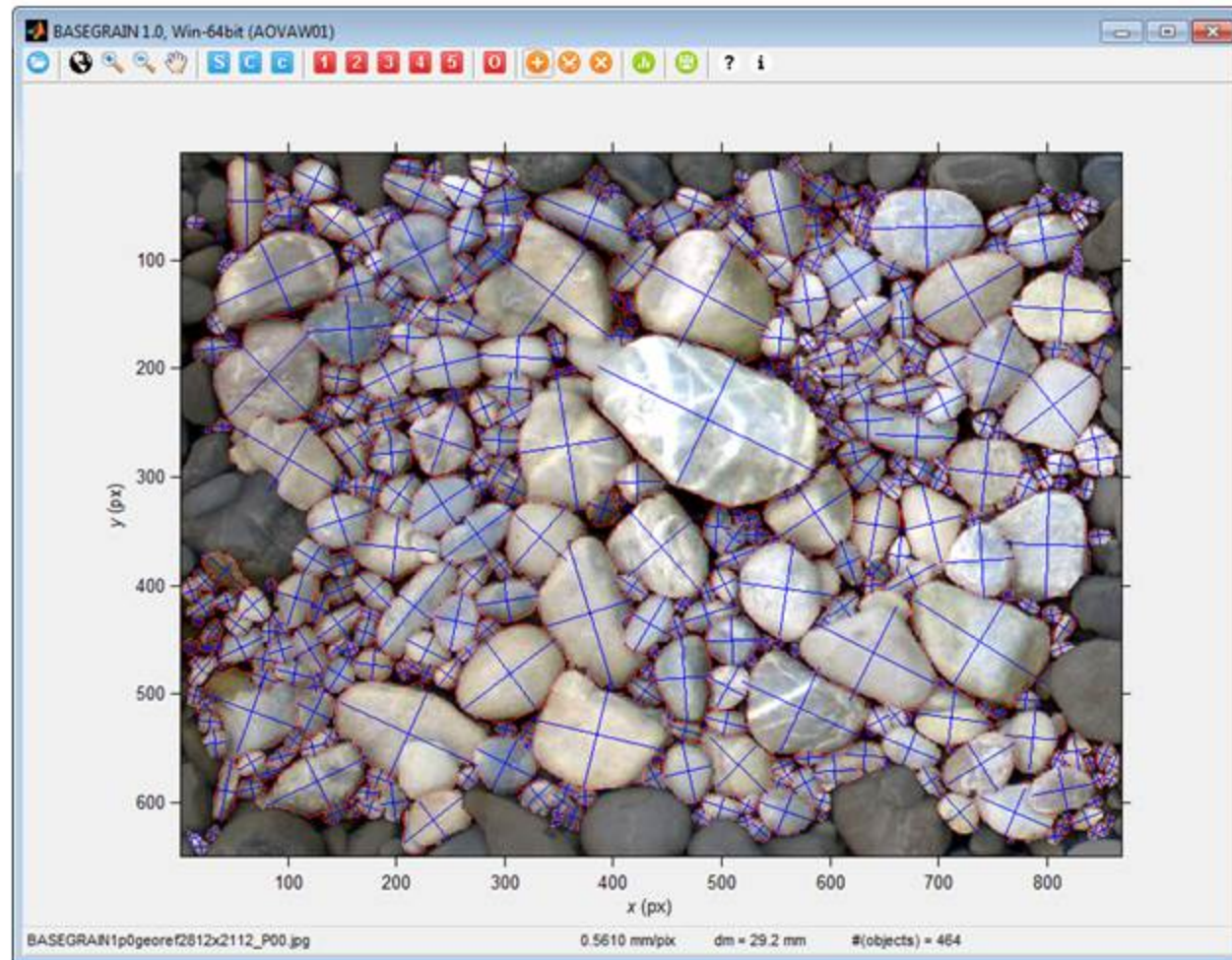
- Click the *AO Step 1-5* button.





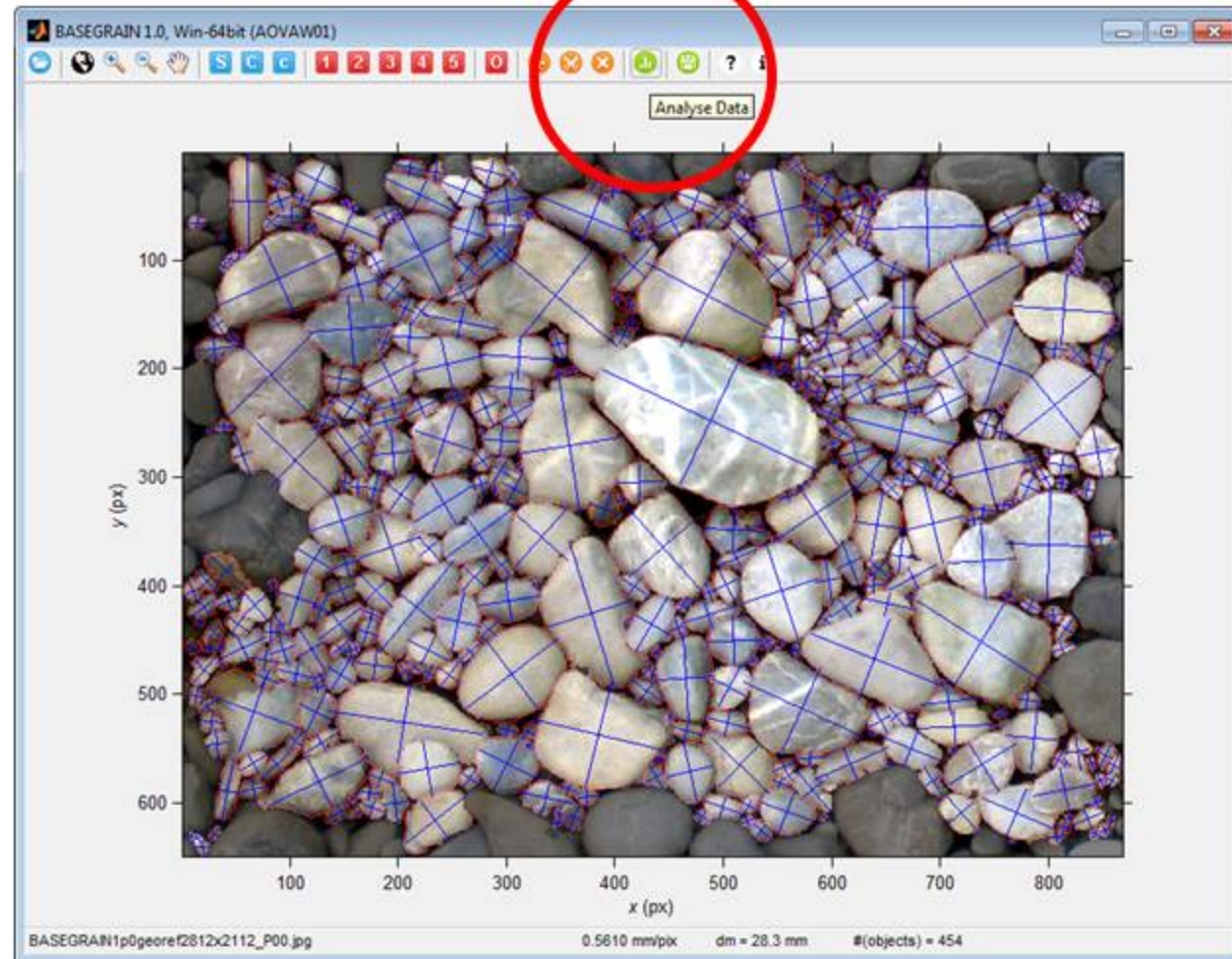
# Automatic object detection

- Tataa!
- Use Merge, depart and blank out to tune some misleading objects...



# Analyse data

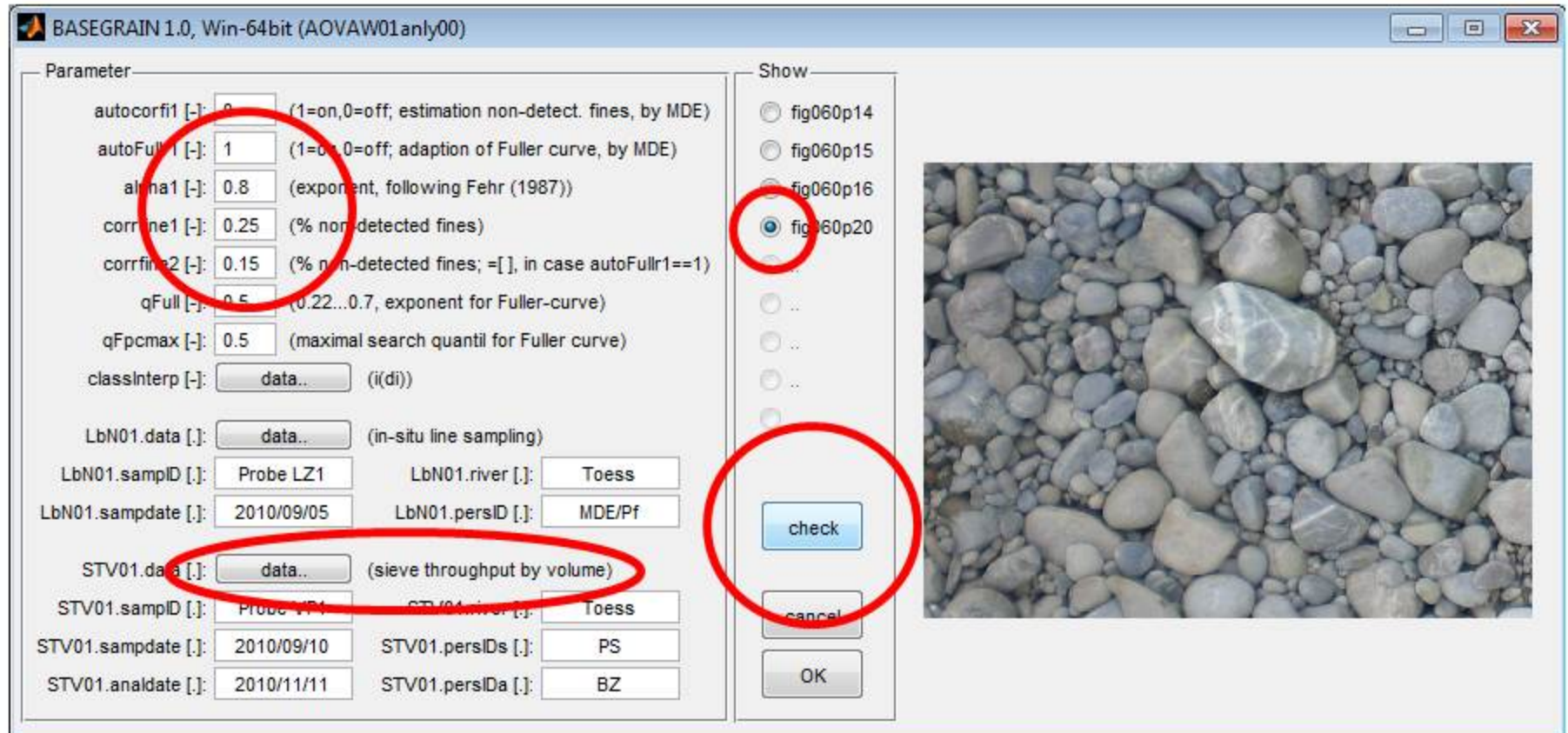
- Tataa!
- Click the *Analyse Data* button.





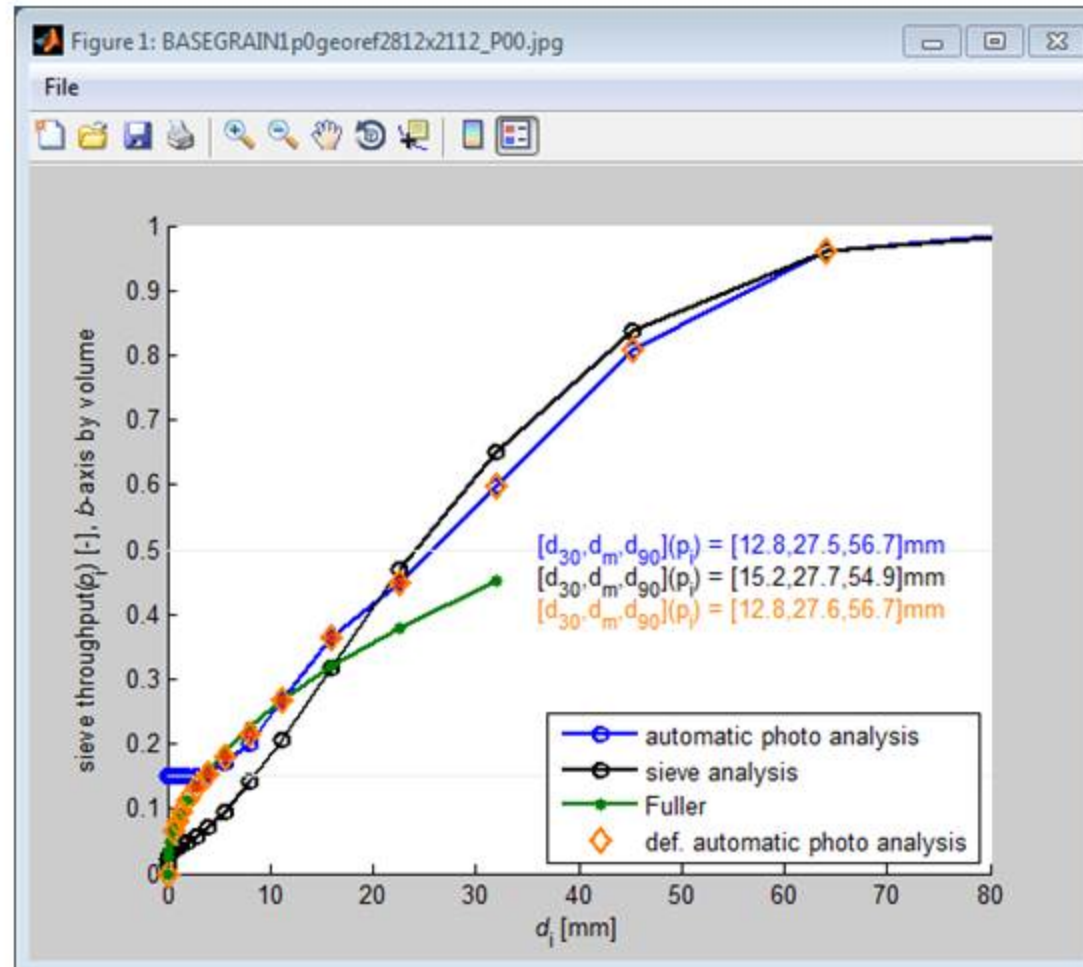
# Analyse data

- Press the *check* button to estimate the grain size distribution (GSD) of the subsurface layer following the methodology of [Fehr \(1987\)](#).  
*Note: You may add data from laboratory sieving (or in-situ line sampling).*



# Analyse data

- The GSD of the subsurface layer estimated via the  $b$ -axis of detected grains' areas is shown in comparison to a GSD gained by laboratory sieving.

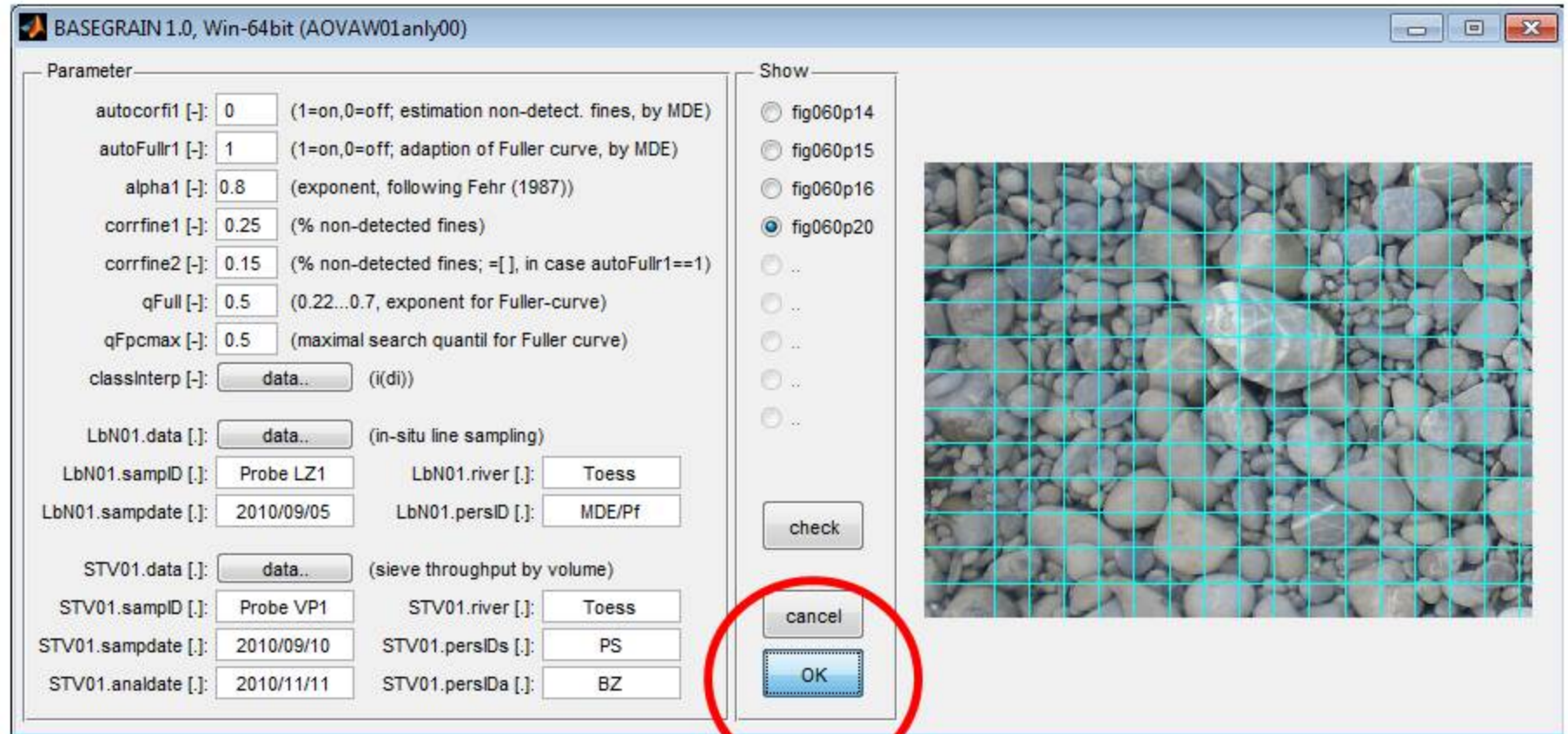




# Analyse data

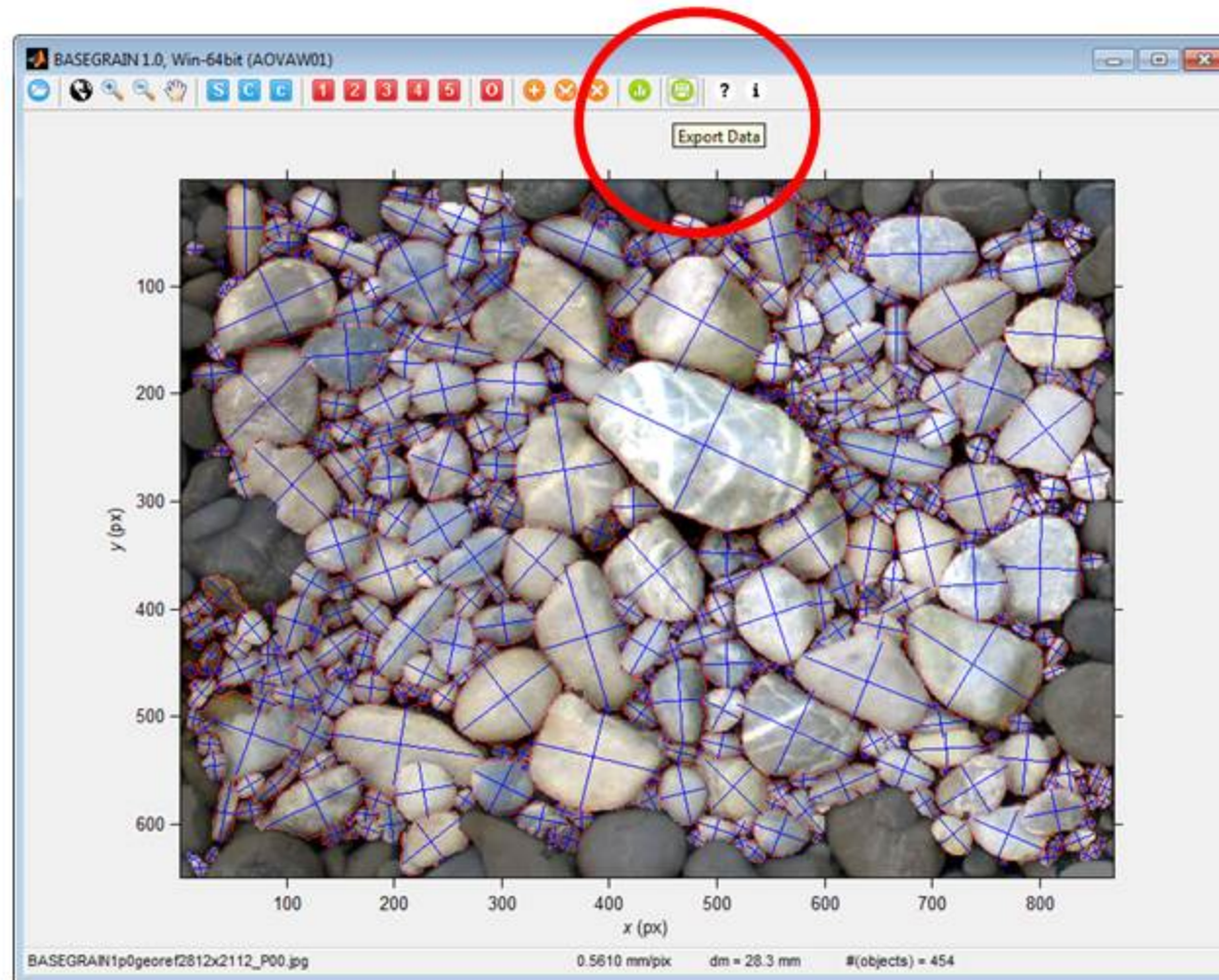
- To finish the analysis, press the OK button.

*Note: BASEGRAIN 2.0 applies quasi line-sampling (Fehr) or **quasi area-sampling using the whole (a, b, area) information of the separated grains.***



# Export

- Click the *Export Data* button.





# Export data to a control parameter file

- Save the control parameter as text file \*.m.
- Open the file with a text editor.

BASEGRAIN 1.0, Win-64bit (AOVAW01expo02)

**Controls**

control parameter file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.m

image file: \BASEGRAIN1p0georef2812x2112\_P00.jpg

scale [mm/px]: 0.5610

**Results2EXCEL**

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.xlsx

**Results2MATLAB**

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.mat

**Results2GIS**

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.shp

phi(WGS84) [°, ', '']: 47.00 22.00 38.80  
 lambda(WGS84) [°, ', '']: 8.00 33.00 12.40  
 h(WGS84) [m]: 500.00

phi(WGS84) [°]: 699999.76  
 lambda(WGS84) [°]: 099999.97  
 h(WGS84) [m]: 600.05

Xy(CH1903) [m]: 699999.76  
 Yx(CH1903) [m]: 099999.97  
 h(CH1903) [m ü.M.]: 0600.05

Buttons: checkWGS, saveWGS, checkCH, saveCH

# Export data to a control parameter file

- Explore the control parameter file.

*Note: To use the file for further analysis of images, you may change parameters or delete the lines behind ‘%% part B00.xx: merge, depart and blank values’.*

```

BASEGRAIN1p0georef2812x2112_P01.m - Editor
Datei Bearbeiten Format Ansicht ?
=====
% file: P:\4304_AORheinBAW\07_AOVAW\20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112_P01.m
% date: 12-Sep-2012 12:53:00
% task: default control data for BASEGRAIN1p0georef2812x2112_P00.jpg
% notes: _ save everytime as ASCII-text
%       _ enjoy AOVAW01!
%       _ ...
%
%=====
%% part 000.xx: head
handles.fig000p30sho = 0; %l-on, 0=off
handles.fig000p30sav = 0; %l-on, 0=off
%---
handles.pathIO = 'P:\4304_AORheinBAW\07_AOVAW\20120806\BASEGRAIN1.0\tut02\';
handles.fileIO = 'BASEGRAIN1p0georef2812x2112_P00.jpg';
% handles.IO = imread(handles.fileIO);
handles.M = 0.5610; %0.1...5.0 [mm/pix]
handles.cF = [1 1 2816 2112]; %[xmin ymin width height]
handles.cA = [210 1069 867 649];
handles.cT = [470 1263 78 83];
%---
handles.resizi = 1.0000;
%---
%---
%---
%---
%---
%---
%---
%% part 010.xx: interstice detection by grayscale threshold
handles.fig010p10sho = 0;
handles.fig010p10sav = 0;
handles.fig010p20sho = 0;
handles.fig010p20sav = 0;
%---
handles.medfiltsize10 = 1;
handles.medfiltsize11 = 1;
%---
handles.strdisksiz10 = 1;
% handles.se10 = strel('disk', handles.strdisksiz10);
%---
handles.conn1 = 8;
handles.critericut11 = 0.05;
handles.blocSizeG = 8;
handles.mFG = 2;
handles.facgraythr1 = 0.6;
handles.facgraythr2min1 = 0.3;
%---
%---
%---

```

```

BASEGRAIN1p0georef2812x2112_P01.m - Editor
Datei Bearbeiten Format Ansicht ?
%---
%---
%---
%---
%---
%---
%---
%% part 800.xx: merge, depart and blank values
handles.pts2merge(1).x = [258;249;249];
handles.pts2merge(1).y = [672;641;641];
handles.pts2merge(2).x = [179;189;189];
handles.pts2merge(2).y = [631;625;625];
handles.pts2merge(3).x = [131;148;148];
handles.pts2merge(3).y = [667;666;666];
handles.pts2merge(4).x = [88;105;105;105];
handles.pts2merge(4).y = [588;588;575;575];
handles.pts2merge(5).x = [187;159;159];
handles.pts2merge(5).y = [396;375;375];
handles.pts2merge(6).x = [158;154;154];
handles.pts2merge(6).y = [266;239;239];
handles.pts2merge(7).x = [126;132;132];

```



# Export georeferenced results

- Click the *checkWGS* button to convert WGS84-coordinates from  $[^{\circ}, ', '' ]$  to  $[^{\circ}]$ .  
*Note: You may change  $[^{\circ}, ', '' ]$ -data, especially in case of non geo-tagged photos.*

BASEGRAIN 1.0, Win-64bit (AOVAW01expo02)

Controls

control parameter file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.m

image file: .\BASEGRAIN1p0georef2812x2112\_P00.jpg

scale [mm/px]: 0.5610

save

Results2EXCEL

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.xlsx

save

Results2MATLAB

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.mat

save

Results2GIS

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.shp

phi(WGS84) [ $^{\circ}, ', ''$ ]	47.00	22.00	38.80	phi(WGS84) [ $^{\circ}$ ]:	699999.76
lambda(WGS84) [ $^{\circ}, ', ''$ ]	8.00	33.00	12.40	lambda(WGS84) [ $^{\circ}$ ]:	099999.97
h(WGS84) [m]:	500.00			h(WGS84) [m]:	600.05
				Xy(CH1903) [m]:	699999.76
				Yx(CH1903) [m]:	099999.97
				h'(CH1903) [m ü.M.]:	0600.05

checkWGS

saveWGS

checkCH

saveCH

# Export Data

- Click the **saveWGS** button to save the results to point \*.shp and \*.kml.  
*Note: You may save results to point \*.shp in Swiss coordinate system as well.*

BASEGRAIN 1.0, Win-64bit (AOVAW01expo02)

**Controls**

control parameter file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.m

image file: .\BASEGRAIN1p0georef2812x2112\_P00.jpg

scale [mm/px]: 0.5610

**Results2EXCEL**

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.xlsx

**Results2MATLAB**

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.mat

**Results2GIS**

result file: P:\4304\_AORheinBAW07\_AOVAW20120806\BASEGRAIN1.0\tut02\BASEGRAIN1p0georef2812x2112\_P01.shp

phi(WGS84) [°, ', '']:	47.00	22.00	38.80	phi(WGS84) [°]:	47.377444
lambda(WGS84) [°, ', '']:	8.00	33.00	12.40	lambda(WGS84) [°]:	8.553444
h(WGS84) [m]:	500.00			h(WGS84) [m]:	500.00
				Xy(CH1903) [m]:	699999.70
				Yx(CH1903) [m]:	099999.97
				h(CH1903) [m ü.M.]:	0600.05

checkWGS

**saveWGS**

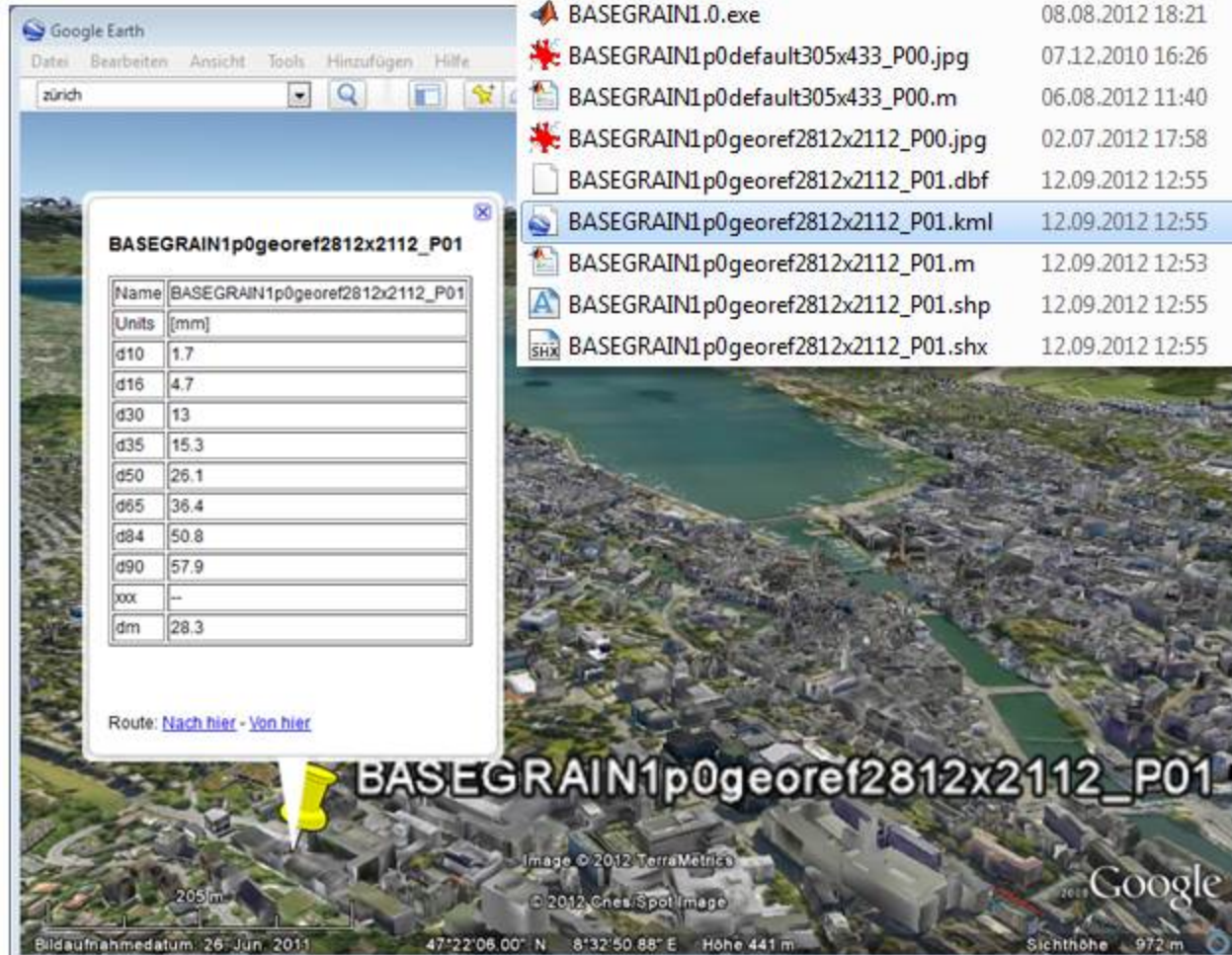
checkCH

saveCH



# View Results

- Open the \*.kml file, explore and enjoy the results.



Name	Änderungsdatum	Typ	Größe
BASEGRAIN1.0.exe	08.08.2012 18:21	Anwendung	14'283 KB
BASEGRAIN1p0default305x433_P00.jpg	07.12.2010 16:26	IrfanView JPG File	24 KB
BASEGRAIN1p0default305x433_P00.m	06.08.2012 11:40	MATLAB Code	15 KB
BASEGRAIN1p0georef2812x2112_P00.jpg	02.07.2012 17:58	IrfanView JPG File	970 KB
BASEGRAIN1p0georef2812x2112_P01.dbf	12.09.2012 12:55	DBF-Datei	1 KB
BASEGRAIN1p0georef2812x2112_P01.kml	12.09.2012 12:55	KML-Datei	2 KB
BASEGRAIN1p0georef2812x2112_P01.m	12.09.2012 12:53	MATLAB Code	74 KB
BASEGRAIN1p0georef2812x2112_P01.shp	12.09.2012 12:55	AutoCAD Shape S...	1 KB
BASEGRAIN1p0georef2812x2112_P01.shx	12.09.2012 12:55	AutoCAD Compil...	1 KB



In Tutorial 02 you should have learned how to...

- Import a georeferenced image
- Scale and crop
- Tune analysis parameters
- Export data to a control parameter file
- Export georeferenced results

<http://www.basement.ethz.ch/services/Tools/basegrain>

M. Detert, VAW/ETHZ