**Figure 1 (Showing 3D segmentation):**

**1A**

Create either a segmentation flow chart or a cross-sections of the raw data

**Single Cell Isosurface**

**~~SingleCell3DIsosurfaceMovie\_withCrossSections(dataLSTC,3,22,1);~~** ~~To generate the 3D isosurface and multiple cropped images of a single cell. Cropped images were taken at the frames layervec = 1:5:60;~~

~~-I’ve updated the cell to #35 which is more typical in terms of having a larger area at the apical layer. Patch transparency is set to 0.5.~~

SingleCell3DIsosurfaceMovie\_withCrossSections(dataSample,1,3,1)

**4 Cell Isosurfaces with cross-sections**

~~%TypeT1\_3DIsosurfaceMovie\_withImages(dataLSTC,1,12)~~

FourCell3DIsosurfaceMovie\_withCrossSections(dataSample,1,[3 4 8 9],1); % use

**Whole tissue Isosurfaces with cross-sections**

**Epithelial3DIsosurfaceMovie\_withCrossSections(dataLSTC,3**); To generate the 3D isosurface and the 3 image layers (currently panel C). We took the 1st image frame of movie 3. Each time the function runs a random cell colormap is generated. The 3 layers selected were 1, 30, and 60.

**Average Cell Area Profile**

CellAreaProfile\_LS(dataLSTC,1:3);

Cell Area by Rate (typical shape)

ImwriteFramesOfIsosurface\_mapArea2color(dataLSTC(1),49,80:9:120,'~/Desktop/SampleVideo/');

View(-83,10)

Cell Area by Rate (basal bulge)

ImwriteFramesOfIsosurface\_mapArea2color(dataLSTC(1),20,70:9:120,'~/Desktop/SampleVideo/');

view(0,10)

**Figure 2 (Area Oscillations in 3D):**

**MakeMovieOfIsosurface\_mapArea2color(dataLSTC(1),49,'~/Desktop/SampleVideo/')**

**MakeMovieOfIsosurface\_mapAreaRate2color(dataLSTC(3),20);**

**Example Area Rate Heatmaps**

AreaRateHeatmap\_LS(dataLSOC,1,27) cell 27 from 0 to 7min.

AreaRateHeatmap\_LS(dataLSOC,1,29) cell 29 from 0 to 7min.

**2C**

**FFTonCellAreaRates\_CellStats\_LS({dataLSOC,dataLSTC});**

**2B**

**AutocorrArea\_LS(dataLSTC,1:3,1:65);**

**Figure 3 (Type T1 transition initiate at all levels):**

**3A**

Figure2\_T1examplesWithImages\_LS(dataLSTC,1,12); ~~input frame 85 for 0 min~~, 66 for -2 min

**3B**

Figure2\_T1examplesWithImages\_LS(dataLSTC,1,23); input frame 55 for 2 min

**3C**

T2AlignedMeanLength\_LS(dataSets,5); int 12

**3D**

T2LeadingLayer\_LS(dataSets); Note: update the method for finding T2 times. I don’t want to use the Contour function because it’s a black box.

**Figure 4 (Myosin intensity results):**

To get the isosurface with the intensity mapping and the unwrapped isosurface the following function was used:

MakeMovieIsosurfaceAndSurfaceUnwrap(dataLSTC(3),24,1:1,'~/Desktop/SampleVideo/');

K>> colormap jet

K>> cd ~/Desktop/

K>> print(gcf,'SurfaceUnwrap.eps','-depsc')

Xcorr\_InterfaceMyoVsLength\_LS(dataLSTC,1:3); % cross correlation of interface length and junctional myosin

% step detection and analysis

[StepResultsH50y27] = StepDetection\_LS({dataLSY27},50);

1

2

>> StepAnalysisFigures\_LS(StepResultsH5,StepResultsH5y27,'Apical Horiz. WT','Apical Horiz. Y27');

Supplemental Figure 2

T2AlignedMeanLength\_LS(dataSets,5); dataSets mn1, 24; dataSets mn 1, 10; dataSets mn 1, 16

Supplemental Figure 3

PhaseMetricHeatmapsDuringT1transitions\_LS(dataLSTC,1,1);

PhaseMetricHeatmapsDuringT1transitions\_LS(dataLSTC,2,1); % 11th example

Ecad Figure

A. MakeMovieIsosurfaceAndSurfaceUnwrap(dataLSecad(1),9,2:2);

**Supplementary Figure 3**

Rosette images from Long Movie 3:

ColorRosetteCells(dataLong,3,1750:60:2400,[227,230,226,218,196,217]);

[] = NeighborNumberFigures\_LS(data,MovieNums)

VIDEOS

SuppVideo1:

MakeMovieOfIsosurface\_mapArea2color(dataLSTC(1),49,'~/Desktop/SampleVideo/')

MakeMovieOfIsosurface\_mapArea2color\_2Cells(dataLSTC,[49 54],'~/Desktop/SampleVideo/');

SuppVideo2:

MakeMovieOfIsosurface\_mapAreaRate2color(dataLSOC(1),23,'~/Desktop/SampleVideo/');

MakeMovieOfIsosurface\_mapAreaRate2color\_2cells(dataLSTC,[51 54],'~/Desktop/SampleVideo/');

SuppVideo3:

TypeT1\_3DIsosurfaceMovie\_withImages(dataLSTC,2,14);

SuppVideo4:

MakeMovieIsosurfaceAndSurfaceUnwrapZip(dataLSzip(2),32,14:100,'~/Desktop/SampleVideo/’);