ImportModule

Importing and processing of CT-images for numerical simulations

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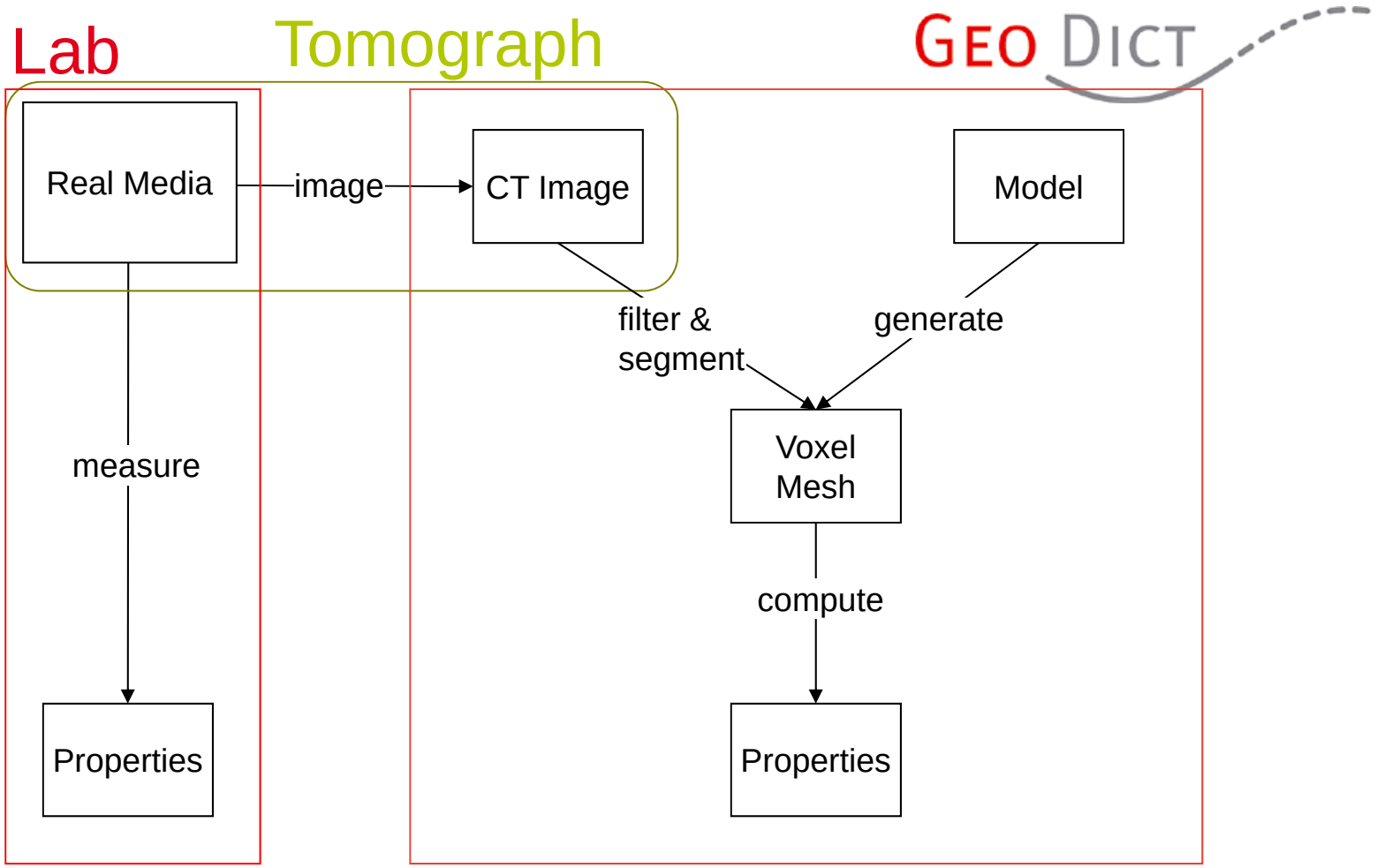
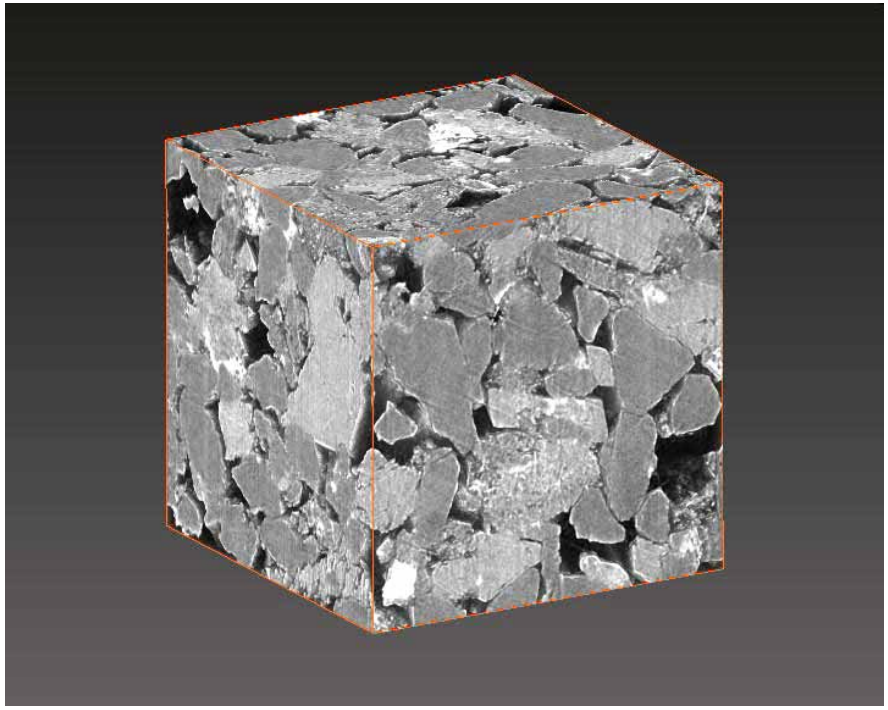
Computer Aided Material Engineering



The CT-images

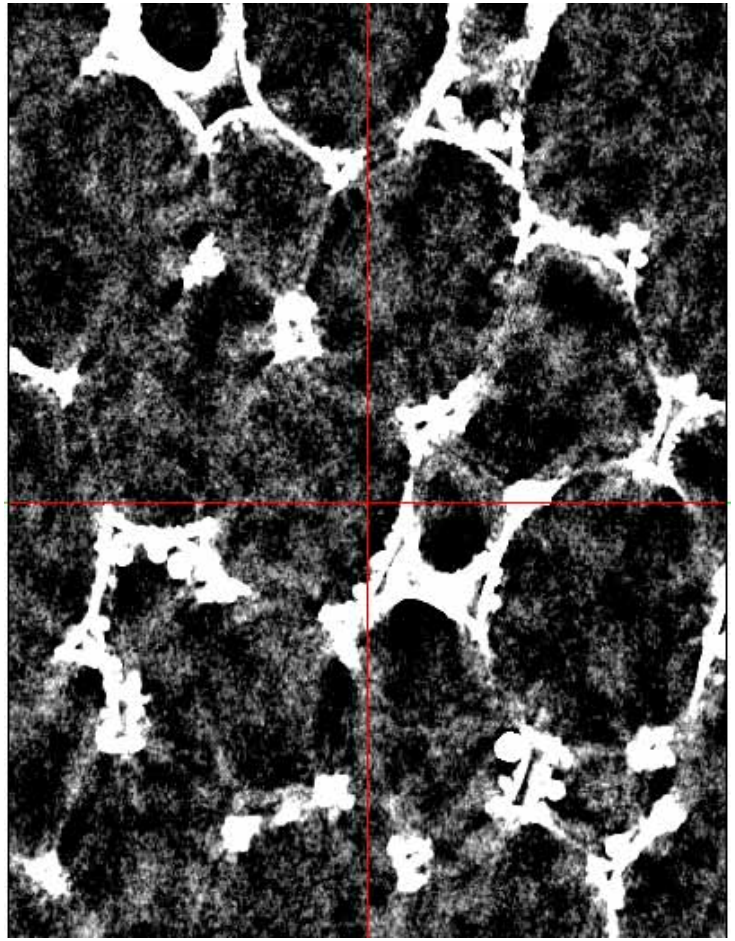


Red Sandstone

(Dr. Frieder Enzmann,

Institut für Geowissenschaften,

Johannes Gutenberg-Universität Mainz)



Metal Sponge
(from one of our projects)

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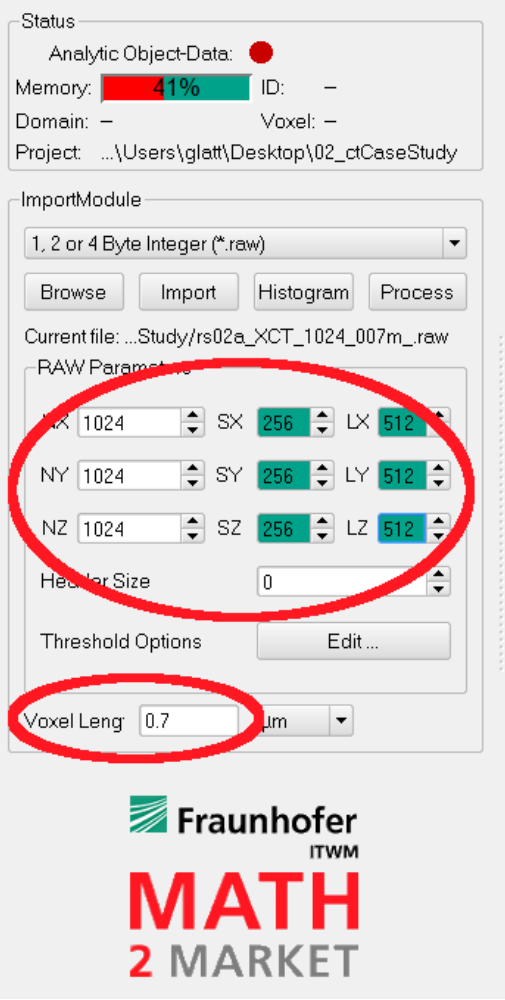
Sandstone: ImportModule

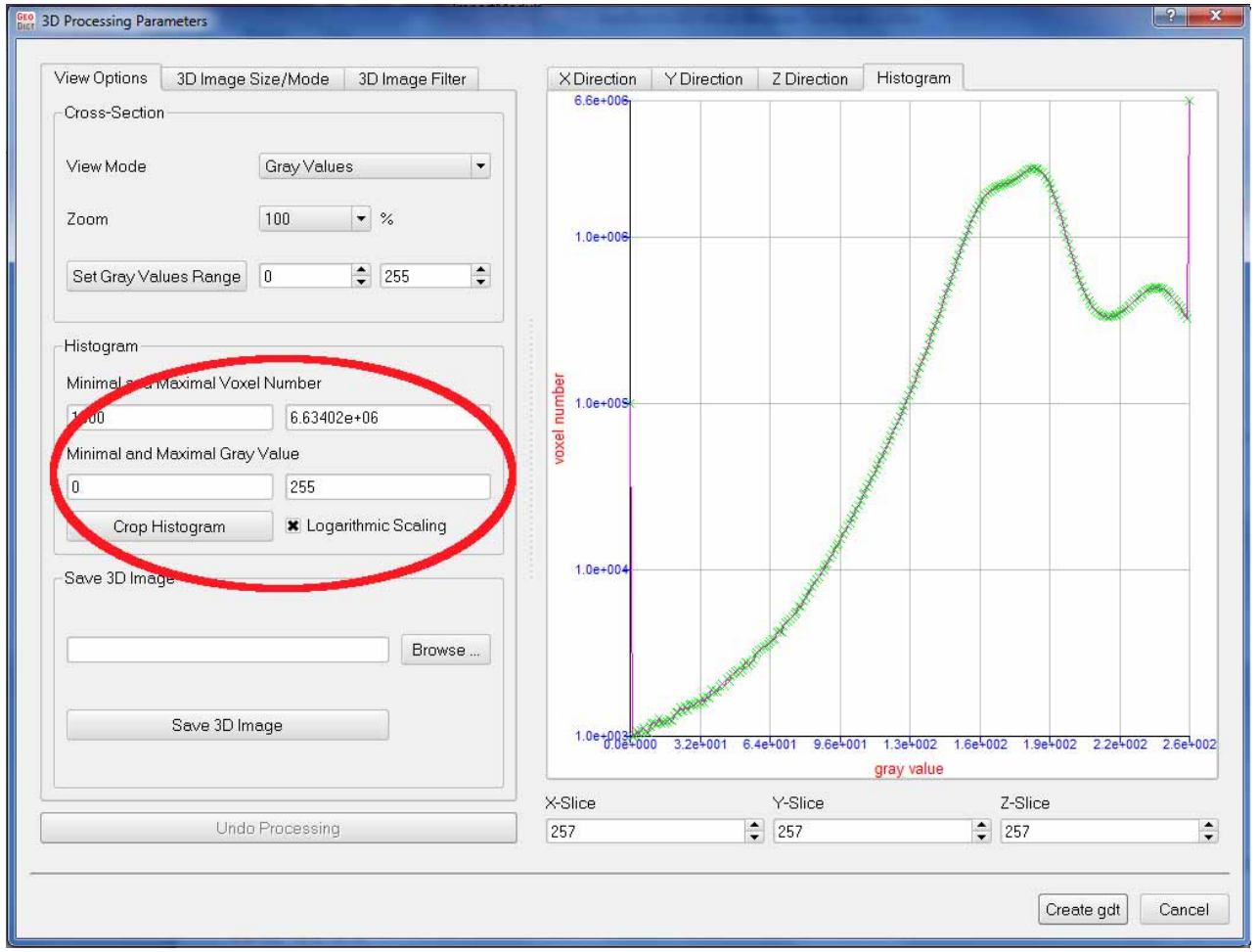


- Go to the **ImportModule**
- Chose the file format (here *.raw)
- “Browse” for the file you want to import
- If needed enter the image size, the voxel length and the header size
- You can crop the image (here the final size is 512x512x512 voxels)
- Setting the thresholds with the “Threshold Options” you can directly import the image with the “Import” button
- **You can process the image with the “Process” button**

Sandstone: Image Processing Dialog

The Image Processing Dialog appears:

- Set view-options of the 2d cross sections
- Set view-options of the histogram

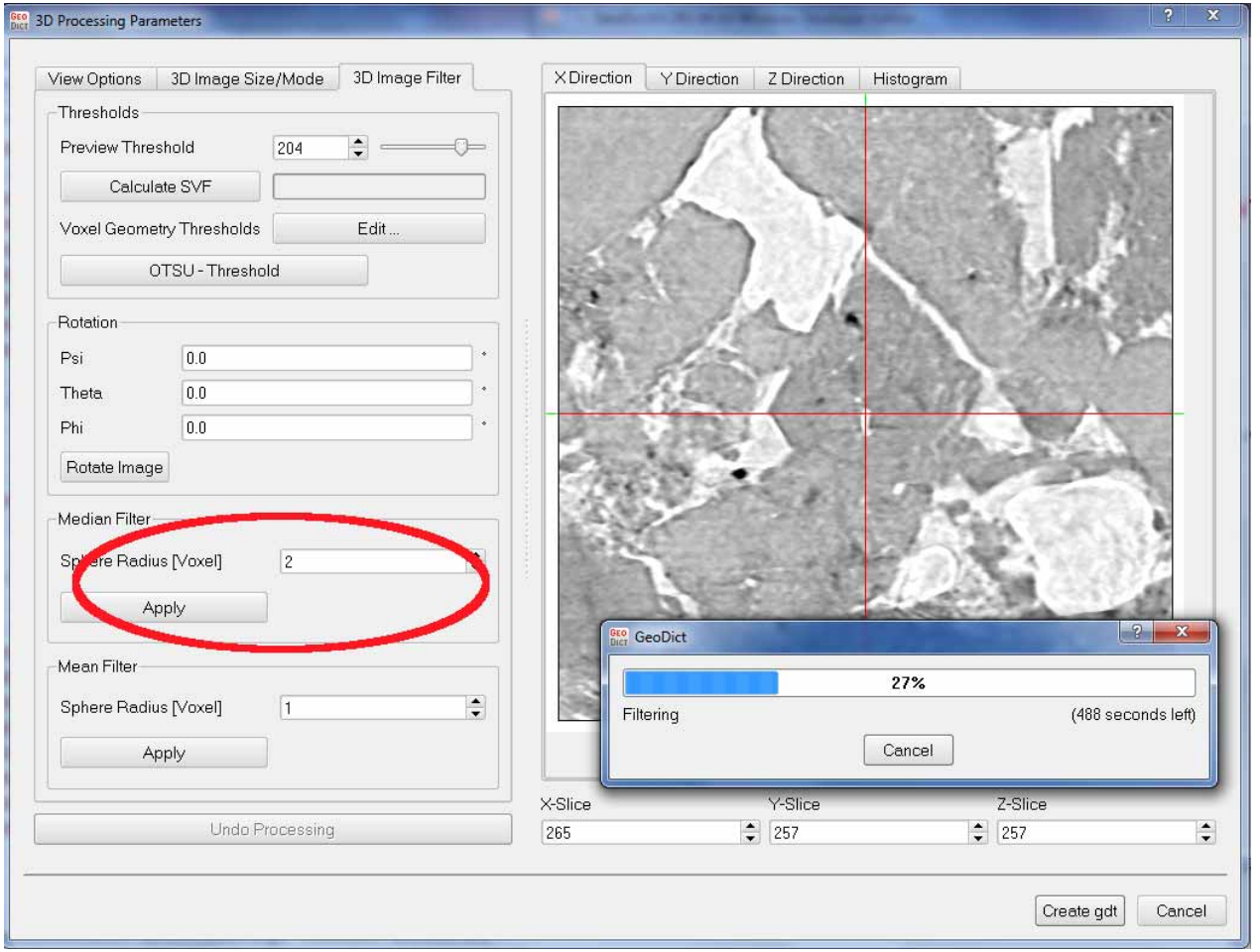


Sandstone: Median Filter

"3D Image Filter" tab:

- Rotation
- Median-Filter
- Mean-Filter
- Other image filters needed?

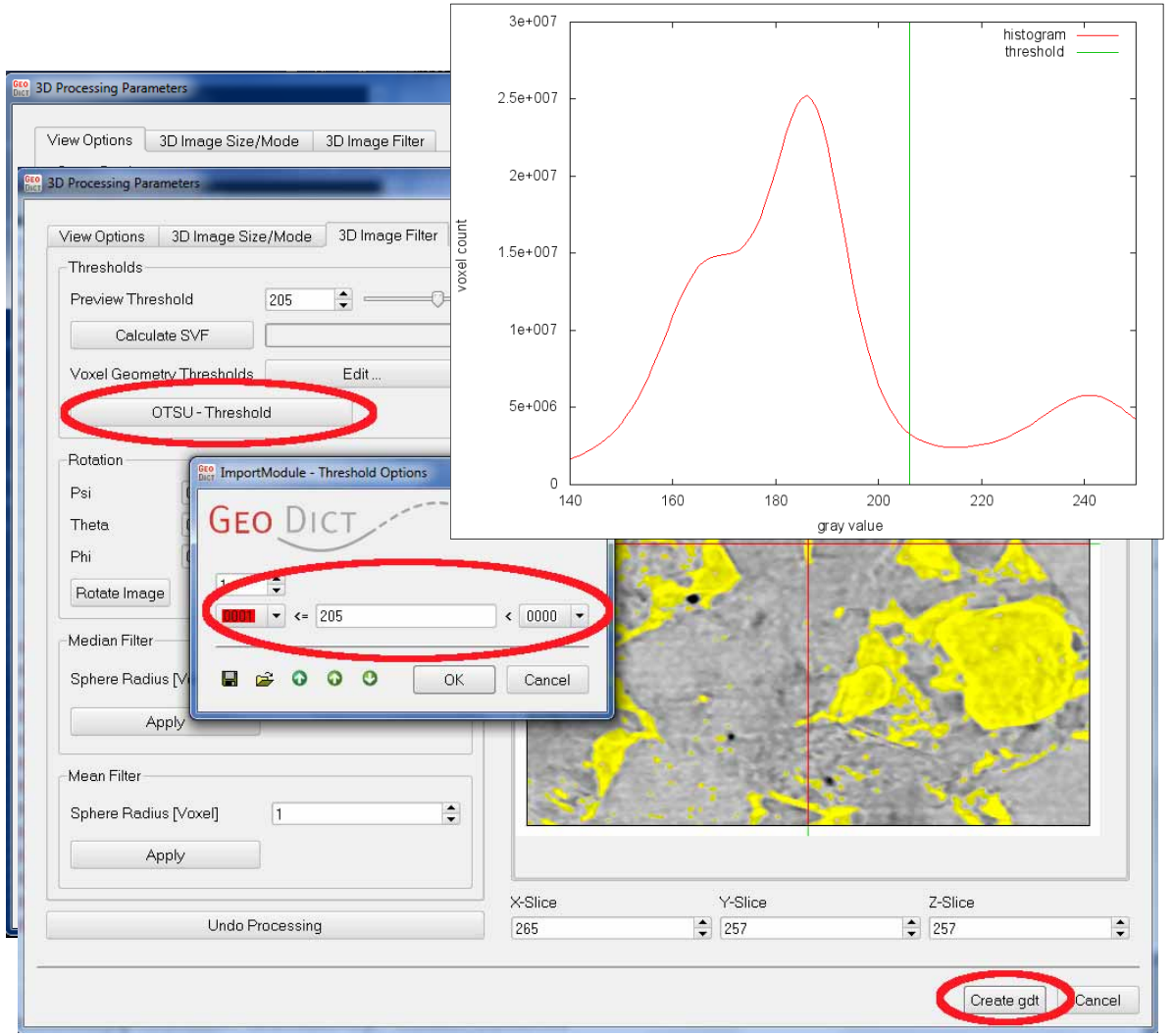
- For the sandstone use the Median-Filter (reduce noise preserve edges)



Sandstone: Thresholds

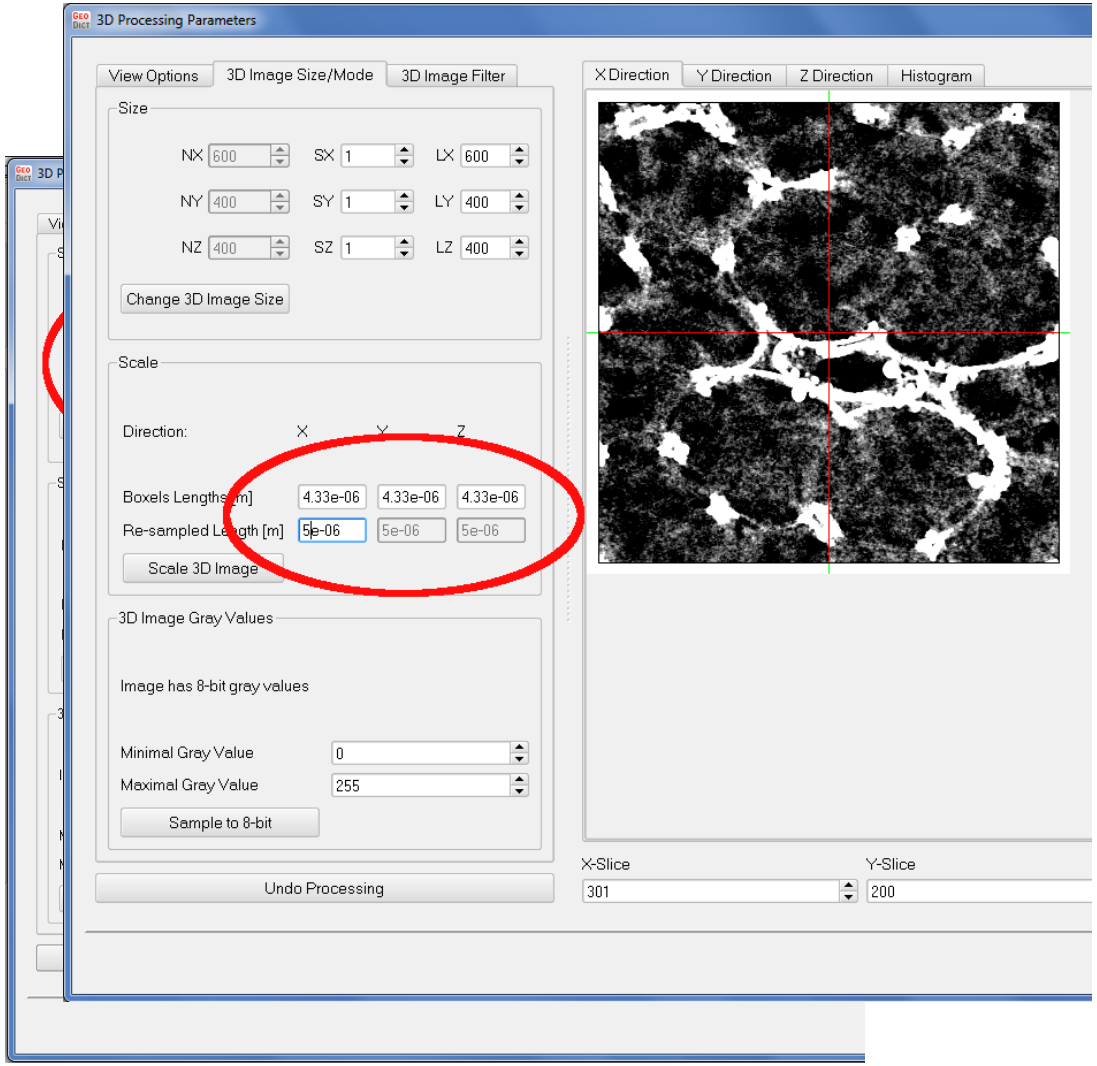
Segmentation with global thresholds:

- View mode “Gray Values and Threshold”
- Automatic Threshold with the OTSU method
- Use known SVF to check the result
- Enter chosen thresholds in “Voxel Geometry Thresholds”
- Click “Create gdt”



Sponge: Crop and Scale

- Crop the sponge to 600x400x400 Voxels
- Scale the sponge to 5 microns
- Use the median filter with radius 3 (reduce noise and preserve edges)

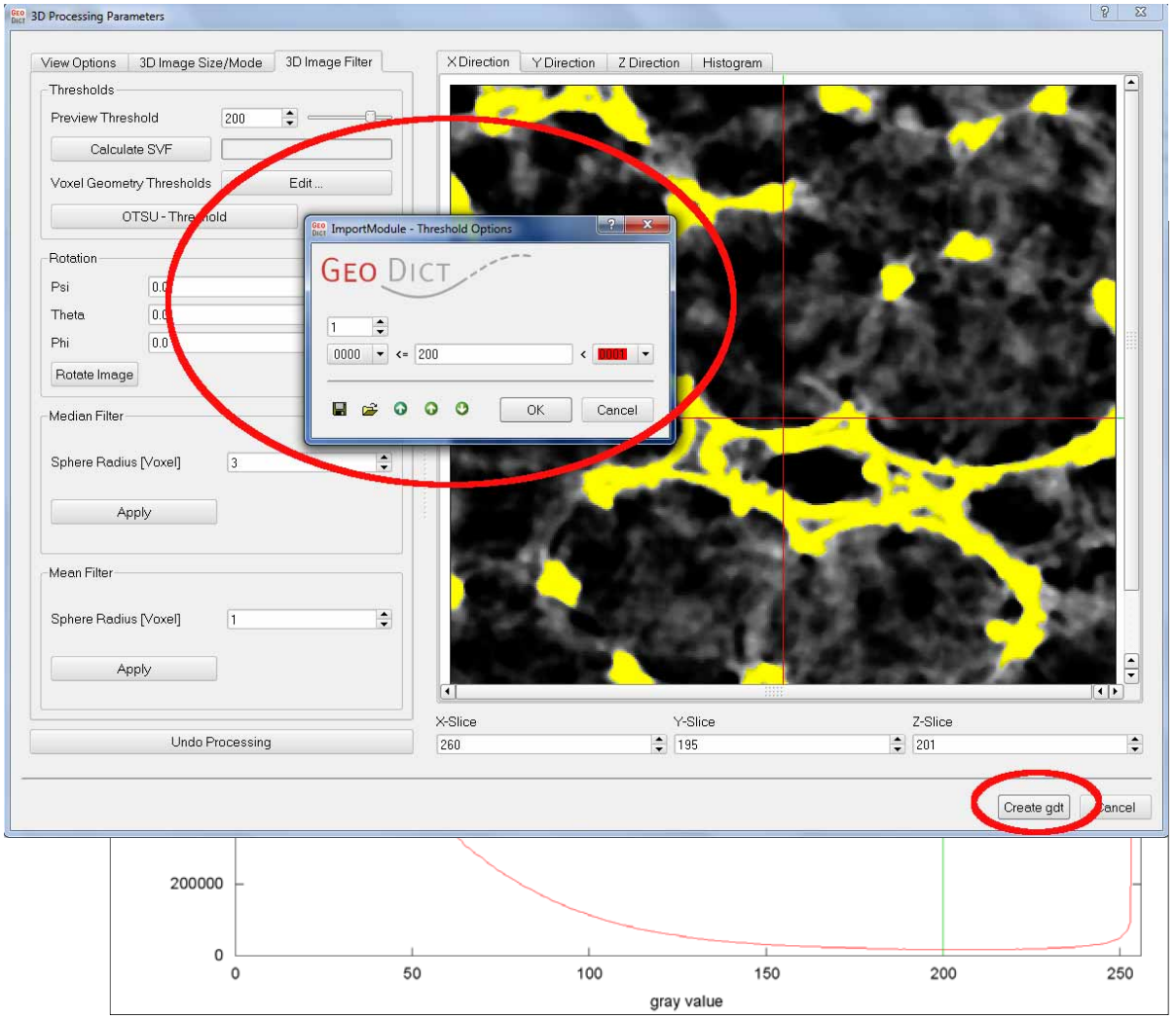


Sponge: Thresholds

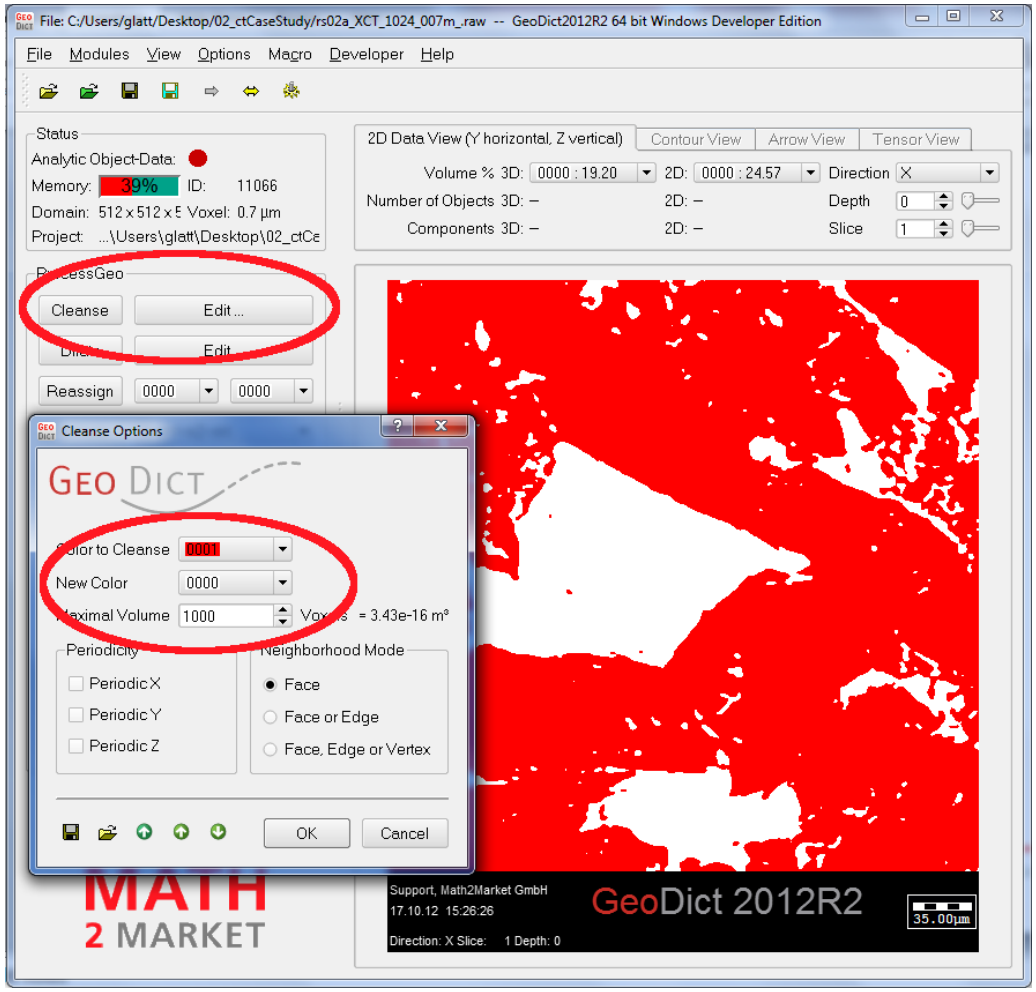
Segmentation with global thresholds:

- Threshold in histogram minimum
- Use known SVF to check the result

- Enter chosen thresholds in “Voxel Geometry Thresholds”
- Click “Create gdt”



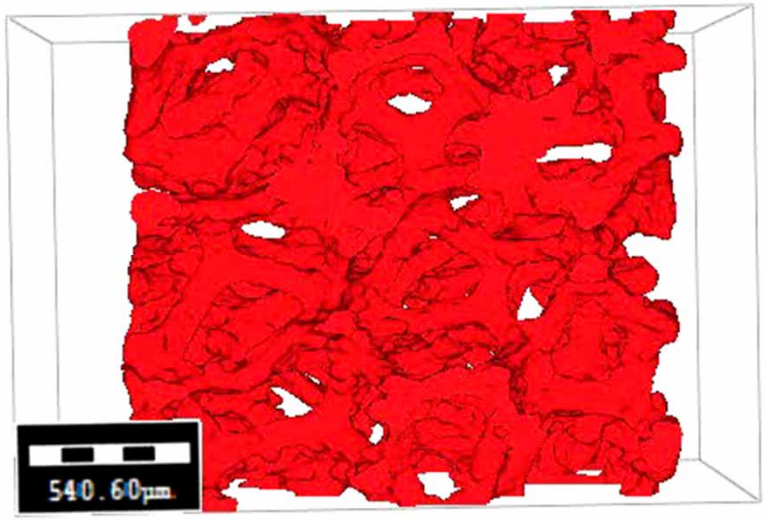
Sandstone: ProcessGeo Cleanse

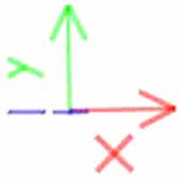


Cleanse in ProcessGeo:

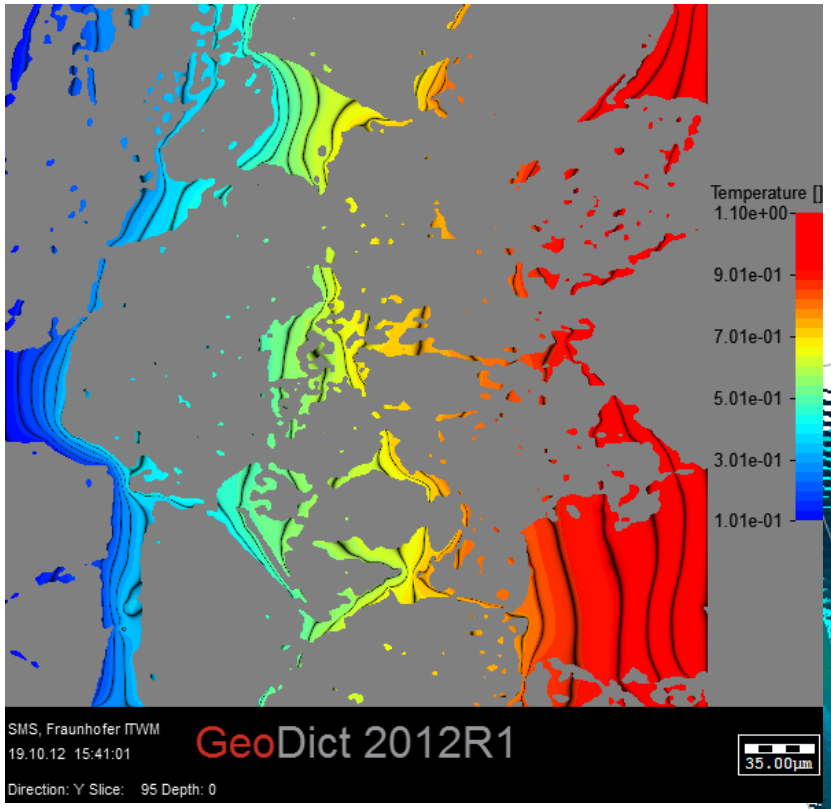
- Fast Method to Remove small components
- Remove noise from segmented CT-image

The Resulting GeoDict Structures

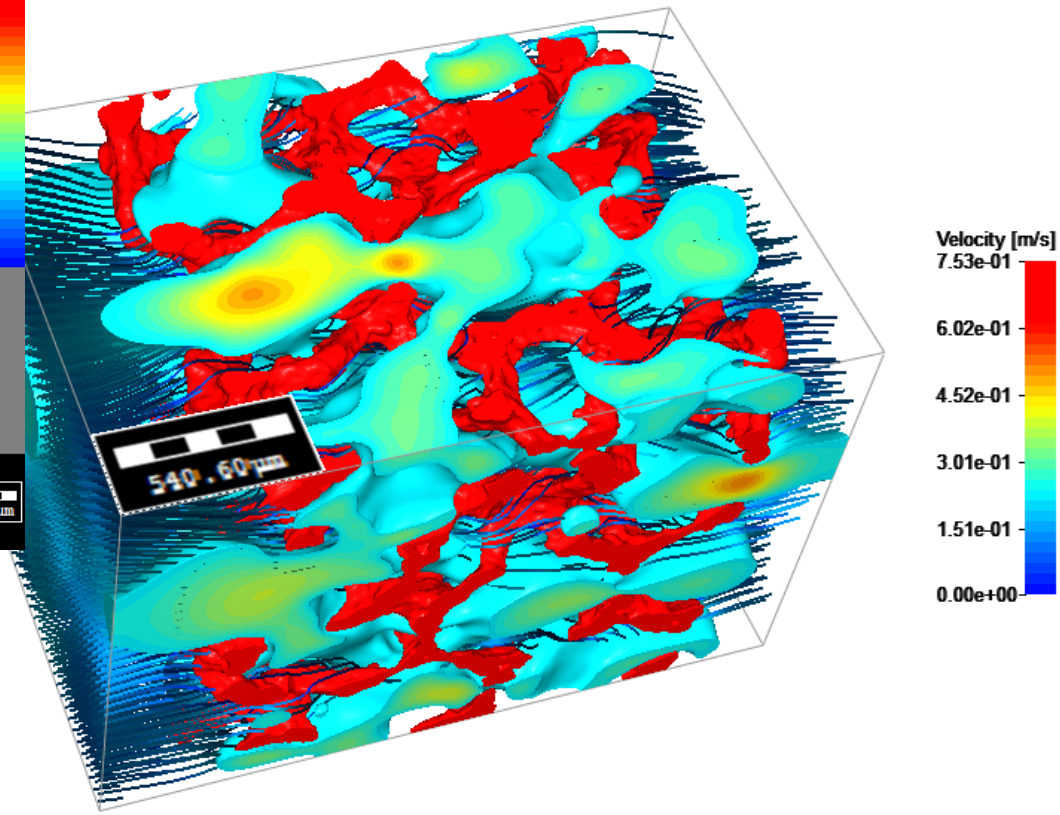




Flow and Conductivity Simulations



Use the CT images to predict material properties like permeability, conductivity, ..



Conclusions and Outlook

GeoDict offers a lot of useful features to process and import CT-images for further use in GeoDict

Examples in this talk:

- A CT-image of a sandstone
- A CT-image of a metal sponge

Outlook

We try to further improve the import due to customer needs

- More image filters
- Improved thresholding