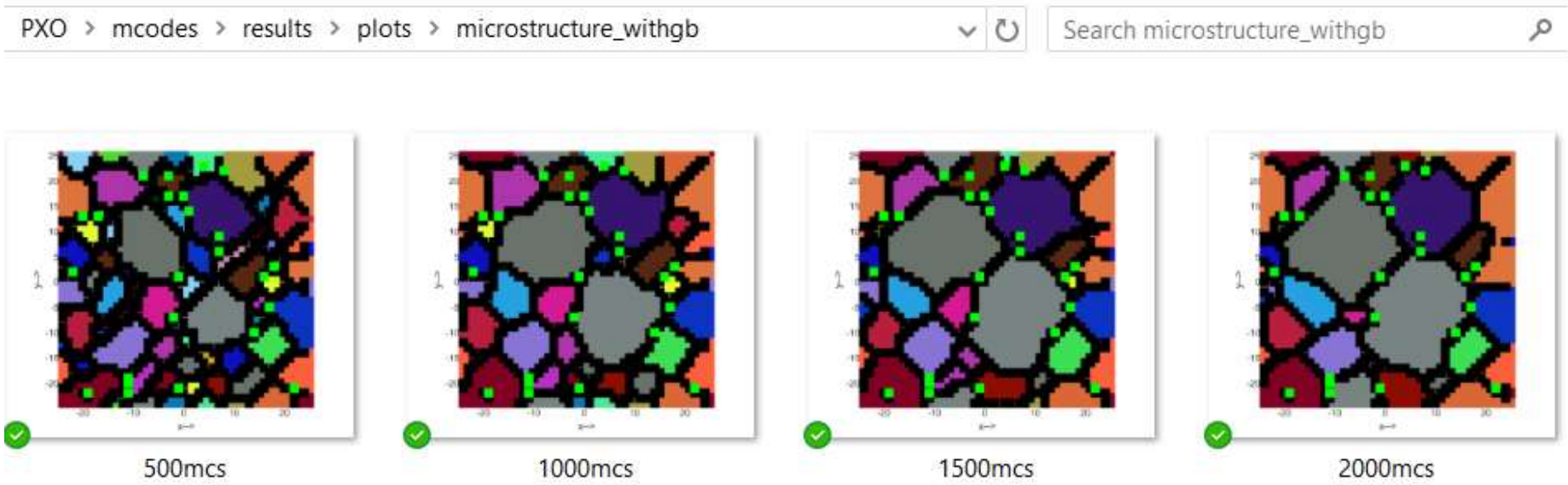
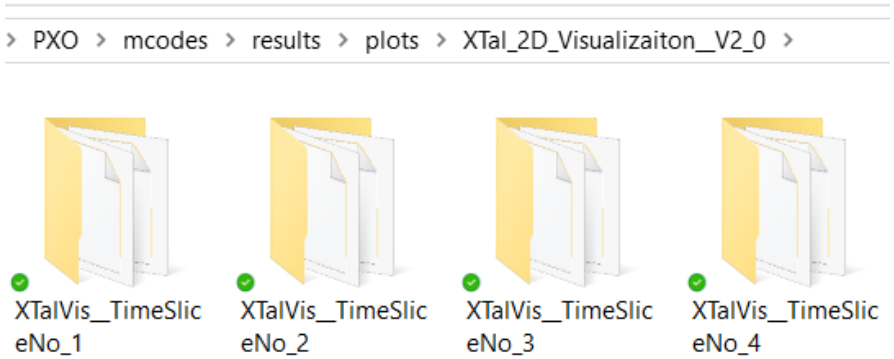
50x50, q = 32.. Want SLSP 1, others 0.. Vf of SLSP = 1.0 %..

Temporal evolution of grain structure



1

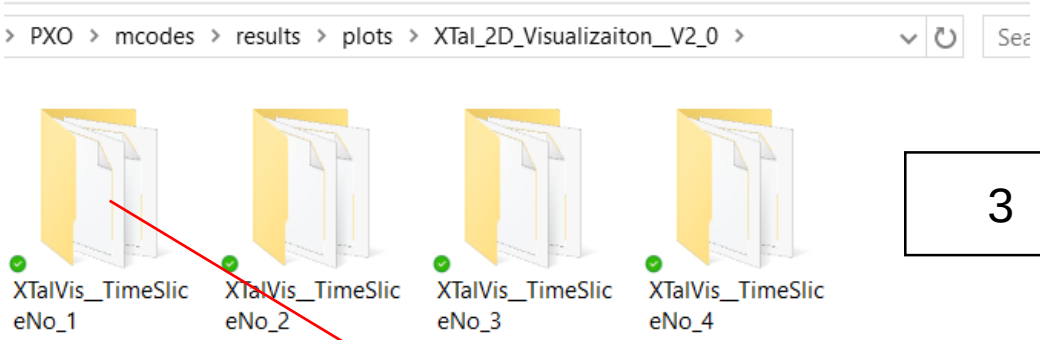
Grain structure analysis files are stored



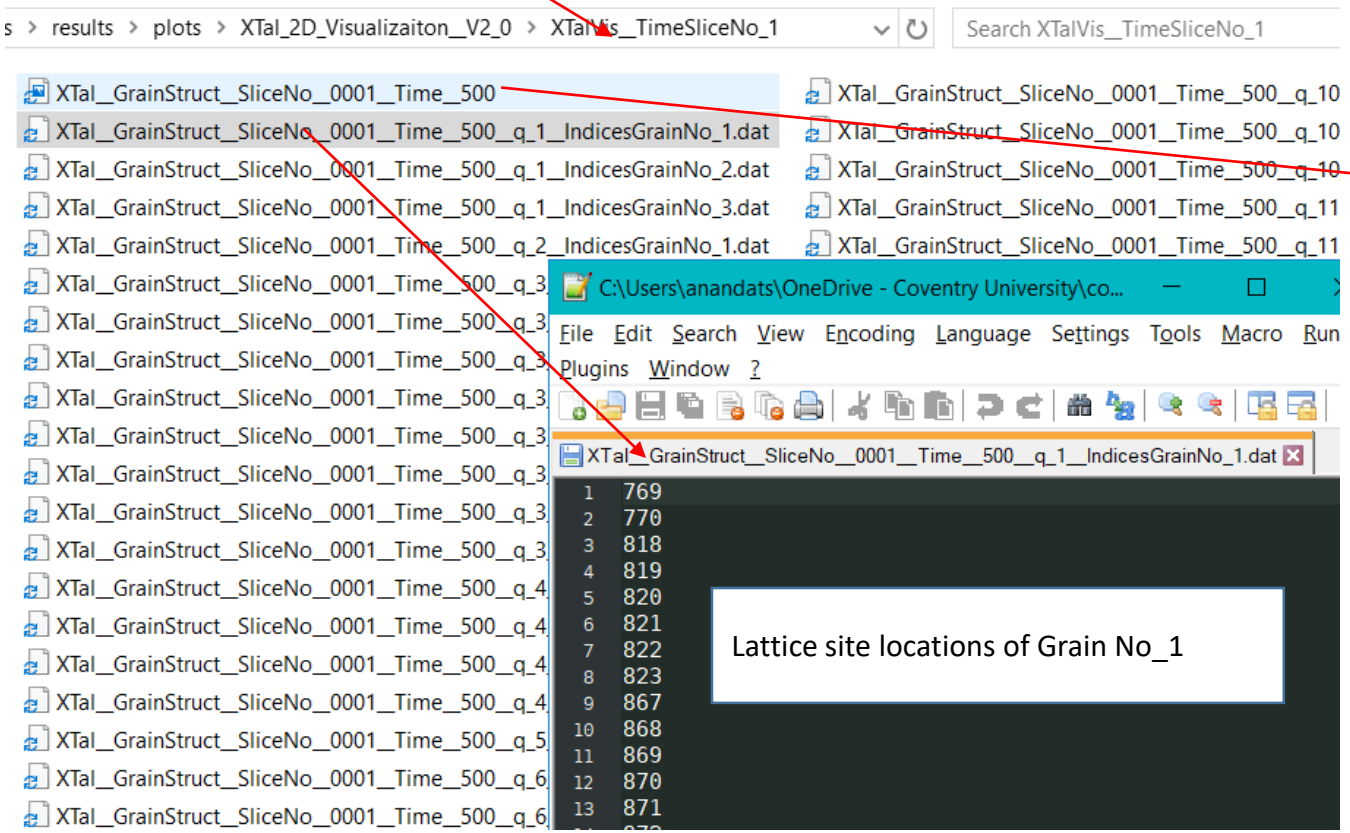
3

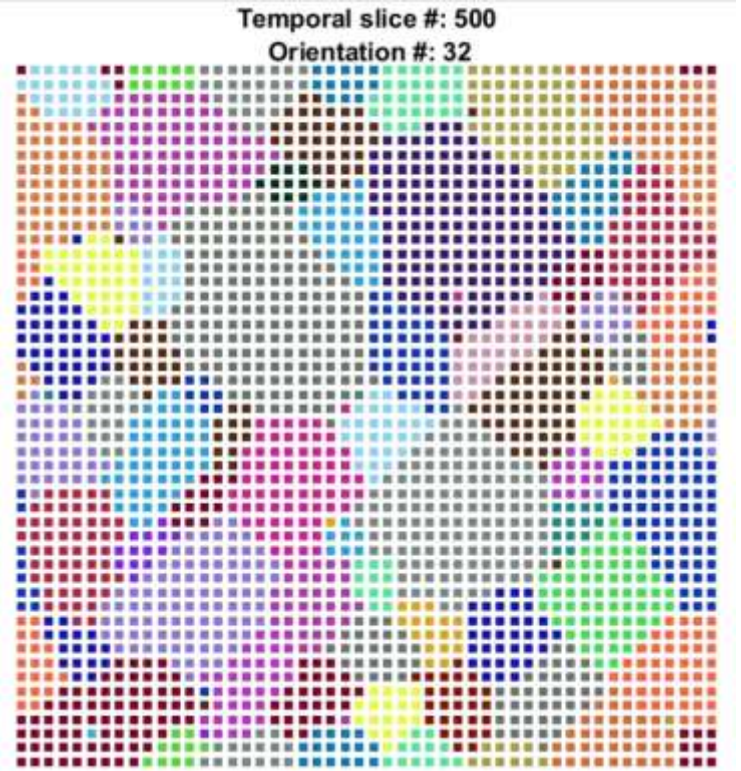
```
>> figure
[TimeSteps, All_Grains_time, All_GrainBoundaries_time, All_GrainAreas_time, GBL_time,...
   All_GrainEqGrainSize_time, GrainCentroid_xy_time, ogn, CFN, FileLocations, GenericFileName,...
   ImageFileName, DataFileNames, Number_of_grains, Grain_Area_PXL,...
   NGRAINS] = Characterize_Grain_Structure_2D(0, 'af2d', 'ALG_01');
------------  ------------  ------------
CHARACTERIZING THE GRAIN STRUCTRURES...
------------  ------------  ------------
q = 1  --  Grain #(1 in q, 1 in PXtal)-- Grain area 71.0 unit^2
q = 1  --  Grain #(2 in q, 2 in PXtal)-- Grain area  1.0 unit^2
q = 1  --  Grain #(3 in q, 3 in PXtal)-- Grain area  1.0 unit^2
q = 2  --  Grain #(1 in q, 4 in PXtal)-- Grain area 64.0 unit^2
q = 3  --  Grain #(1 in q, 5 in PXtal)-- Grain area 73.0 unit^2
q = 3  --  Grain #(2 in q, 6 in PXtal)-- Grain area 13.0 unit^2
q = 3  --  Grain #(3 in q, 7 in PXtal)-- Grain area  9.0 unit^2
```

2


PXO › mcodes › results › plots › XTal_2D_Visualizaiton__V2_0 ›
XTalVis__TimeSlicNo_1
XTalVis__TimeSlicNo_2
XTalVis__TimeSlicNo_3
XTalVis__TimeSlicNo_4

3


s › results › plots › XTal_2D_Visualizaiton__V2_0 › XTalVis__TimeSliceNo_1
Search XTalVis__TimeSliceNo_1
XTal__GrainStruct__SliceNo__0001__Time__500
XTal__GrainStruct__SliceNo__0001__Time__500__q_1__IndicesGrainNo_1.dat
XTal__GrainStruct__SliceNo__0001__Time__500__q_1__IndicesGrainNo_2.dat
XTal__GrainStruct__SliceNo__0001__Time__500__q_1__IndicesGrainNo_3.dat
XTal__GrainStruct__SliceNo__0001__Time__500__q_2__IndicesGrainNo_1.dat
XTal__GrainStruct__SliceNo__0001__Time__500__q_10
XTal__GrainStruct__SliceNo__0001__Time__500__q_11
C:\Users\anandats\OneDrive - Coventry University\co...
File Edit Search View Encoding Language Settings Tools Macro Run
Plugins Window ?
XTal__GrainStruct__SliceNo__0001__Time__500__q_1__IndicesGrainNo_1.dat
1 769
2 770
3 818
4 819
5 820
6 821
7 822
8 823
9 867
10 868
11 869
12 870
13 871
Lattice site locations of Grain No_1


Temporal slice #: 500
Orientation #: 32

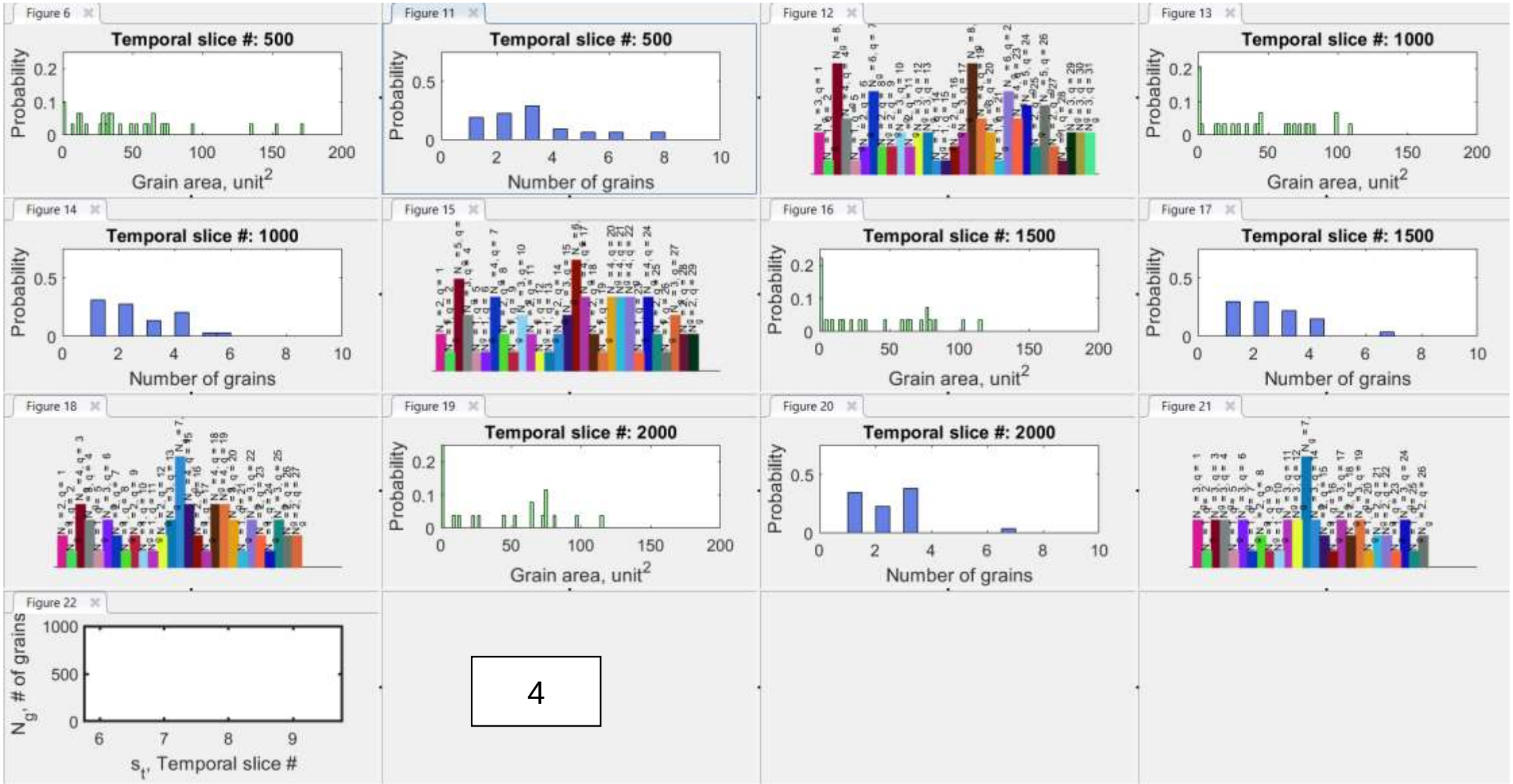
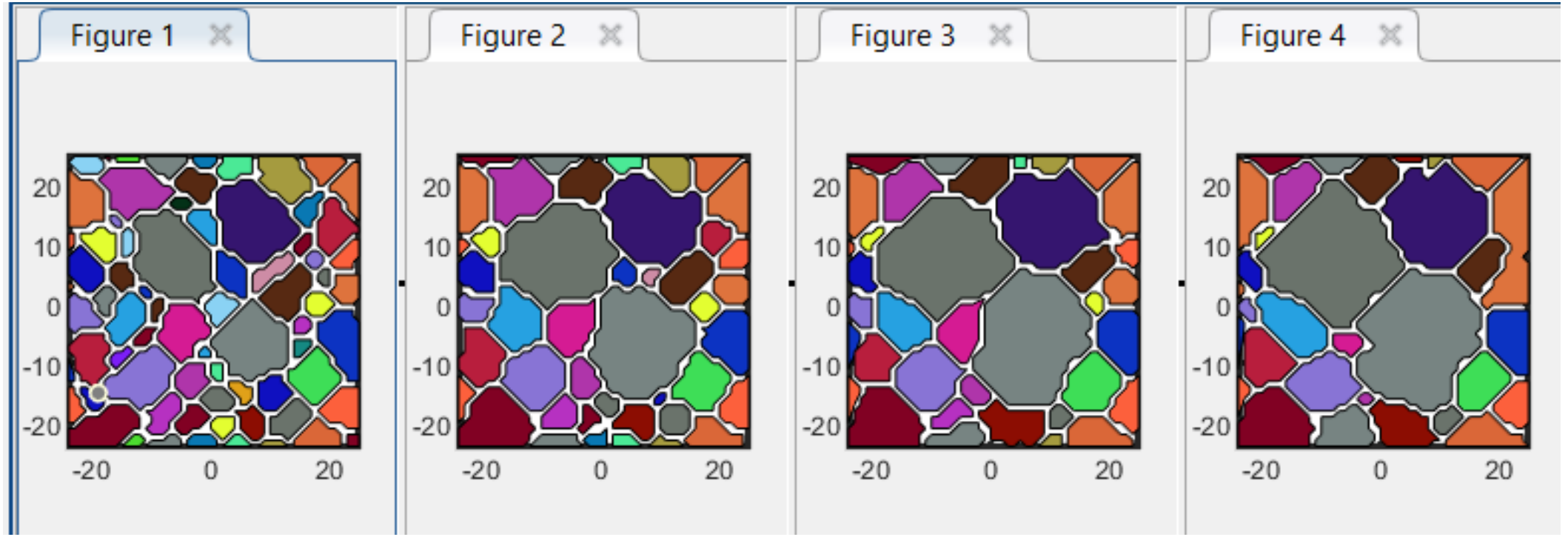


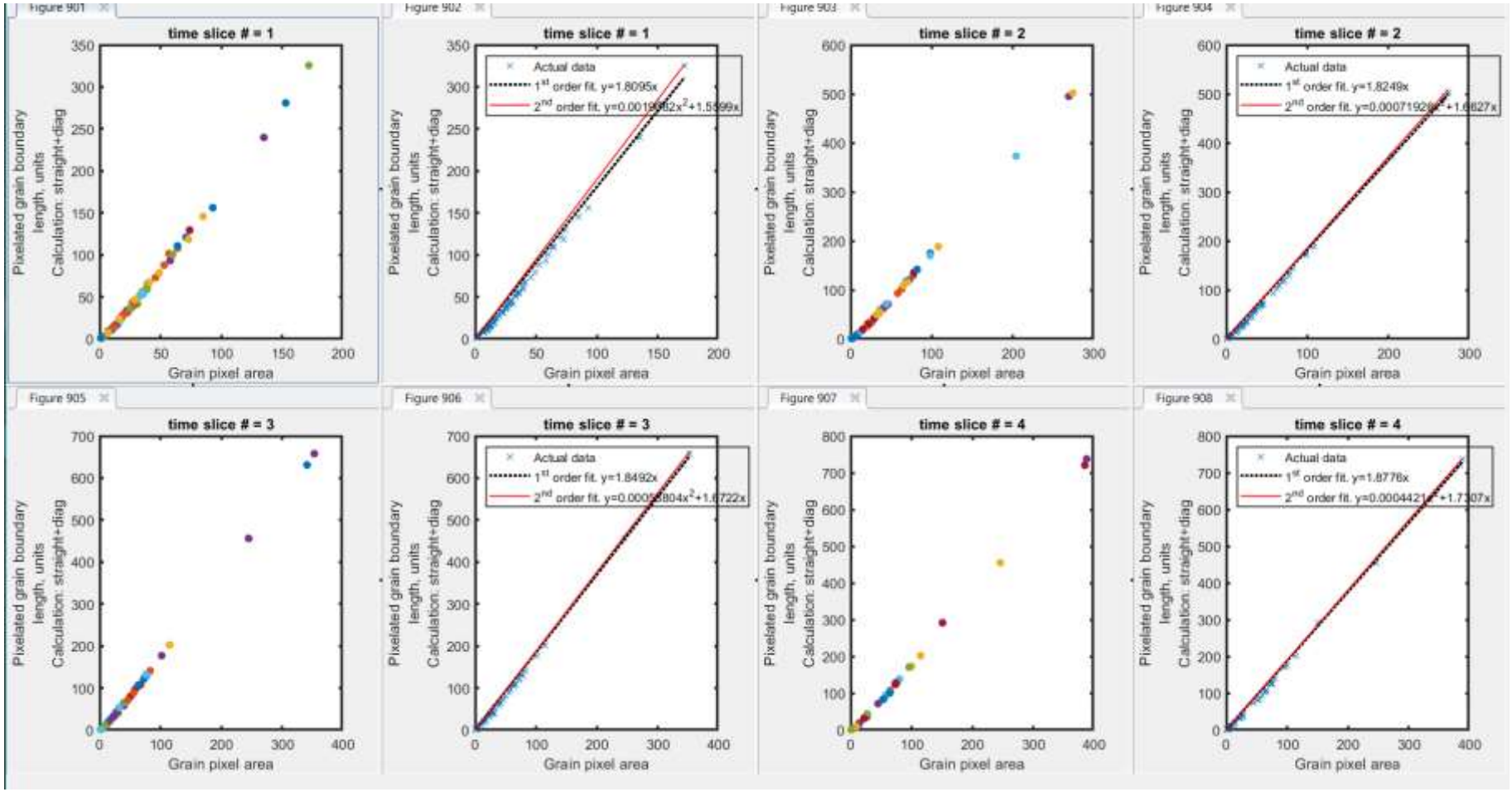
Figure 6
Temporal slice #: 500
Probability
Grain area, unit^2
Figure 11
Temporal slice #: 500
Probability
Number of grains
Figure 12
Figure 13
Temporal slice #: 1000
Probability
Grain area, unit^2
Figure 14
Temporal slice #: 1000
Probability
Number of grains
Figure 15
Figure 16
Temporal slice #: 1500
Probability
Grain area, unit^2
Figure 17
Temporal slice #: 1500
Probability
Number of grains
Figure 18
Figure 19
Temporal slice #: 2000
Probability
Grain area, unit^2
Figure 20
Temporal slice #: 2000
Probability
Number of grains
Figure 21
Figure 22
N_g, # of grains
s_t, Temporal slice #
4

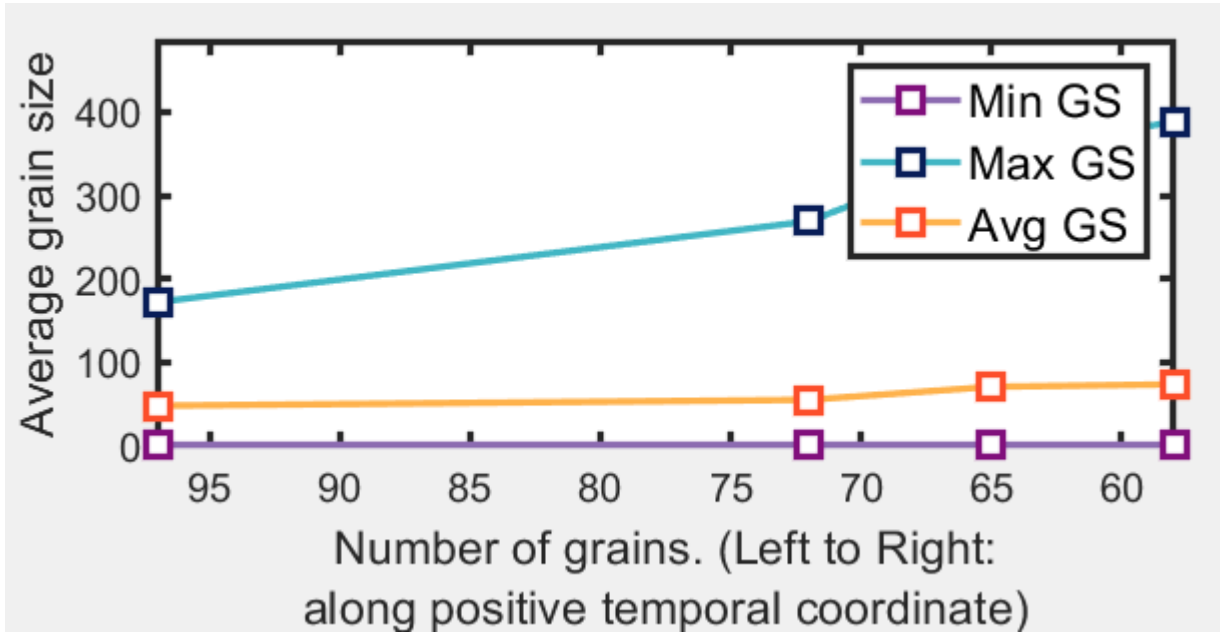
```
% plot__Grain_Structure_in_pixels('2d', TimeSteps, All_Grains_time)
plot__Grain_Structure_in_patches('2d', TimeSteps, All_Grains_time)
```



5

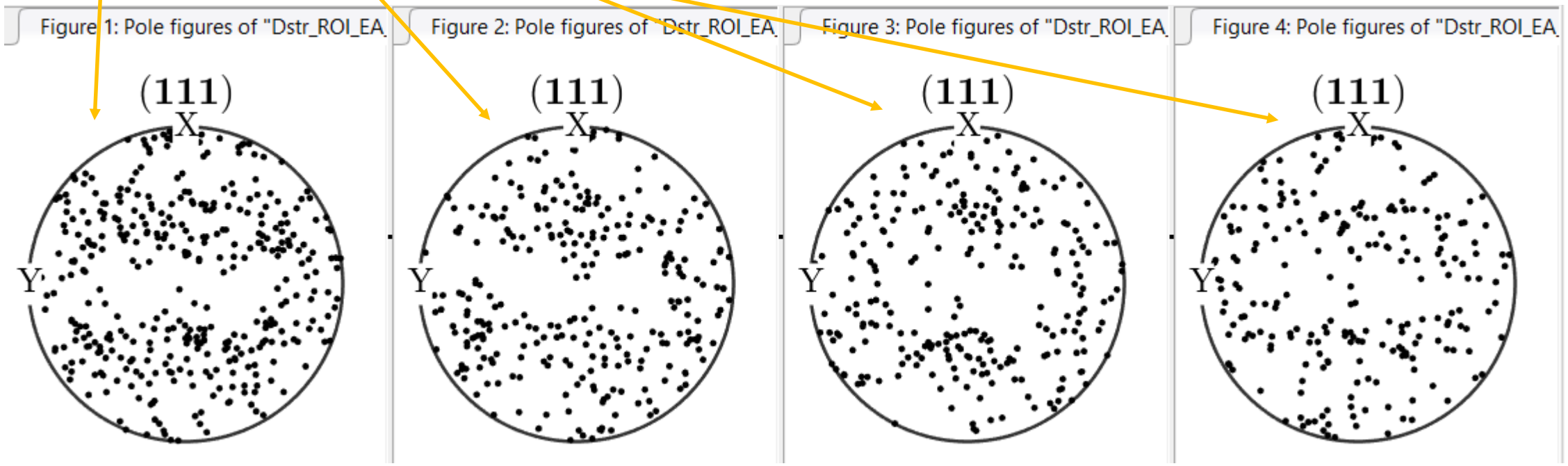
```
%-------------------------
plot__grain_area___grain_length('2d', All_GrainAreas_time, GBL_time)
%-------------------------
```




Average grain size
400
300
200
100
0
95
90
85
80
75
70
65
60
Min GS
Max GS
Avg GS
Number of grains. (Left to Right:
along positive temporal coordinate)

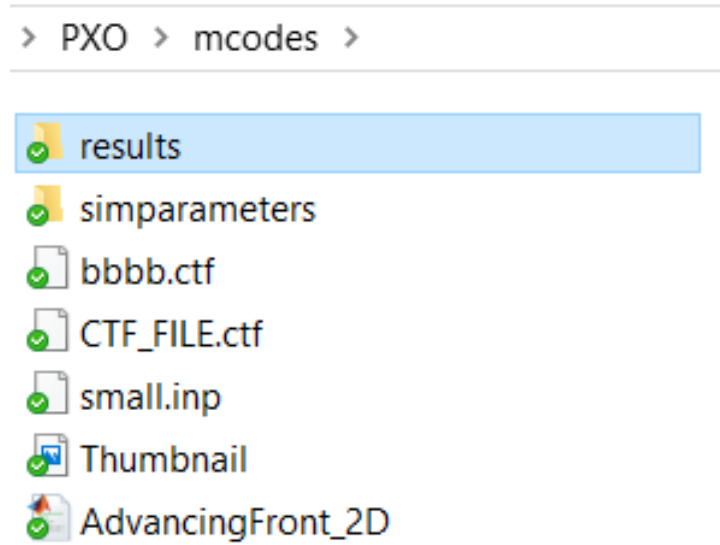
```
>> [Temporal_Phase_Texture, Number_of_Phases, Phase_SymmDetails,...
  PhaseDetails__for__TEX] = Map__TEX__GRST(GrainData_Matrix_0, Number_of_grains, PHASE, GS);
I'm plotting 97 random orientations out of 97 given orientations
You can specify the the number points by the option "points".
The option "all" ensures that all data are plotted
I'm plotting 72 random orientations out of 72 given orientations
You can specify the the number points by the option "points".
The option "all" ensures that all data are plotted
I'm plotting 65 random orientations out of 65 given orientations
You can specify the the number points by the option "points".
The option "all" ensures that all data are plotted
I'm plotting 58 random orientations out of 58 given orientations
You can specify the the number points by the option "points".
The option "all" ensures that all data are plotted
```

8



```
%-----------------------------------------------------------------------------------------
[NUM_Grains_PHASE] = Calc_Num_Grains_FOR_Phases('2d', TimeSteps, All_Grains_time);
%-----------------------------------------------------------
[EulerAngles_Pixellated] = Associate_EA_all_sites('2d', TimeSteps,...
                                                  All_Grains_time,...
                                                  Temporal_Phase_Texture);
%-----------------------------------------------------------------------------------------
Build_CTF(EulerAngles_Pixellated)
%-----------------------------------------------------------------------------------------
```

9



```
[GRAINS] = POLY_XTAL____MTEX_GS_ANALYSIS()
```


Figure 2

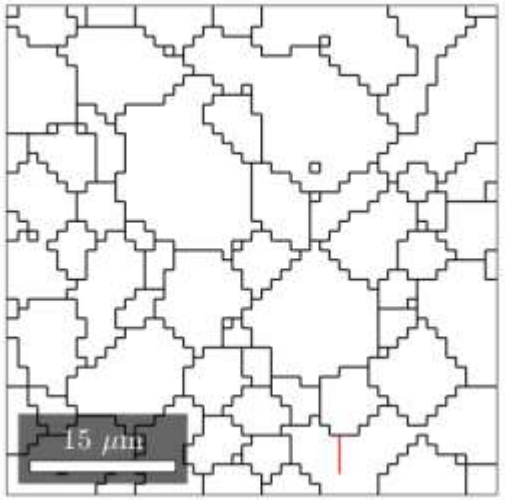


Figure 1

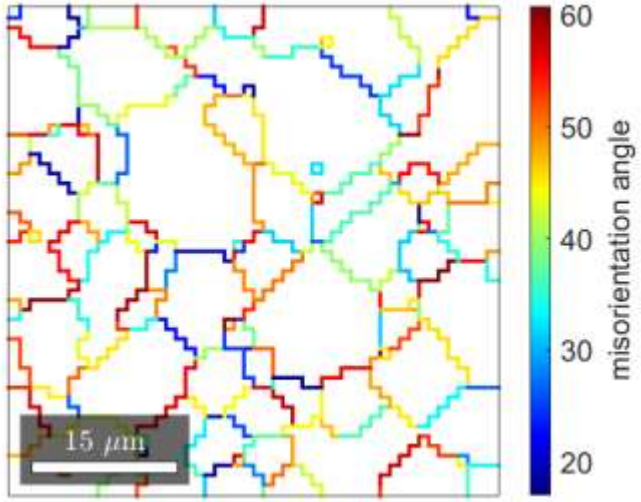


Figure 3

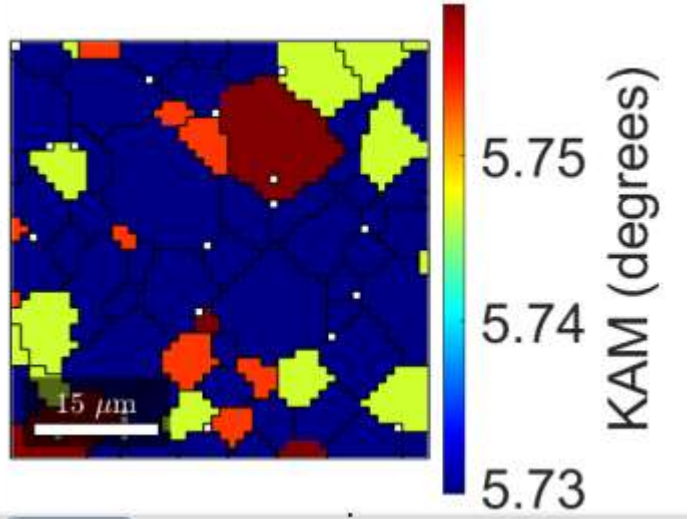


Figure 4

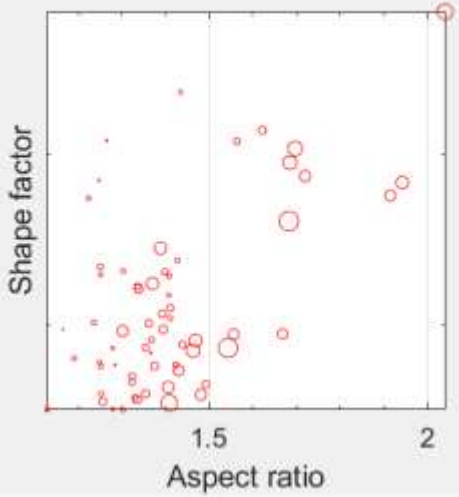


Figure 5

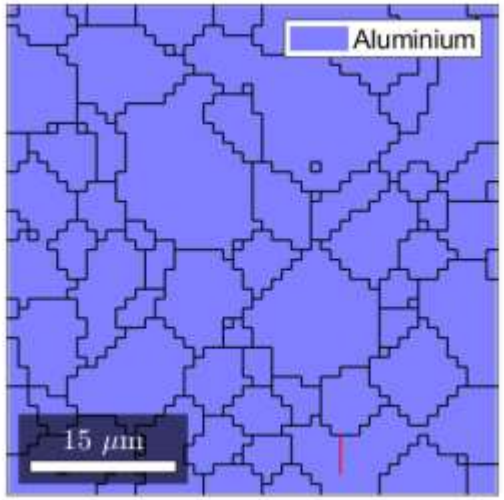
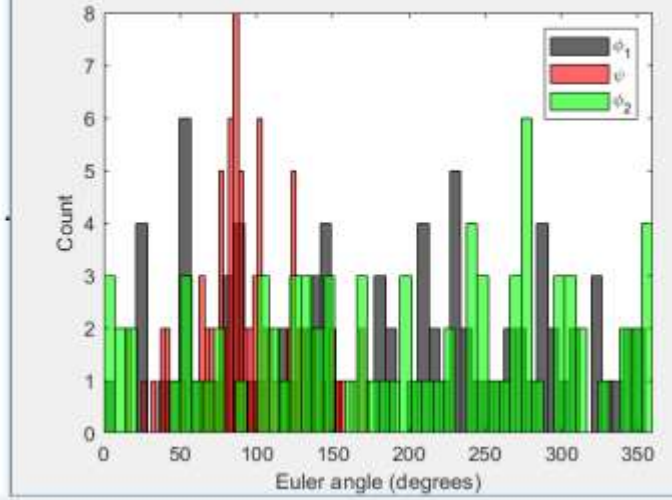
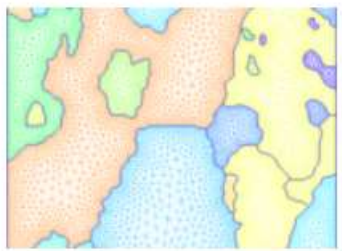


Figure 6



gmsh.info/#Download



MTEX2Gmsh

version 3.1.0 (7.96 MB) by Dorian Depriester

Matlab toolbox for generating meshes from EBS
https://doriandepriester.github.io/MTEX2Gmsh/

Overview | Functions | Examples

docs

- custom
- example
- improvegeometry
- meshing
- plotting
- Prerequities

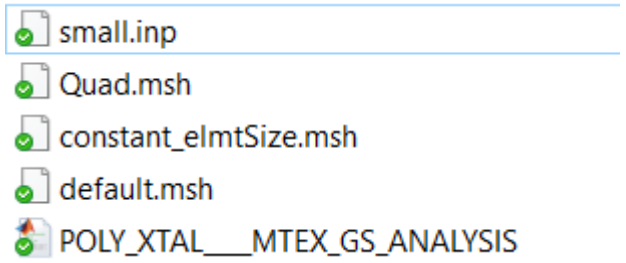
Prerequities

In order to install MTEX2Gmsh i

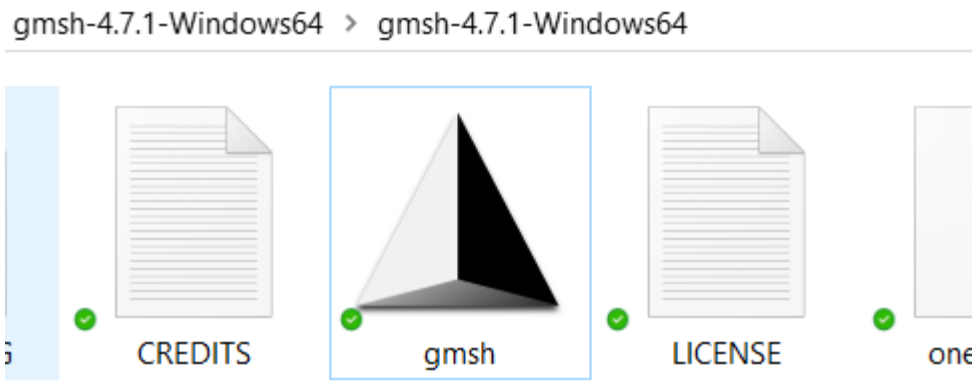
- the MTEX toolbox 5.1.1 (or
- Gmsh 5.2.2 (or newer) is ins

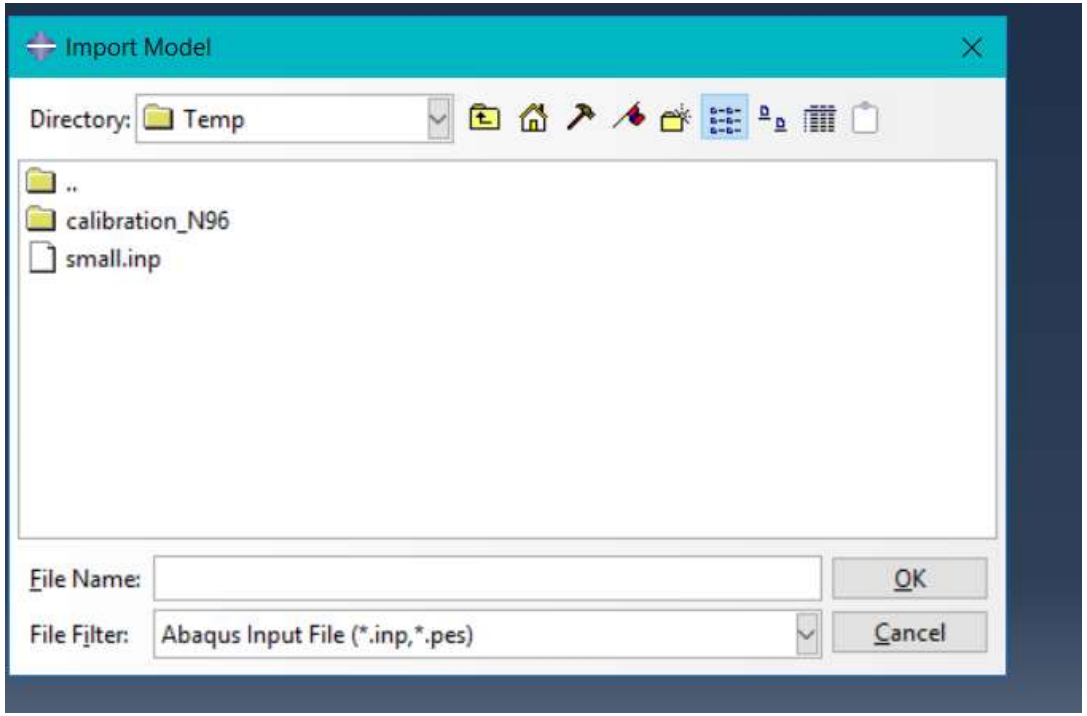
Contents

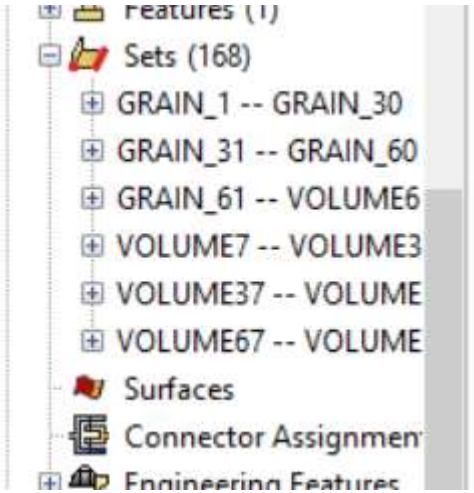
```
G = gmshGeo(GRAINS);

mesh(G,'default.msh')

mesh(G,'constant_elmtSize.msh','ElementSize',50)

mesh(G,'Quad.msh','ElementType','Quad');

mesh(G,'small.inp');
```

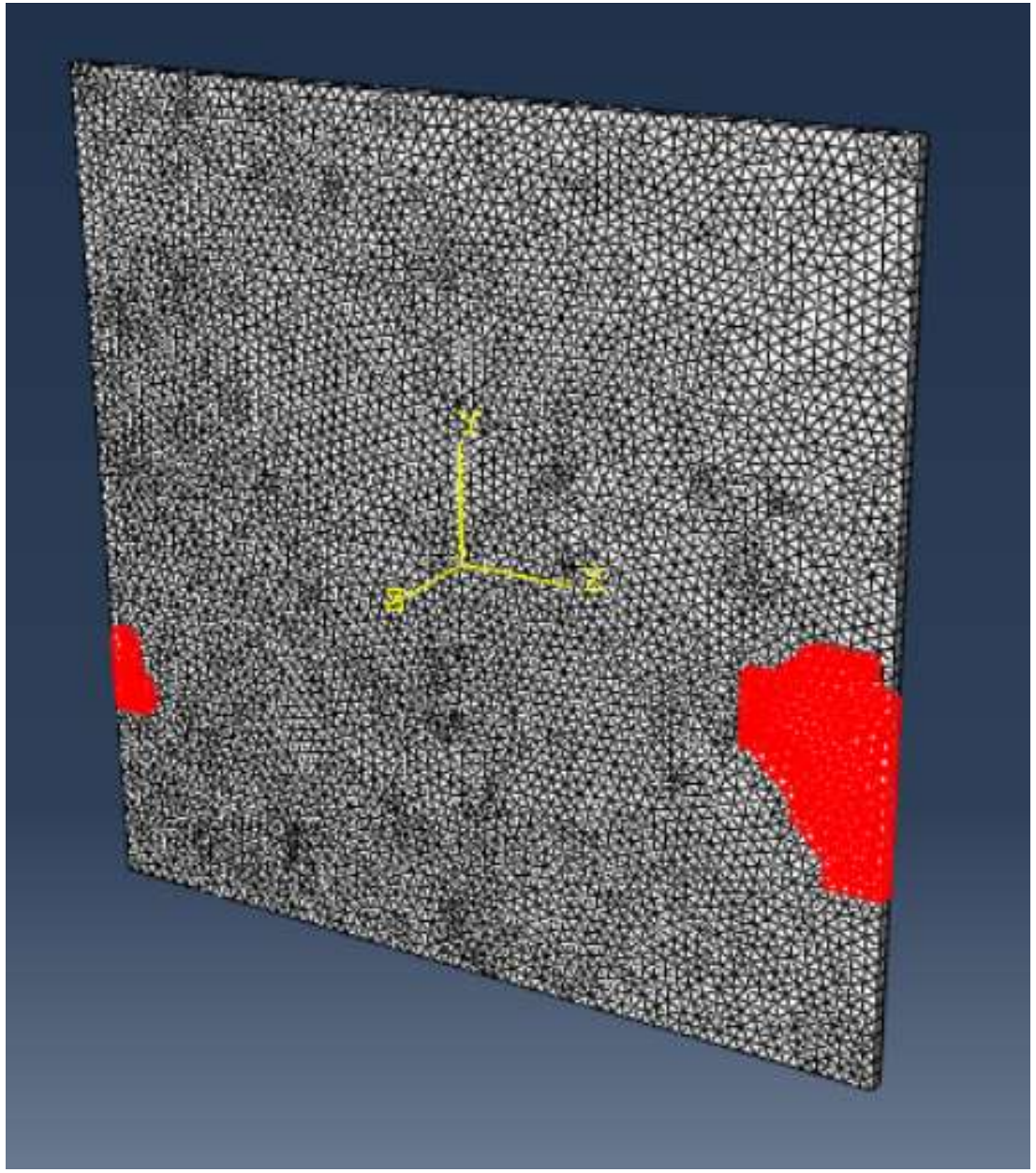


12

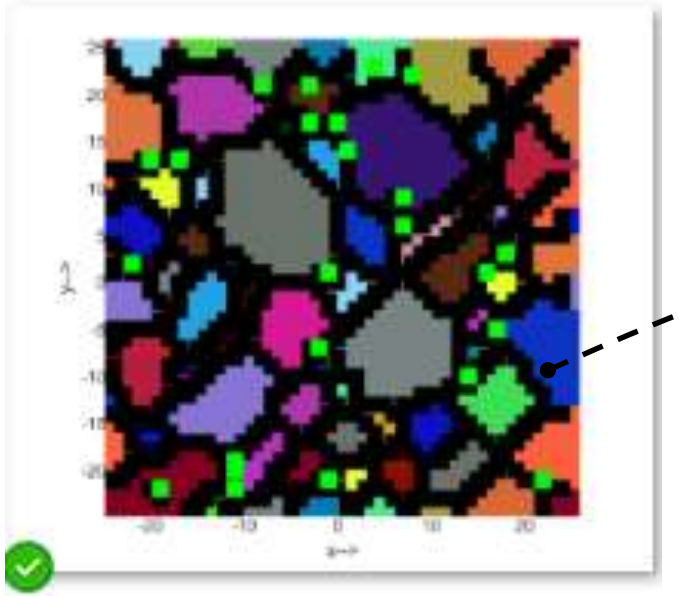



Import Model
Directory: Temp
..
calibration_N96
small.inp
File Name:
OK
File Filter: Abaqus Input File (*.inp,*.pes)
Cancel


Features (1)
Sets (168)
GRAIN_1 -- GRAIN_30
GRAIN_31 -- GRAIN_60
GRAIN_61 -- VOLUME6
VOLUME7 -- VOLUME3
VOLUME37 -- VOLUME
VOLUME67 -- VOLUME
Surfaces
Connector Assignmen
Engineering Features

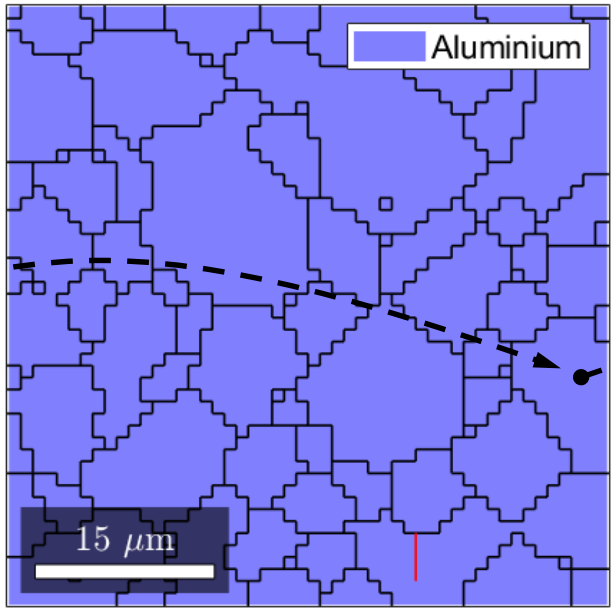


PXO



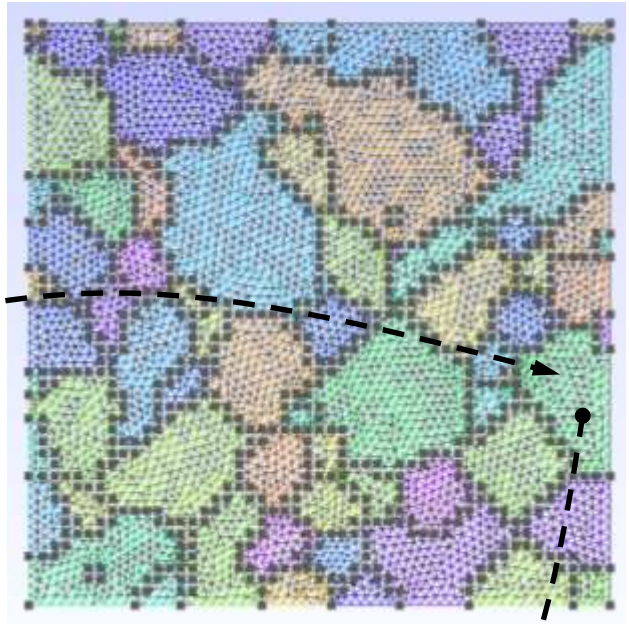
500mcs

MTEX

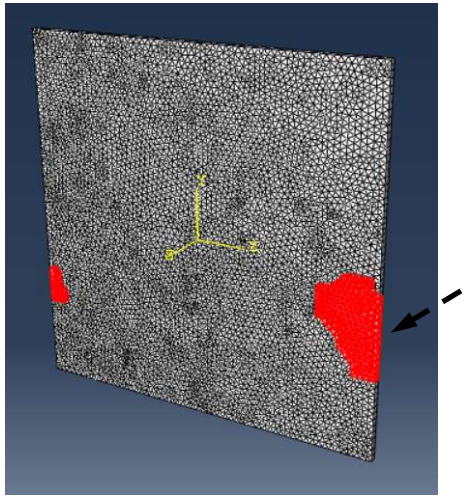


MTEX2GMSH

GMSH



ABAQUS



MATERIAL
SIMULATION

SUMMARY