

Challenge
Create an Initial Microstructure





Synthesizing Microstructures for MICRESS® using 3rd party tools

Required software tools:

Dream3D (freeware):

<http://dream3d.bluequartz.net/>

DREAM3D

Analyzing Data with Ease

Paraview (freeware): www.paraview.org

Further optional: HDF5 viewer (free) for dream3d and other HDF5 files



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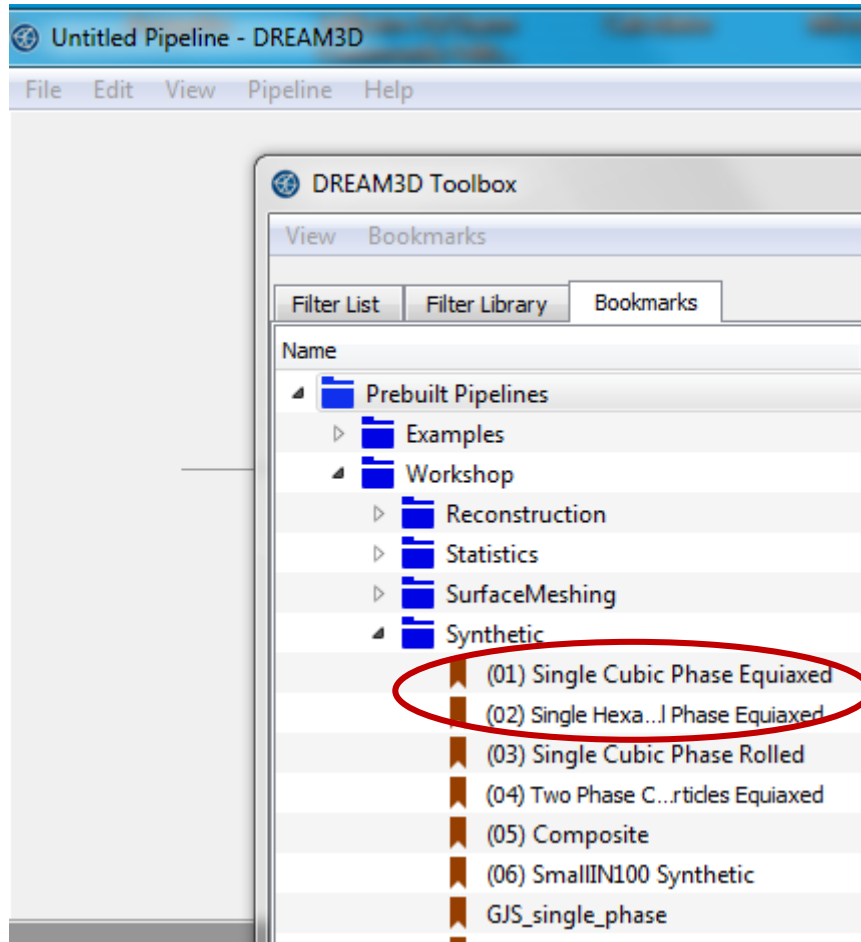


- *generate 3D grain structure by running the prebuilt pipeline in Dream.3D: „single phase equiaxed cubic”*
- *Inspect simulation domain geometry*
- *generate “.Dream3D” and “xdmf” output files*
- *visualize result (xdmf) in paraview*
- *inspect “.dream3D” output in HDF5 view*
- *modify pipeline for a 2D grain structure in a domain of 200x1x200 pixels/voxels with a scaling of 1.5 micron/voxel*
- *generate 2D microstructure files (.dream3d, .xdmf, VTK)*
- *optionally : extract 2D microstructure from a 3D dataset (see below)*





Open Dream 3 D



Many options ...can be exploited on your own..

for synthesizing a microstructure:

Select pre-configured pipeline

(e.g single phase equiaxed cubic, double click)

(once having performed this you will easily see how to adapt a pipeline to your needs)

Following window will show up:



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Open Dream 3 D

*(01) Single Cubic Phase Equiaxed - DREAM3D

Statistics data

File Edit View Bookmarks Pipeline Help

Pipeline 8 Write DREAM.3D Data File

01 StatsGenerator

02 Initialize Synthetic Volume

03 Establish Shape Types

04 Pack Primary Phases

05 Find Feature Neighbors

06 Match Crystallography

07 Generate IPF Colors

08 Write DREAM.3D Data File

09 Vtk Rectilinear Grid Exporter

Parameters

Output File Select...

☒ Write Xdmf File

☐ Include Xdmf Time Markers

Start Pipeline

Size of simulation domain
Make spacings identical for cubic grid

specify output-file

add a VTK exporter (see next slide)

start pipeline !!!



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Add a rectilinear grid export filter

Pipeline 9 Vtk Rectilinear Grid Exporter

Parameters

Output File

☐ Write Binary File

Required Objects

Attribute Arrays to Write

Available Data Arrays

- EulerAngles
- IPFColor
- Phases

Selected Data Arrays

- FeatureIds

Data Structure

- StatsGeneratorDataContainer
 - CellEnsembleData
 - CrystalStructures
 - PhaseName
 - PhaseTypes
 - ShapeTypes
 - Statistics
- SyntheticVolumeDataContainer
 - CellData
 - EulerAngles
 - FeatureIds
 - IPFColor
 - Phases

Filter List **Filter Library** **Bookmarks**

Filter Library

- Export GBCD Triangles File
- Export INL File
- ITK::Image Writer
- Export Los Alamos FFT File
- Export Ph File (Feature Ids)
- Export SPParks Sites File
- Export GBCD Pole Figure (GM...)
- Export GBCD Pole Figure (VTK)
- Vtk Rectilinear Grid Exporter**
- Export ASCII Data
- Export Pole Figure Images
- Export StatsGenerator ODF A...
- Export STL Files from Triangle...
- Input

Hint: Right click on the empty field next to 'Attribute Array to Write' to add available data arrays



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View and handle resulting microstructure with paraview

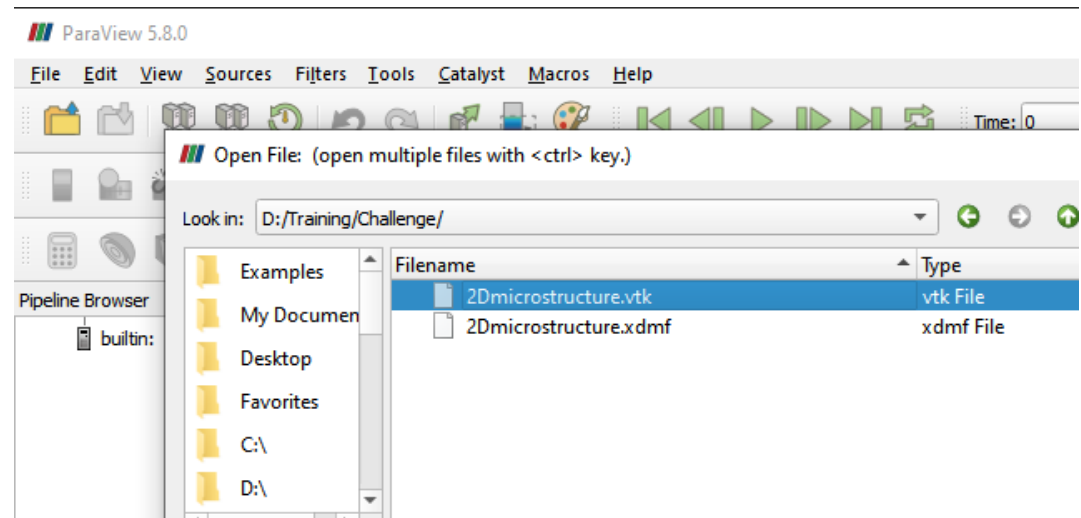
Three files are created:

- *dream3d (an HDF file)*
- *Xdmf*
- *VTK (from rectilinear grid export)*

Name
2Dmicrostructure.dream3d
2Dmicrostructure.vtk
2Dmicrostructure.xdmf

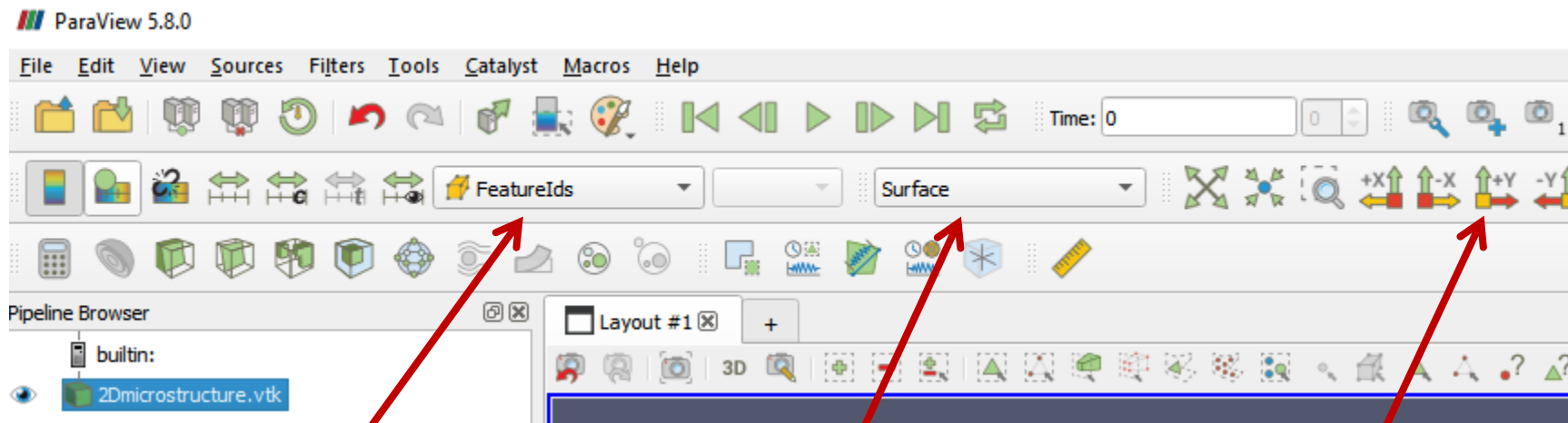
Xdmf or VTK can be used for first visualisation in Paraview

Use VTK for later export/save data to avoid export errors in newer Paraview versions (5.8 or higher)





Paraview: set up the view



Select data field ,Feature Ids'

Select ,Surface' representation

Select axis orientation +Y



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Optional: Extract 2D subset from 3D synthetic microstructure

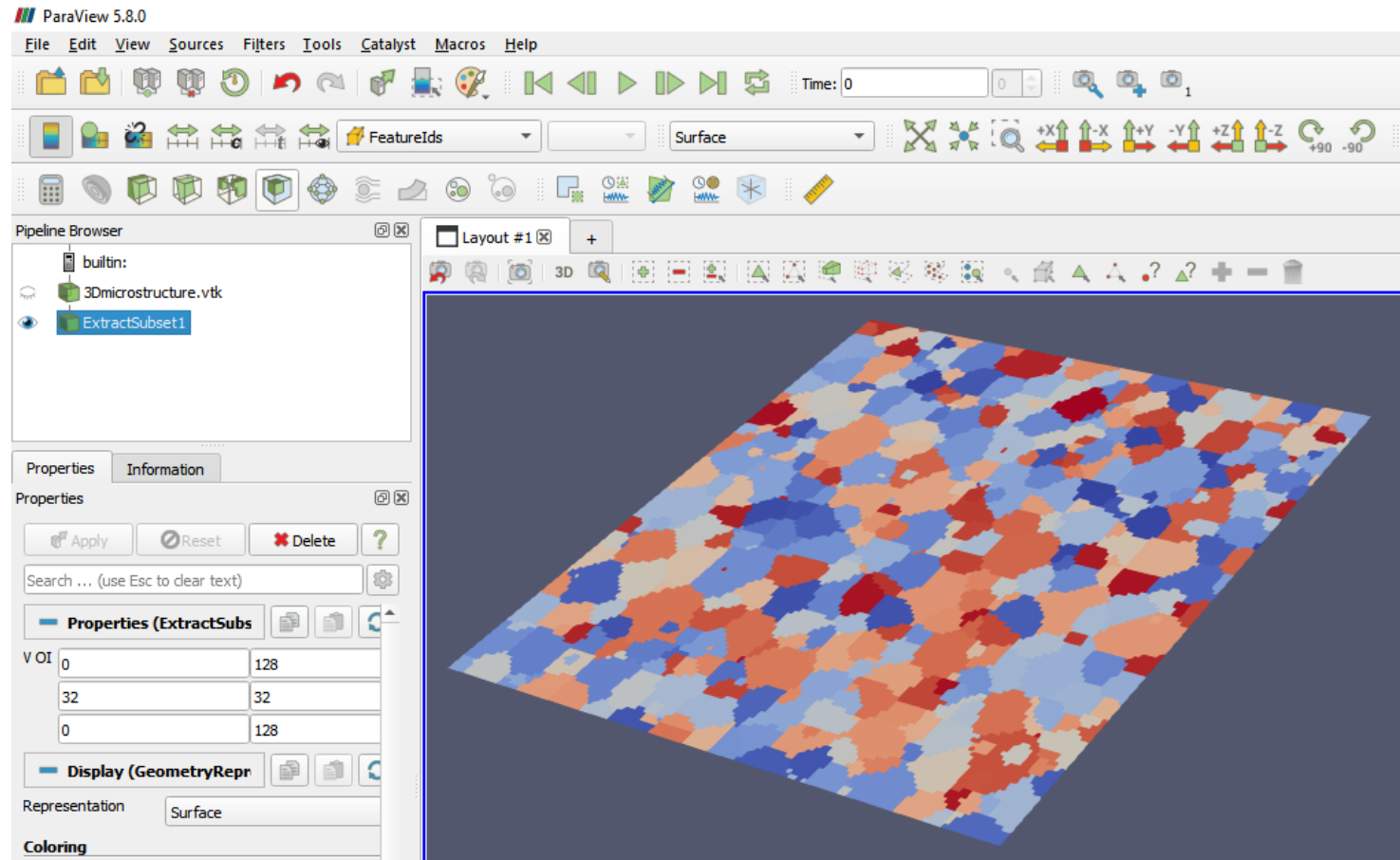
Use a 3D geometry!

...select filter „extract subset“ ...

...define desired plane....

...apply the filter...

...save data (legacy VTK - ASCII)



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