

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

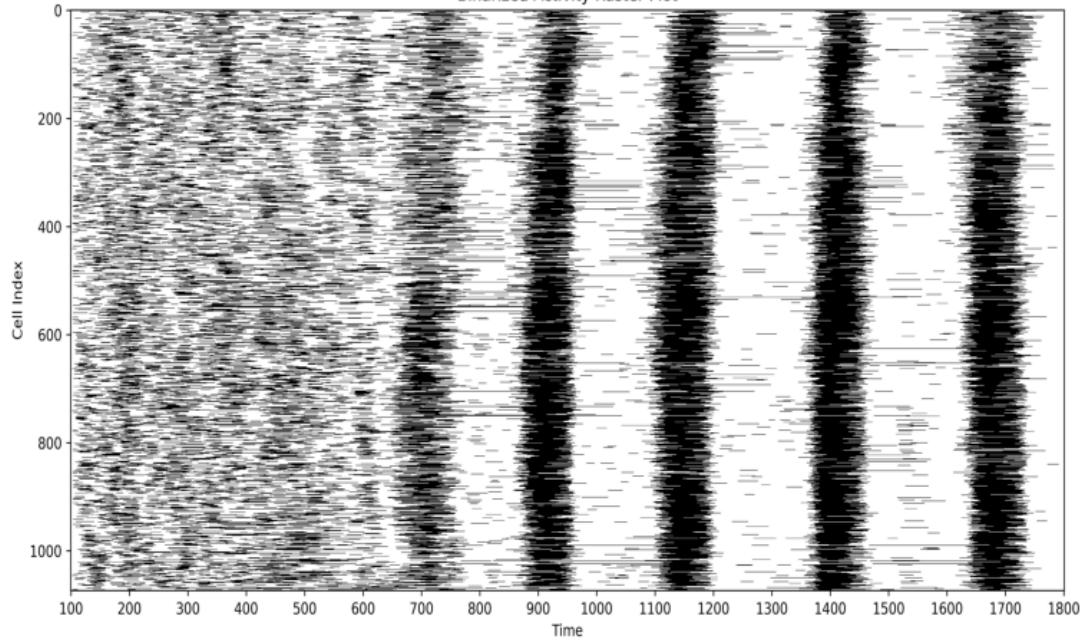
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

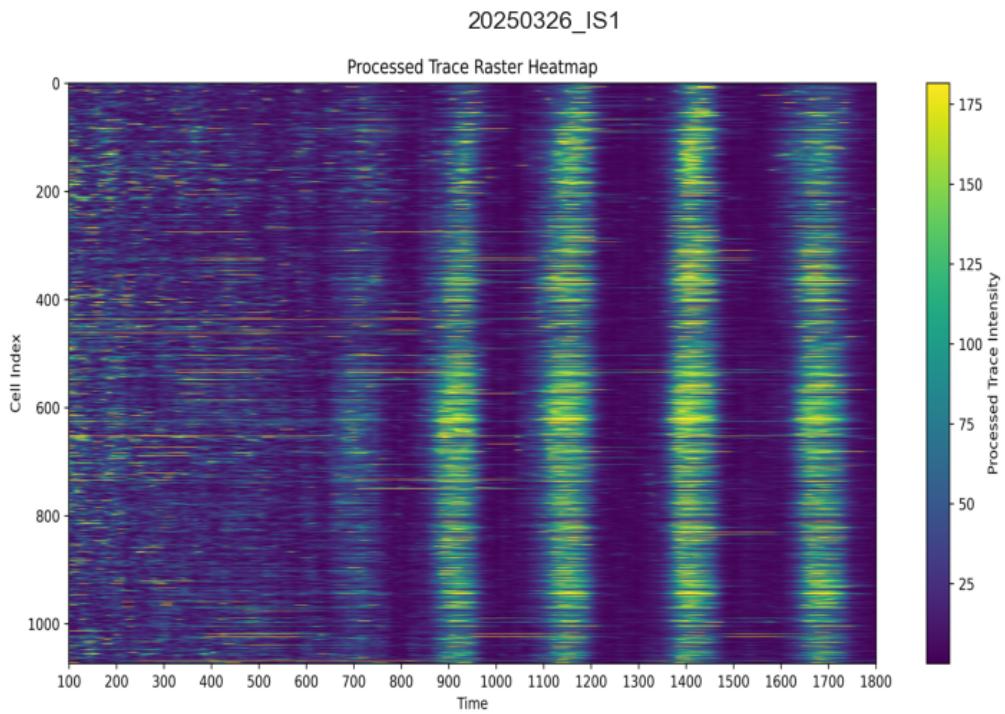
Binary Activity Raster Plot

20250326_IS1

Binarized Activity Raster Plot



Heatmap Activity Raster Plot



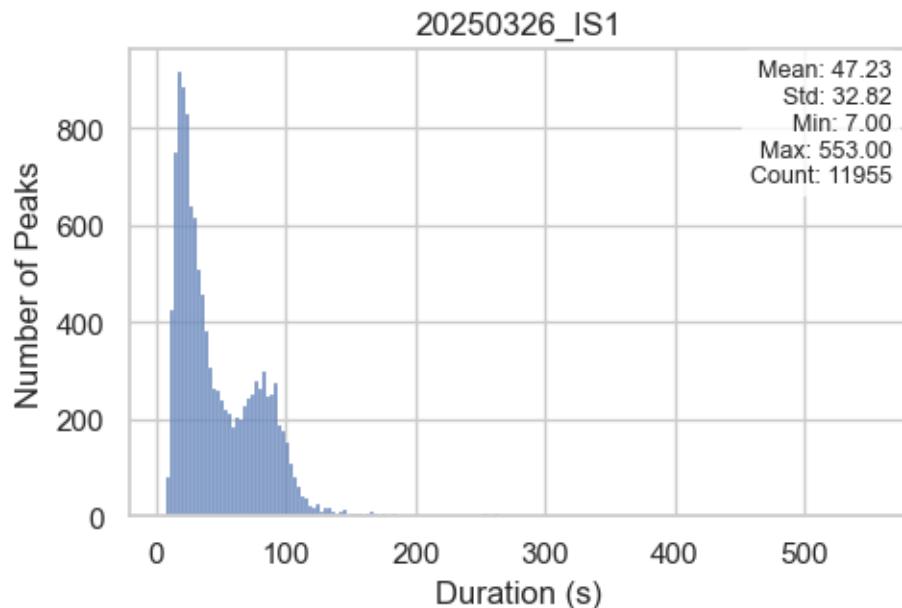
1.1.2 Peaks population

Total number of peaks: 11955

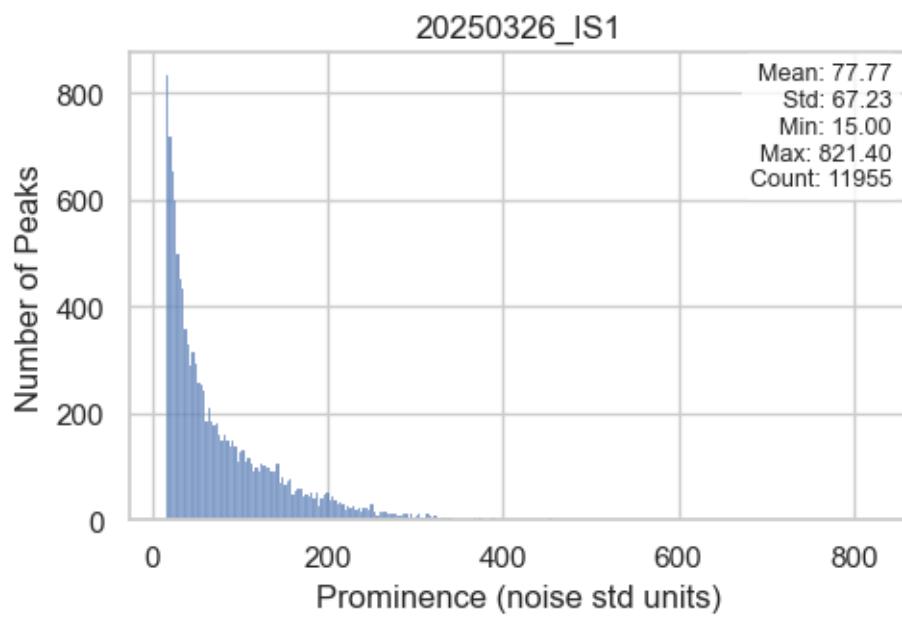
Total number of cells: 1074

1.1.3 Peaks statistics

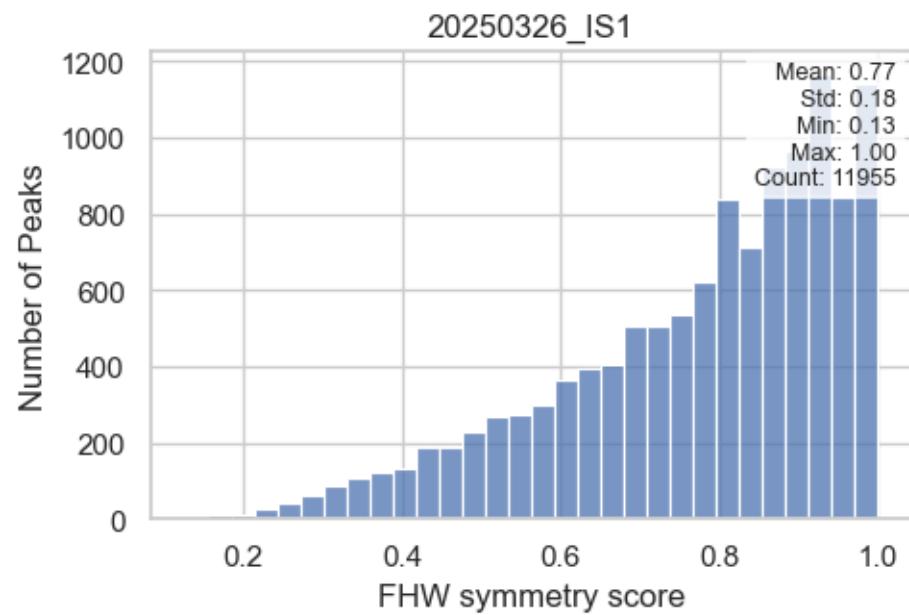
Distribution of Peak Durations



Distribution of Peak Prominences

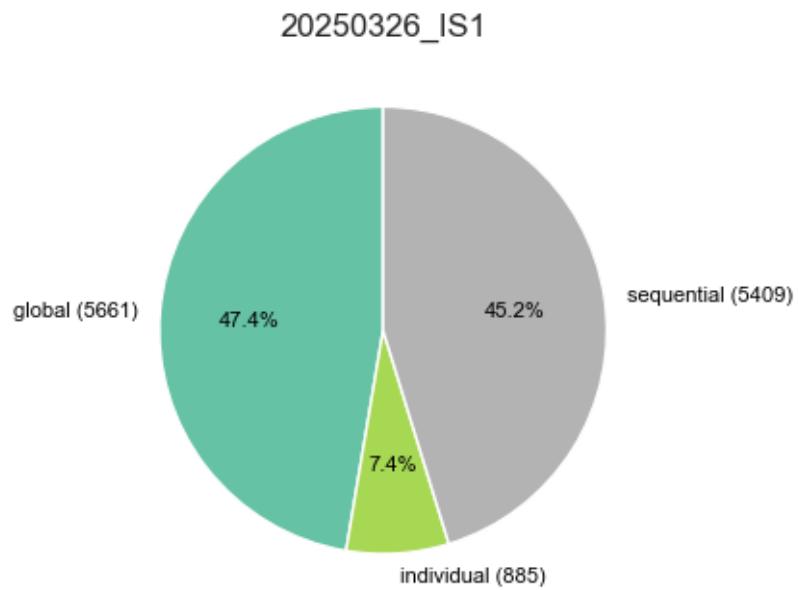


Distribution of Peak Symmetry Scores



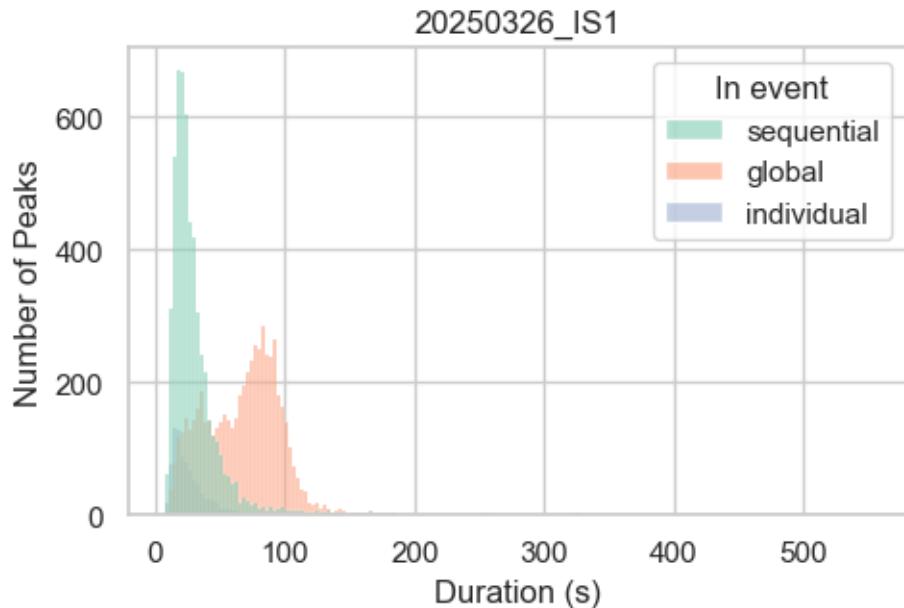
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

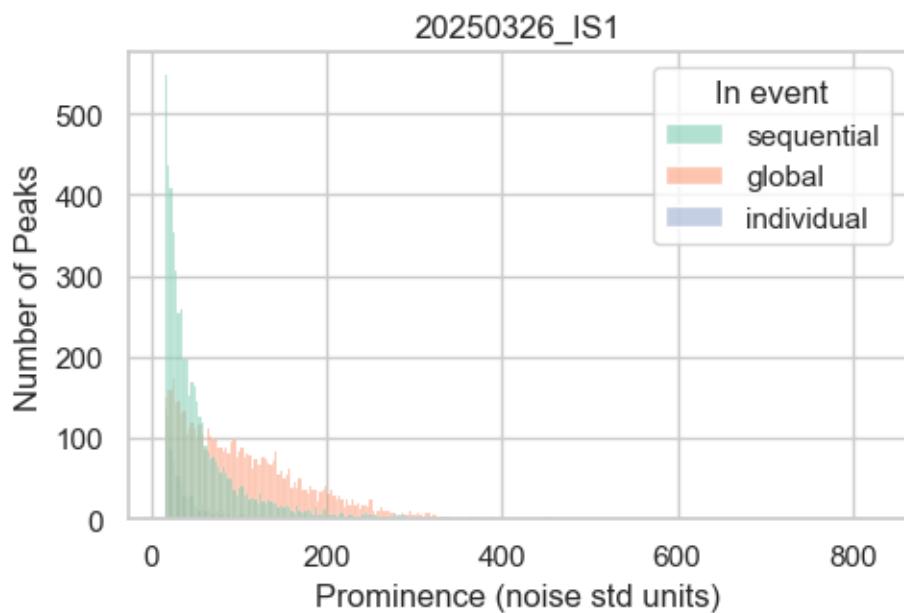


1.1.5 Peaks statistics per event types

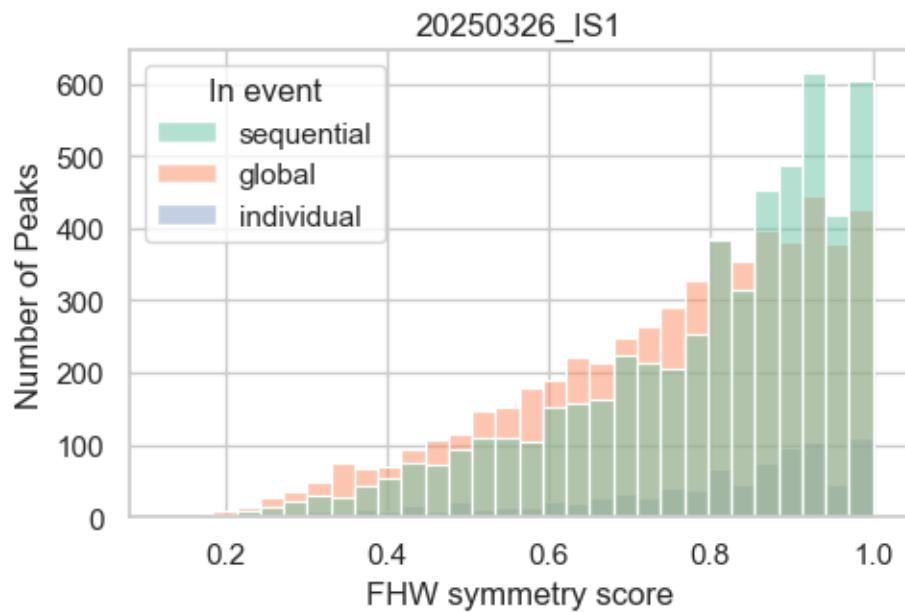
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

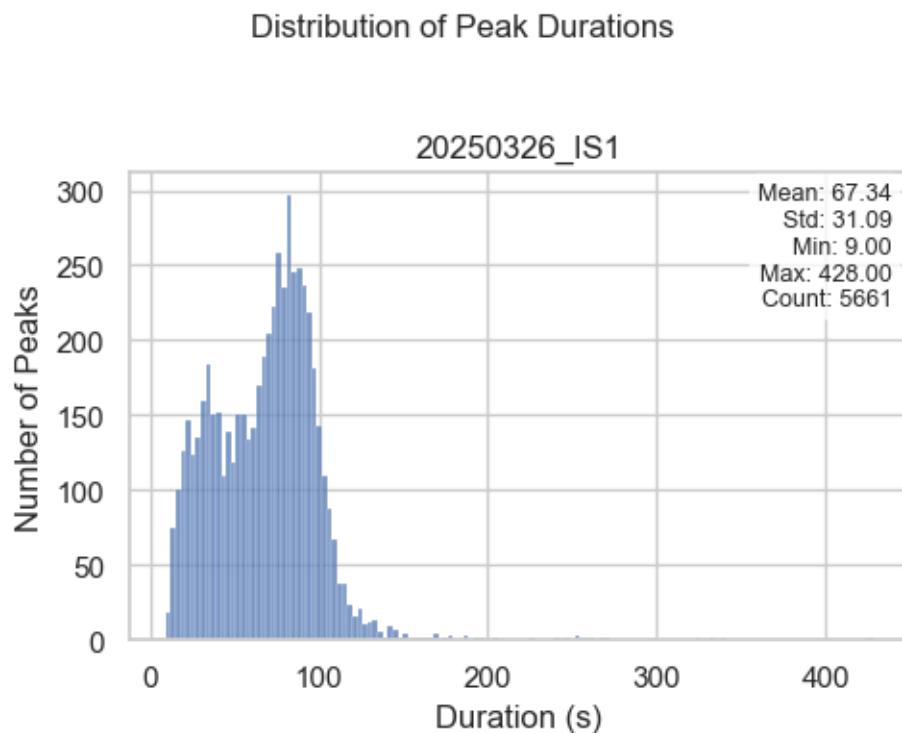


Distribution of Peak Symmetry Scores by Group

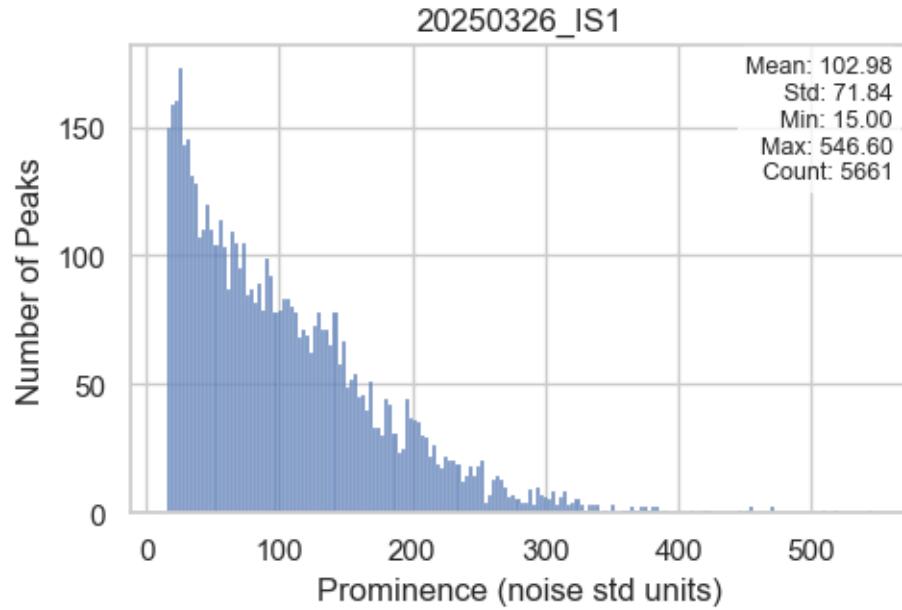


1.2 GLOBAL EVENTS

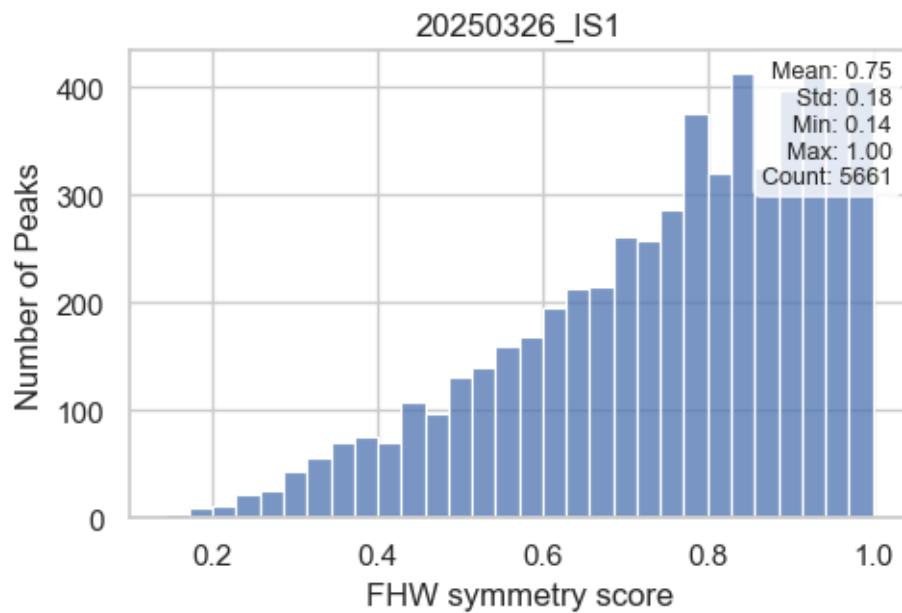
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

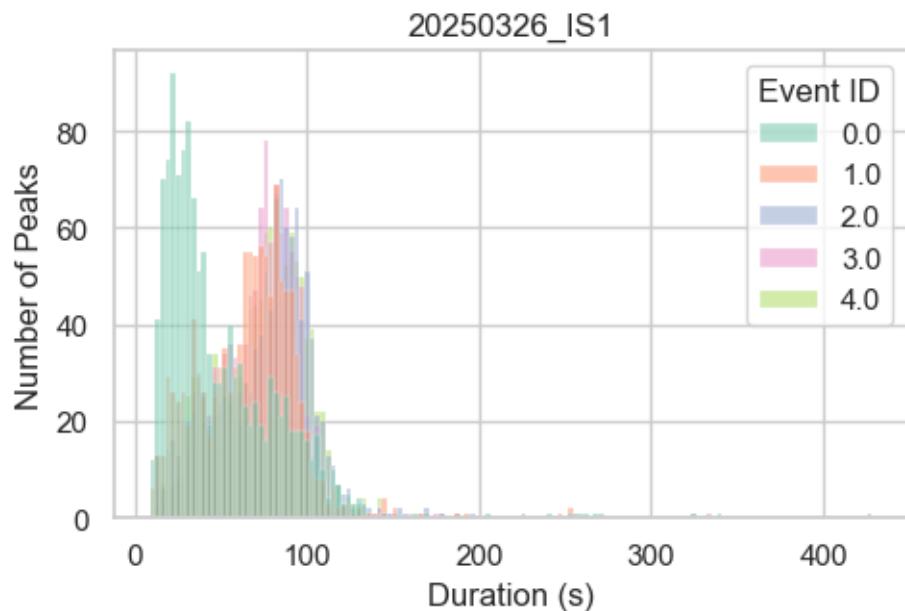


Distribution of Peak Symmetry Scores

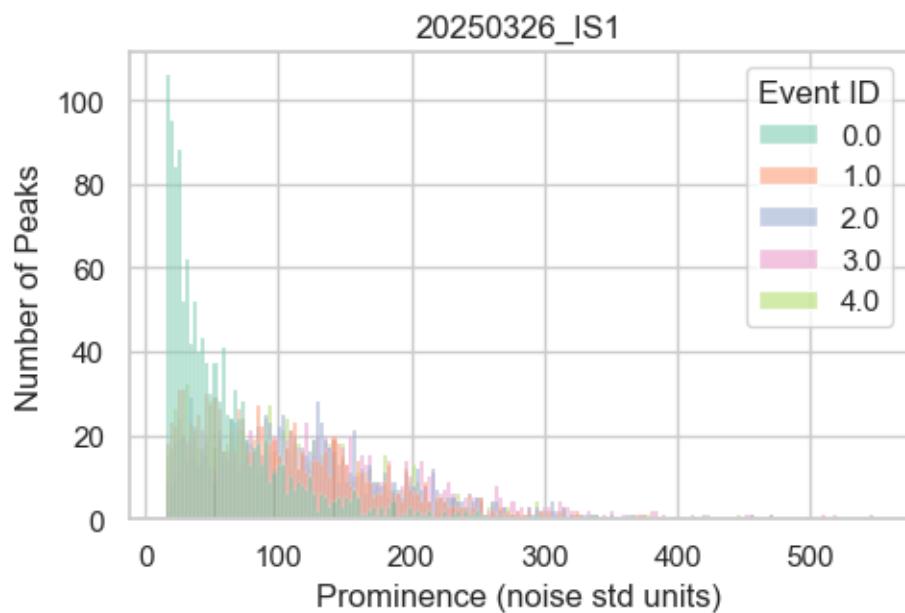


1.2.2 Peak statistics in global event per event ID

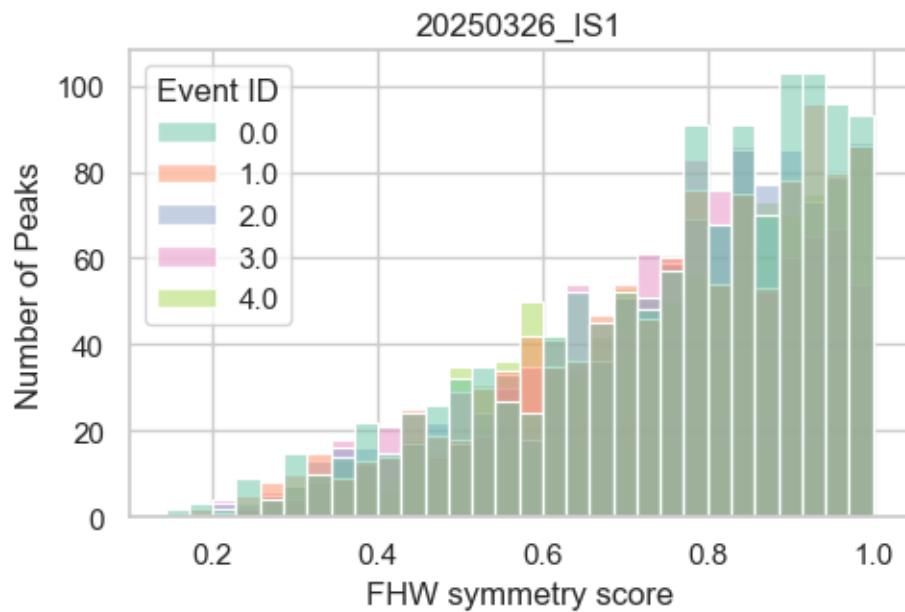
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



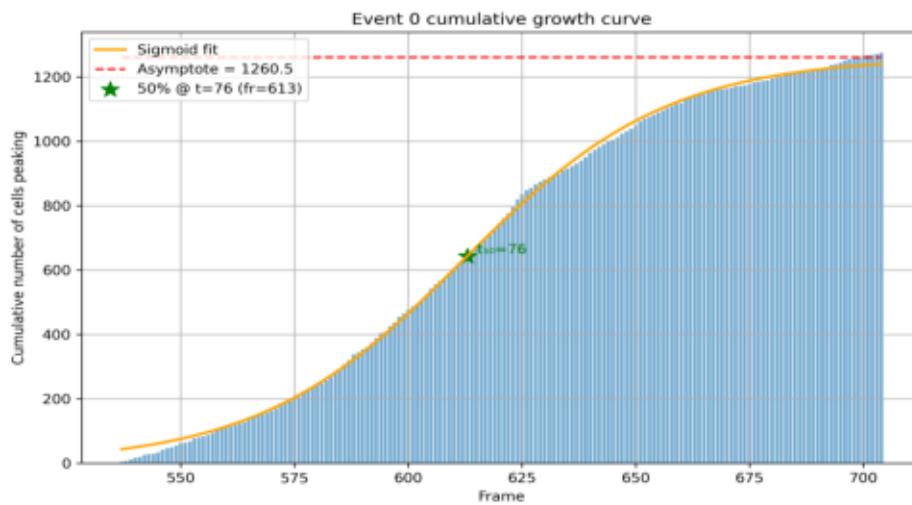
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

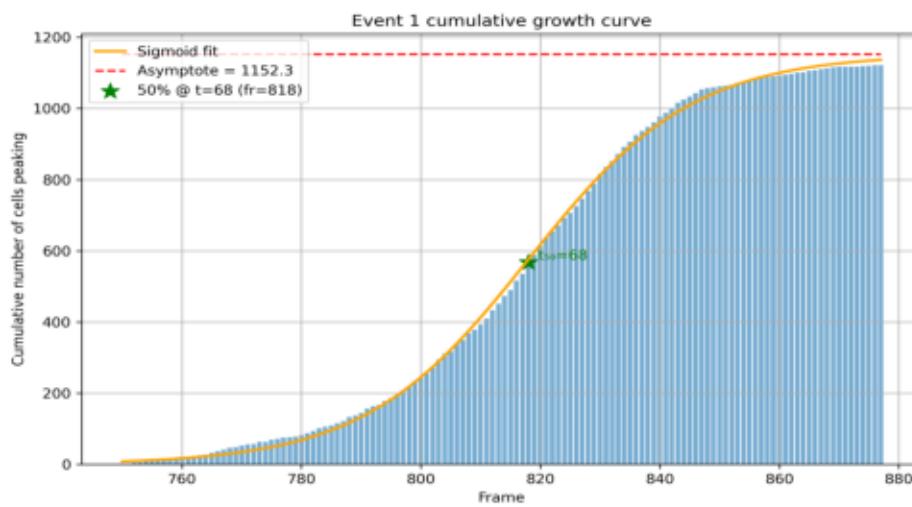
Event Activity Overlay (Event ID: 0)

20250326_IS1



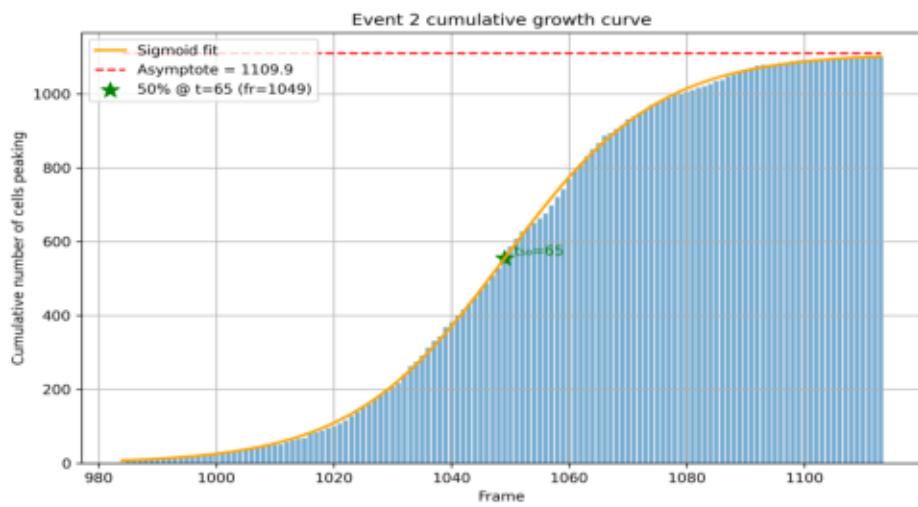
Event Activity Overlay (Event ID: 1)

20250326_IS1



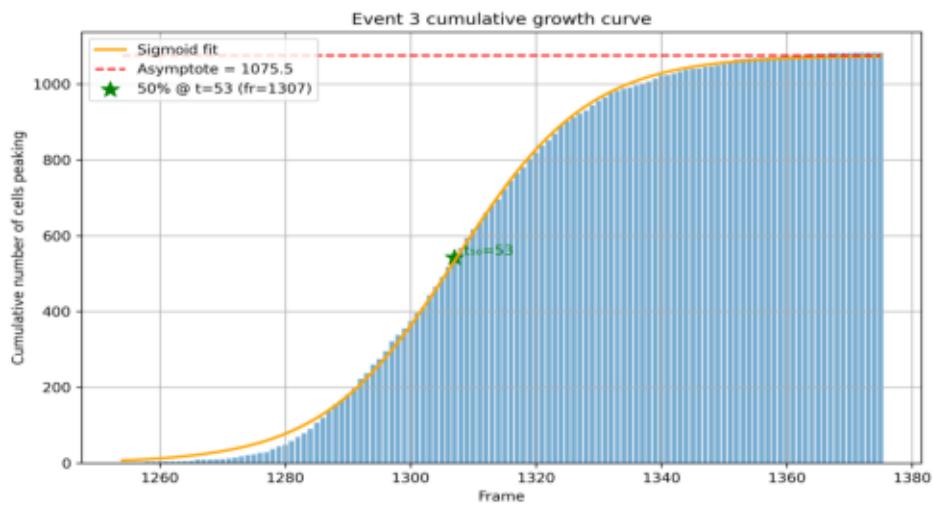
Event Activity Overlay (Event ID: 2)

20250326_IS1



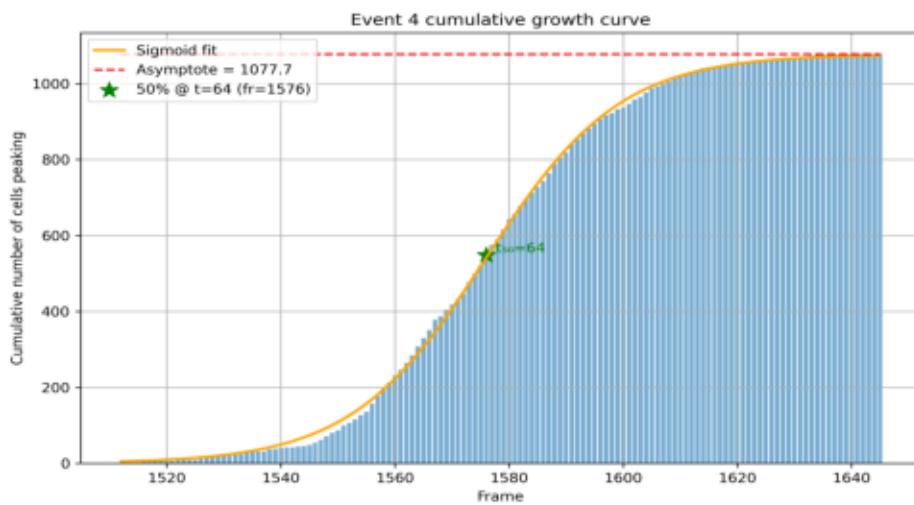
Event Activity Overlay (Event ID: 3)

20250326_IS1



Event Activity Overlay (Event ID: 4)

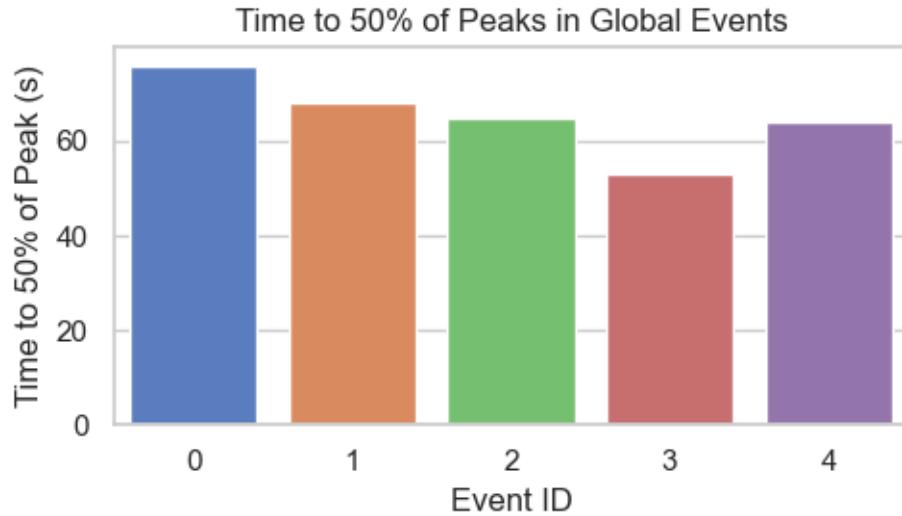
20250326_IS1



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.
```

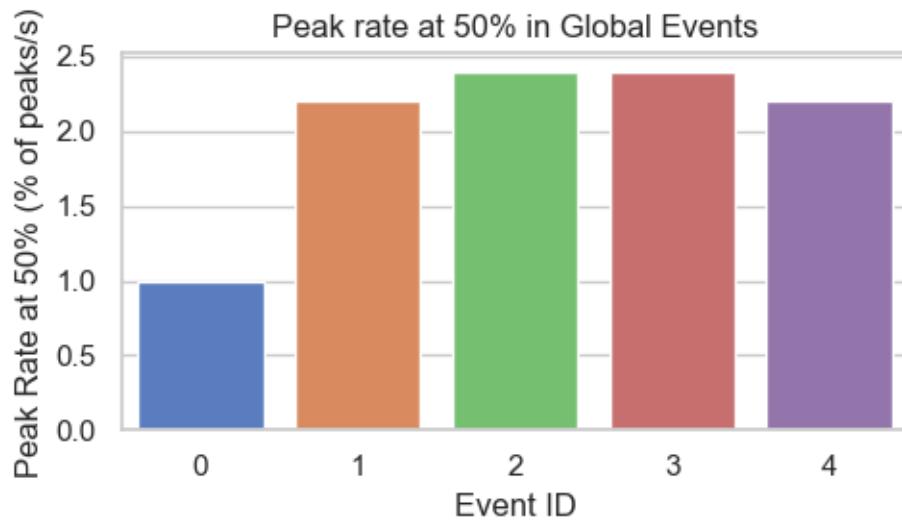
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column, dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys
is\visualizers.py:257: FutureWarning:
```

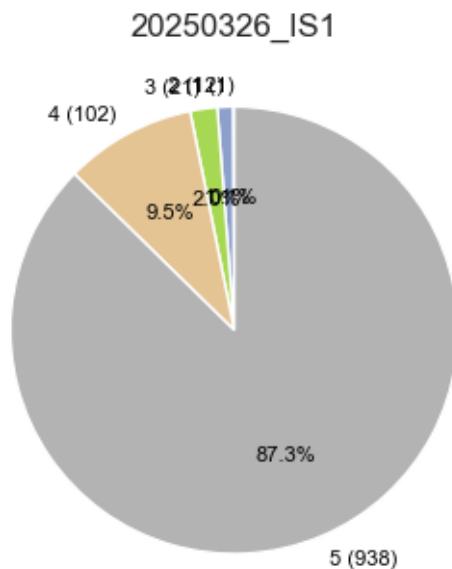
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



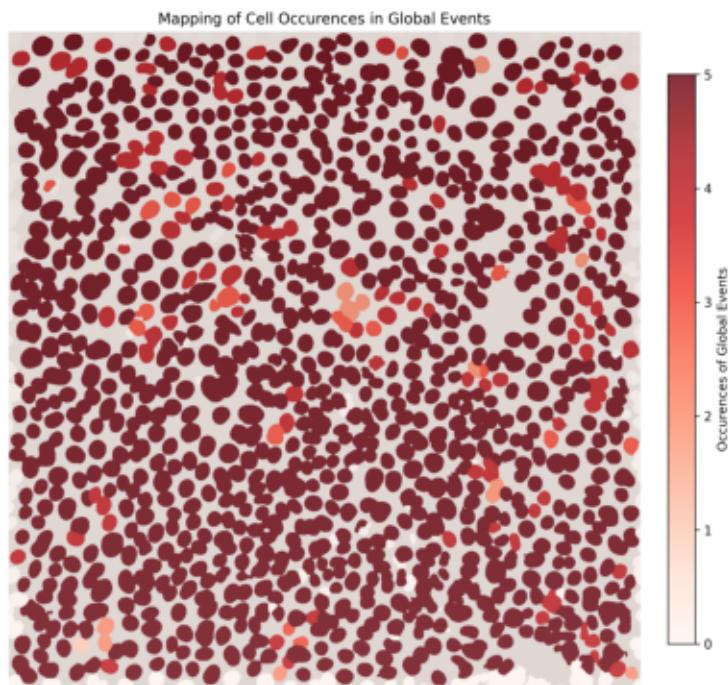
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

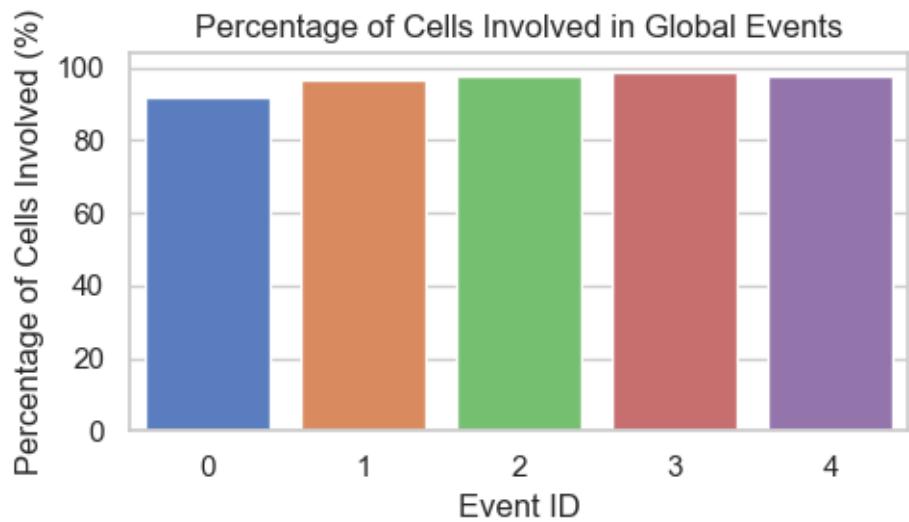
20250326_IS1



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.2.5 Inter-event interval analysis

Intervals between global event peaks: [210.0, 227.0, 260.0, 267.0]

Estimated periodicity: 0.911

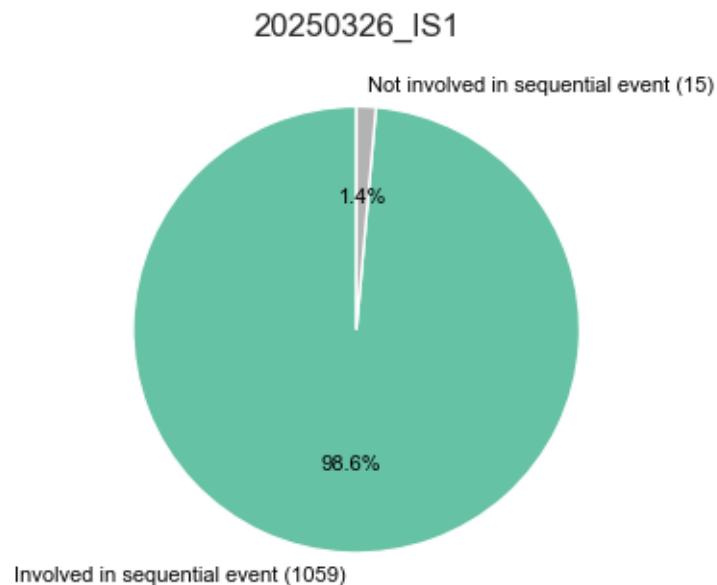
The global events exhibit a regular periodic pattern.

Estimated frequency (1/mean interval): 0.004 Hz

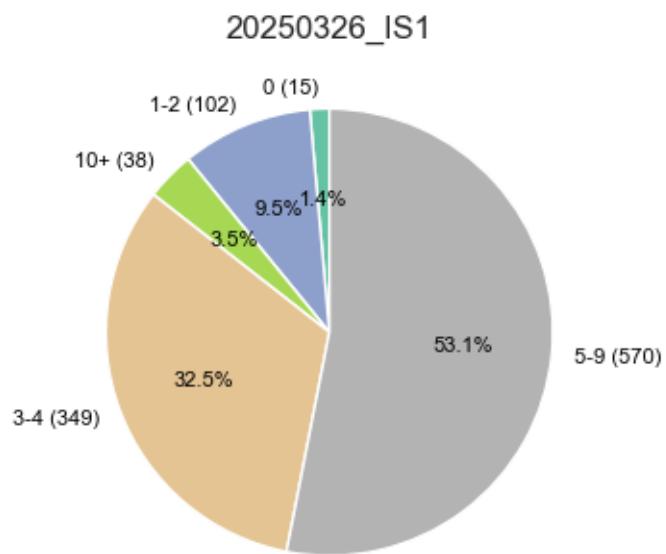
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

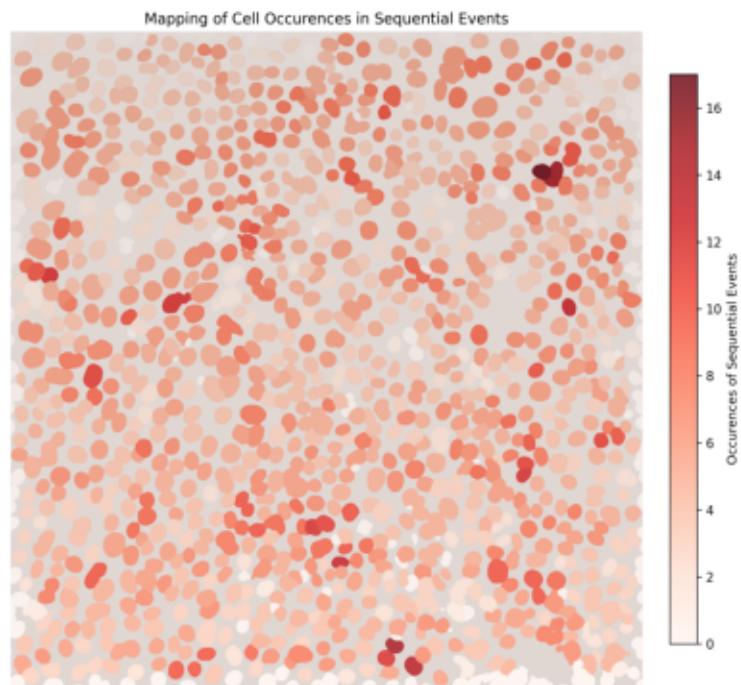


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

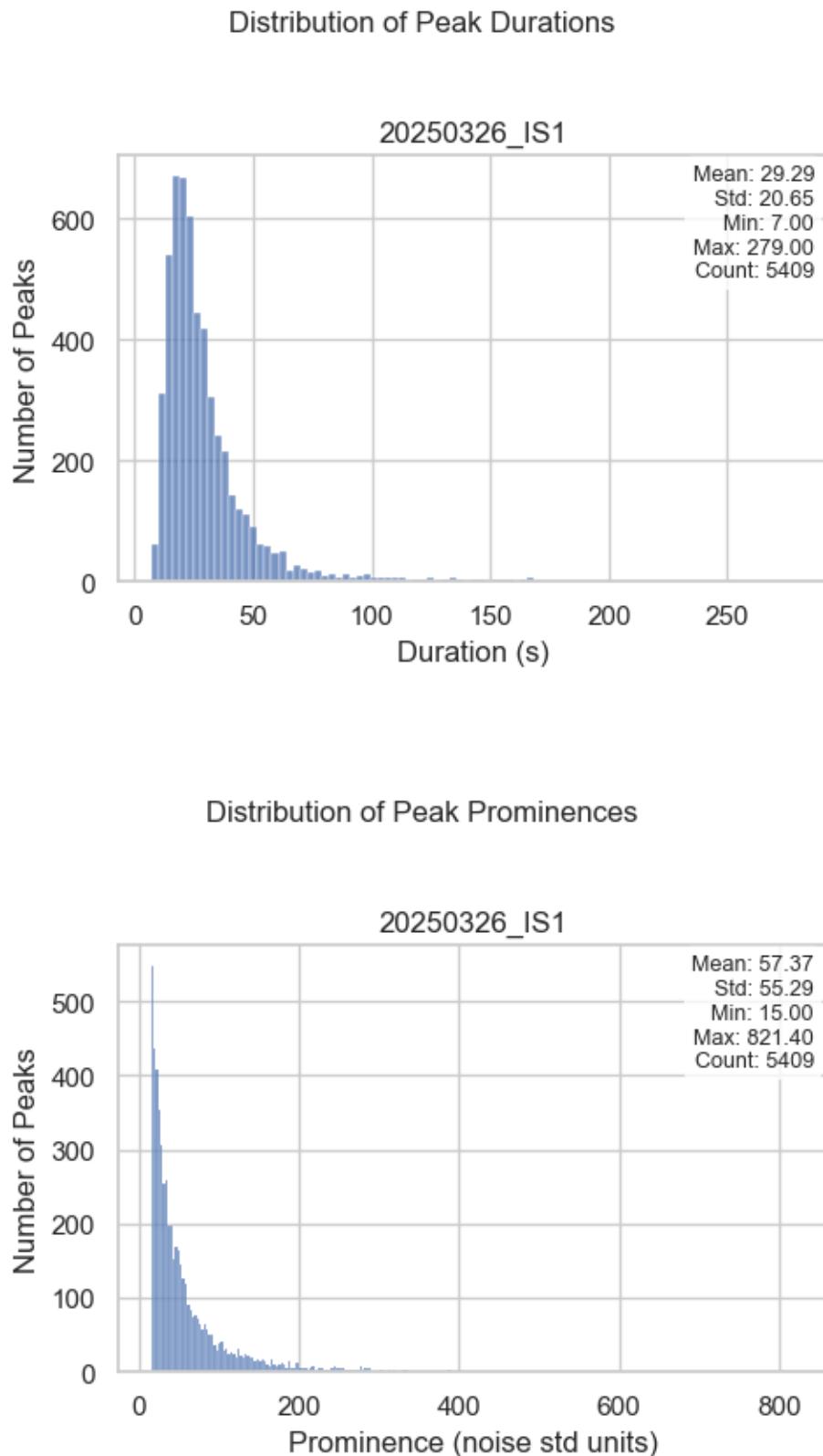


Cell Mapping with Occurrences in Sequential Events Overlay

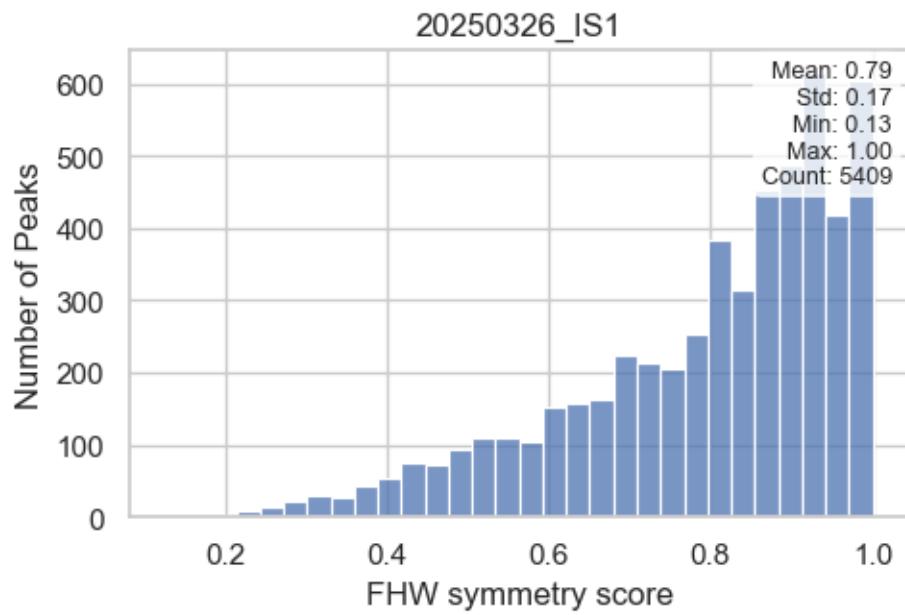
20250326_IS1



1.3.2 Peaks statistics in sequential events

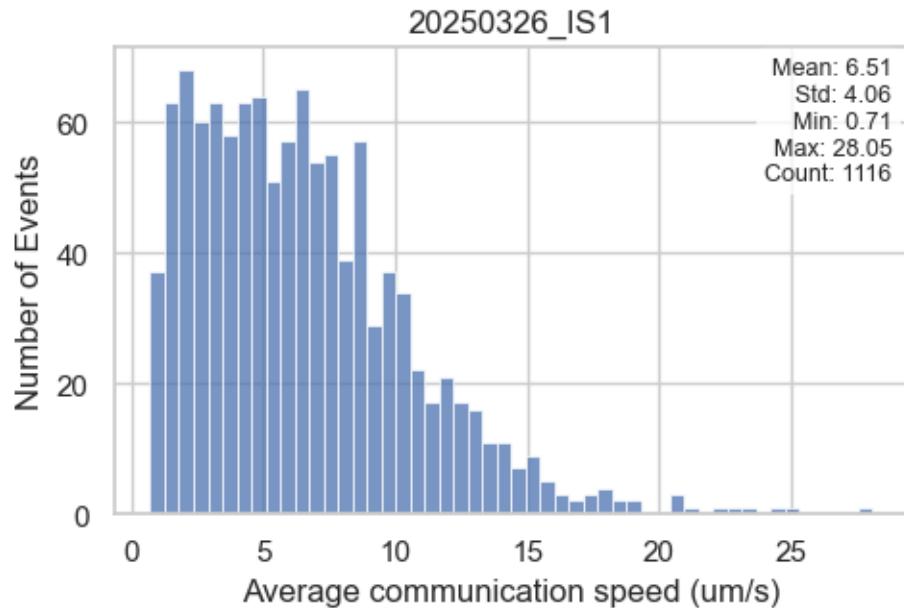


Distribution of Peak Symmetry Scores

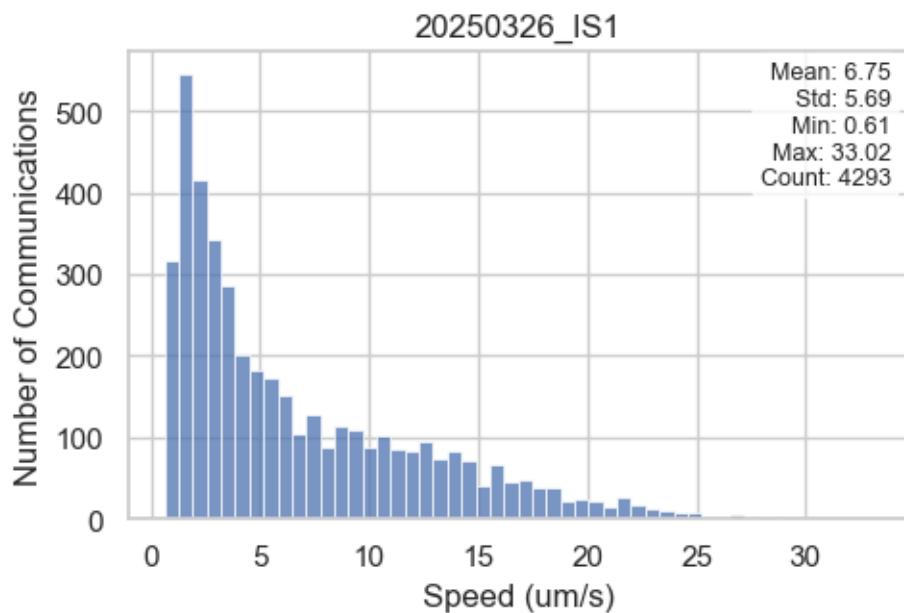


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

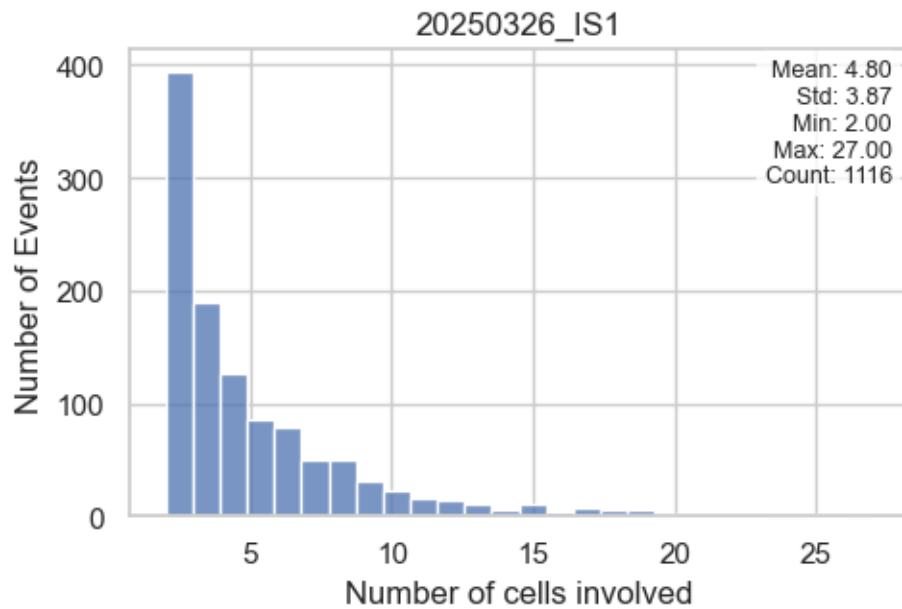


Distribution of Cell-Cell Communication Speeds



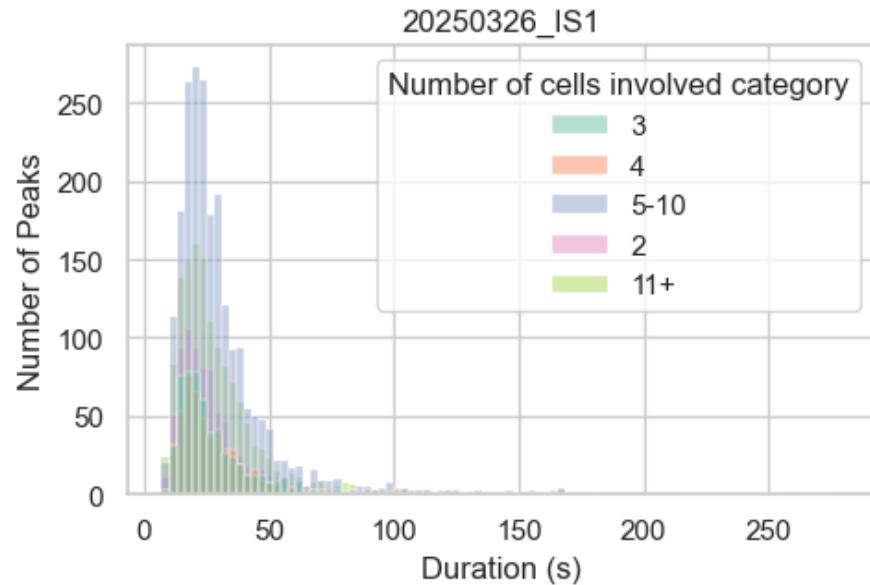
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

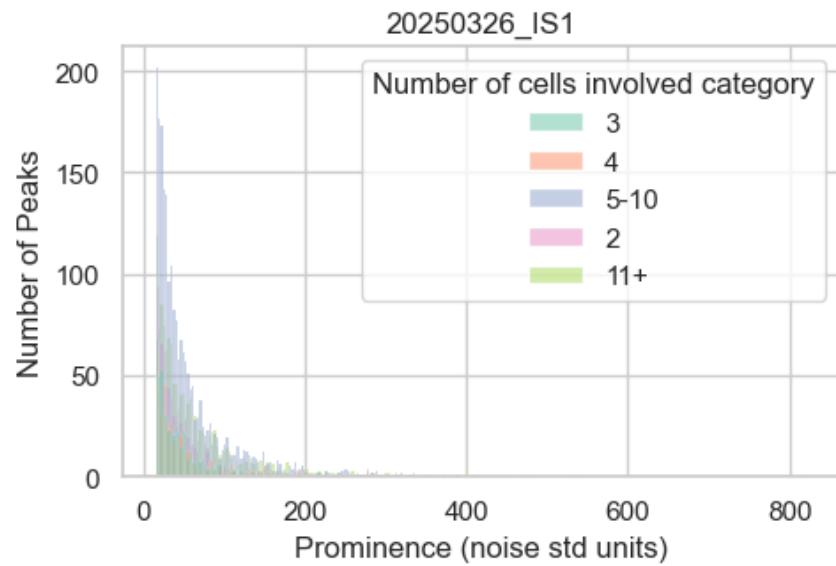


1.3.5 Influence of cell count per event on statistics

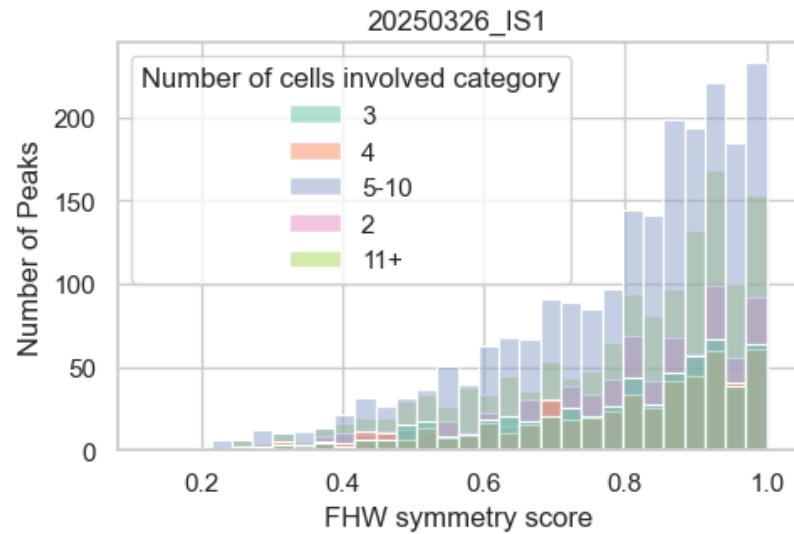
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



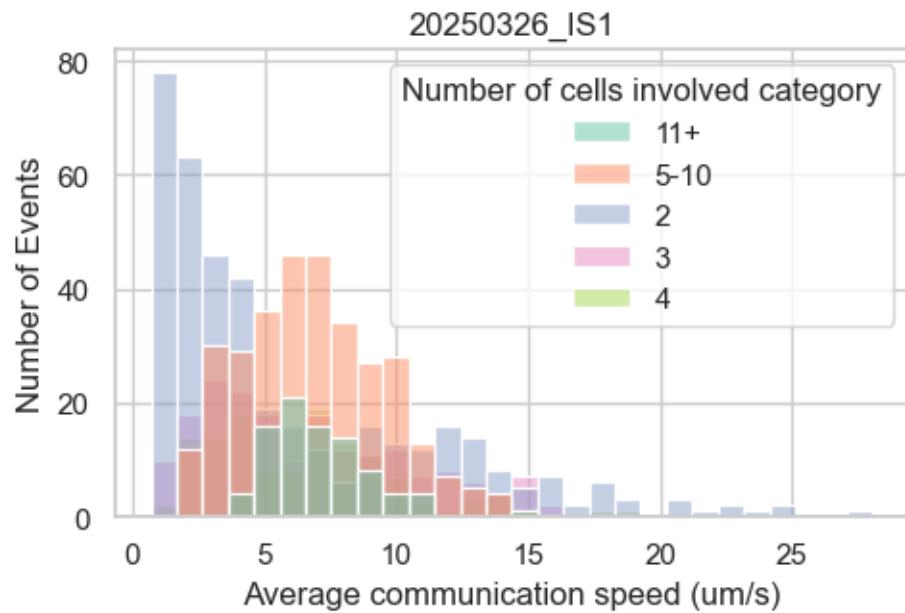
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



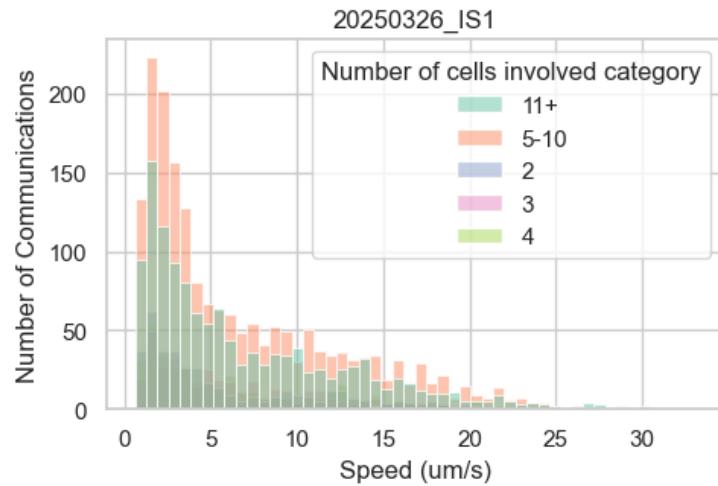
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

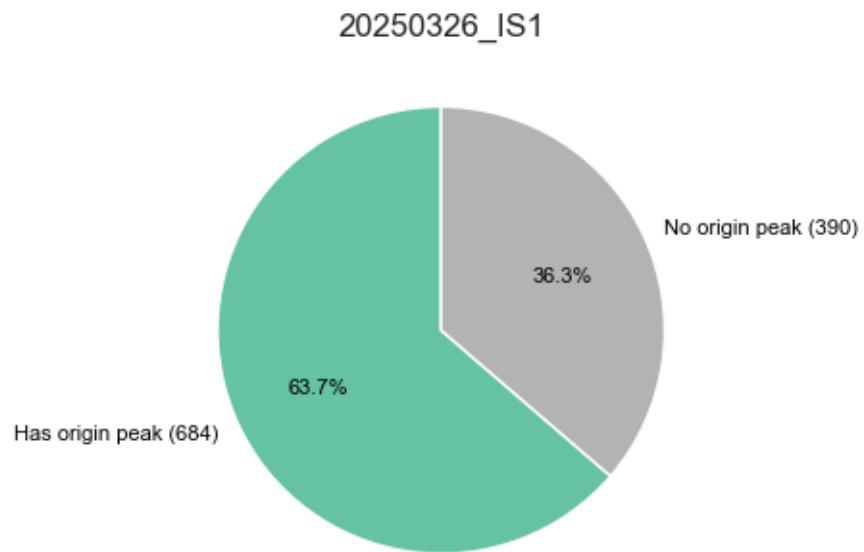


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

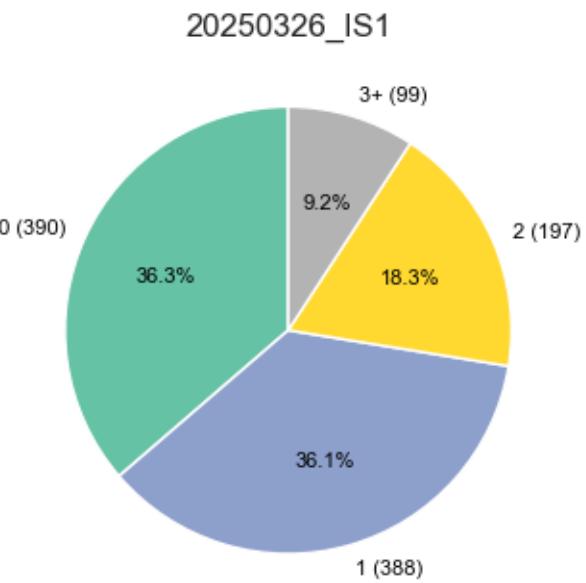


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

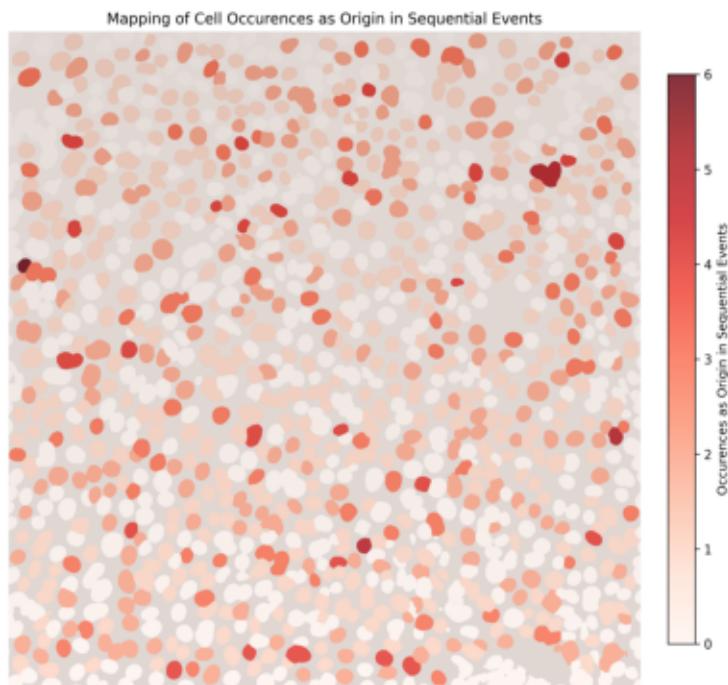


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

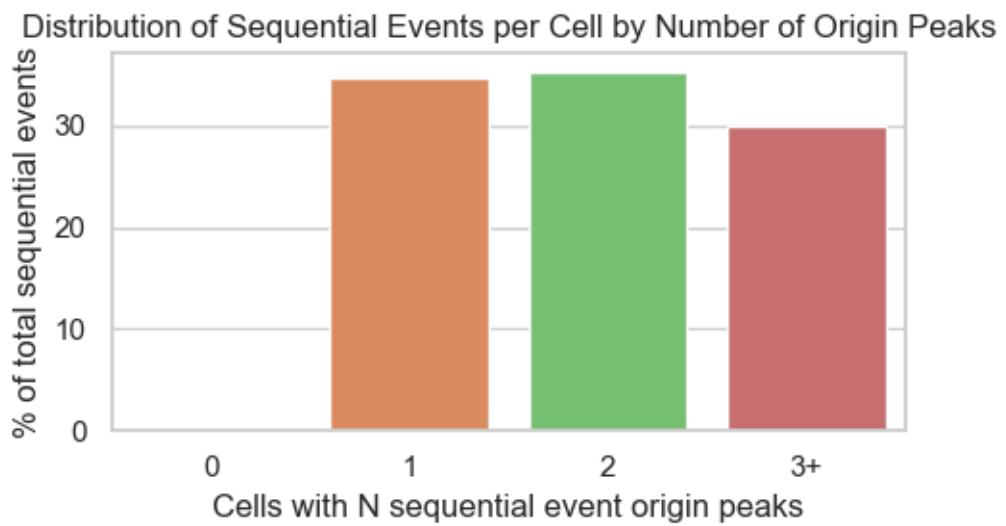
20250326_IS1



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

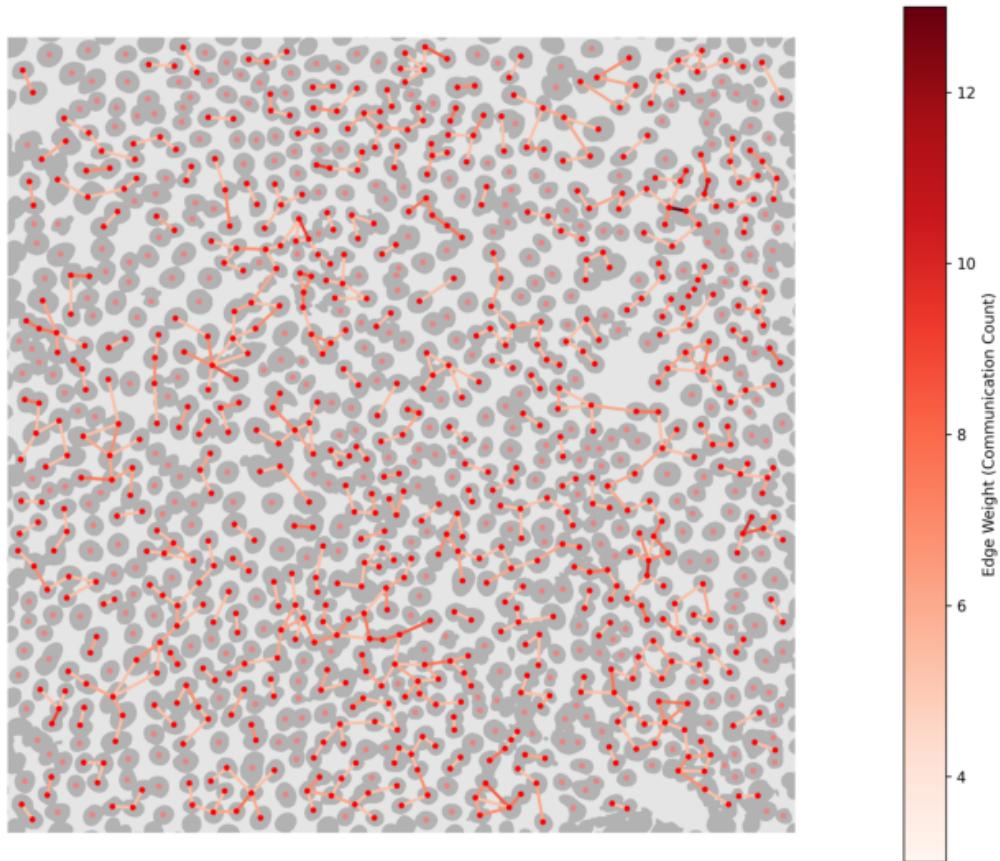


1.3.7 Connection network between cells

Cell Connection Network Graph

20250326_IS1

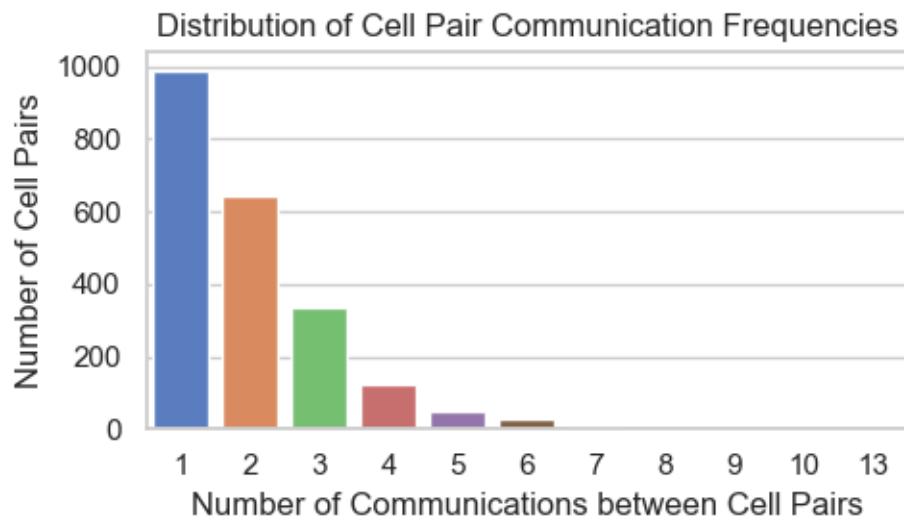
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

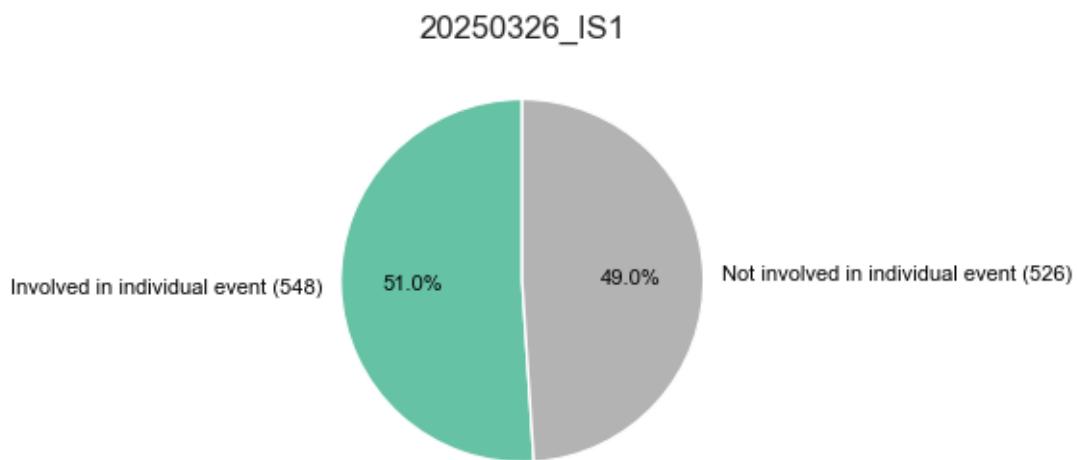
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



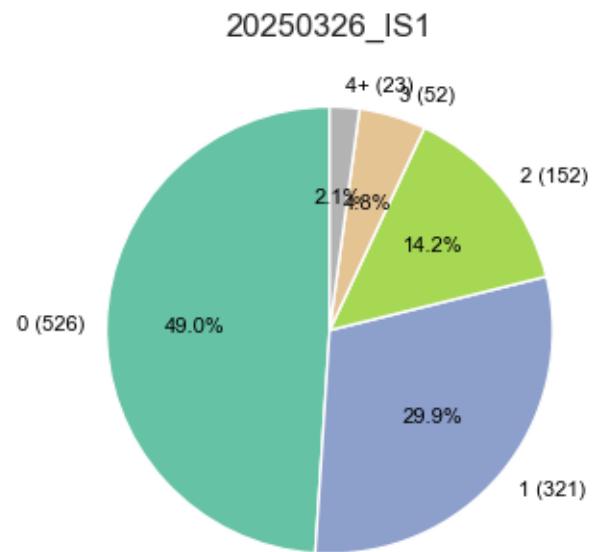
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

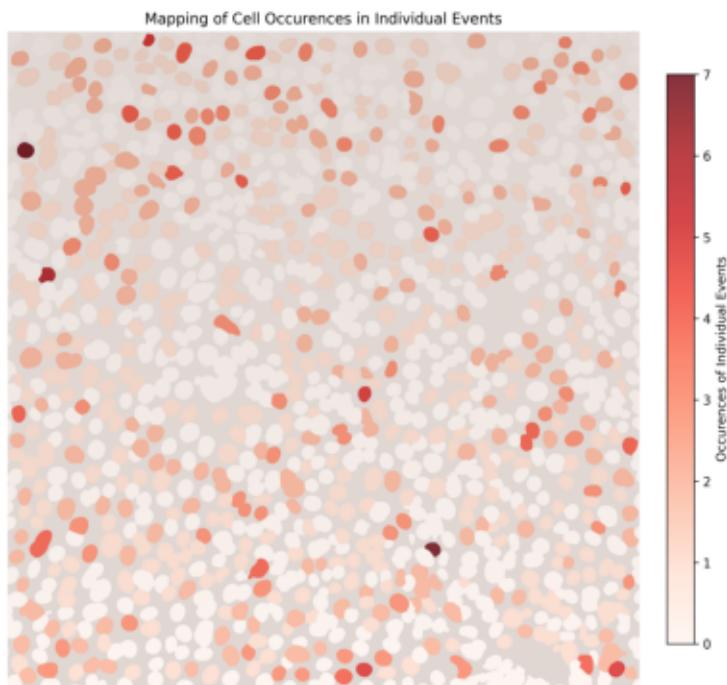


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)



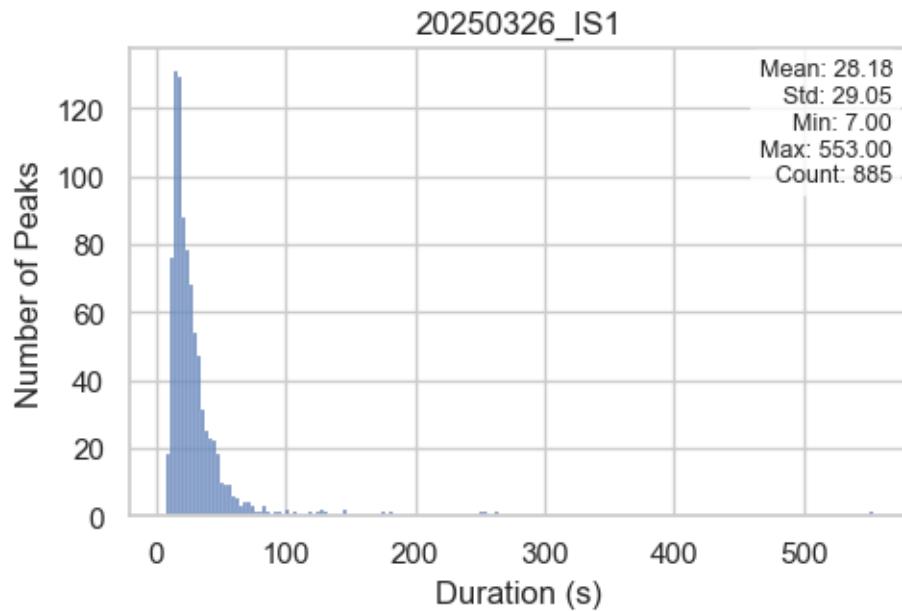
Cell Mapping with Occurrences in Individual Events Overlay

20250326_IS1

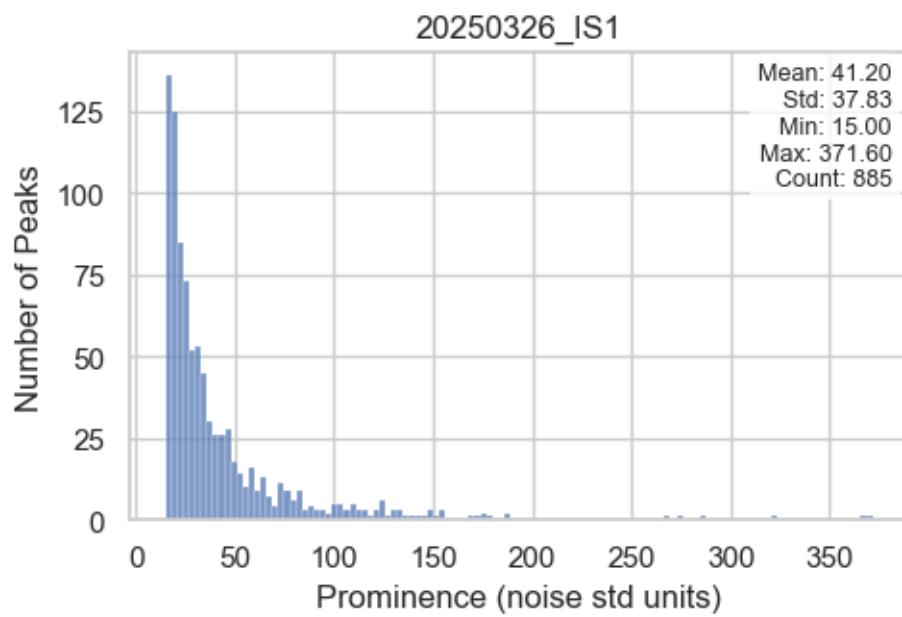


1.4.2 Peaks statistics in individual events

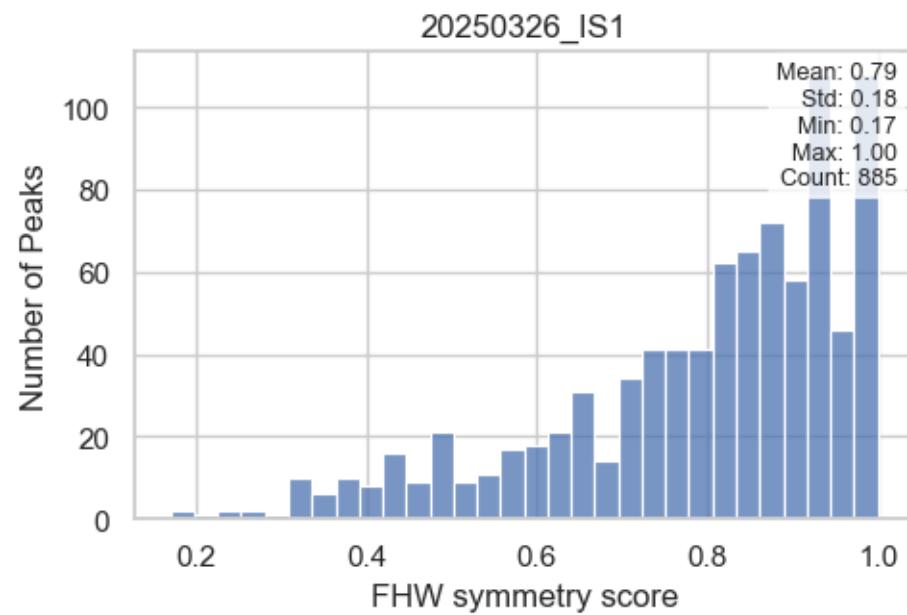
Distribution of Peak Durations



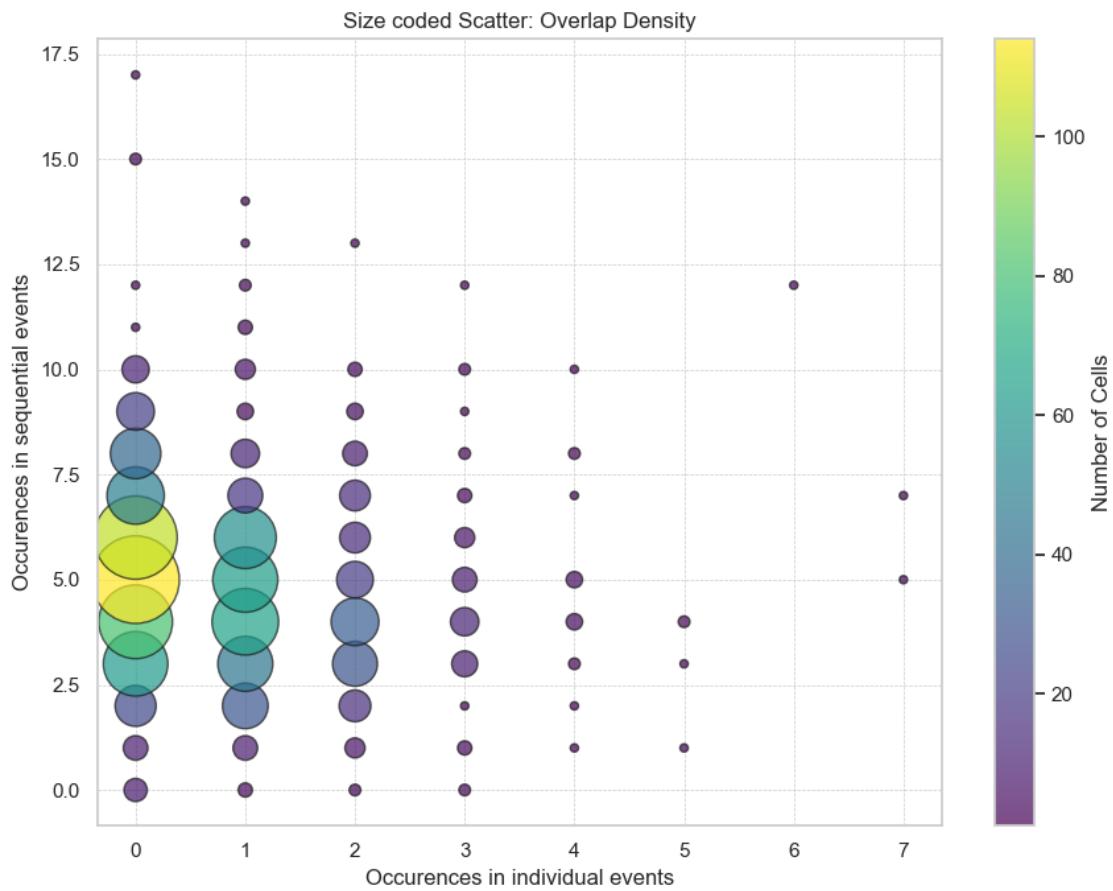
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

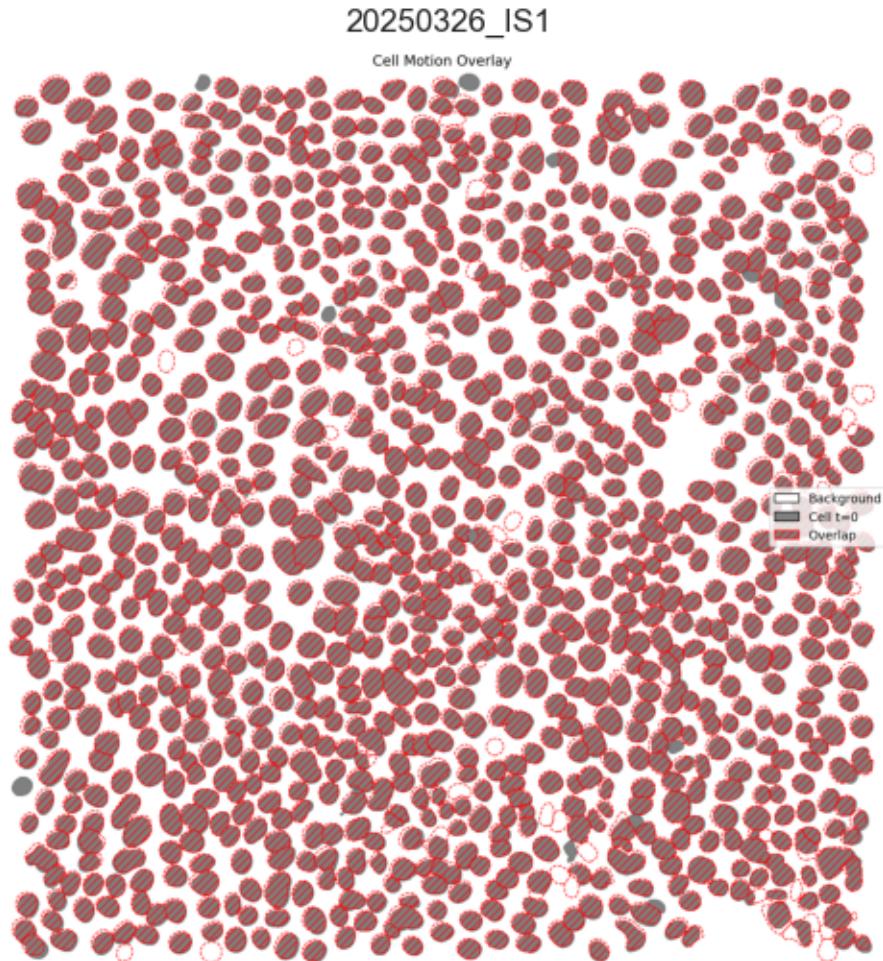


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 1057
- Hoechst image taken at t=1801: 1054
- Number of cells difference: absolute 3, relative 0.28%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 1118572
- Pixels segmented as cell at t=1801: 1144633
- Overlapping pixels between t=0 and t=1801: 985731 (87.11% of total)
- Pixels exclusive to t=0: 132841 (11.88% of total)
- Pixels exclusive to t=1801: 158902 (13.88% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

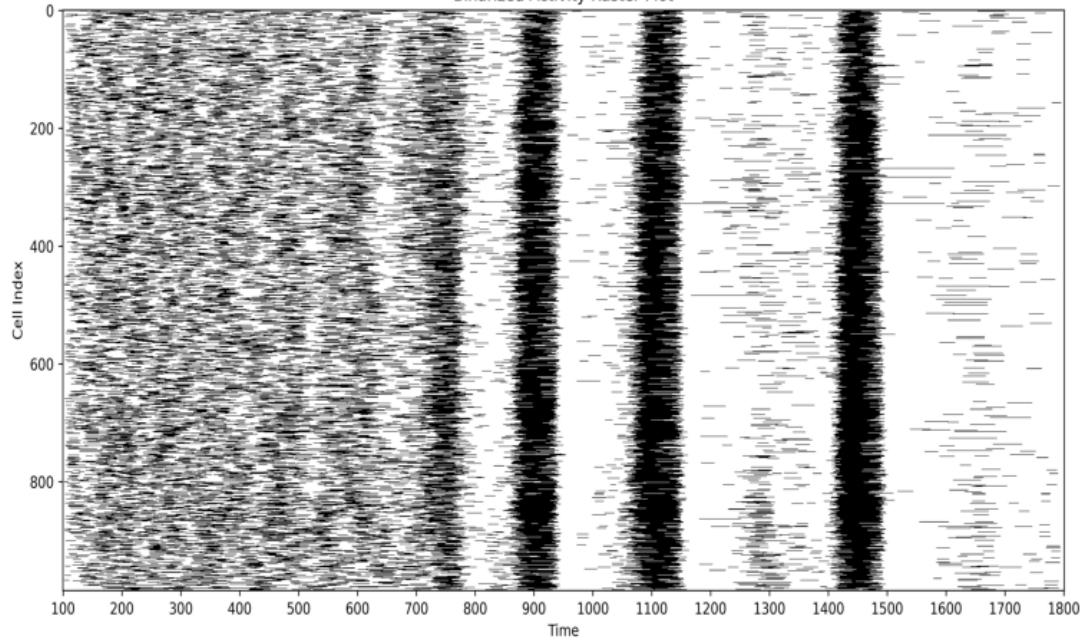
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

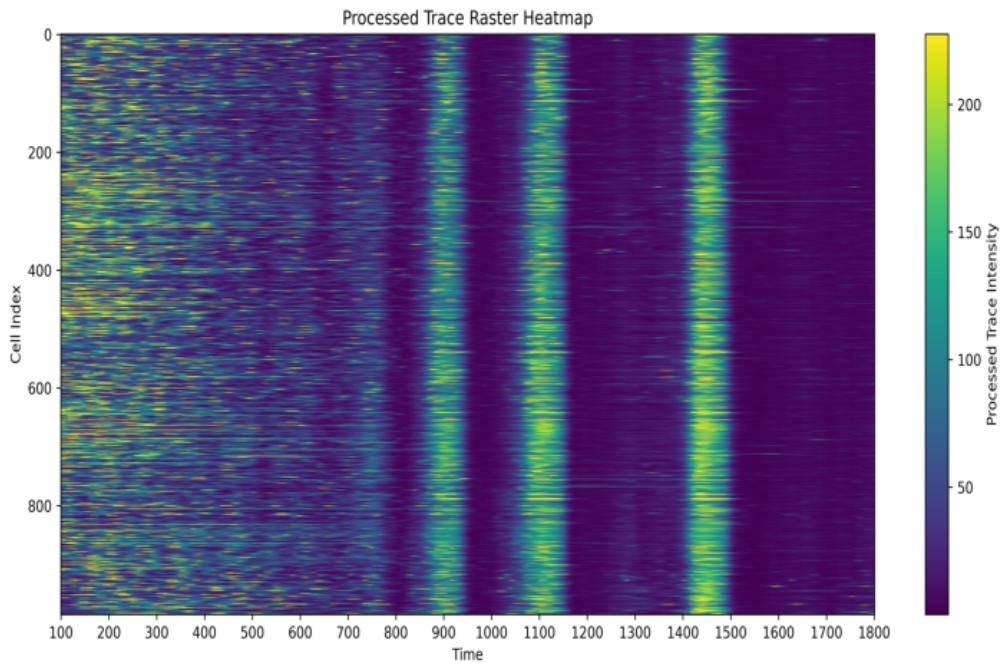
20250326_IS3

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250326_IS3



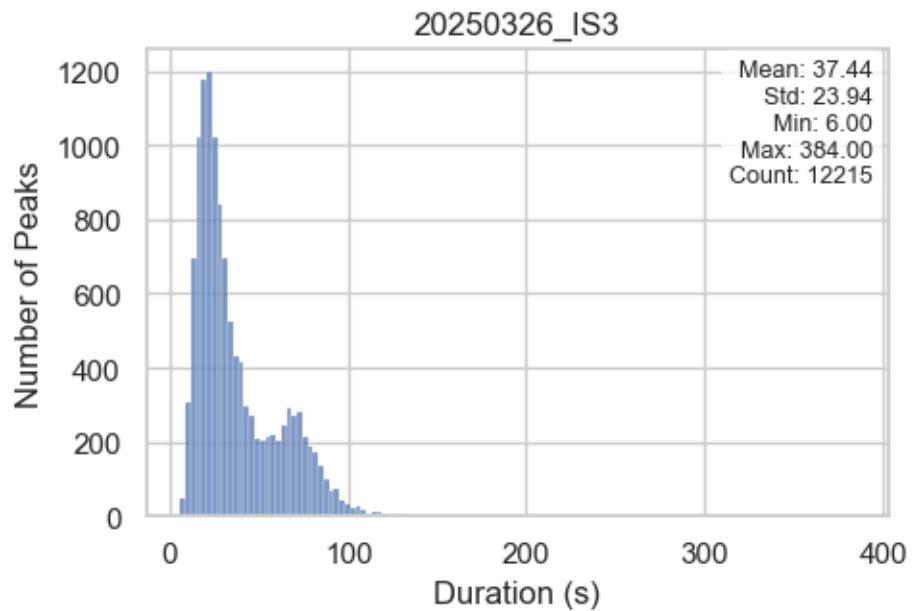
1.1.2 Peaks population

Total number of peaks: 12215

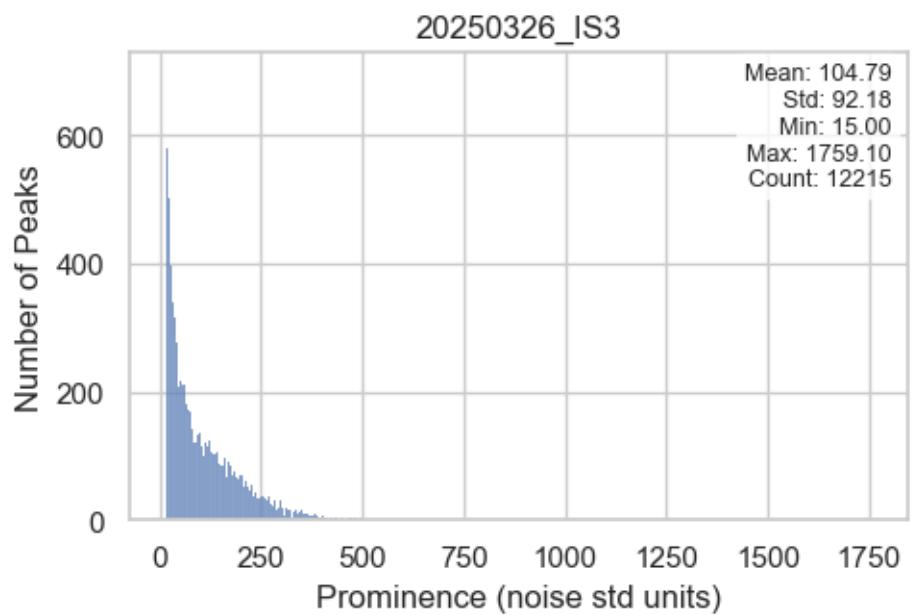
Total number of cells: 985

1.1.3 Peaks statistics

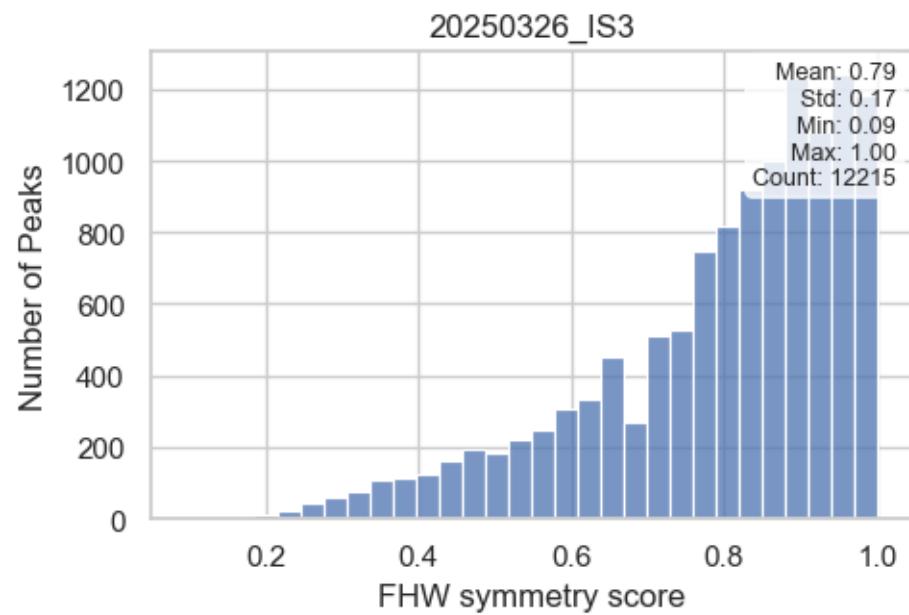
Distribution of Peak Durations



Distribution of Peak Prominences

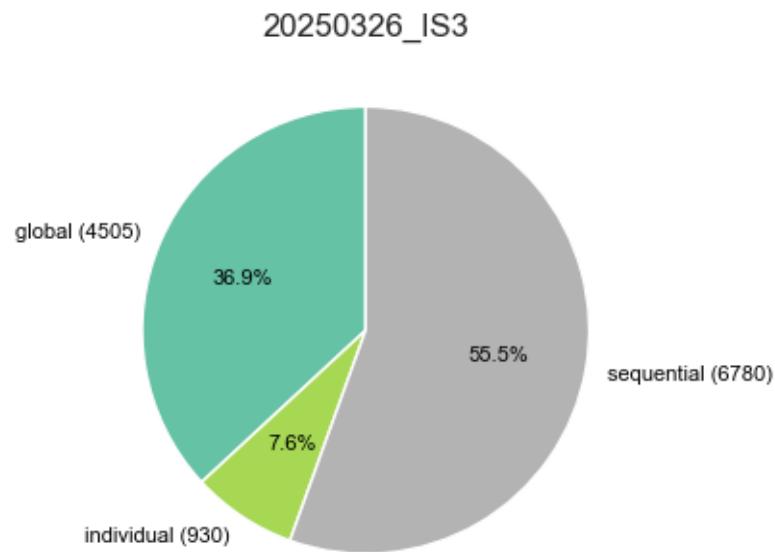


Distribution of Peak Symmetry Scores



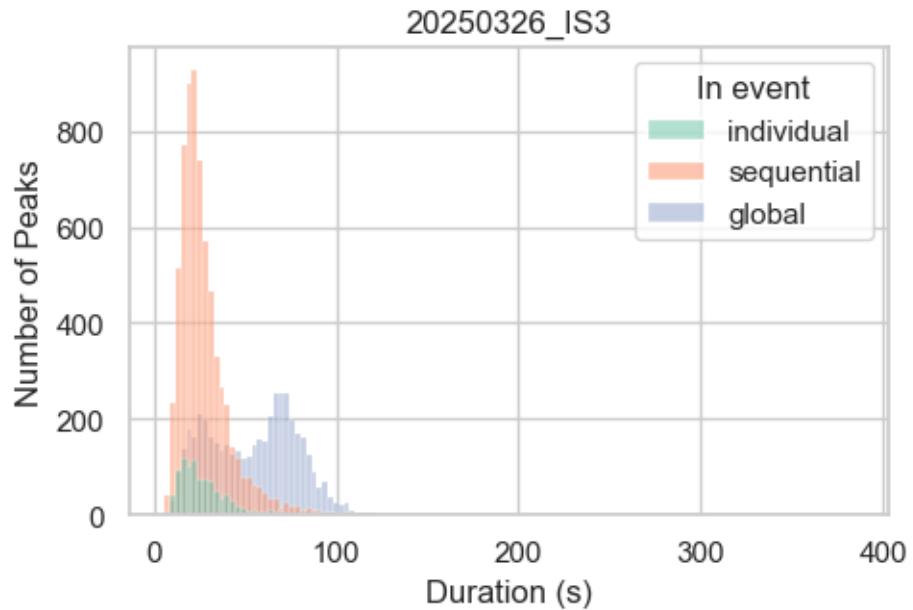
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

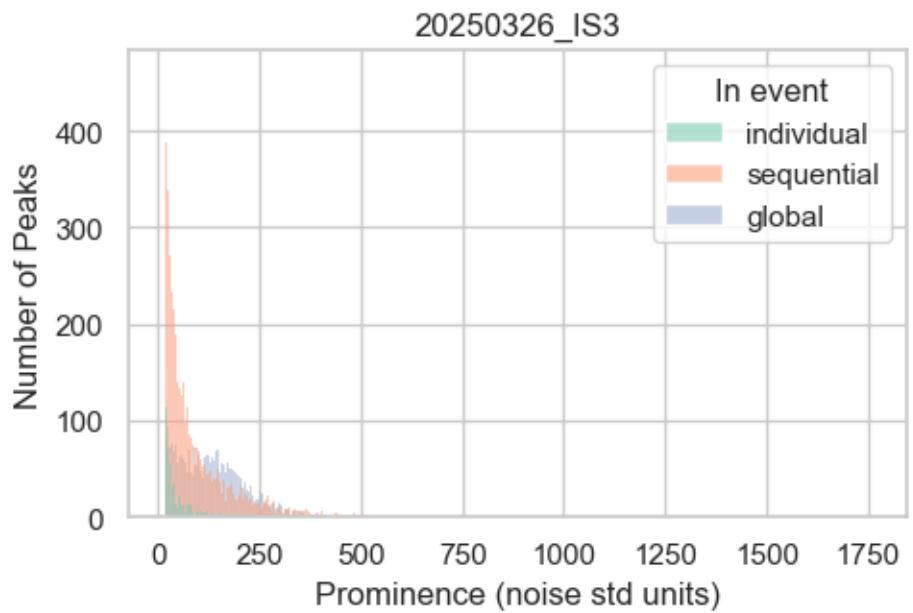


1.1.5 Peaks statistics per event types

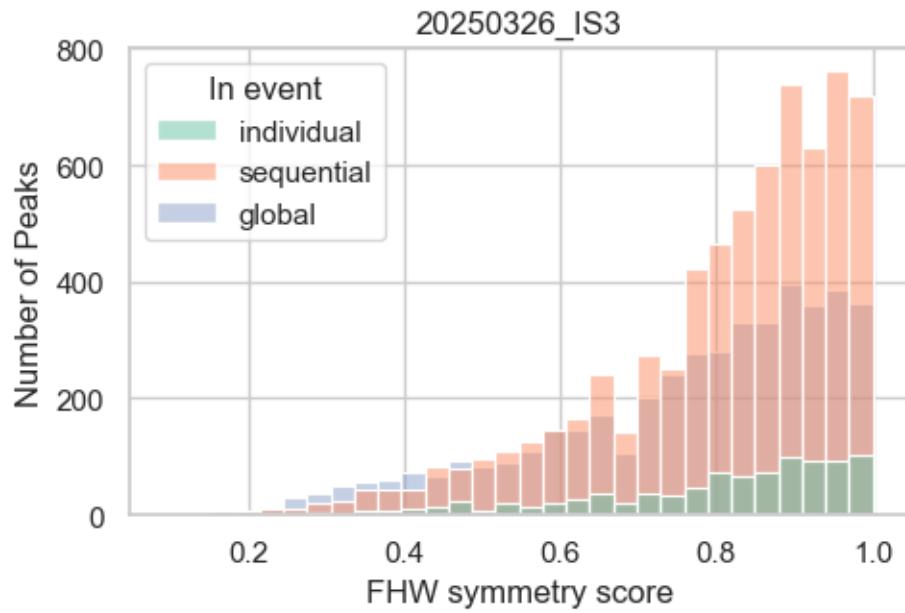
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

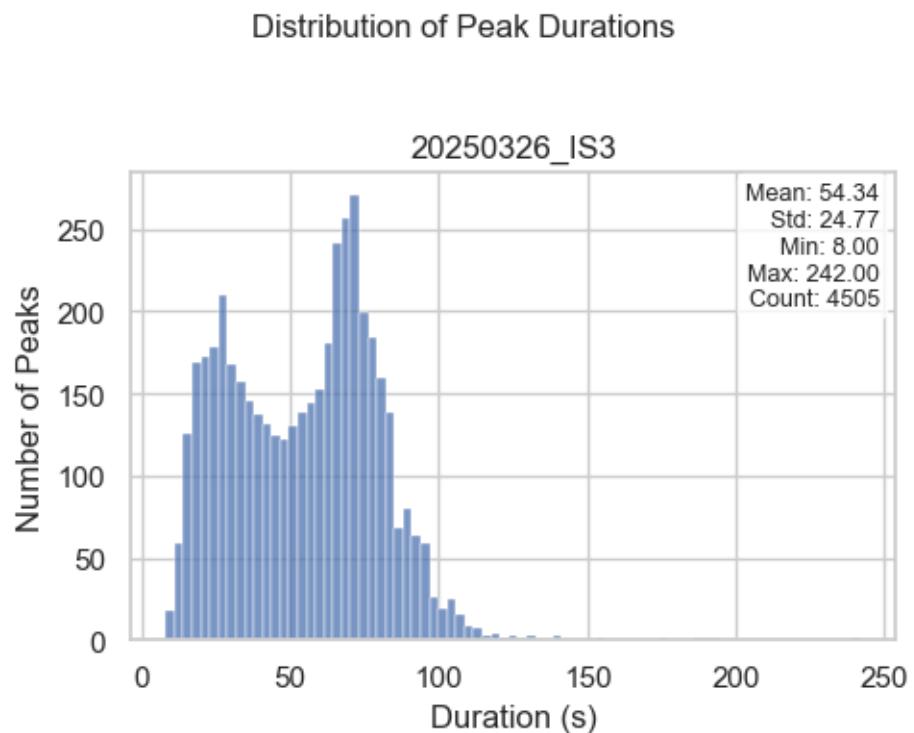


Distribution of Peak Symmetry Scores by Group

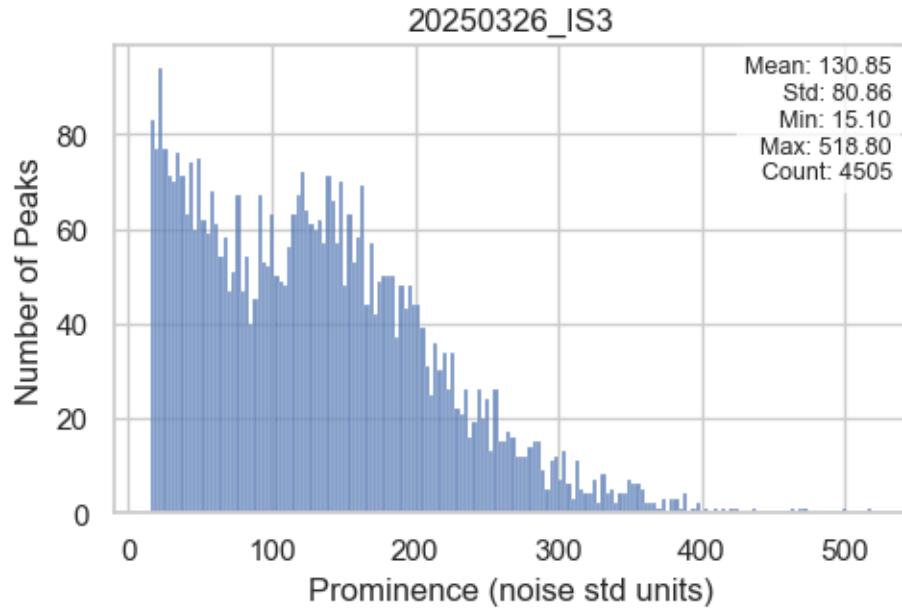


1.2 GLOBAL EVENTS

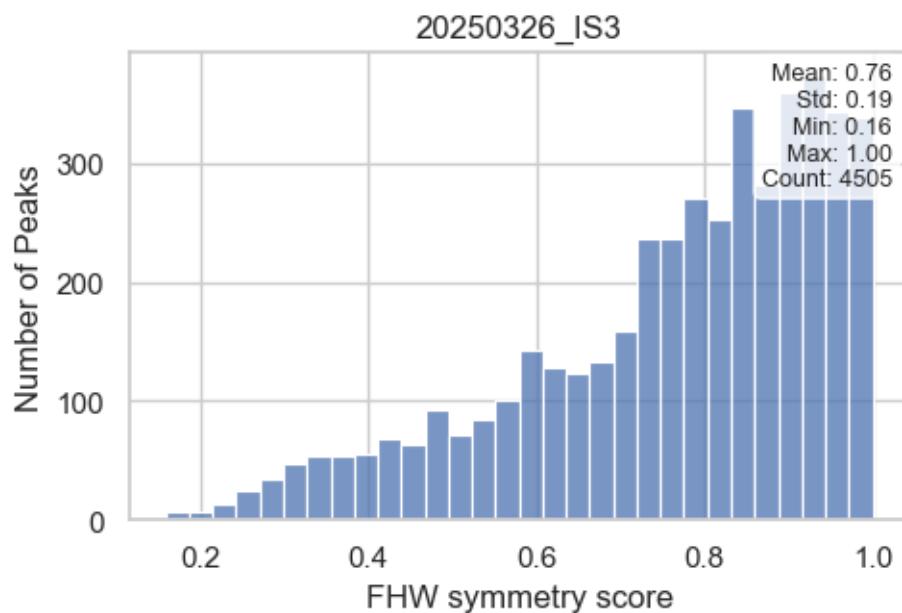
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

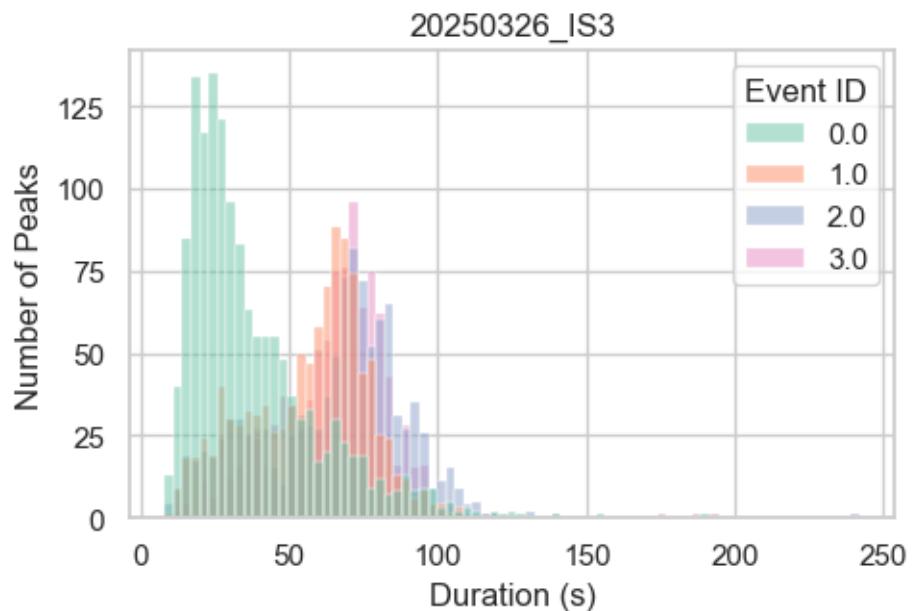


Distribution of Peak Symmetry Scores

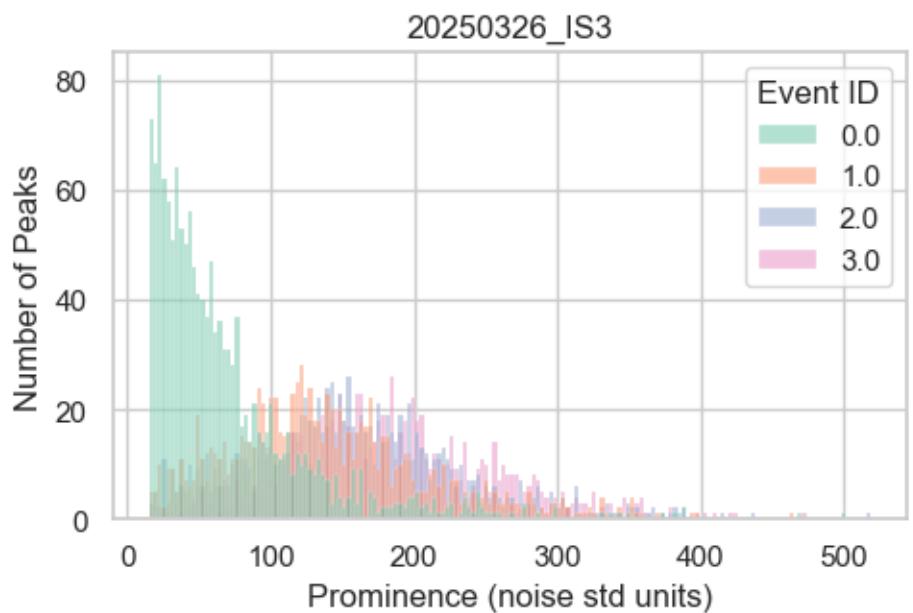


1.2.2 Peak statistics in global event per event ID

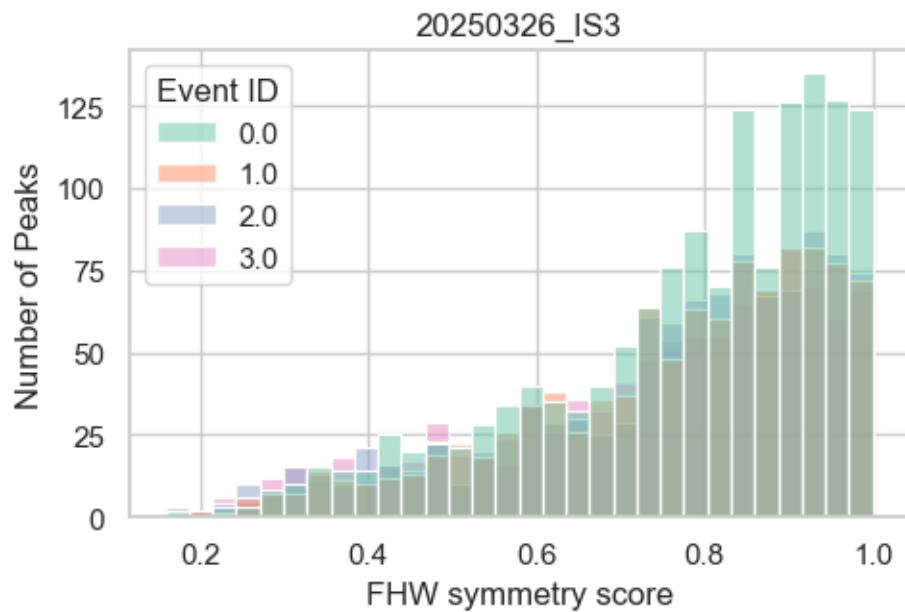
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



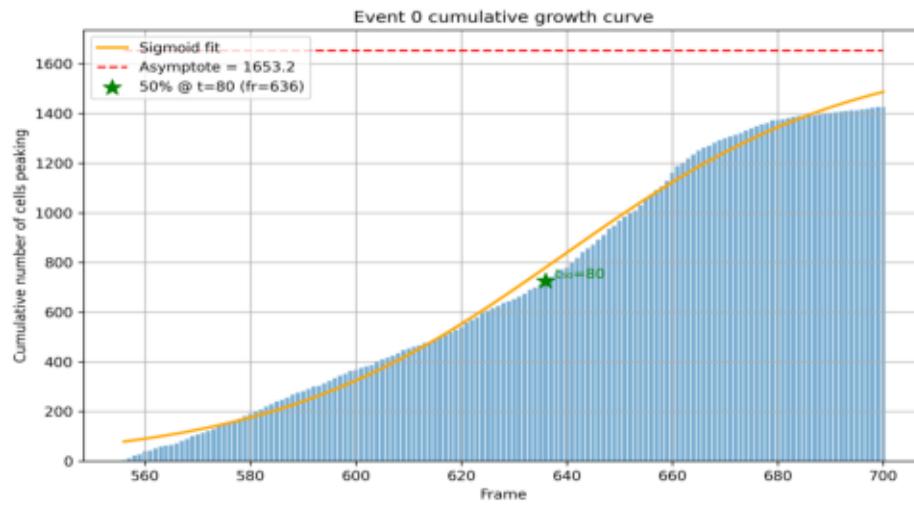
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

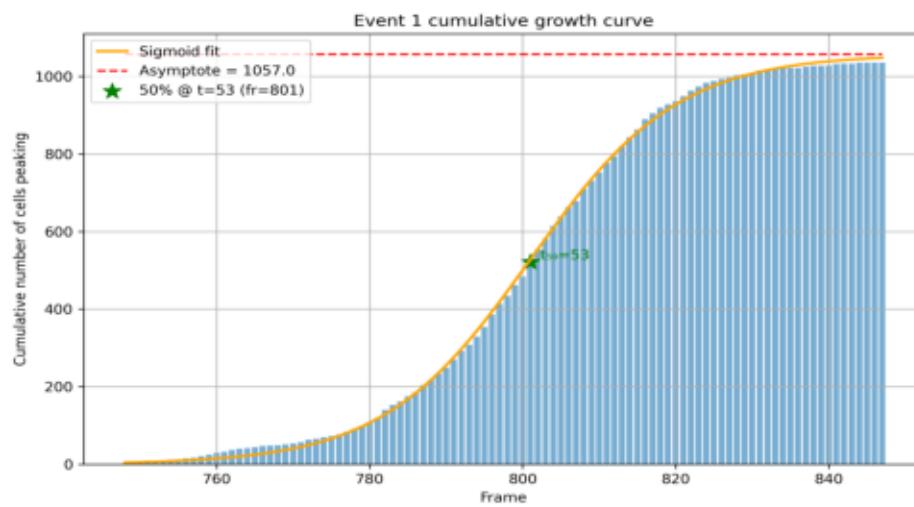
Event Activity Overlay (Event ID: 0)

20250326_IS3



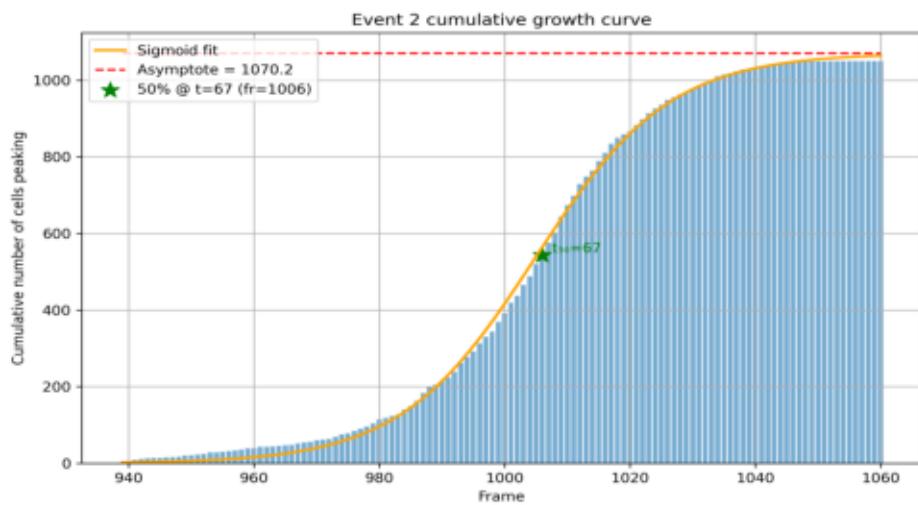
Event Activity Overlay (Event ID: 1)

20250326_IS3



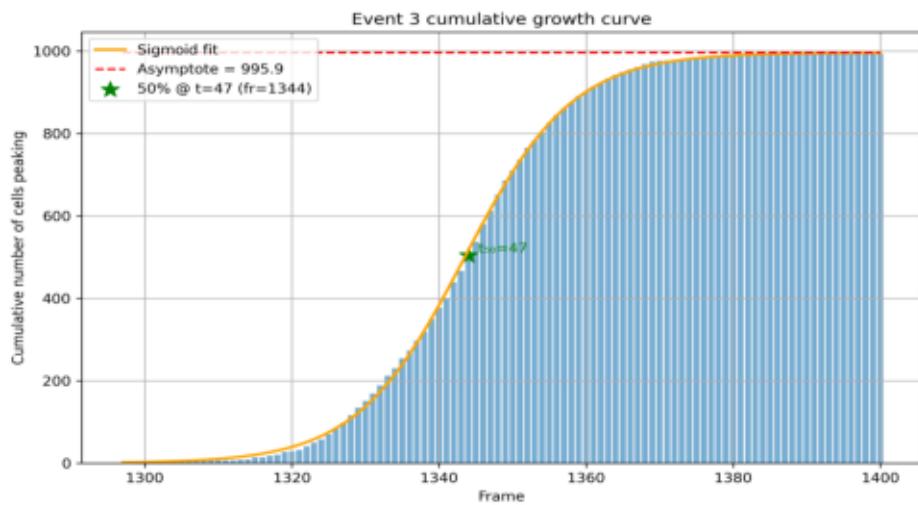
Event Activity Overlay (Event ID: 2)

20250326_IS3



Event Activity Overlay (Event ID: 3)

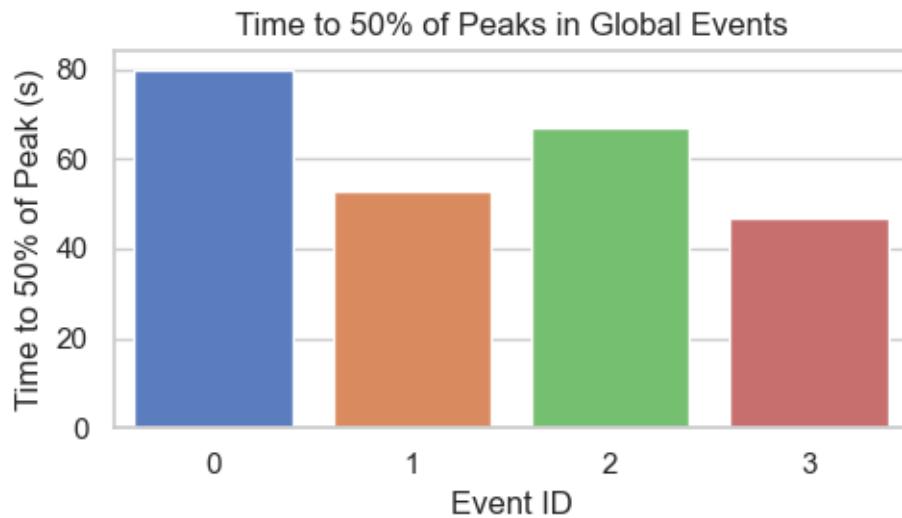
20250326_IS3



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

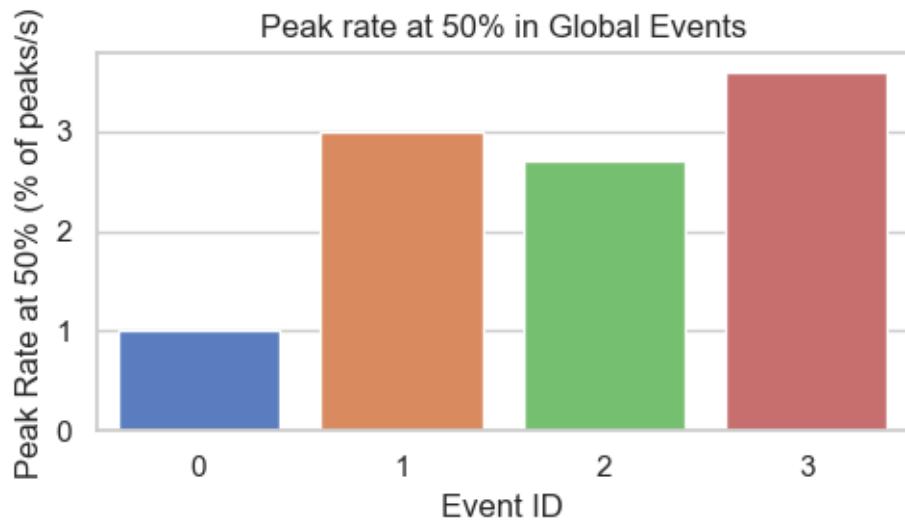
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

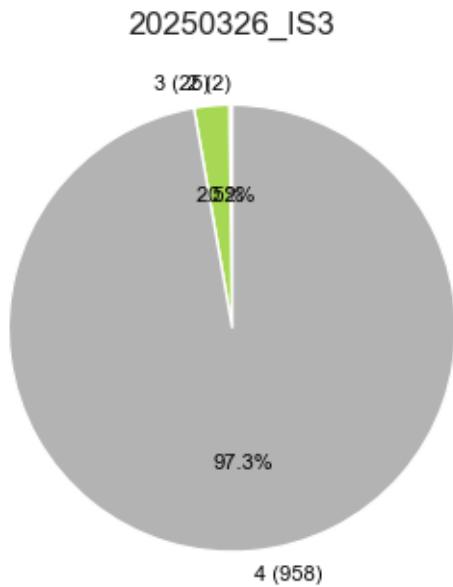
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



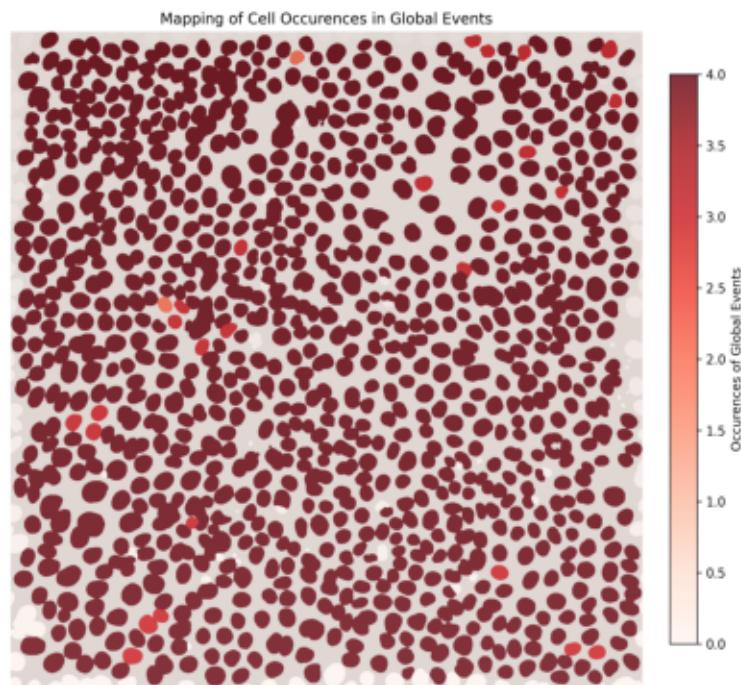
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

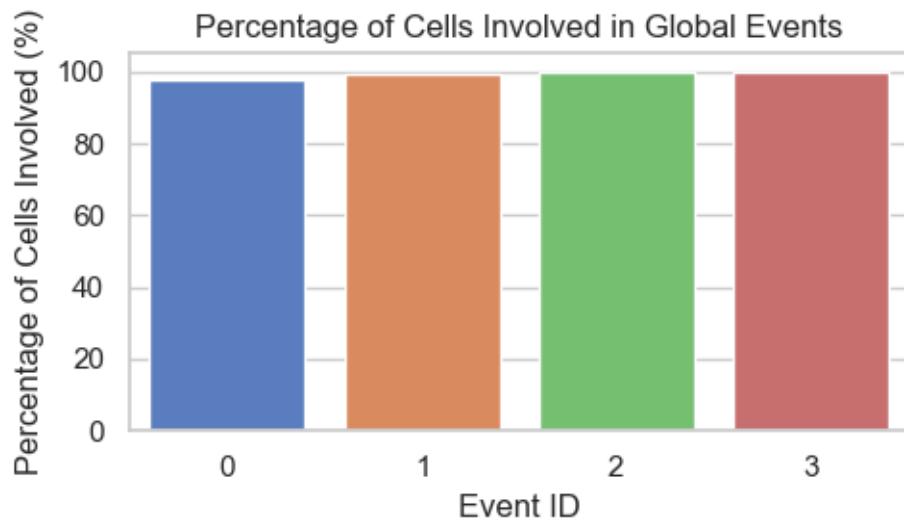
20250326_IS3



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.2.5 Inter-event interval analysis

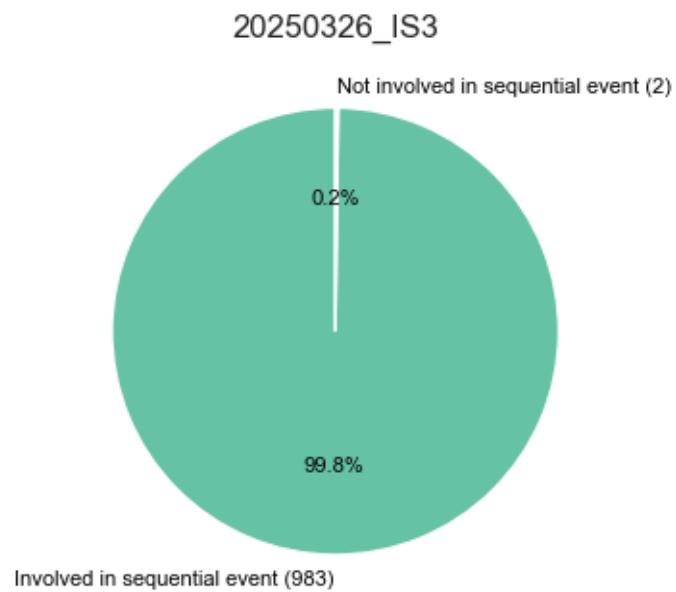
Intervals between global event peaks: [149.0, 205.0, 343.0]

Estimated periodicity: 0.740

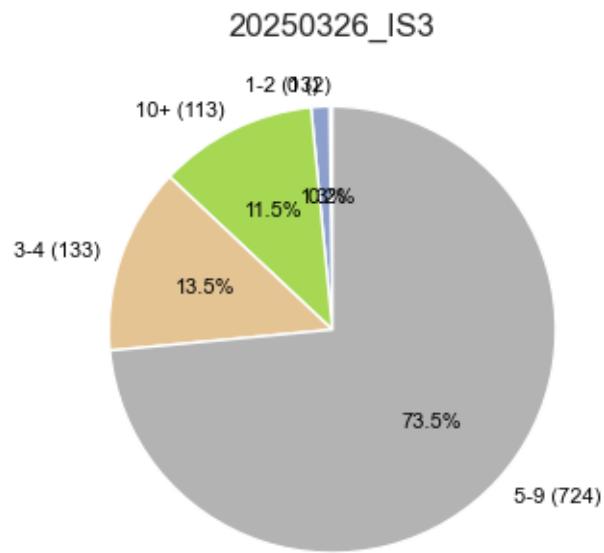
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequential events

Distribution of Cells Involved in Sequential Events

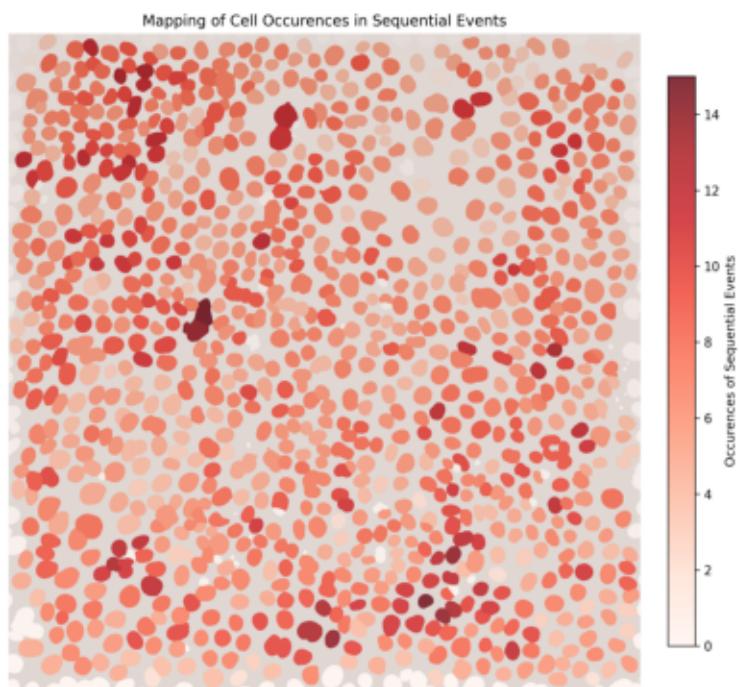


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

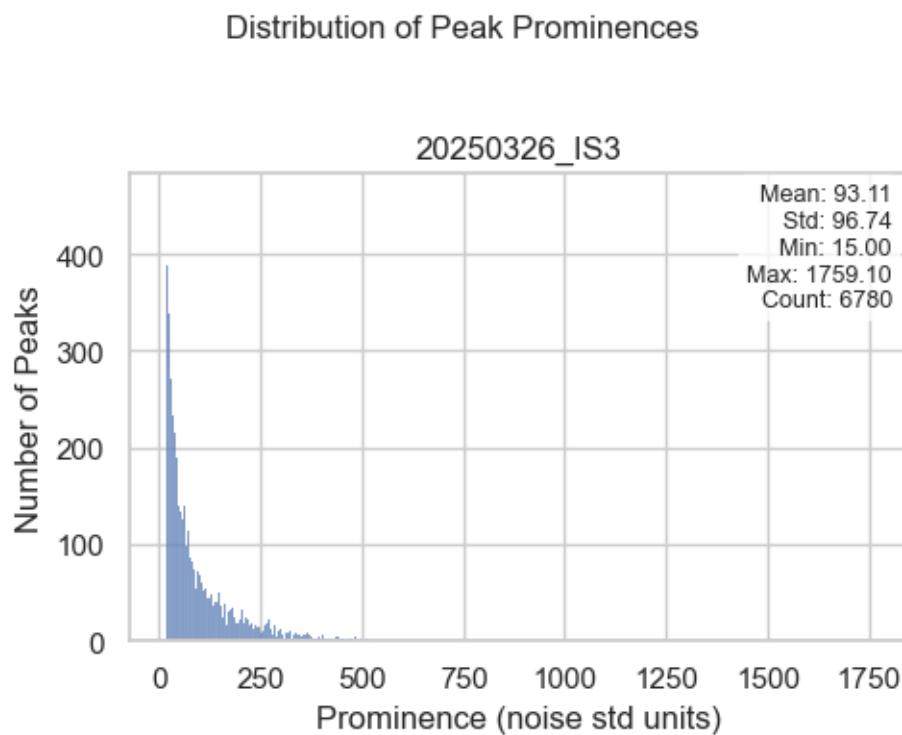
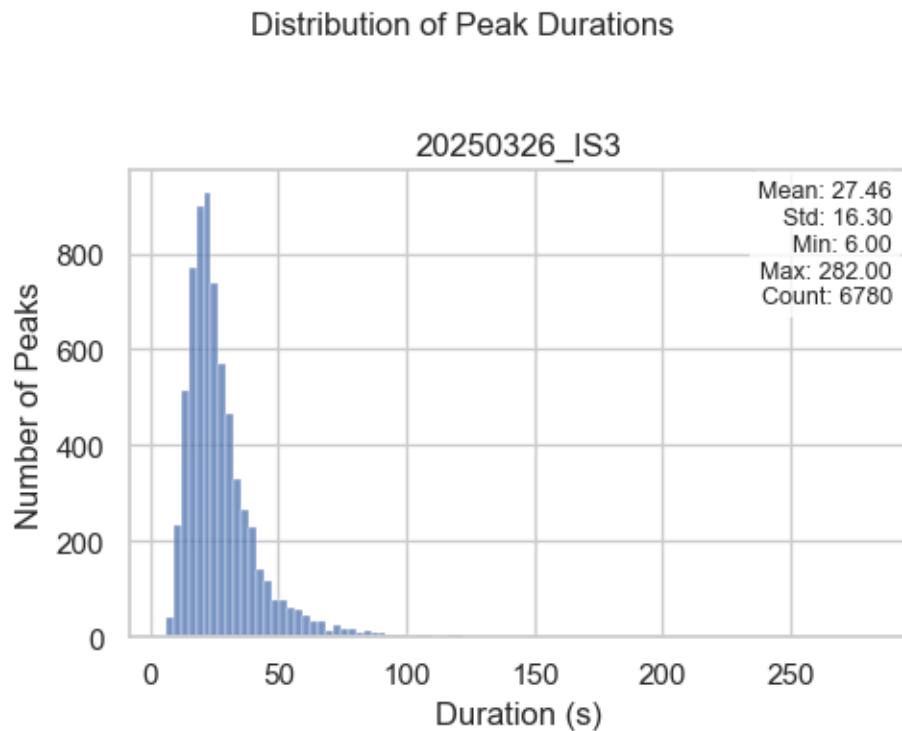


Cell Mapping with Occurrences in Sequential Events Overlay

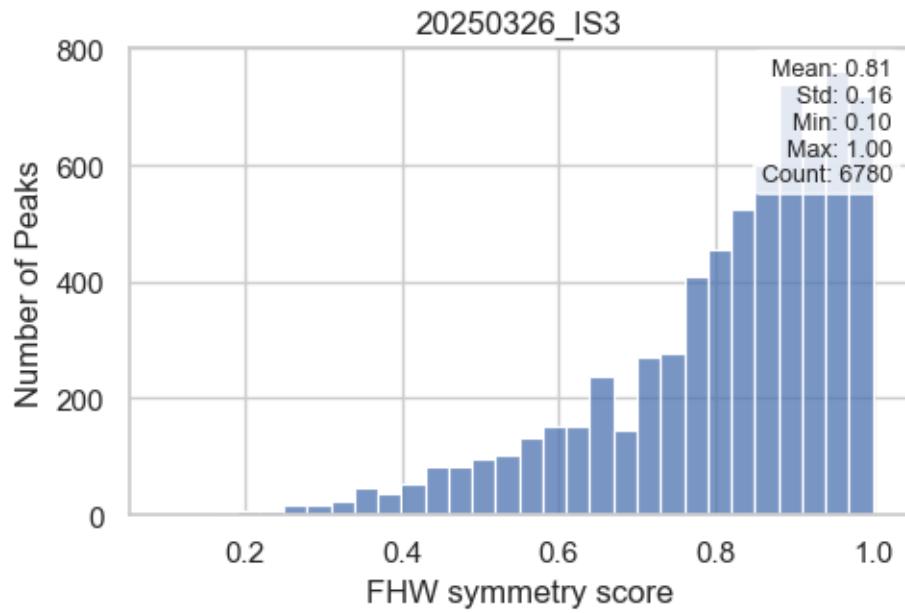
20250326_IS3



1.3.2 Peaks statistics in sequential events

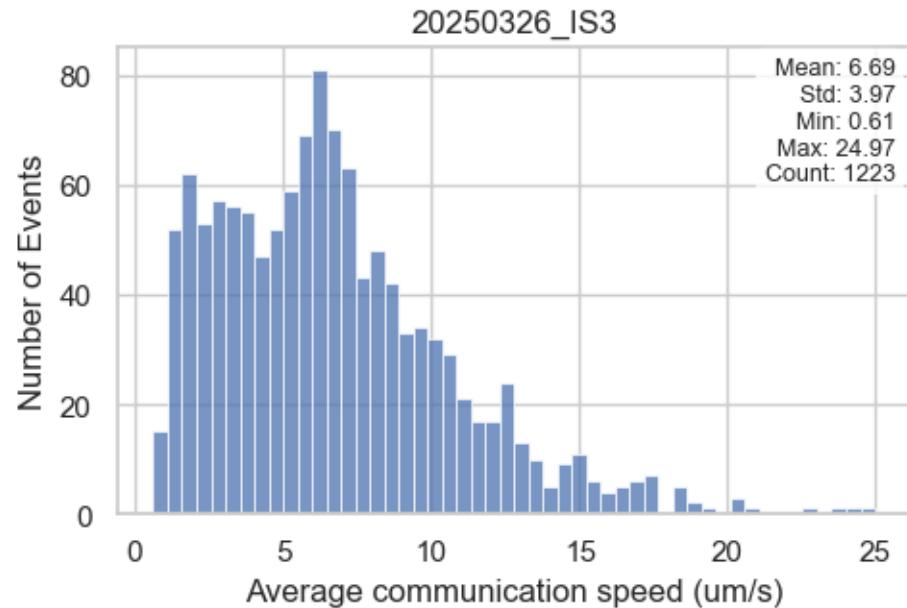


Distribution of Peak Symmetry Scores

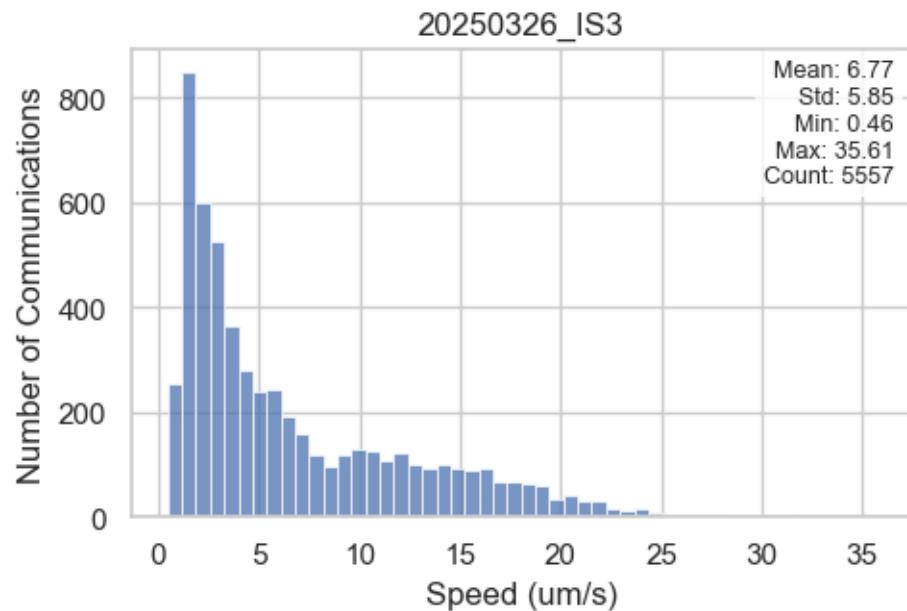


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

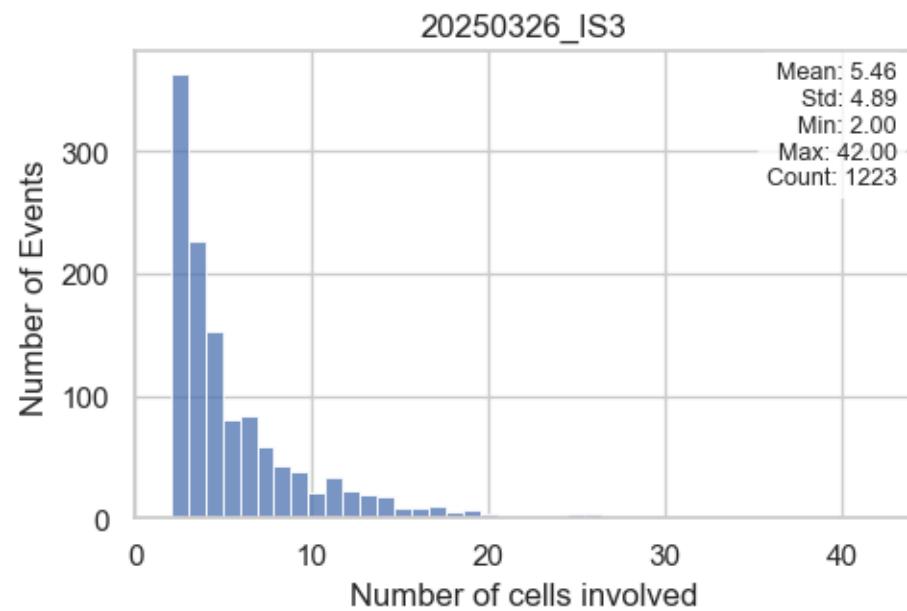


Distribution of Cell-Cell Communication Speeds



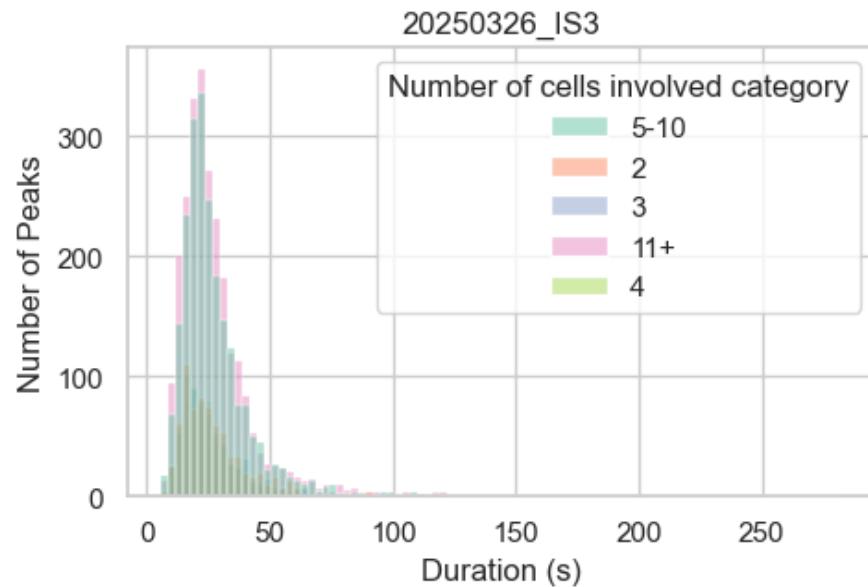
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

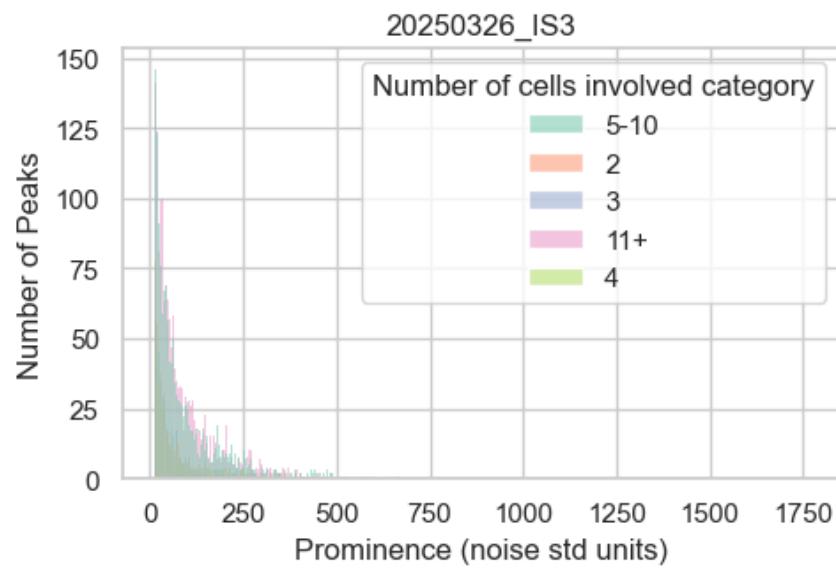


1.3.5 Influence of cell count per event on statistics

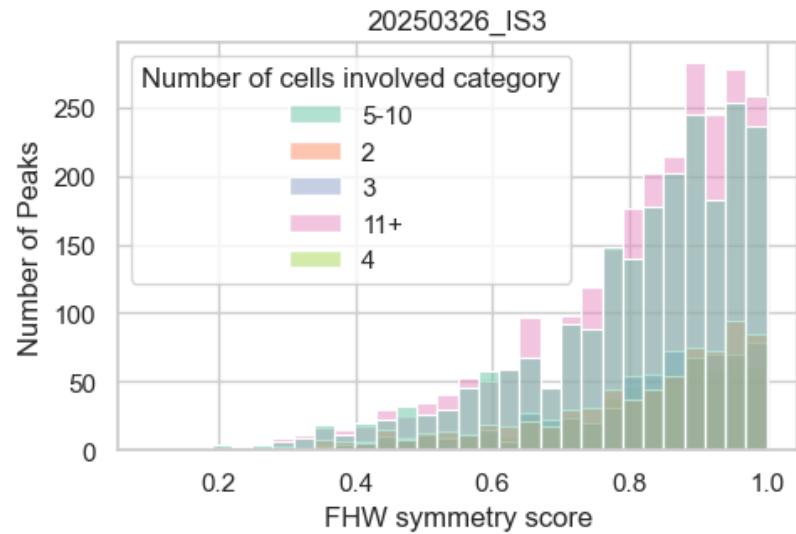
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



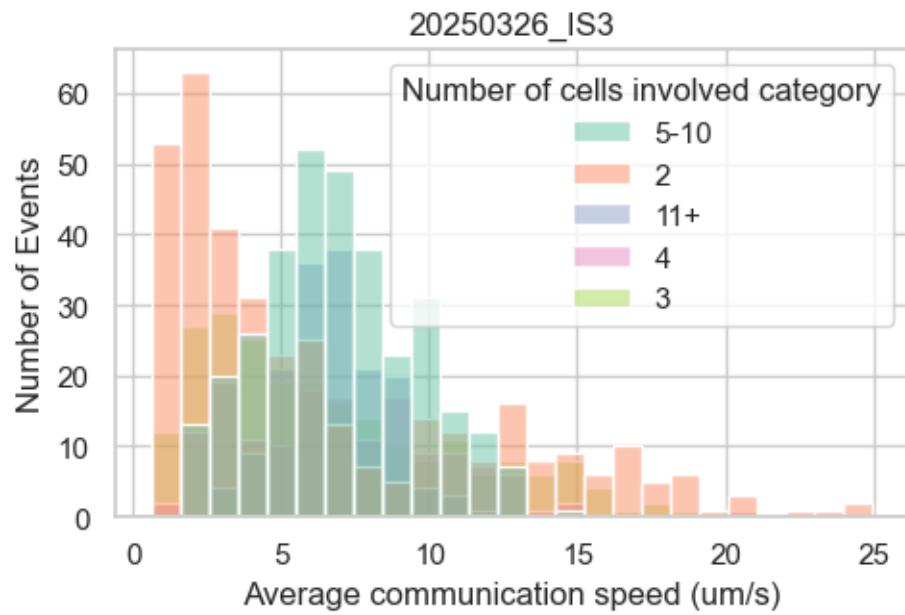
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



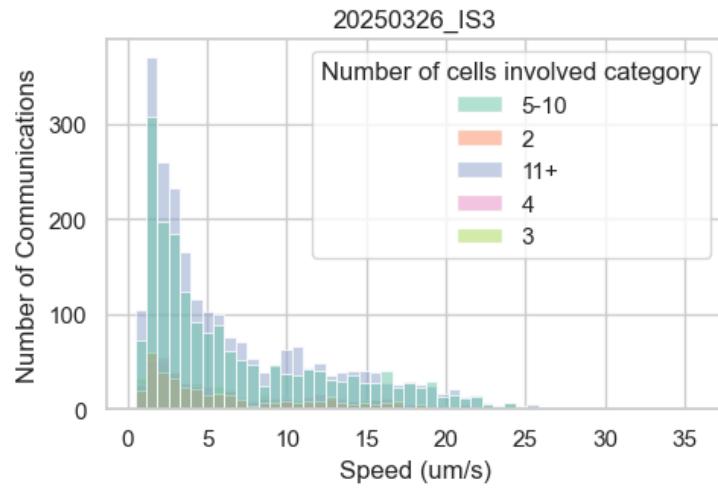
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

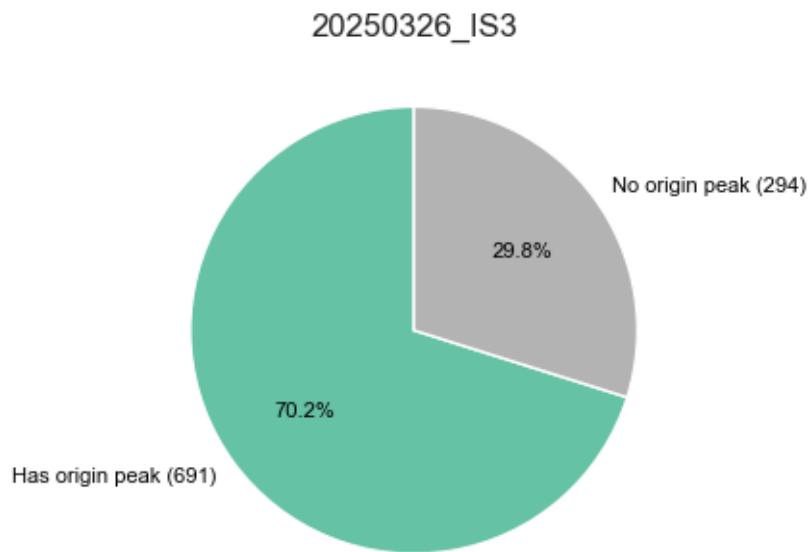


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events



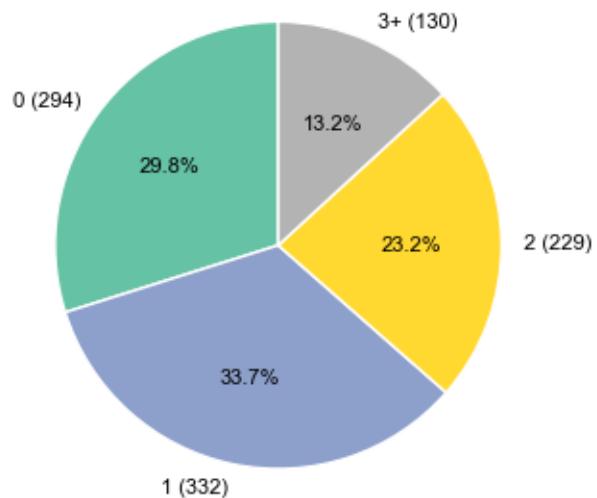
1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell



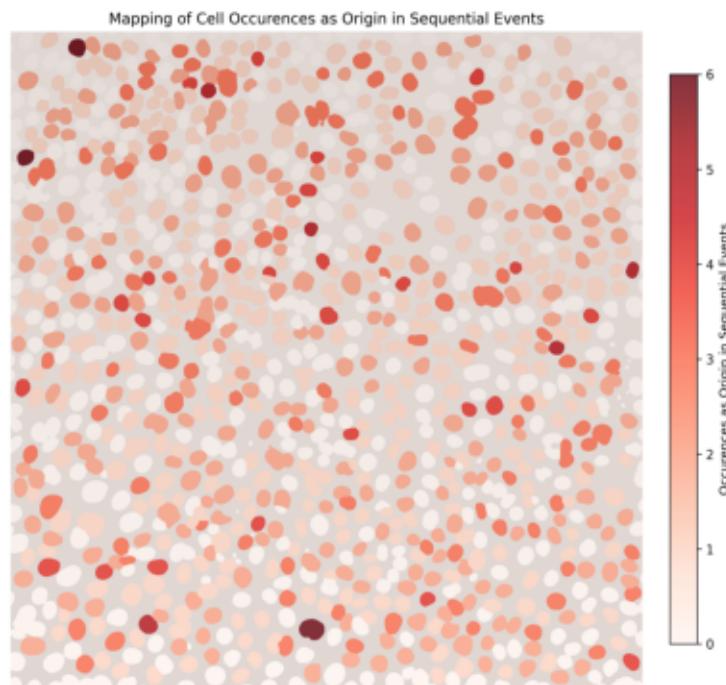
Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)

20250326_IS3



Cell Mapping with Origin Peaks Overlay

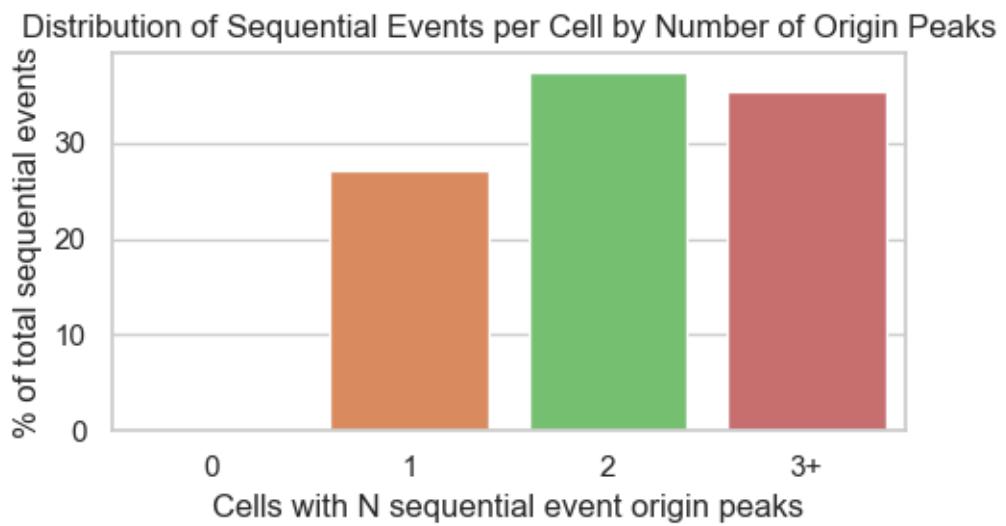
20250326_IS3



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

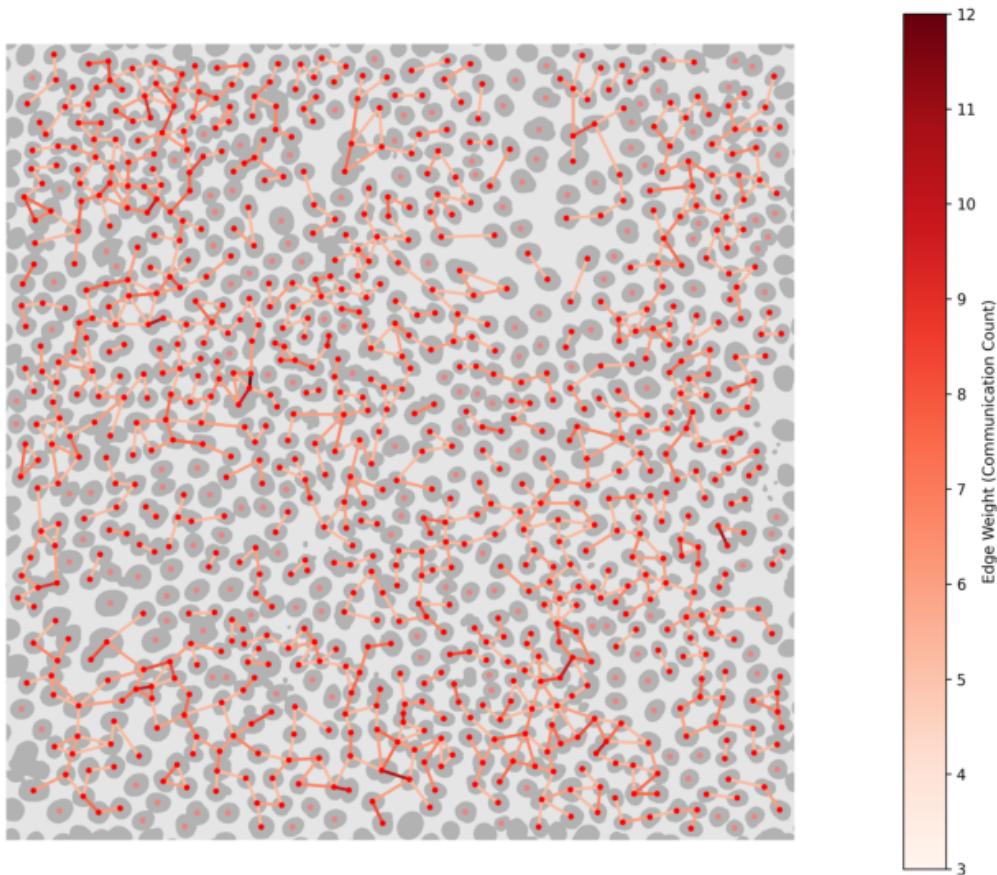


1.3.7 Connection network between cells

Cell Connection Network Graph

20250326_IS3

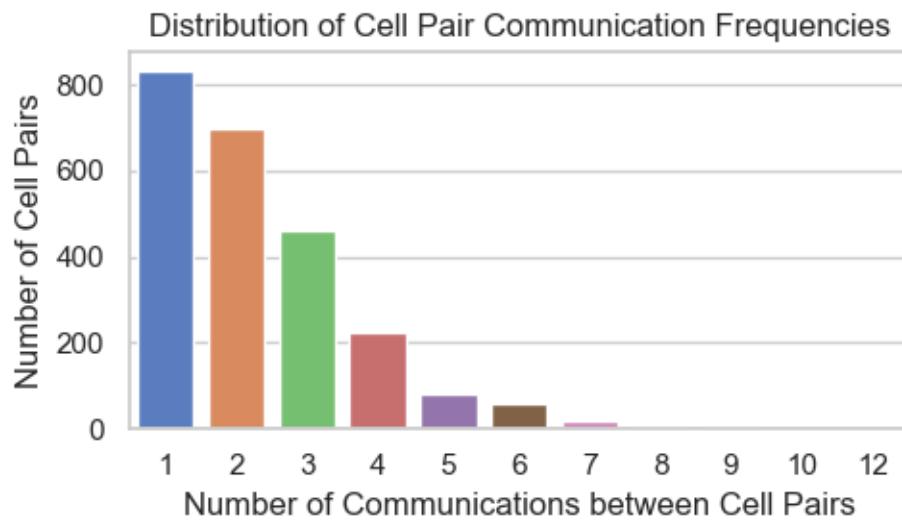
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

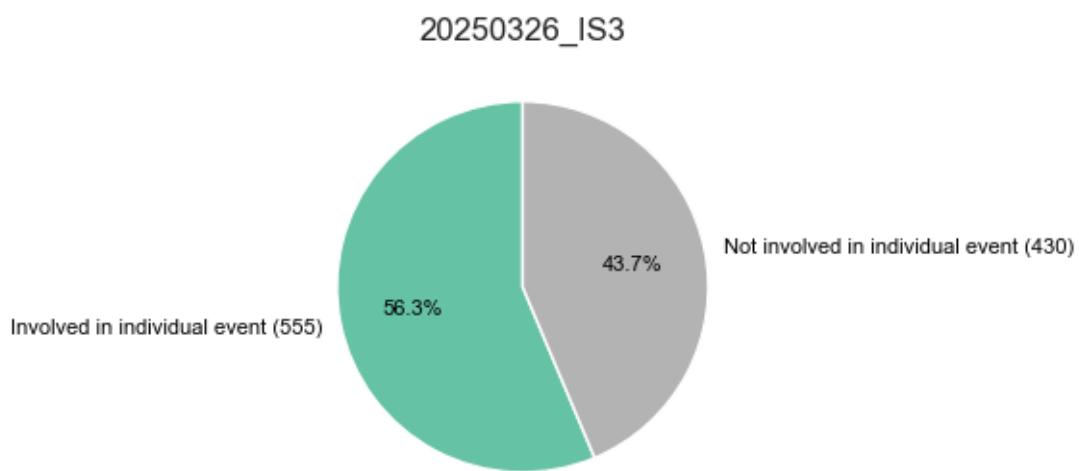
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



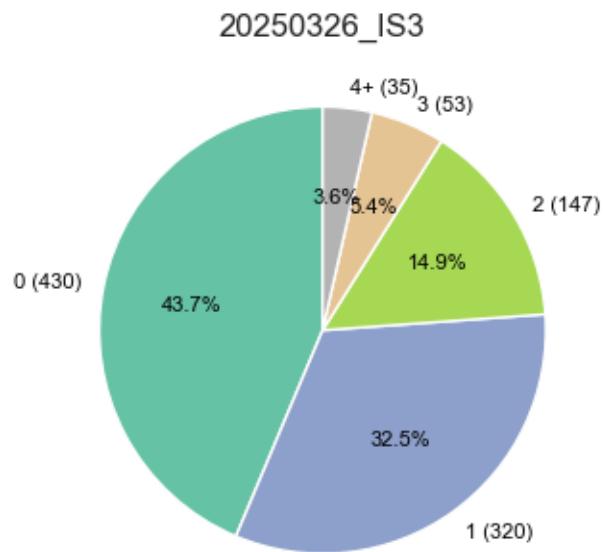
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

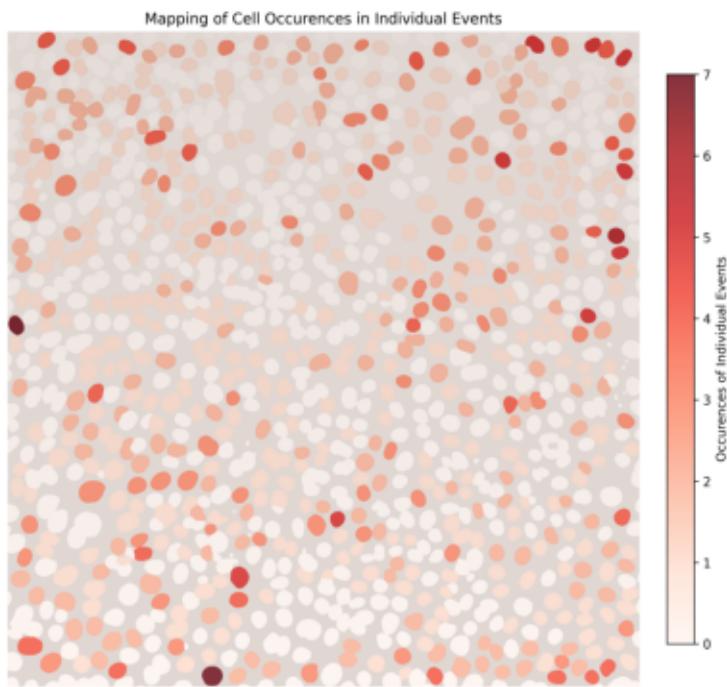


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)



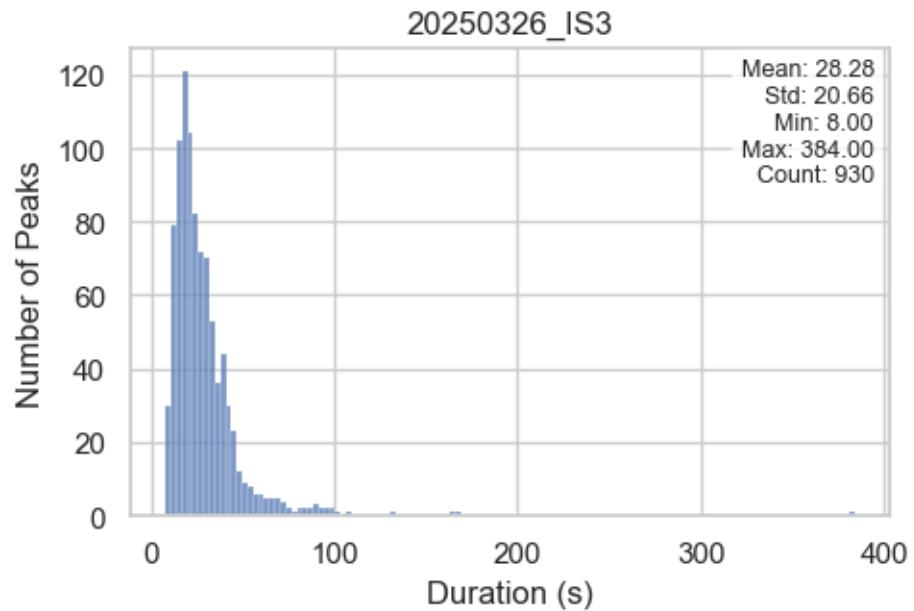
Cell Mapping with Occurrences in Individual Events Overlay

20250326_IS3

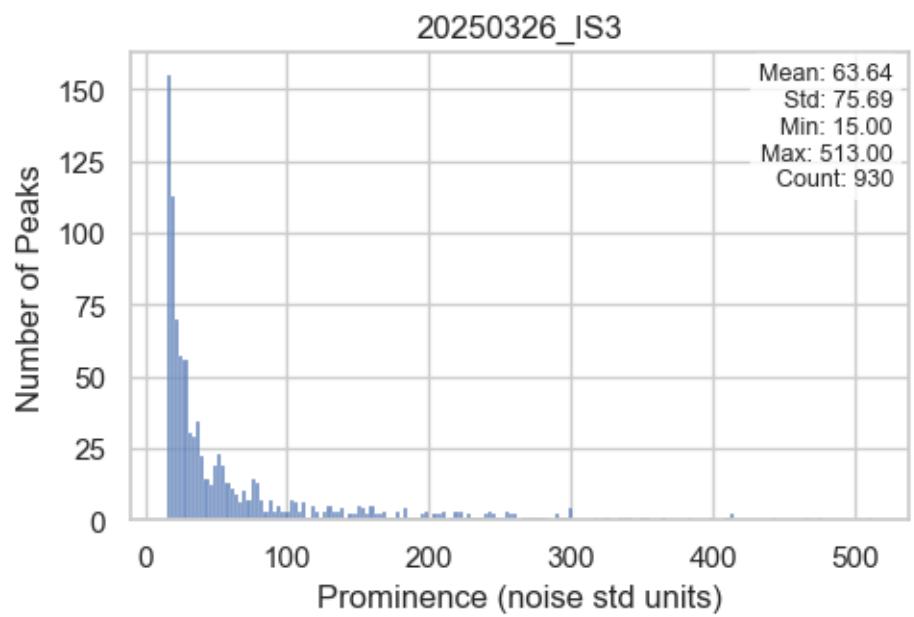


1.4.2 Peaks statistics in individual events

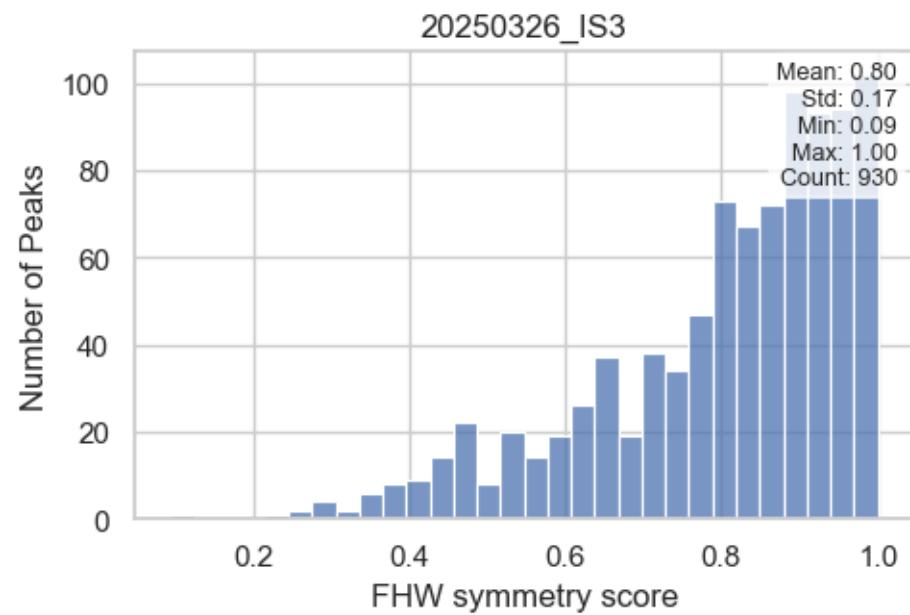
Distribution of Peak Durations



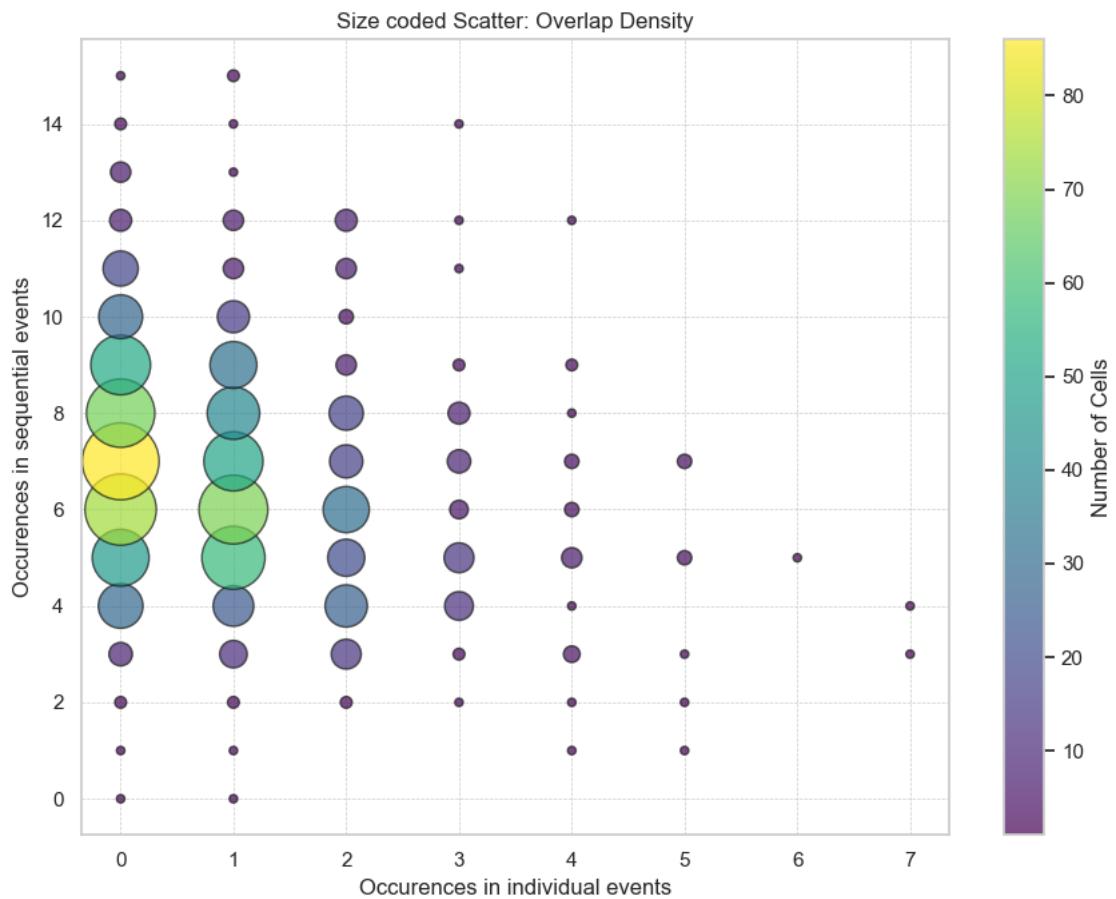
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

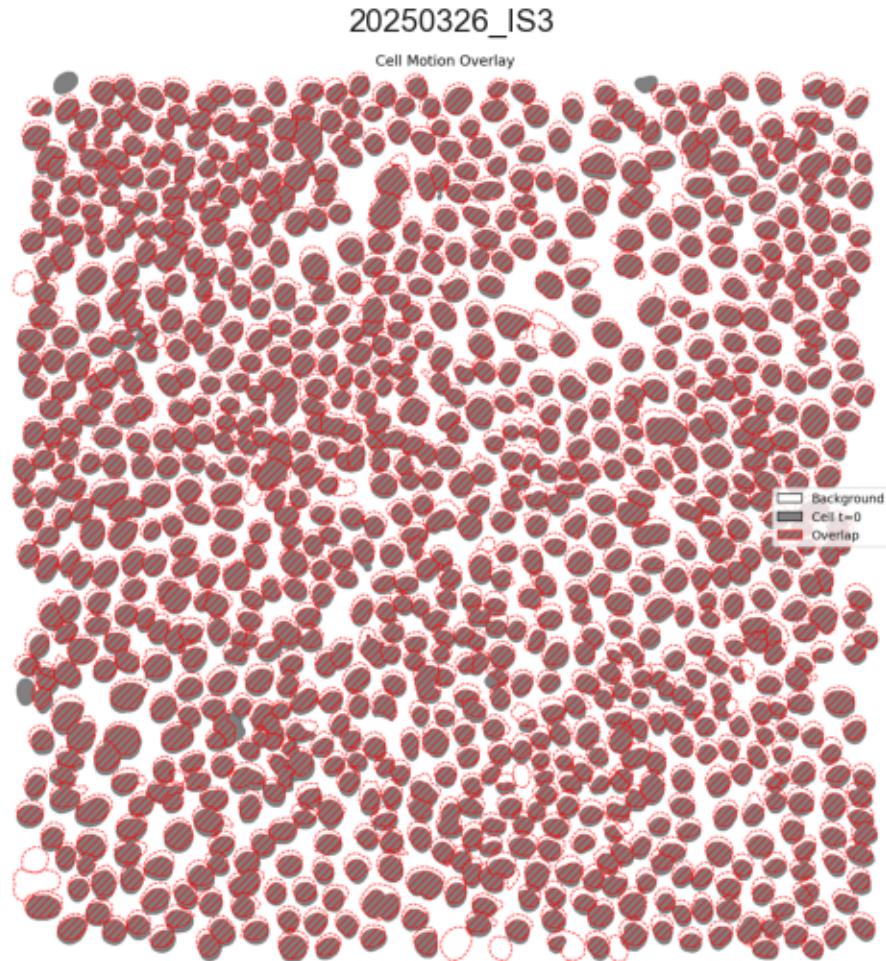


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 985
- Hoechst image taken at t=1801: 999
- Number of cells difference: absolute 14, relative 1.41%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 1166809
- Pixels segmented as cell at t=1801: 1288137
- Overlapping pixels between t=0 and t=1801: 937179 (76.35% of total)
- Pixels exclusive to t=0: 229630 (19.68% of total)
- Pixels exclusive to t=1801: 350958 (27.25% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n    "Default Dataset": "/path/to/your/dataset"\n}'
```

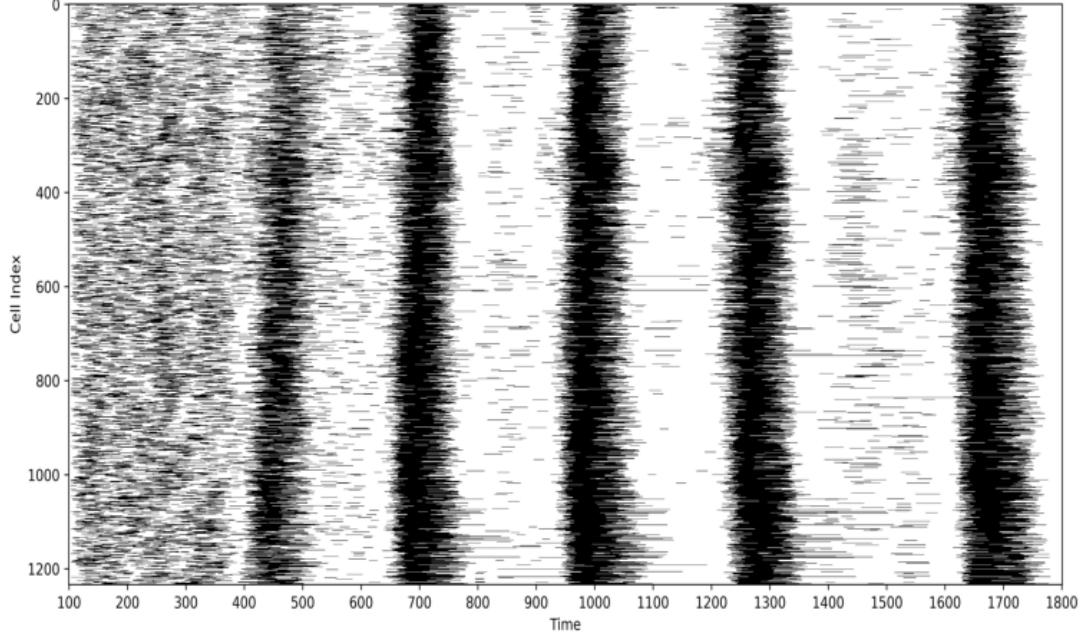
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

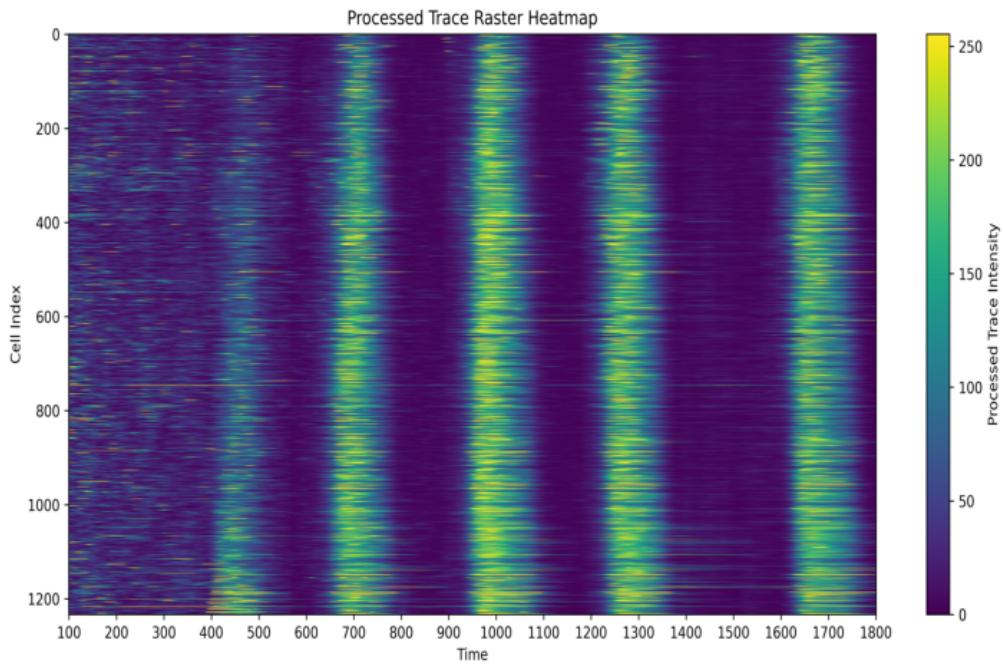
20250404_IS1

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250404_IS1



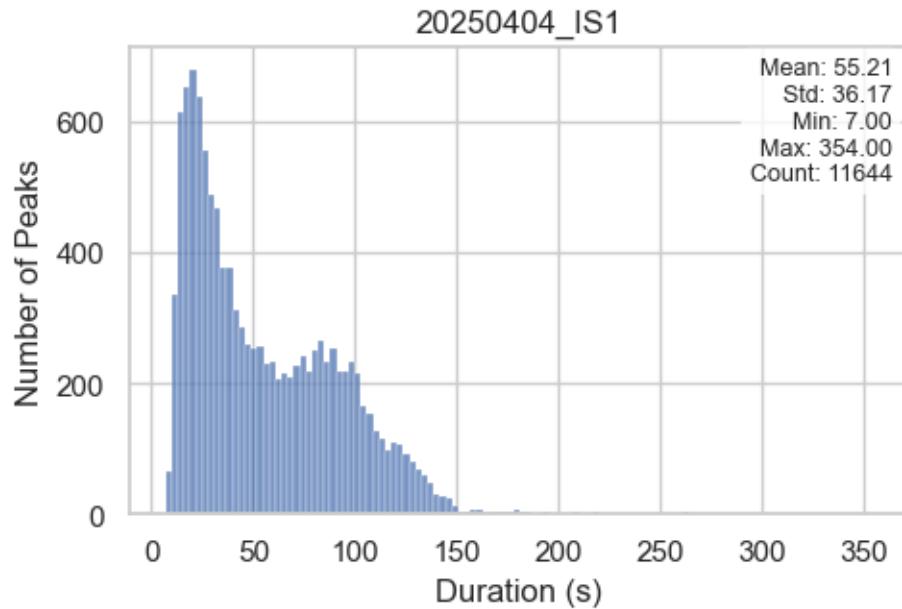
1.1.2 Peaks population

Total number of peaks: 11644

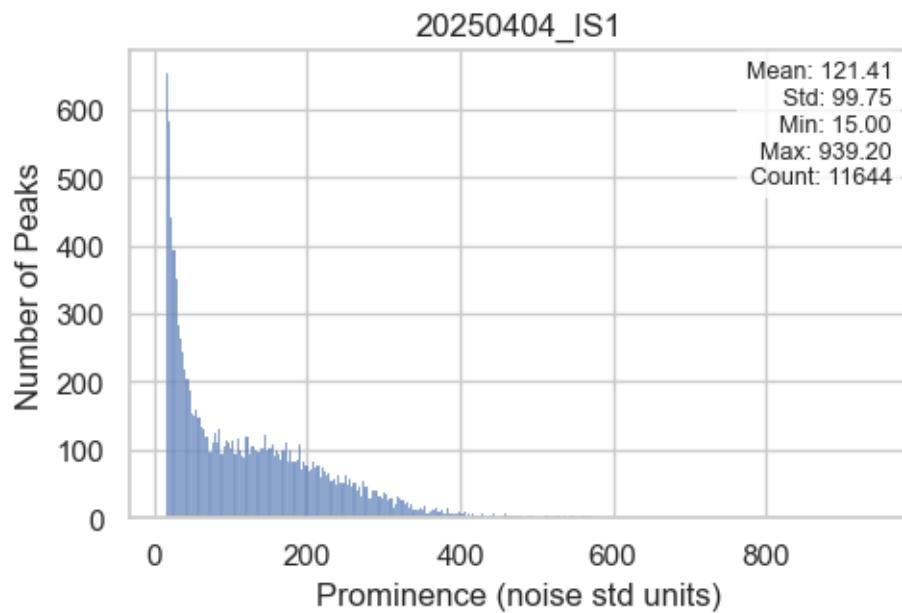
Total number of cells: 1234

1.1.3 Peaks statistics

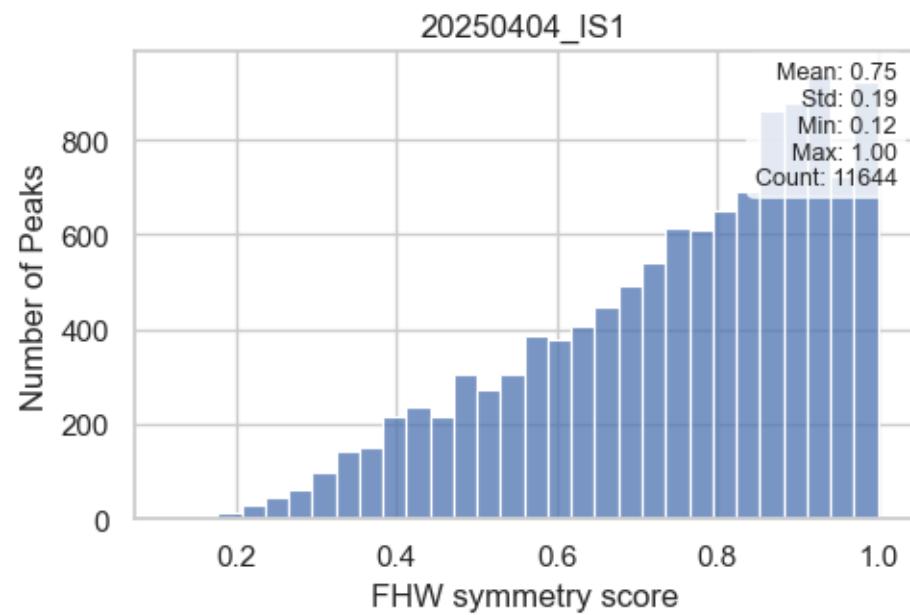
Distribution of Peak Durations



Distribution of Peak Prominences

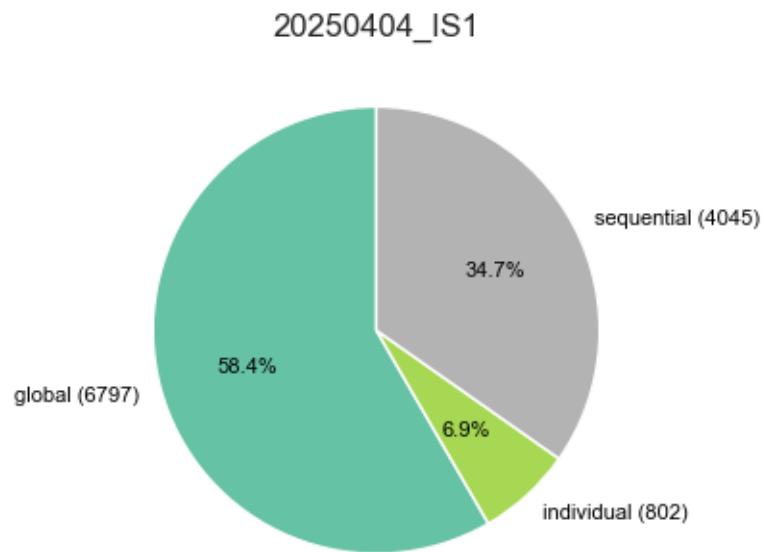


Distribution of Peak Symmetry Scores



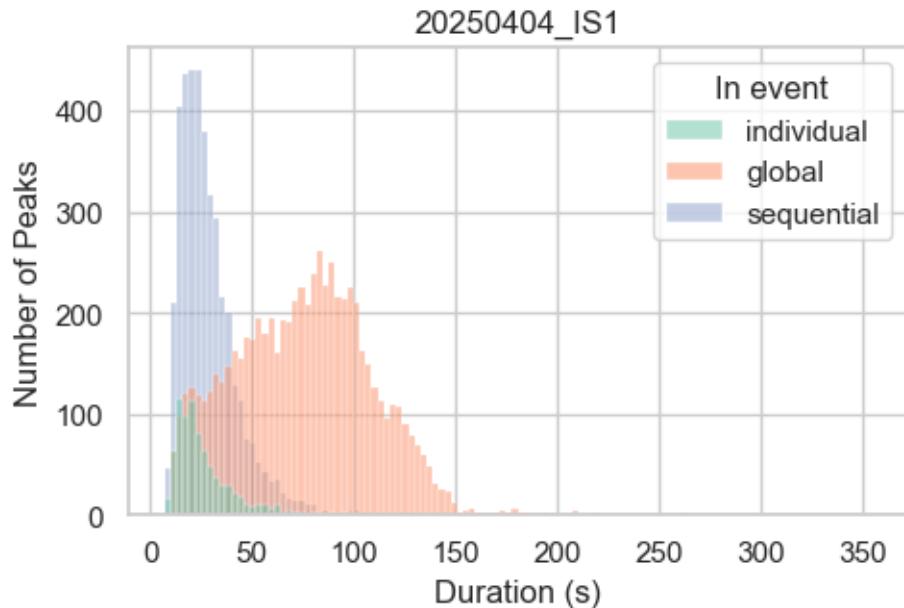
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

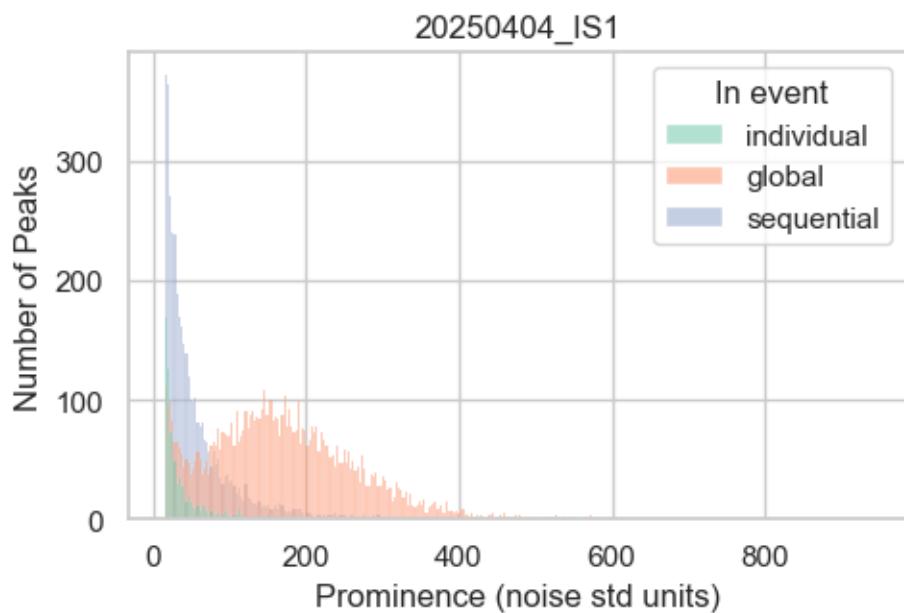


1.1.5 Peaks statistics per event types

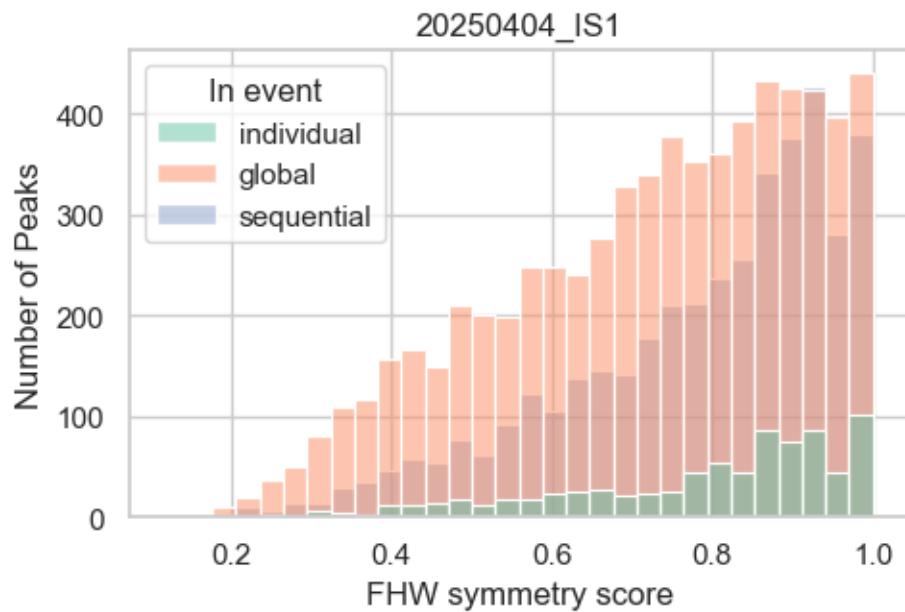
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

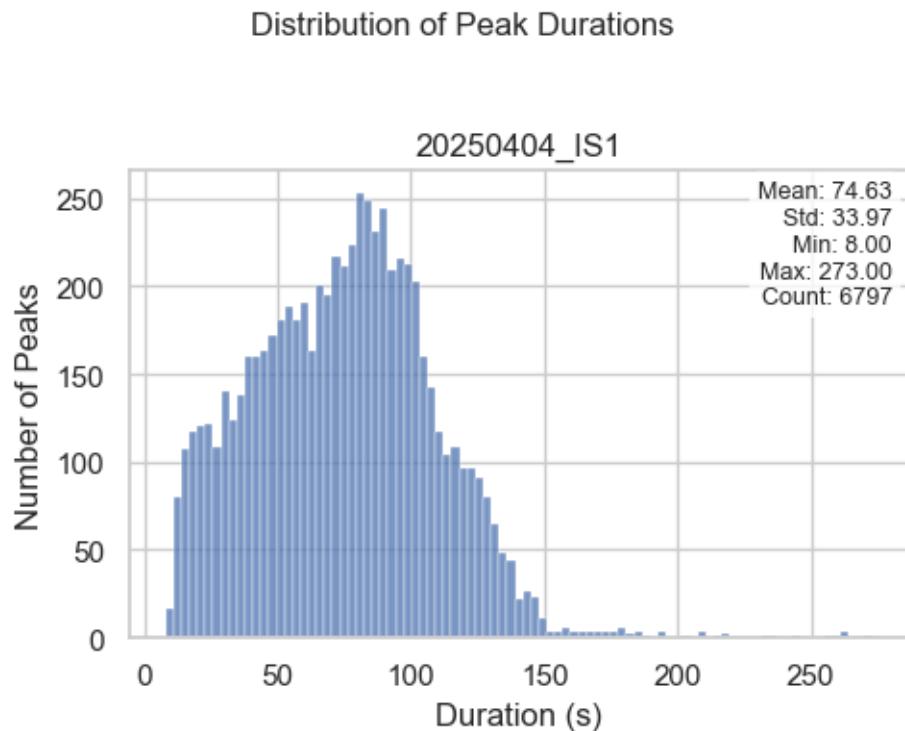


Distribution of Peak Symmetry Scores by Group

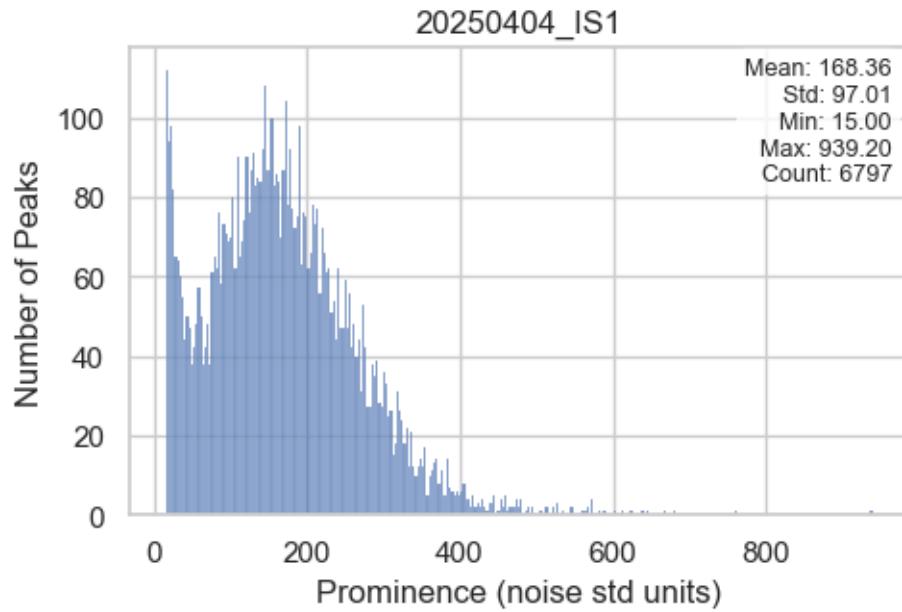


1.2 GLOBAL EVENTS

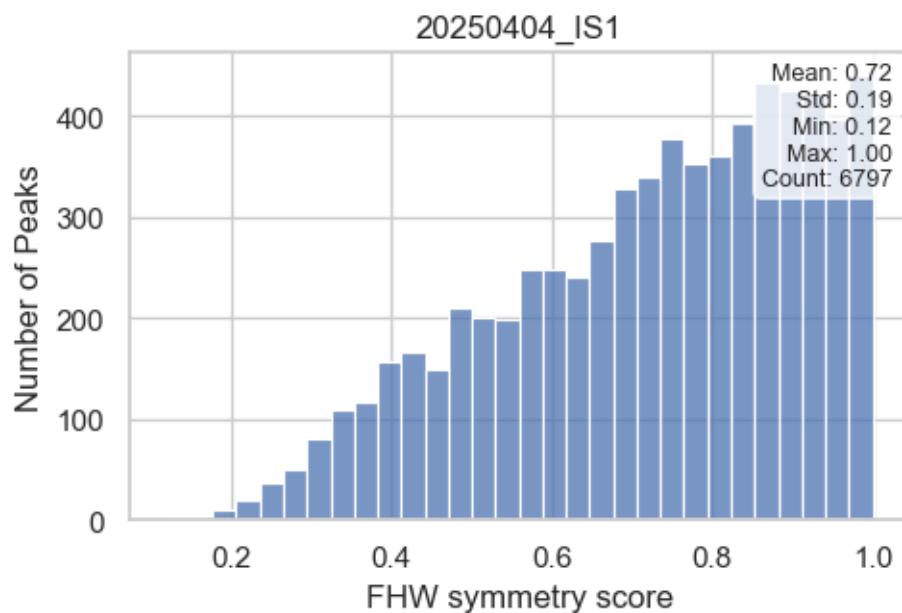
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

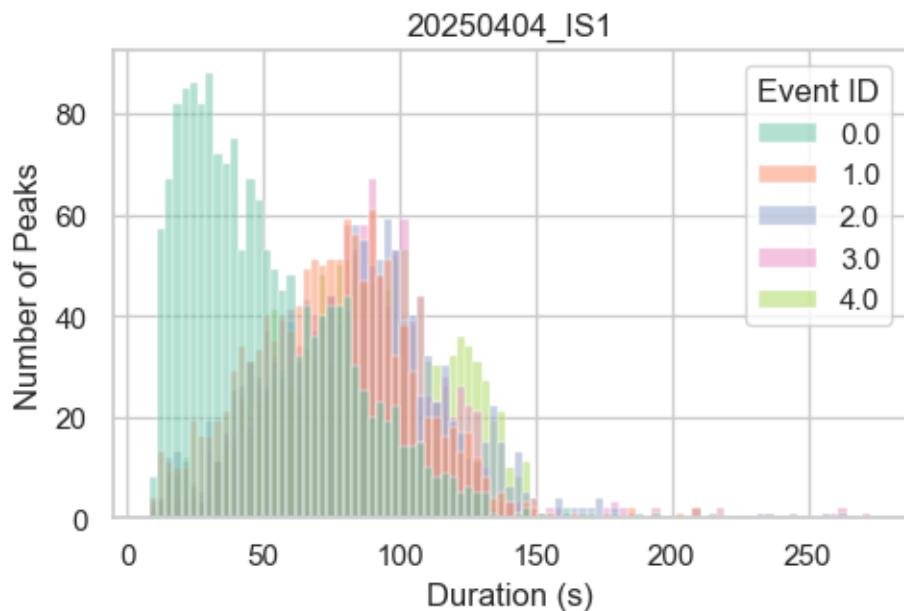


Distribution of Peak Symmetry Scores

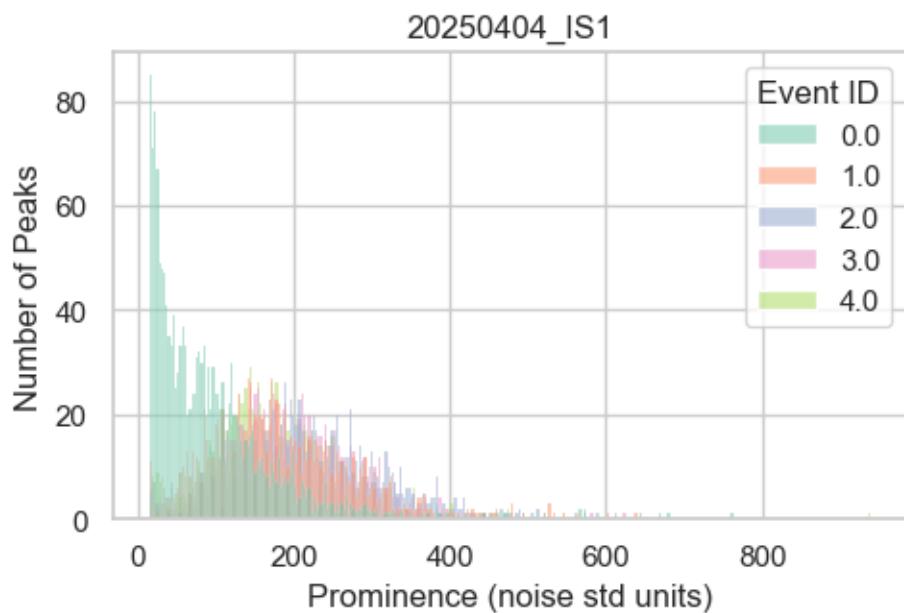


1.2.2 Peak statistics in global event per event ID

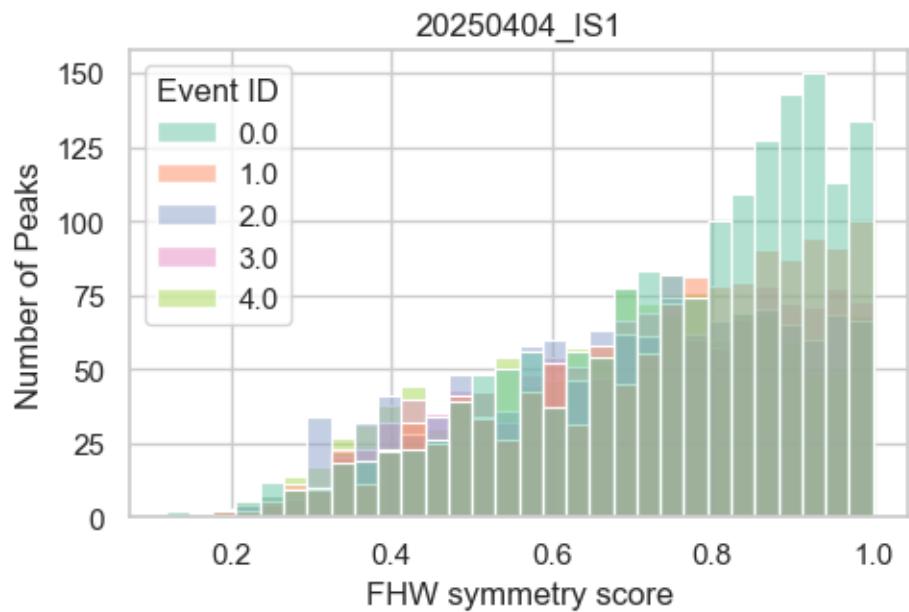
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



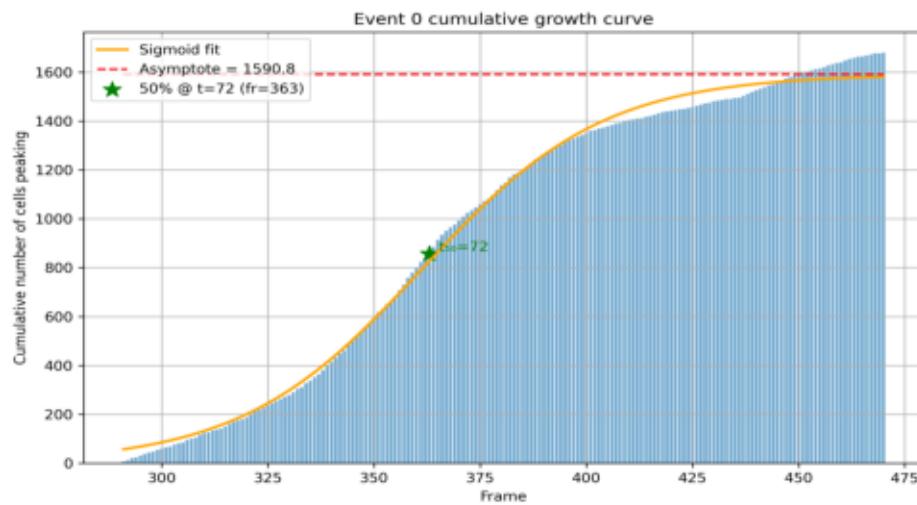
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

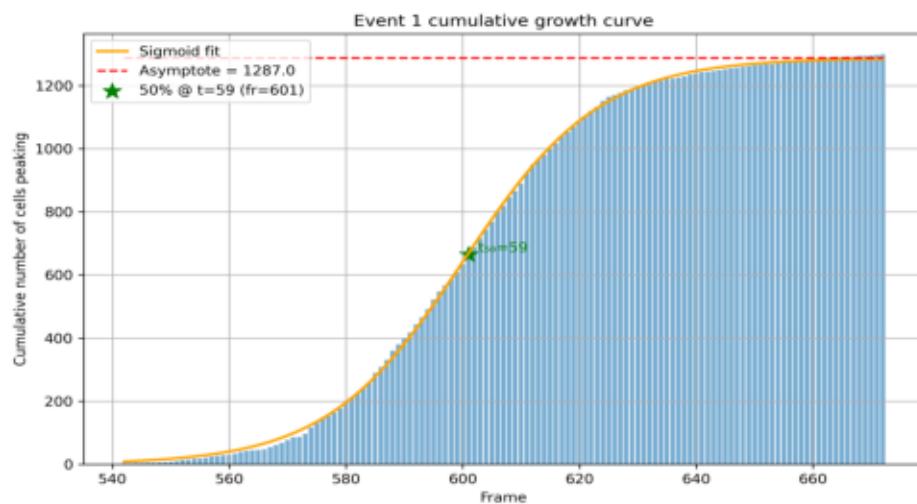
Event Activity Overlay (Event ID: 0)

20250404_IS1



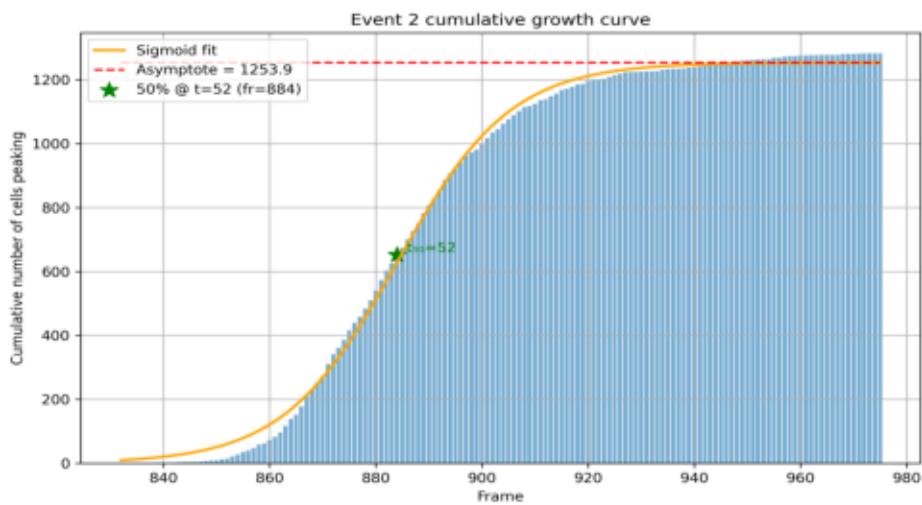
Event Activity Overlay (Event ID: 1)

20250404_IS1



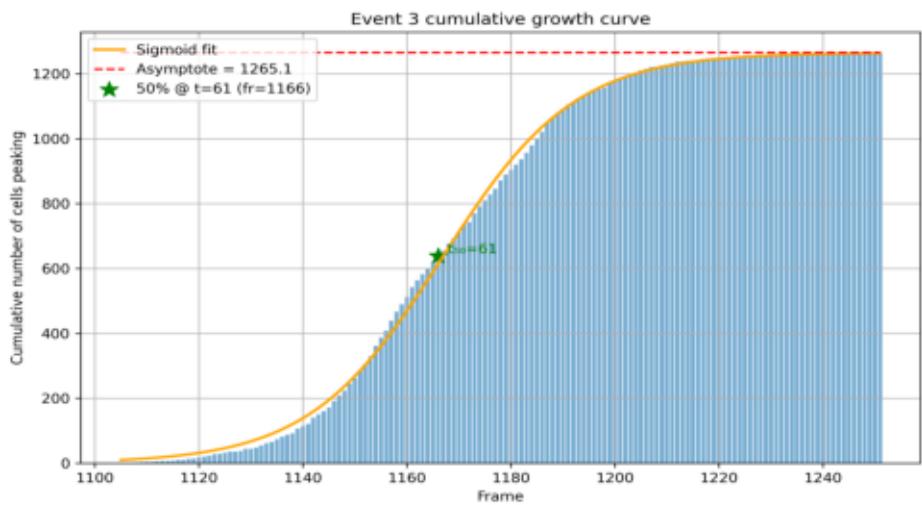
Event Activity Overlay (Event ID: 2)

20250404_IS1



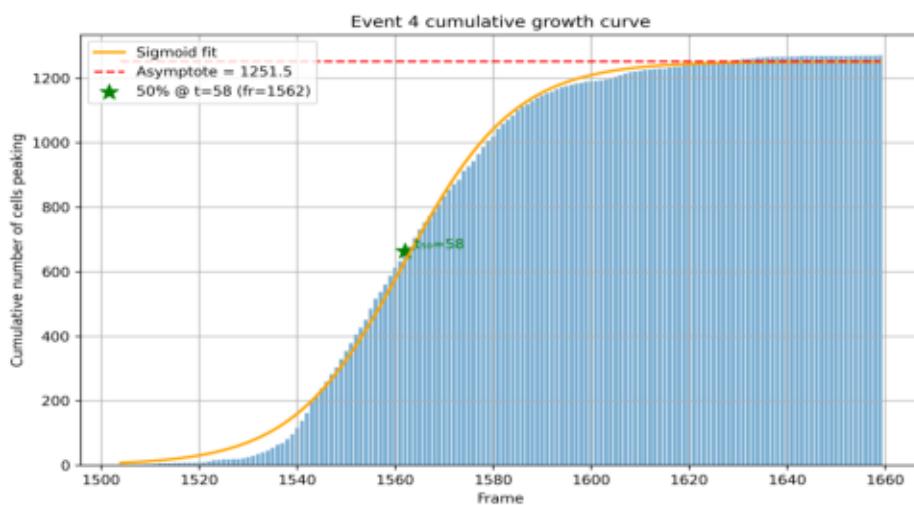
Event Activity Overlay (Event ID: 3)

20250404_IS1



Event Activity Overlay (Event ID: 4)

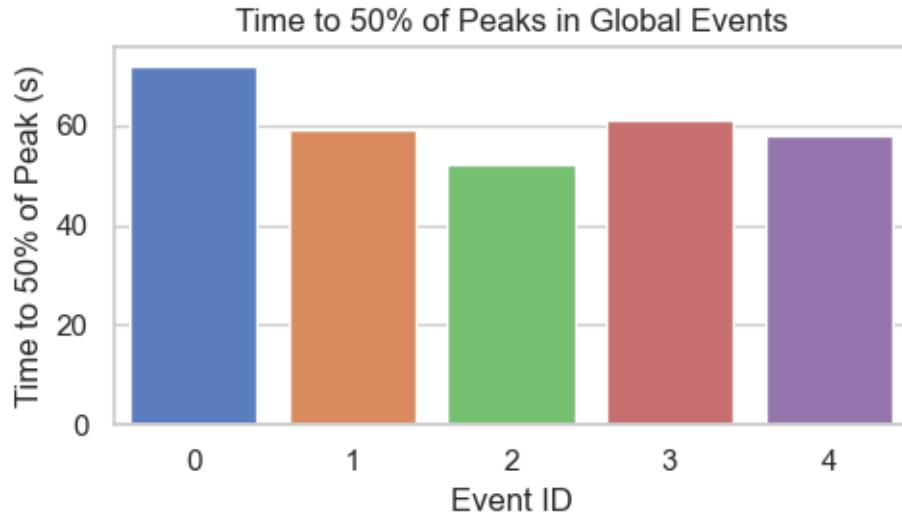
20250404_IS1



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

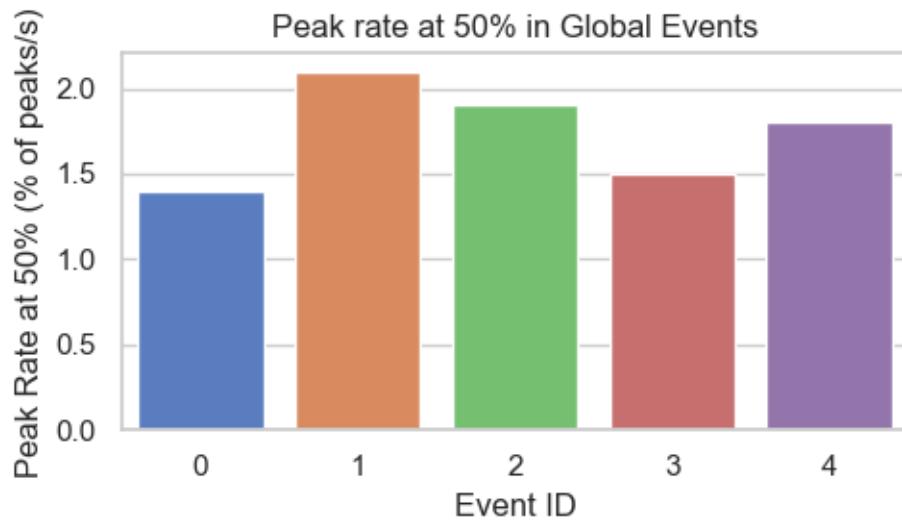
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys
is\visualizers.py:257: FutureWarning:
```

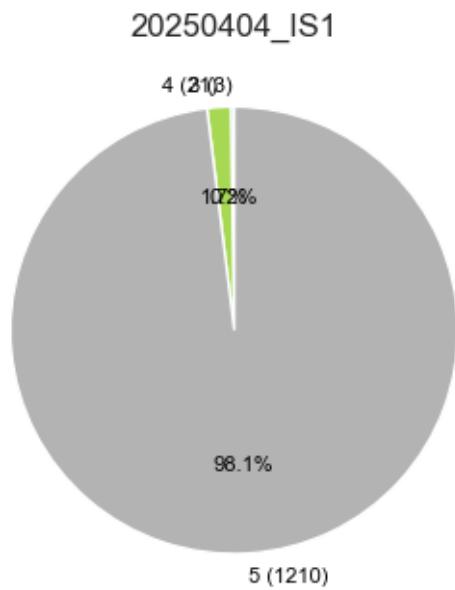
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



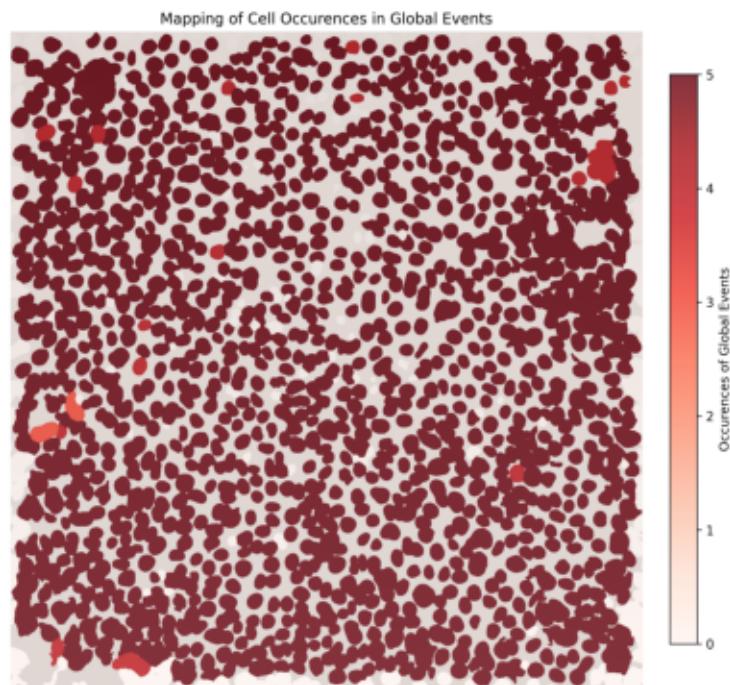
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

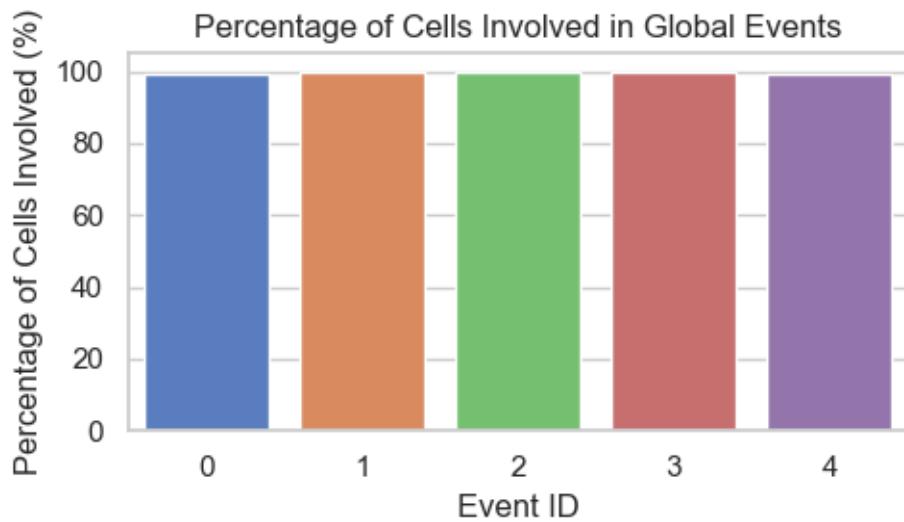
20250404_IS1



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.2.5 Inter-event interval analysis

Intervals between global event peaks: [241.0, 286.0, 281.0, 396.0]

Estimated periodicity: 0.839

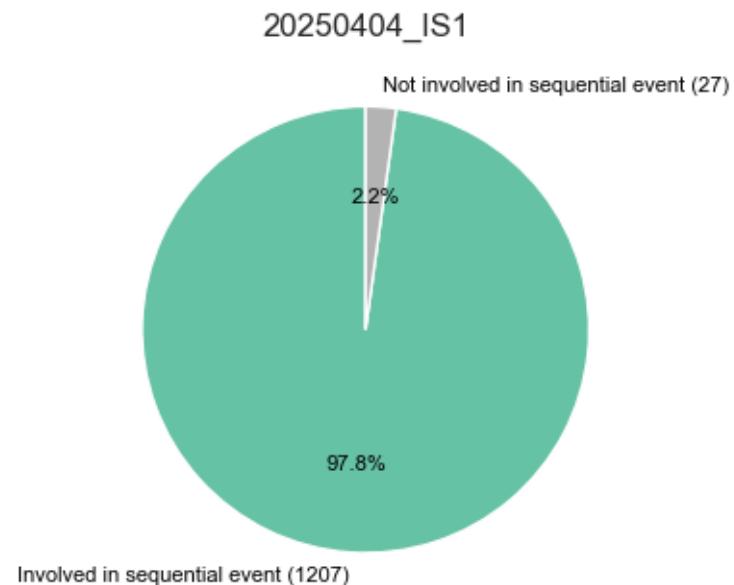
The global events exhibit a regular periodic pattern.

Estimated frequency (1/mean interval): 0.003 Hz

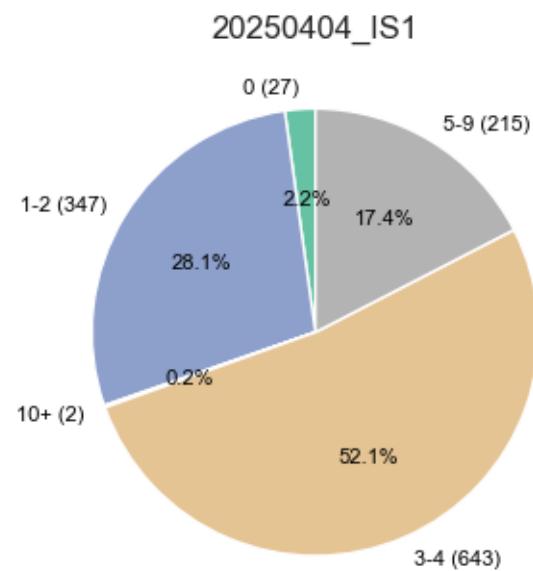
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

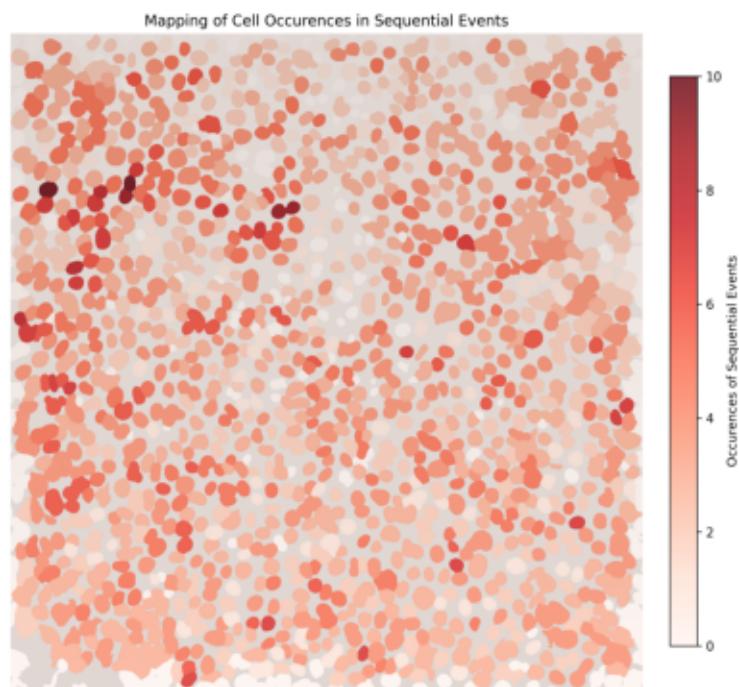


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

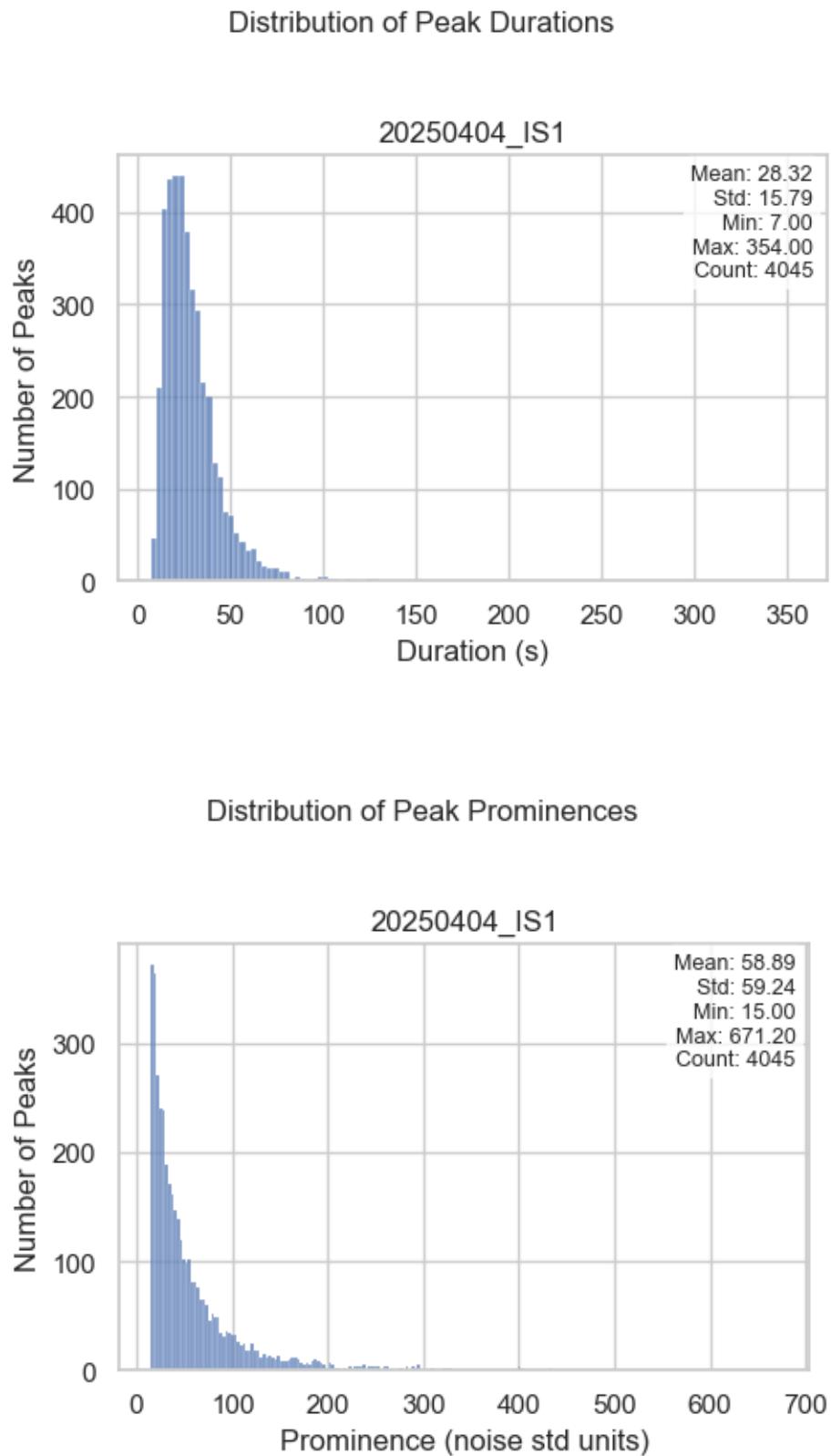


Cell Mapping with Occurrences in Sequential Events Overlay

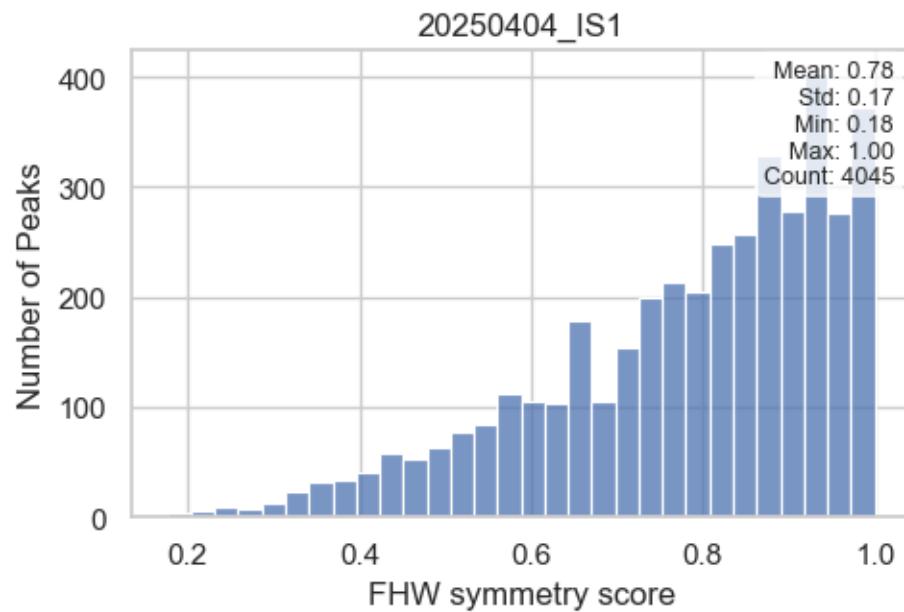
20250404_IS1



1.3.2 Peaks statistics in sequential events

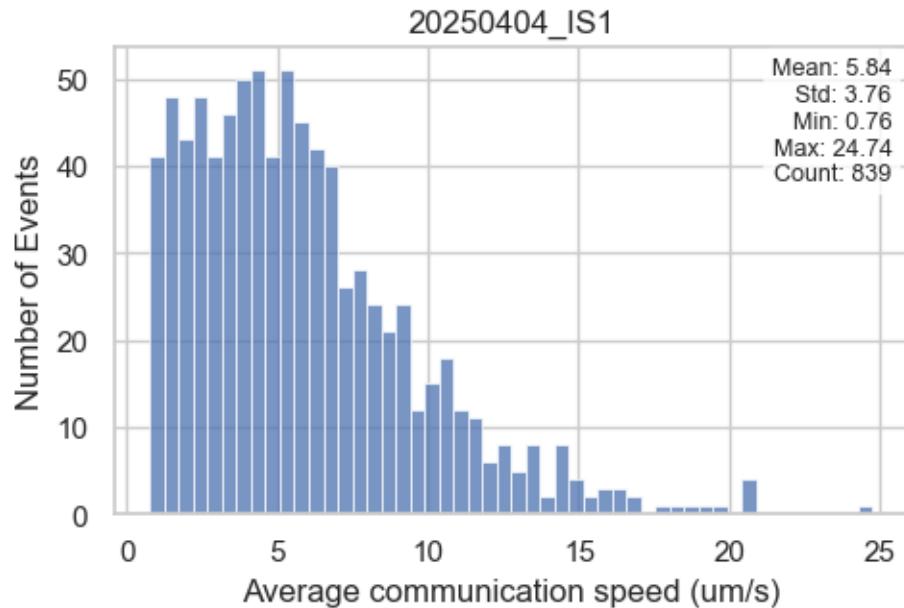


Distribution of Peak Symmetry Scores

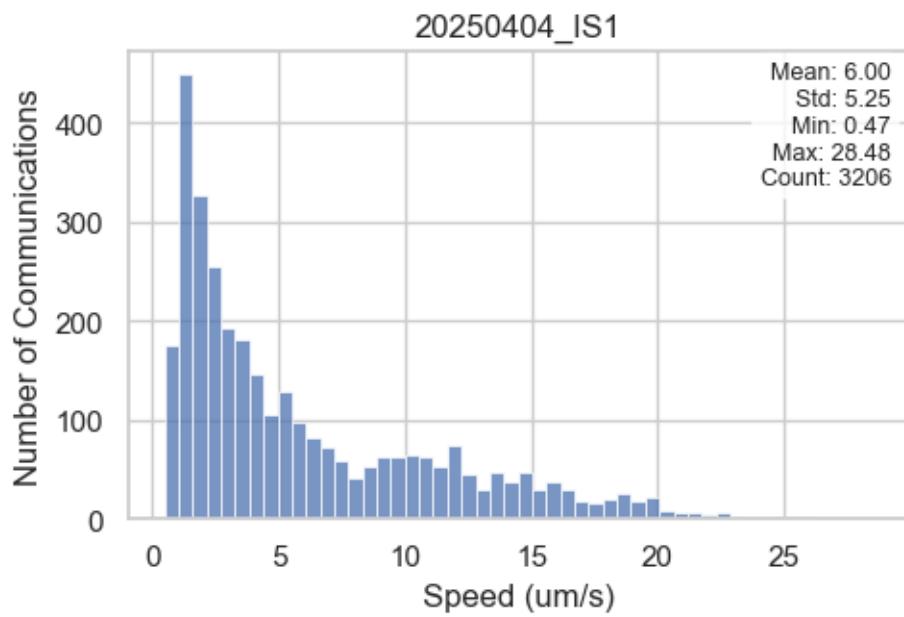


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

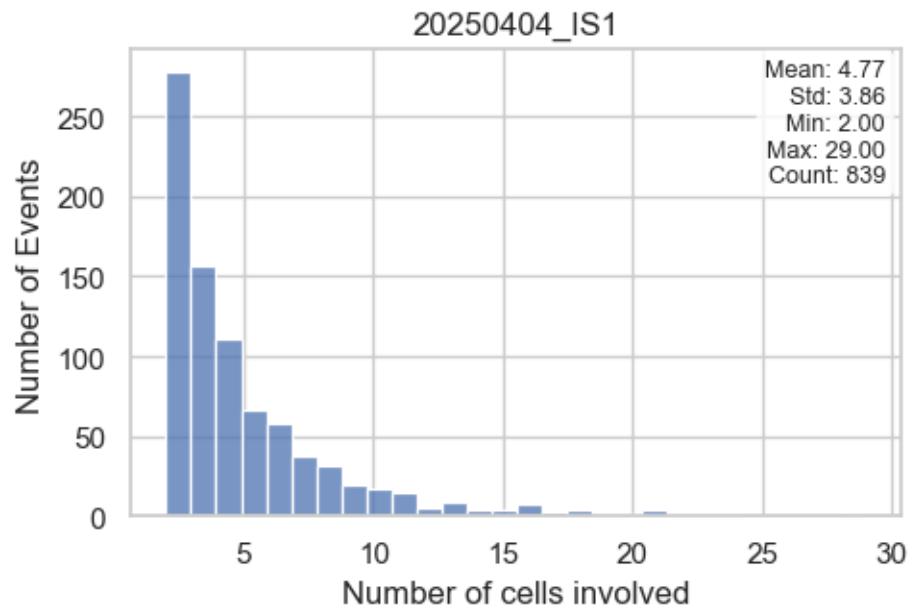


Distribution of Cell-Cell Communication Speeds



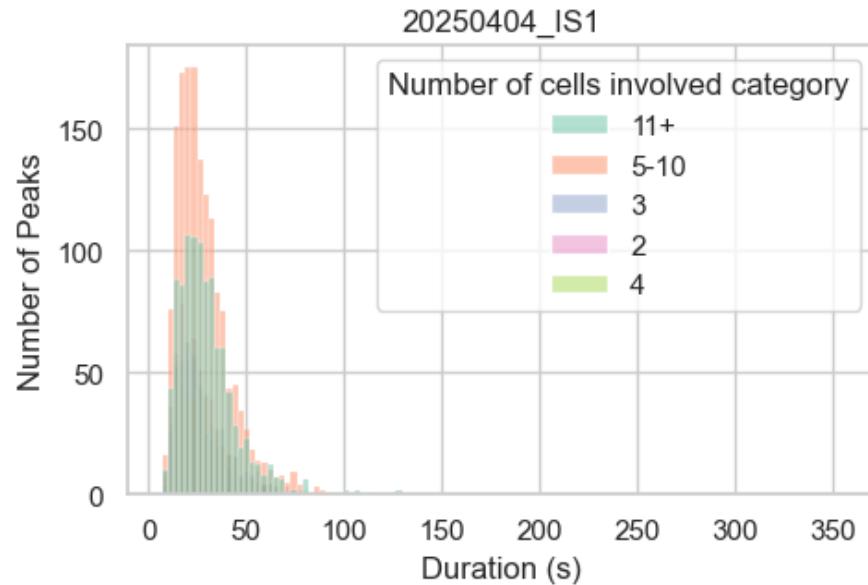
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

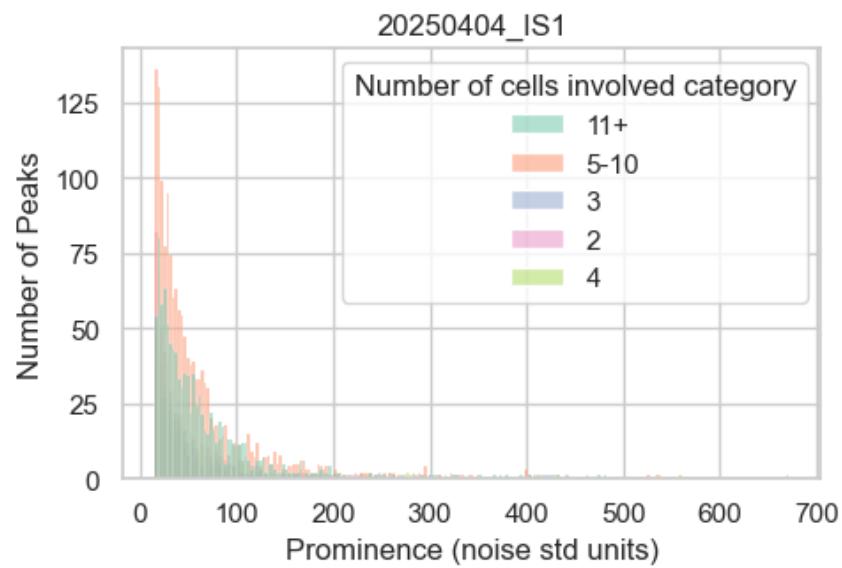


1.3.5 Influence of cell count per event on statistics

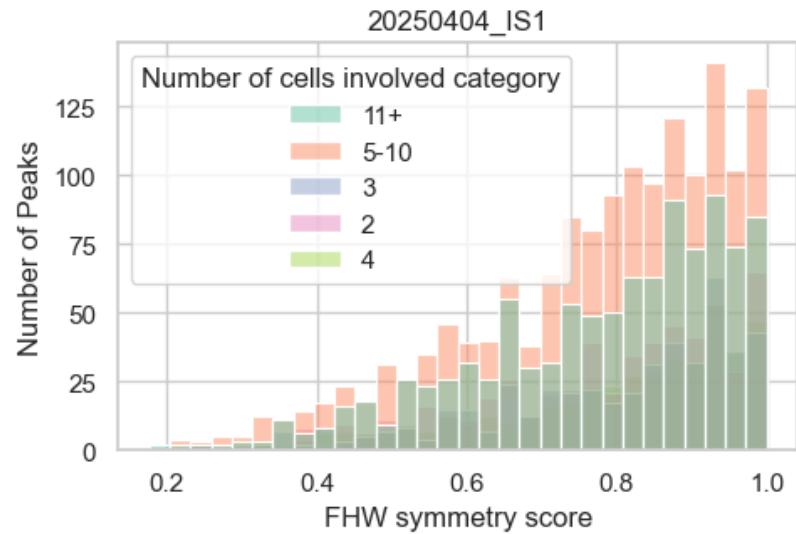
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



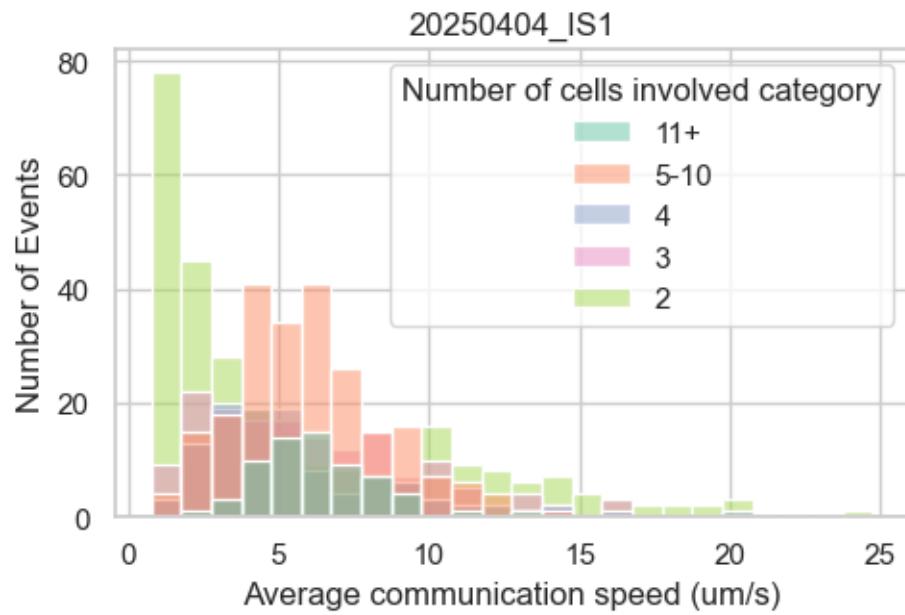
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



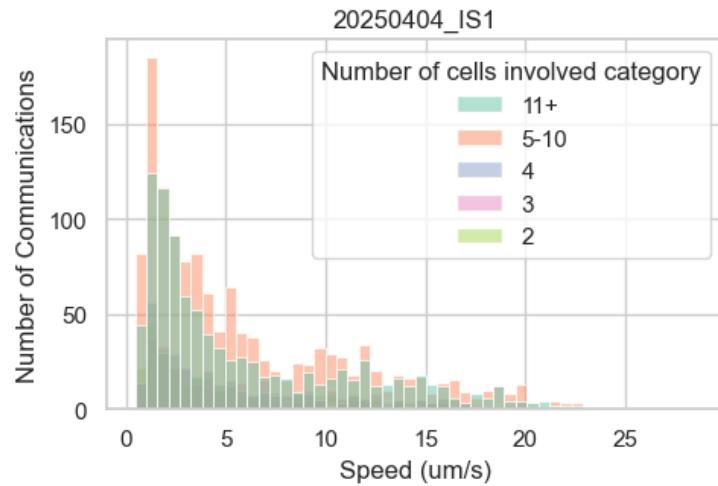
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

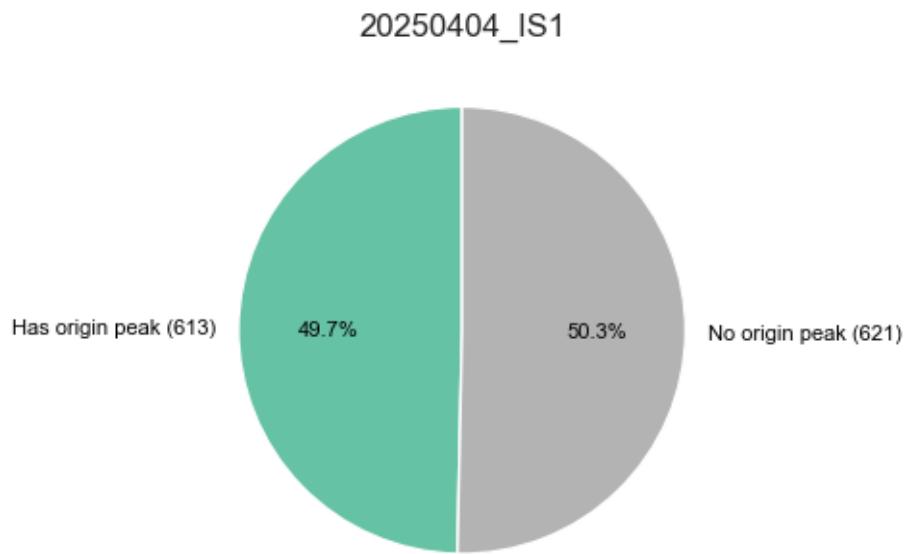


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

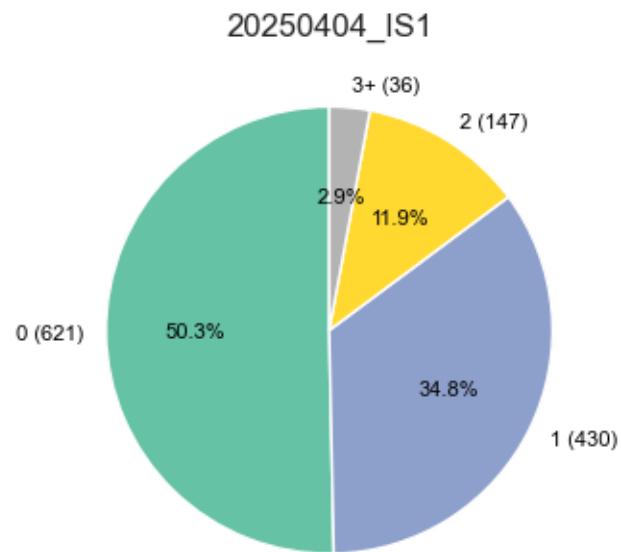


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

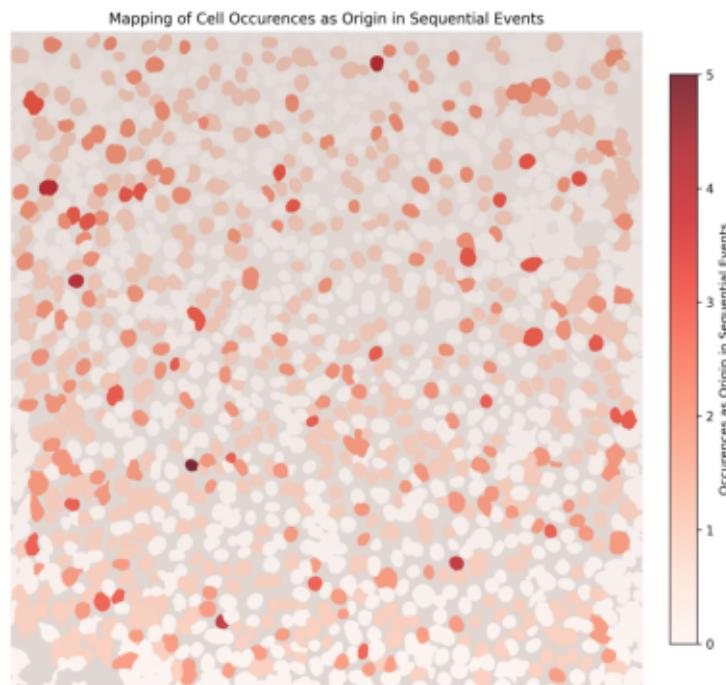


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

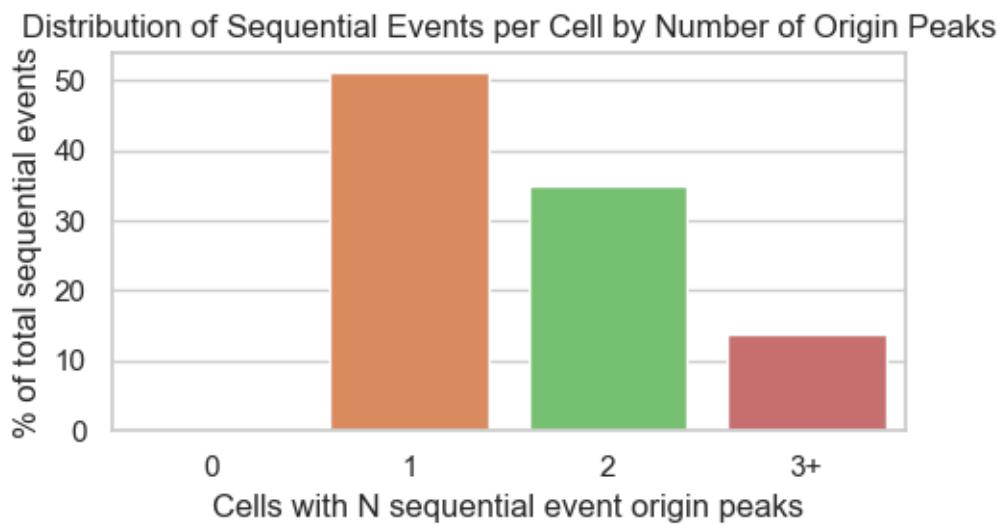
20250404_IS1



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

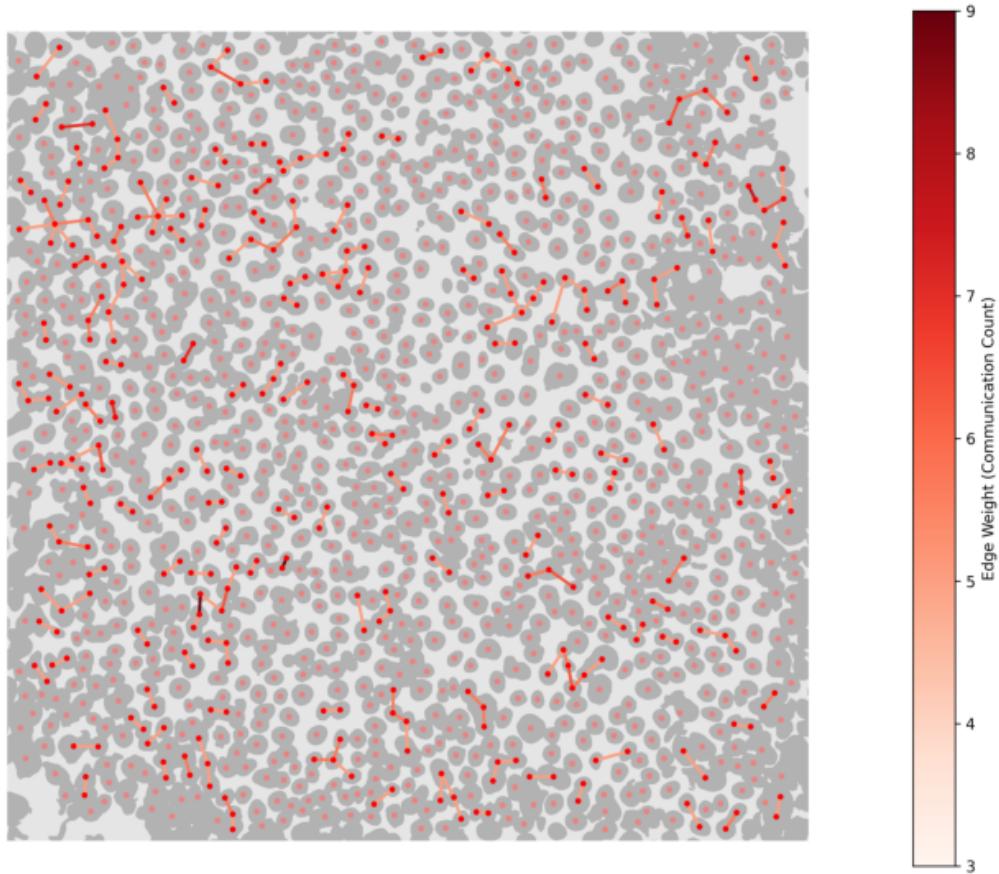


1.3.7 Connection network between cells

Cell Connection Network Graph

20250404_IS1

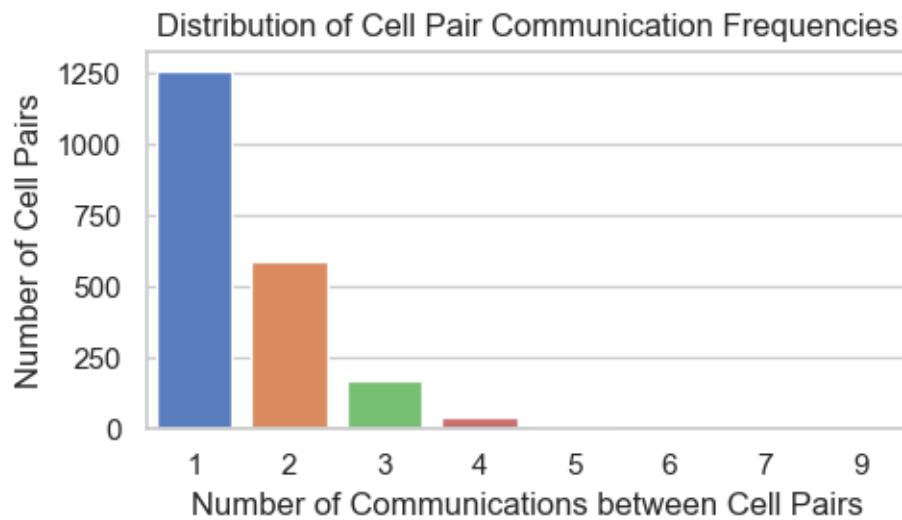
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

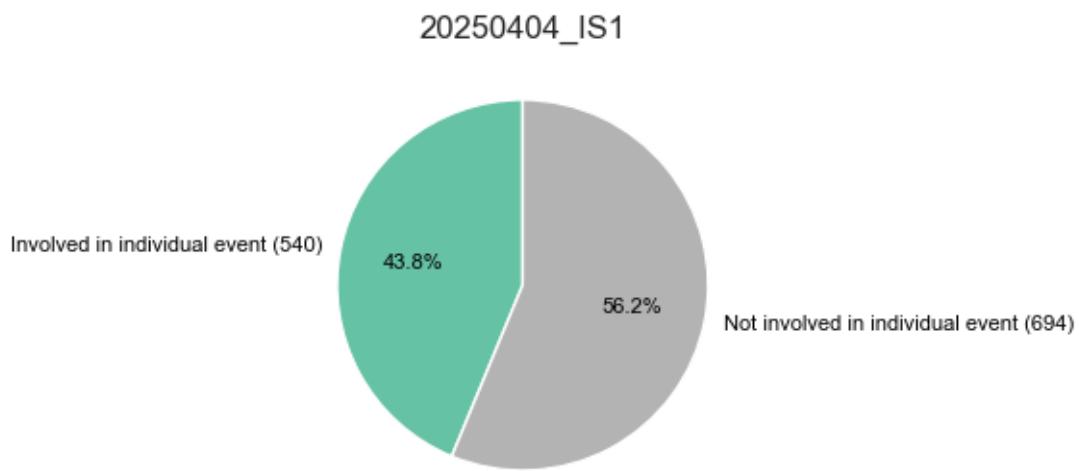
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



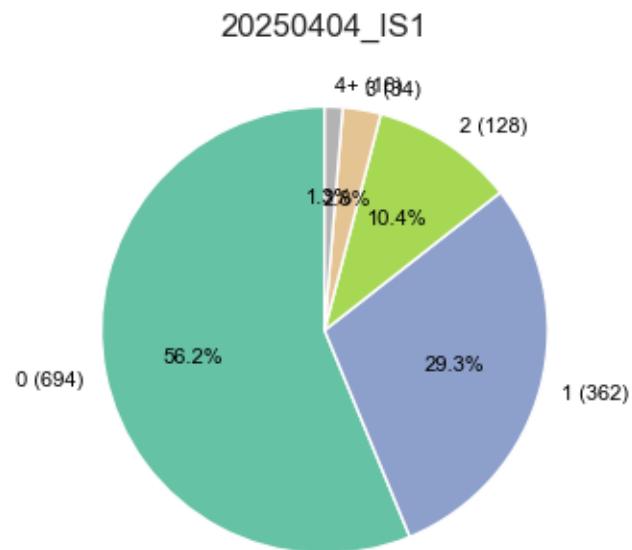
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

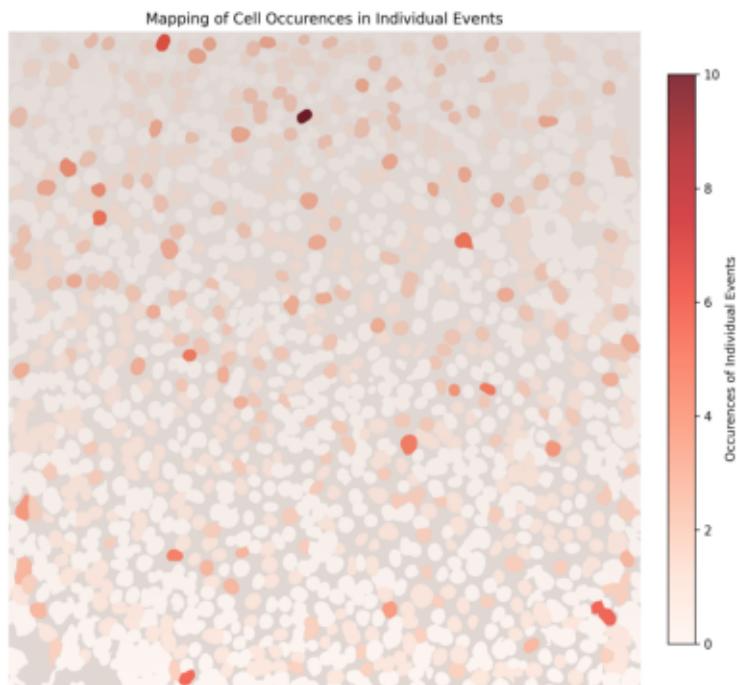


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)

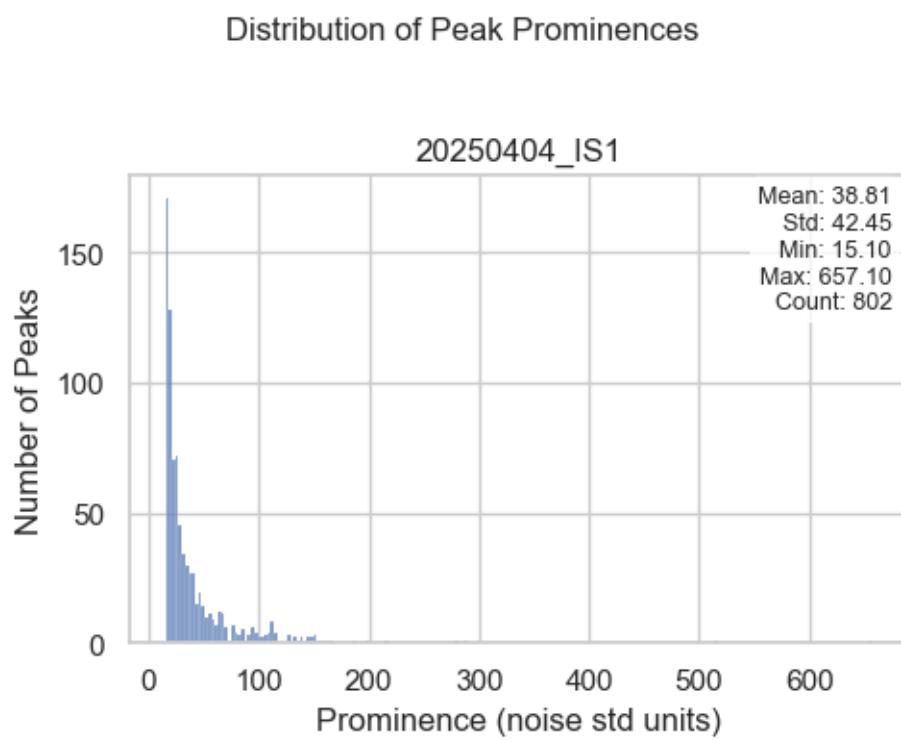
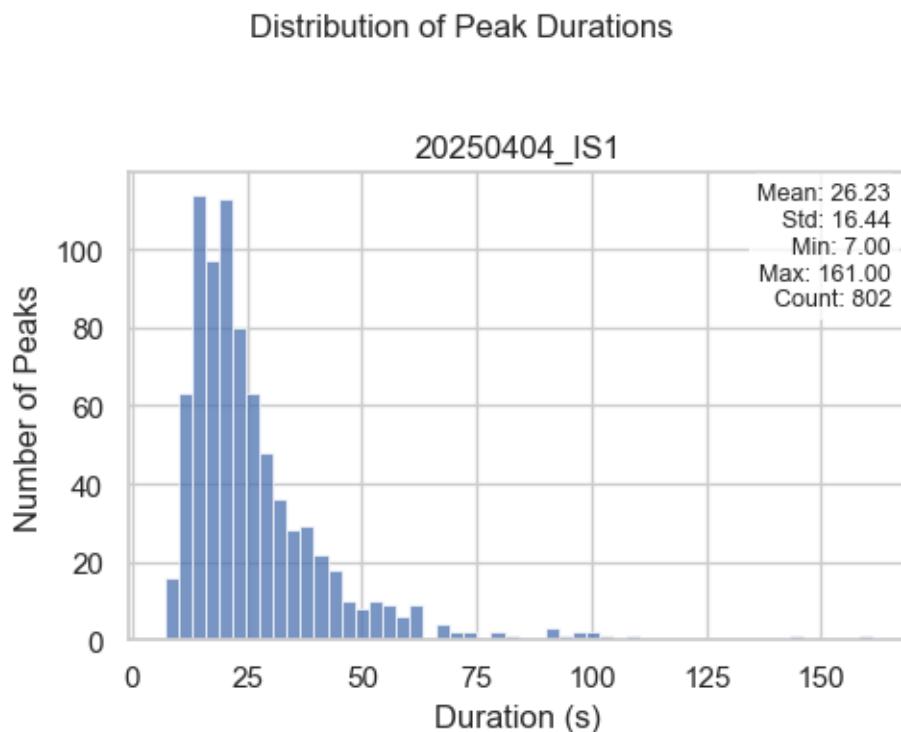


Cell Mapping with Occurrences in Individual Events Overlay

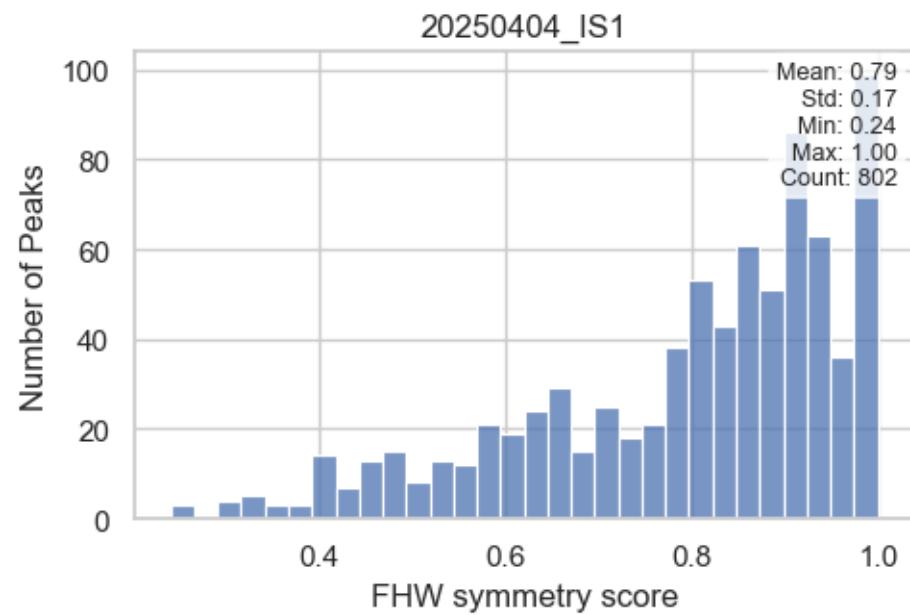
20250404_IS1



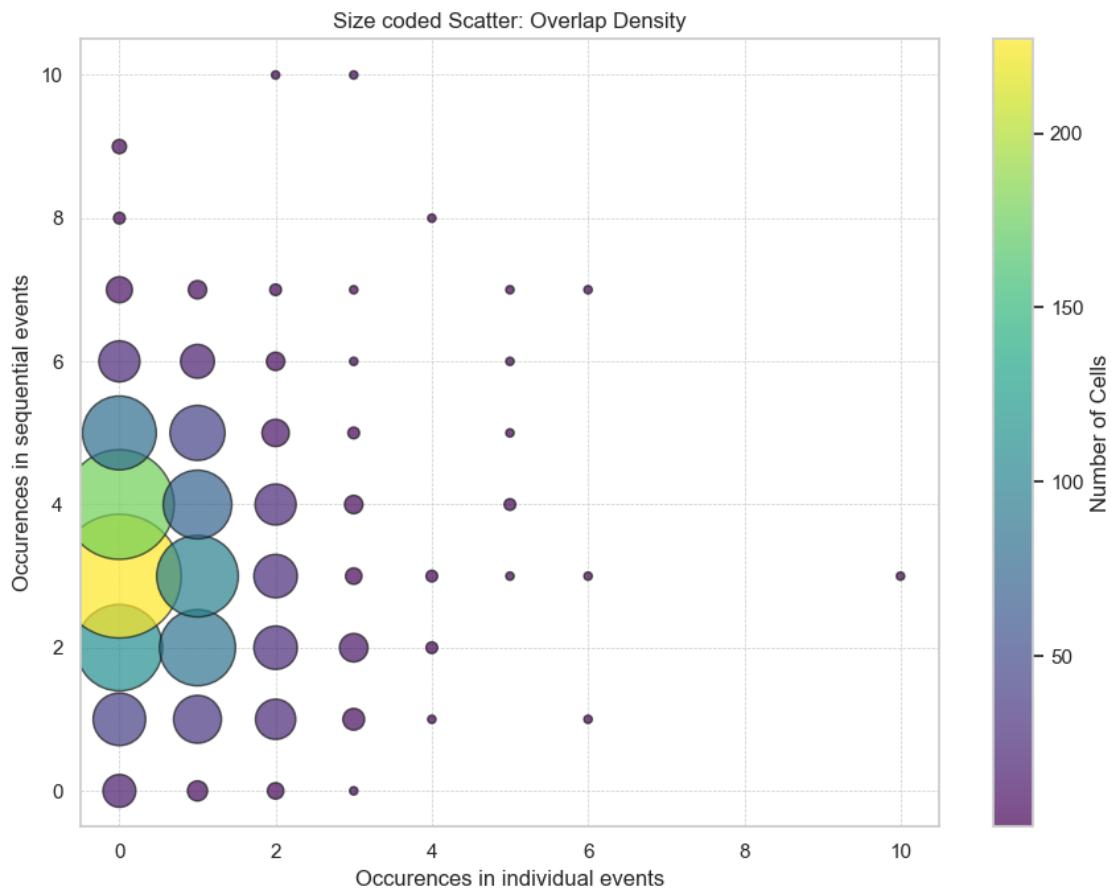
1.4.2 Peaks statistics in individual events



Distribution of Peak Symmetry Scores

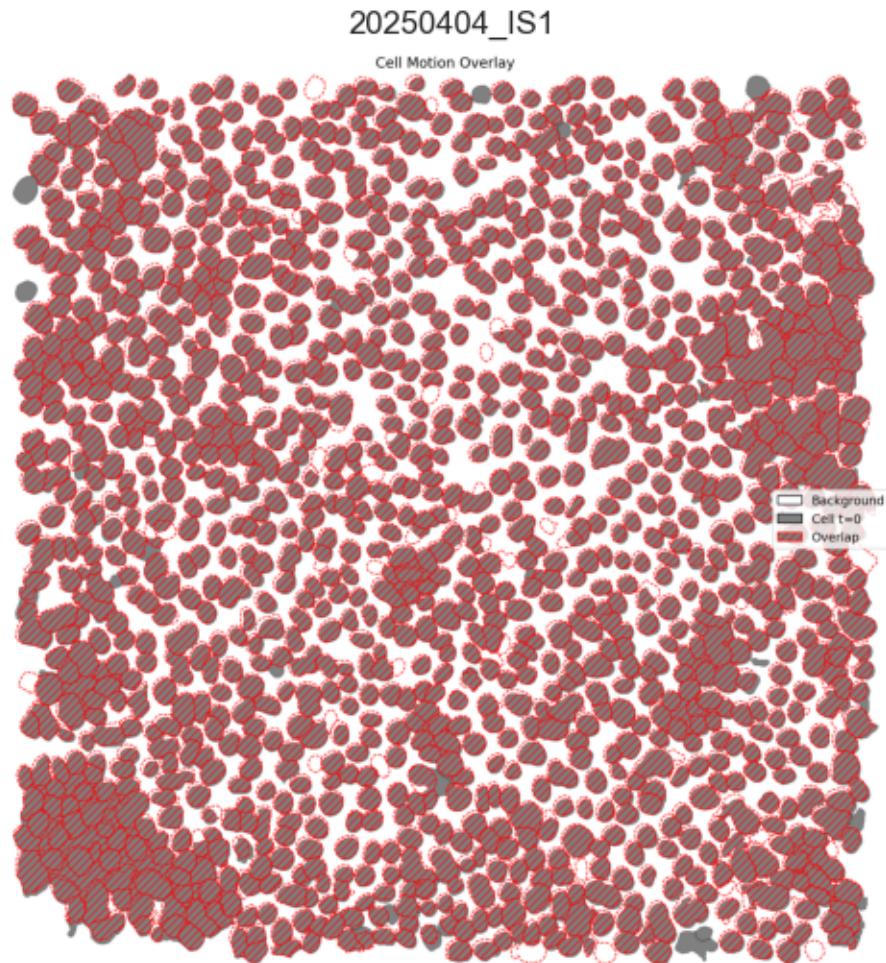


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 1234
- Hoechst image taken at t=1801: 1238
- Number of cells difference: absolute 4, relative 0.32%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 1369674
- Pixels segmented as cell at t=1801: 1414102
- Overlapping pixels between t=0 and t=1801: 1219514 (87.62% of total)
- Pixels exclusive to t=0: 150160 (10.96% of total)
- Pixels exclusive to t=1801: 194588 (13.76% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

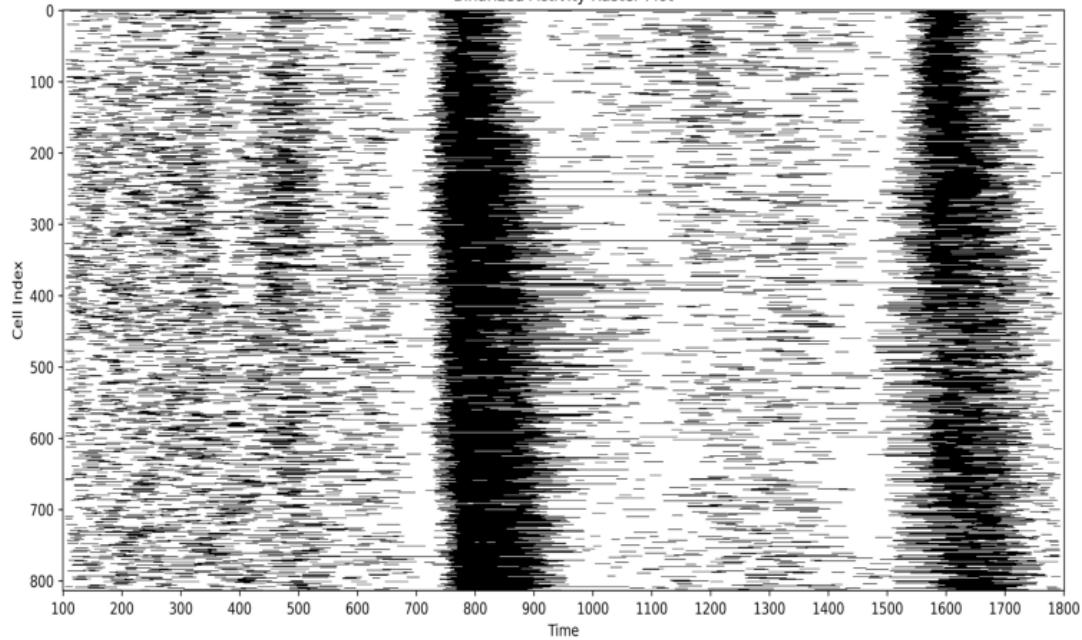
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

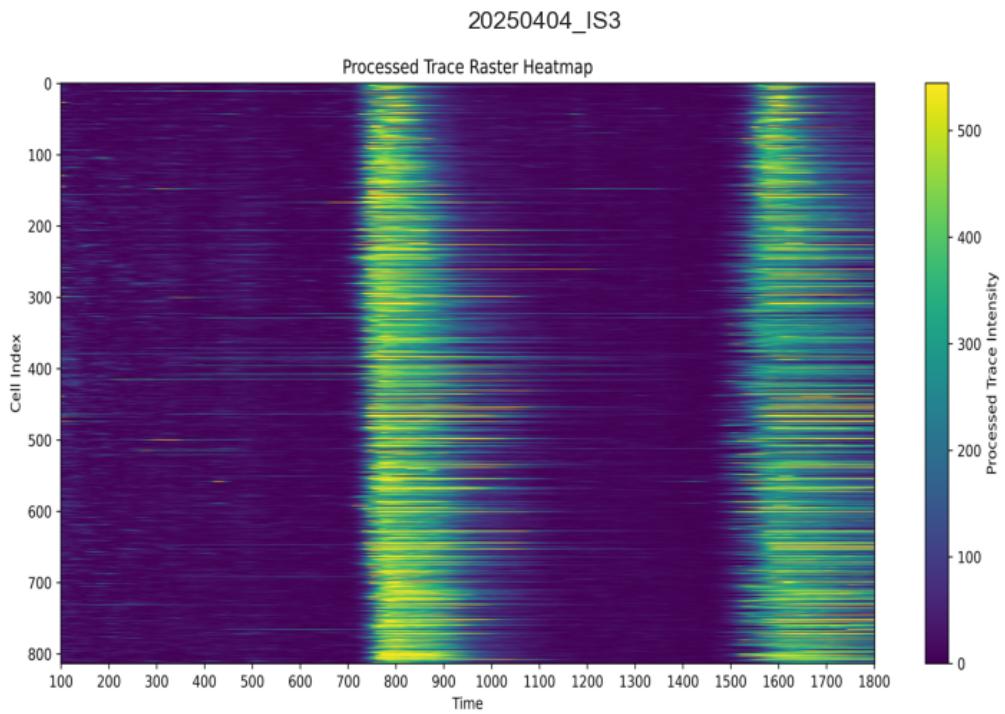
Binary Activity Raster Plot

20250404_IS3

Binarized Activity Raster Plot



Heatmap Activity Raster Plot



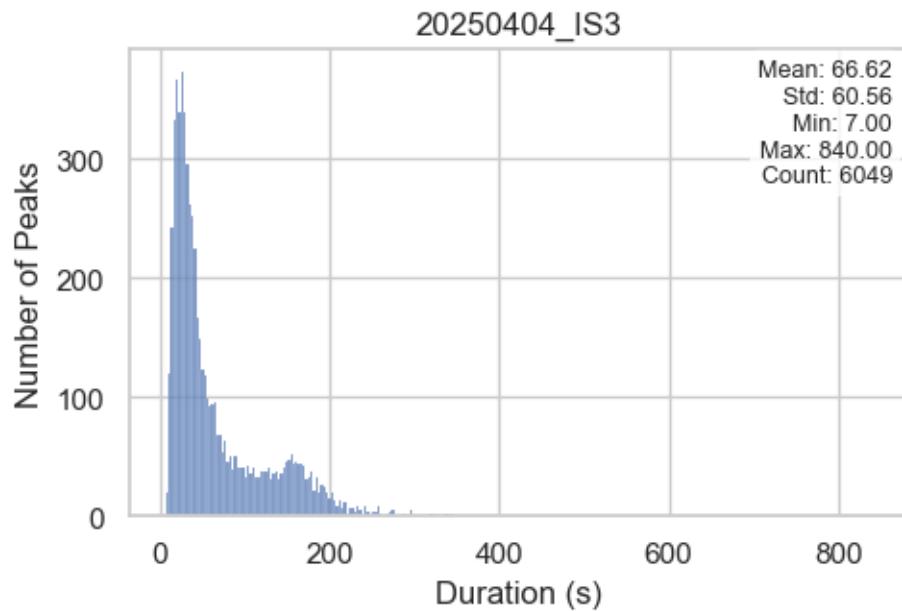
1.1.2 Peaks population

Total number of peaks: 6049

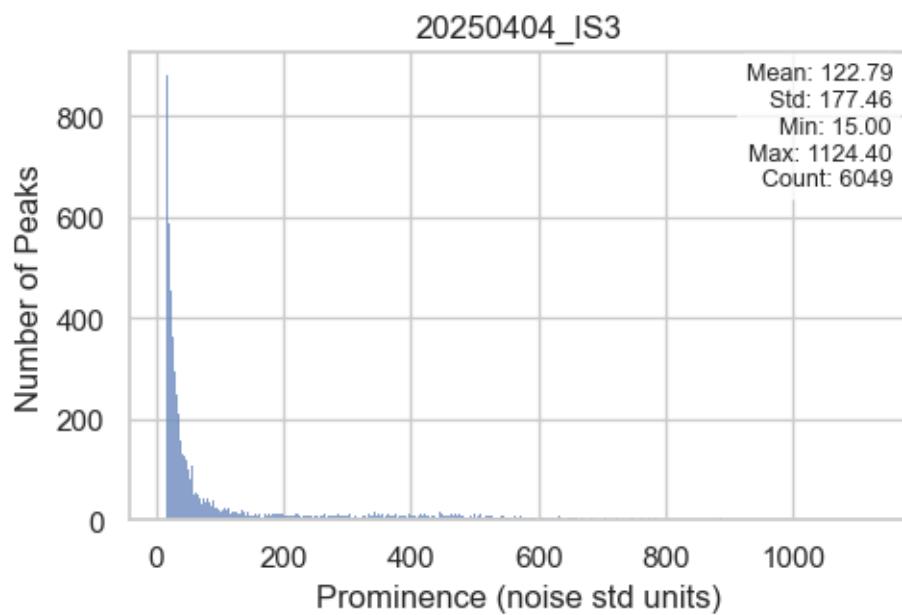
Total number of cells: 814

1.1.3 Peaks statistics

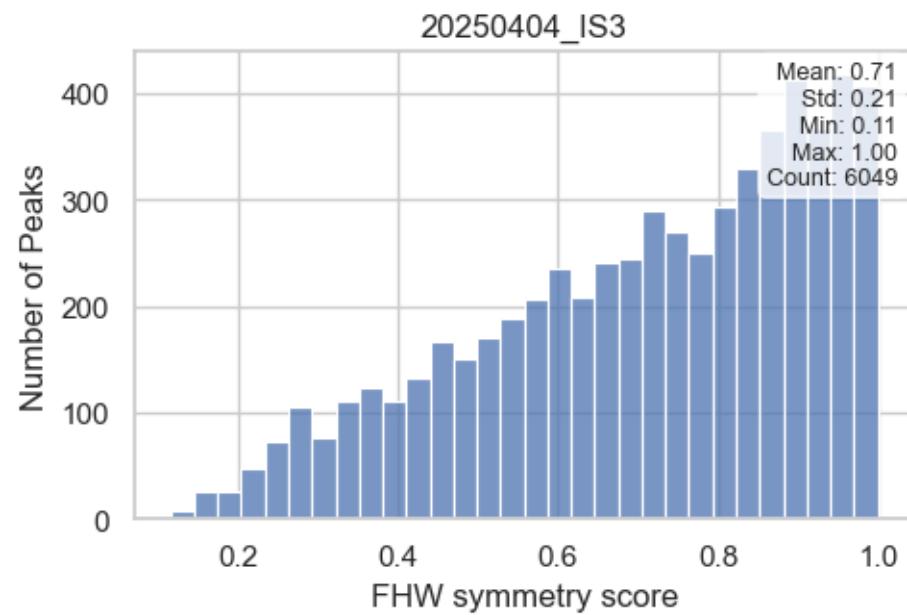
Distribution of Peak Durations



Distribution of Peak Prominences

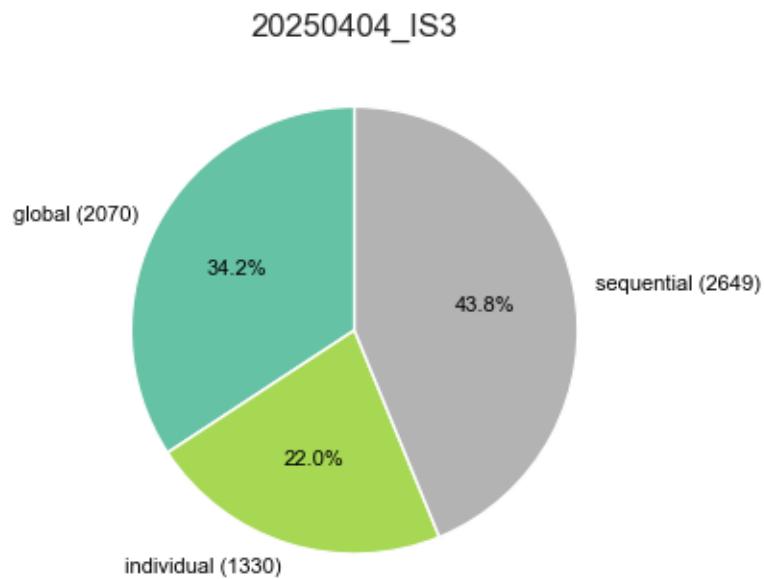


Distribution of Peak Symmetry Scores



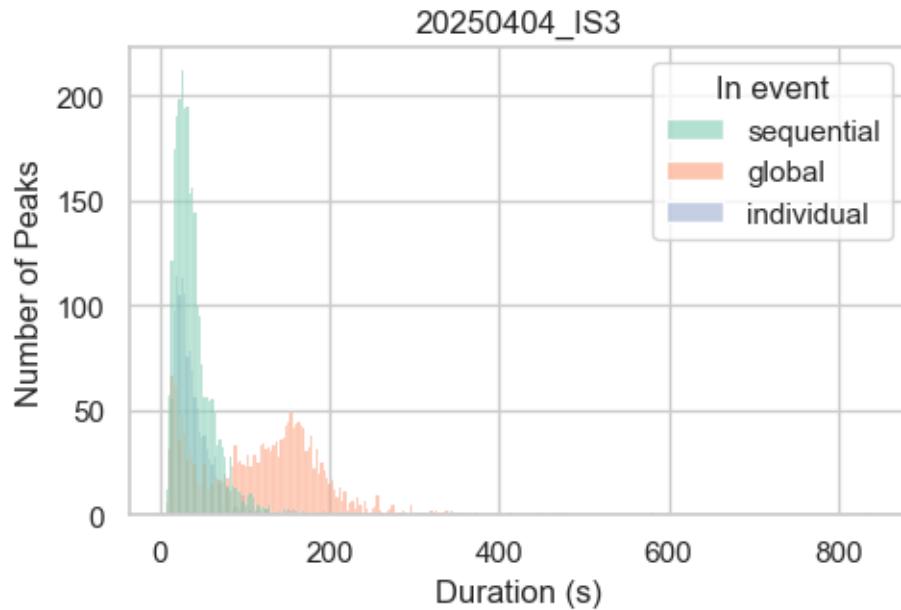
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

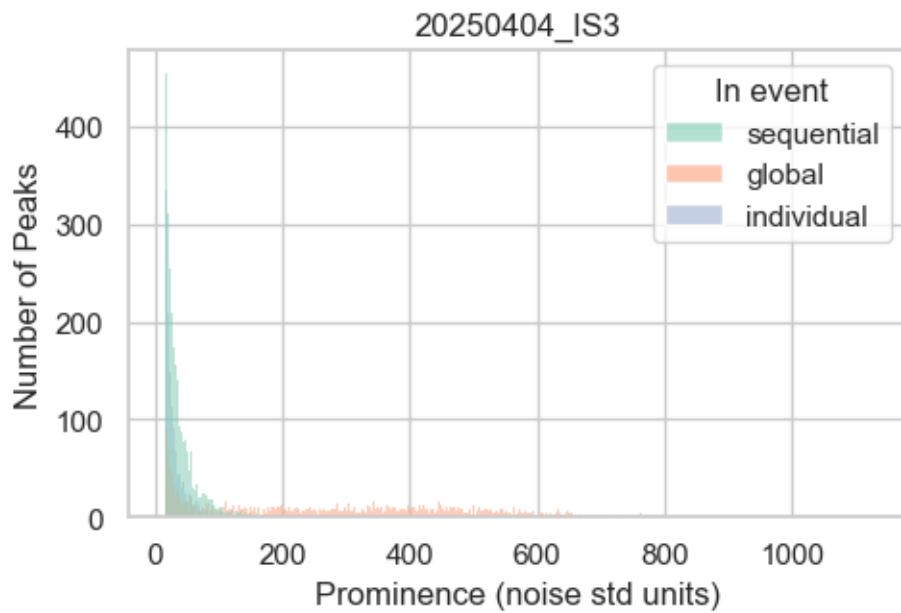


1.1.5 Peaks statistics per event types

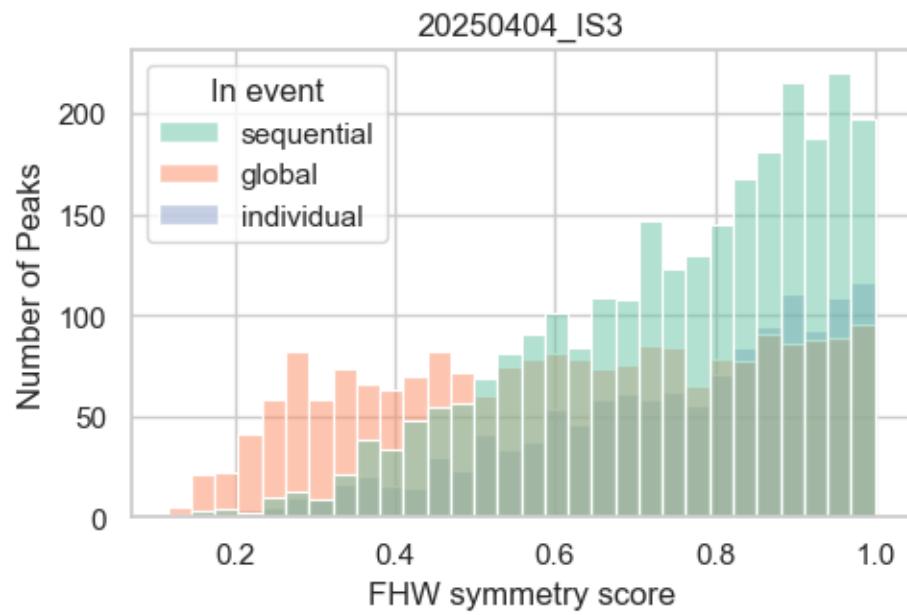
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

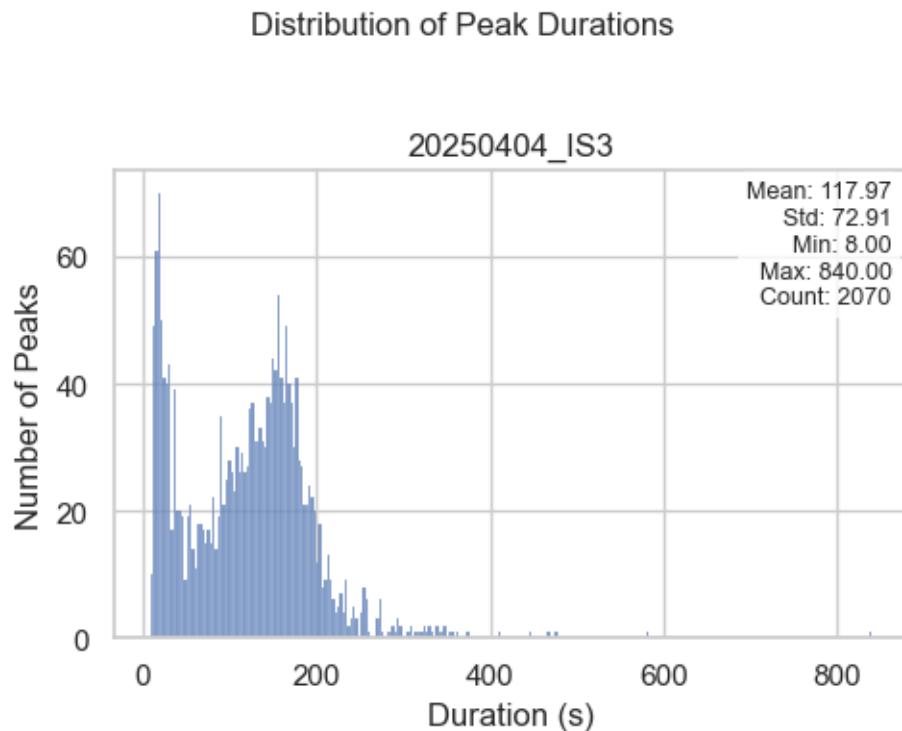


Distribution of Peak Symmetry Scores by Group

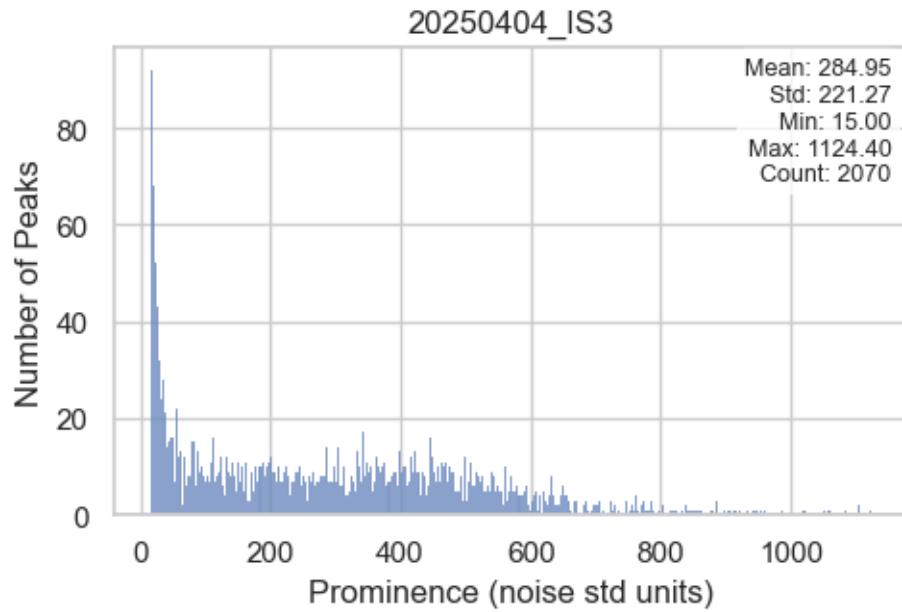


1.2 GLOBAL EVENTS

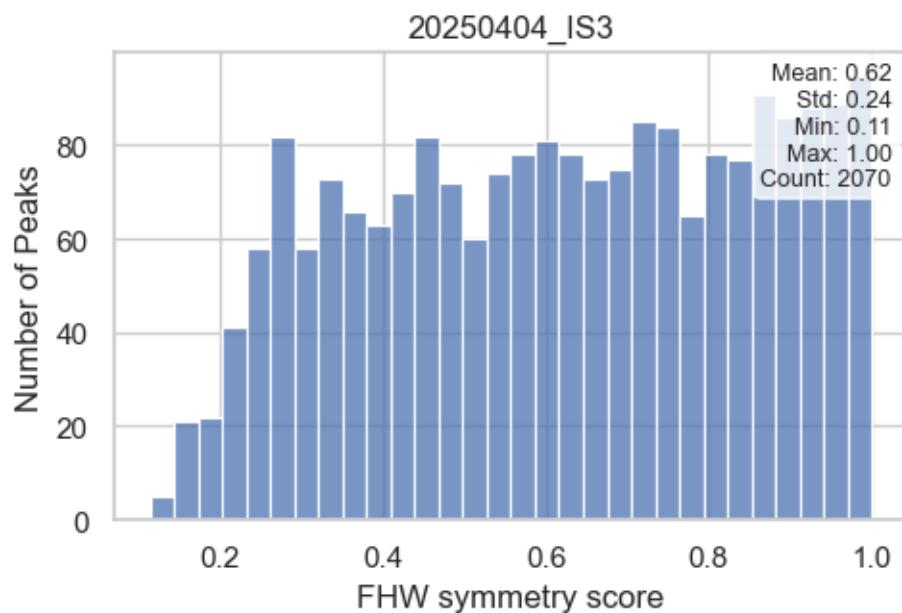
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

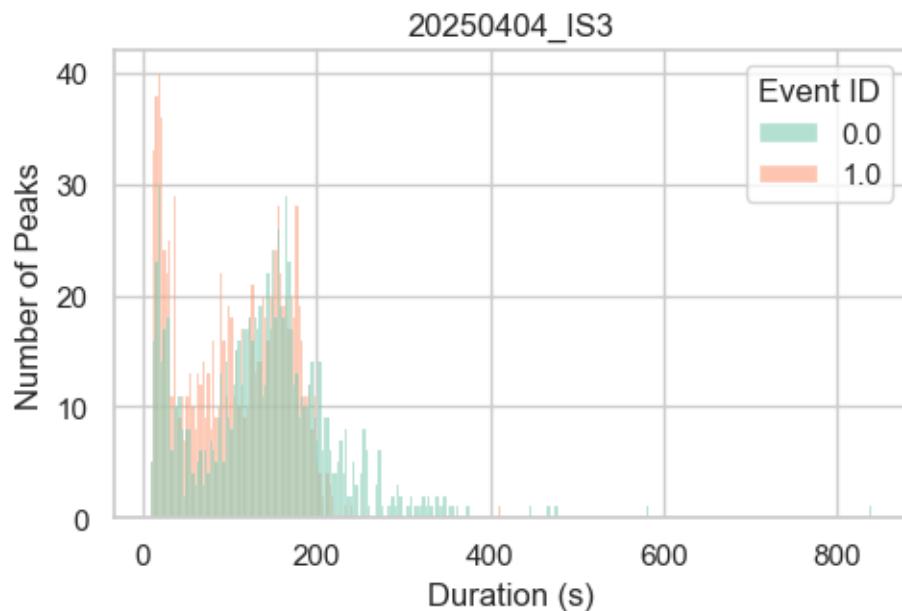


Distribution of Peak Symmetry Scores

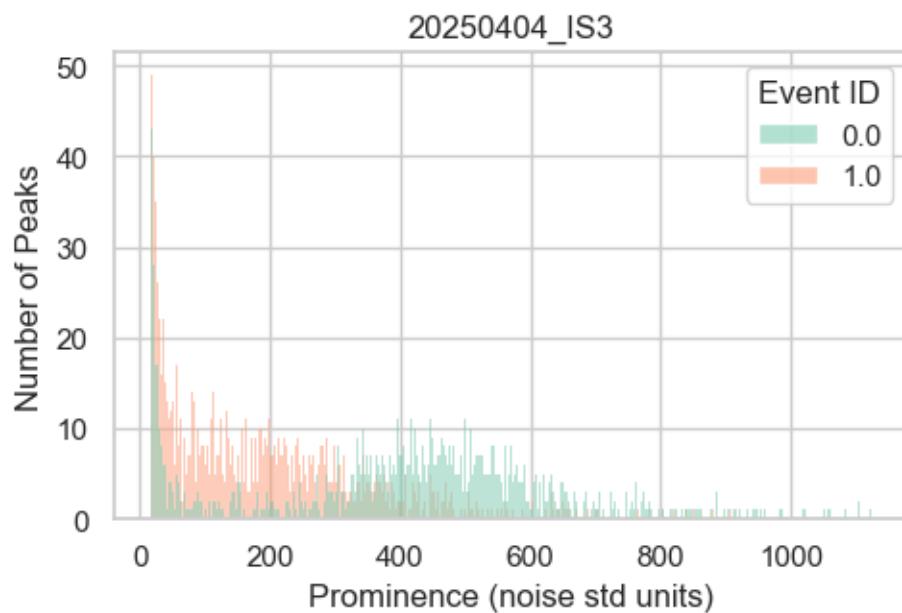


1.2.2 Peak statistics in global event per event ID

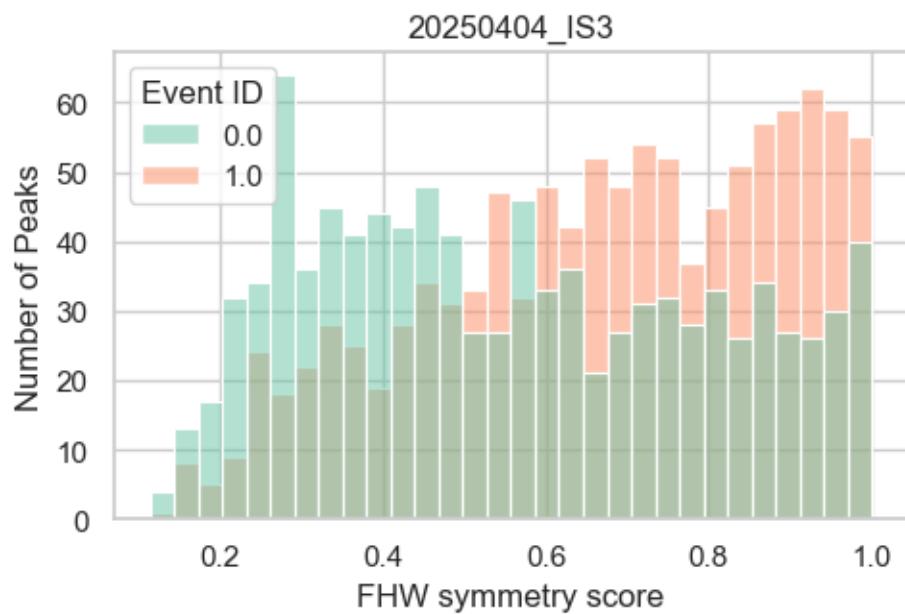
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



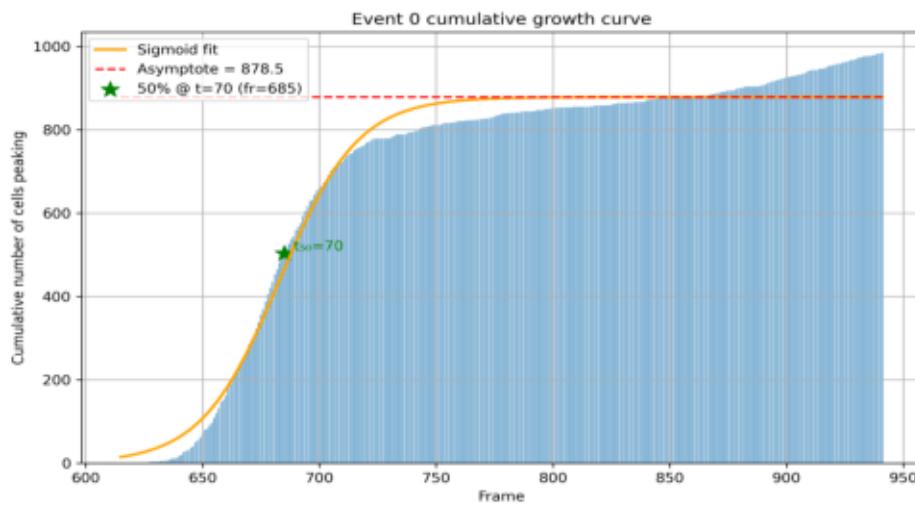
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

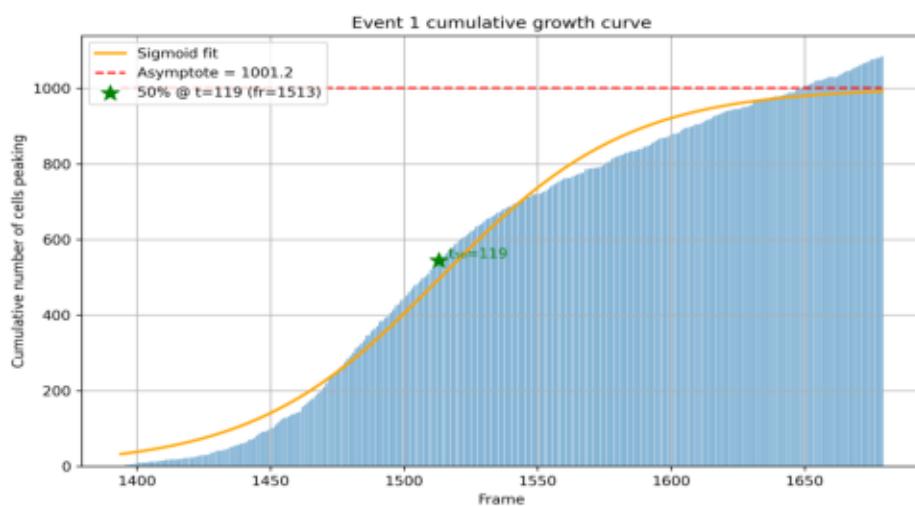
Event Activity Overlay (Event ID: 0)

20250404_IS3



Event Activity Overlay (Event ID: 1)

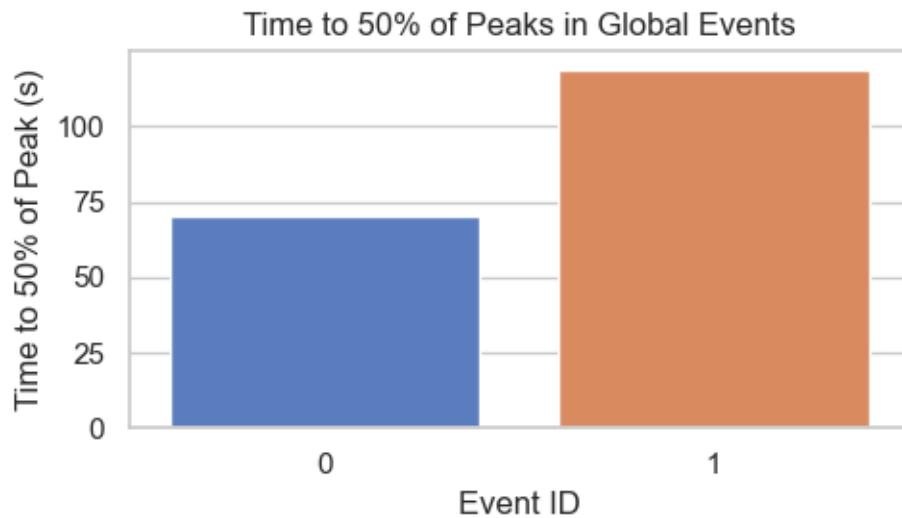
20250404_IS3



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

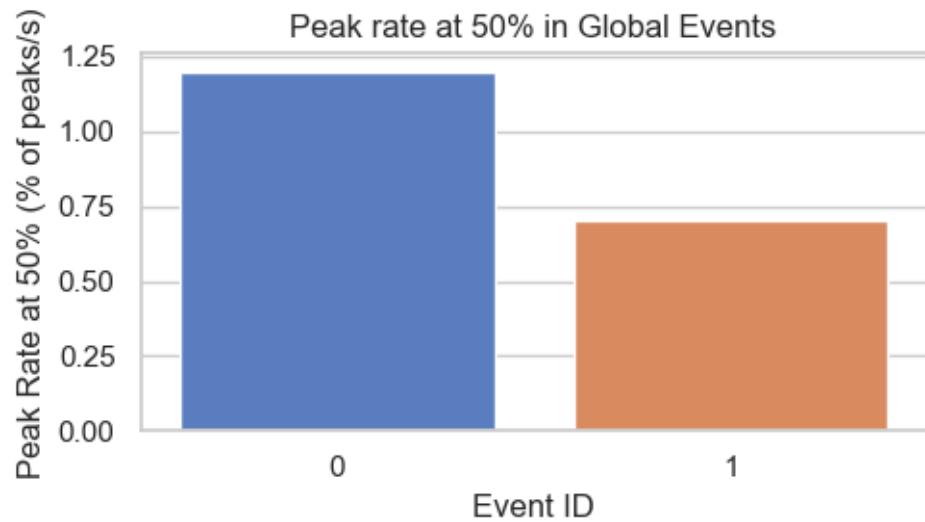
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

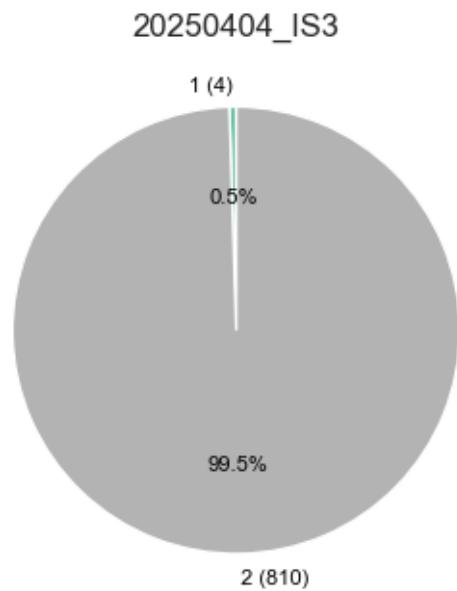
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



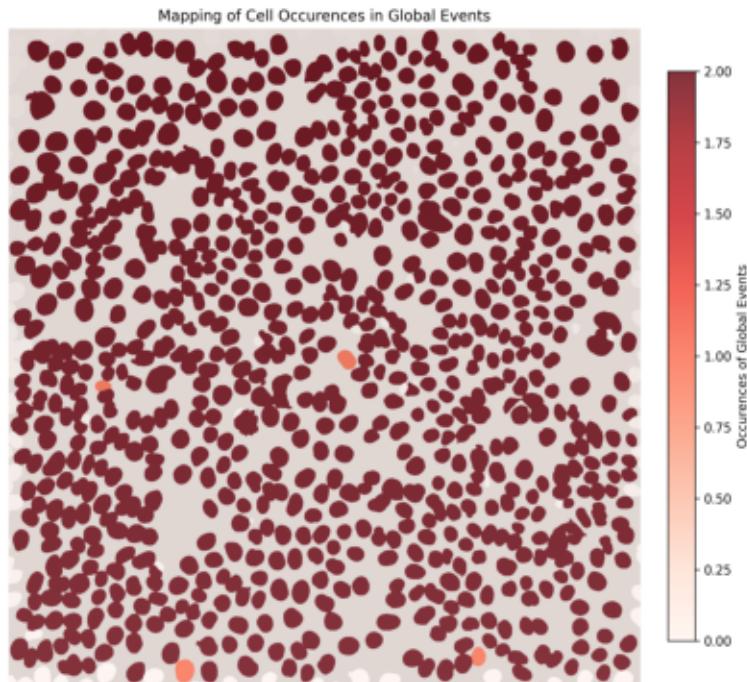
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

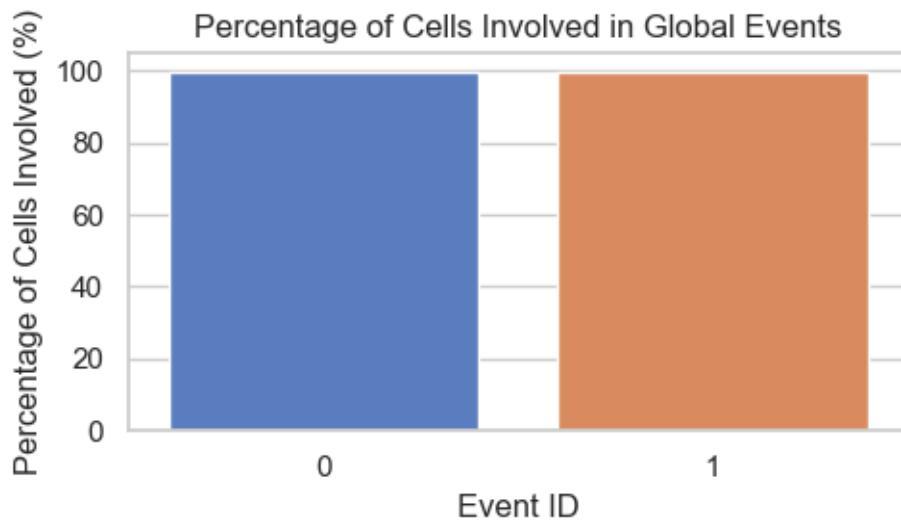
20250404_IS3



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



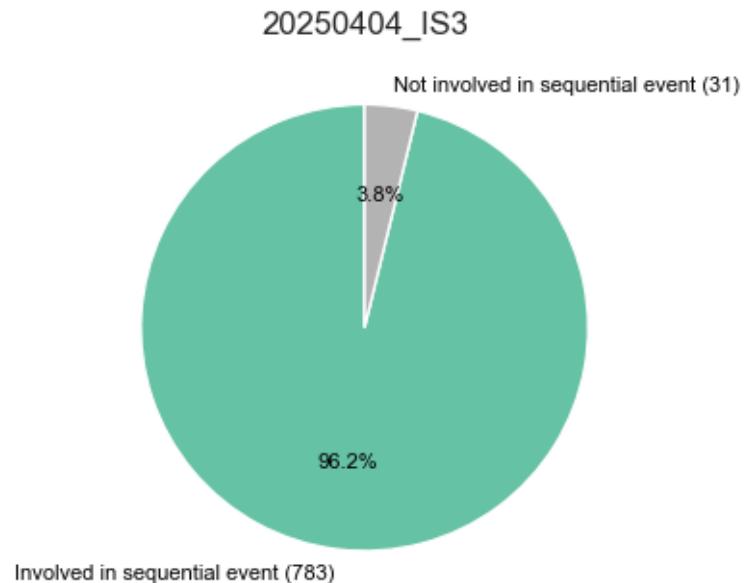
1.2.5 Inter-event interval analysis

Intervals between global event peaks: [831.0]

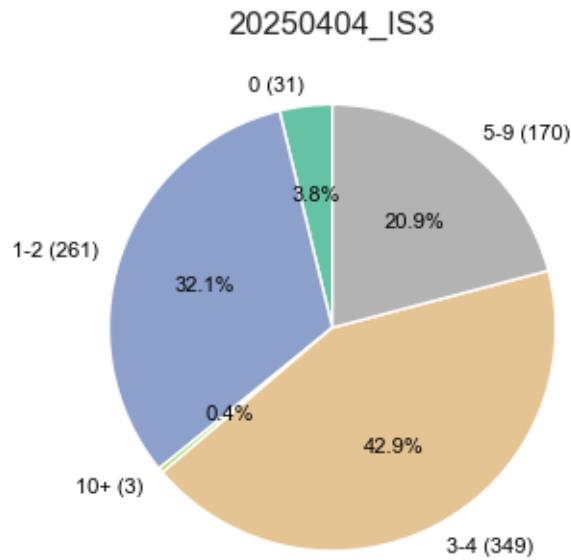
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

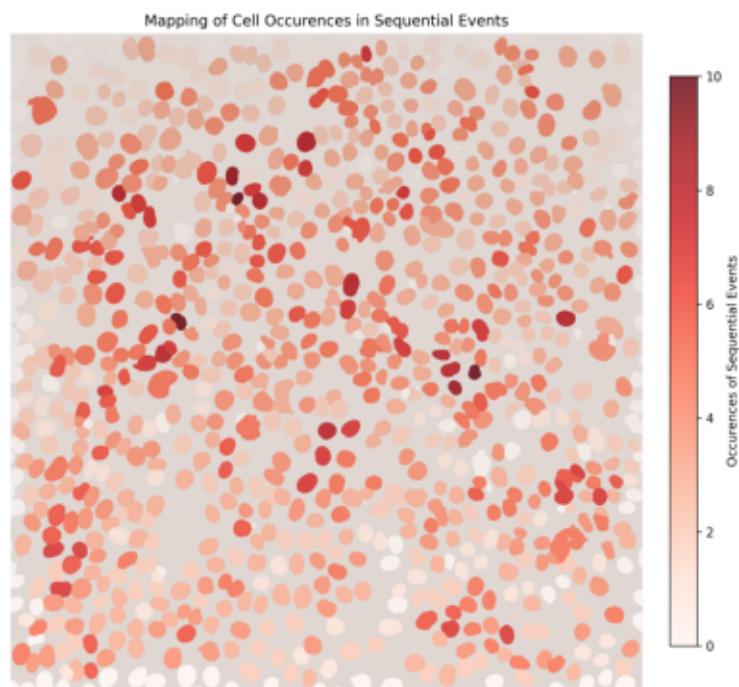


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

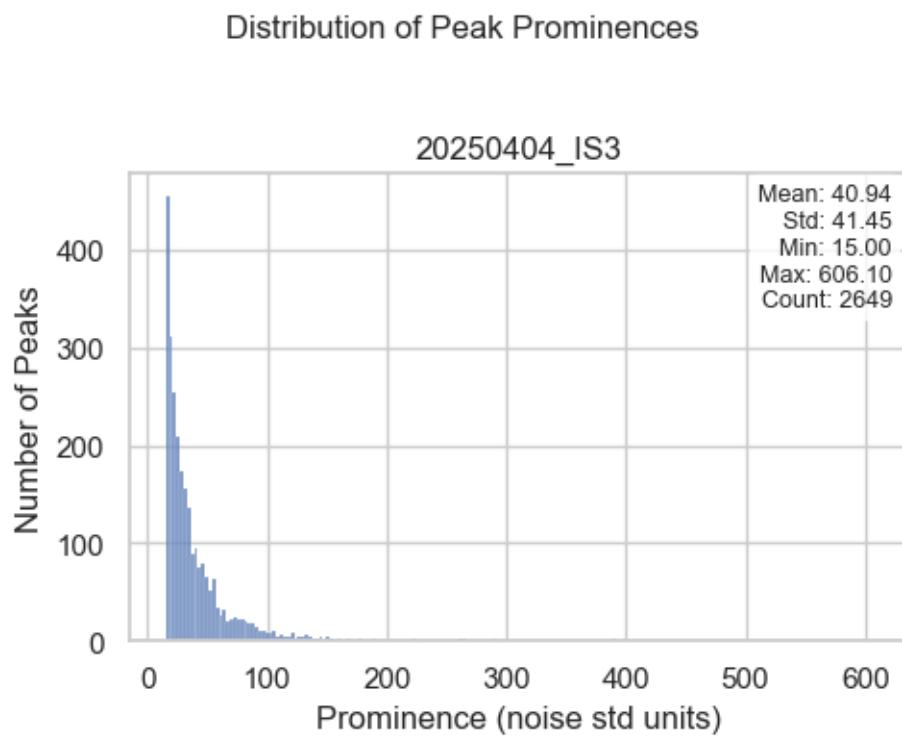
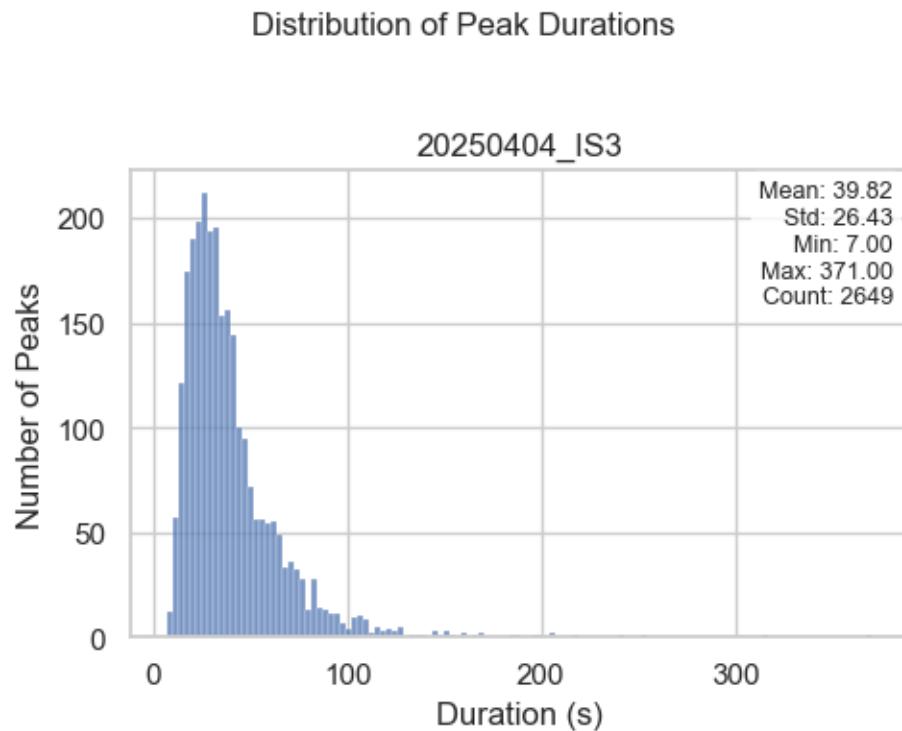


Cell Mapping with Occurrences in Sequential Events Overlay

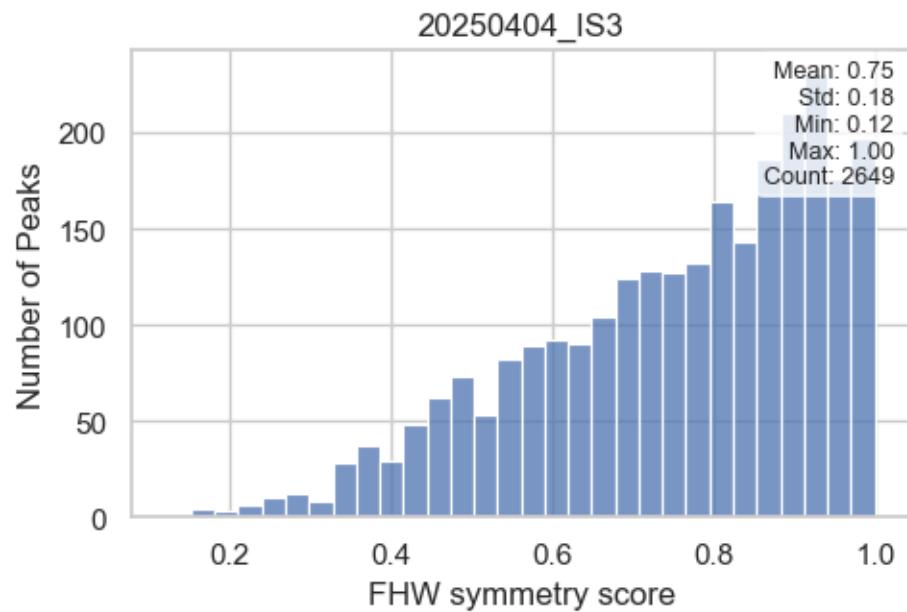
20250404_IS3



1.3.2 Peaks statistics in sequential events

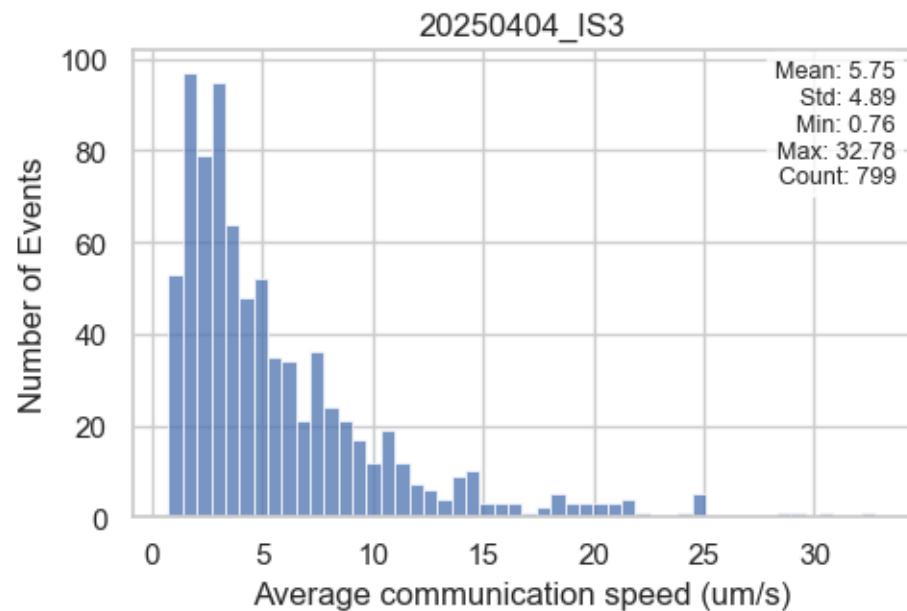


Distribution of Peak Symmetry Scores

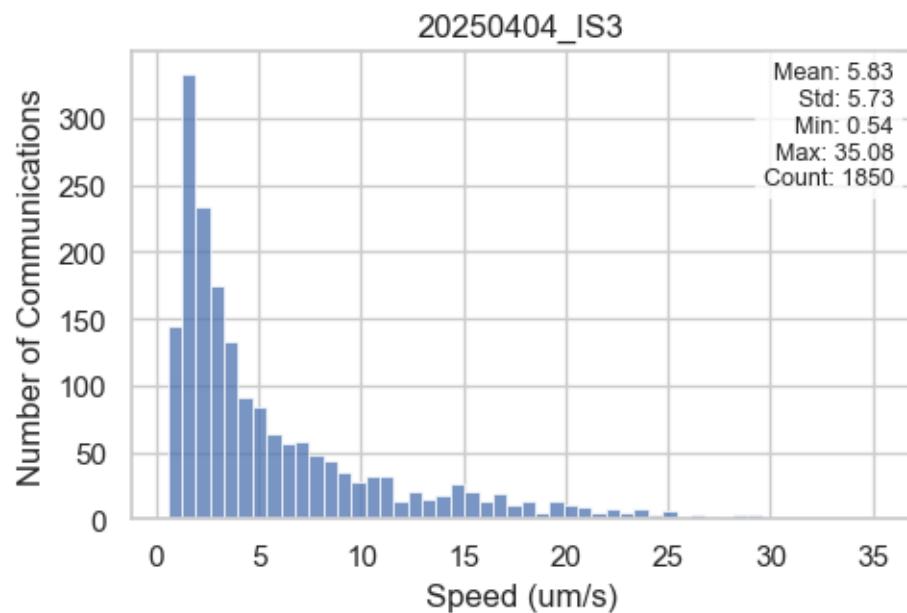


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

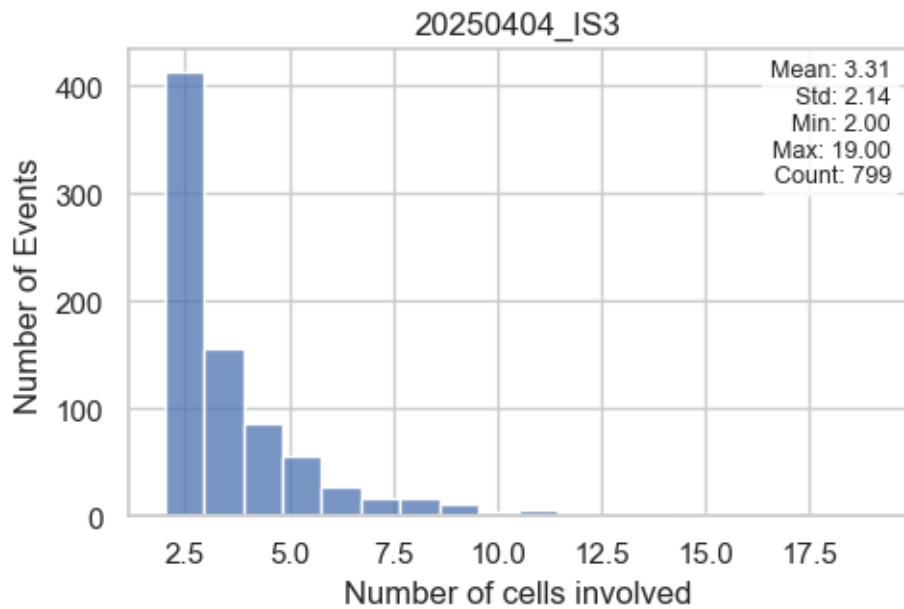


Distribution of Cell-Cell Communication Speeds



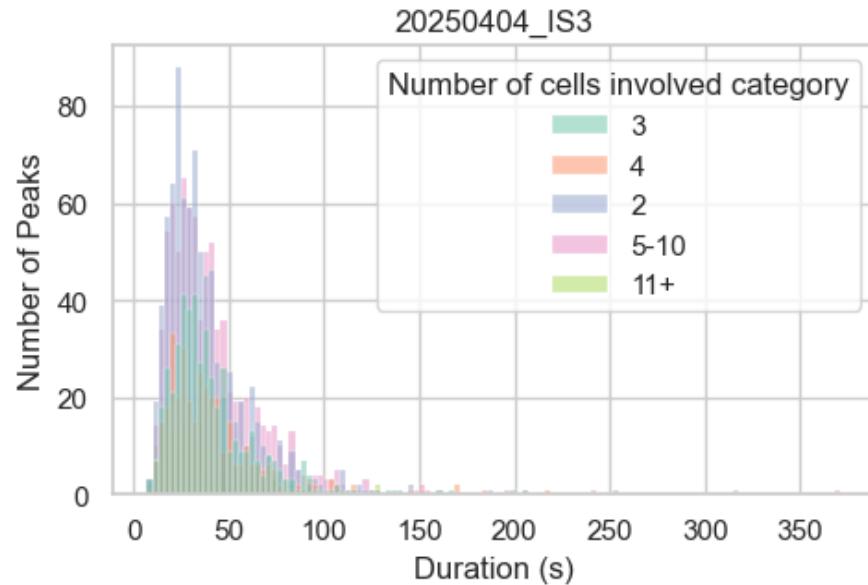
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

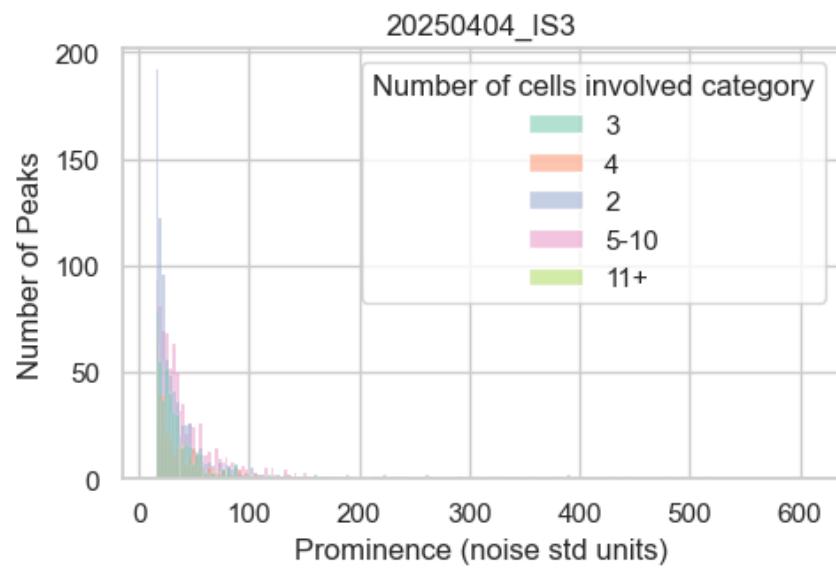


1.3.5 Influence of cell count per event on statistics

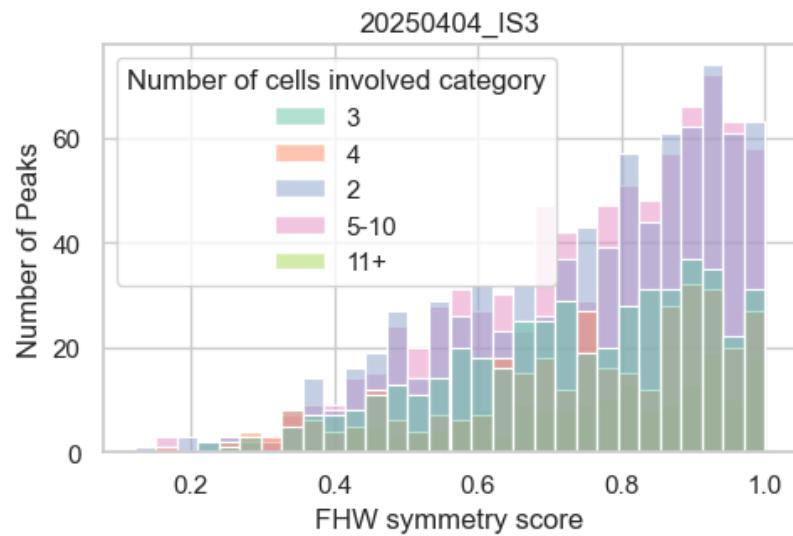
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



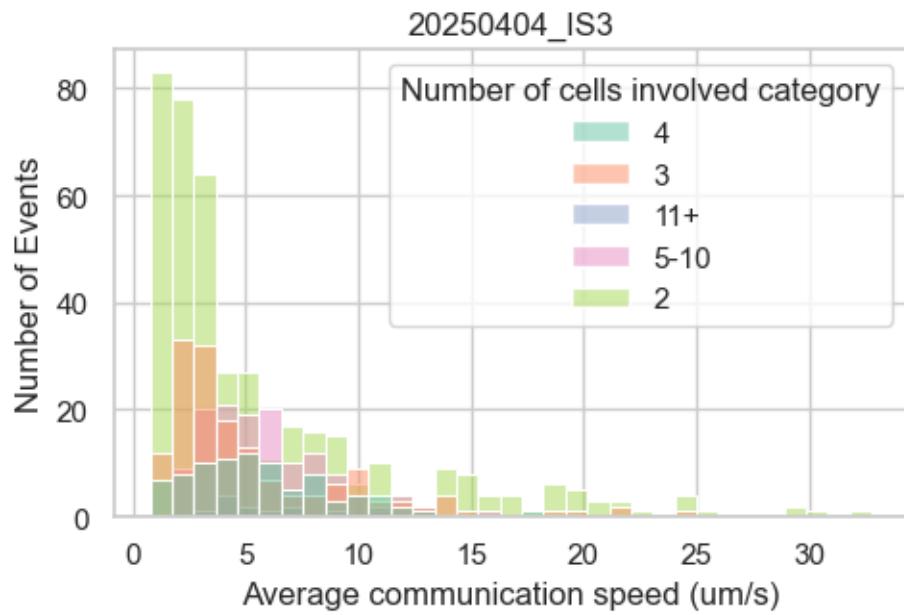
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



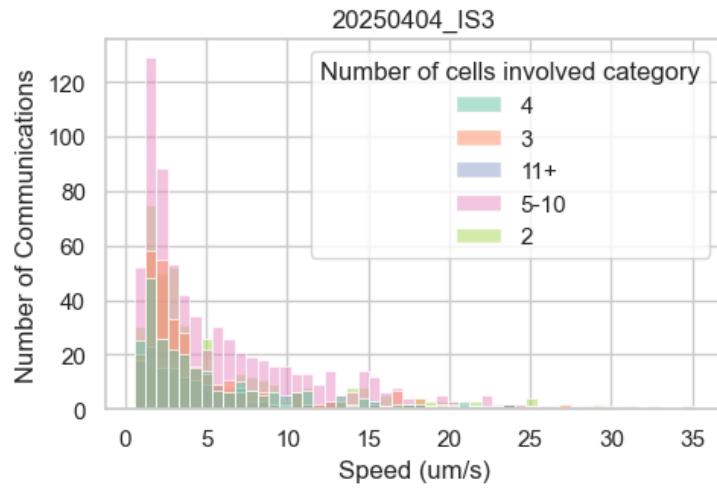
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

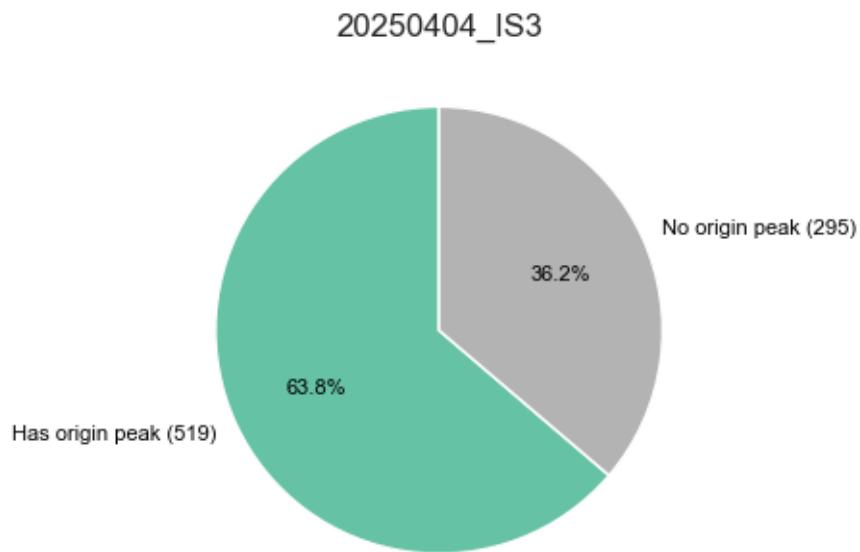


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

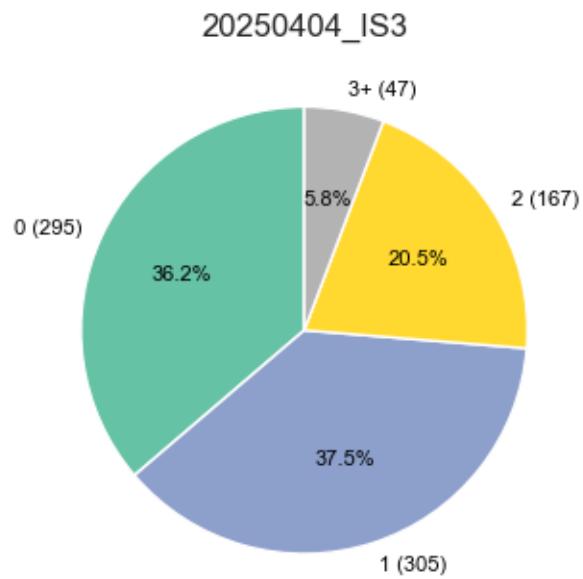


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

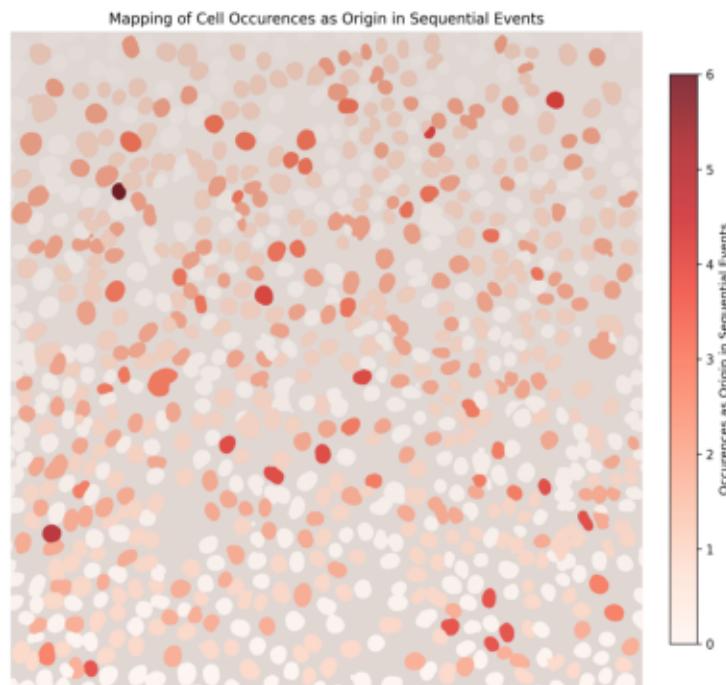


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

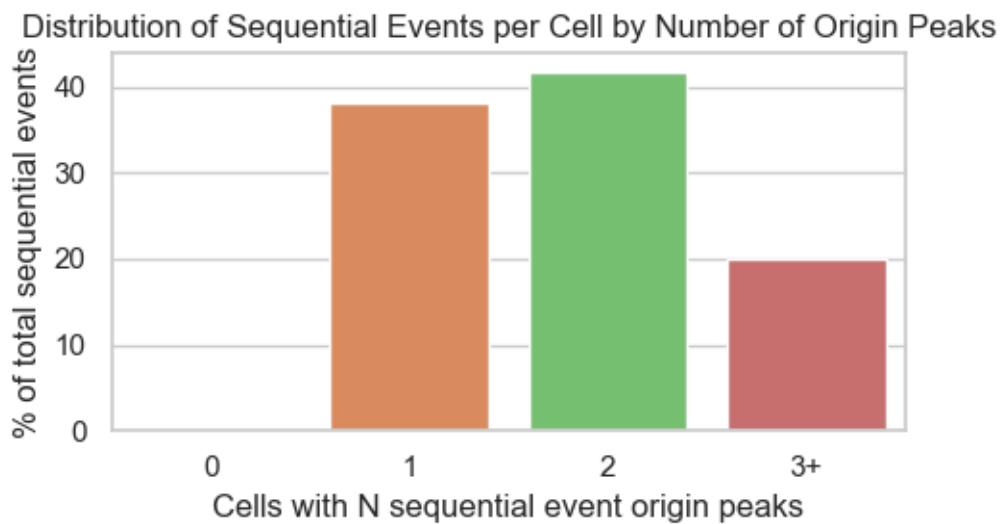
20250404_IS3



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

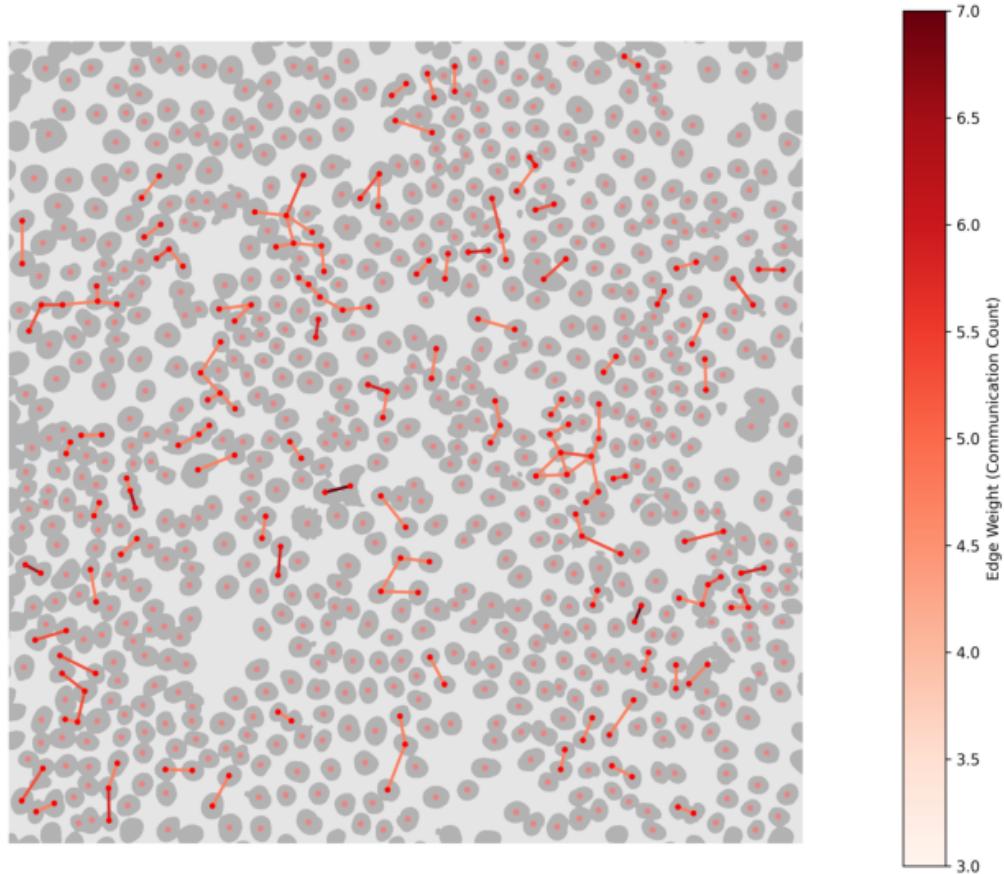


1.3.7 Connection network between cells

Cell Connection Network Graph

20250404_IS3

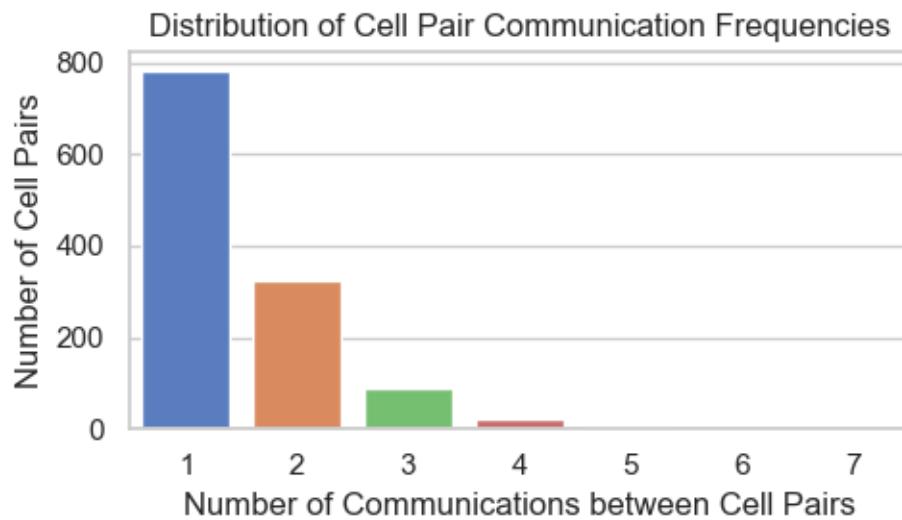
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

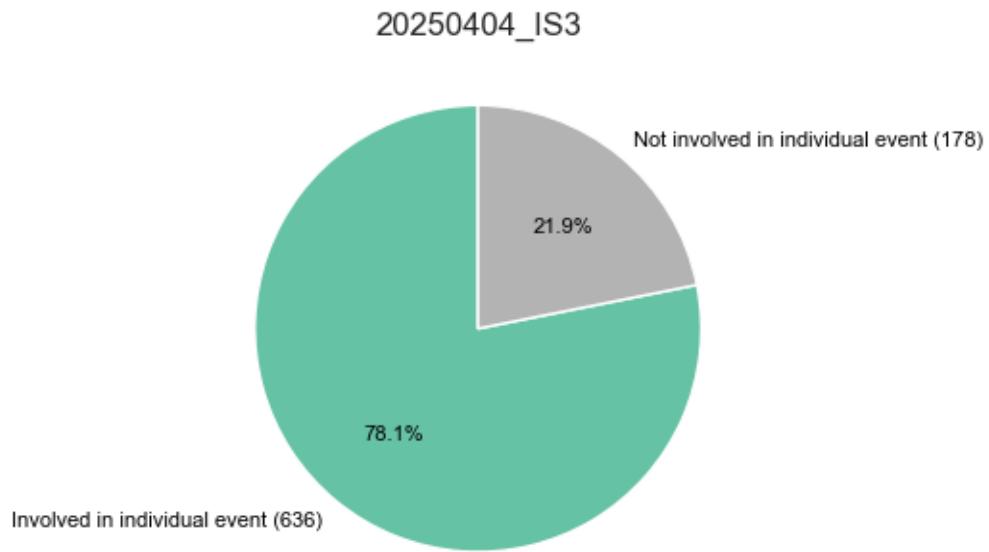
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



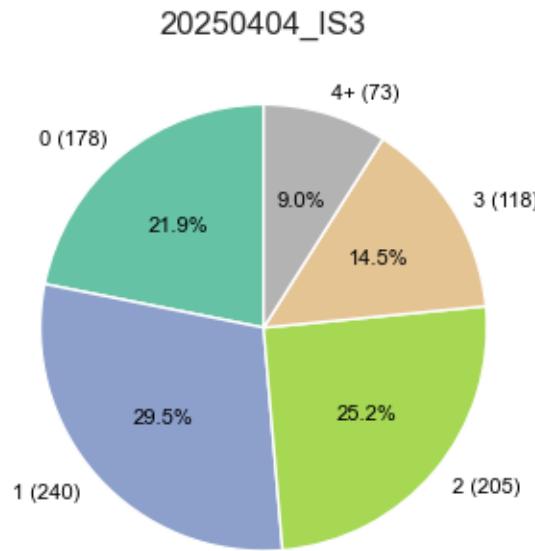
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

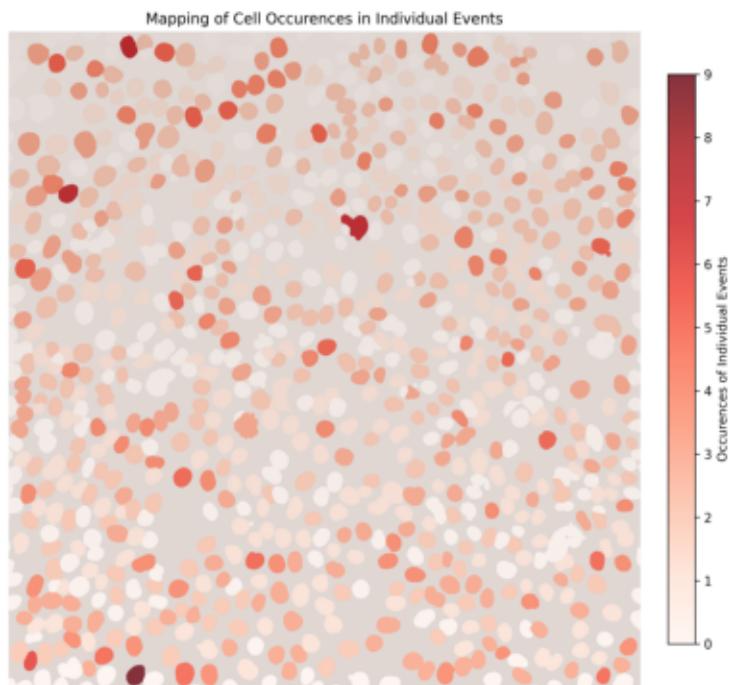


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)

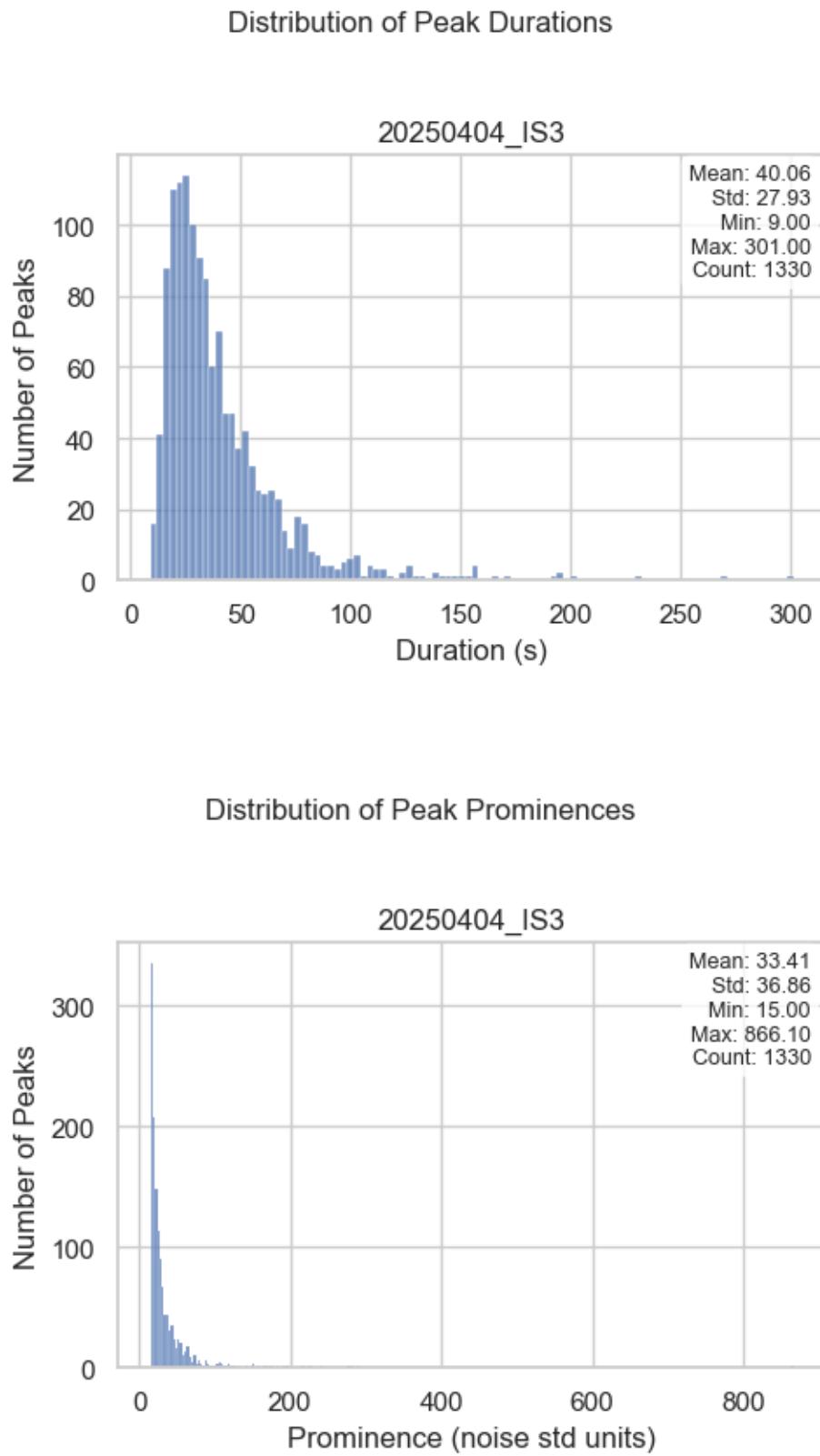


Cell Mapping with Occurrences in Individual Events Overlay

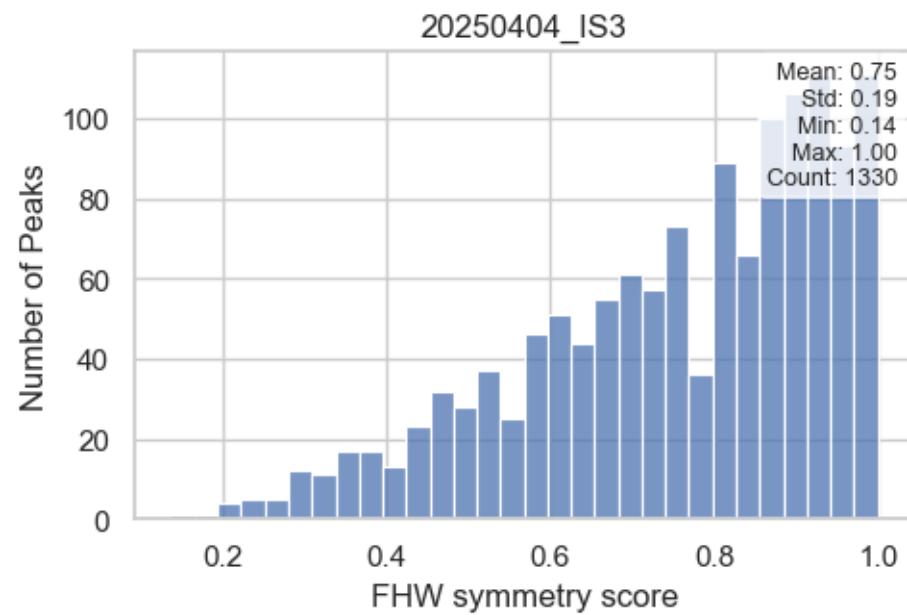
20250404_IS3



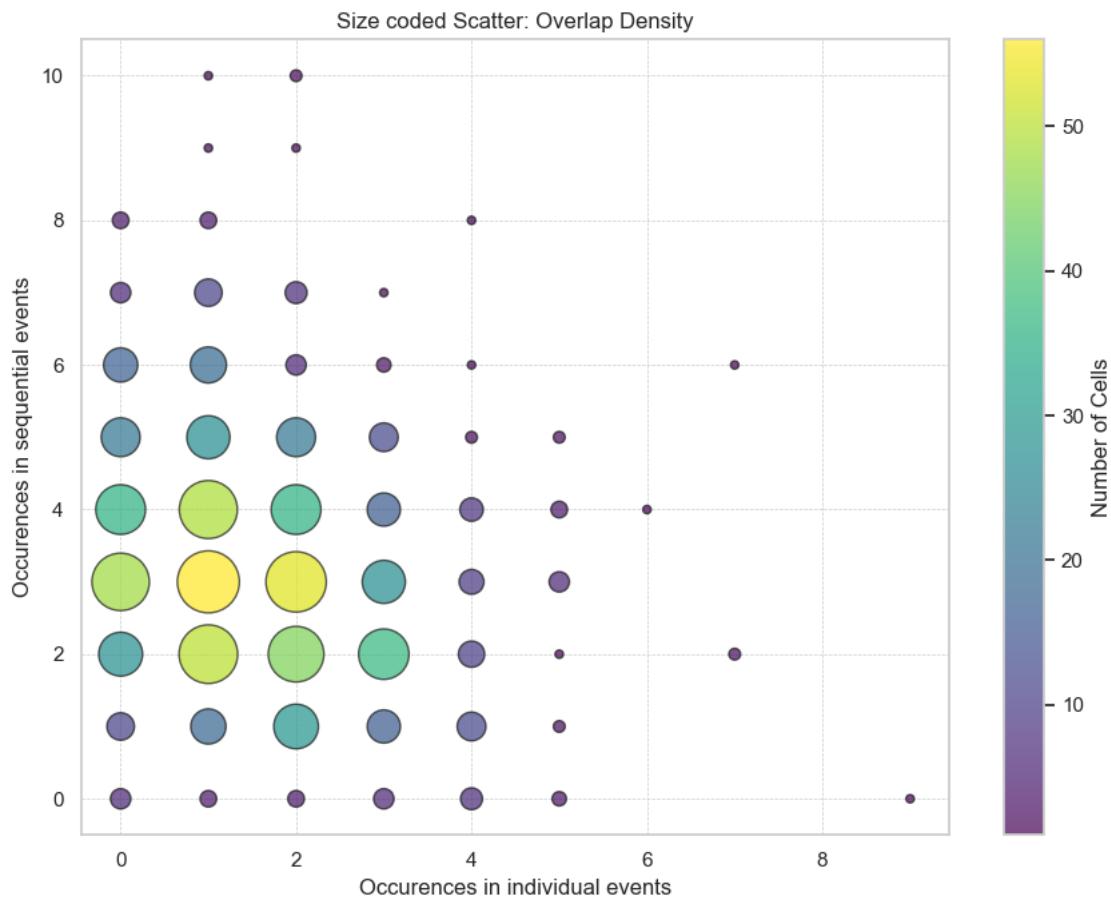
1.4.2 Peaks statistics in individual events



Distribution of Peak Symmetry Scores

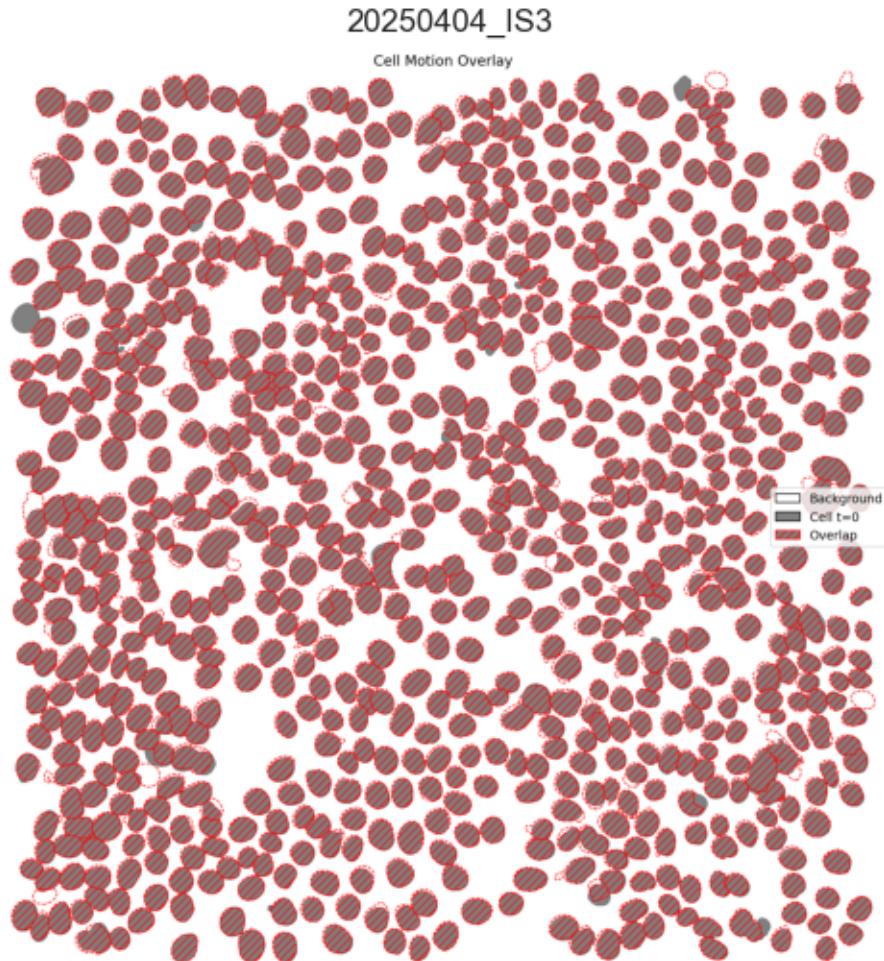


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 814
- Hoechst image taken at t=1801: 812
- Number of cells difference: absolute 2, relative 0.25%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 1056876
- Pixels segmented as cell at t=1801: 1081782
- Overlapping pixels between t=0 and t=1801: 988607 (92.45% of total)
- Pixels exclusive to t=0: 68269 (6.46% of total)
- Pixels exclusive to t=1801: 93175 (8.61% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

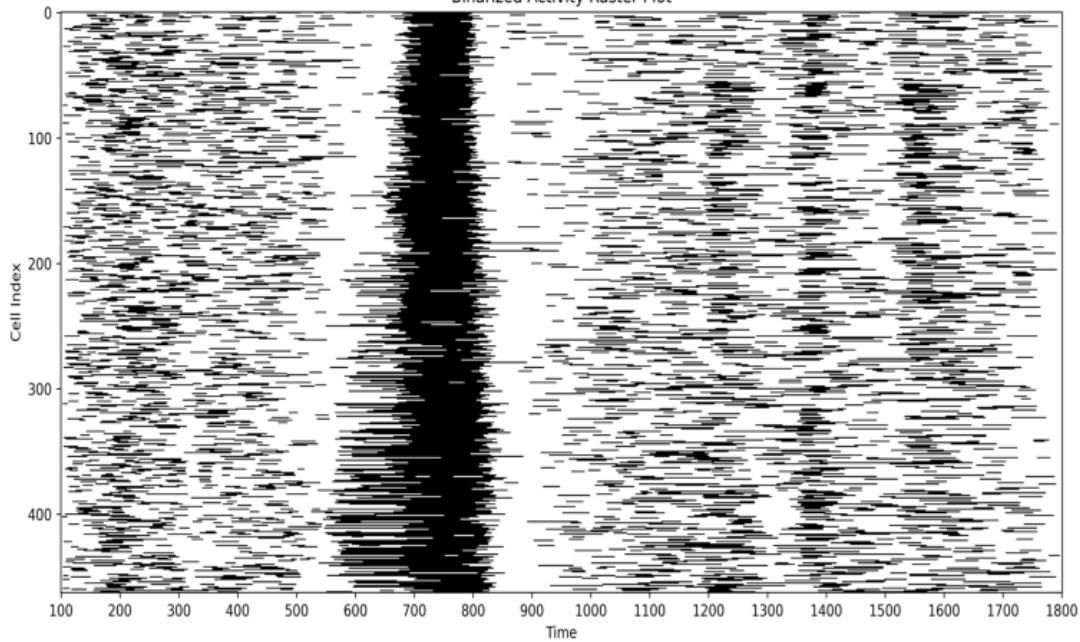
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

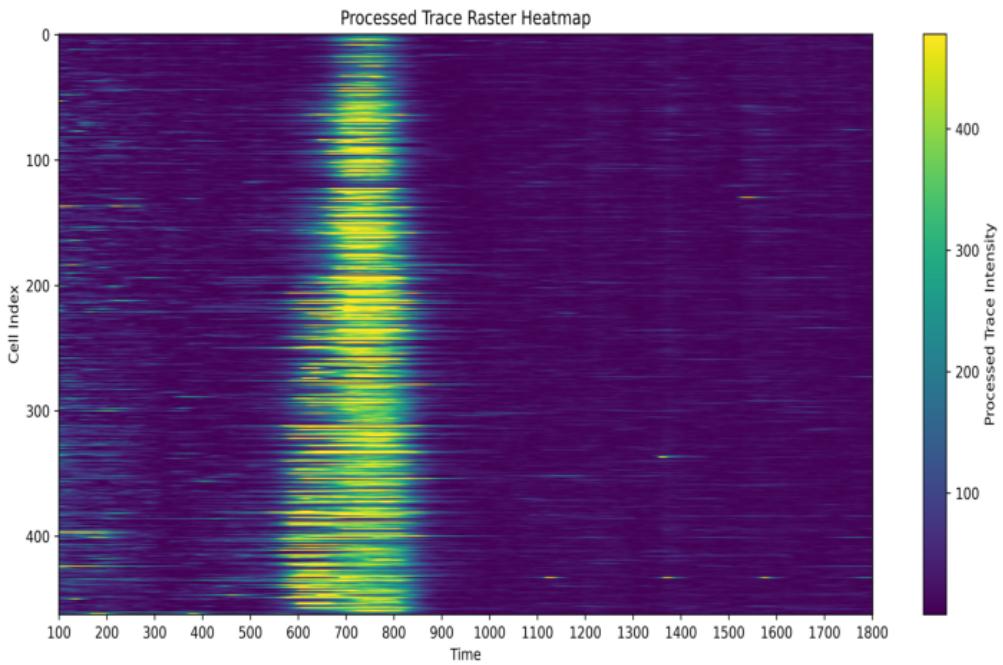
20250409_IS01

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250409_IS01



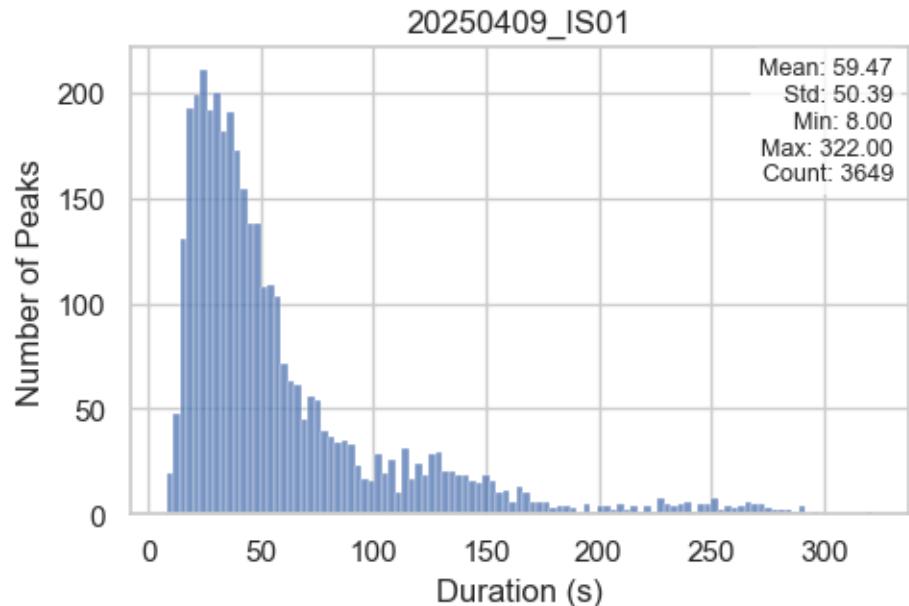
1.1.2 Peaks population

Total number of peaks: 3649

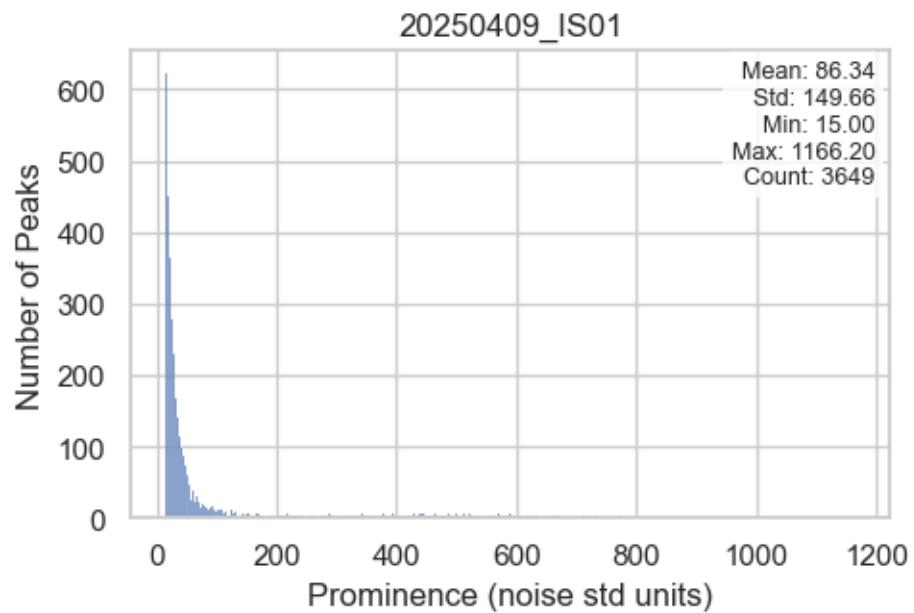
Total number of cells: 463

1.1.3 Peaks statistics

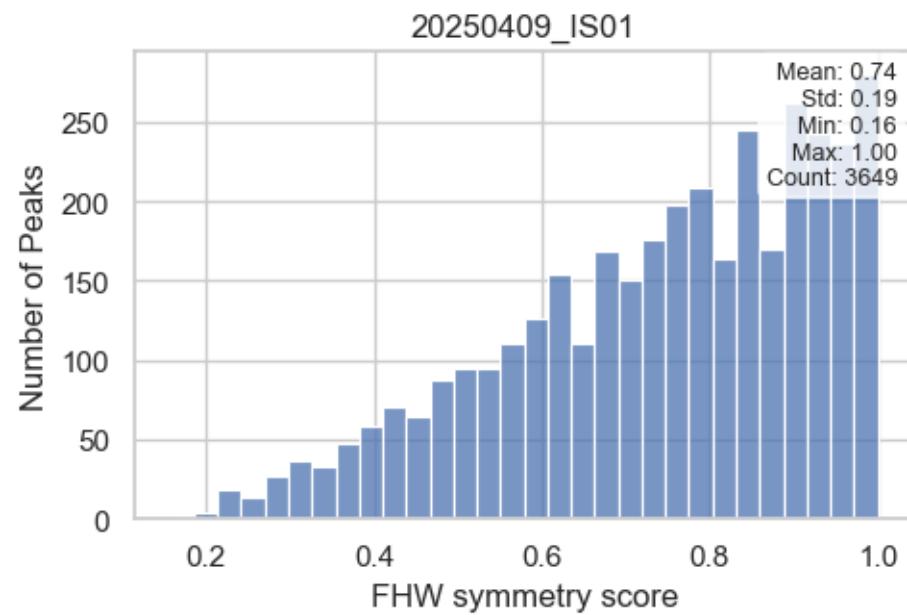
Distribution of Peak Durations



Distribution of Peak Prominences

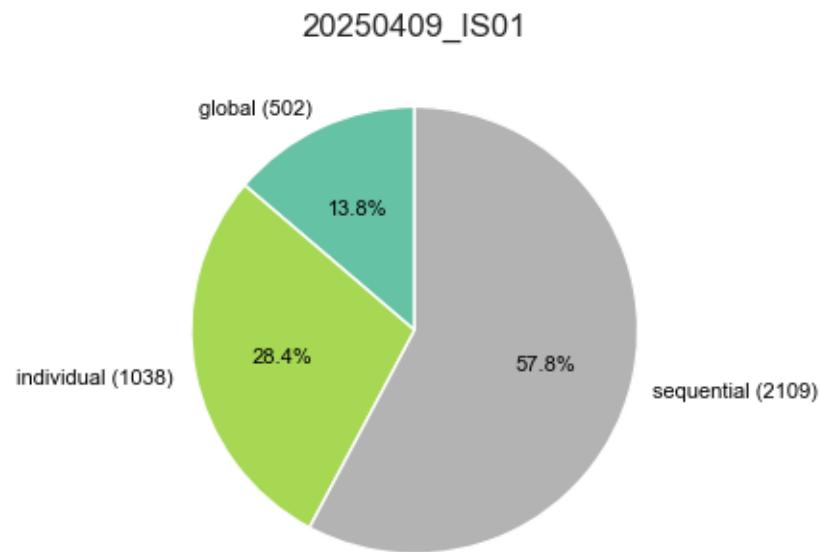


Distribution of Peak Symmetry Scores



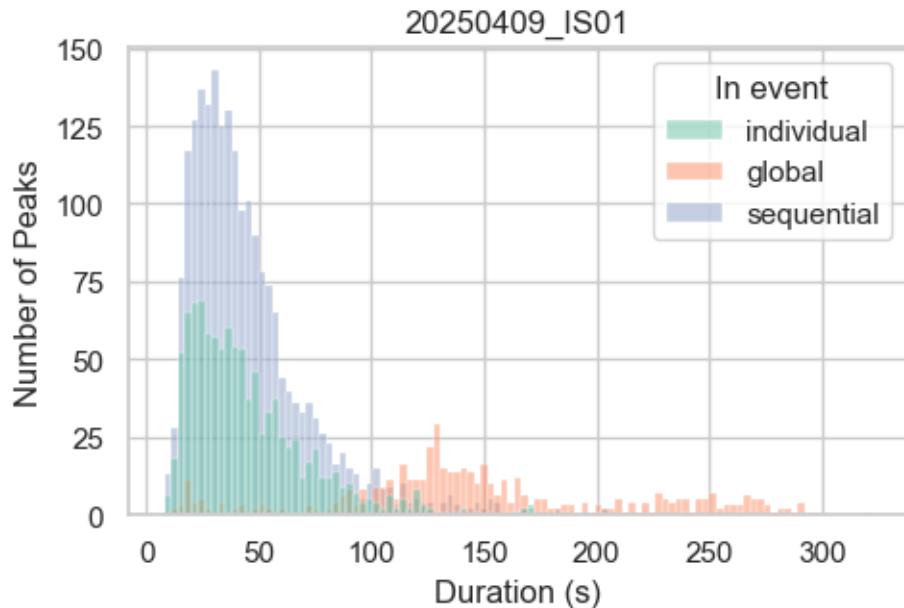
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

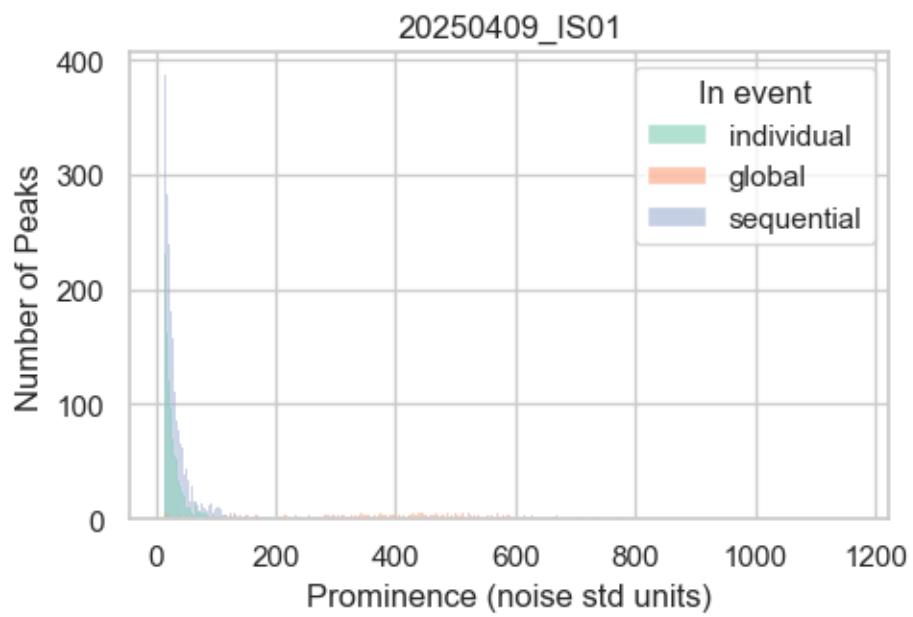


1.1.5 Peaks statistics per event types

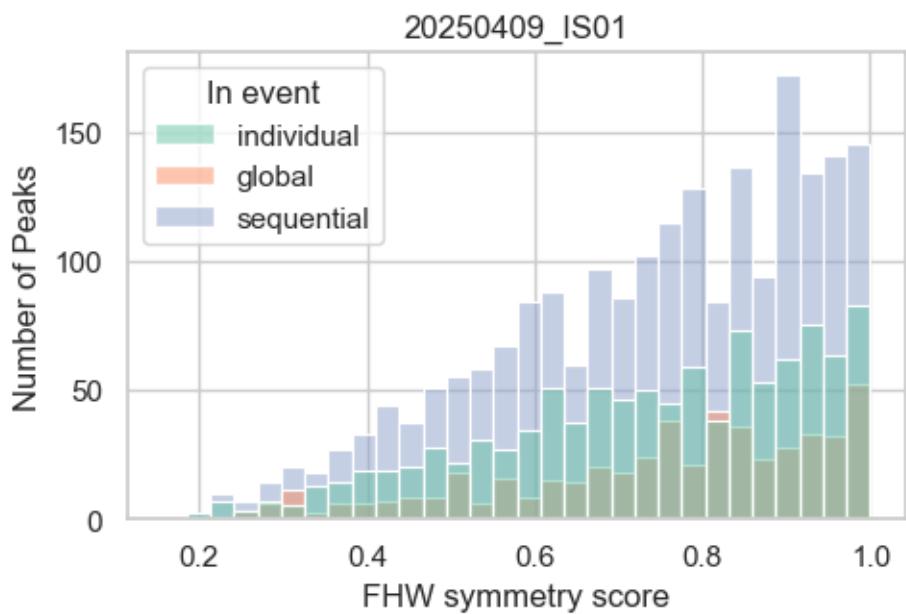
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

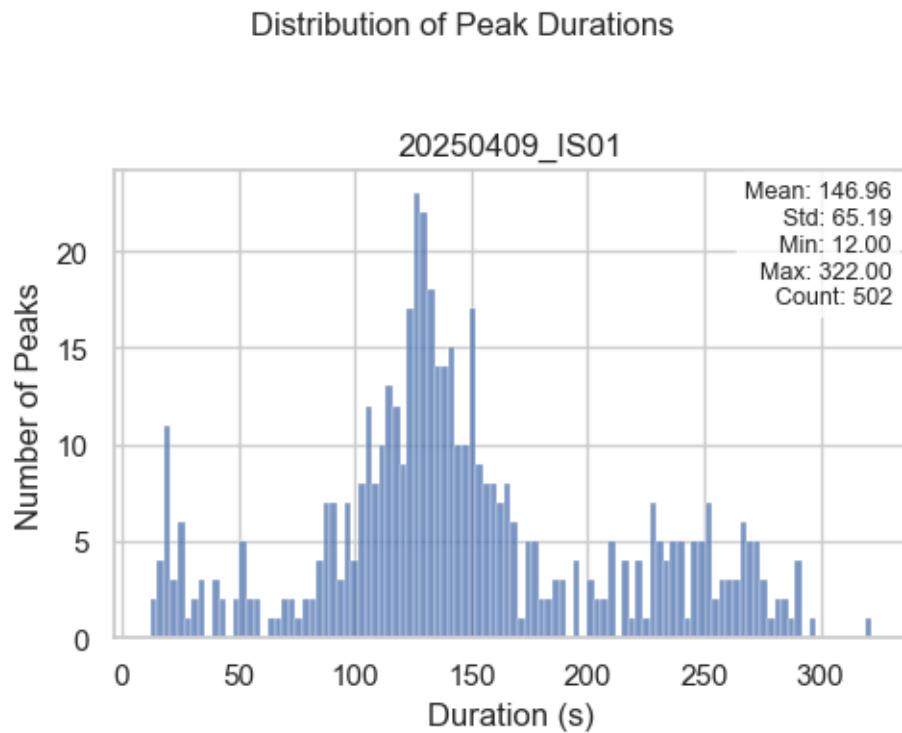


Distribution of Peak Symmetry Scores by Group

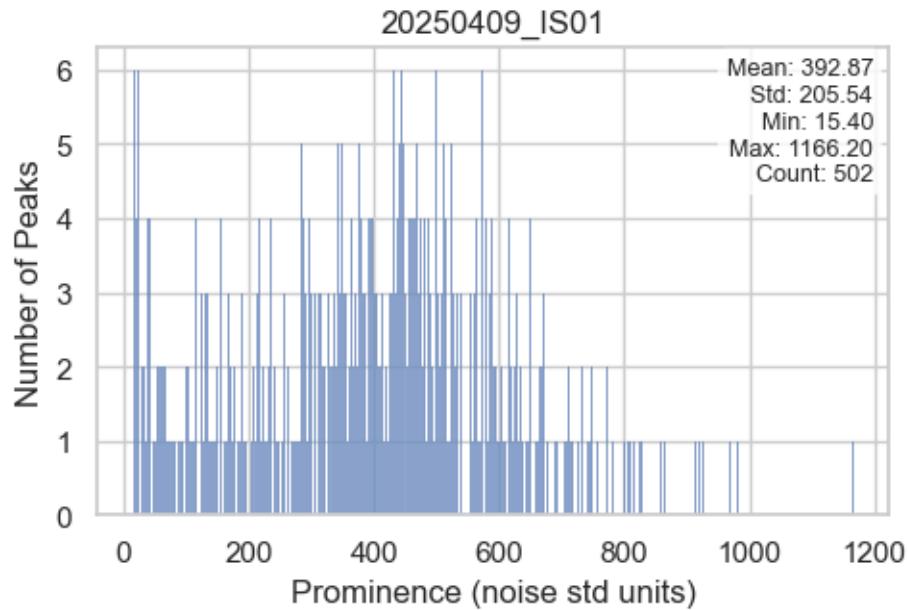


1.2 GLOBAL EVENTS

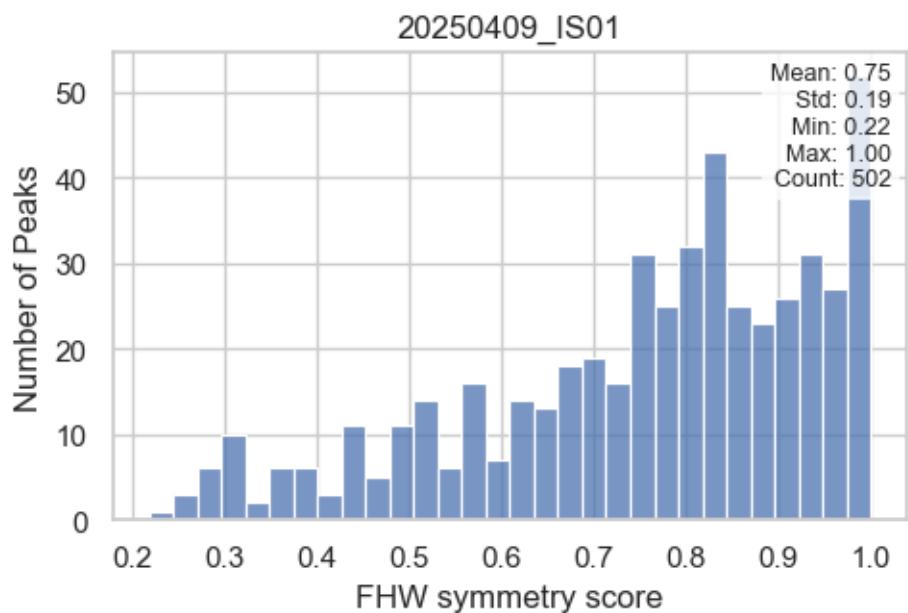
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

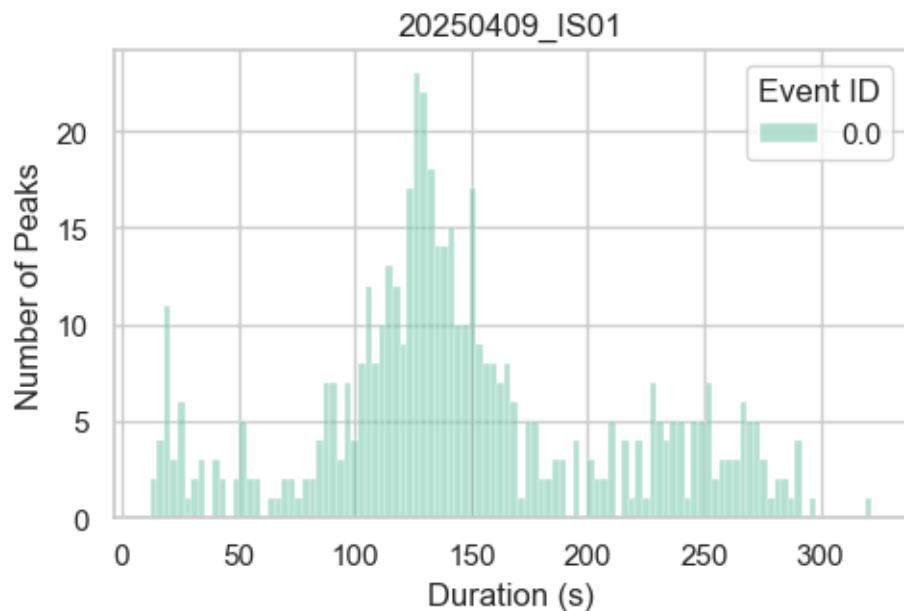


Distribution of Peak Symmetry Scores

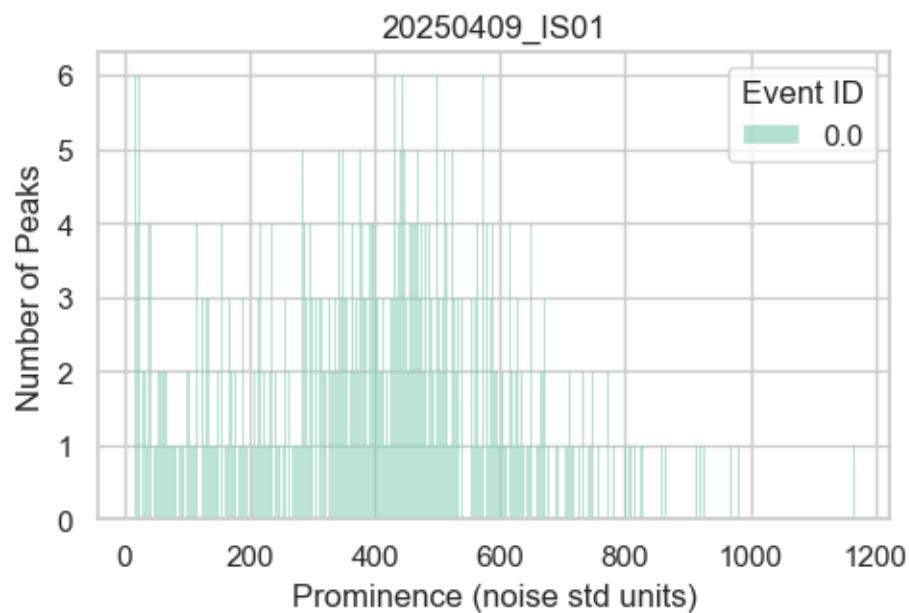


1.2.2 Peak statistics in global event per event ID

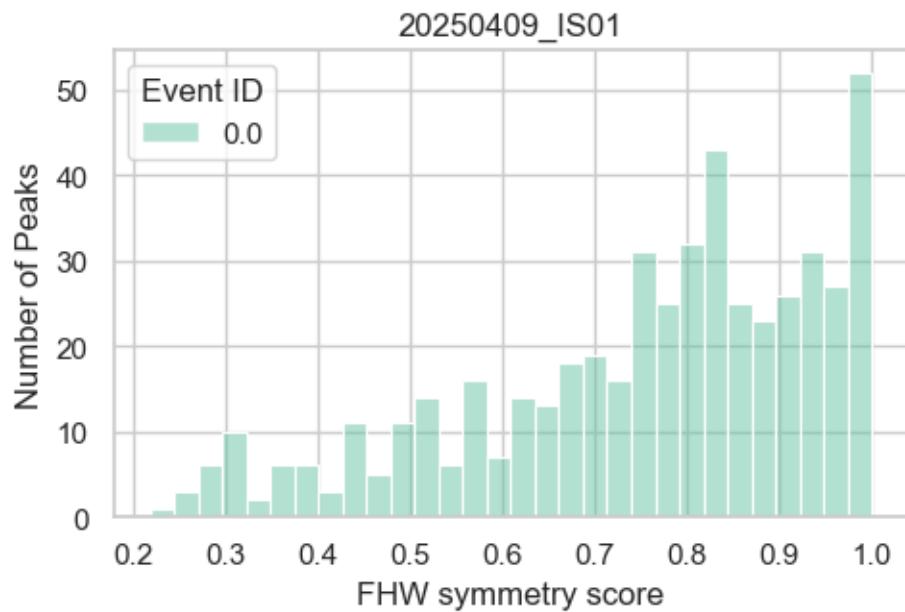
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



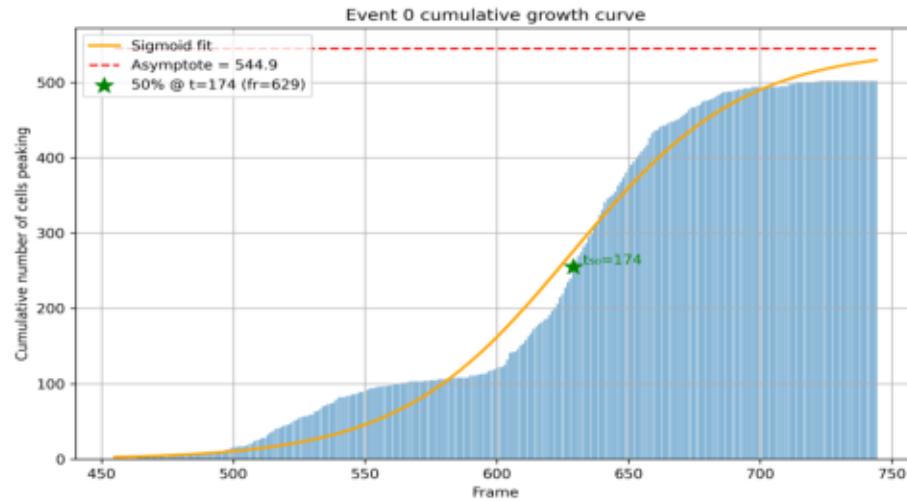
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

Event Activity Overlay (Event ID: 0)

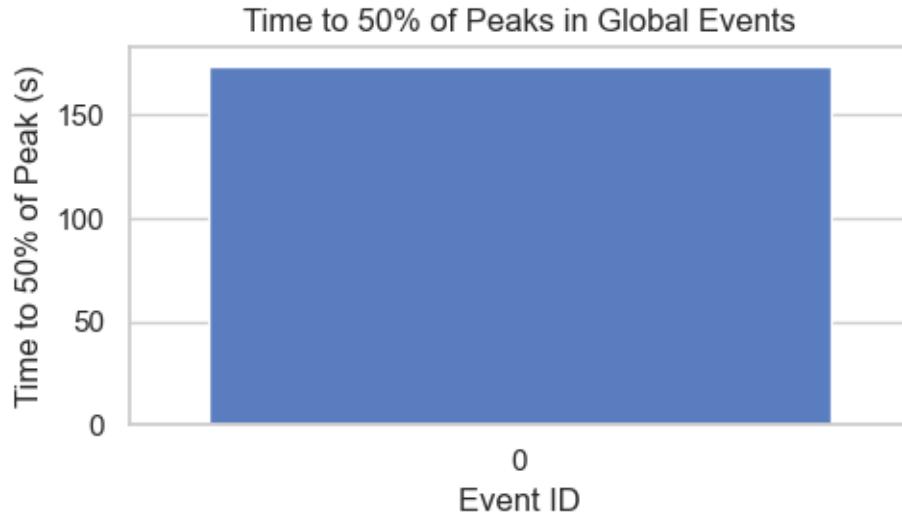
20250409_IS01



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

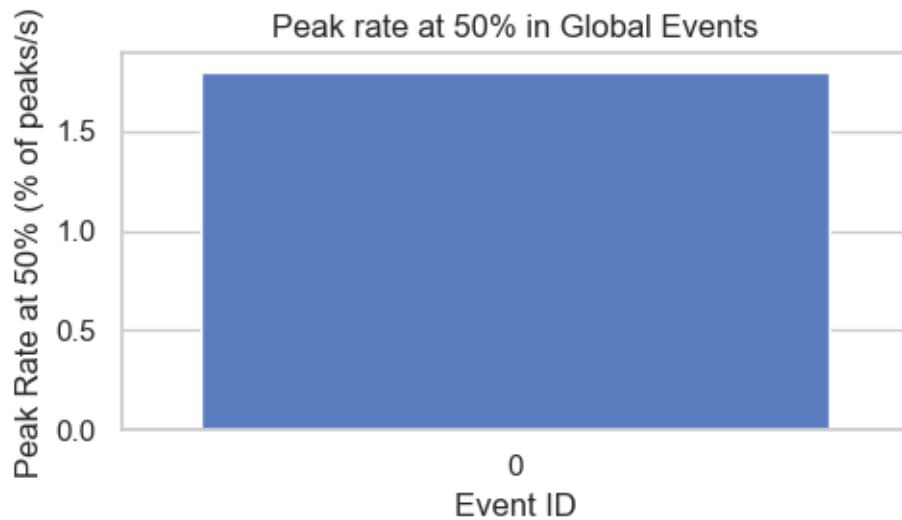
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys
is\visualizers.py:257: FutureWarning:
```

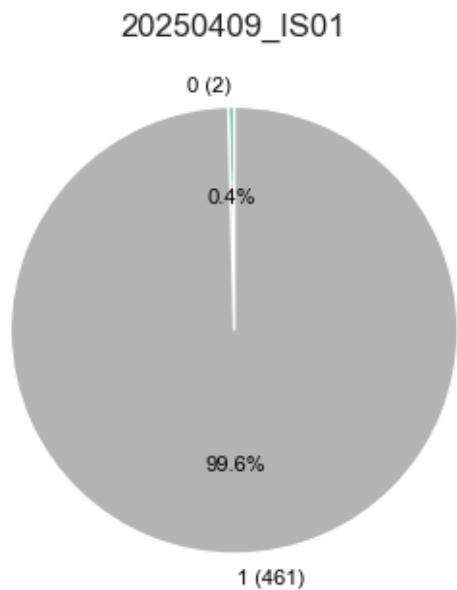
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



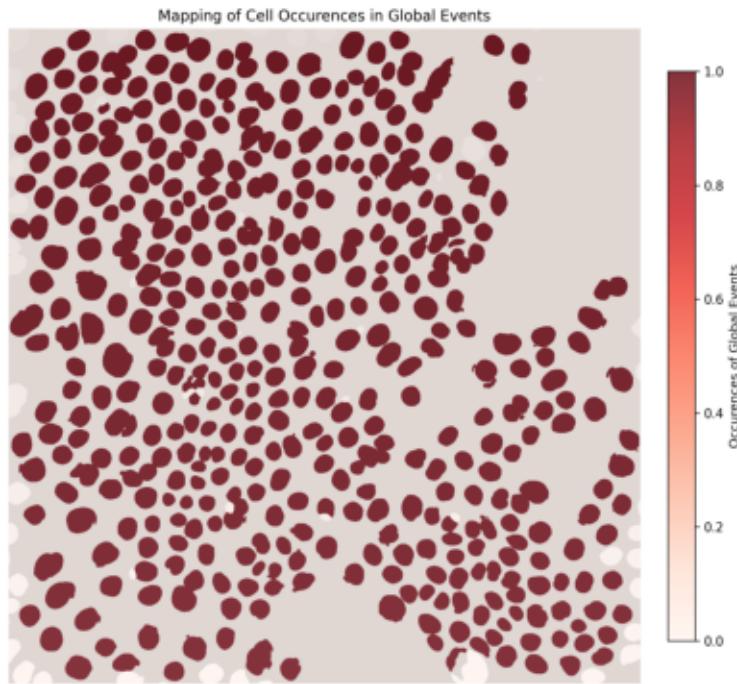
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

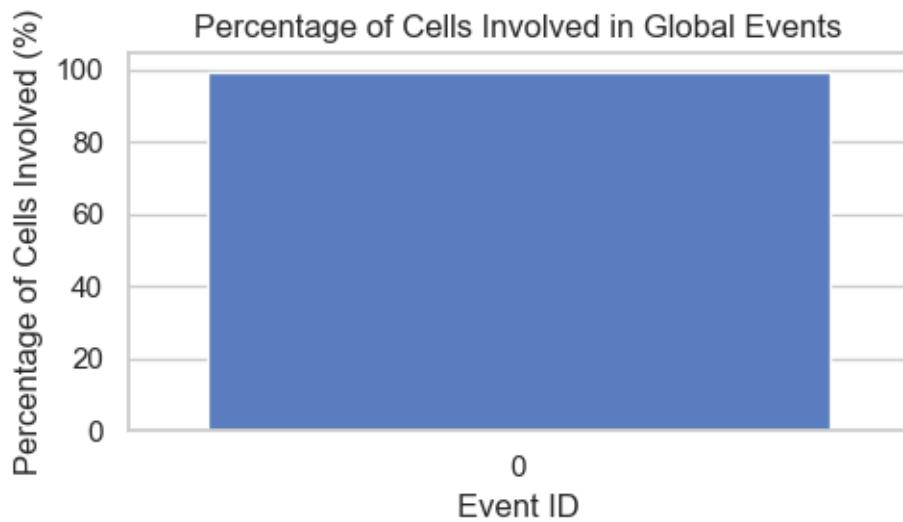
20250409_IS01



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



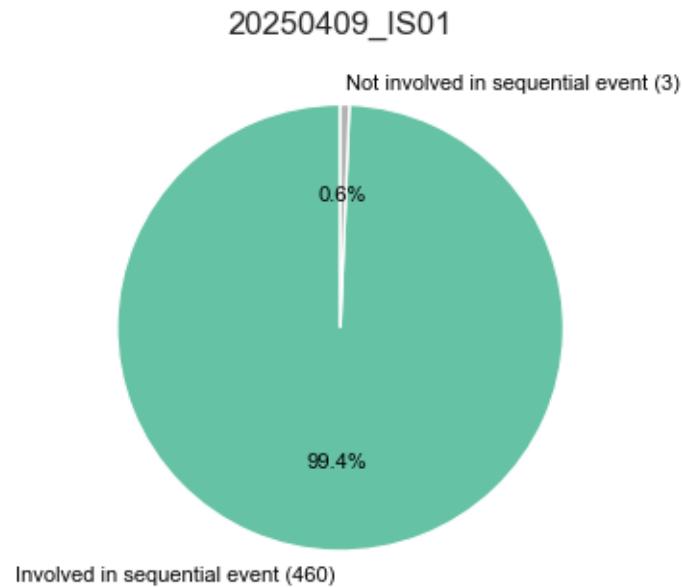
1.2.5 Inter-event interval analysis

Intervals between global event peaks: []

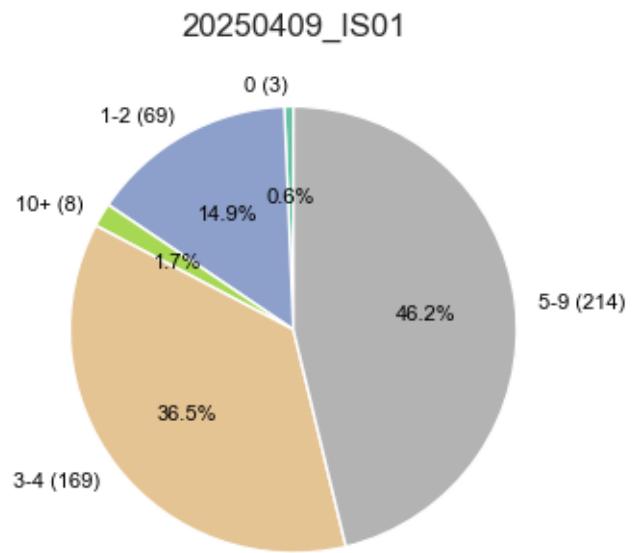
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequential events

Distribution of Cells Involved in Sequential Events

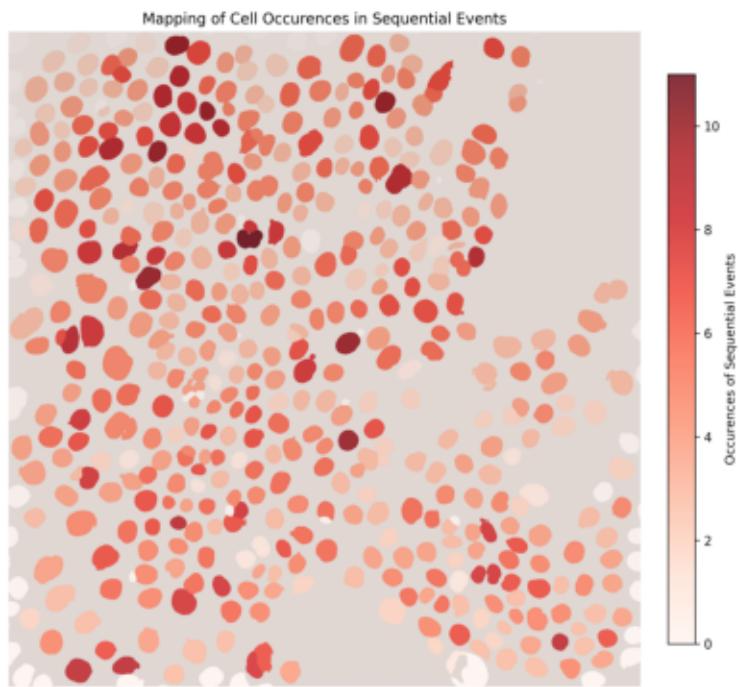


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

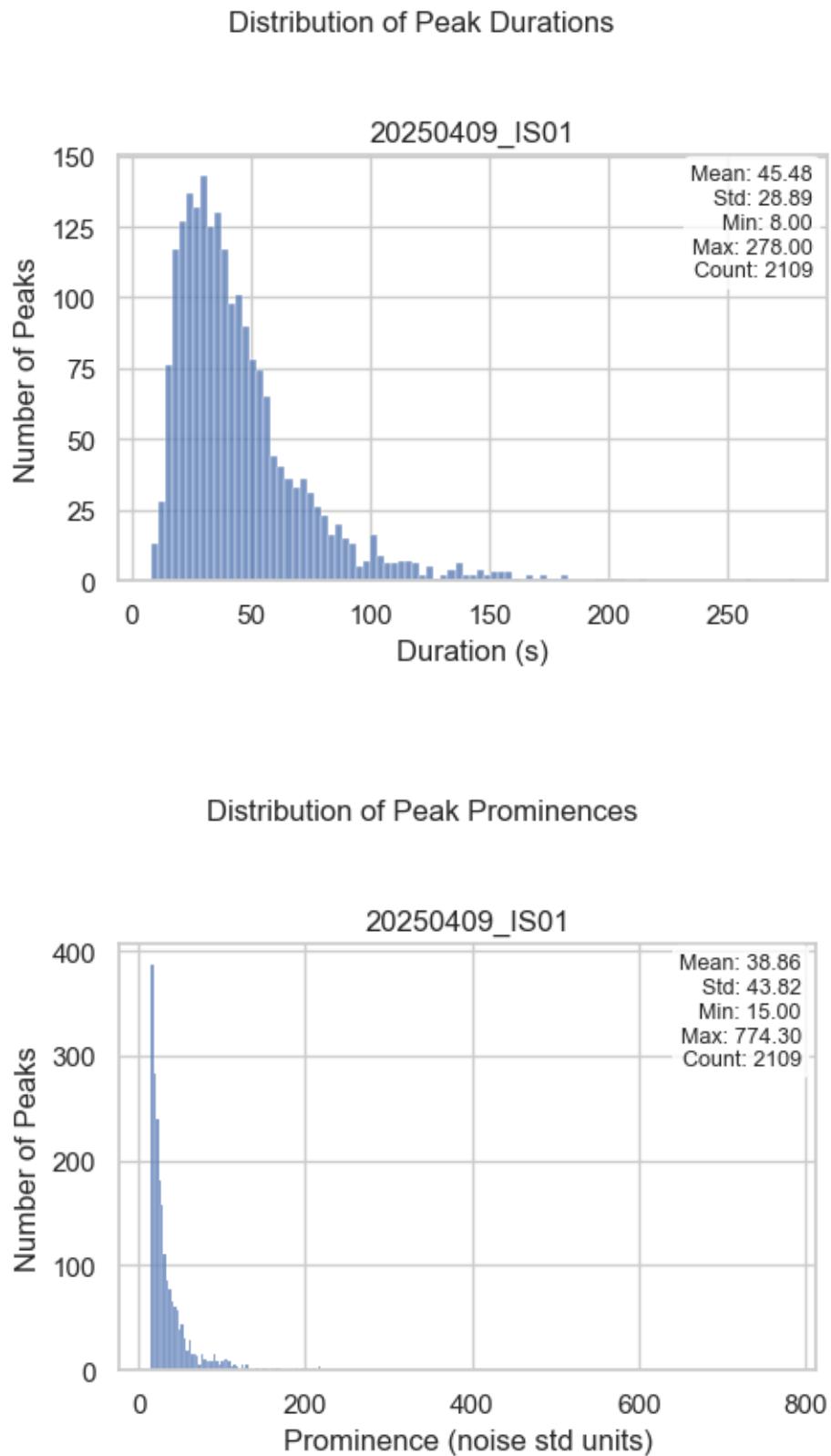


Cell Mapping with Occurrences in Sequential Events Overlay

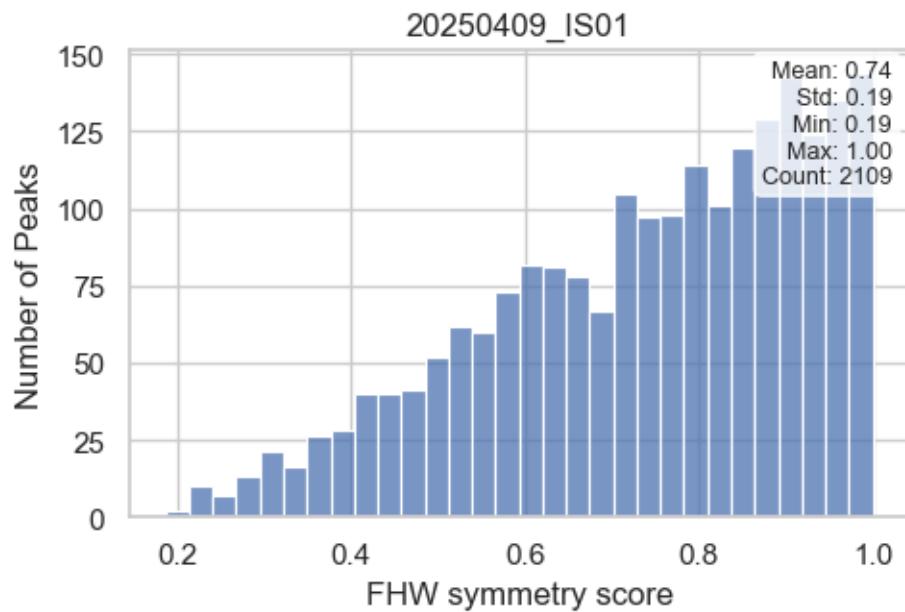
20250409_IS01



1.3.2 Peaks statistics in sequential events

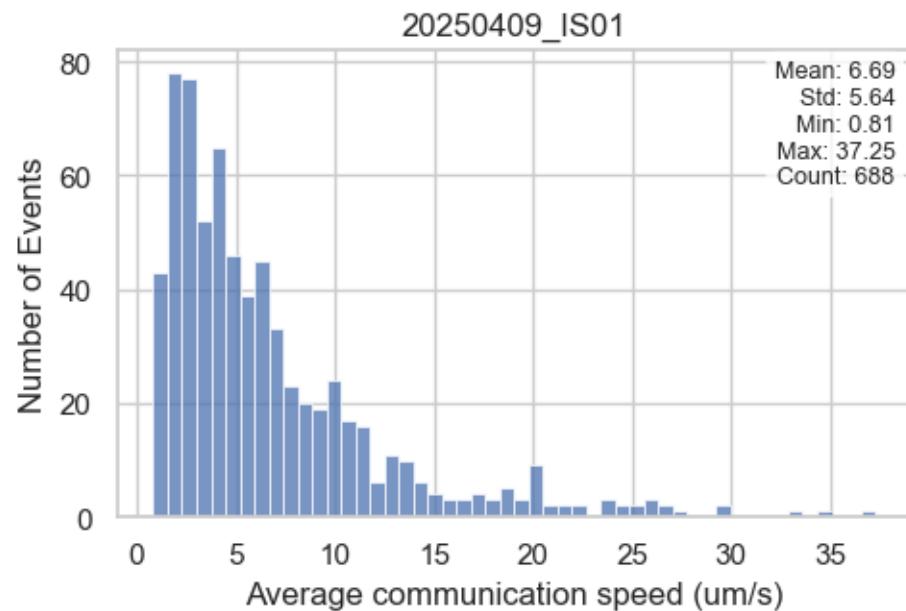


Distribution of Peak Symmetry Scores

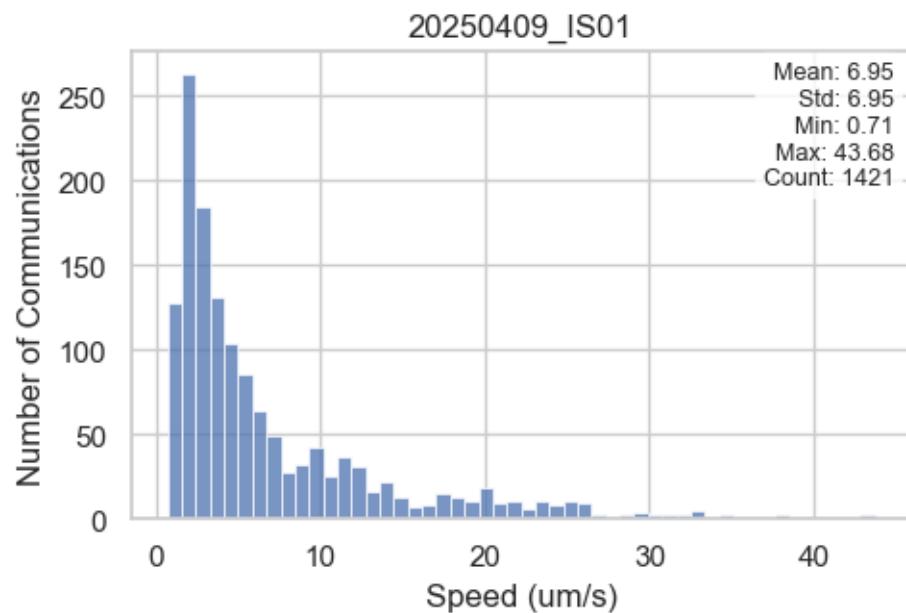


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

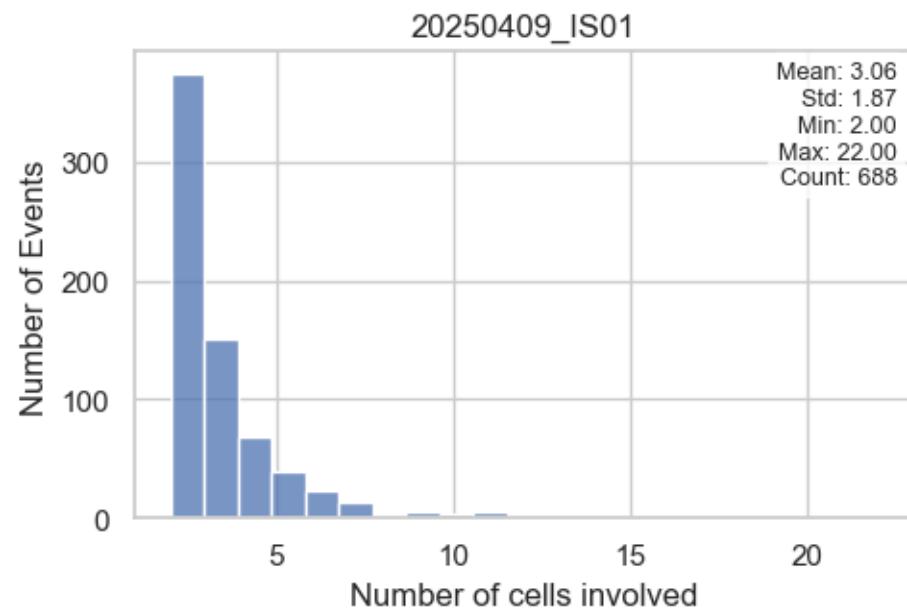


Distribution of Cell-Cell Communication Speeds



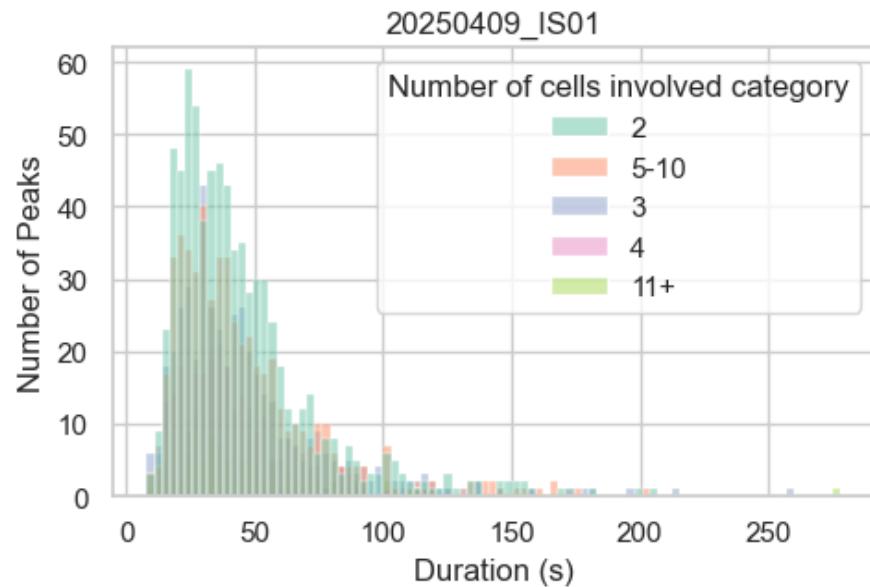
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

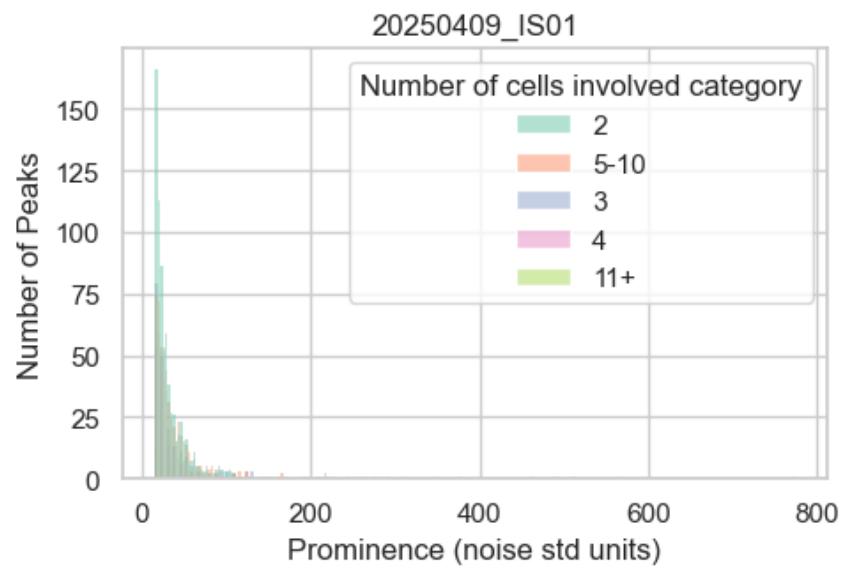


1.3.5 Influence of cell count per event on statistics

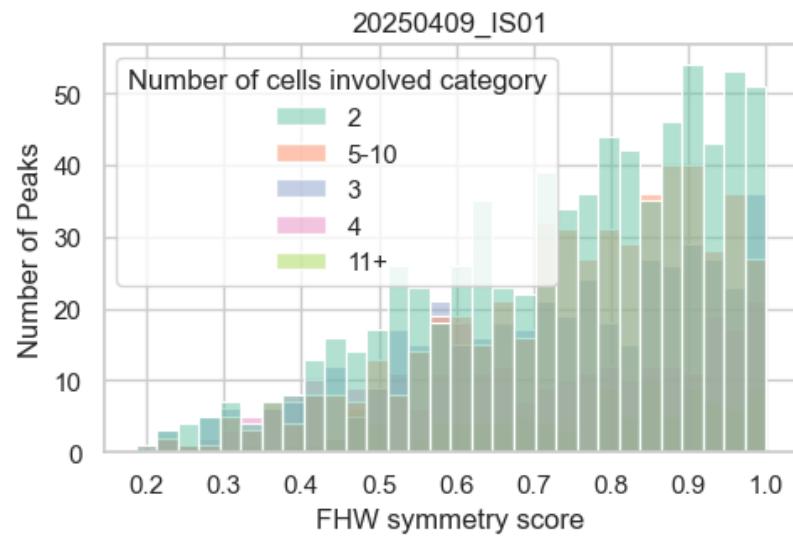
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



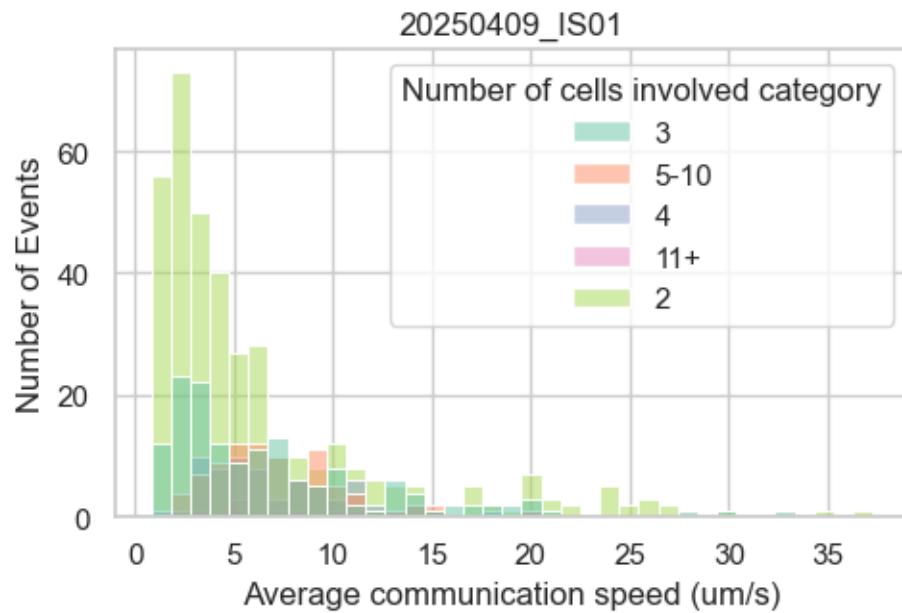
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



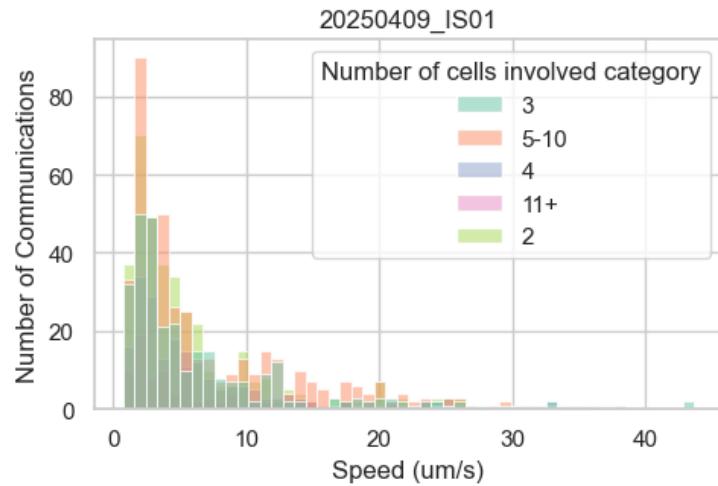
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

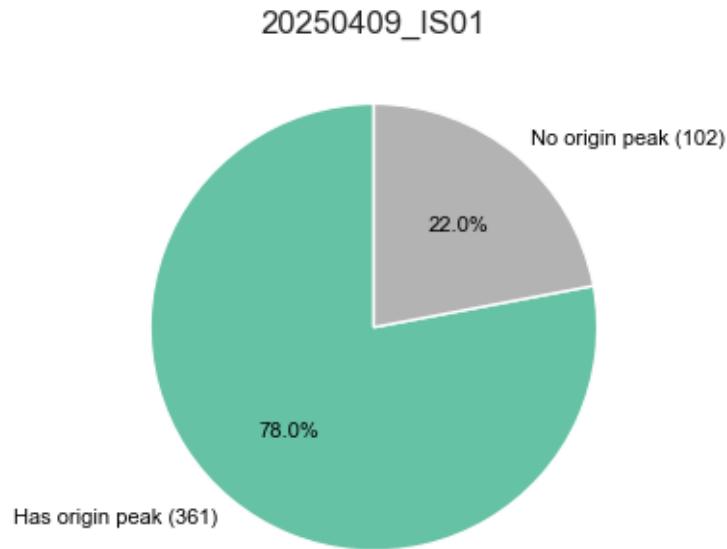


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events



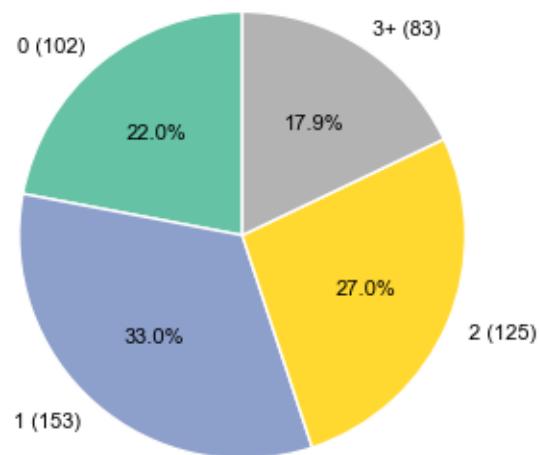
1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell



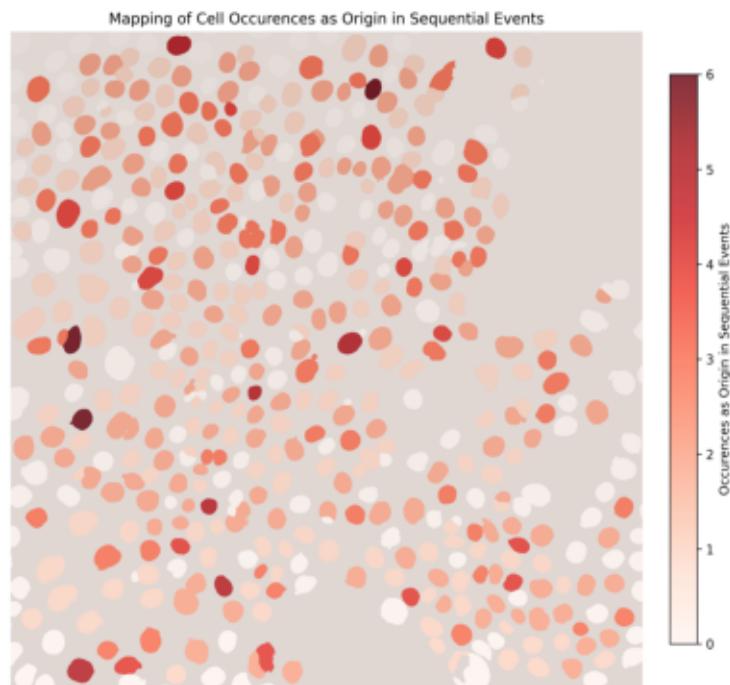
Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)

20250409_IS01



Cell Mapping with Origin Peaks Overlay

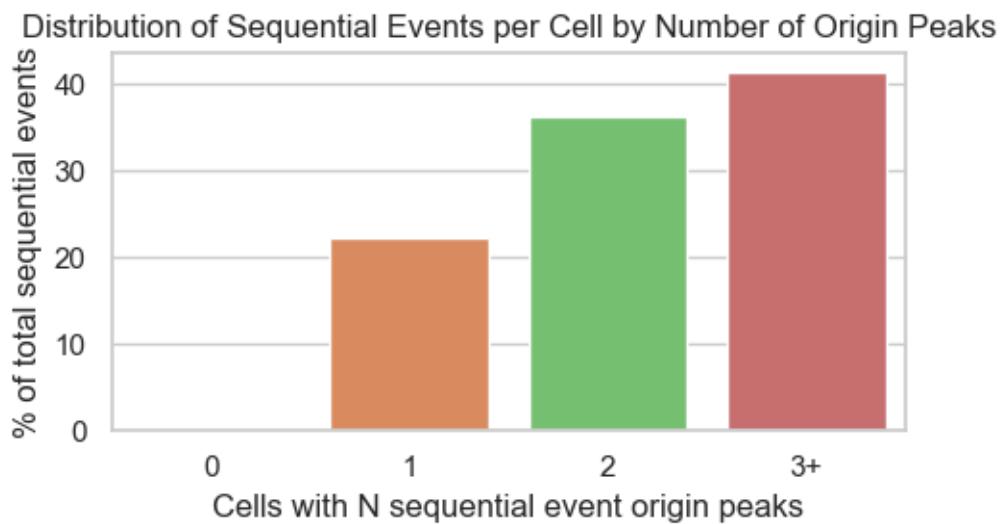
20250409_IS01



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

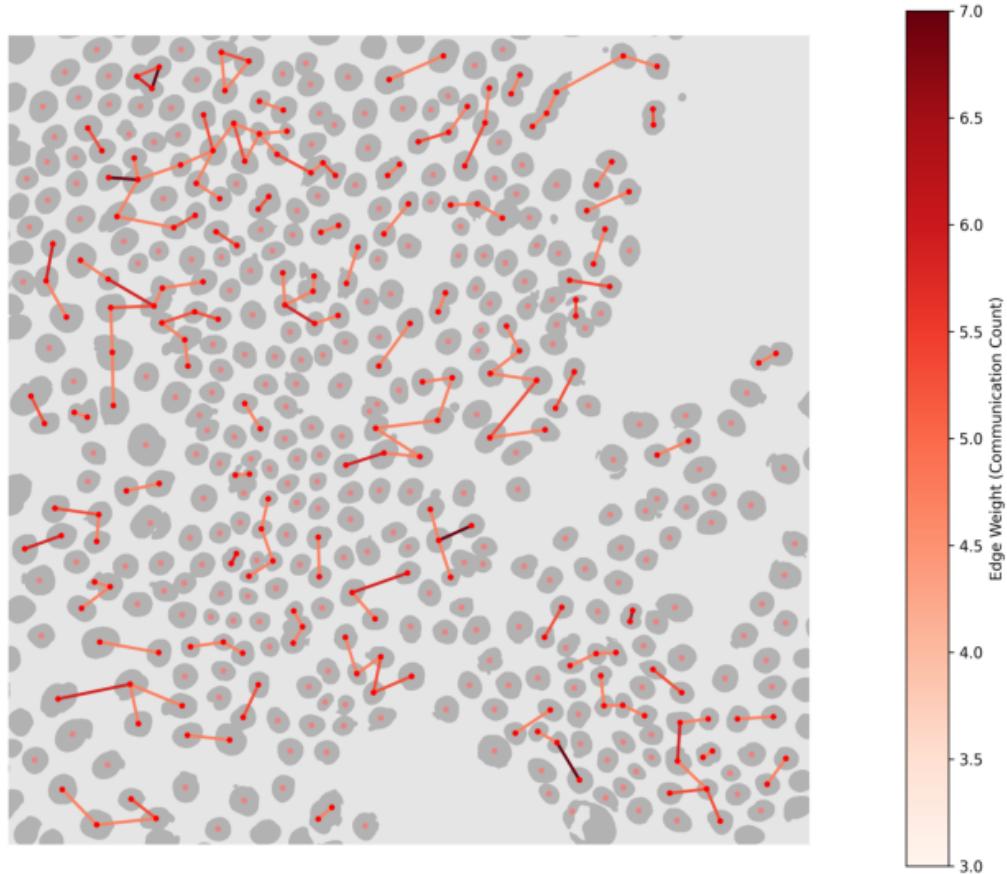


1.3.7 Connection network between cells

Cell Connection Network Graph

20250409_IS01

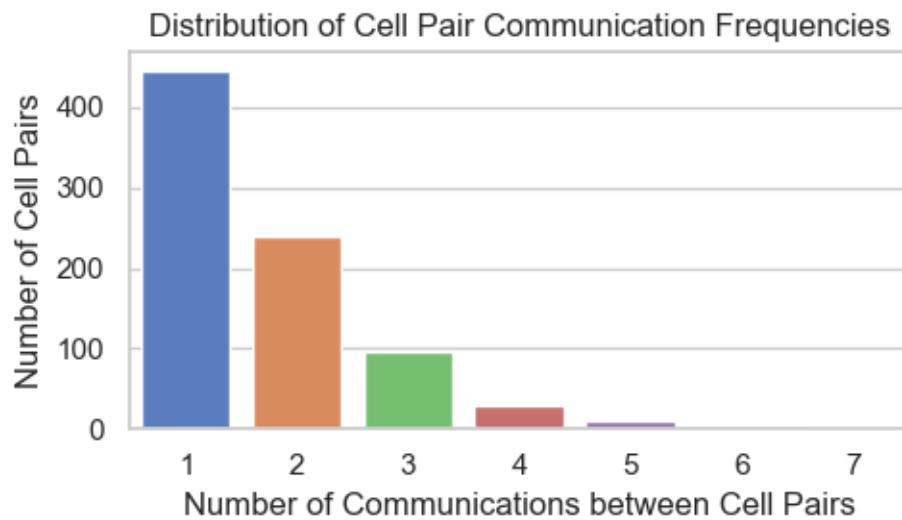
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

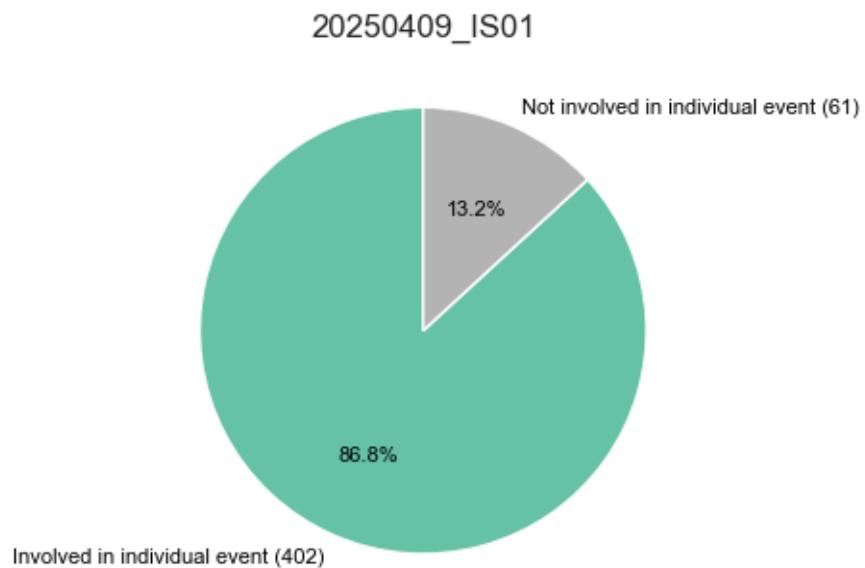
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



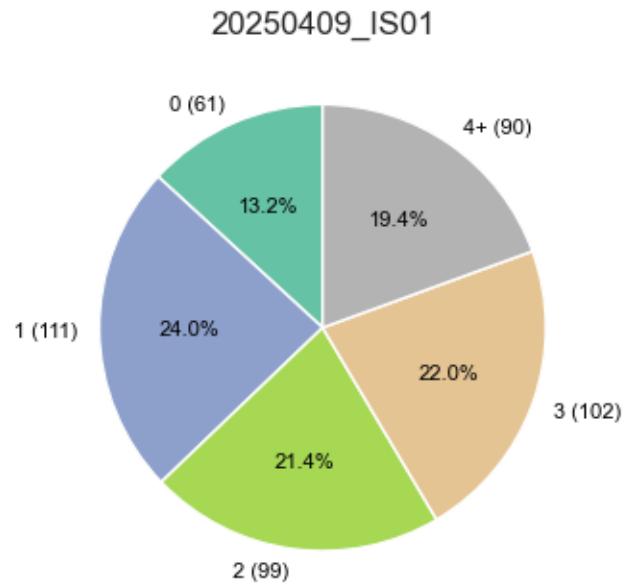
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

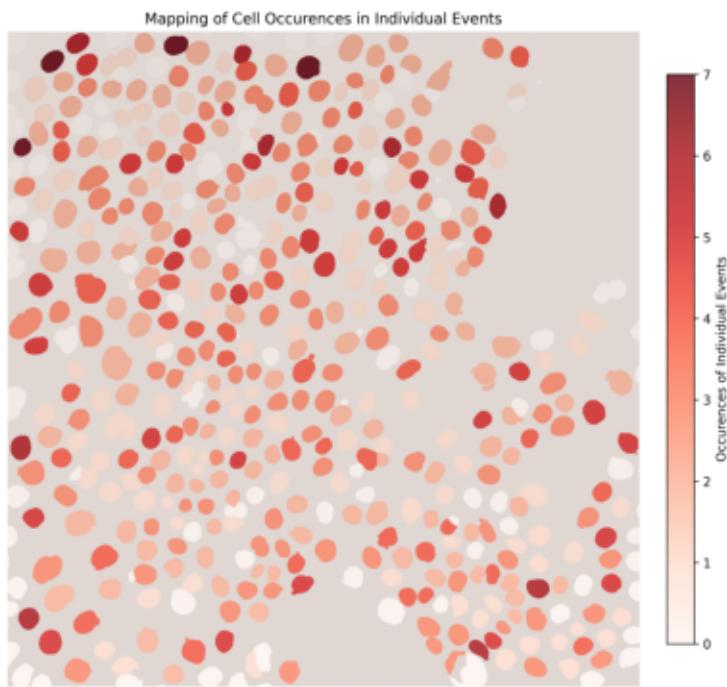


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)



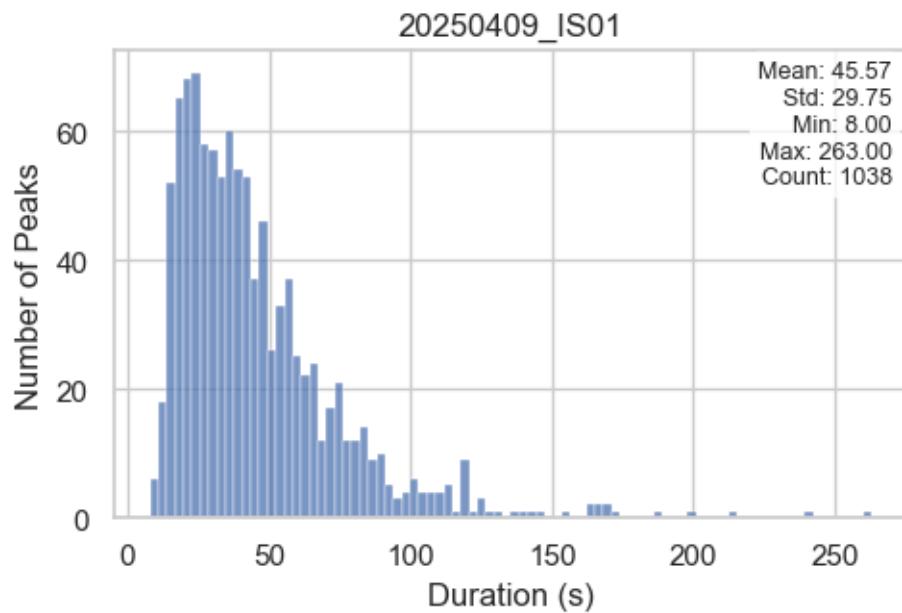
Cell Mapping with Occurrences in Individual Events Overlay

20250409_IS01

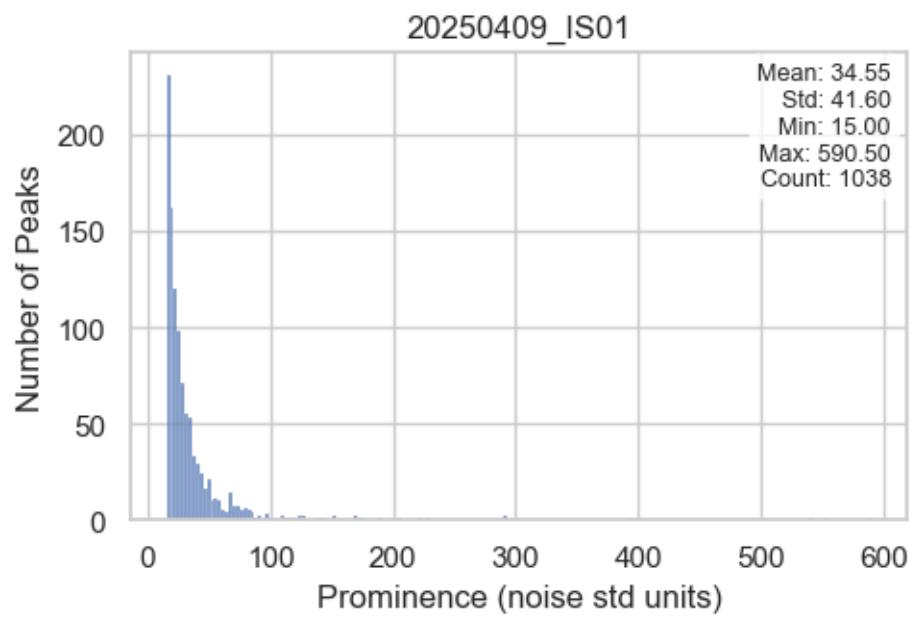


1.4.2 Peaks statistics in individual events

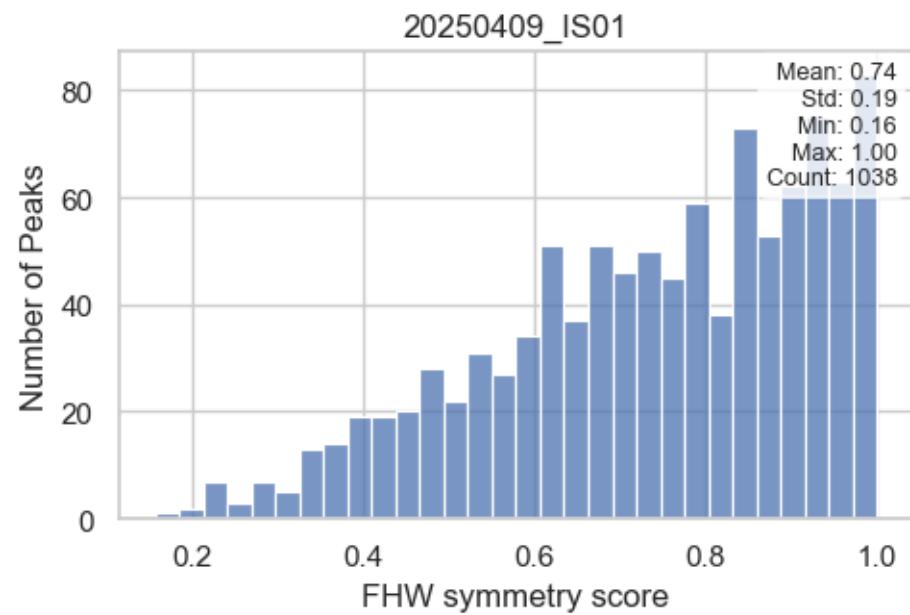
Distribution of Peak Durations



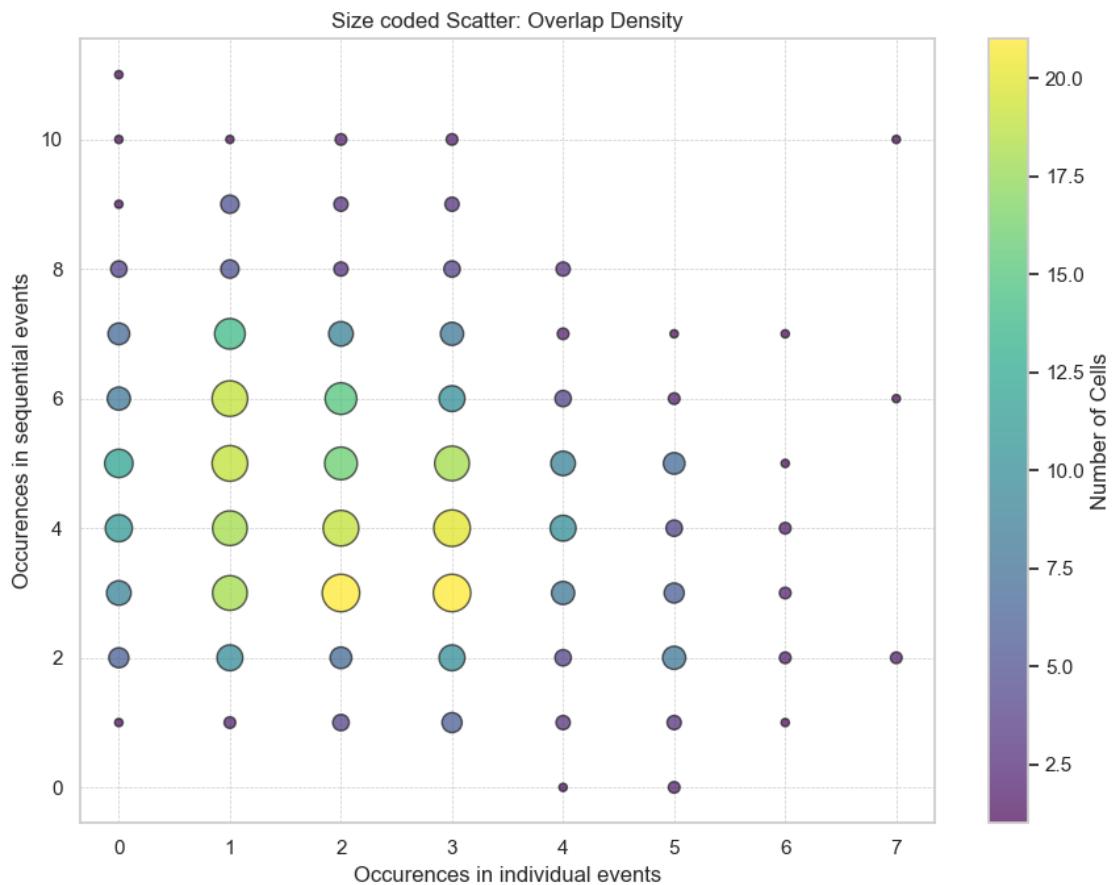
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

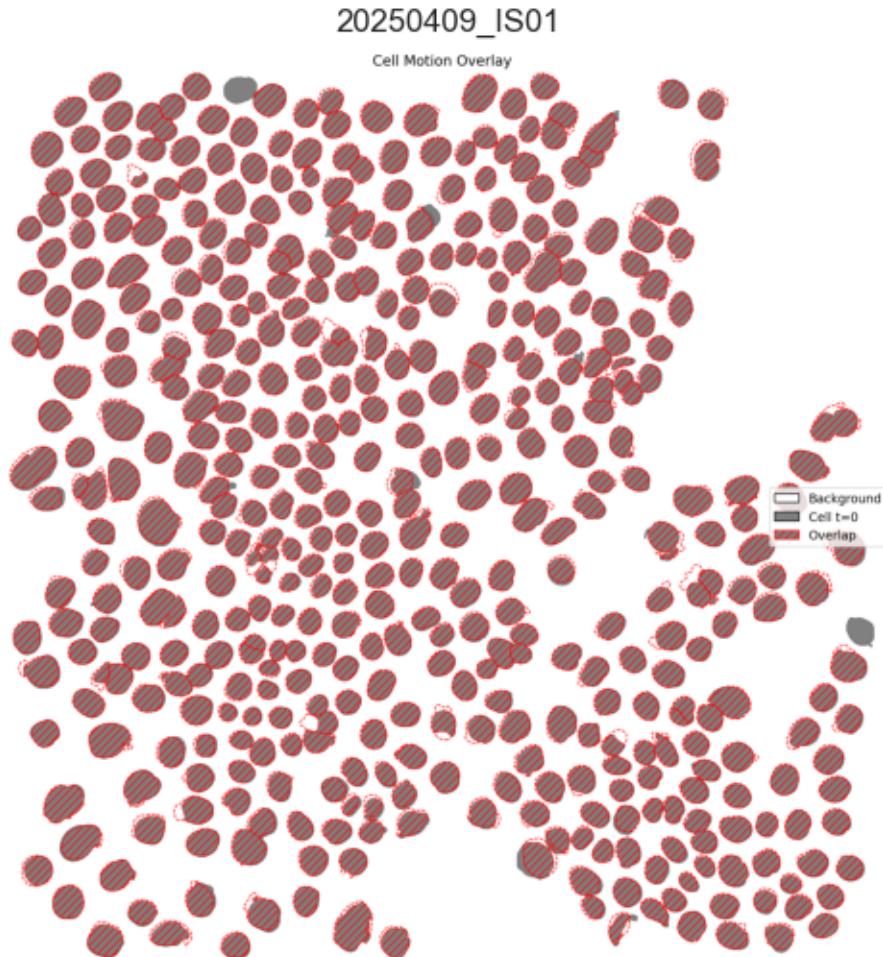


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 463
- Hoechst image taken at t=1801: 454
- Number of cells difference: absolute 9, relative 1.96%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 799186
- Pixels segmented as cell at t=1801: 781380
- Overlapping pixels between t=0 and t=1801: 723667 (91.57% of total)
- Pixels exclusive to t=0: 75519 (9.45% of total)
- Pixels exclusive to t=1801: 57713 (7.39% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n    "Default Dataset": "/path/to/your/dataset"\n}'
```

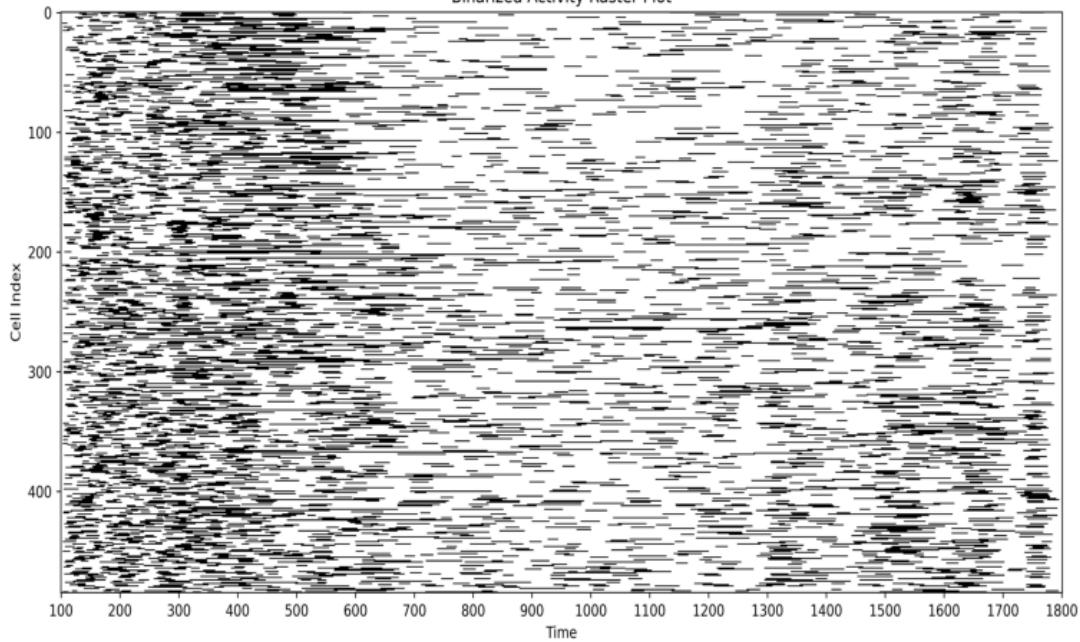
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

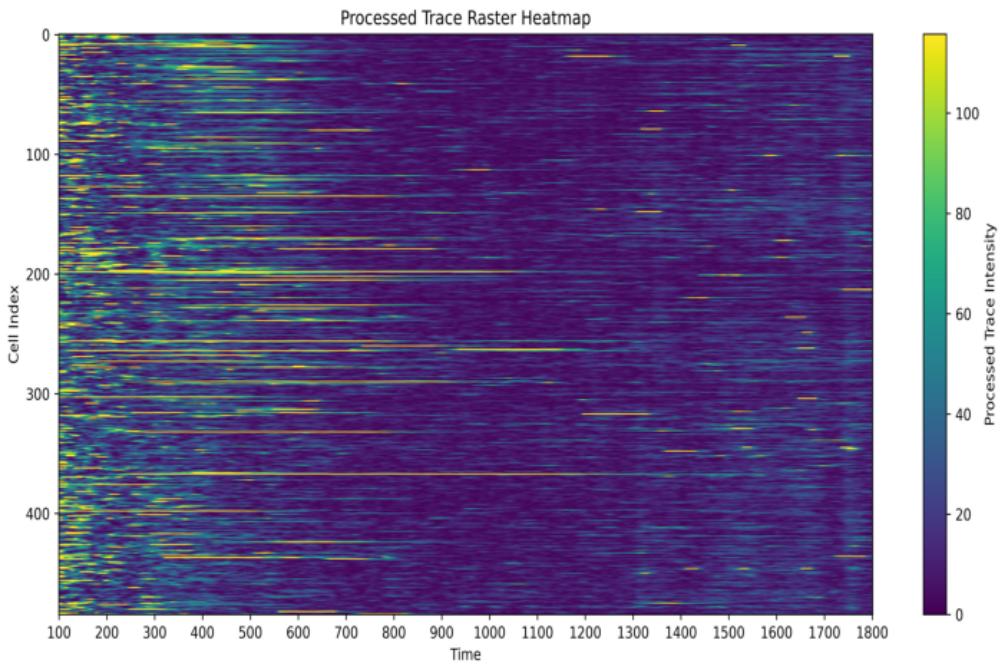
20250409_IS03

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250409_IS03



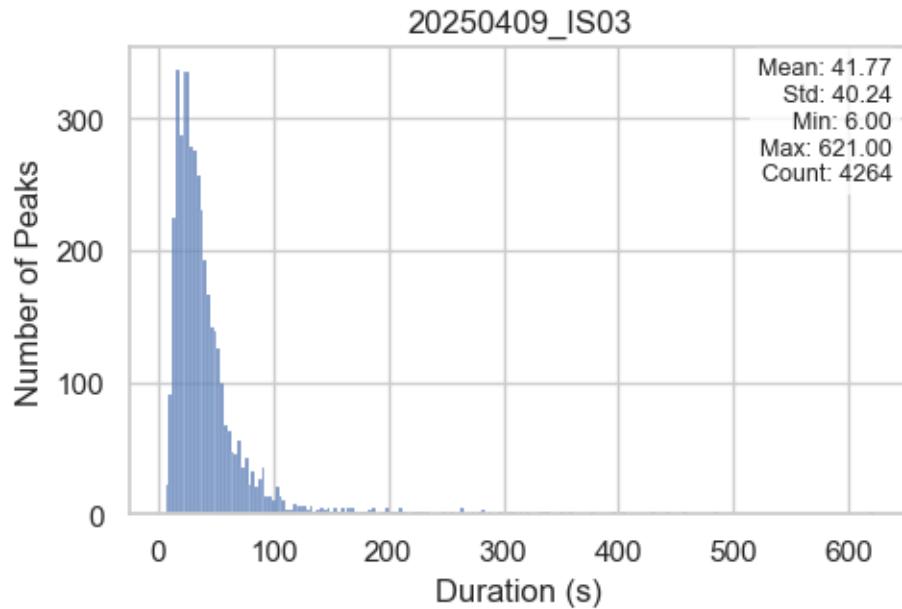
1.1.2 Peaks population

Total number of peaks: 4264

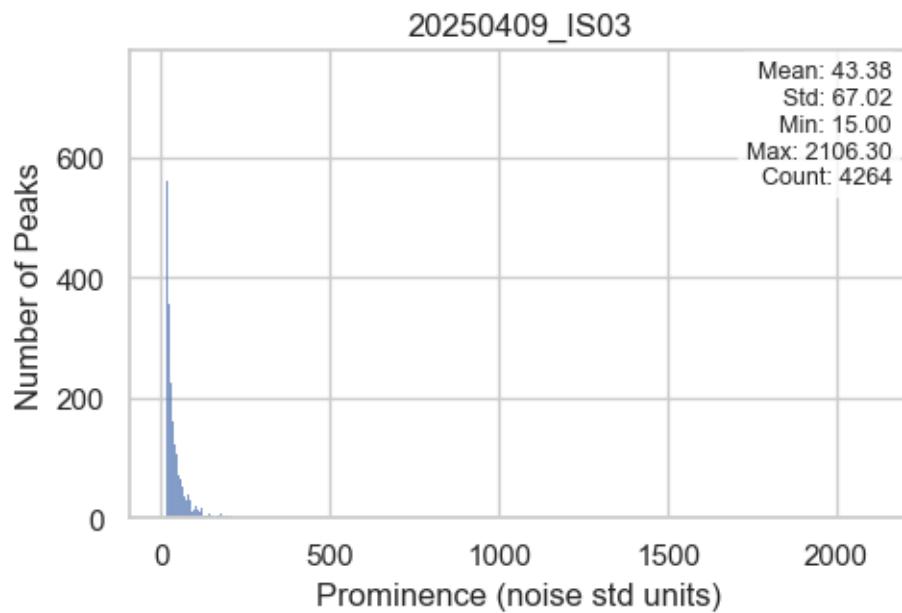
Total number of cells: 485

1.1.3 Peaks statistics

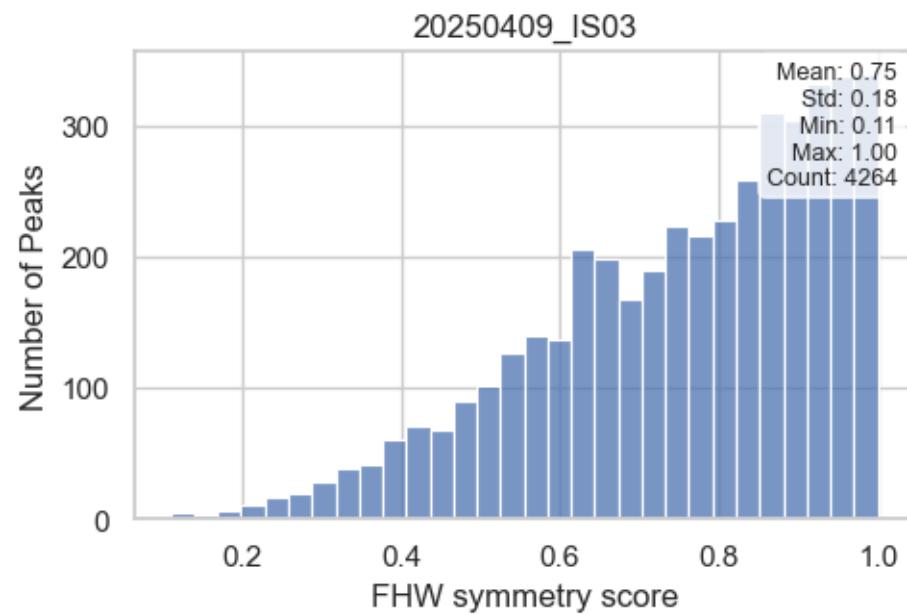
Distribution of Peak Durations



Distribution of Peak Prominences

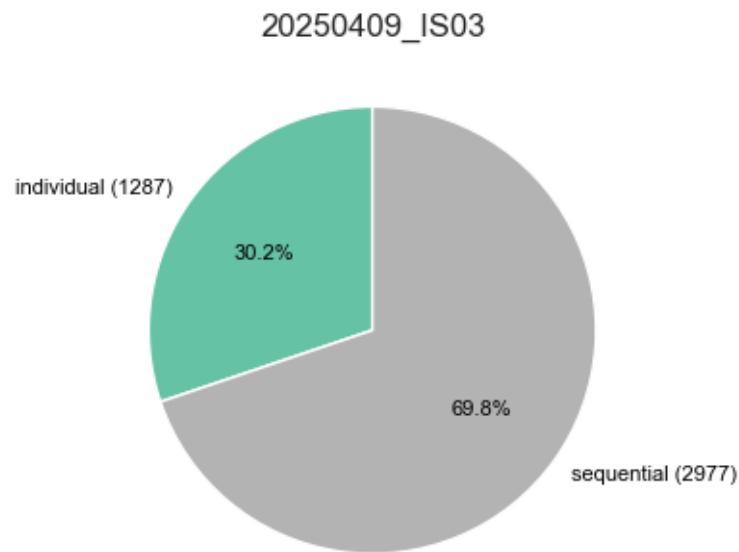


Distribution of Peak Symmetry Scores



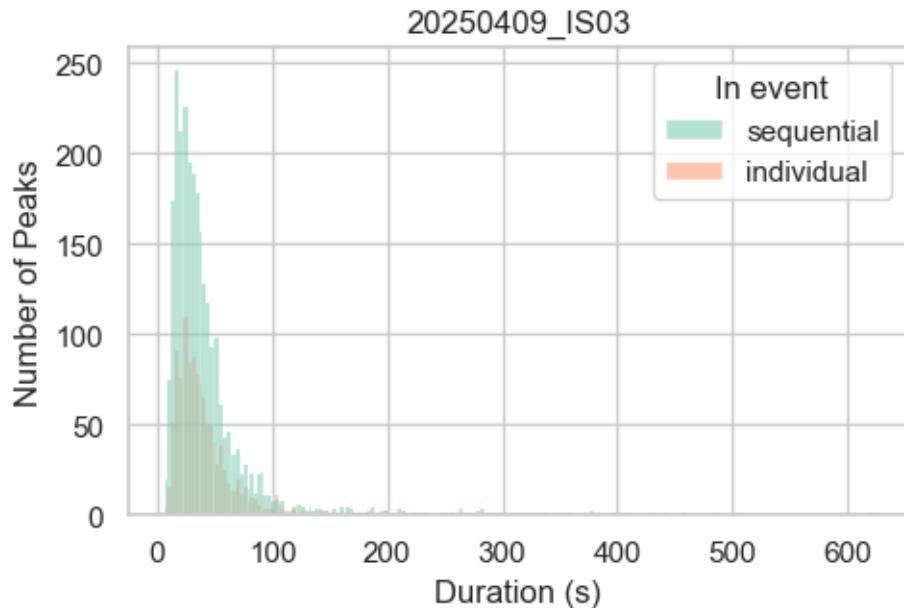
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

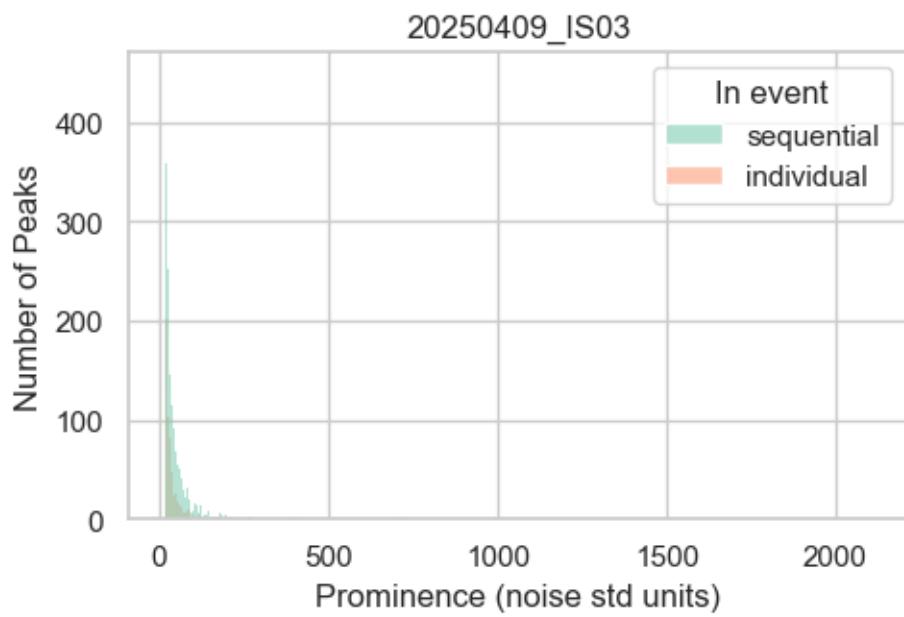


1.1.5 Peaks statistics per event types

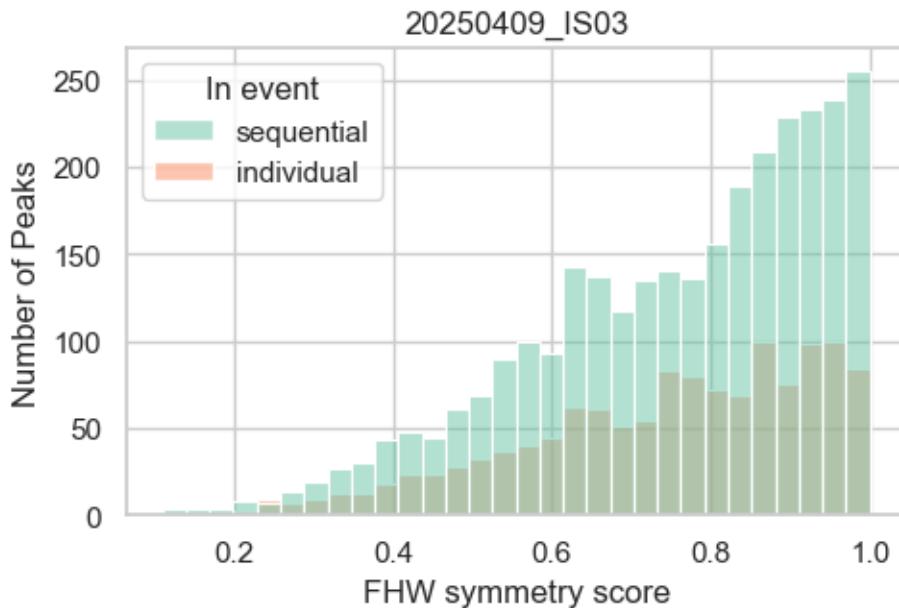
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



Distribution of Peak Symmetry Scores by Group



1.2 GLOBAL EVENTS

1.2.1 Peak statistics in global events

```
[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'Duration (s)'
```

```
[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'Prominence (noise std units)'
```

```
[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'FHW symmetry score'
```

1.2.2 Peak statistics in global event per event ID

```
[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'Duration (s)'
```

```
[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'Prominence (noise std units)'
```

```
[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'FHW symmetry score'
```

1.2.3 Kinetics of global events

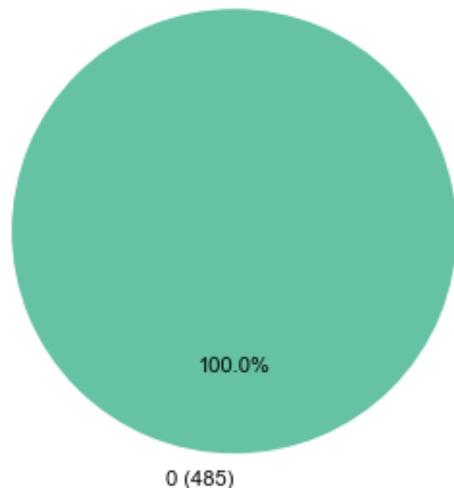
[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'Time to 50% (s)'

[2025-08-06 13:51:19] [WARNING] calcium: No data to plot for column 'Normalized peak rate at 50% (% of peaks/s)'

1.2.4 Cells occurrences in global events

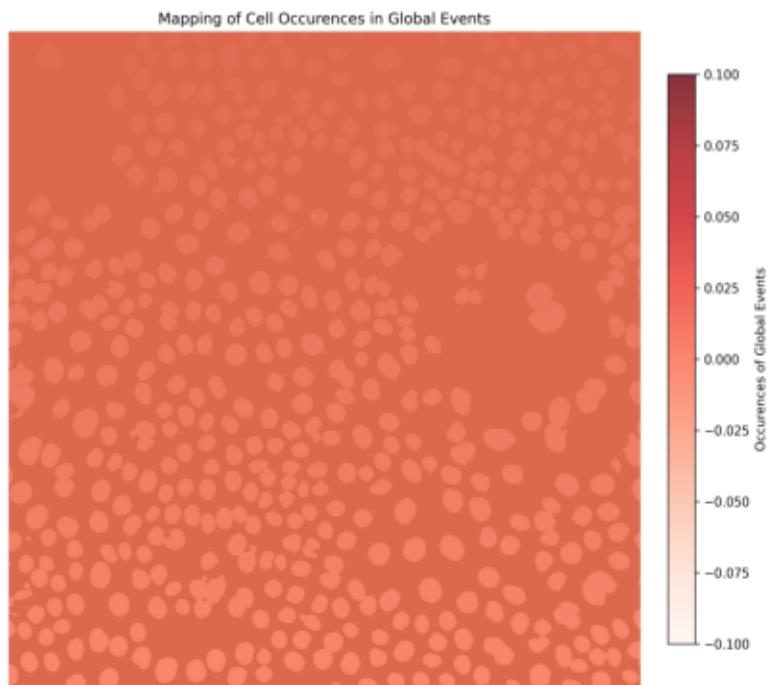
Distribution of Unique Global Events per Cell

20250409_IS03



Cell Mapping with Occurences in Global Events Overlay

20250409_IS03



[2025-08-06 13:51:20] [WARNING] calcium: No data to plot for column '% of cells involved'

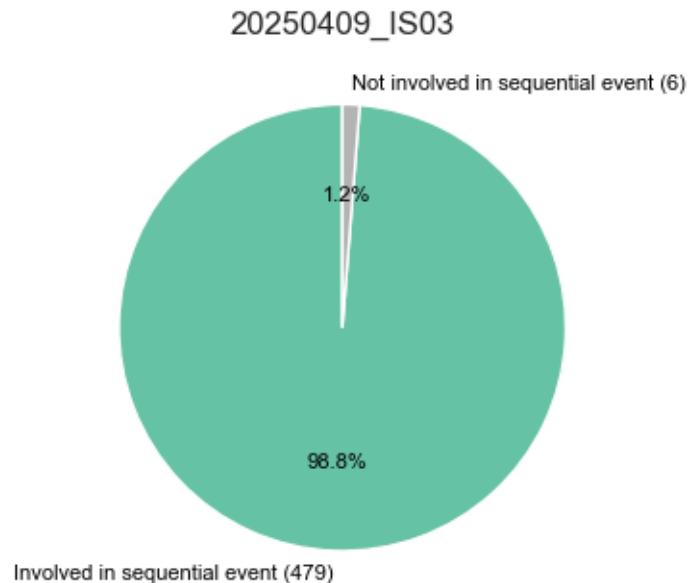
1.2.5 Inter-event interval analysis

Intervals between global event peaks: []

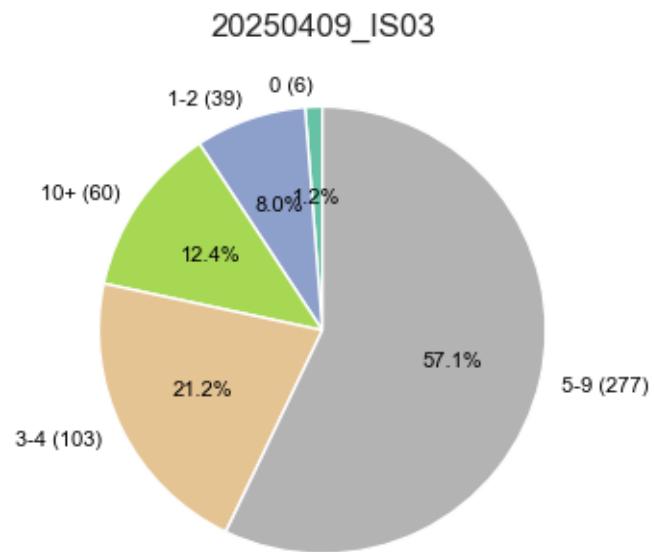
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

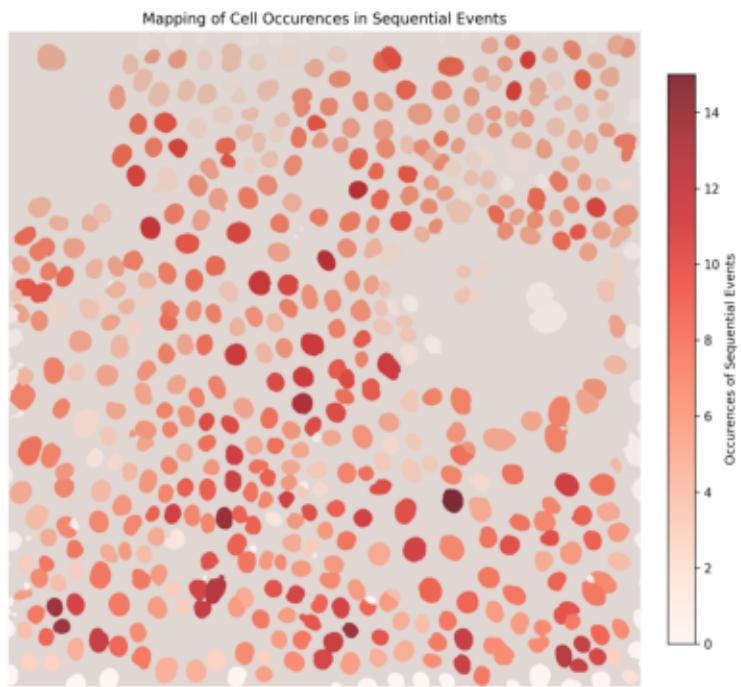


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

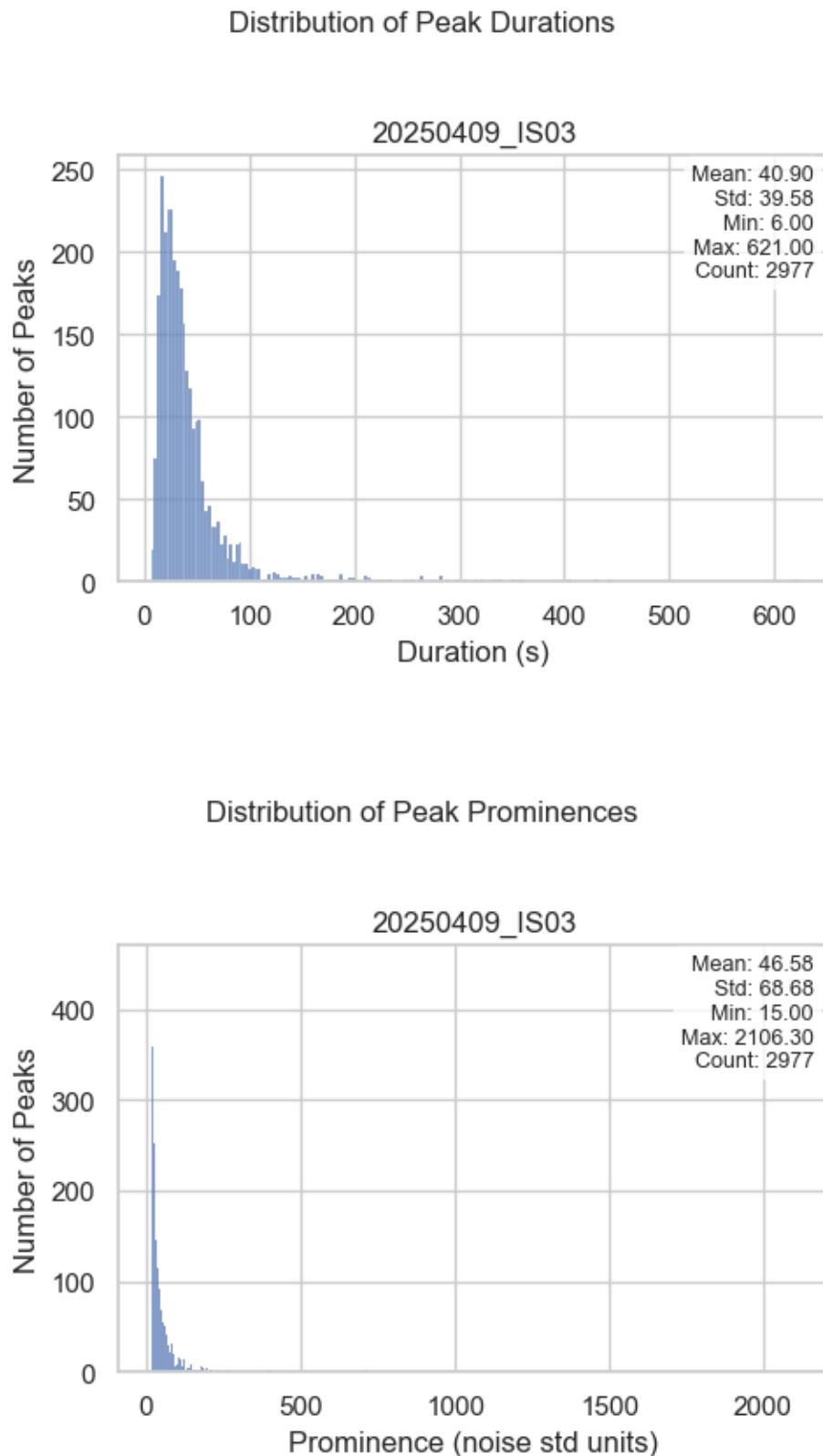


Cell Mapping with Occurrences in Sequential Events Overlay

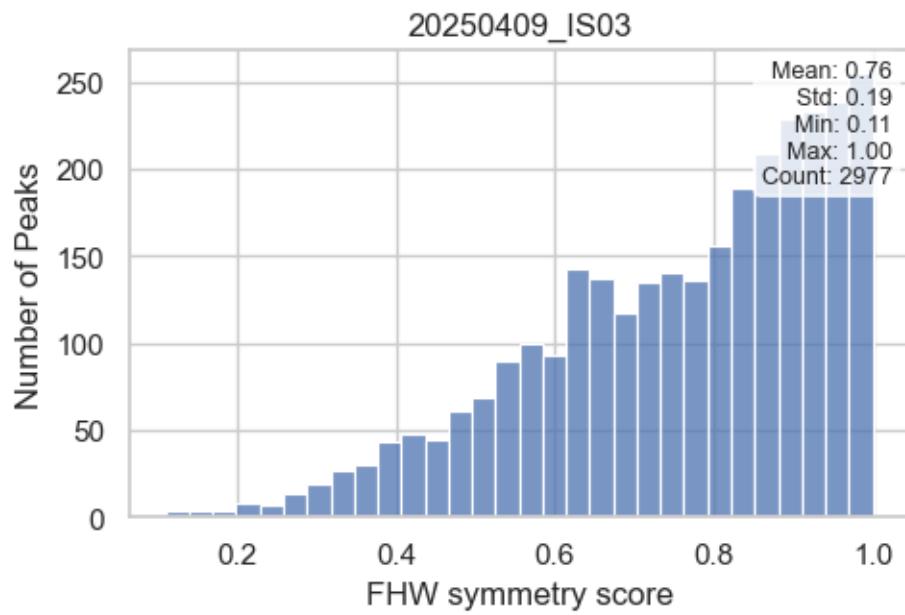
20250409_IS03



1.3.2 Peaks statistics in sequential events

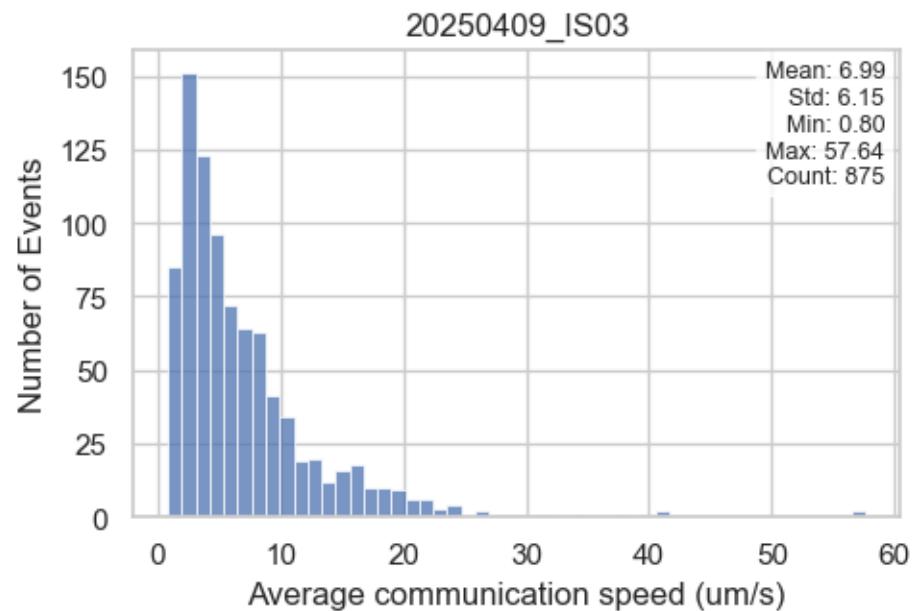


Distribution of Peak Symmetry Scores

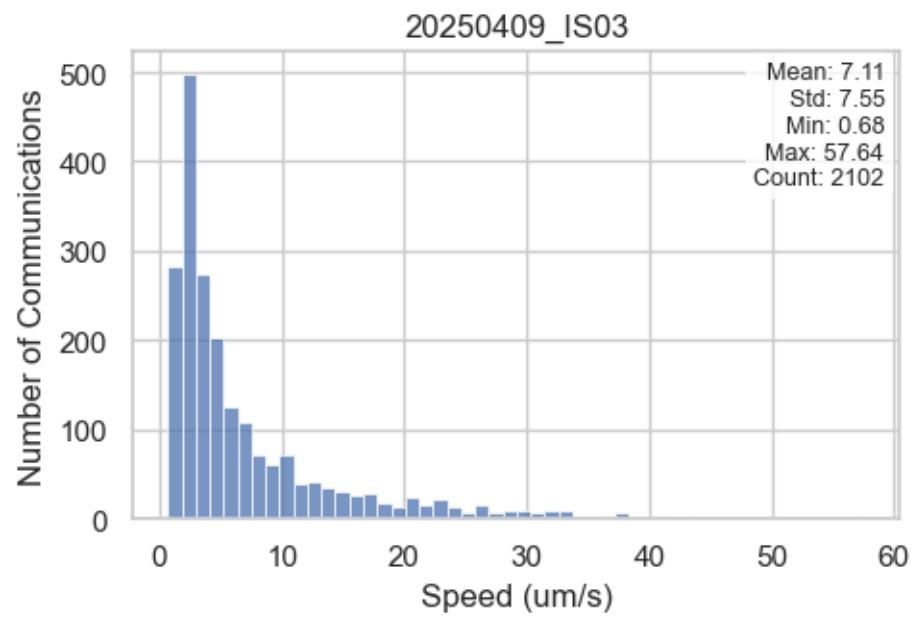


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

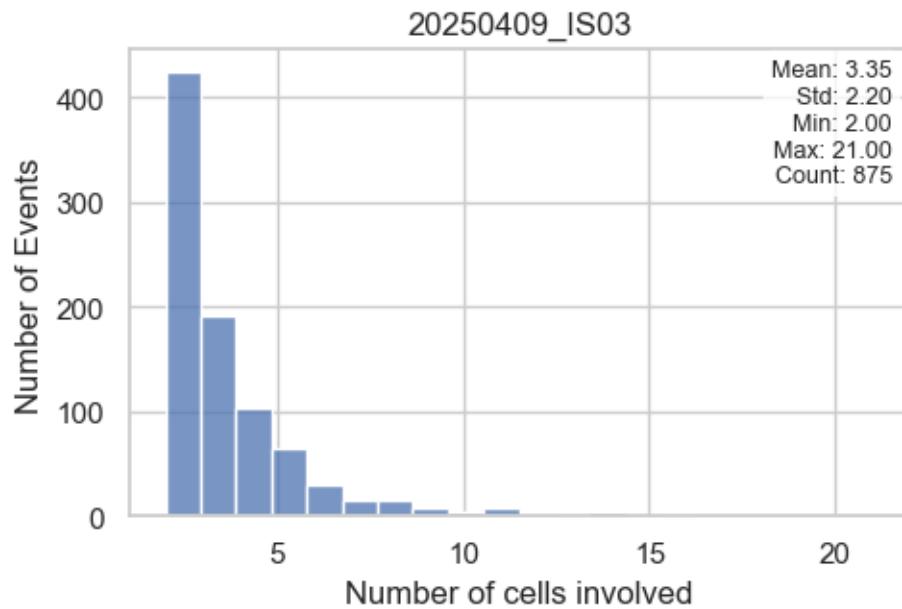


Distribution of Cell-Cell Communication Speeds



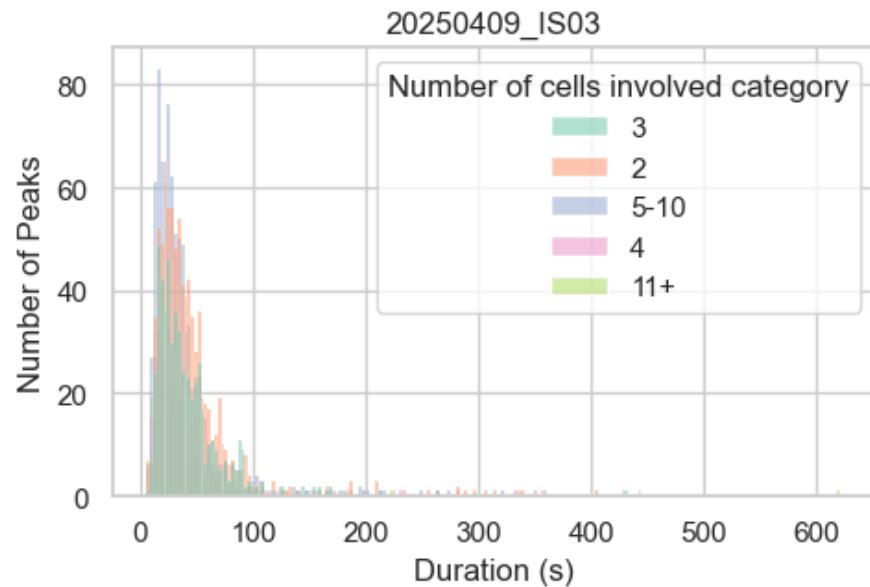
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

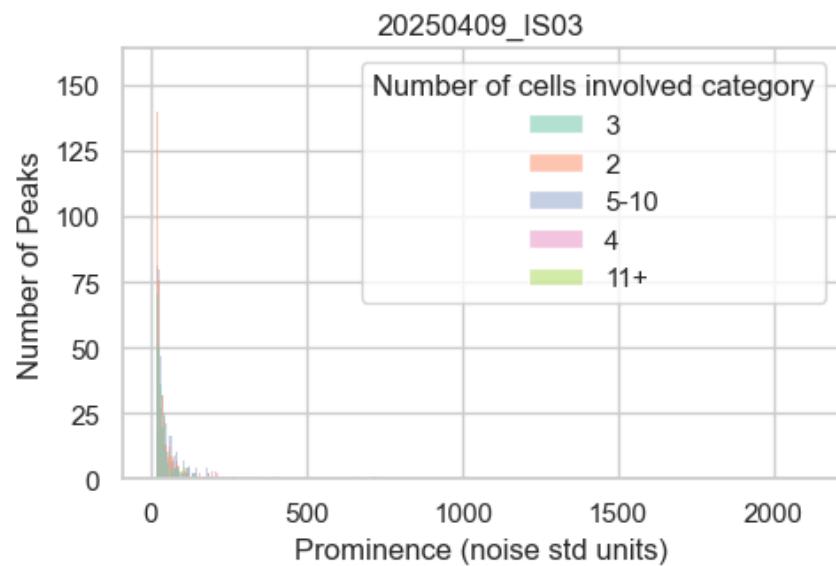


1.3.5 Influence of cell count per event on statistics

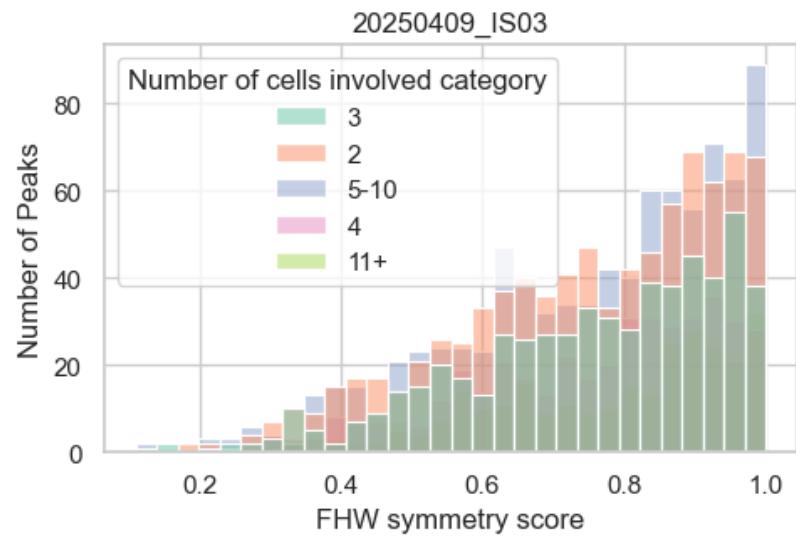
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



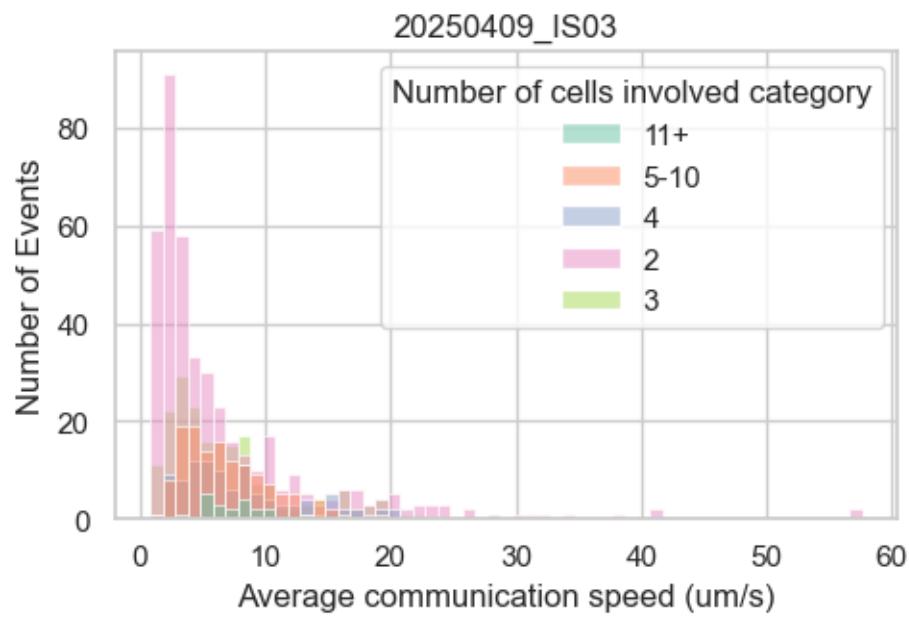
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



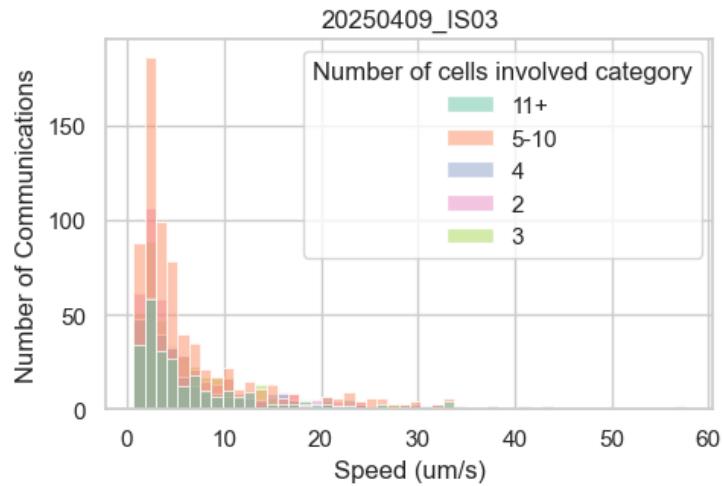
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

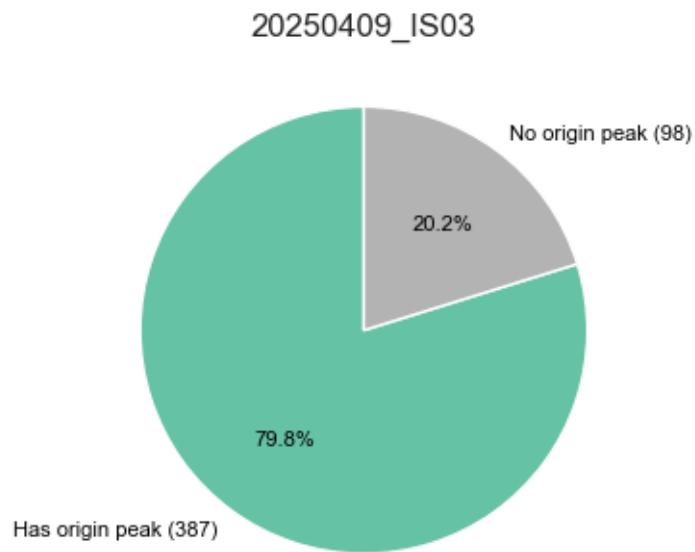


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

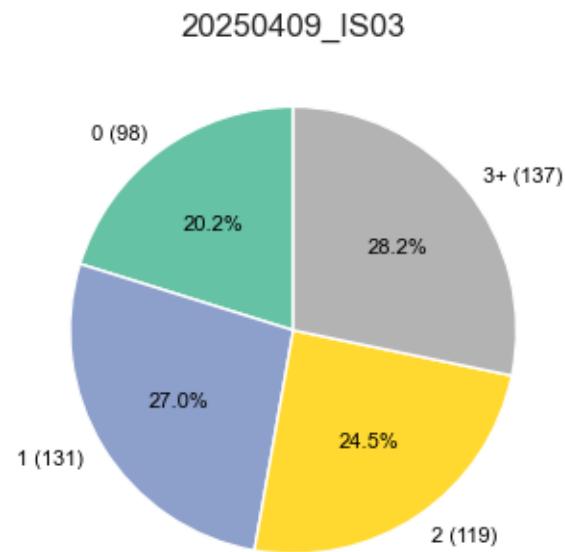


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

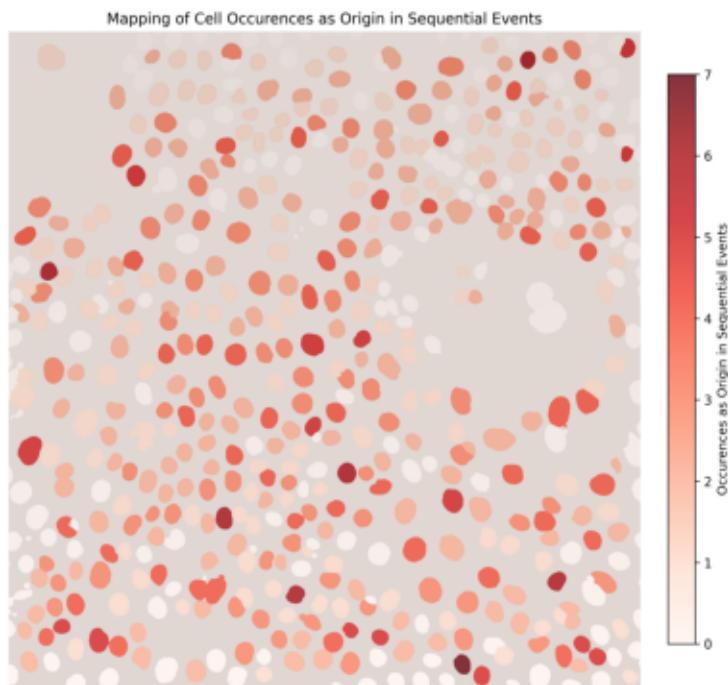


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

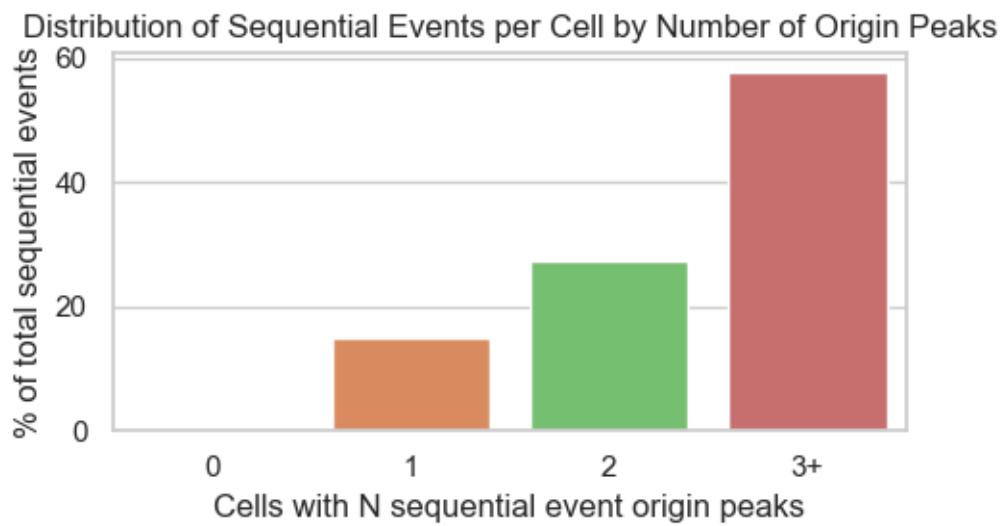
20250409_IS03



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

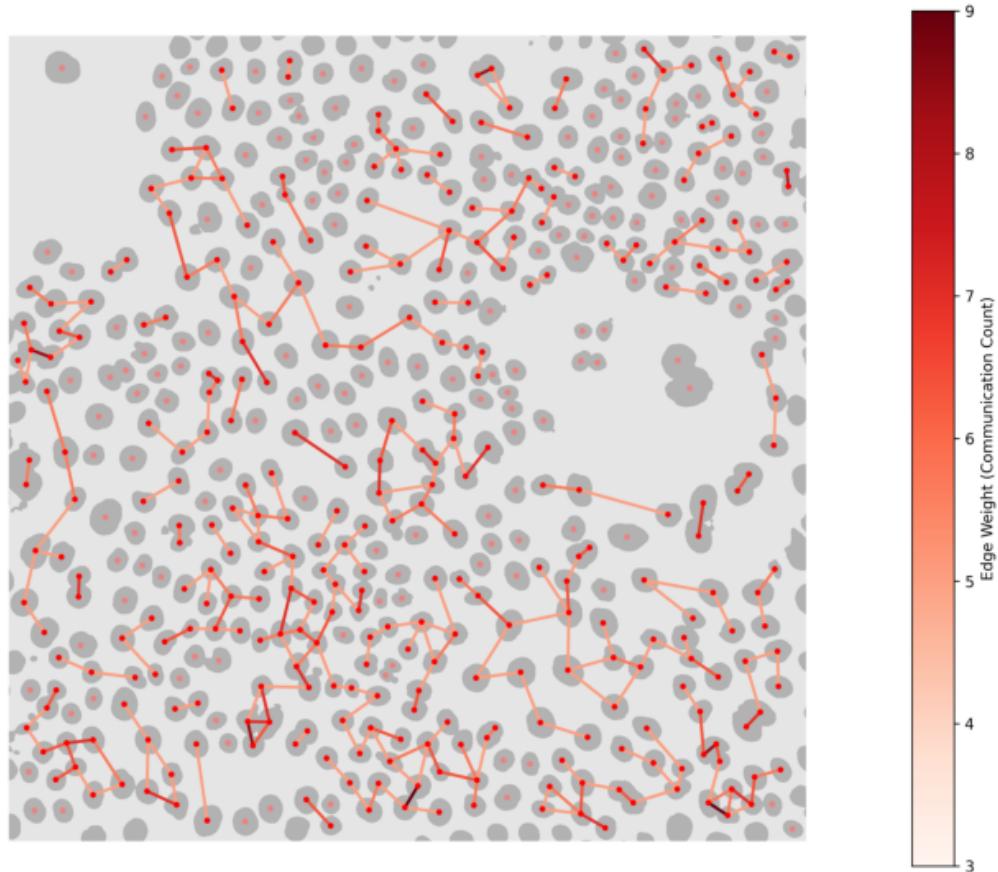


1.3.7 Connection network between cells

Cell Connection Network Graph

20250409_IS03

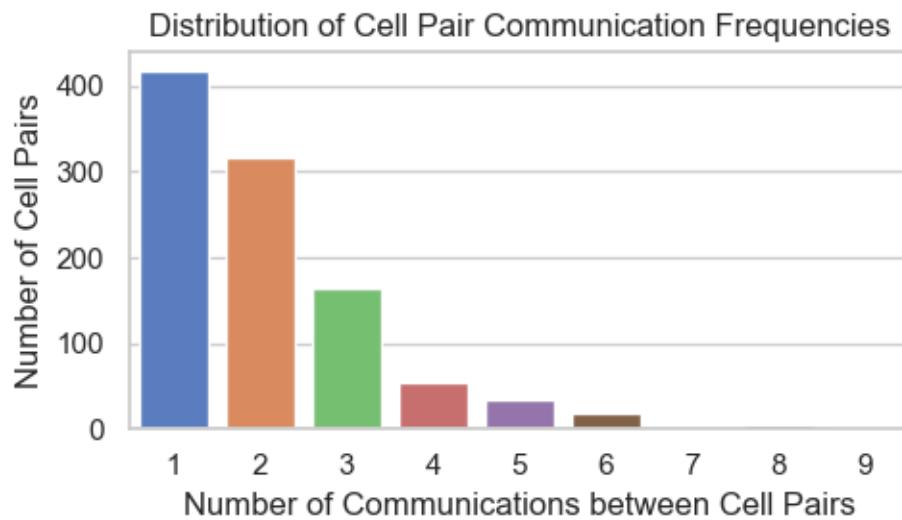
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

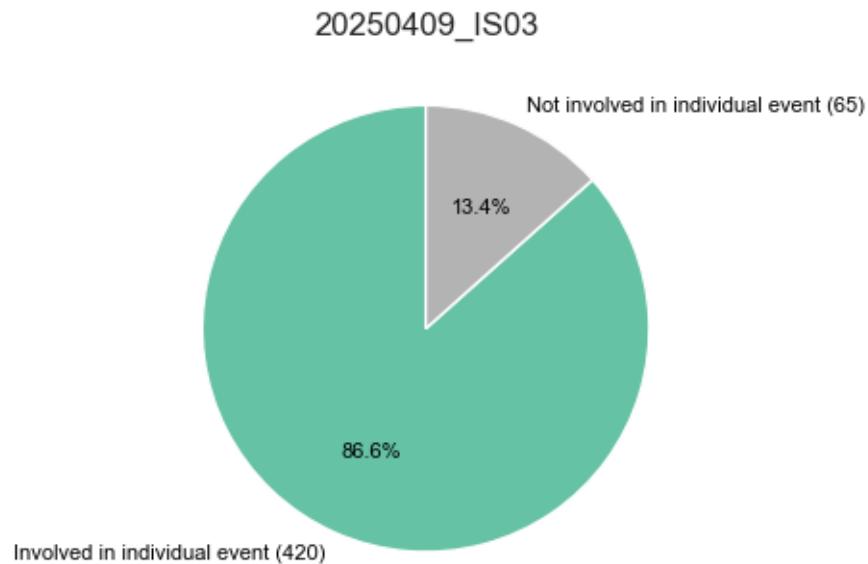
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.4 INDIVIDUAL EVENTS

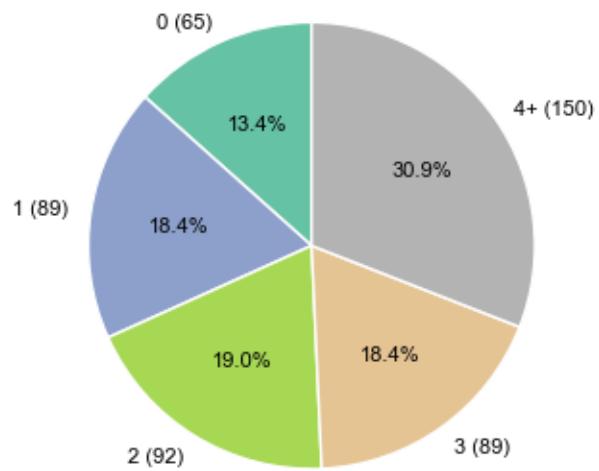
1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events



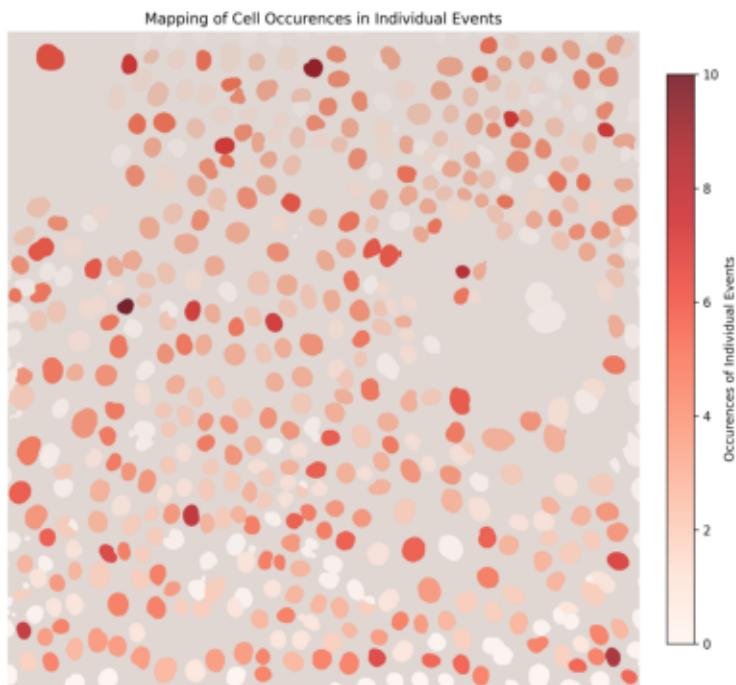
Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)

20250409_IS03



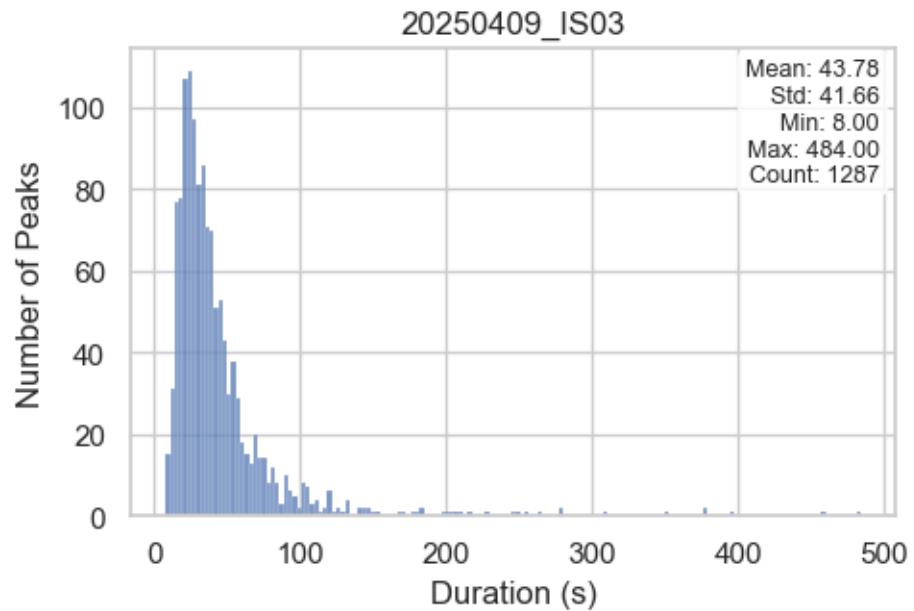
Cell Mapping with Occurrences in Individual Events Overlay

20250409_IS03

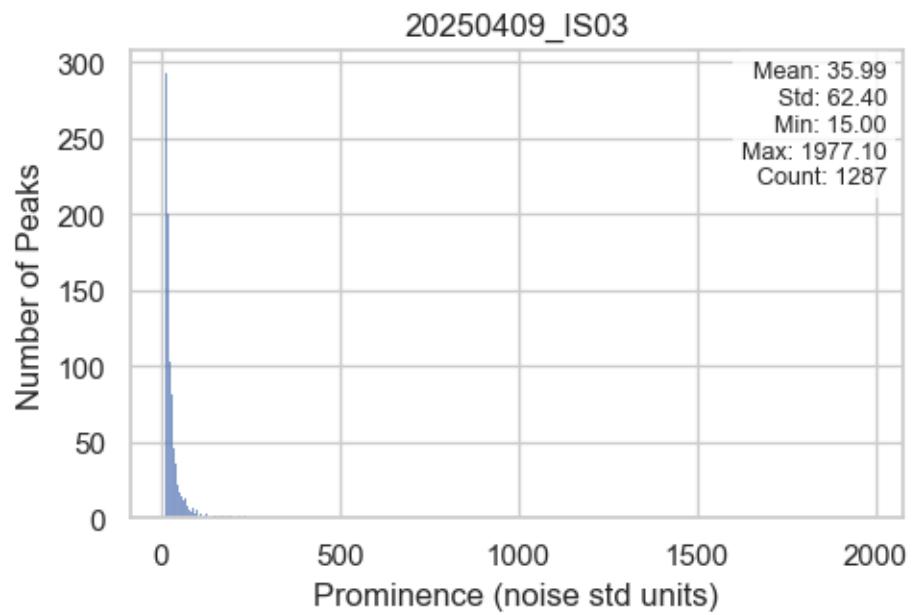


1.4.2 Peaks statistics in individual events

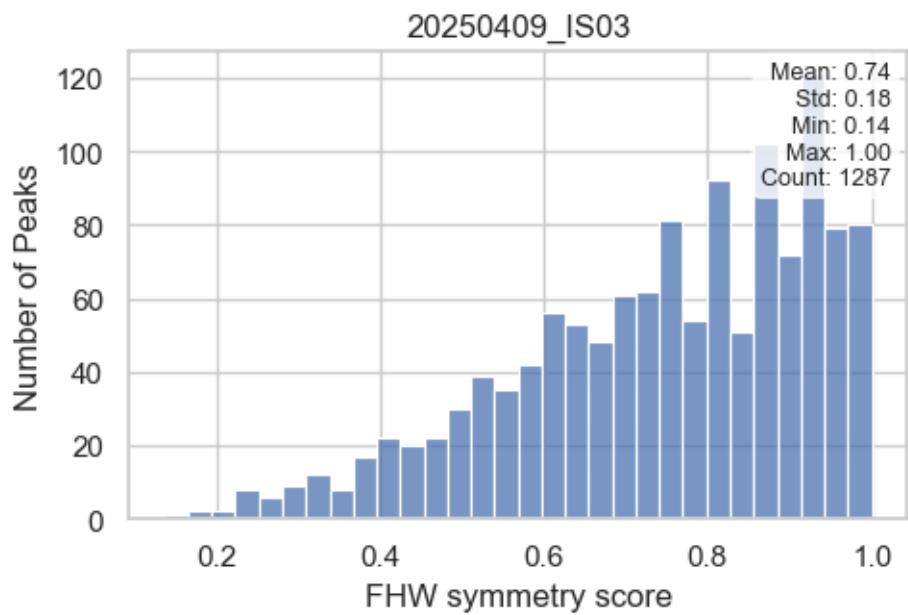
Distribution of Peak Durations



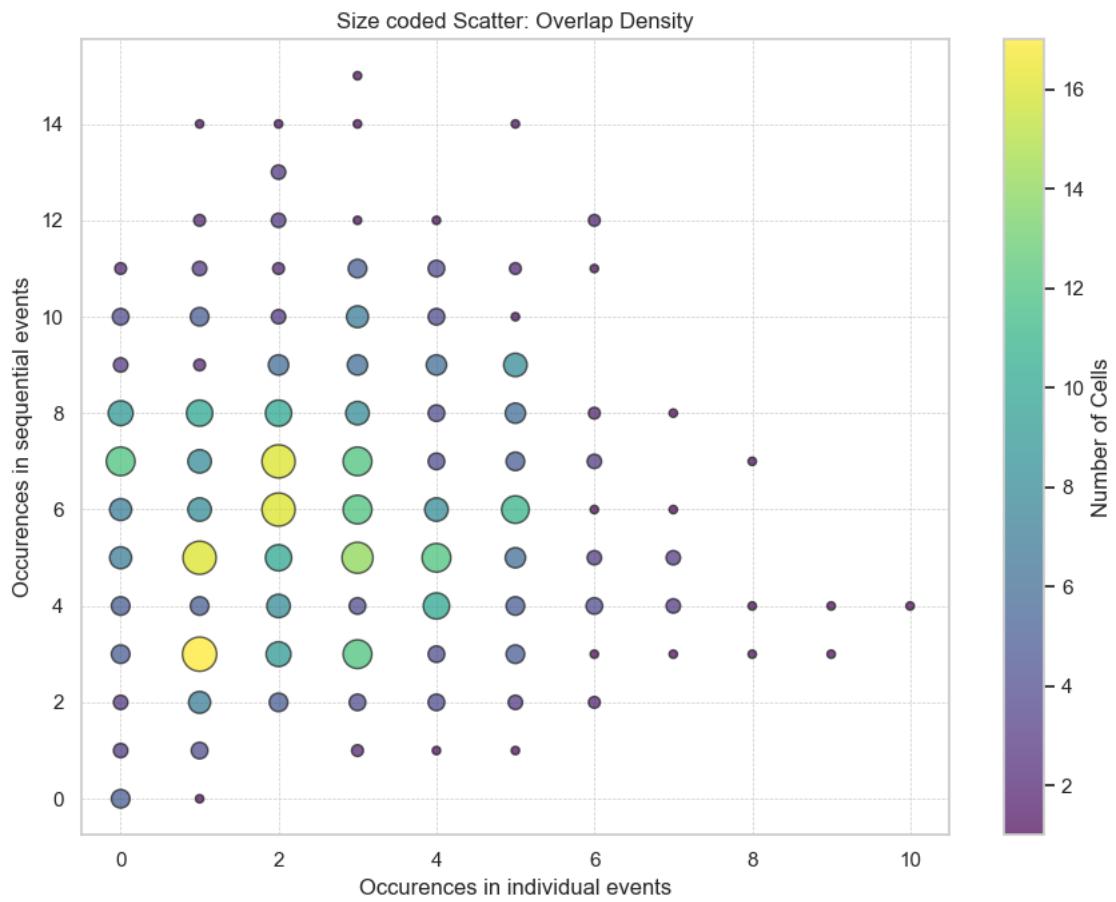
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

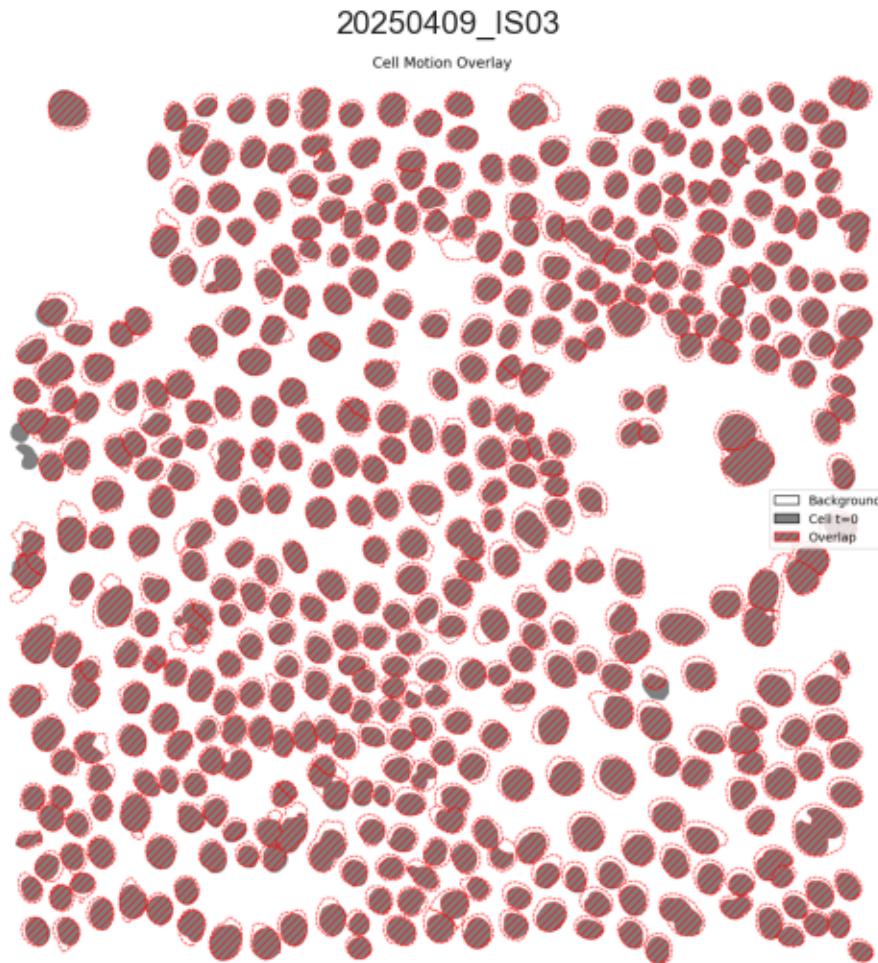


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 485
- Hoechst image taken at t=1801: 479
- Number of cells difference: absolute 6, relative 1.24%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 753273
- Pixels segmented as cell at t=1801: 957052
- Overlapping pixels between t=0 and t=1801: 734853 (85.93% of total)
- Pixels exclusive to t=0: 18420 (2.44% of total)
- Pixels exclusive to t=1801: 222199 (23.22% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n    "Default Dataset": "/path/to/your/dataset"\n}'
```

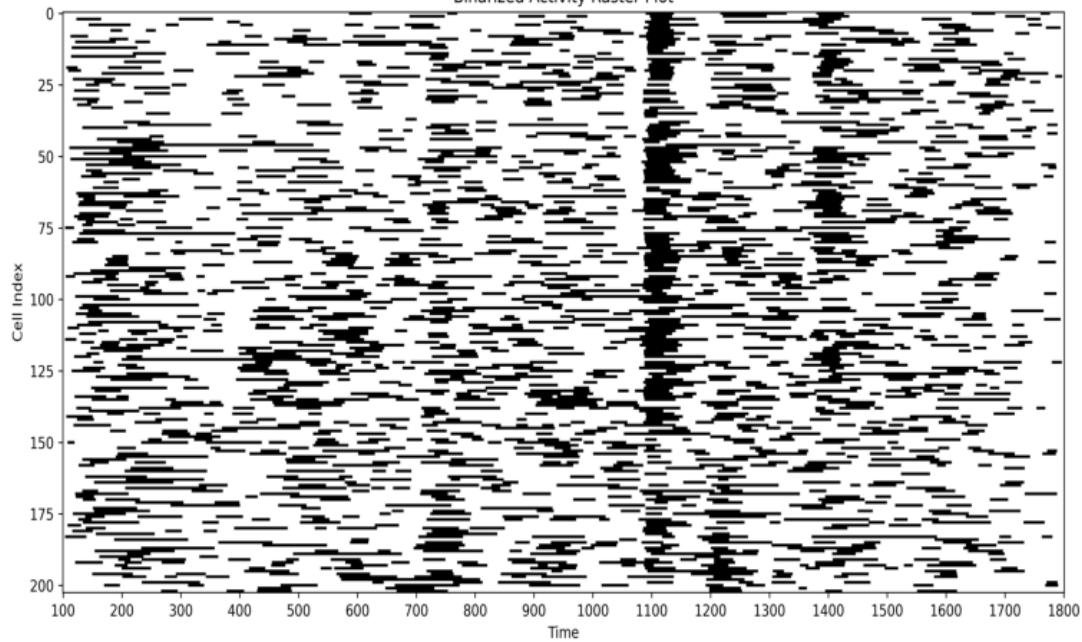
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

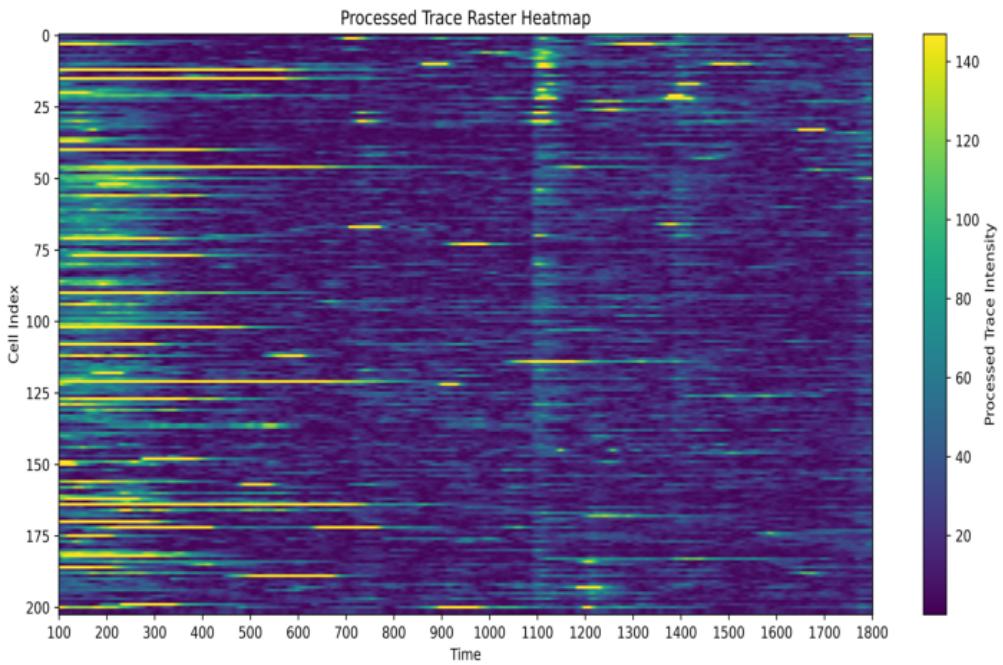
20250409_IS05

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250409_IS05



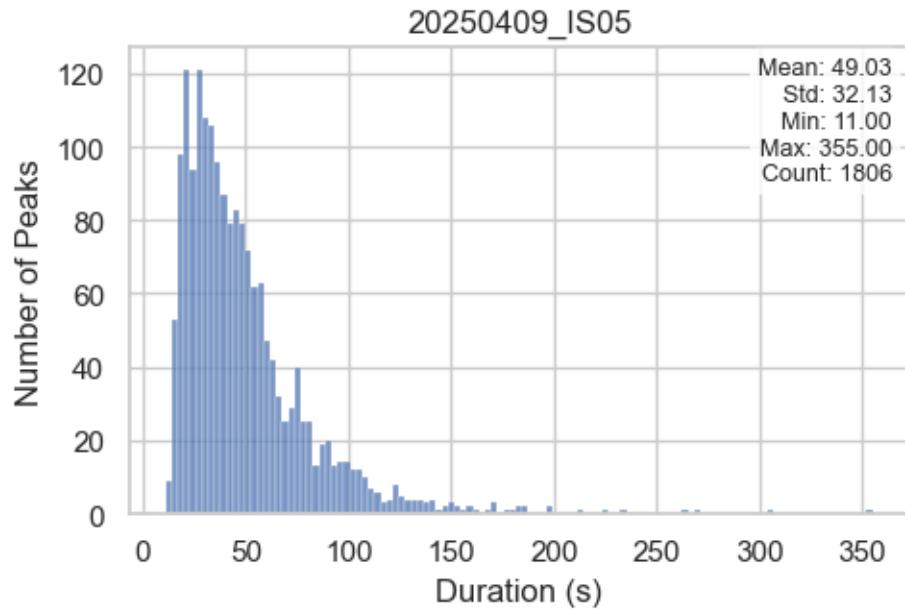
1.1.2 Peaks population

Total number of peaks: 1806

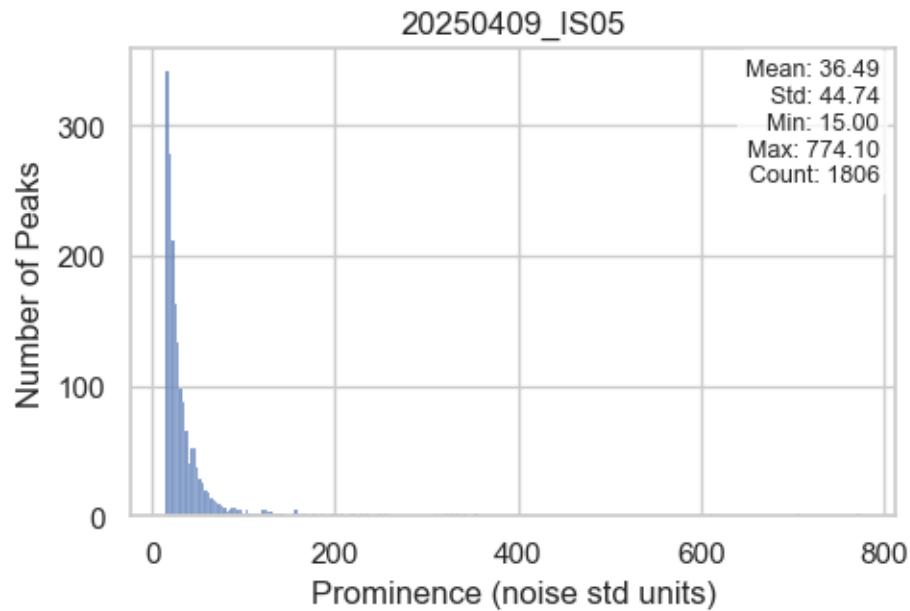
Total number of cells: 203

1.1.3 Peaks statistics

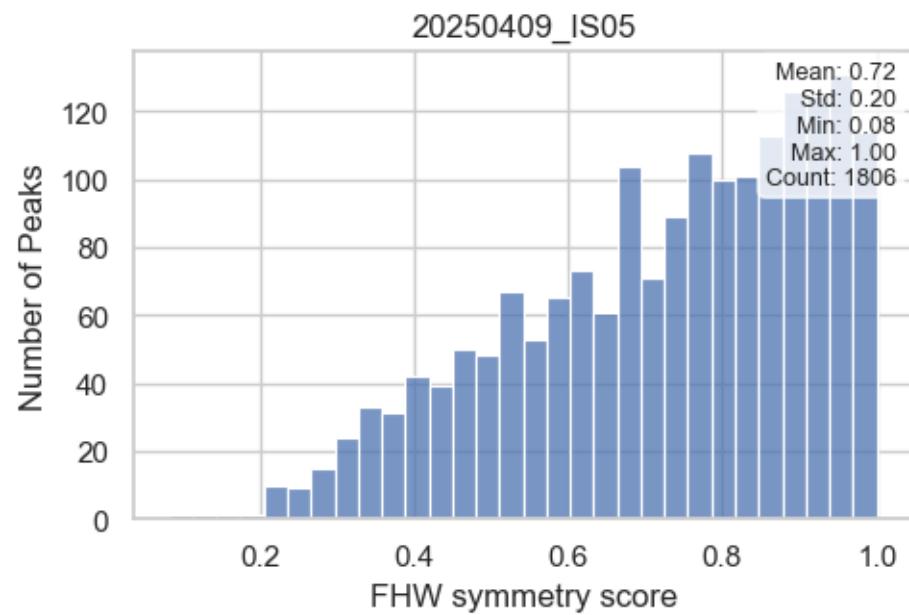
Distribution of Peak Durations



Distribution of Peak Prominences

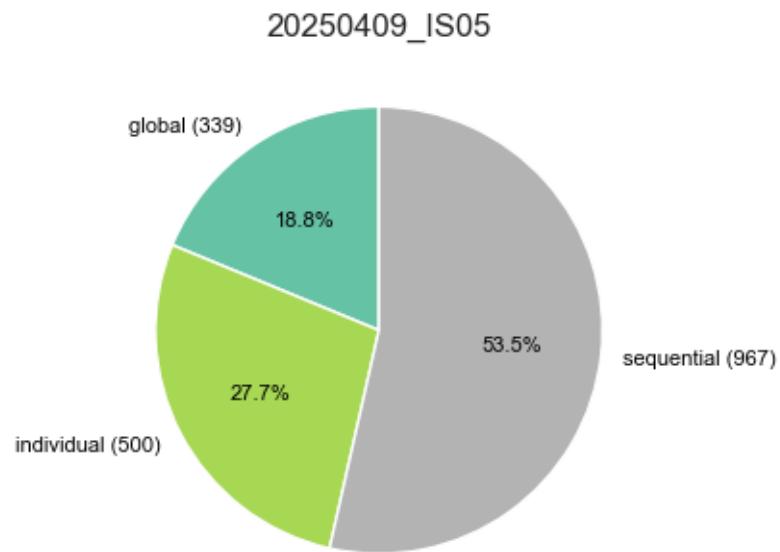


Distribution of Peak Symmetry Scores



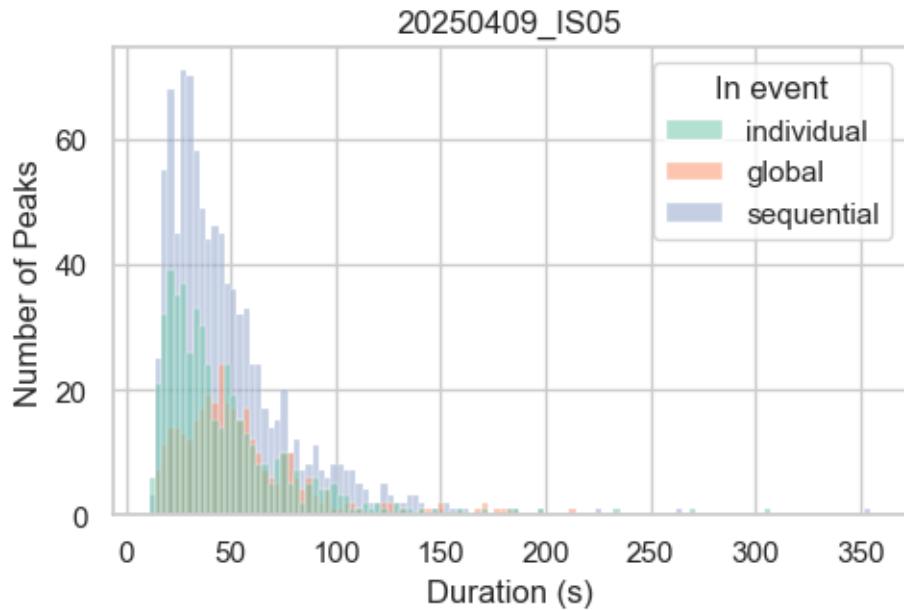
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

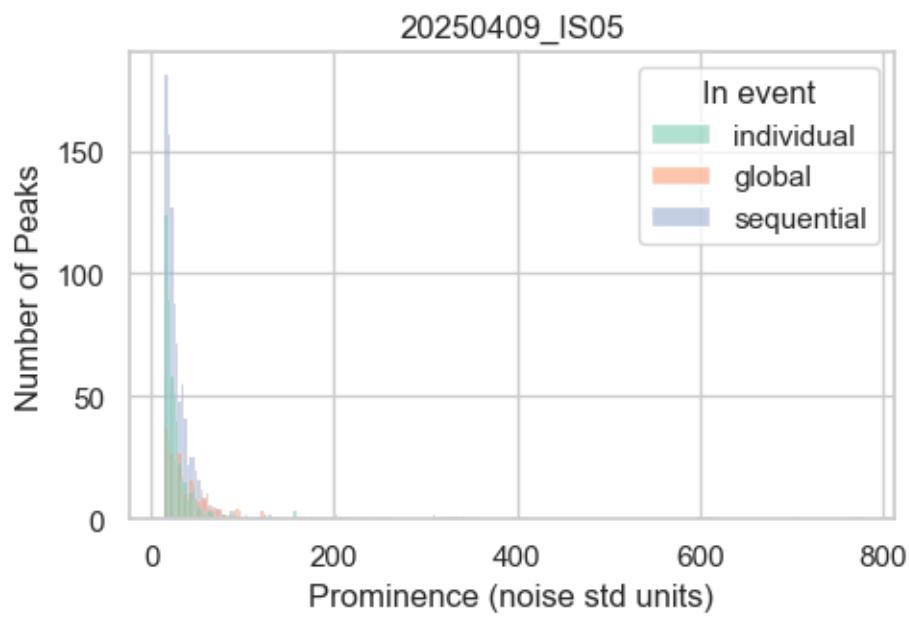


1.1.5 Peaks statistics per event types

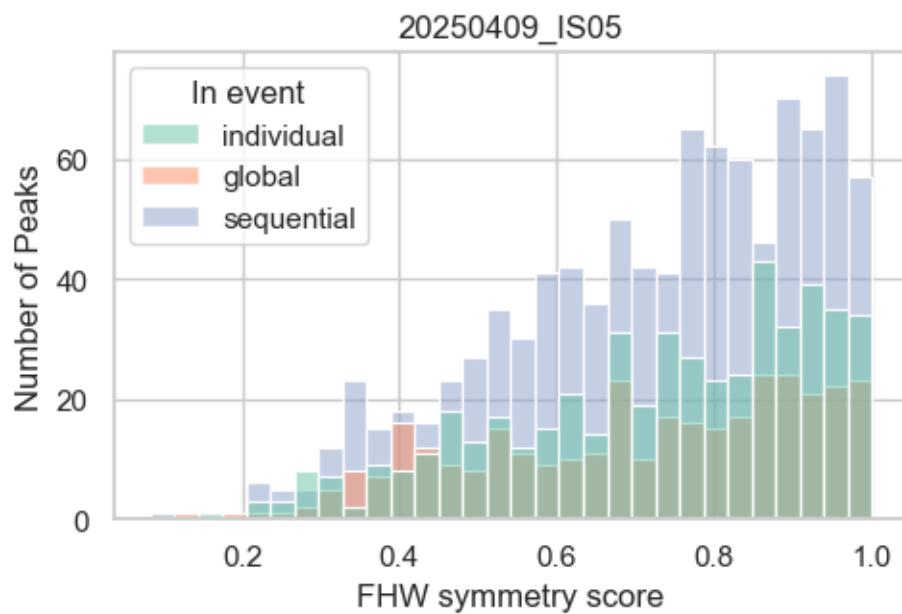
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

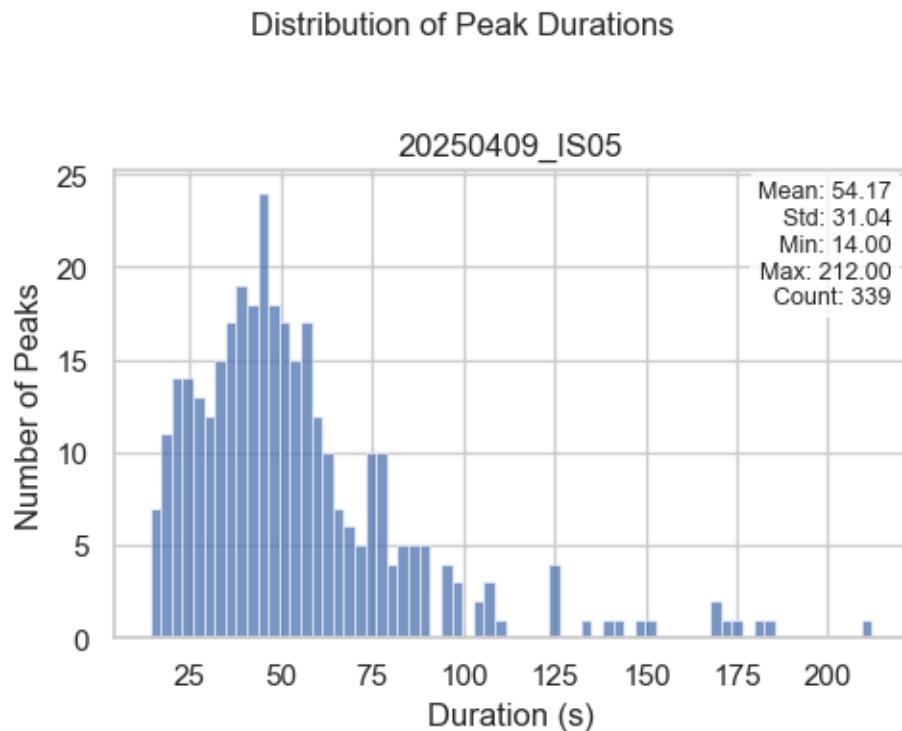


Distribution of Peak Symmetry Scores by Group

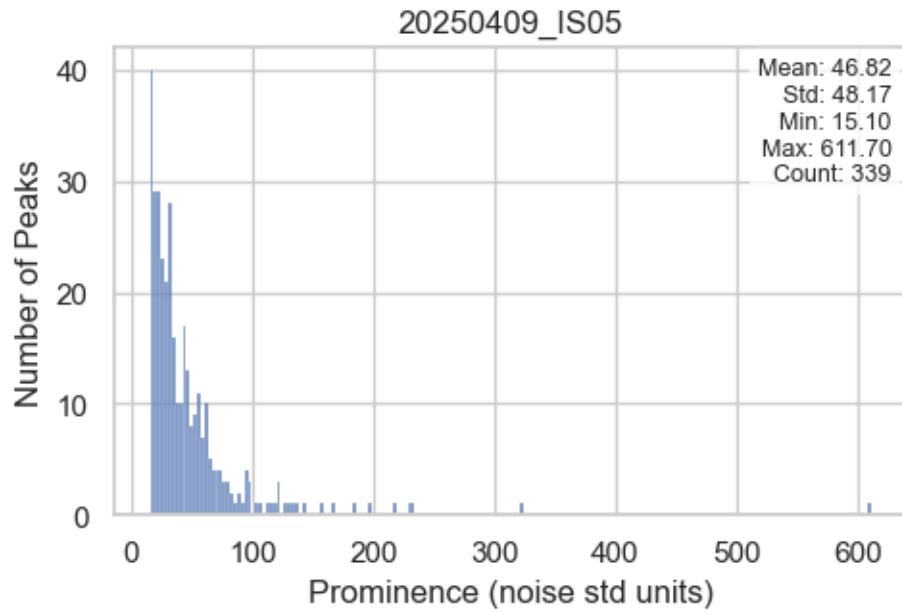


1.2 GLOBAL EVENTS

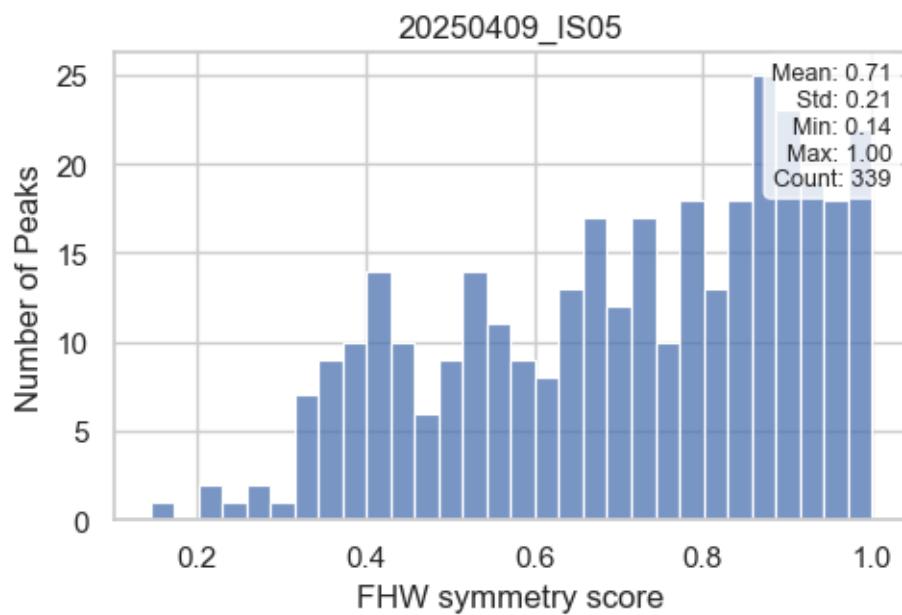
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

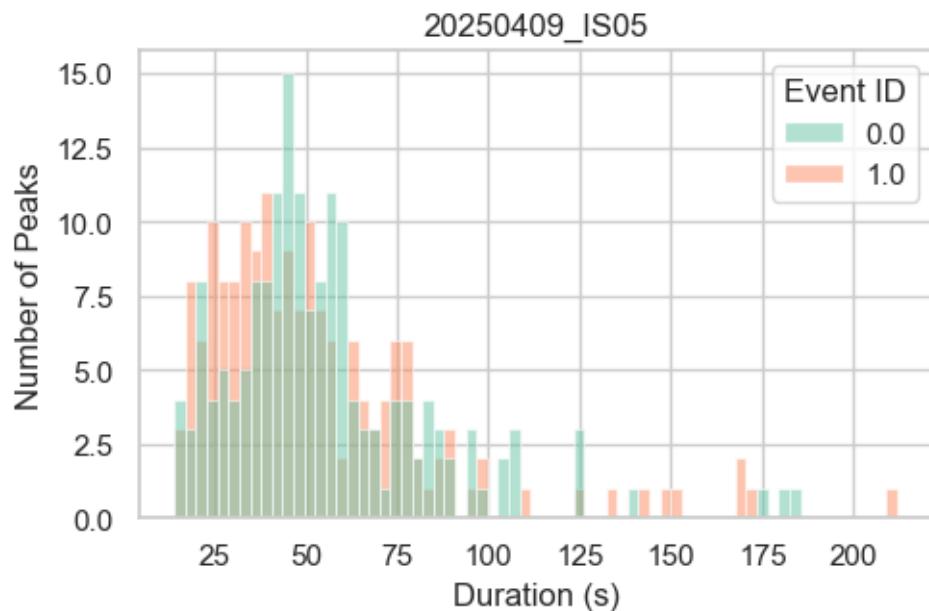


Distribution of Peak Symmetry Scores

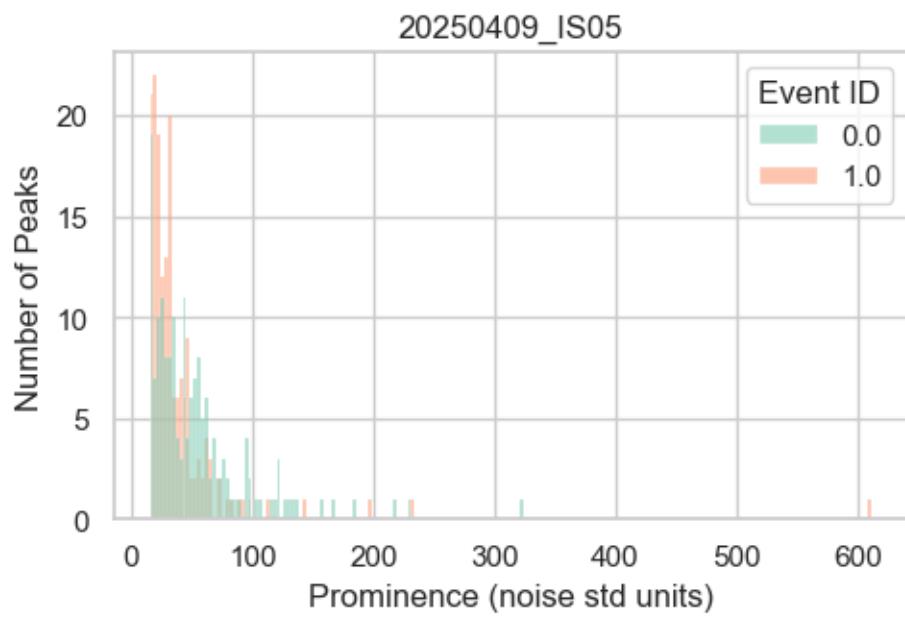


1.2.2 Peak statistics in global event per event ID

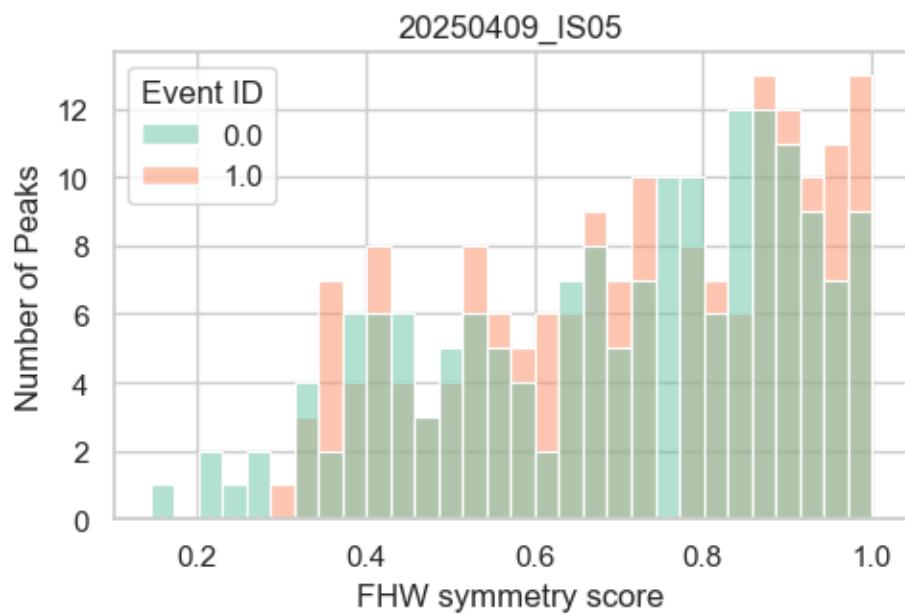
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



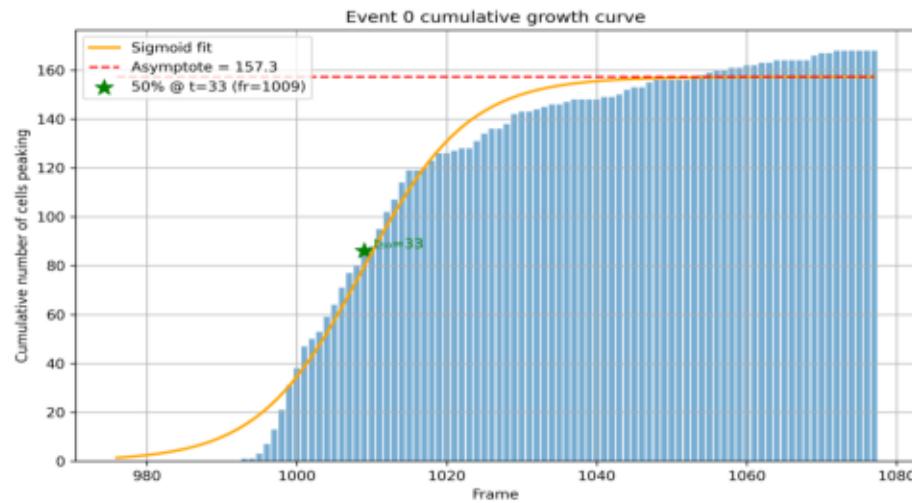
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

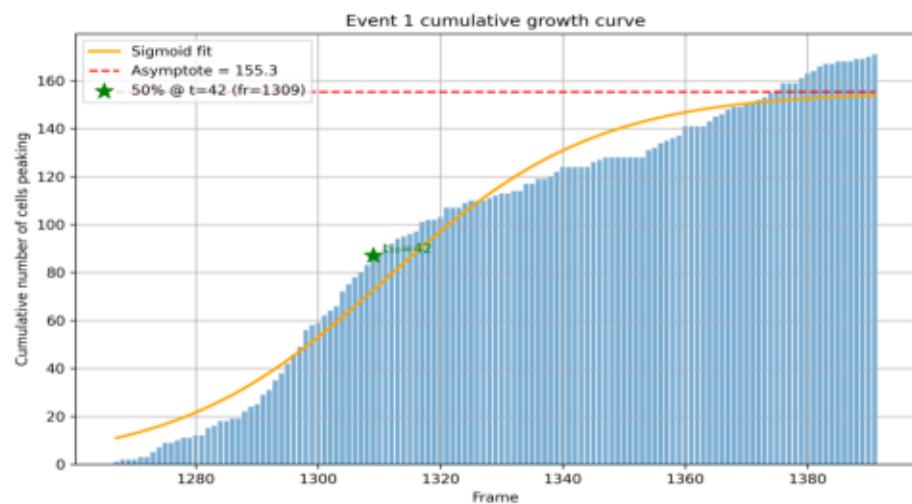
Event Activity Overlay (Event ID: 0)

20250409_IS05



Event Activity Overlay (Event ID: 1)

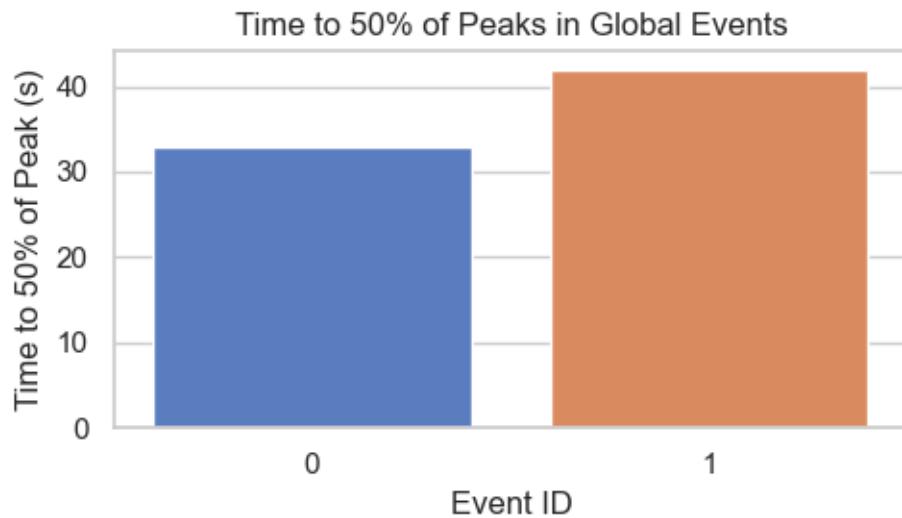
20250409_IS05



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

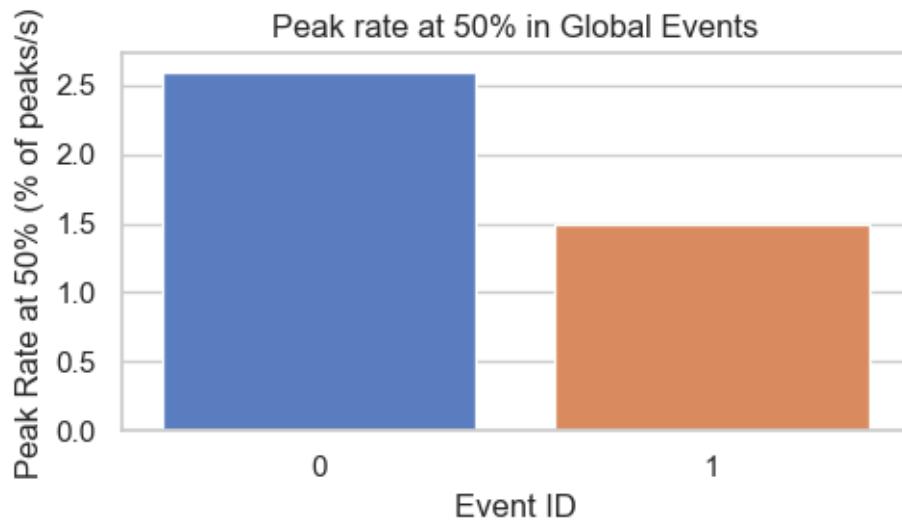
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

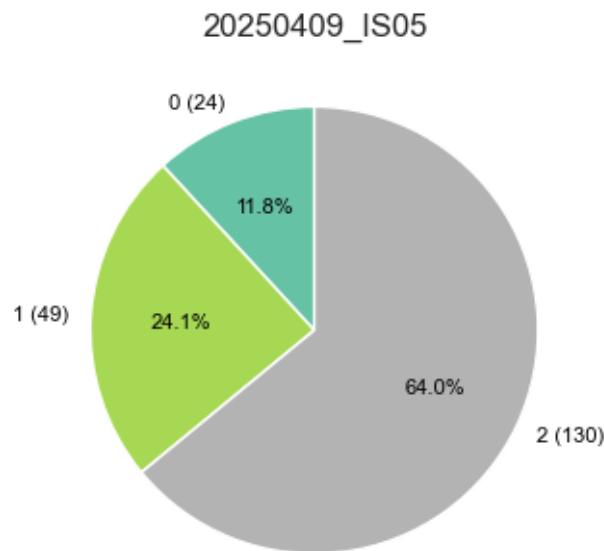
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



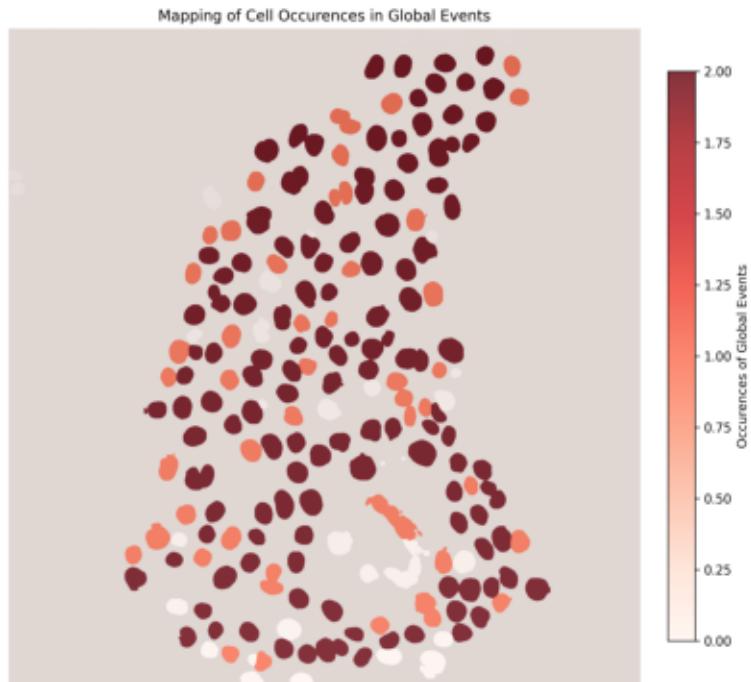
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

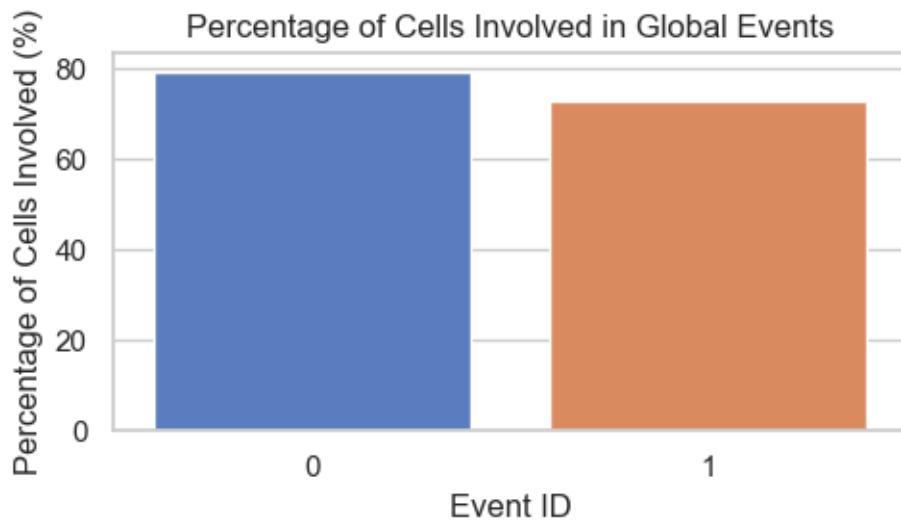
20250409_IS05



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



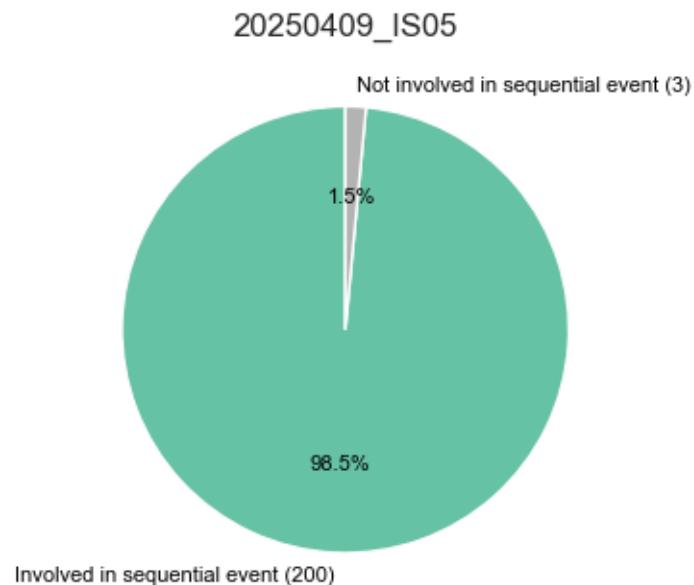
1.2.5 Inter-event interval analysis

Intervals between global event peaks: [292.0]

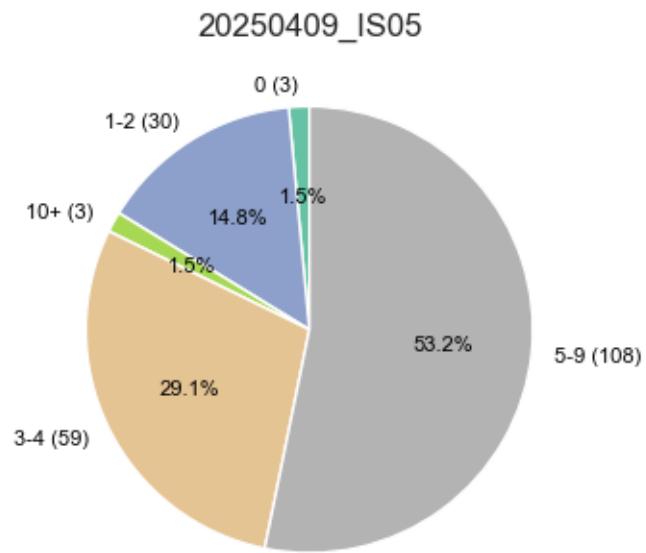
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

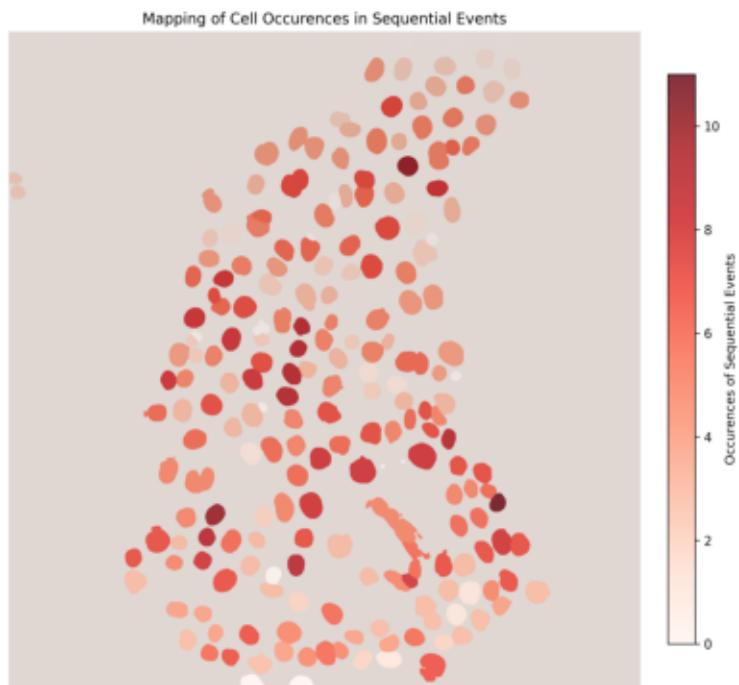


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

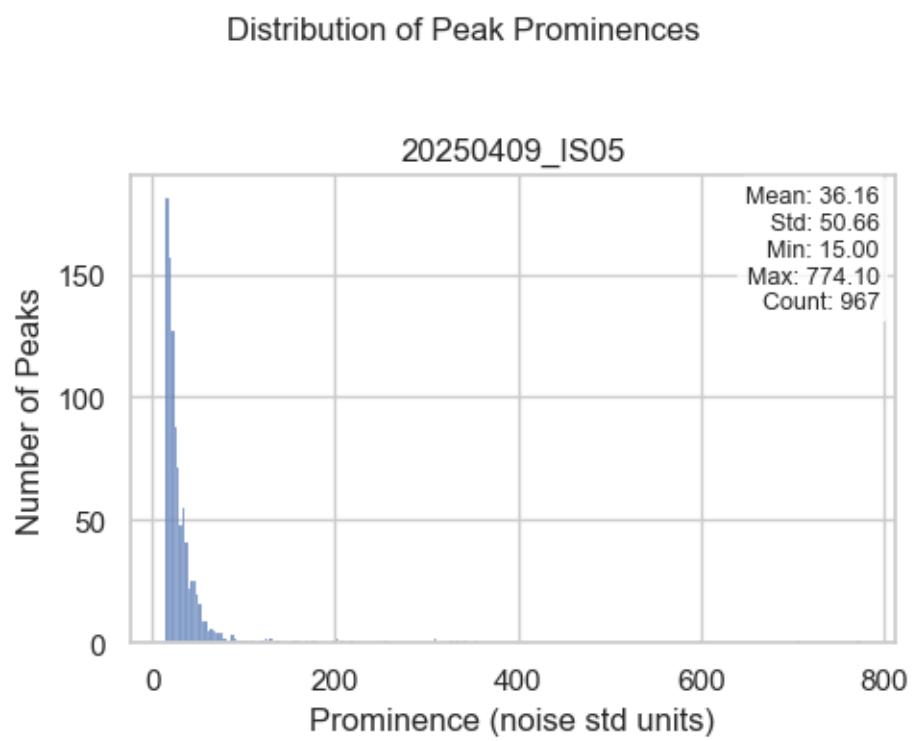
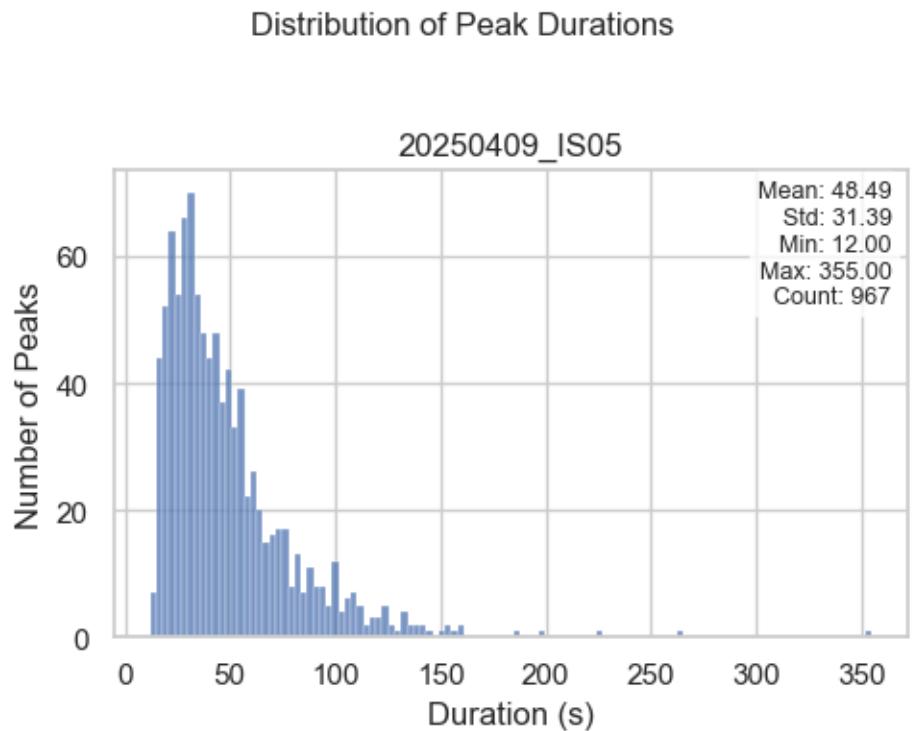


Cell Mapping with Occurrences in Sequential Events Overlay

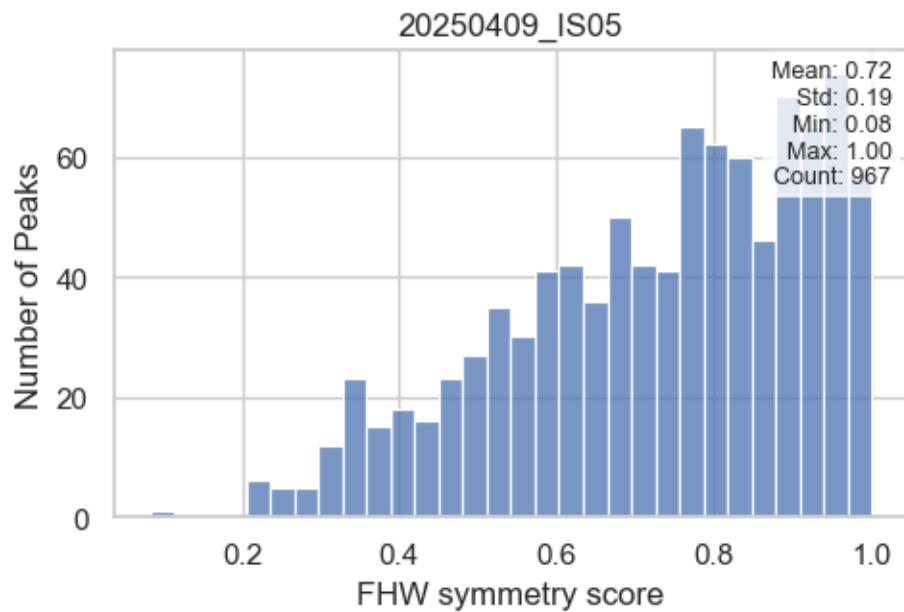
20250409_IS05



1.3.2 Peaks statistics in sequential events

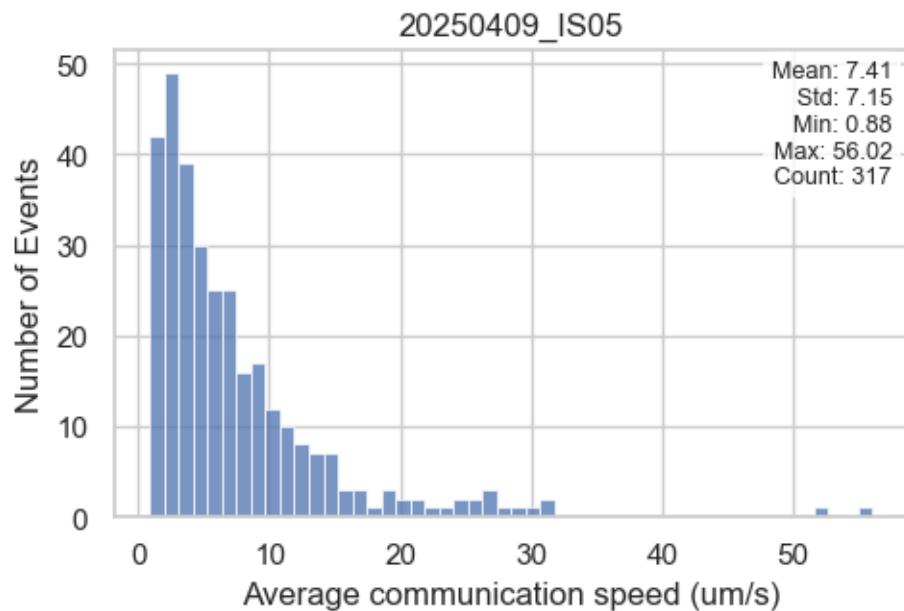


Distribution of Peak Symmetry Scores

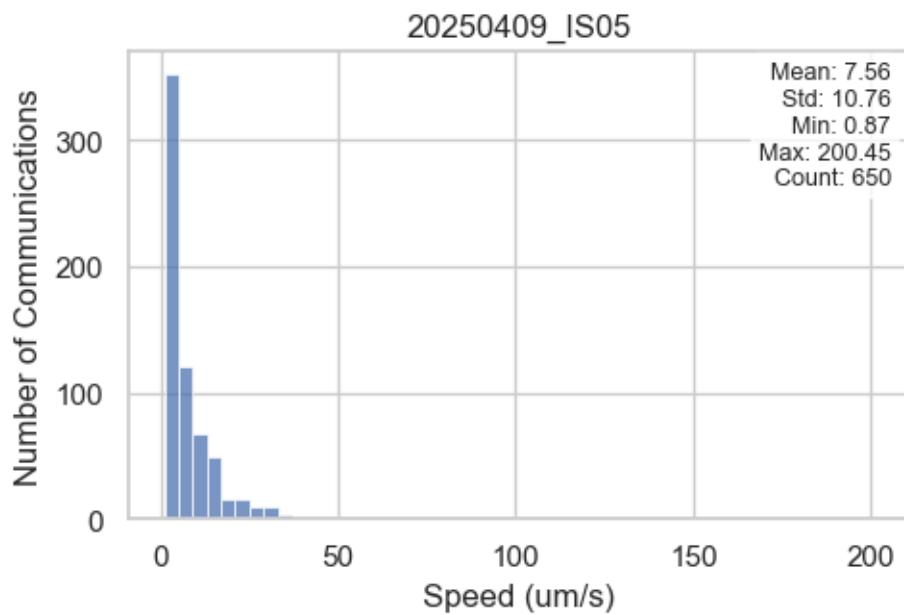


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

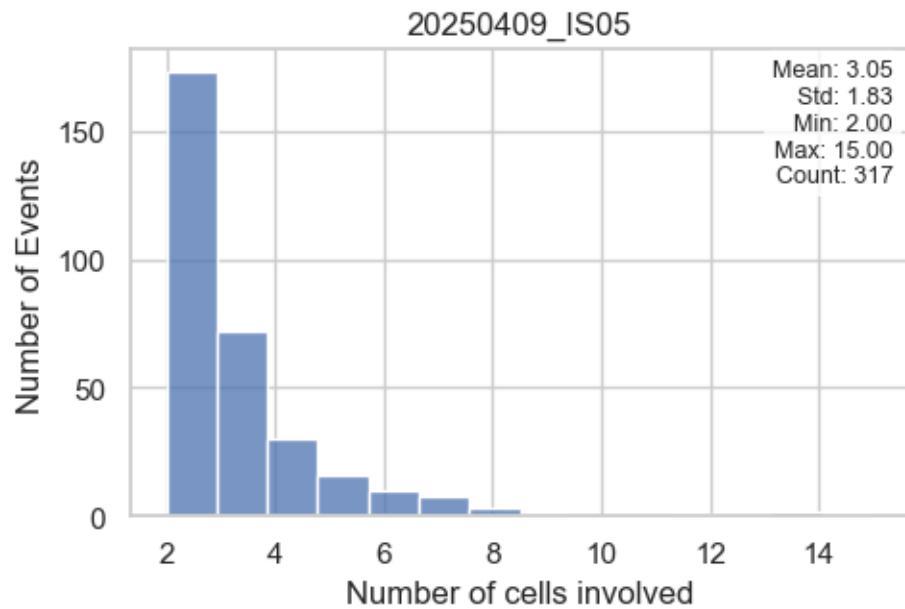


Distribution of Cell-Cell Communication Speeds



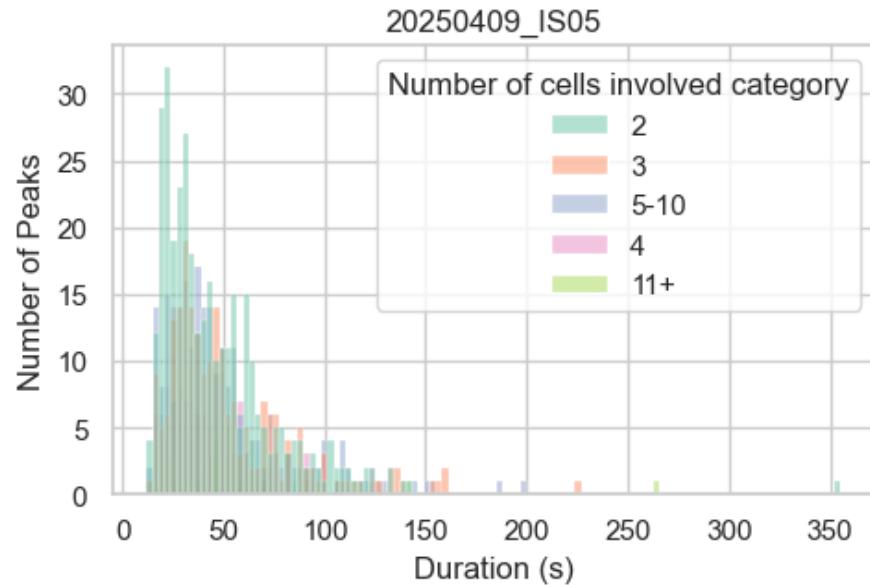
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

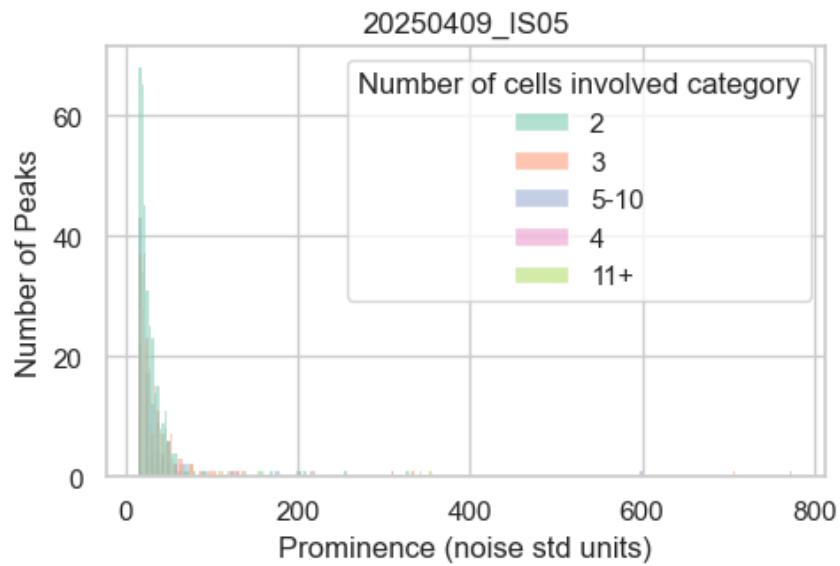


1.3.5 Influence of cell count per event on statistics

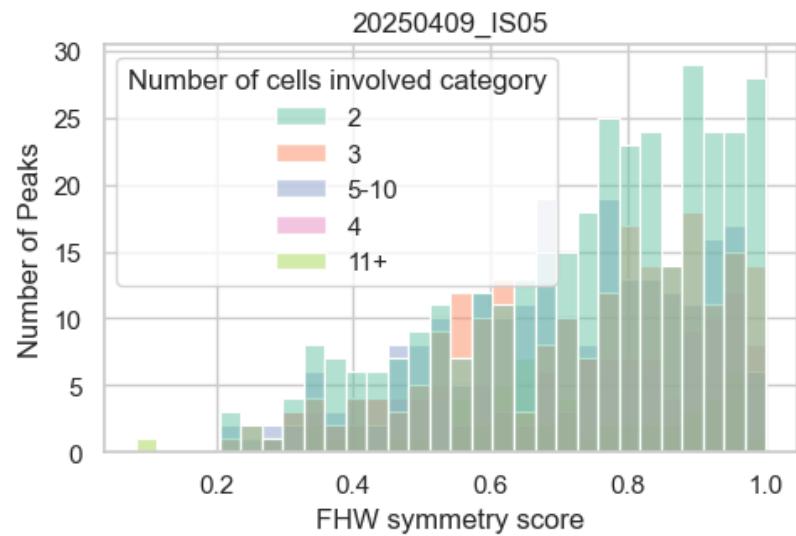
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



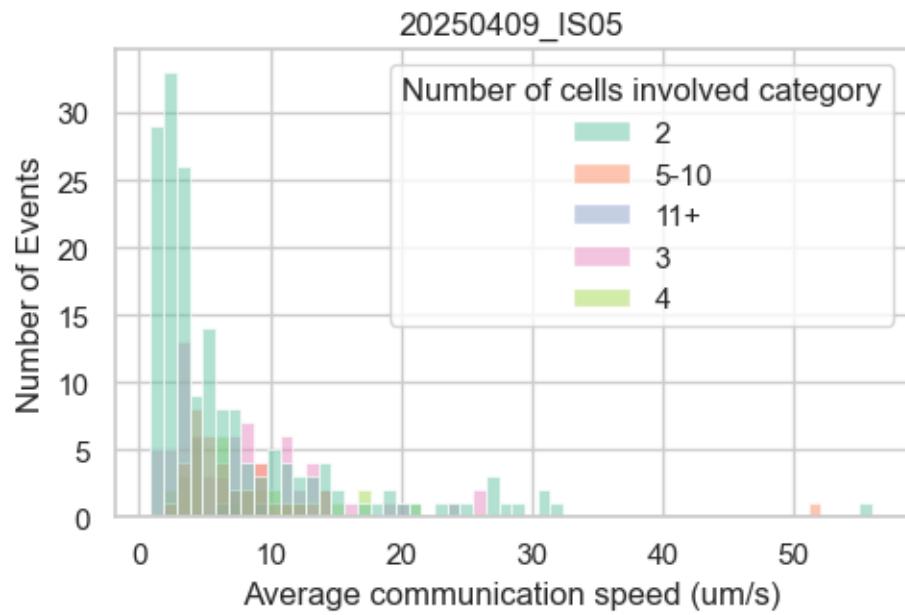
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



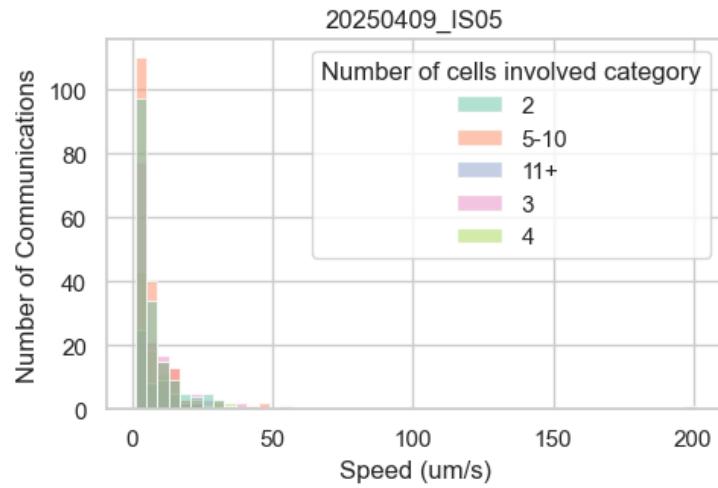
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

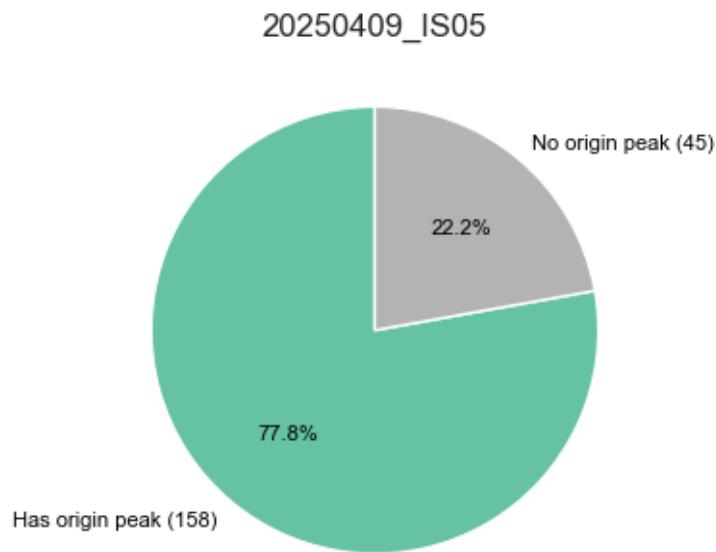


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events



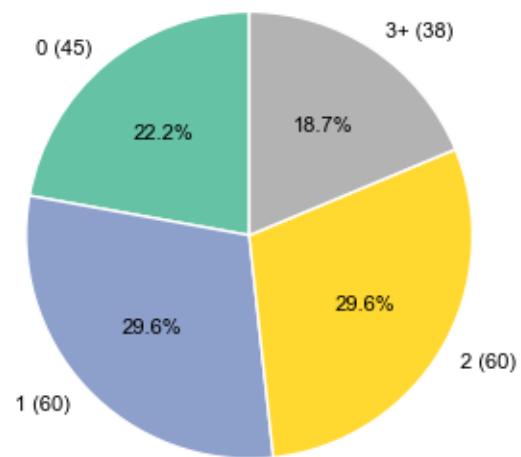
1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell



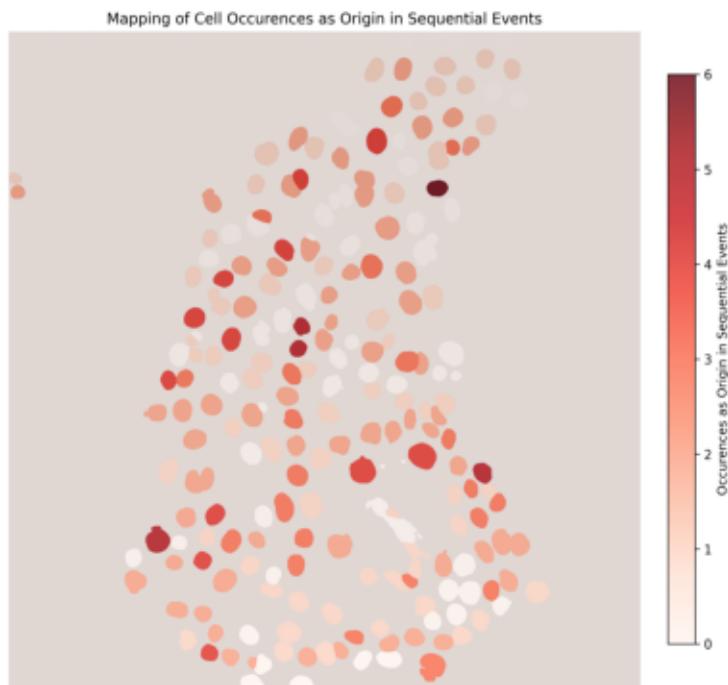
Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)

20250409_IS05



Cell Mapping with Origin Peaks Overlay

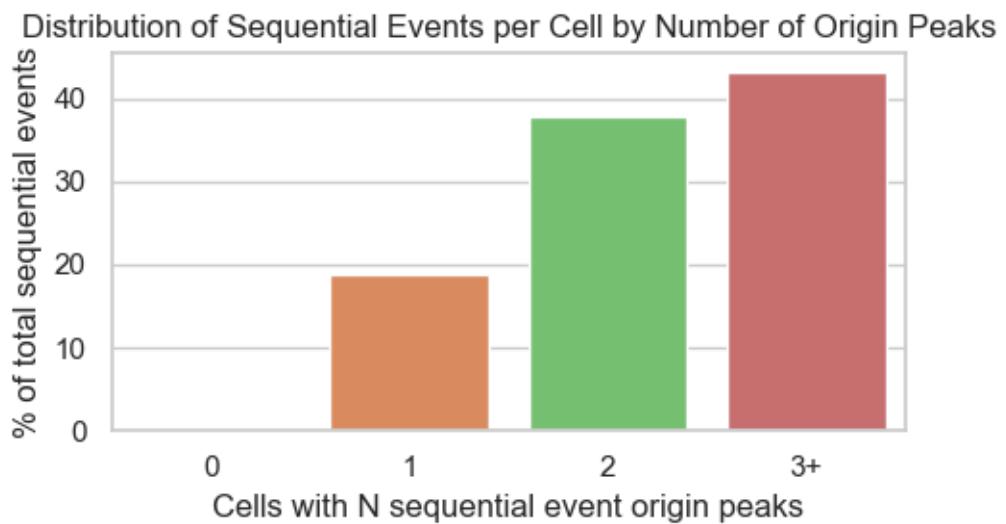
20250409_IS05



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

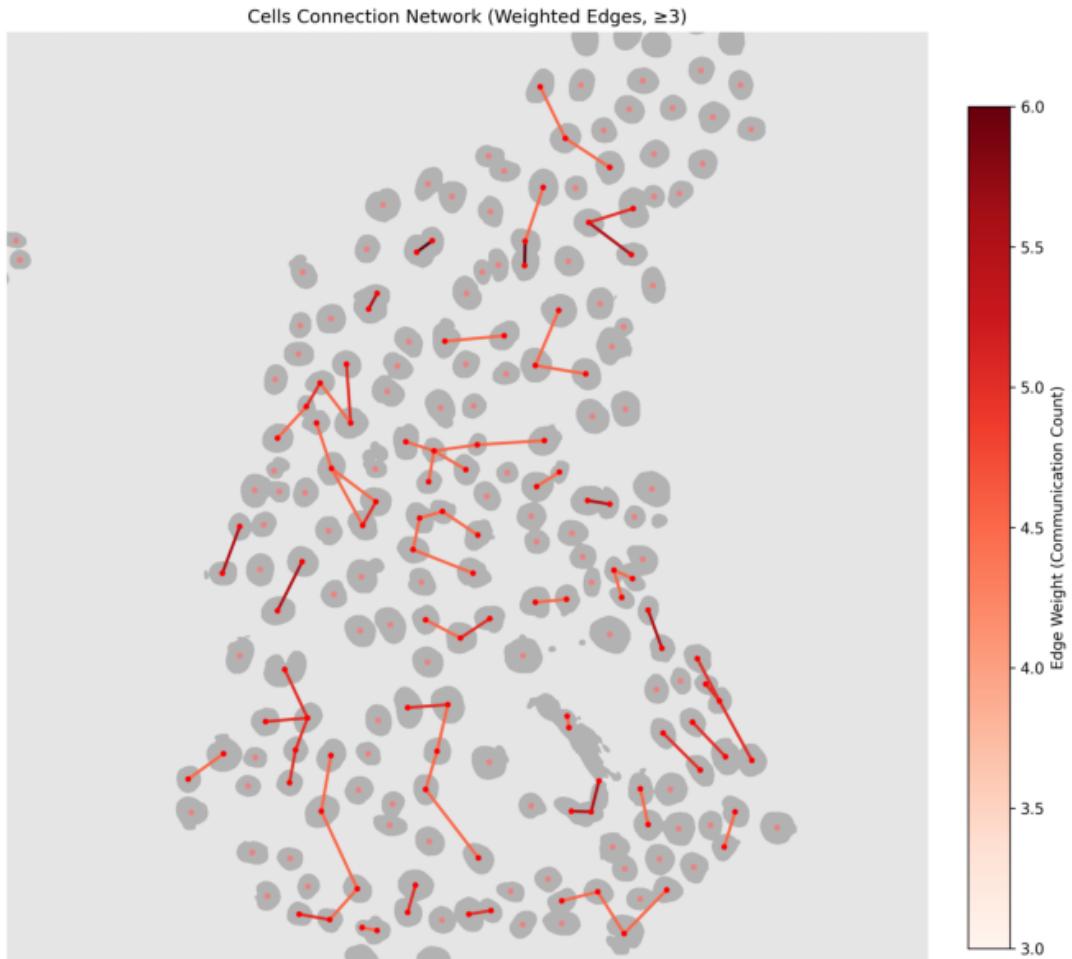
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.3.7 Connection network between cells

Cell Connection Network Graph

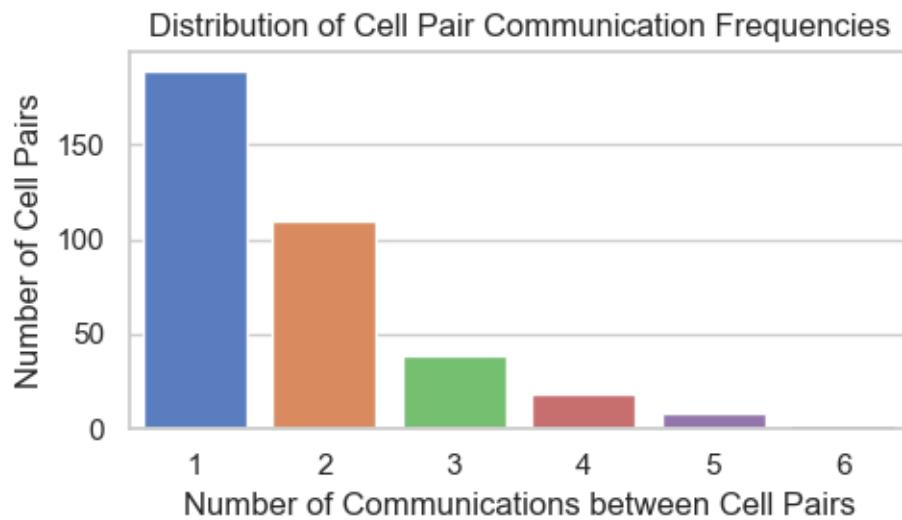
20250409_IS05



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

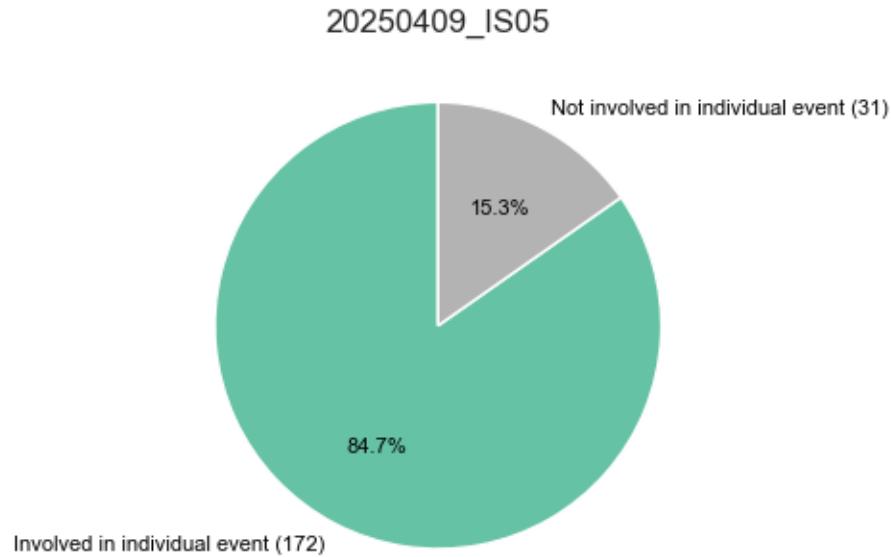
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.4 INDIVIDUAL EVENTS

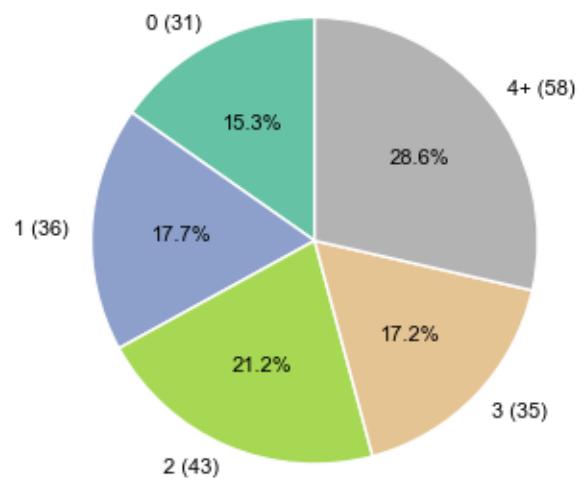
1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events



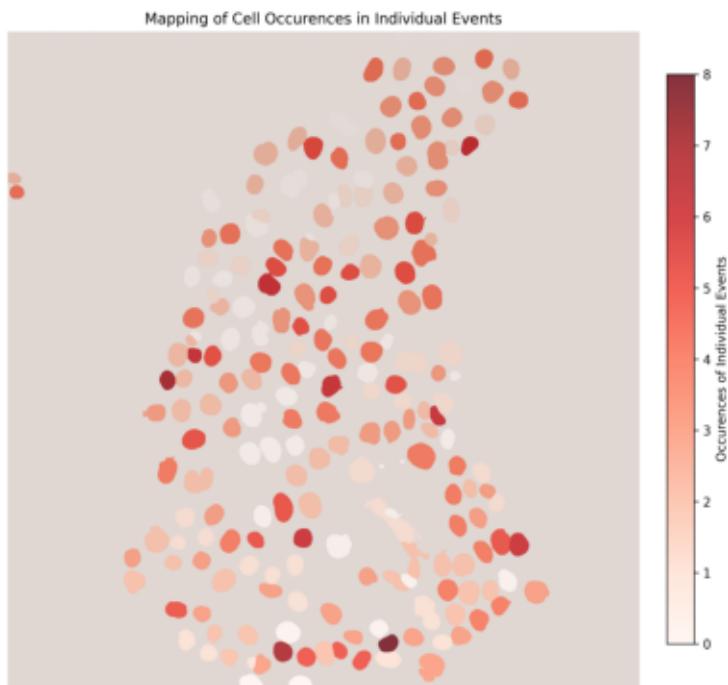
Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)

20250409_IS05

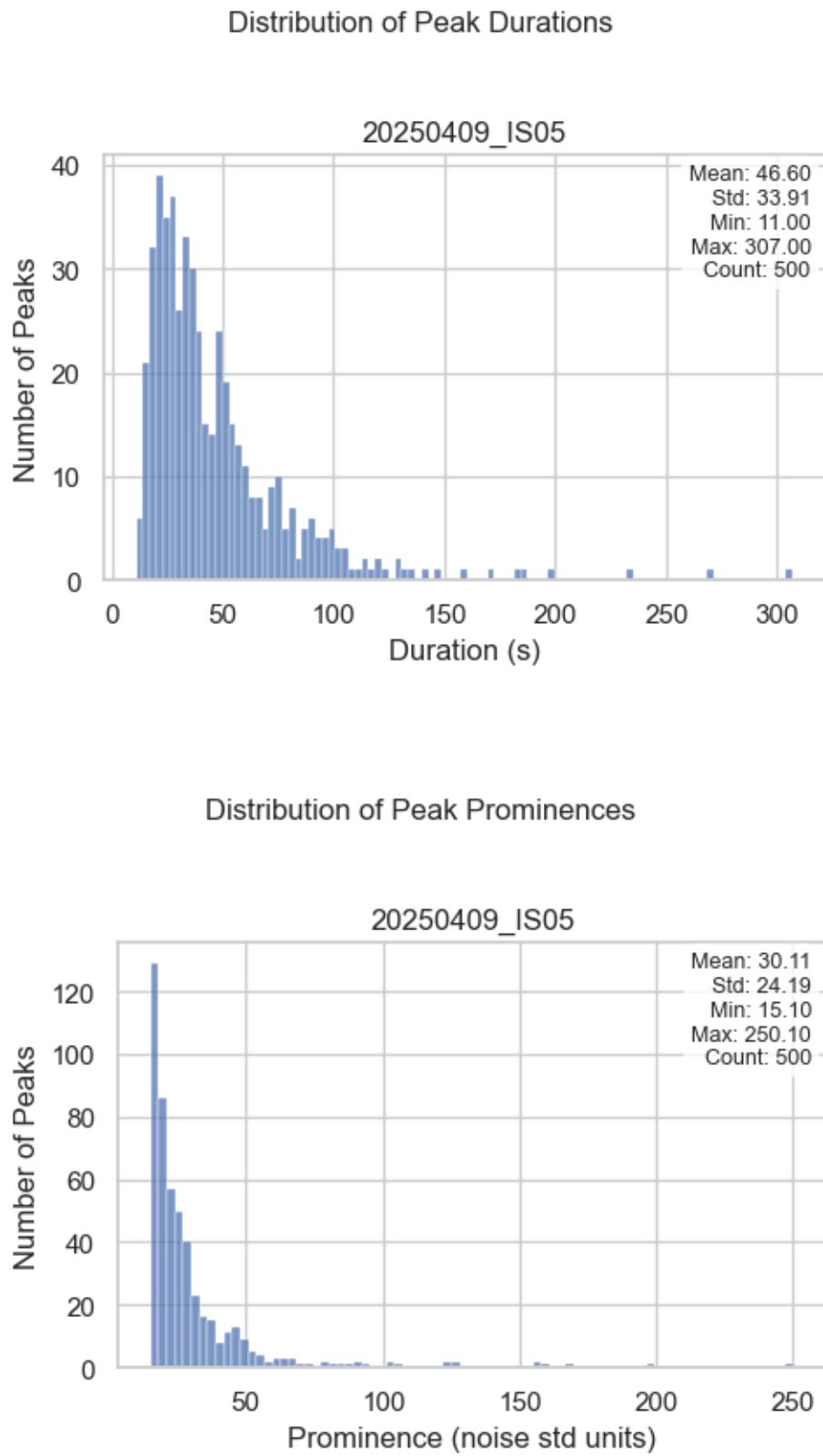


Cell Mapping with Occurrences in Individual Events Overlay

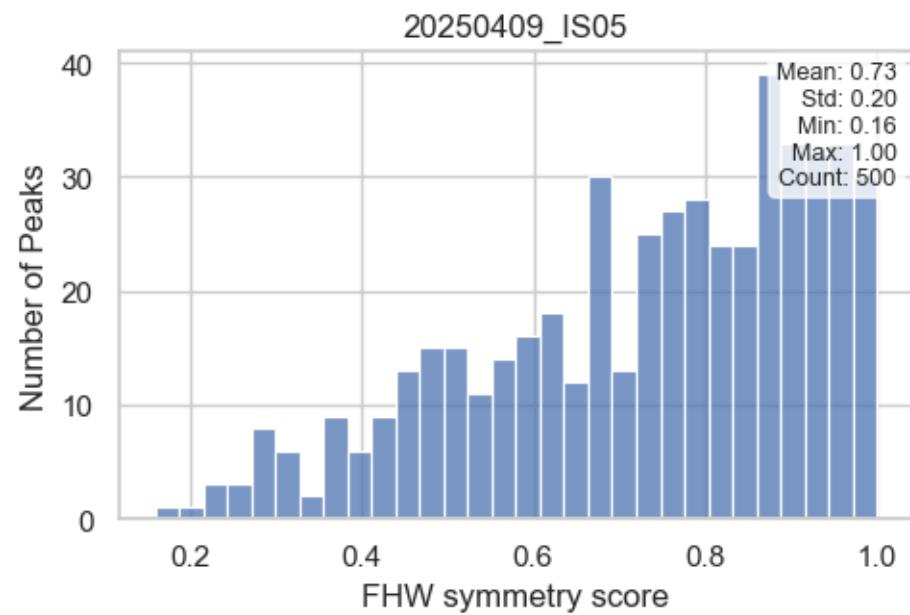
20250409_IS05



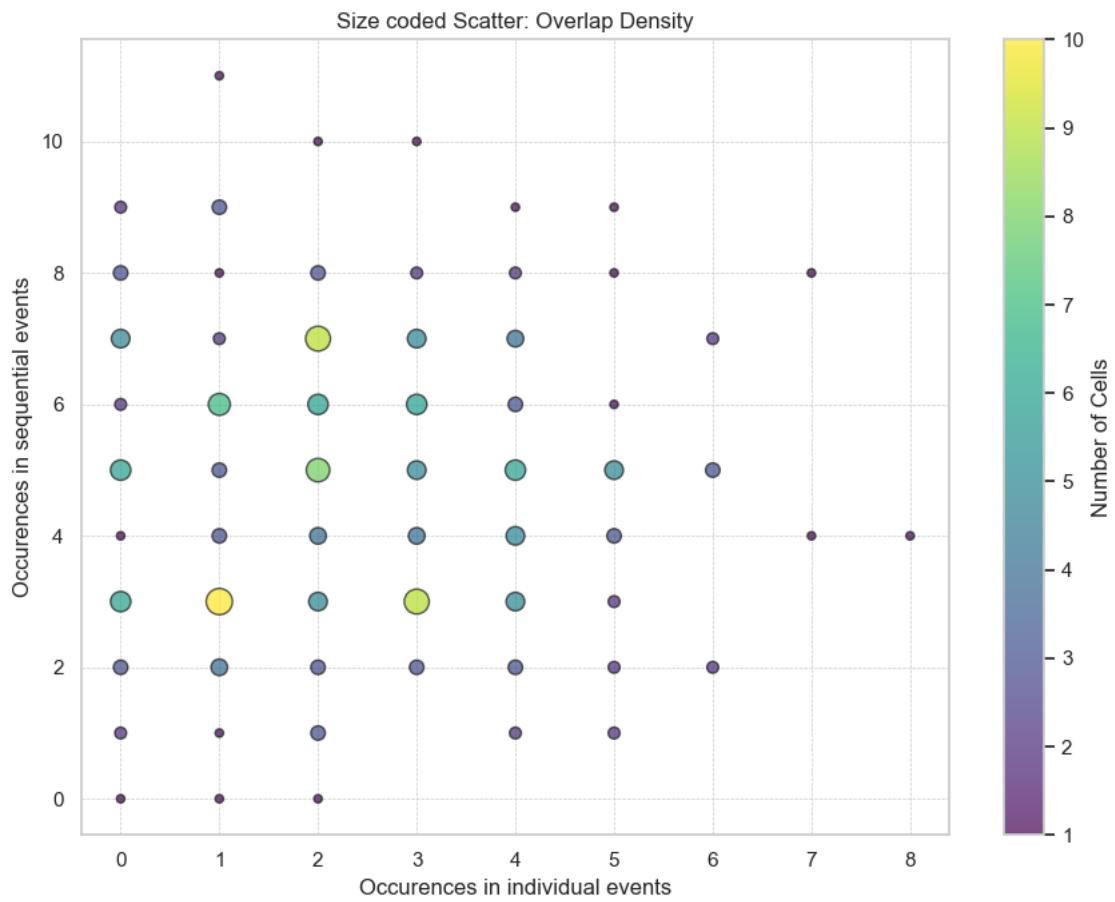
1.4.2 Peaks statistics in individual events



Distribution of Peak Symmetry Scores



1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 203
- Hoechst image taken at t=1801: 204
- Number of cells difference: absolute 1, relative 0.49%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 359358
- Pixels segmented as cell at t=1801: 377004
- Overlapping pixels between t=0 and t=1801: 345439 (93.82% of total)
- Pixels exclusive to t=0: 13919 (3.87% of total)
- Pixels exclusive to t=1801: 31565 (8.37% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

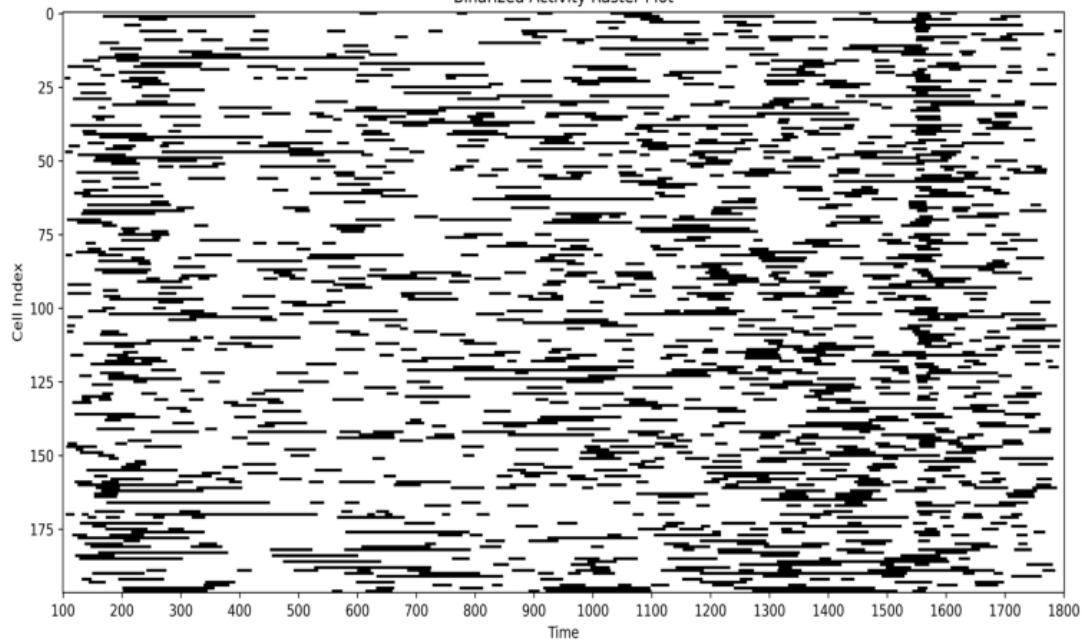
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

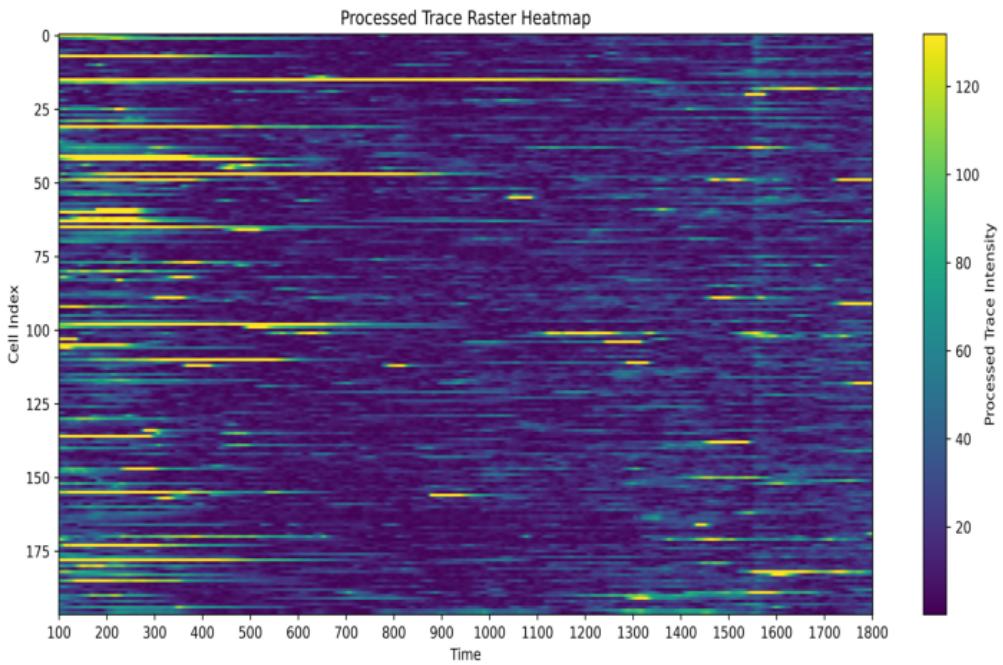
20250409_IS07

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250409_IS07



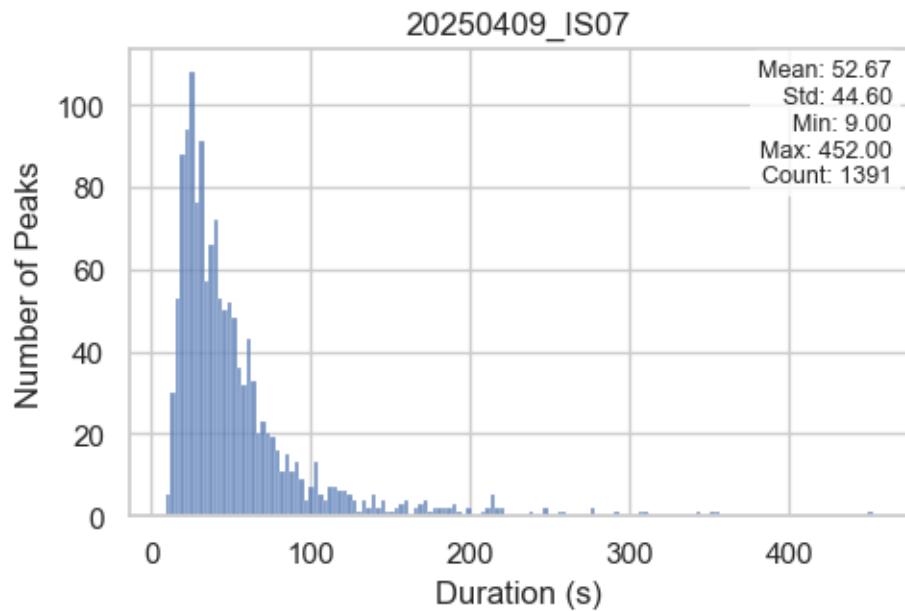
1.1.2 Peaks population

Total number of peaks: 1391

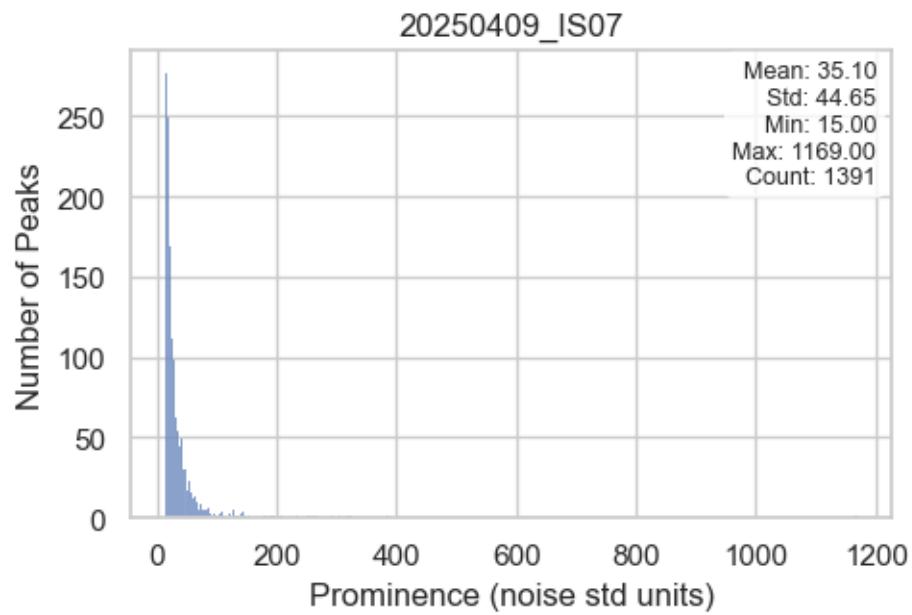
Total number of cells: 197

1.1.3 Peaks statistics

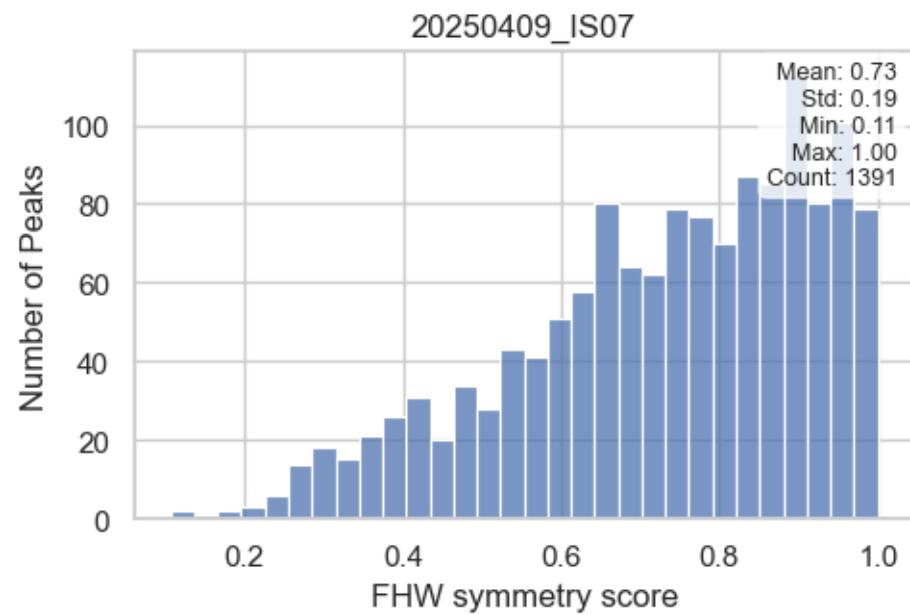
Distribution of Peak Durations



Distribution of Peak Prominences

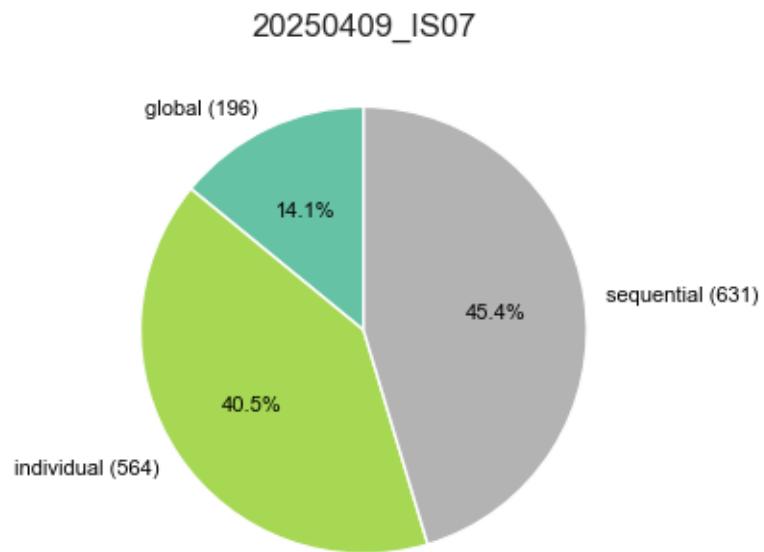


Distribution of Peak Symmetry Scores



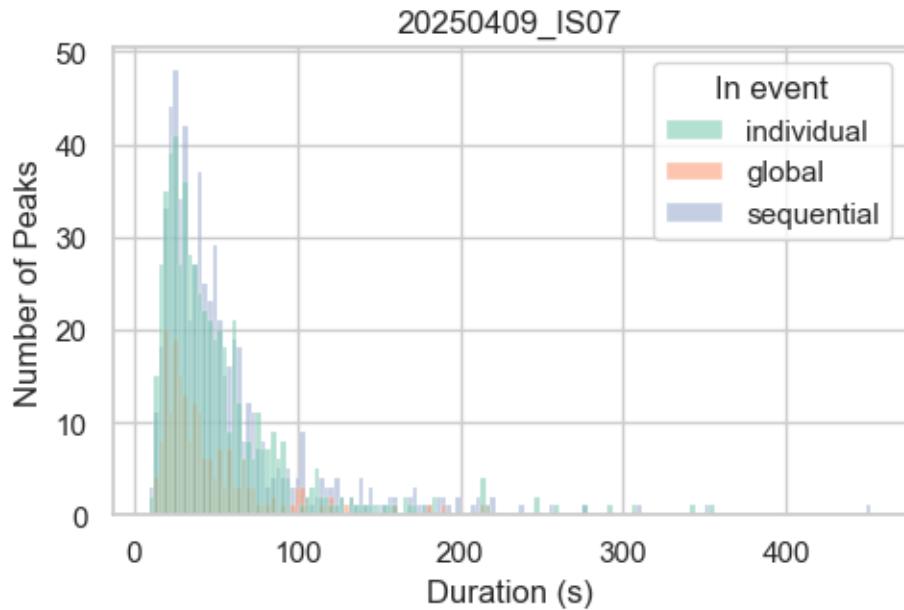
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

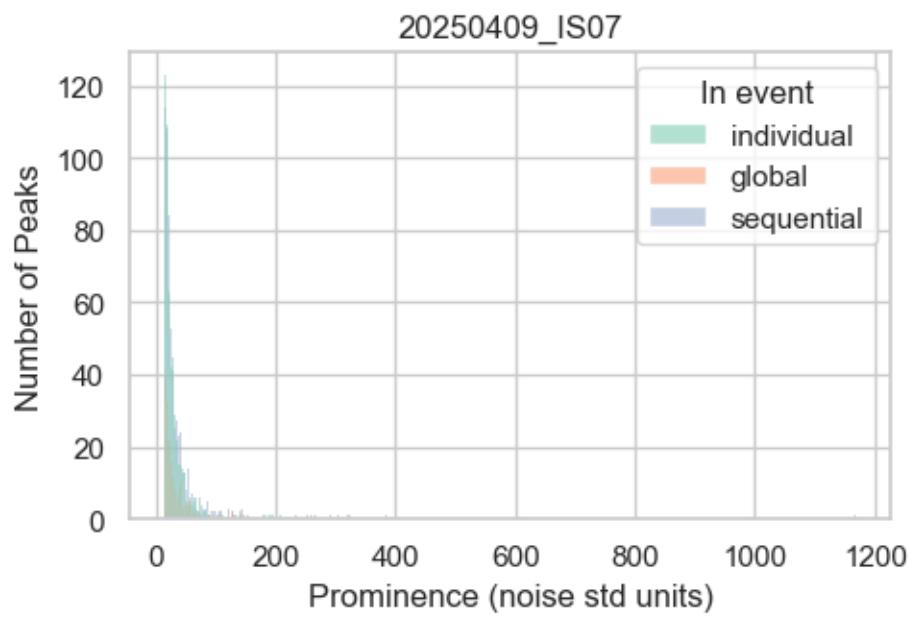


1.1.5 Peaks statistics per event types

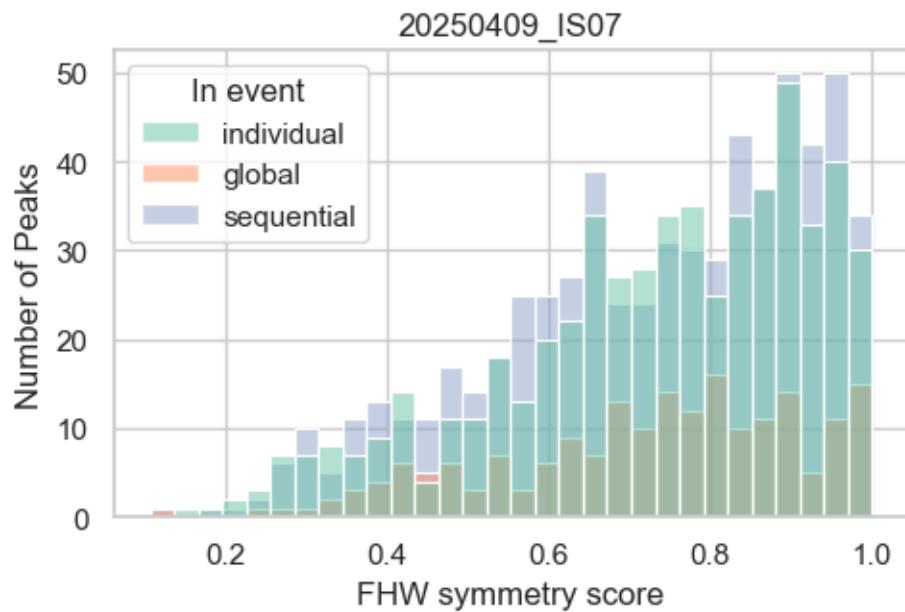
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

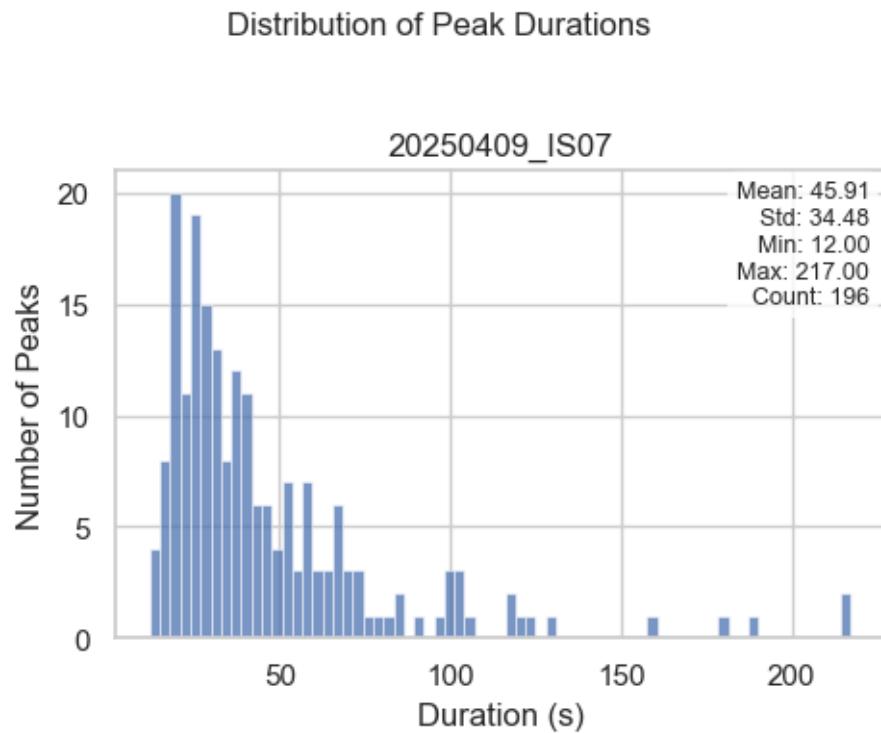


Distribution of Peak Symmetry Scores by Group

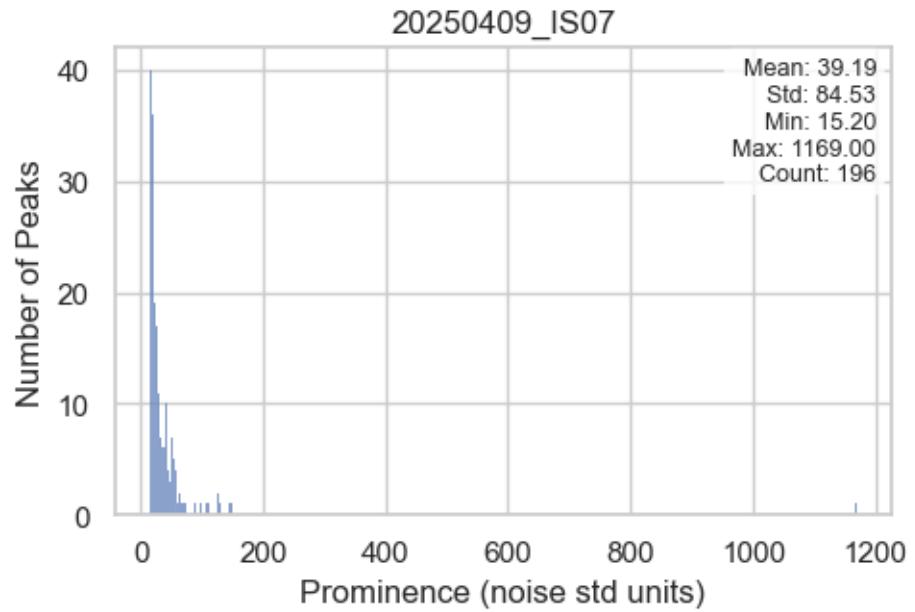


1.2 GLOBAL EVENTS

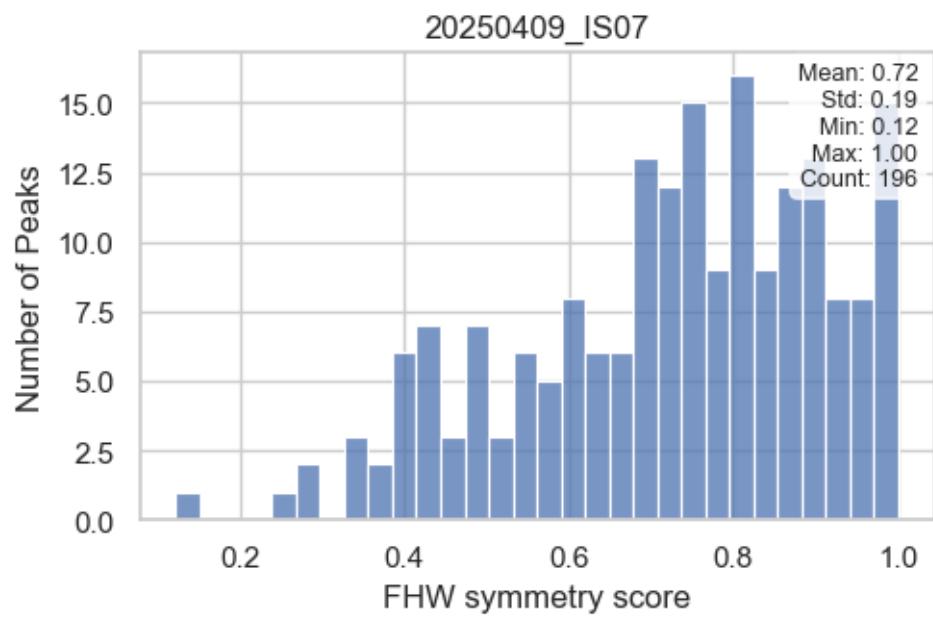
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

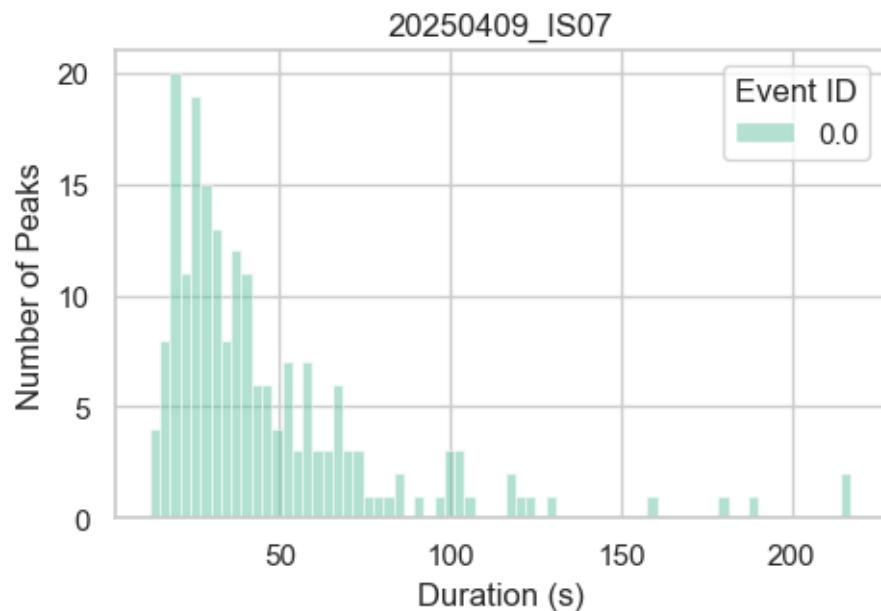


Distribution of Peak Symmetry Scores

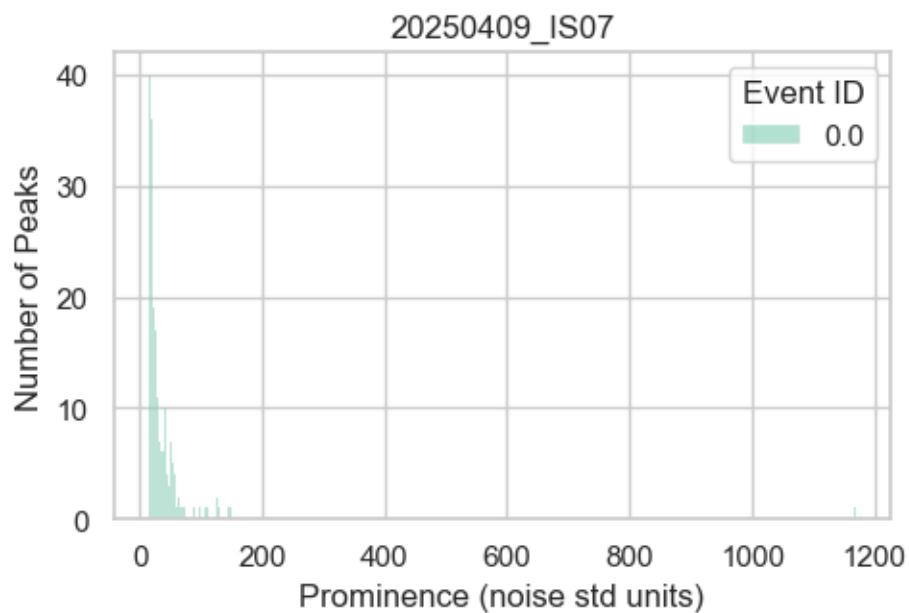


1.2.2 Peak statistics in global event per event ID

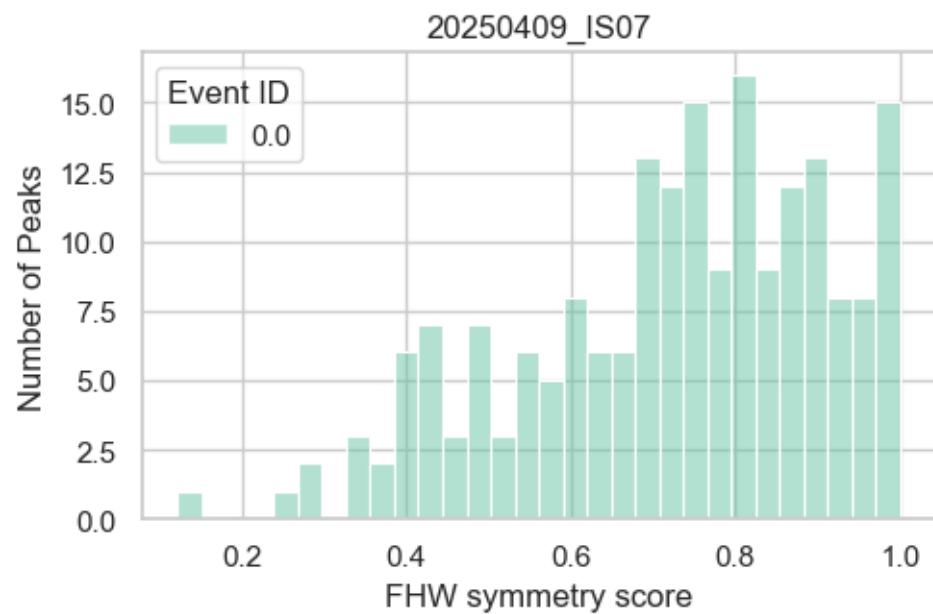
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



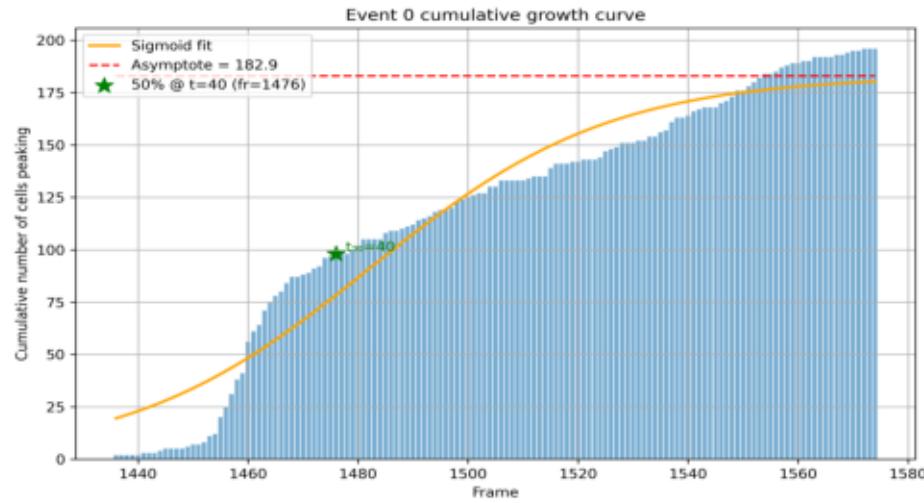
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

Event Activity Overlay (Event ID: 0)

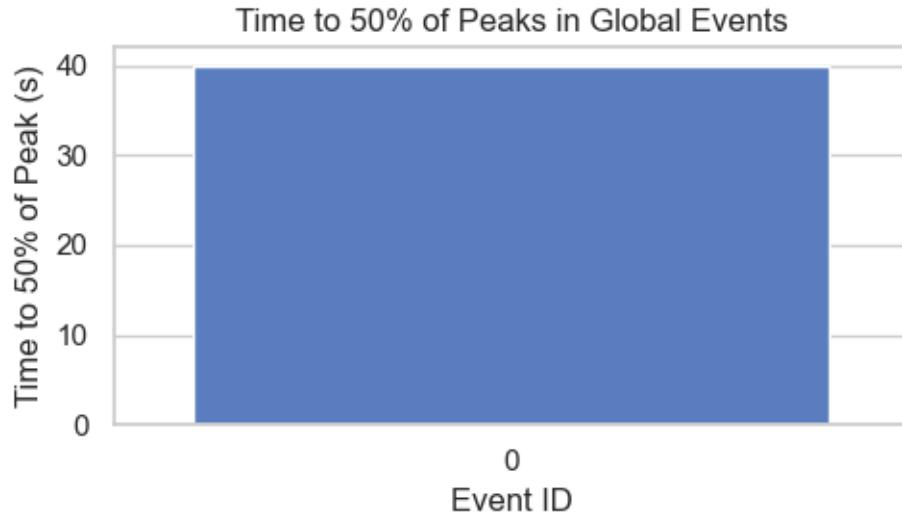
20250409_IS07



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.
```

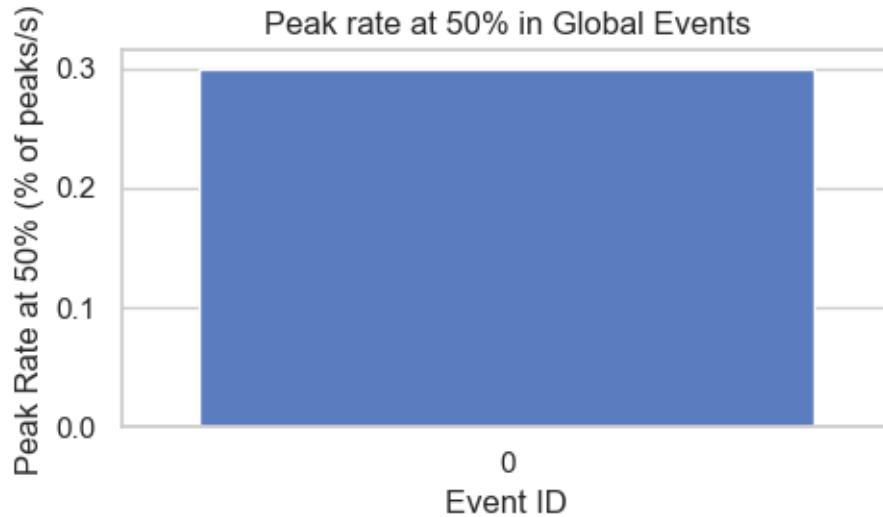
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column, dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys
is\visualizers.py:257: FutureWarning:
```

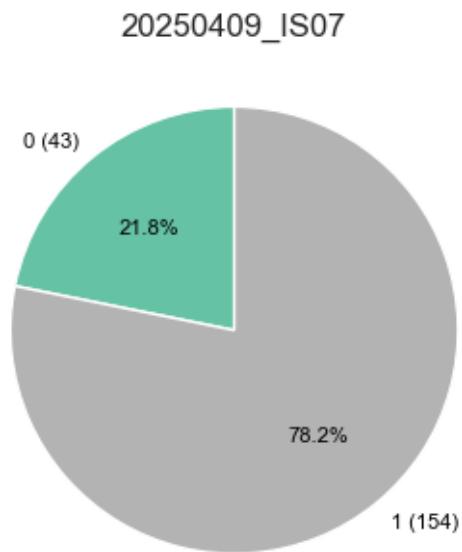
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



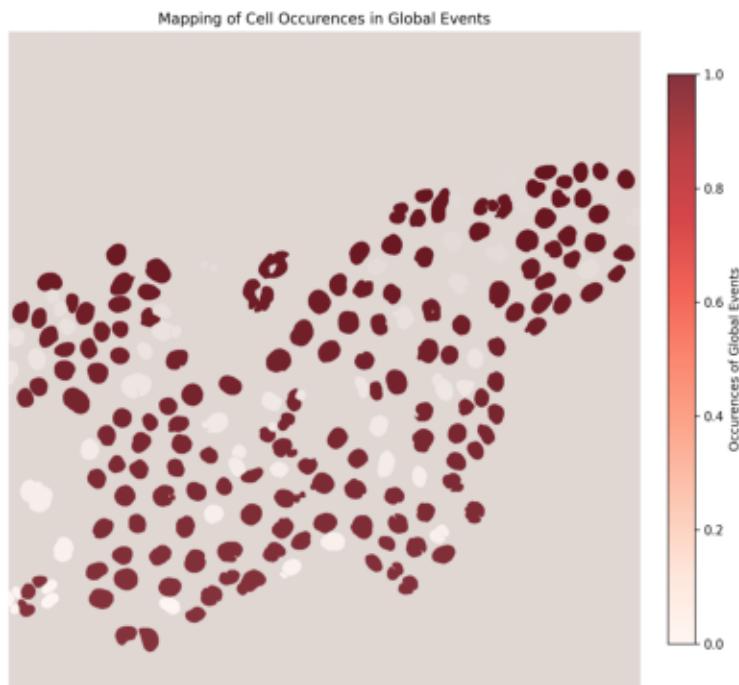
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

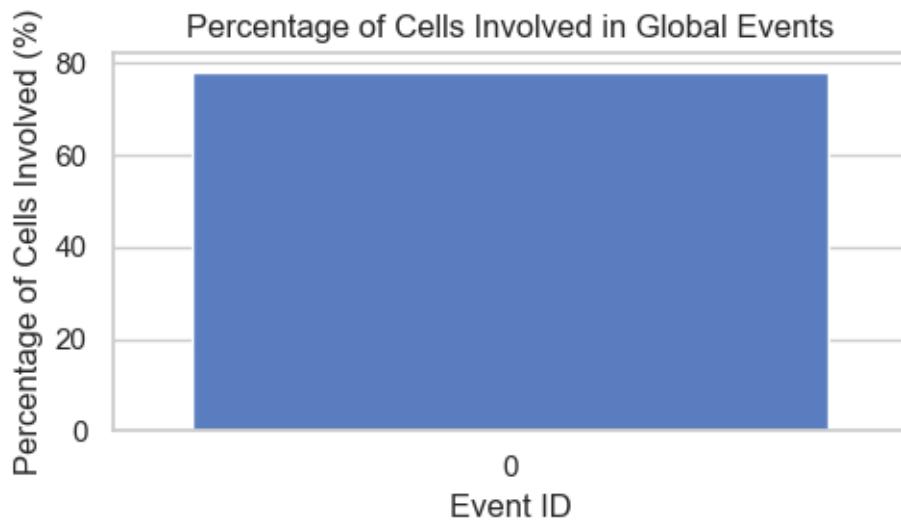
20250409_IS07



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



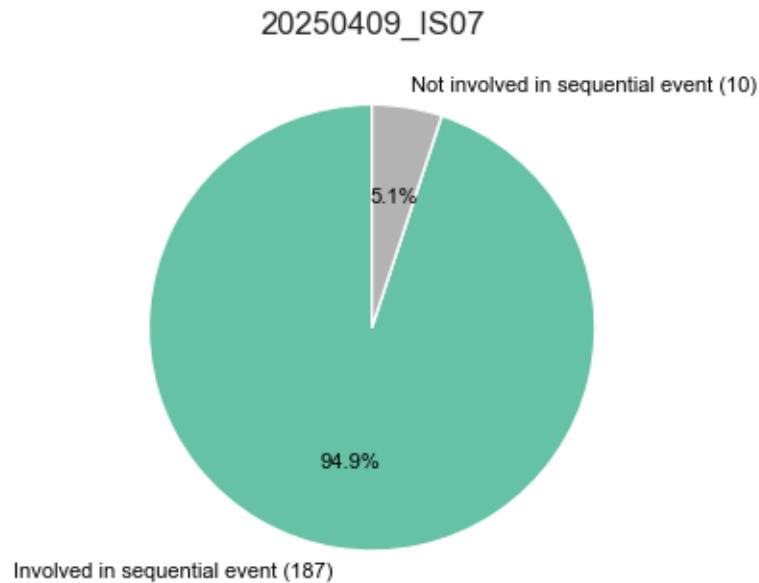
1.2.5 Inter-event interval analysis

Intervals between global event peaks: []

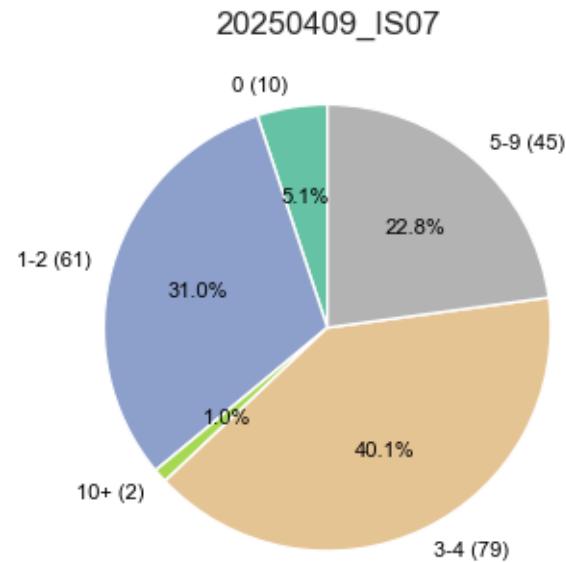
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

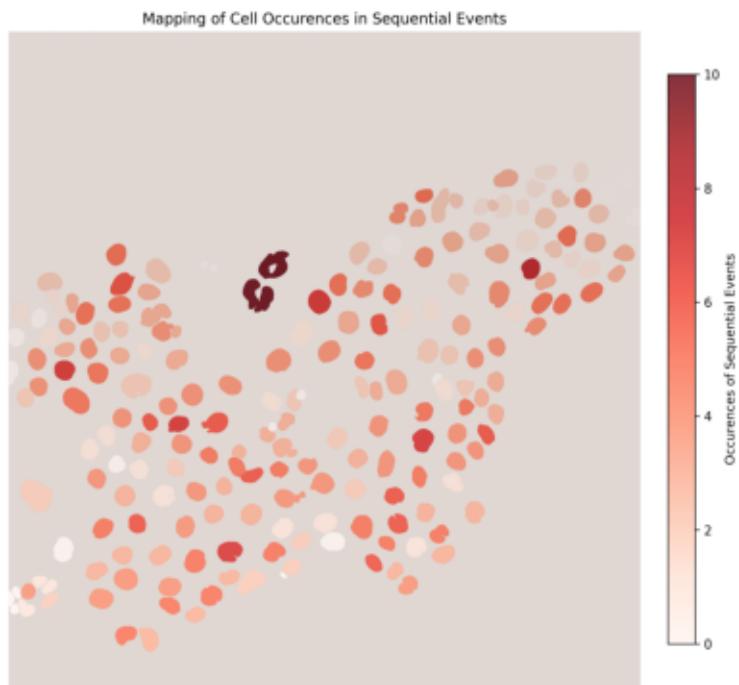


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

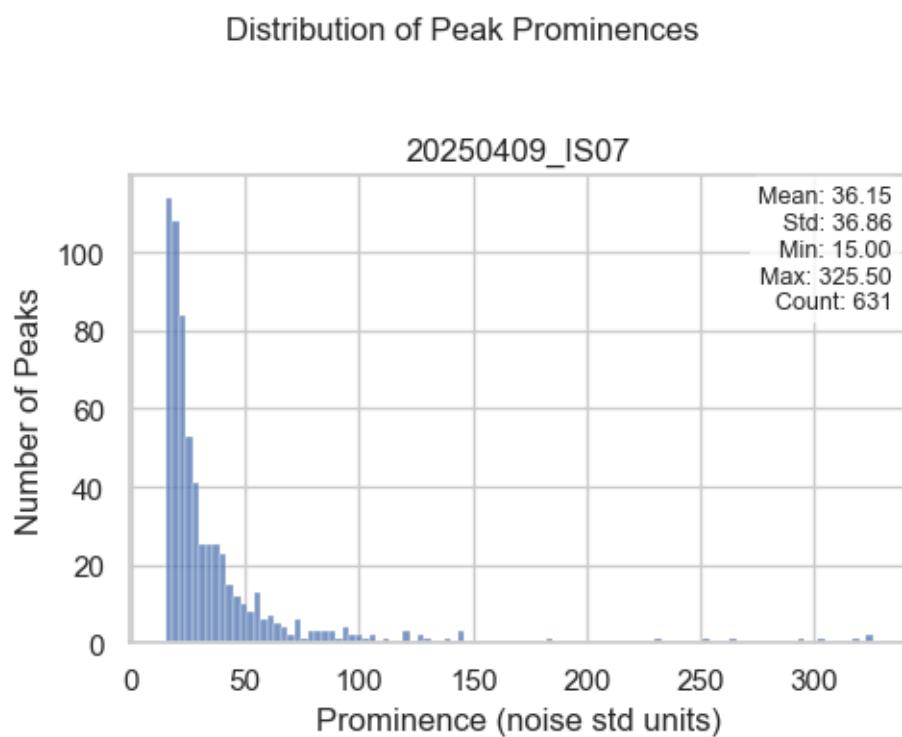
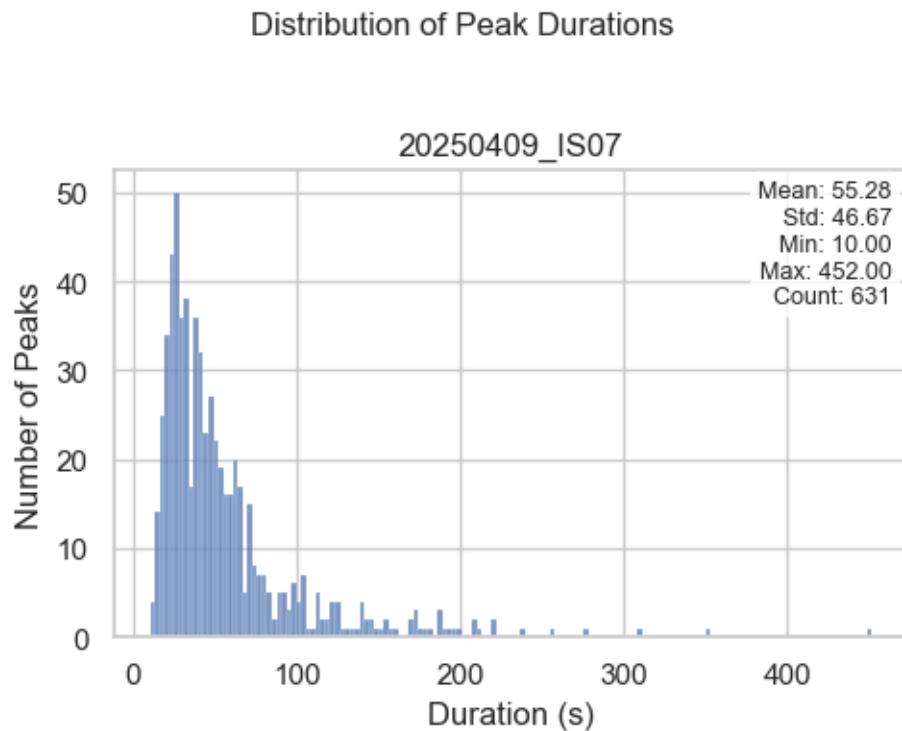


Cell Mapping with Occurrences in Sequential Events Overlay

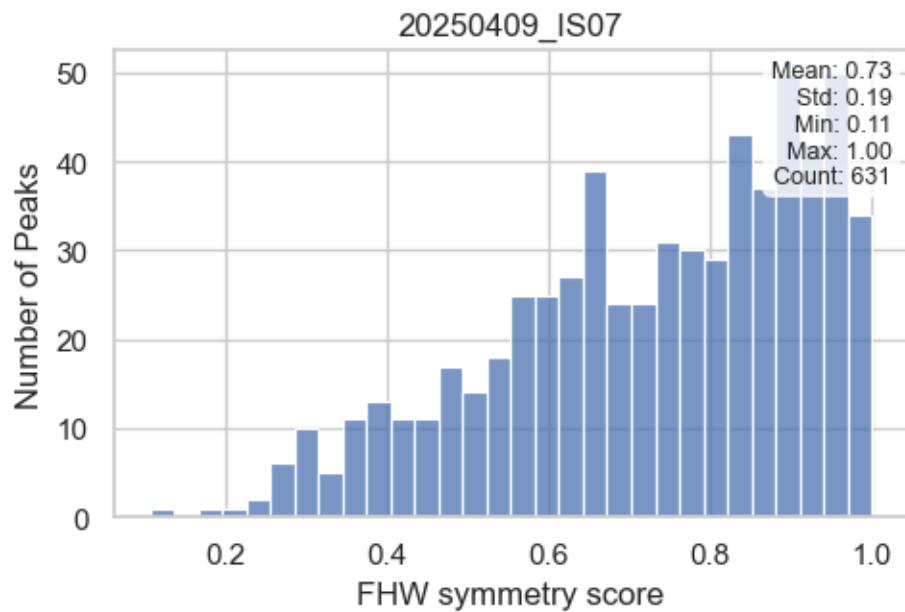
20250409_IS07



1.3.2 Peaks statistics in sequential events

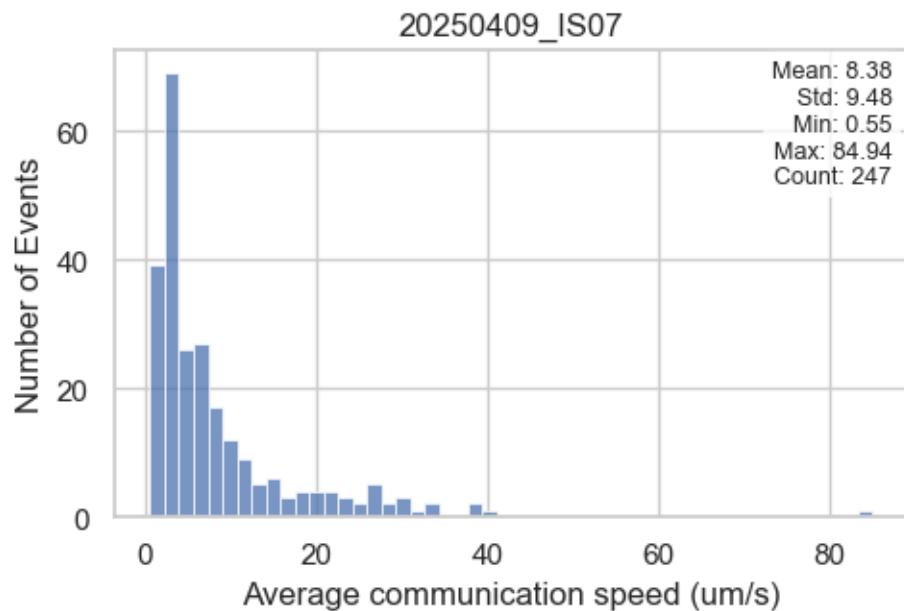


Distribution of Peak Symmetry Scores

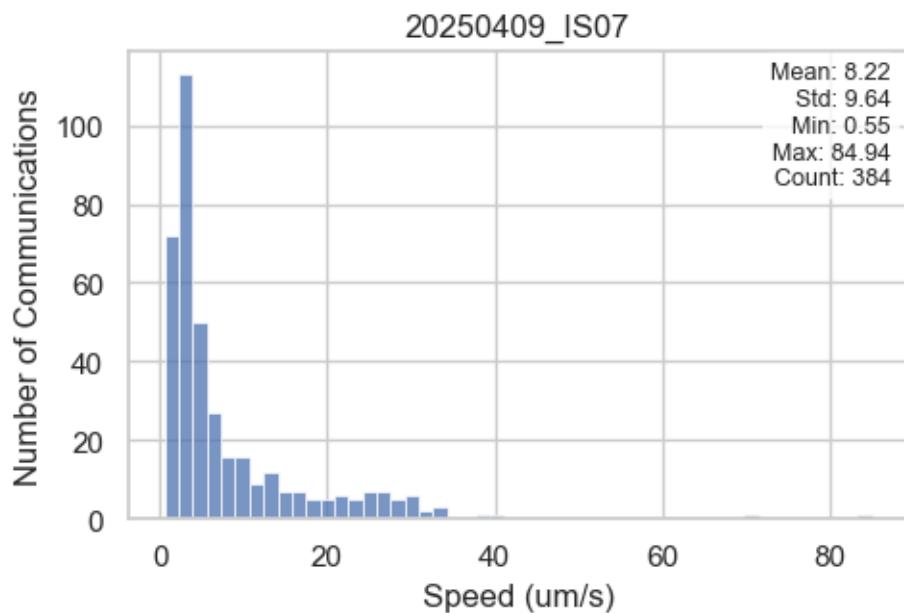


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

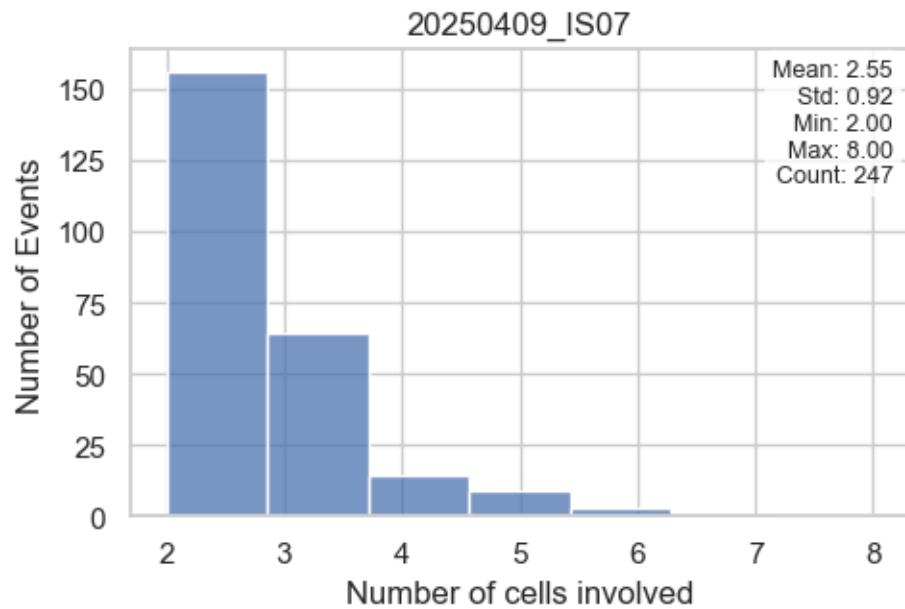


Distribution of Cell-Cell Communication Speeds



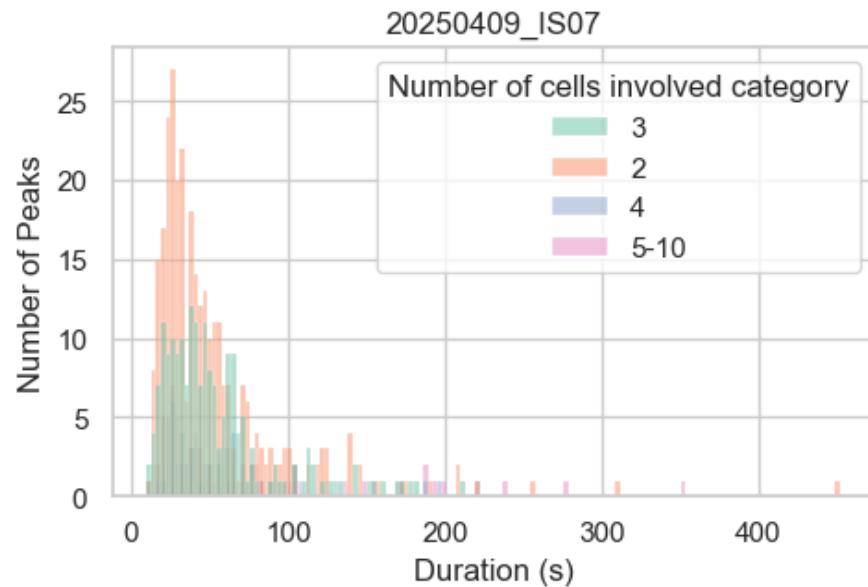
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

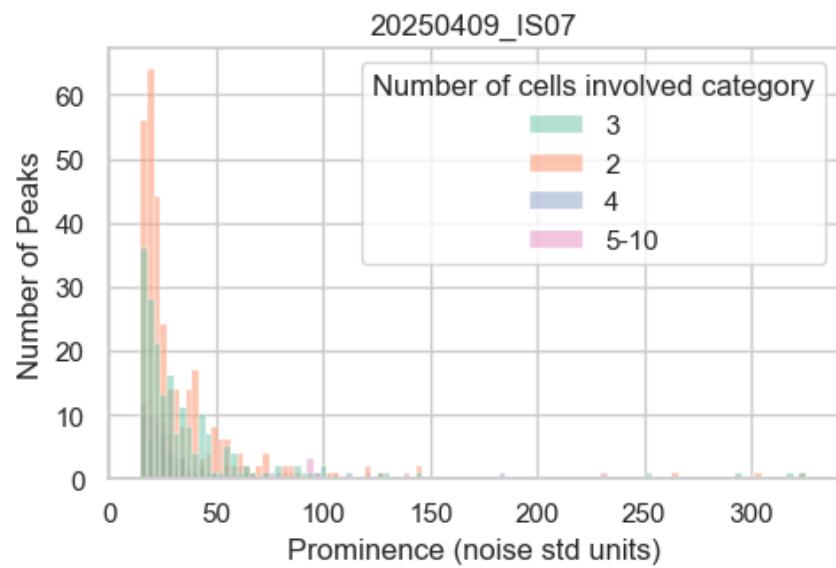


1.3.5 Influence of cell count per event on statistics

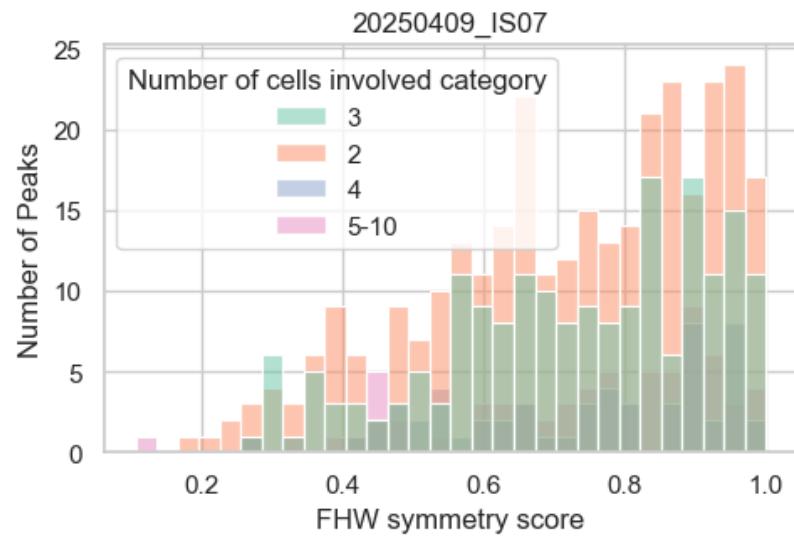
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



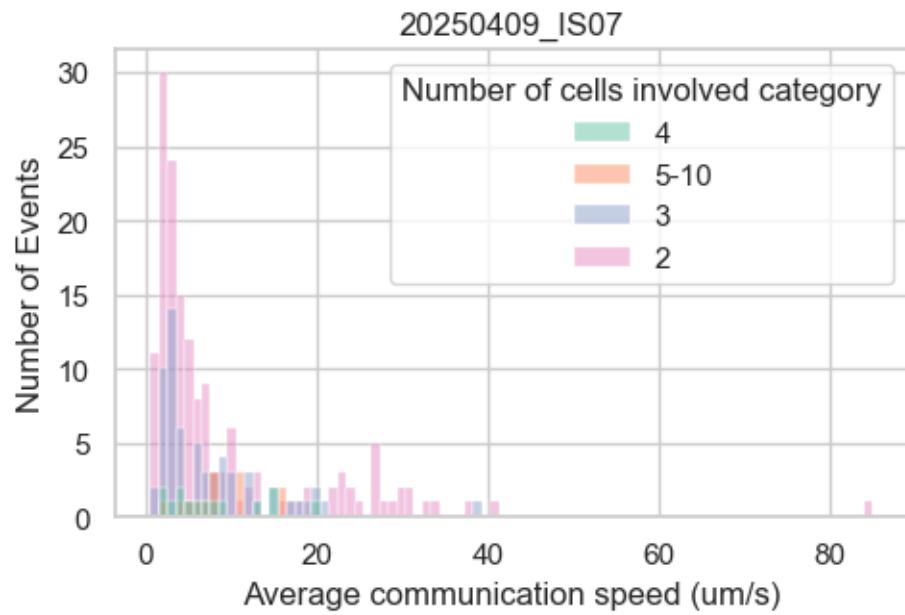
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



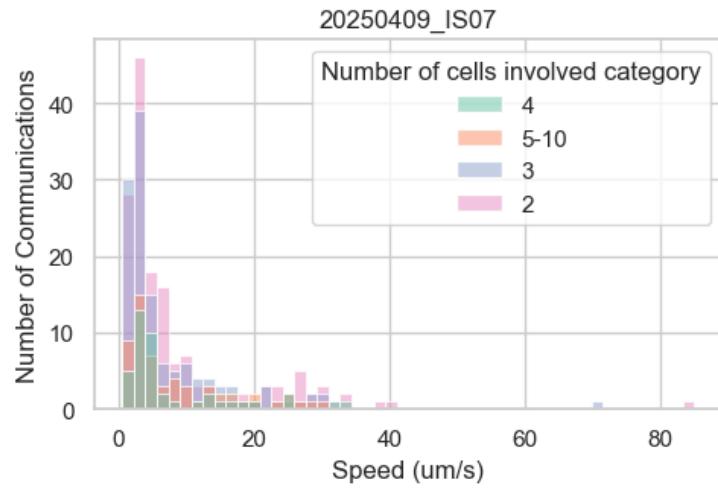
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

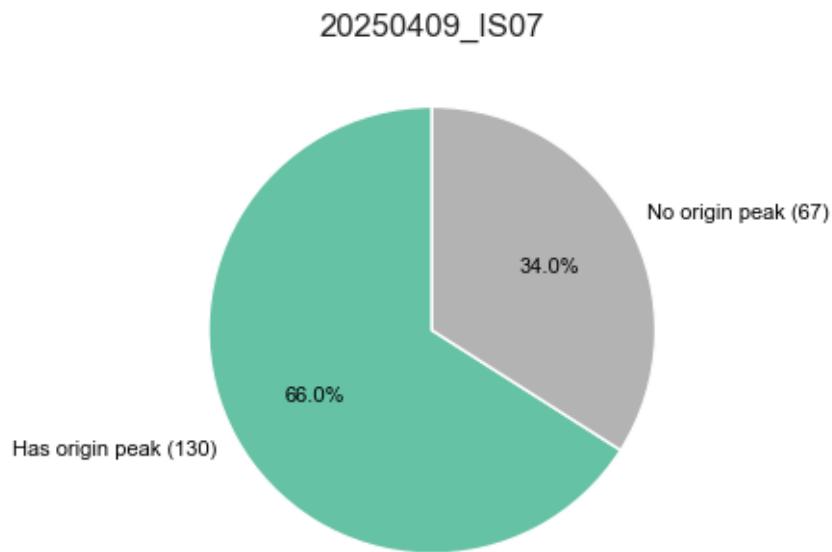


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events



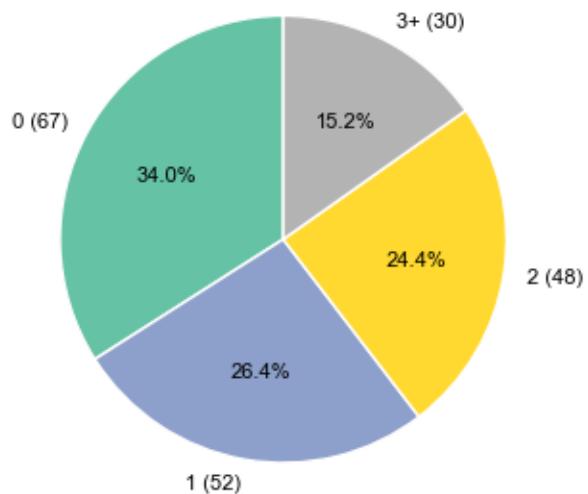
1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell



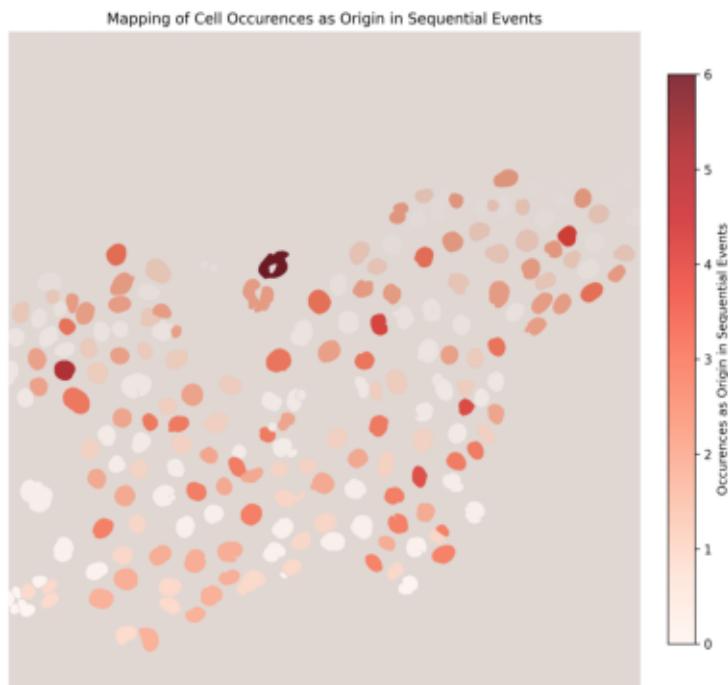
Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)

20250409_IS07



Cell Mapping with Origin Peaks Overlay

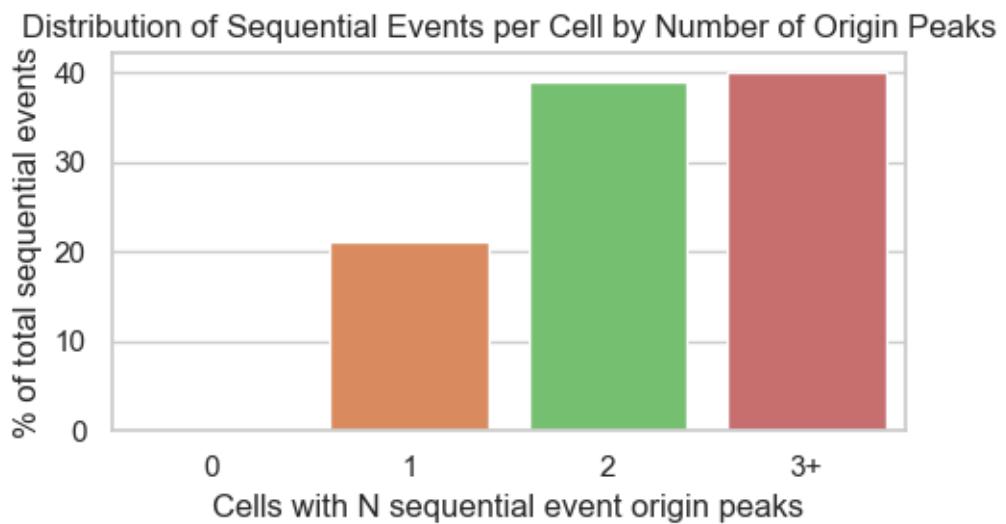
20250409_IS07



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

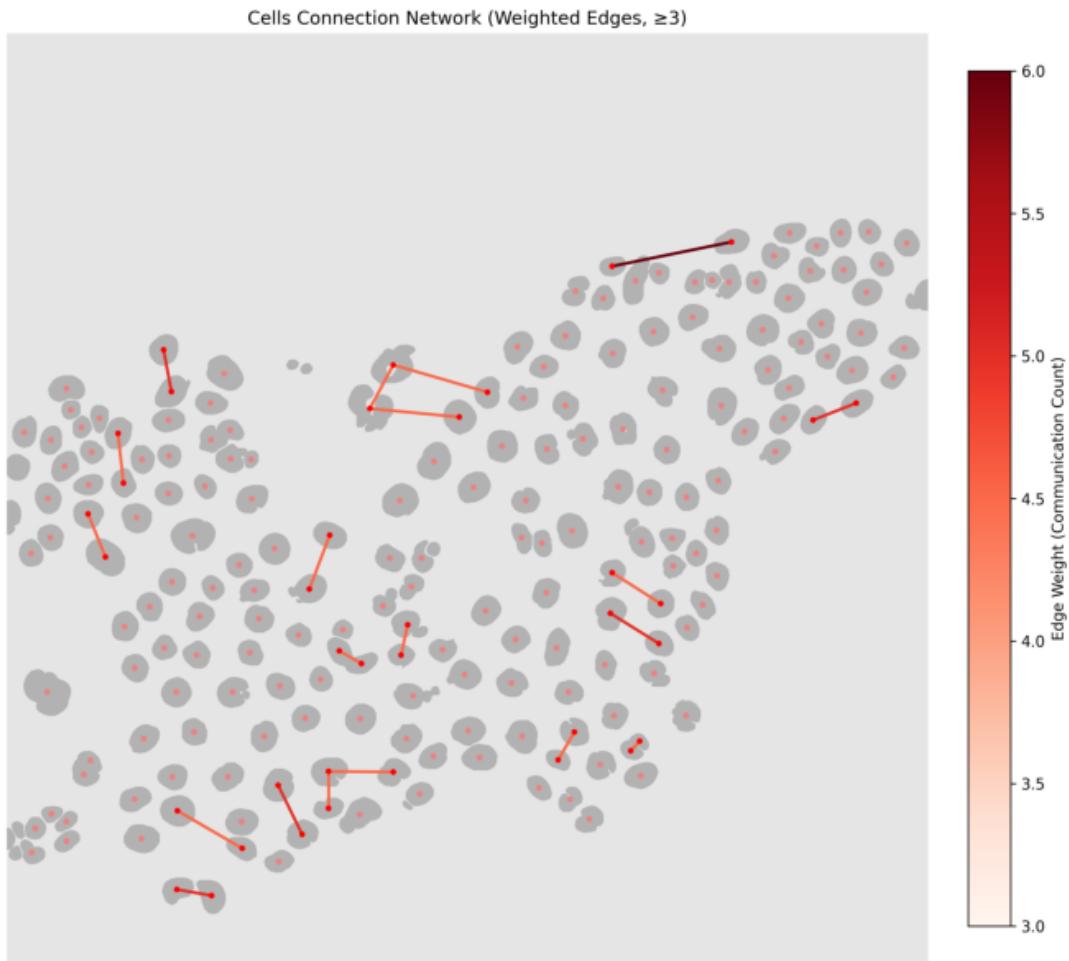
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.3.7 Connection network between cells

Cell Connection Network Graph

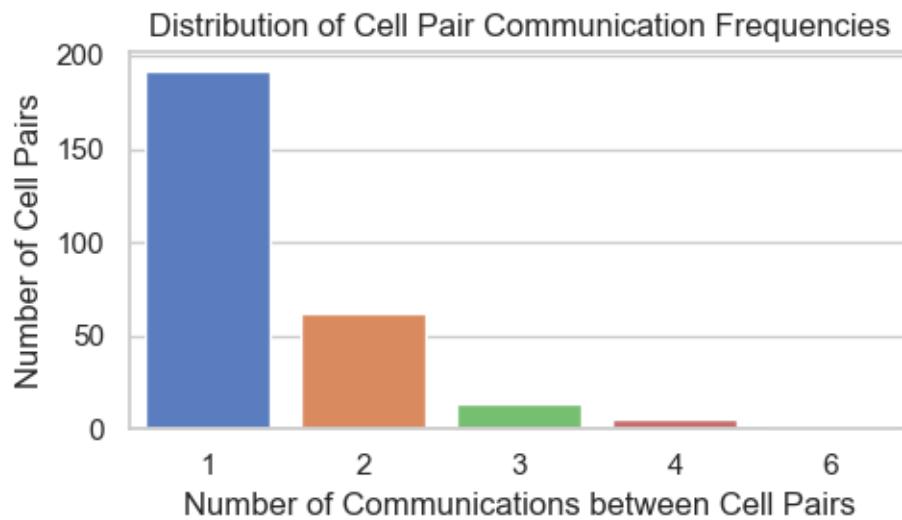
20250409_IS07



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

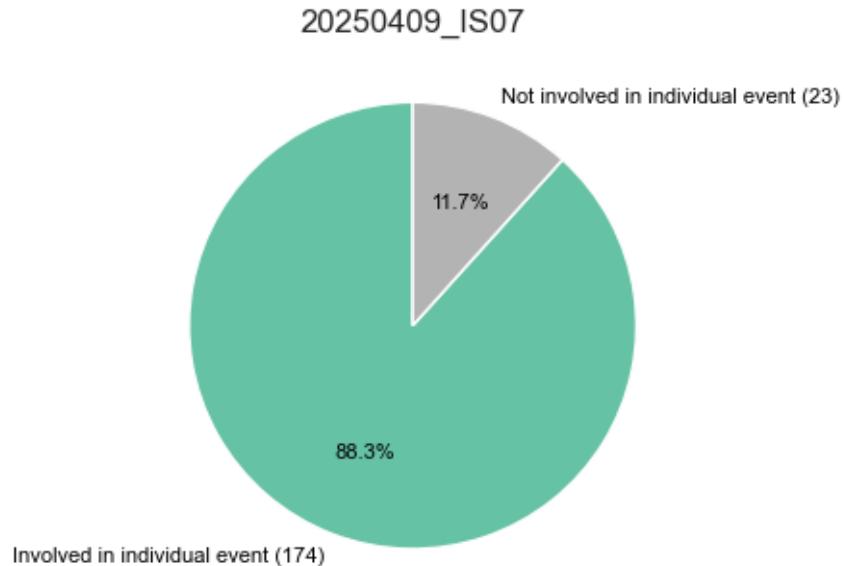
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.4 INDIVIDUAL EVENTS

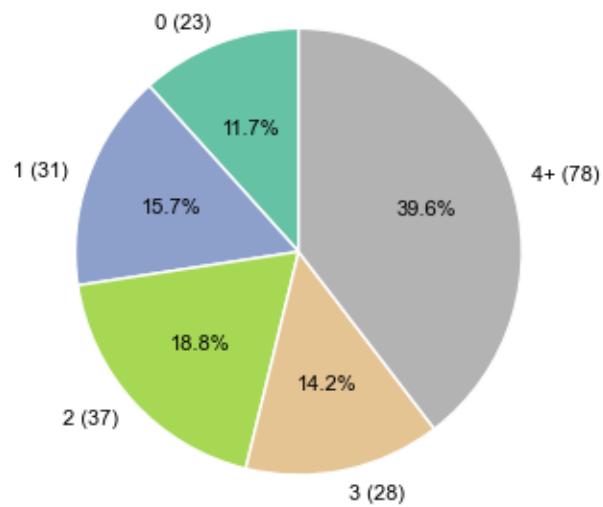
1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events



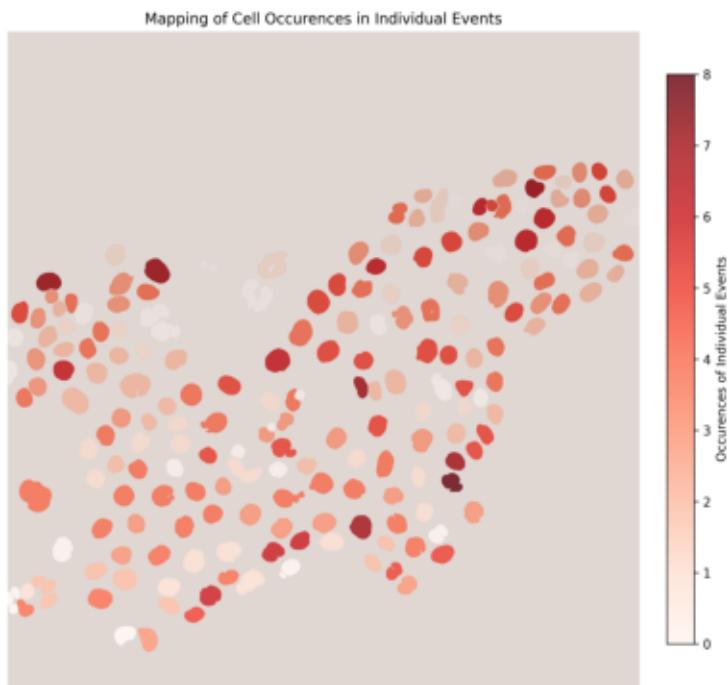
Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)

20250409_IS07



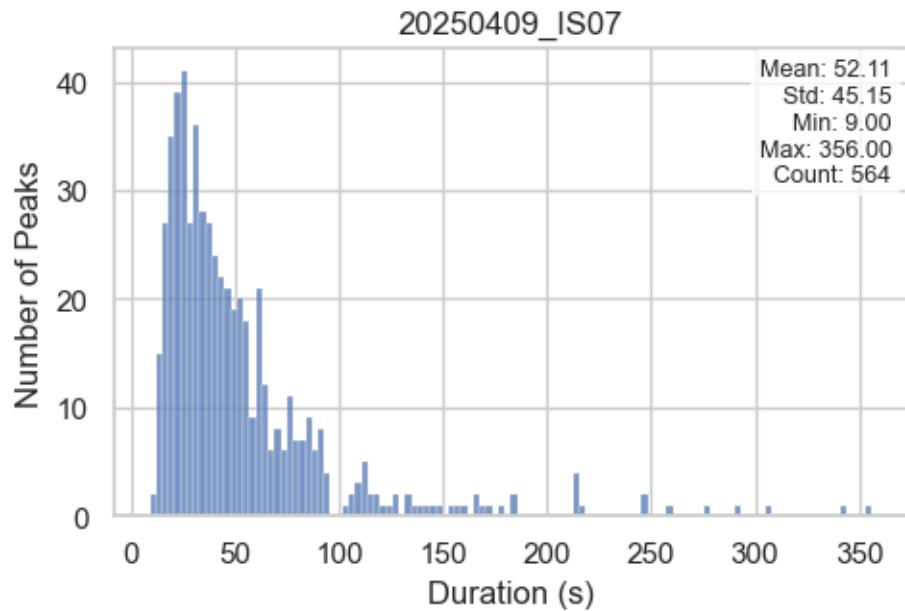
Cell Mapping with Occurrences in Individual Events Overlay

20250409_IS07

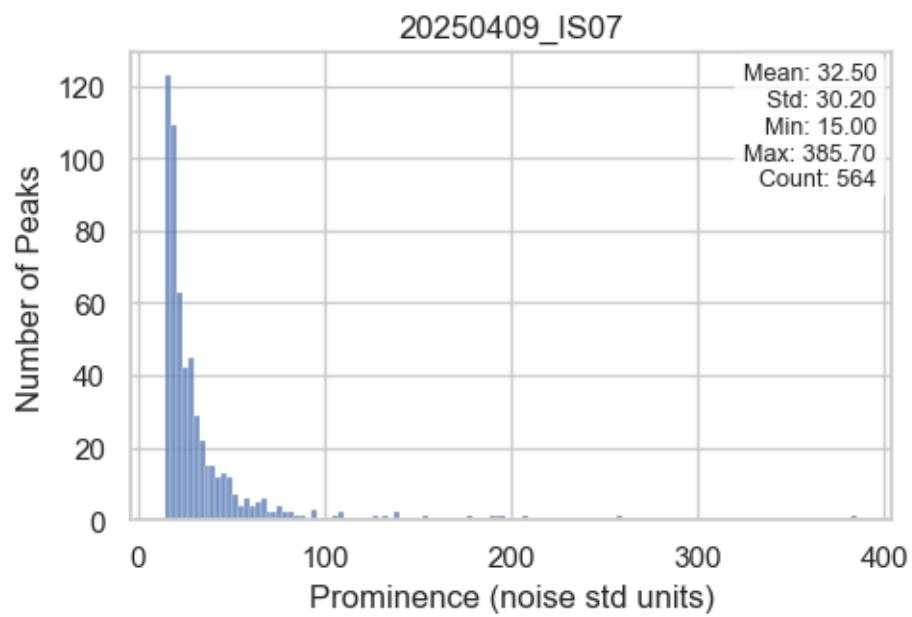


1.4.2 Peaks statistics in individual events

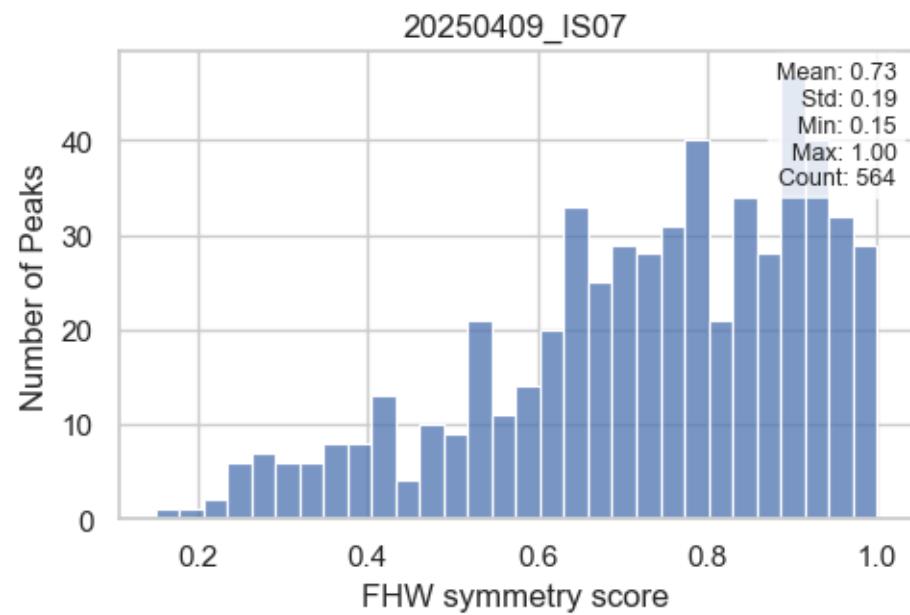
Distribution of Peak Durations



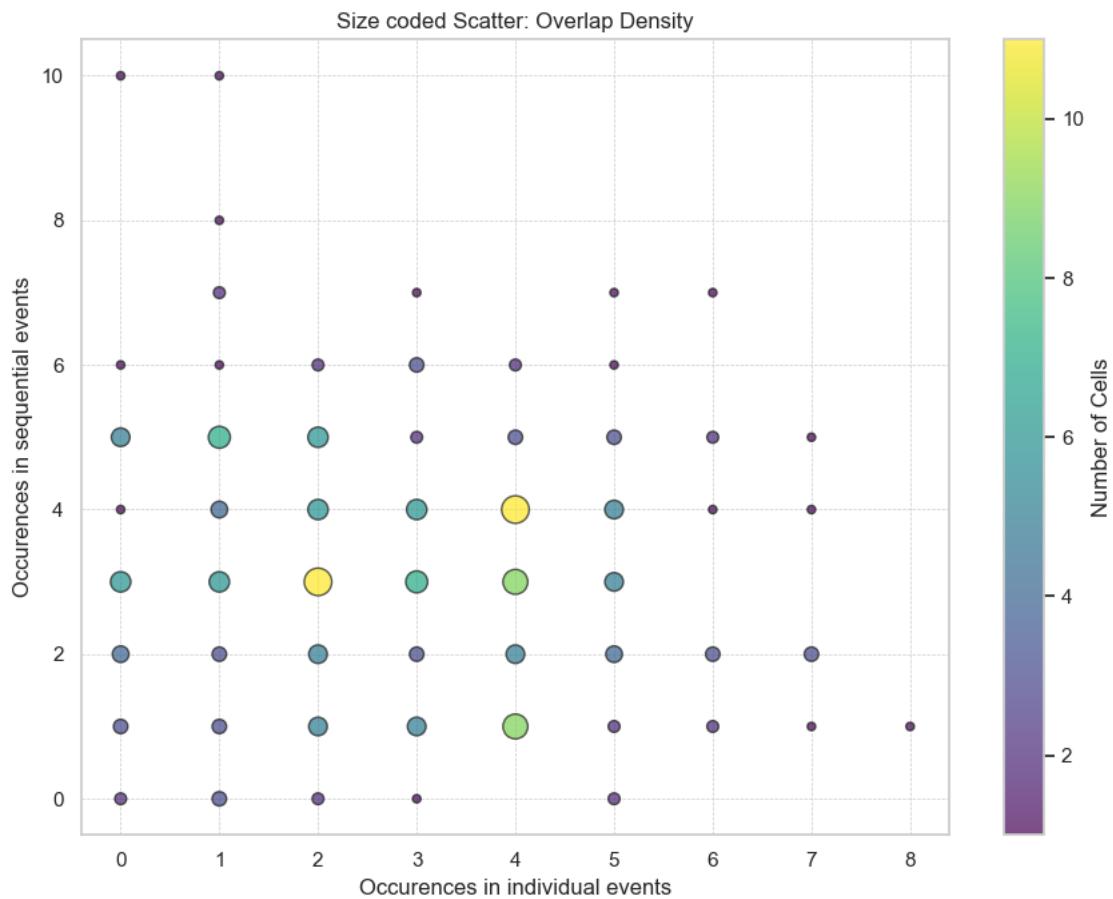
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores



1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 197
- Hoechst image taken at t=1801: 200
- Number of cells difference: absolute 3, relative 1.51%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 333101
- Pixels segmented as cell at t=1801: 378795
- Overlapping pixels between t=0 and t=1801: 317727 (89.26% of total)
- Pixels exclusive to t=0: 15374 (4.61% of total)
- Pixels exclusive to t=1801: 61068 (16.12% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

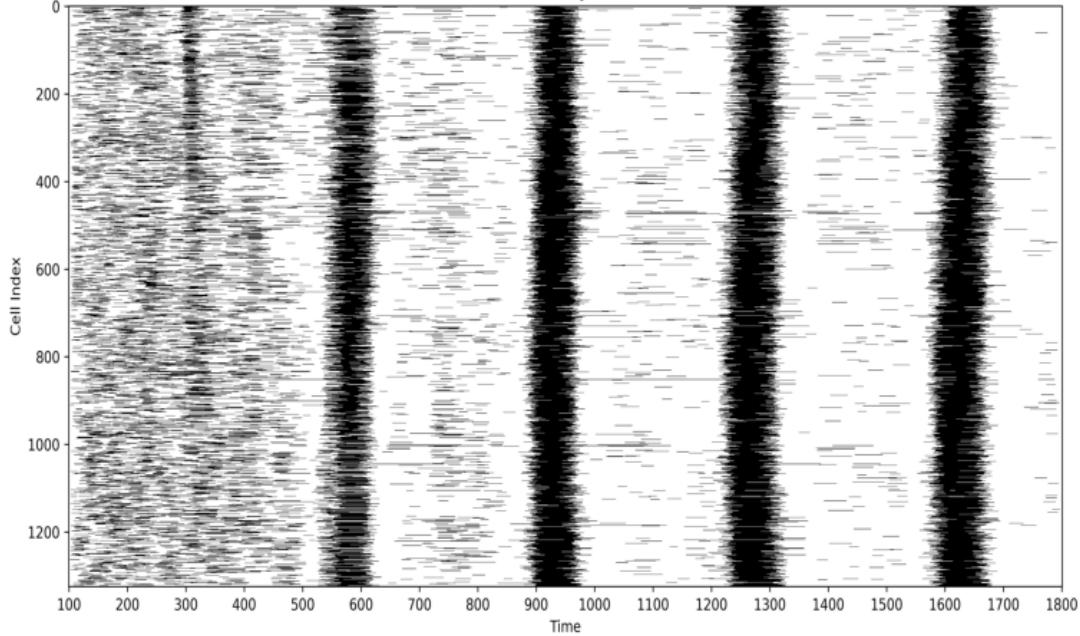
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

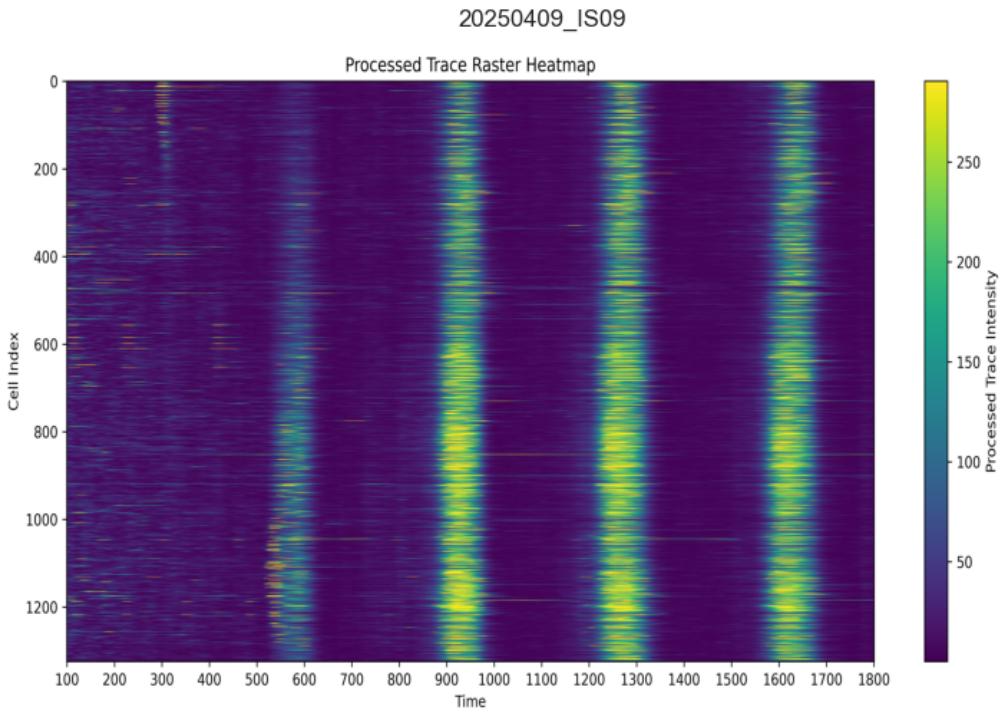
Binary Activity Raster Plot

20250409_IS09

Binarized Activity Raster Plot



Heatmap Activity Raster Plot



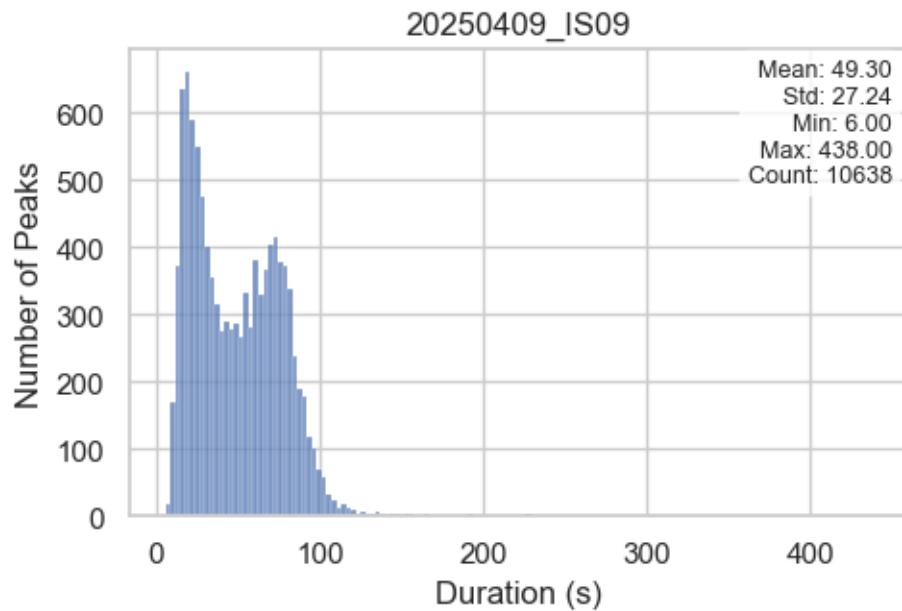
1.1.2 Peaks population

Total number of peaks: 10638

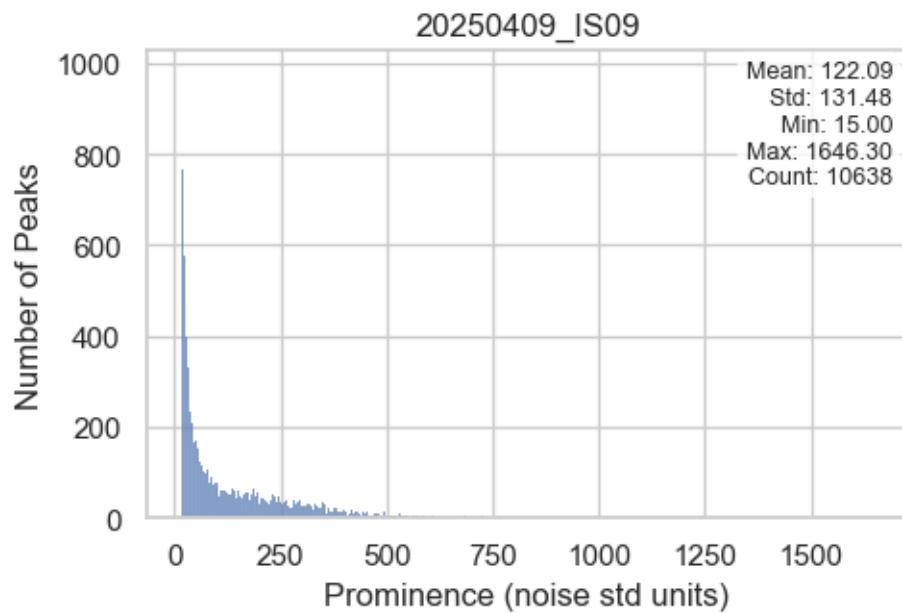
Total number of cells: 1325

1.1.3 Peaks statistics

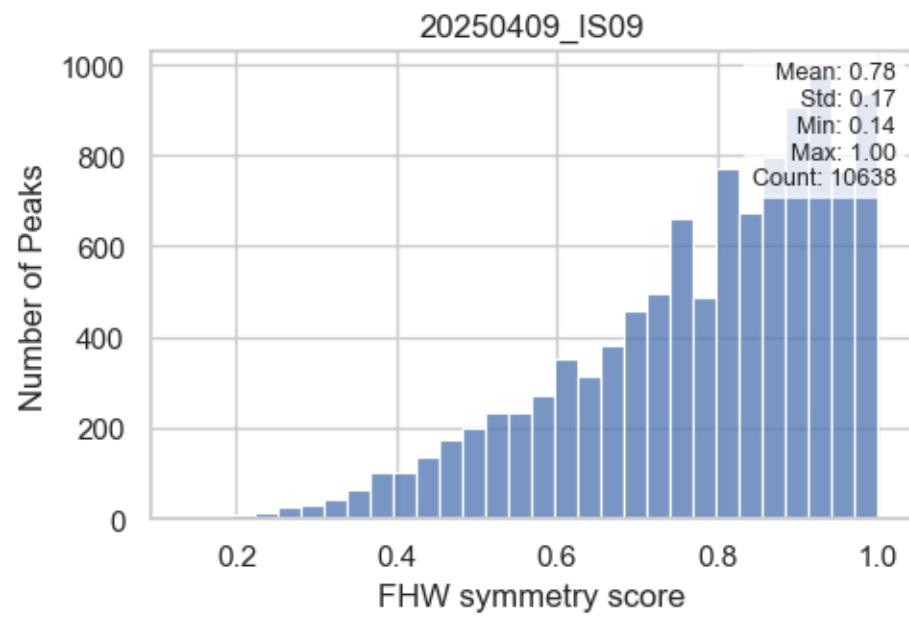
Distribution of Peak Durations



Distribution of Peak Prominences

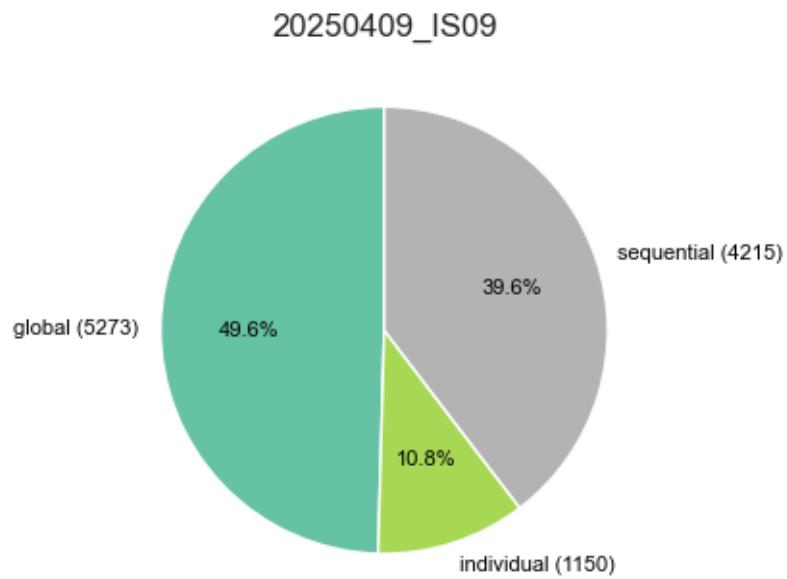


Distribution of Peak Symmetry Scores



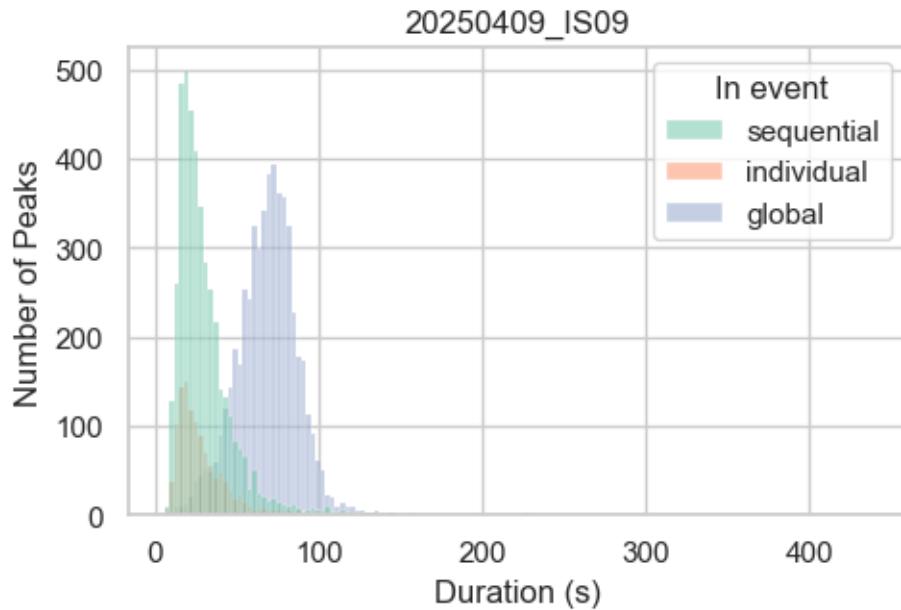
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

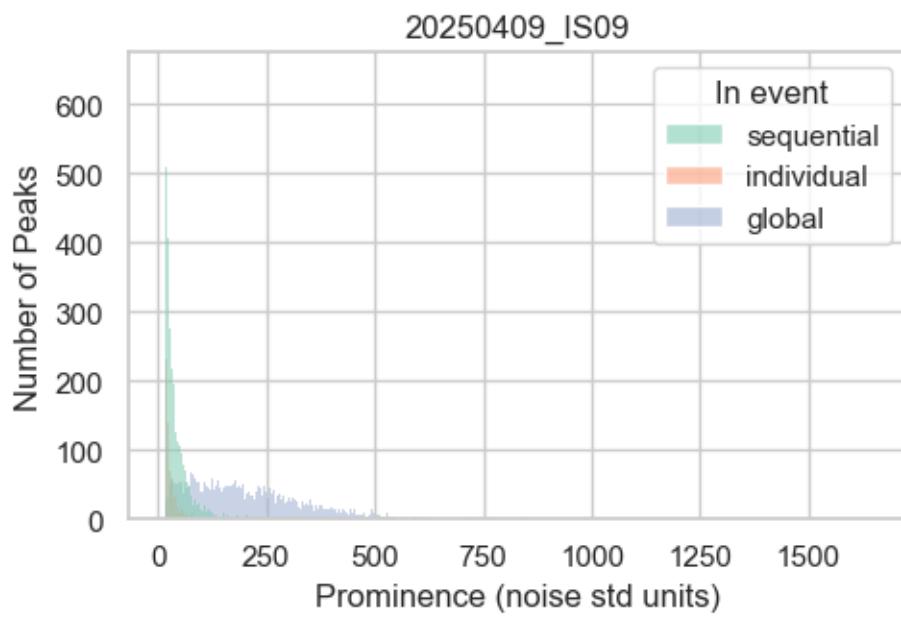


1.1.5 Peaks statistics per event types

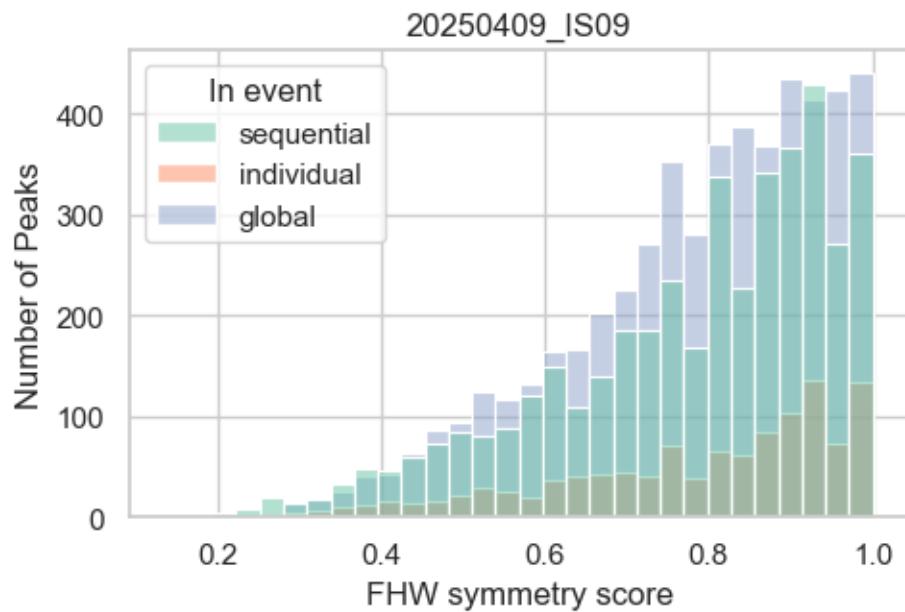
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

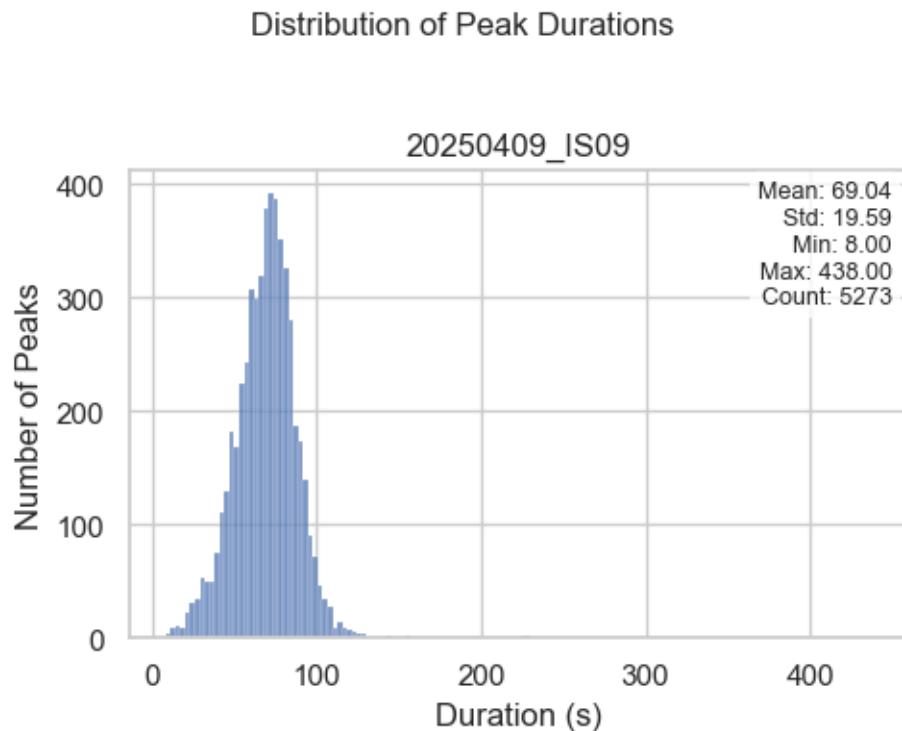


Distribution of Peak Symmetry Scores by Group

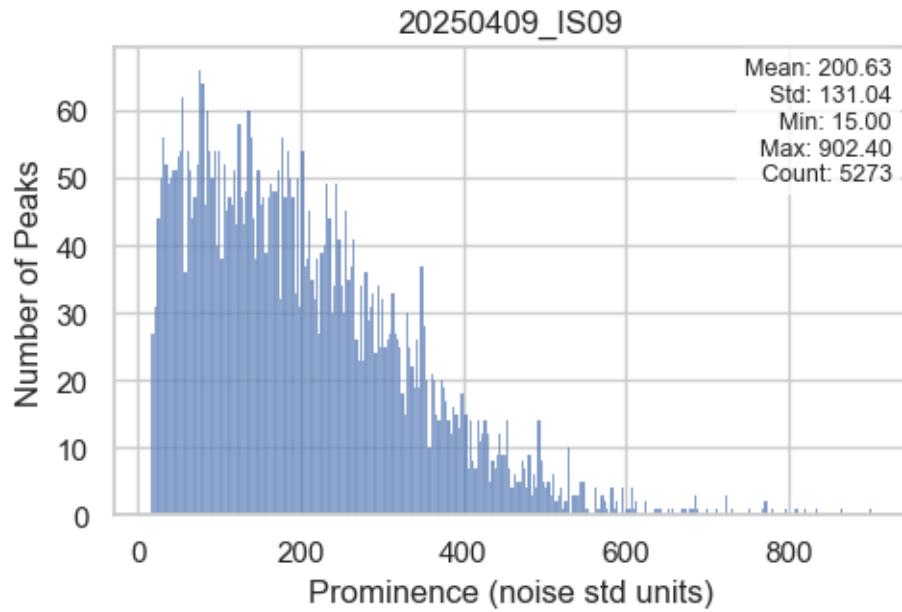


1.2 GLOBAL EVENTS

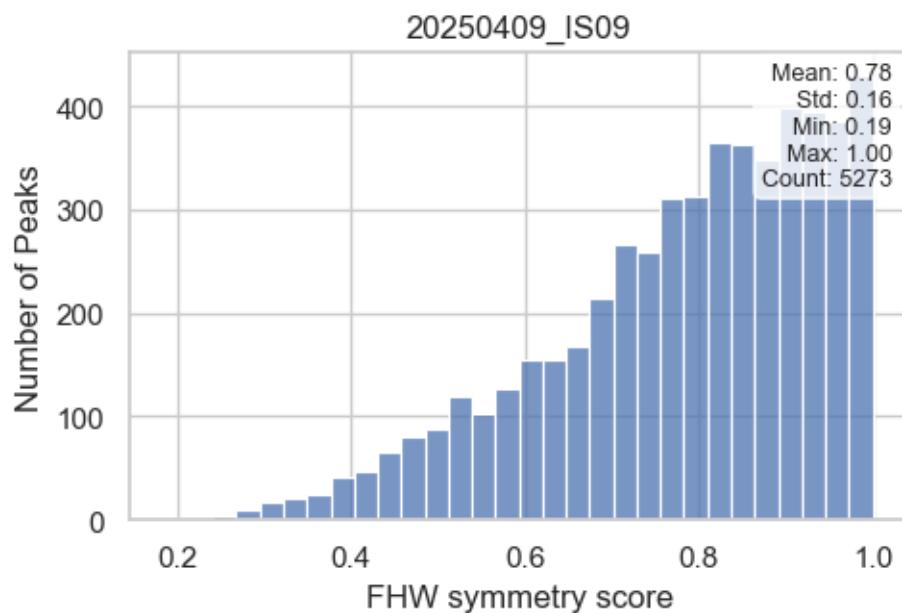
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

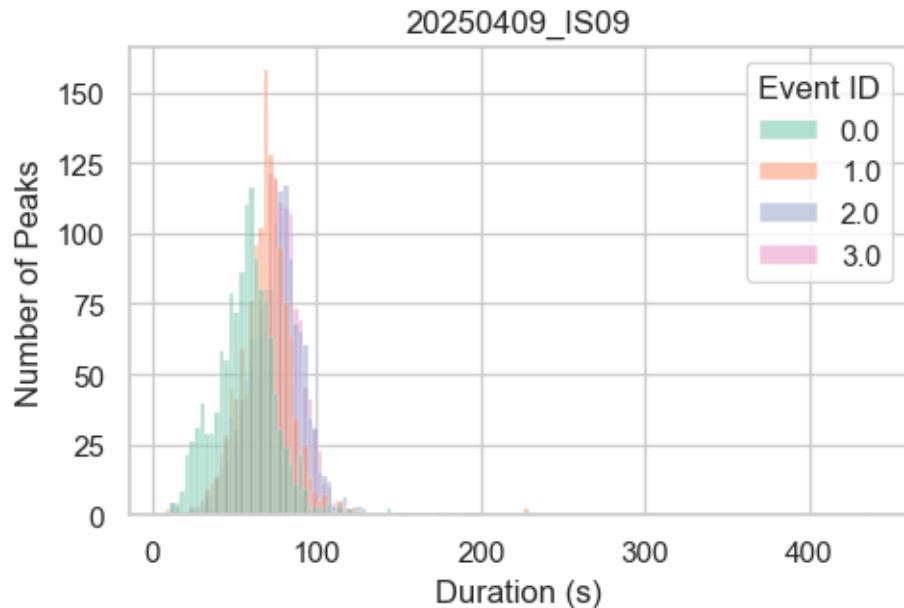


Distribution of Peak Symmetry Scores

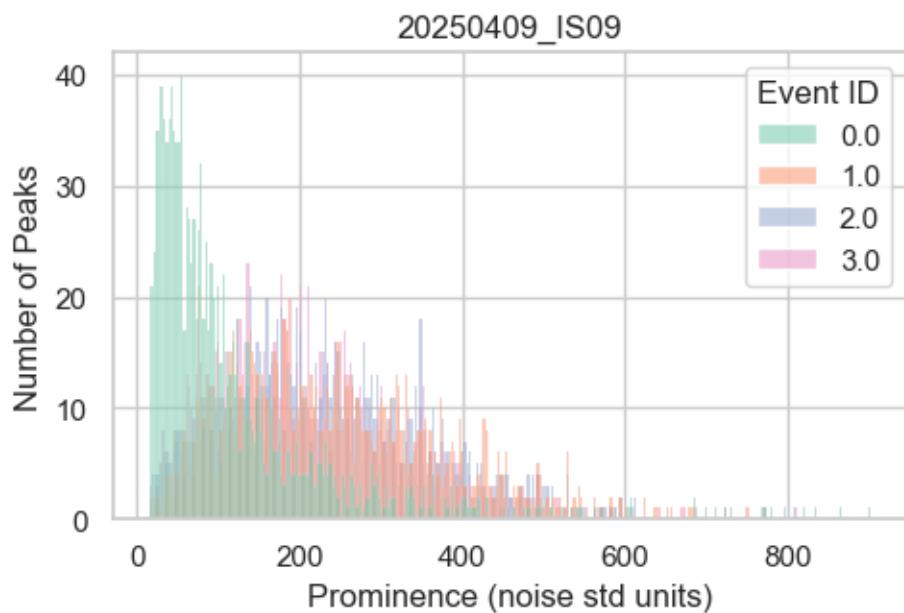


1.2.2 Peak statistics in global event per event ID

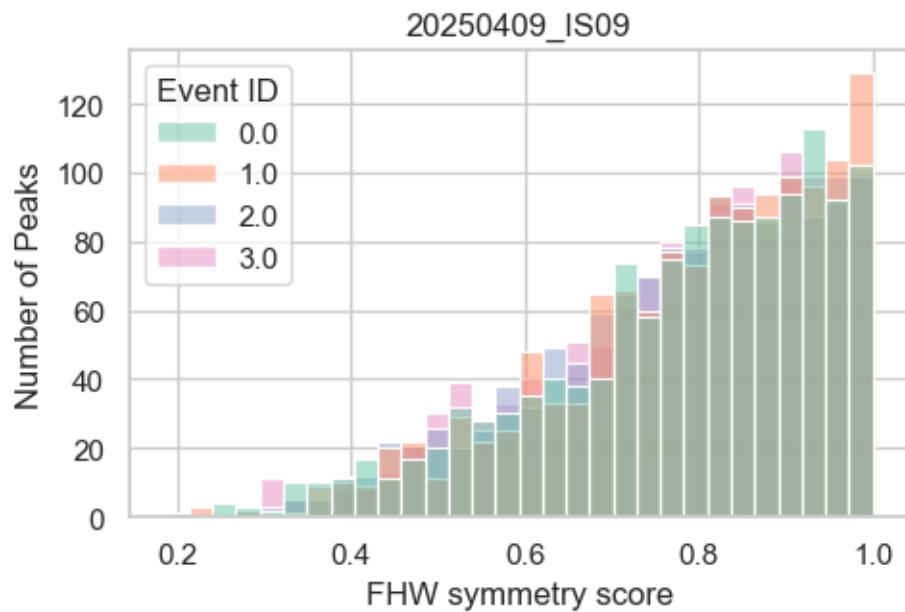
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



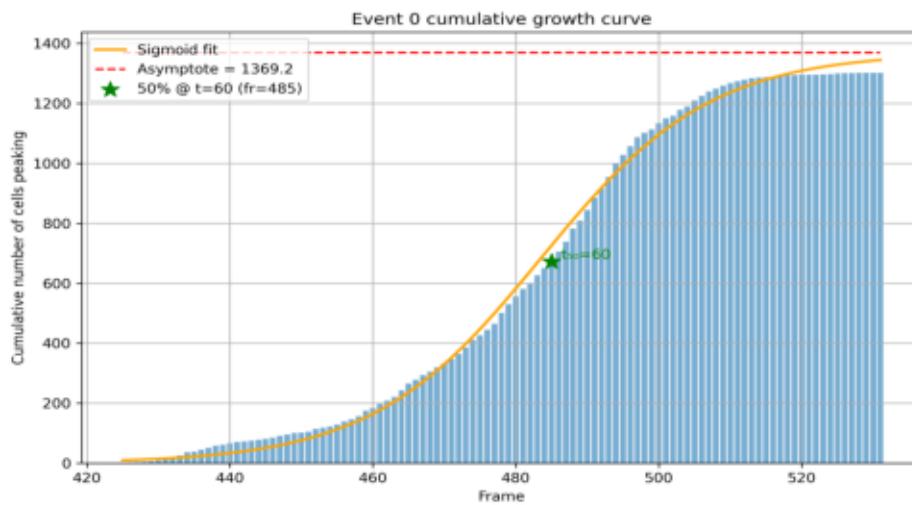
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

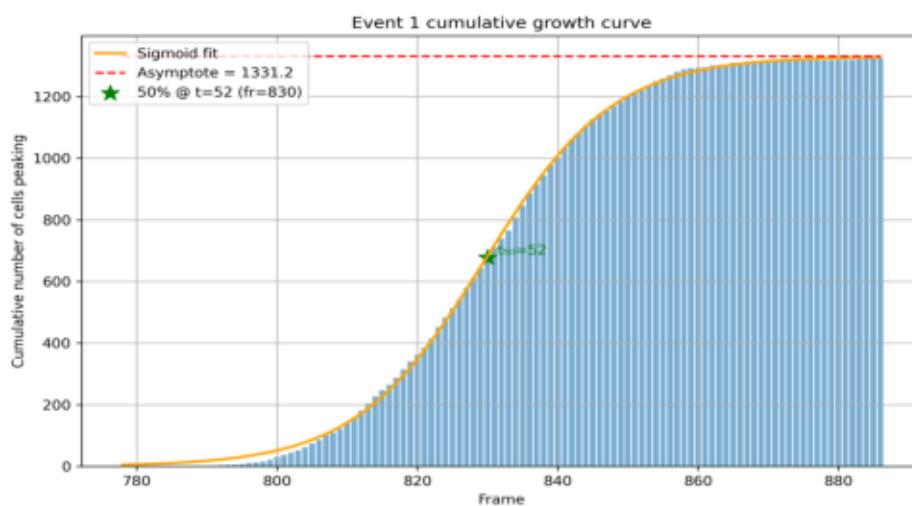
Event Activity Overlay (Event ID: 0)

20250409_IS09



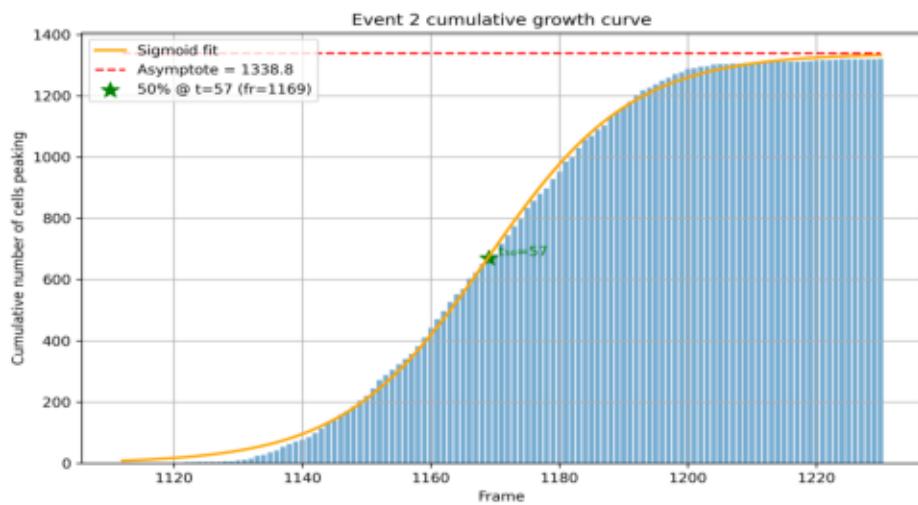
Event Activity Overlay (Event ID: 1)

20250409_IS09



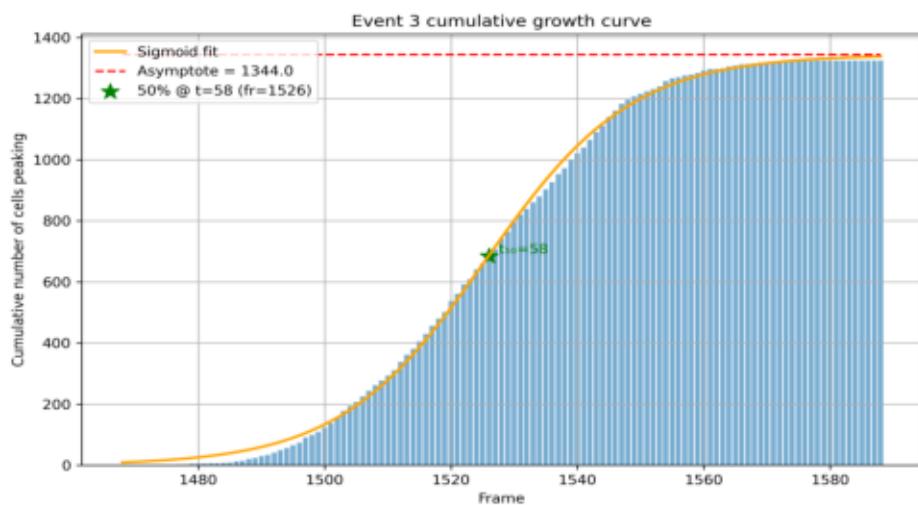
Event Activity Overlay (Event ID: 2)

20250409_IS09



Event Activity Overlay (Event ID: 3)

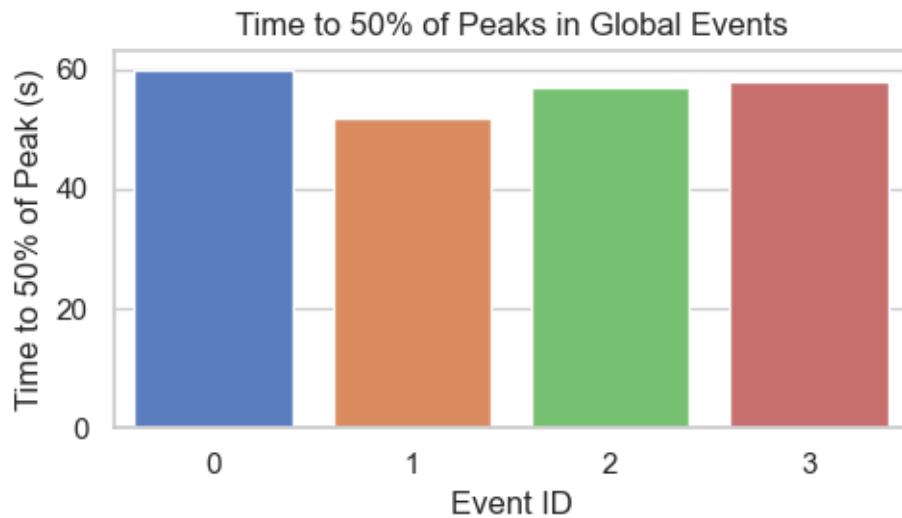
20250409_IS09



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

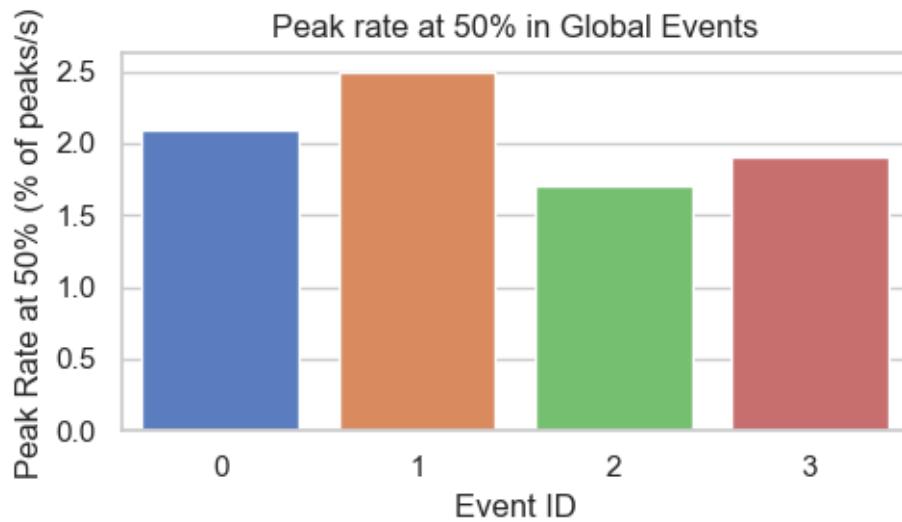
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

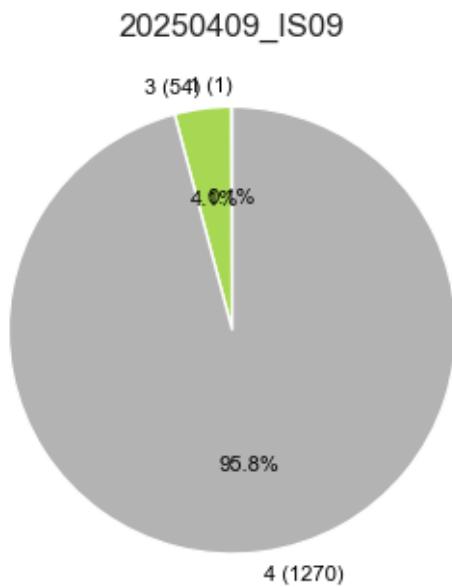
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



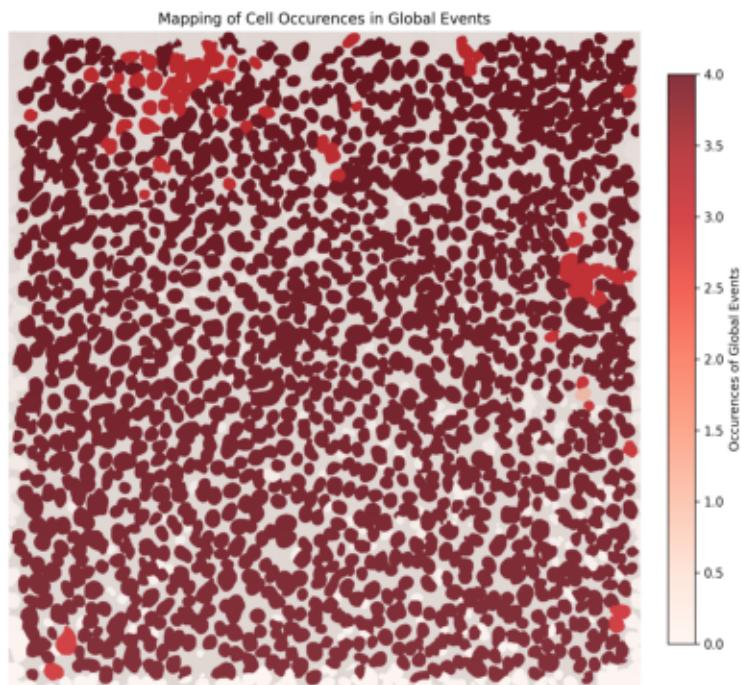
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

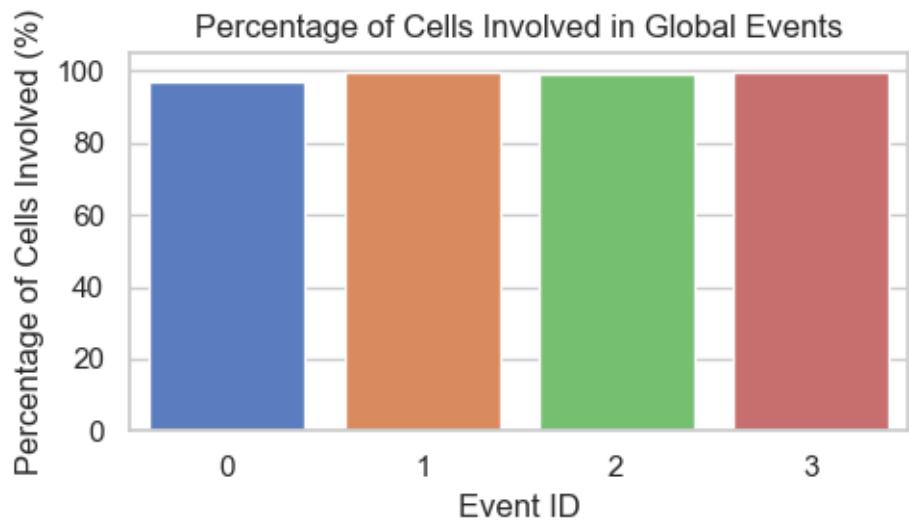
20250409_IS09



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.2.5 Inter-event interval analysis

Intervals between global event peaks: [348.0, 342.0, 357.0]

Estimated periodicity: 0.983

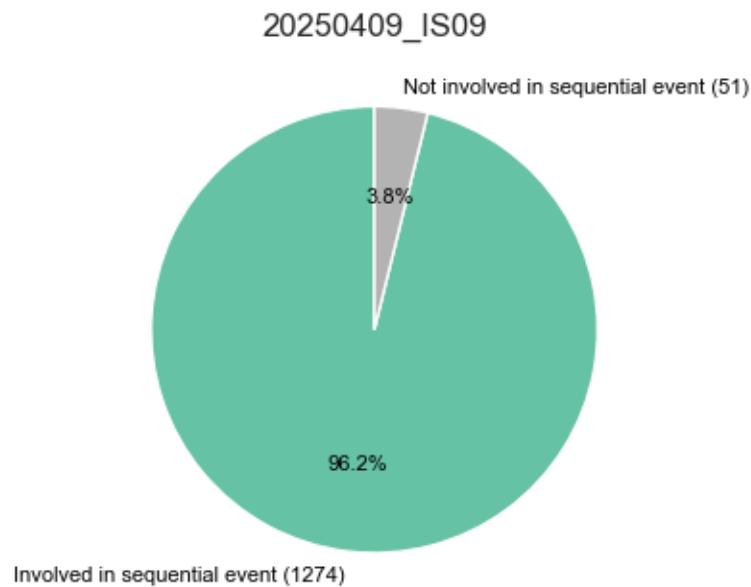
The global events exhibit a regular periodic pattern.

Estimated frequency (1/mean interval): 0.003 Hz

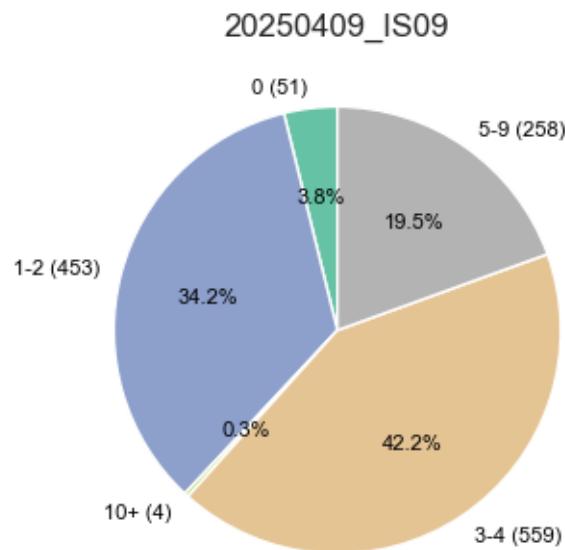
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

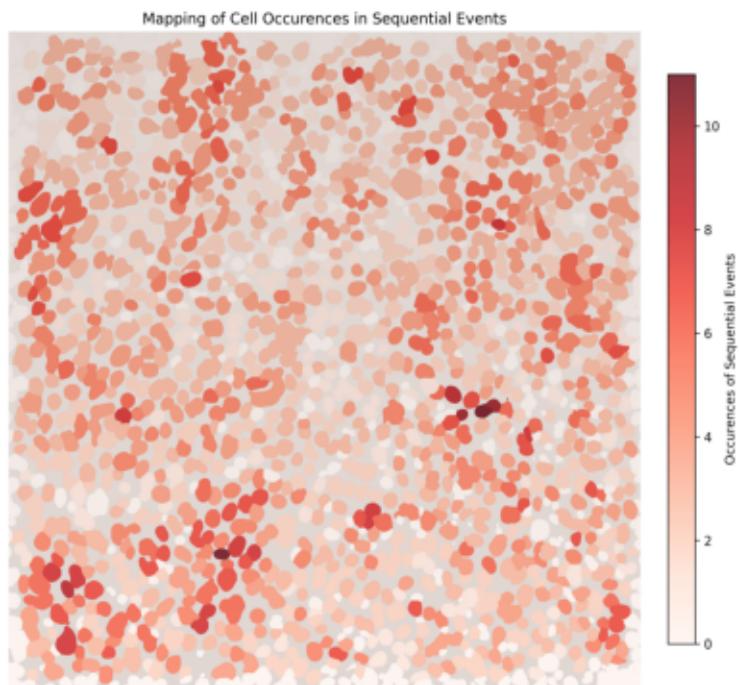


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

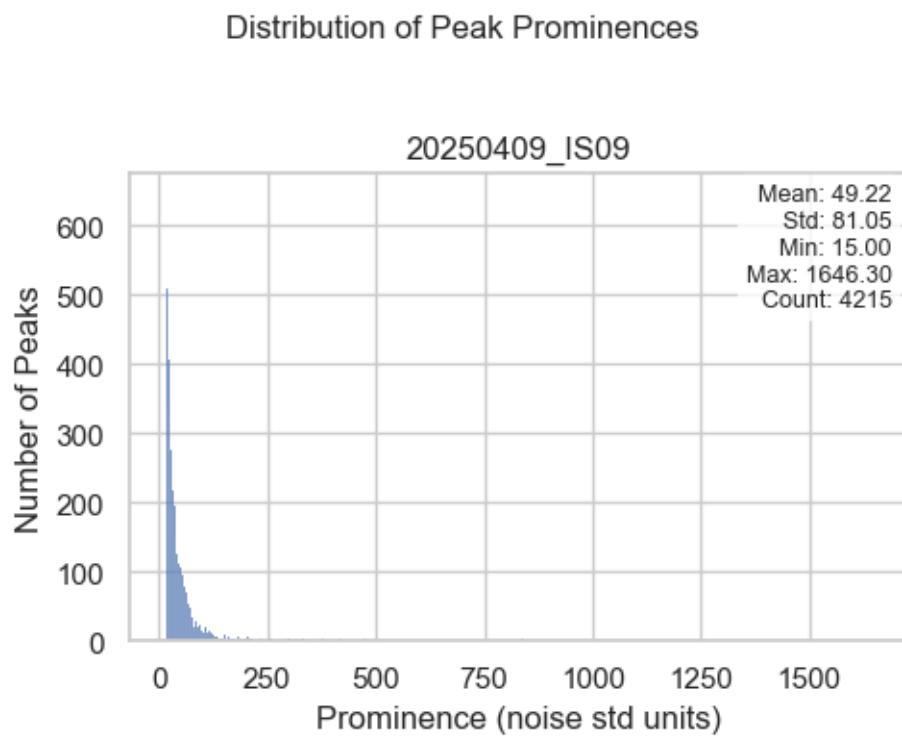
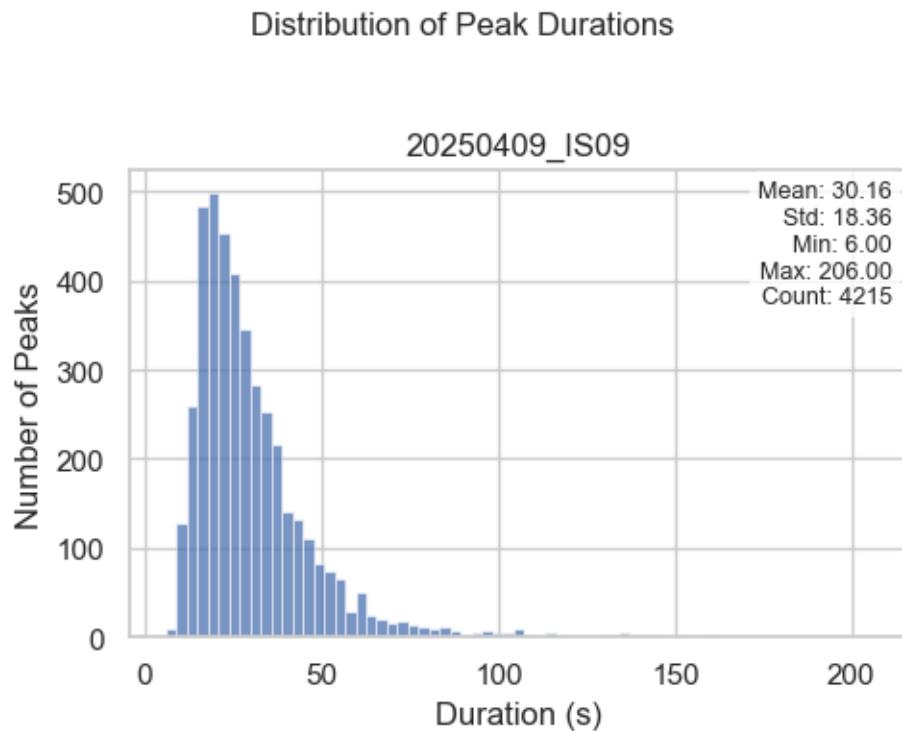


Cell Mapping with Occurrences in Sequential Events Overlay

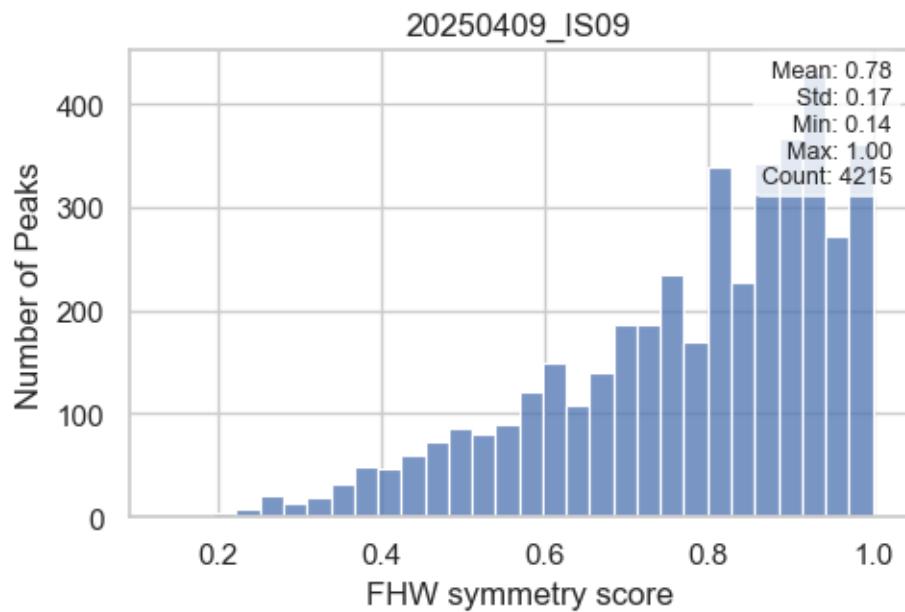
20250409_IS09



1.3.2 Peaks statistics in sequential events

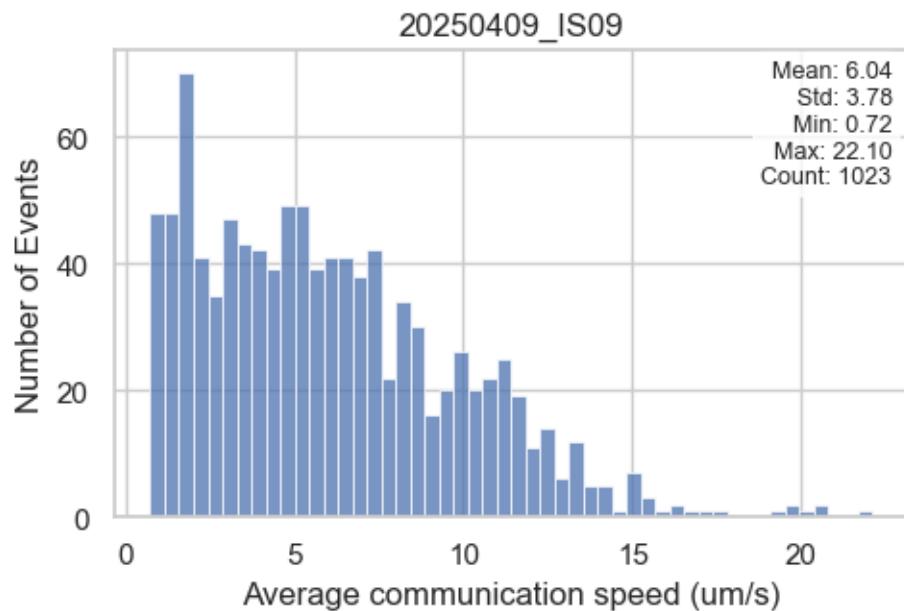


Distribution of Peak Symmetry Scores

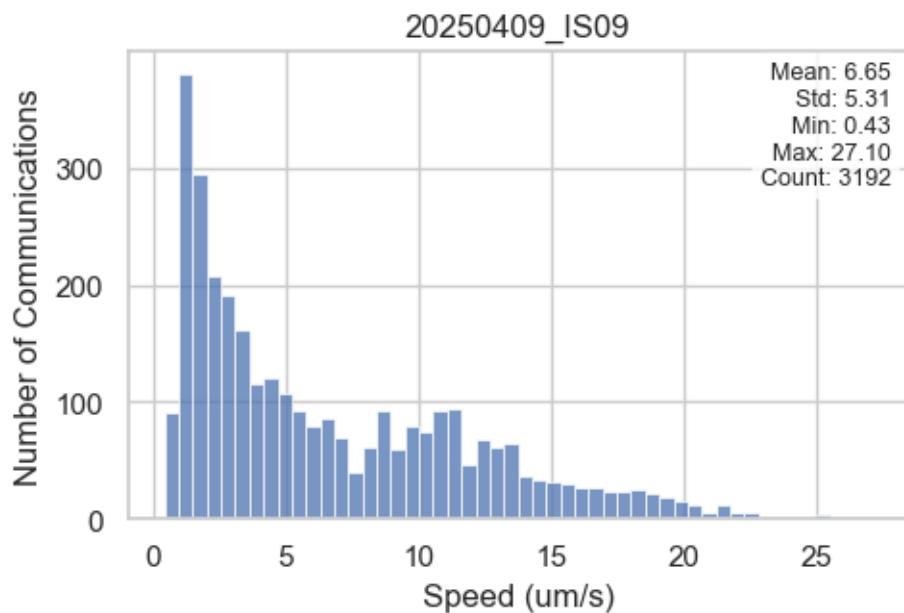


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

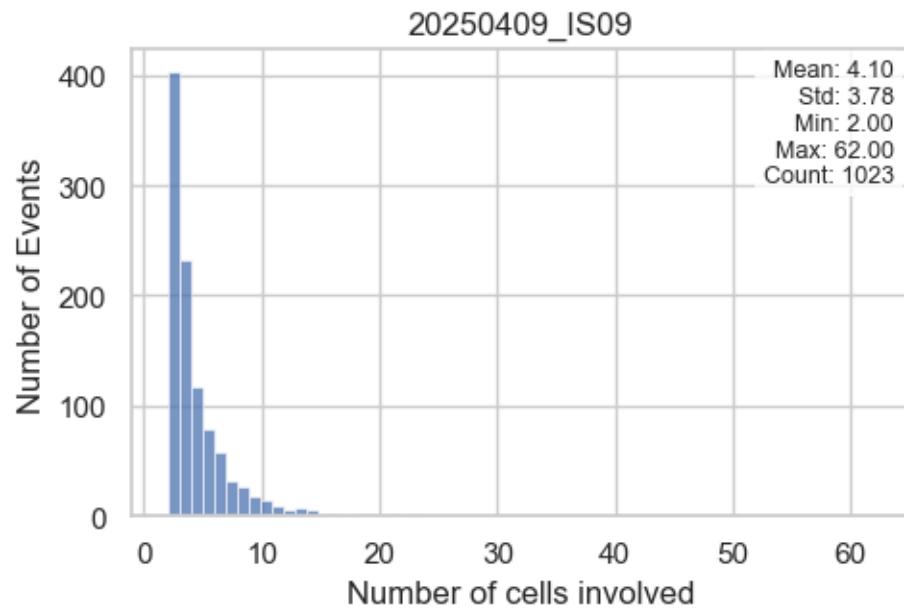


Distribution of Cell-Cell Communication Speeds



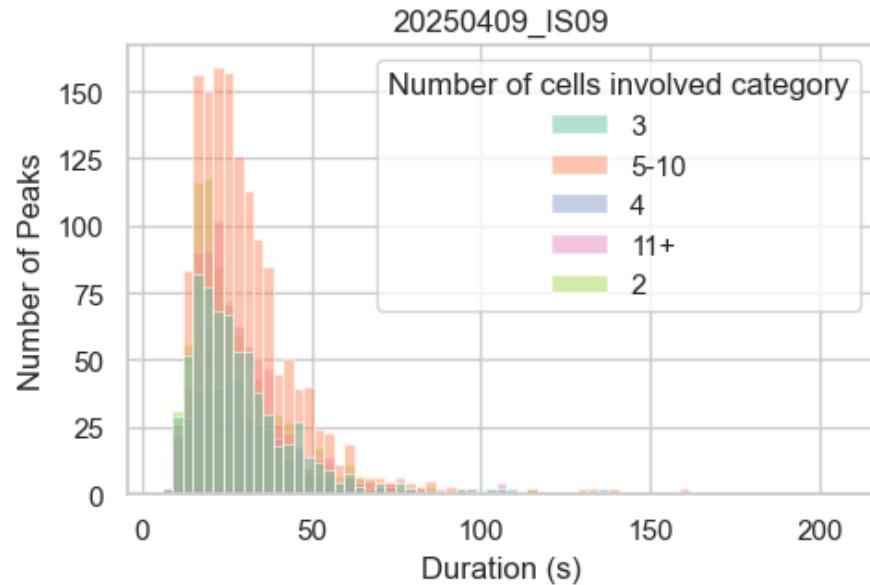
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

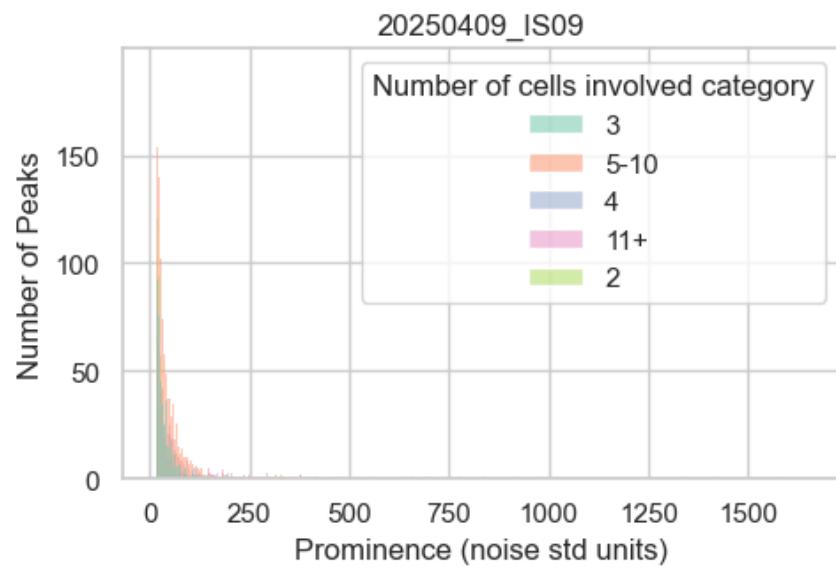


1.3.5 Influence of cell count per event on statistics

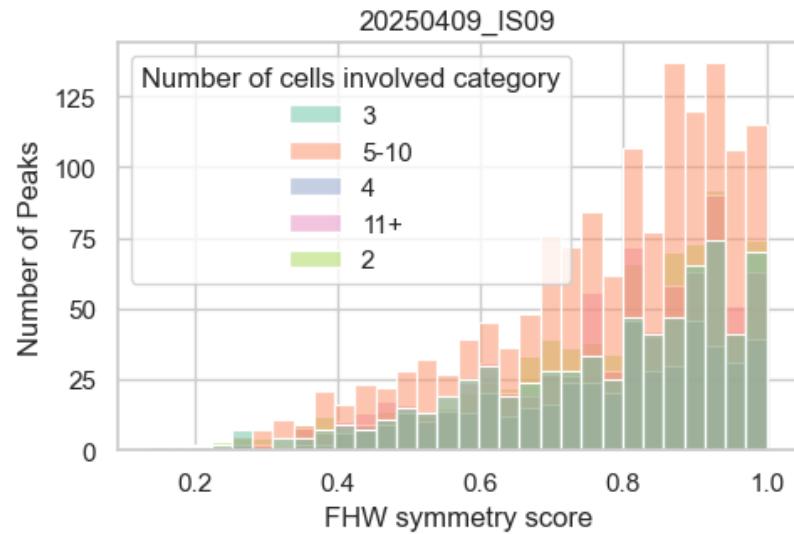
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



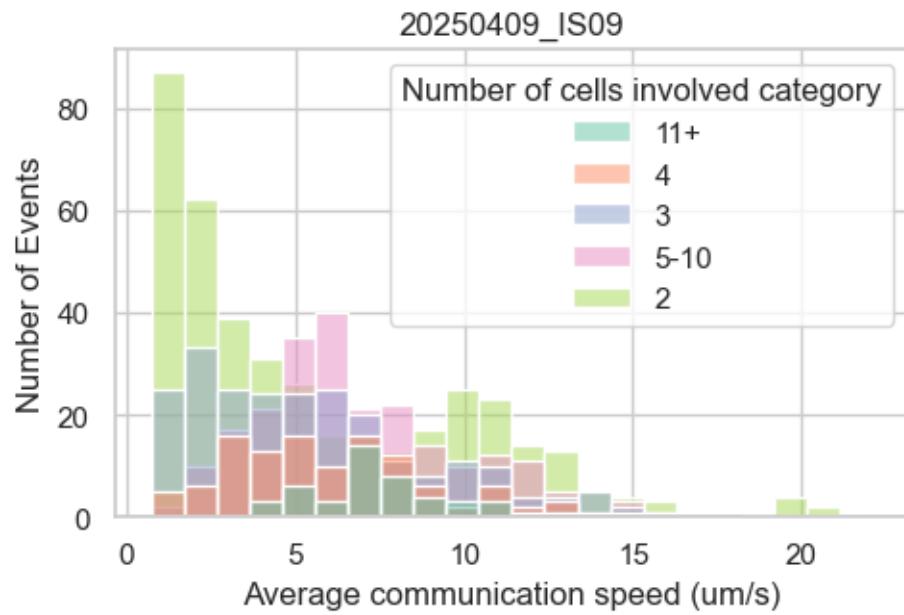
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



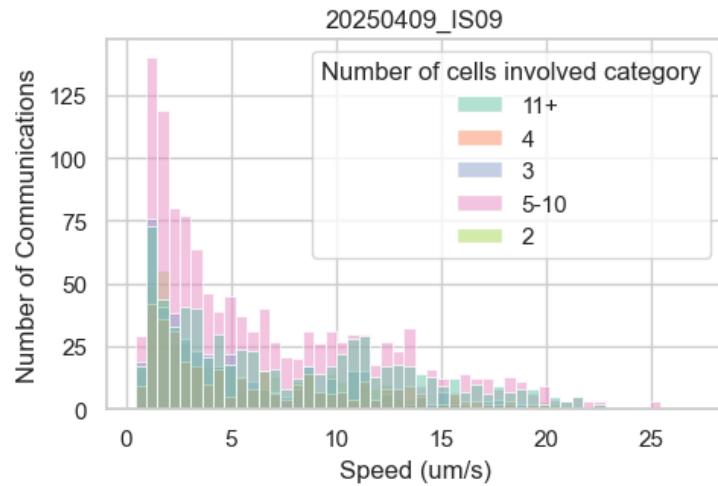
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

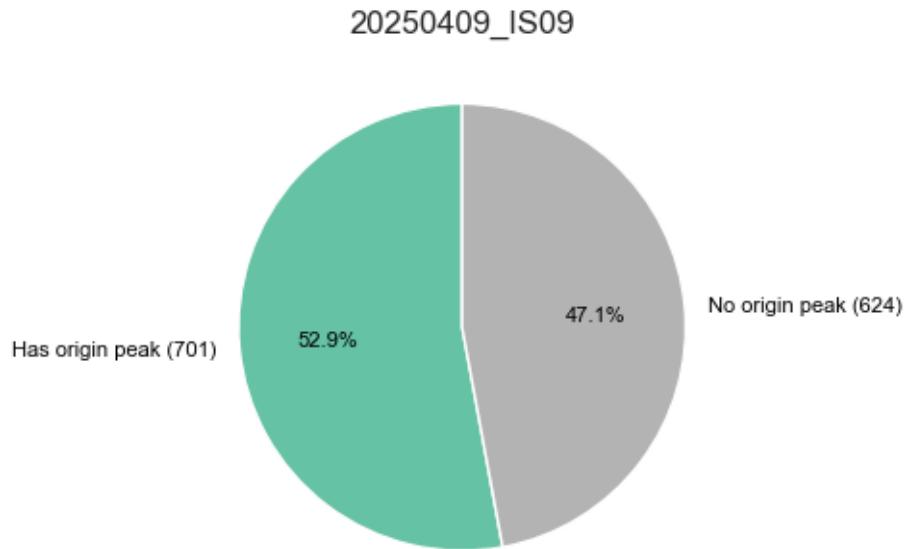


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

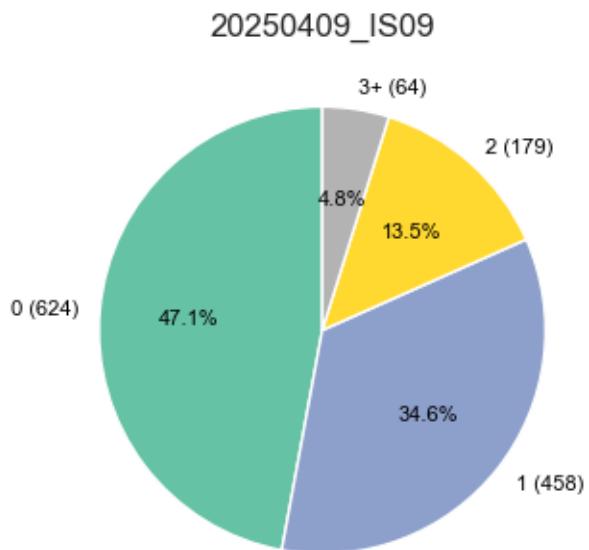


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

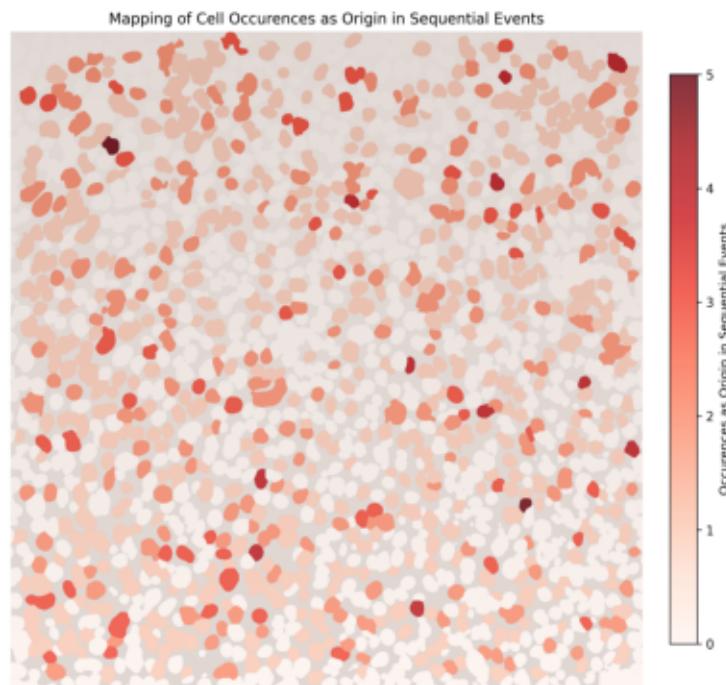


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

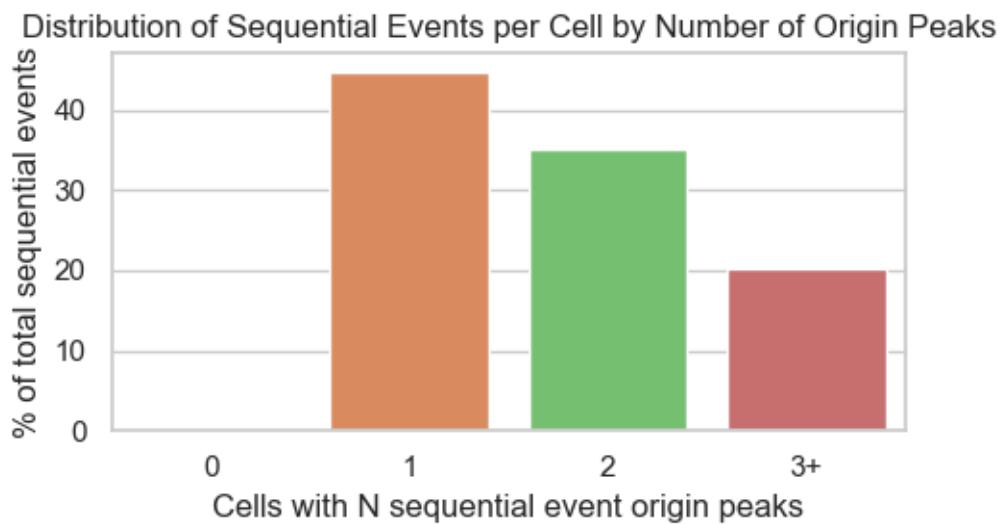
20250409_IS09



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

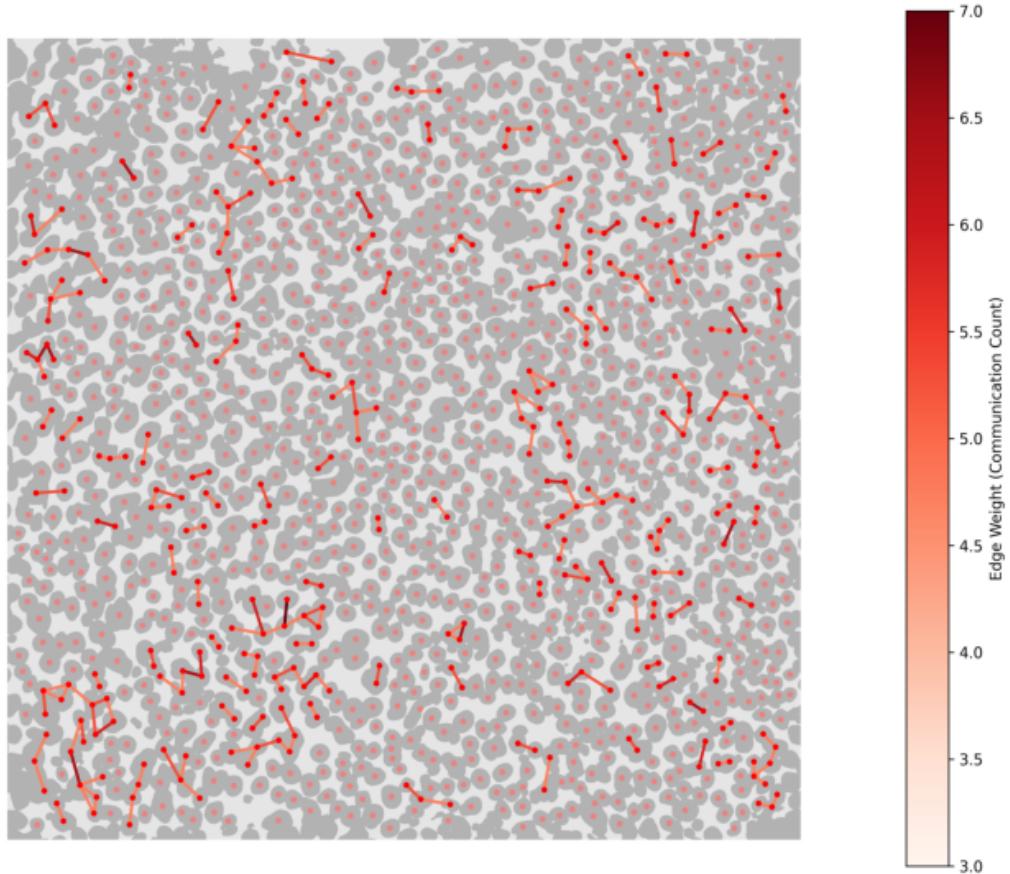


1.3.7 Connection network between cells

Cell Connection Network Graph

20250409_IS09

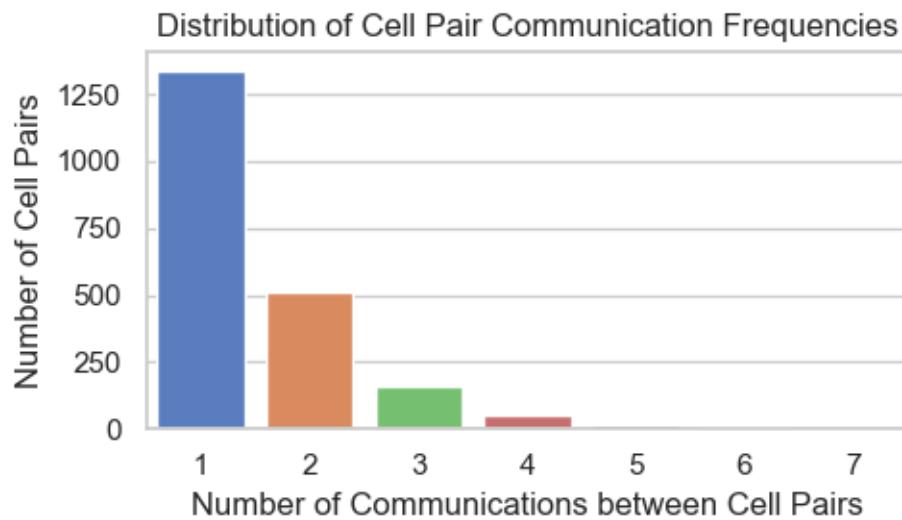
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

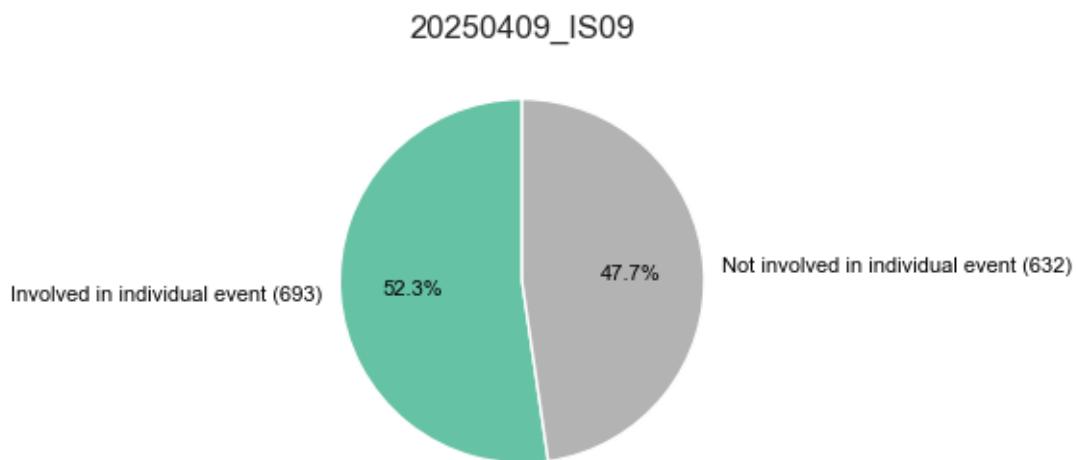
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



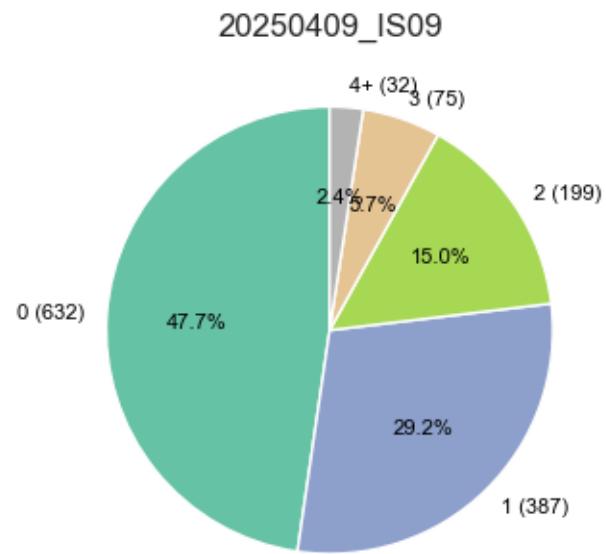
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

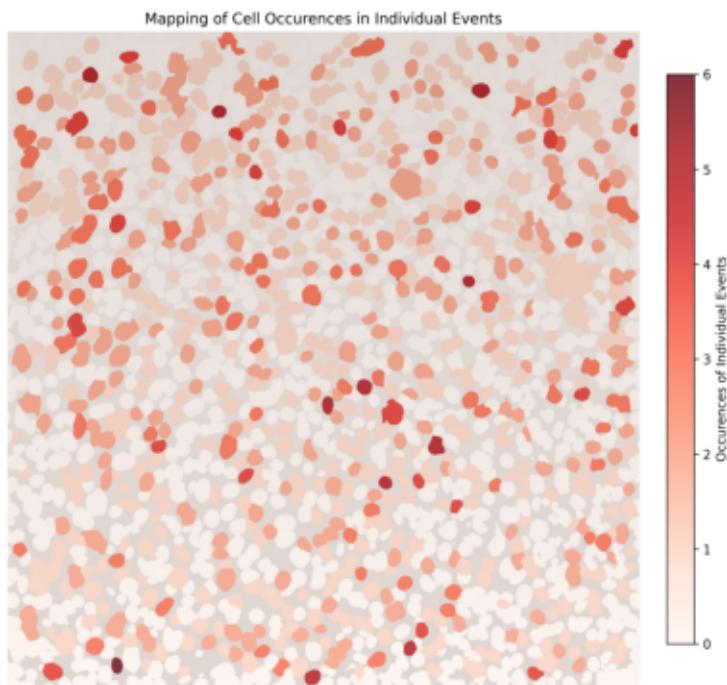


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)



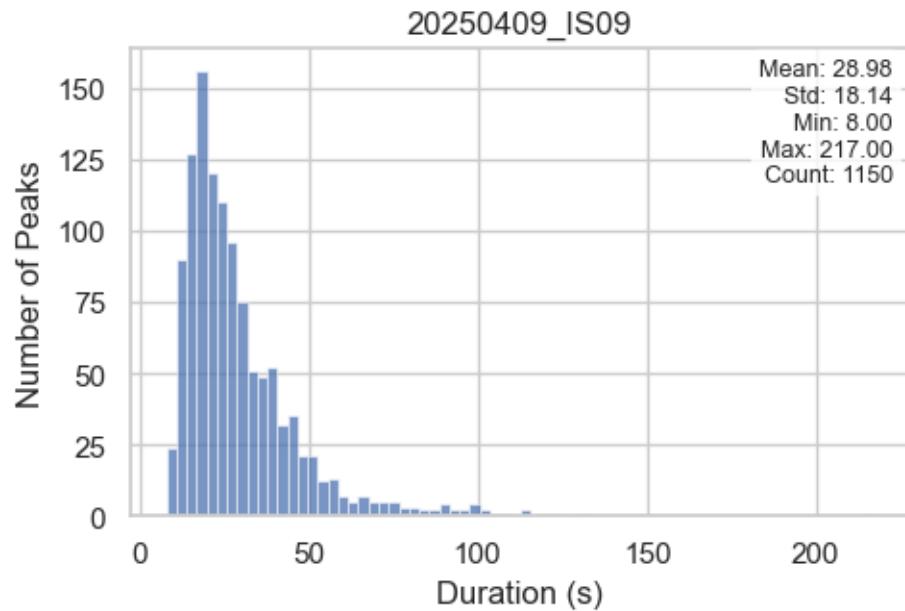
Cell Mapping with Occurrences in Individual Events Overlay

20250409_IS09

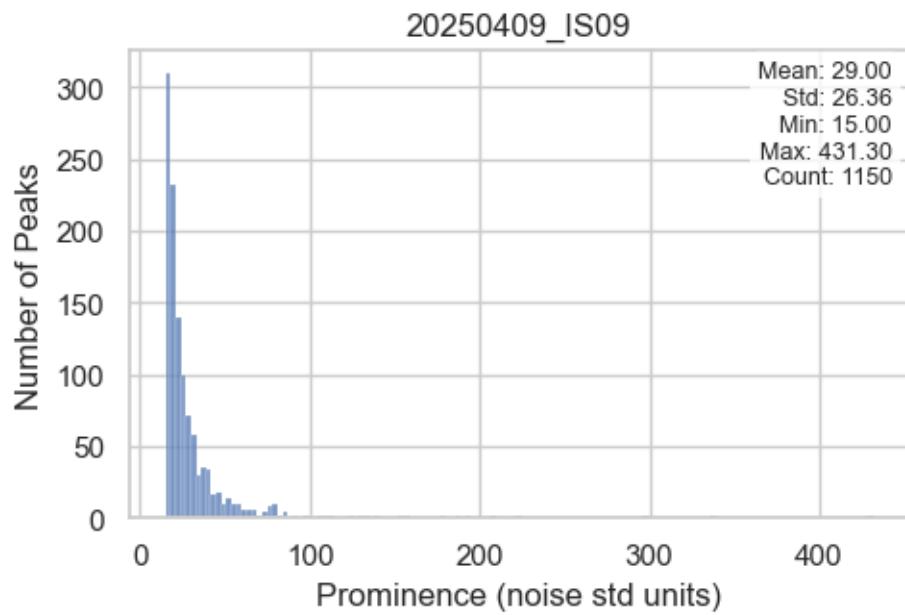


1.4.2 Peaks statistics in individual events

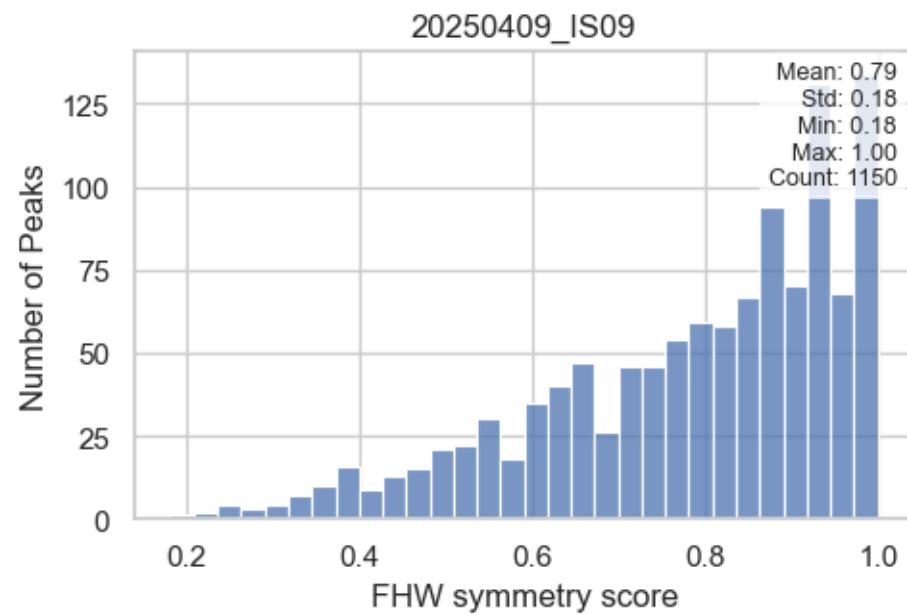
Distribution of Peak Durations



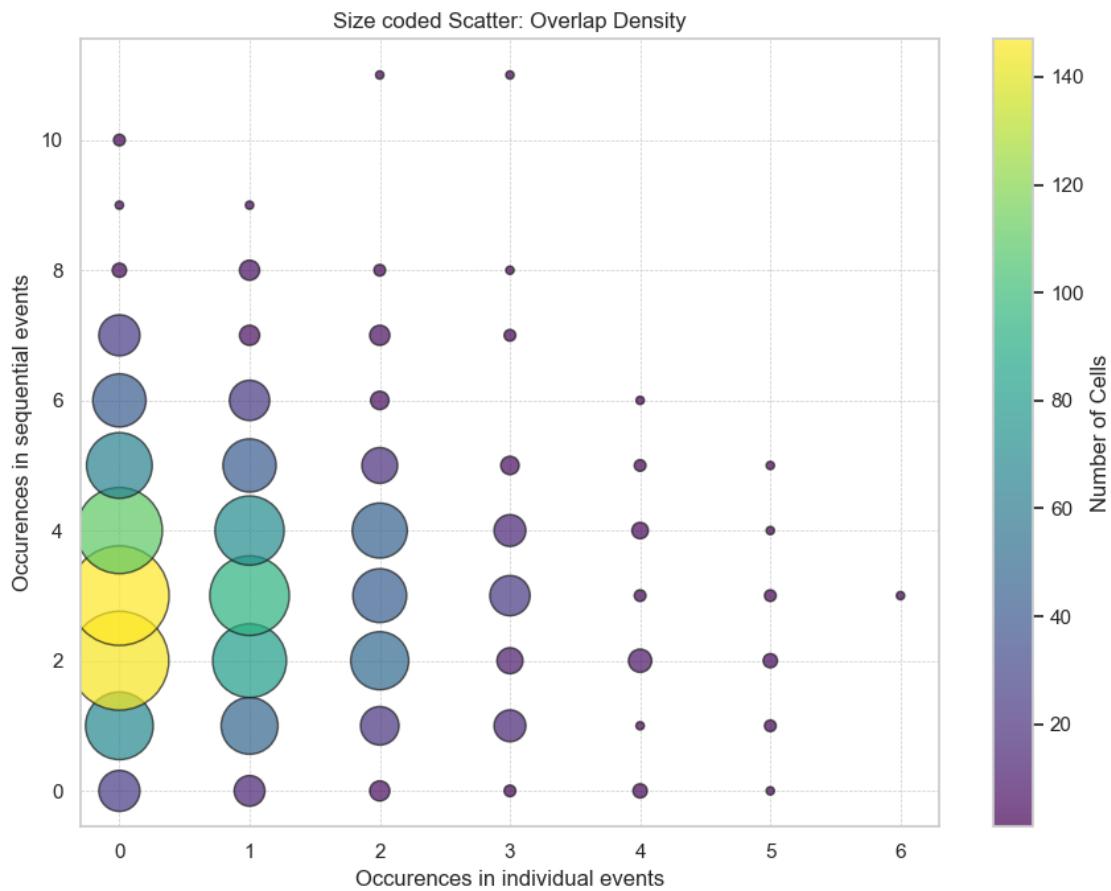
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

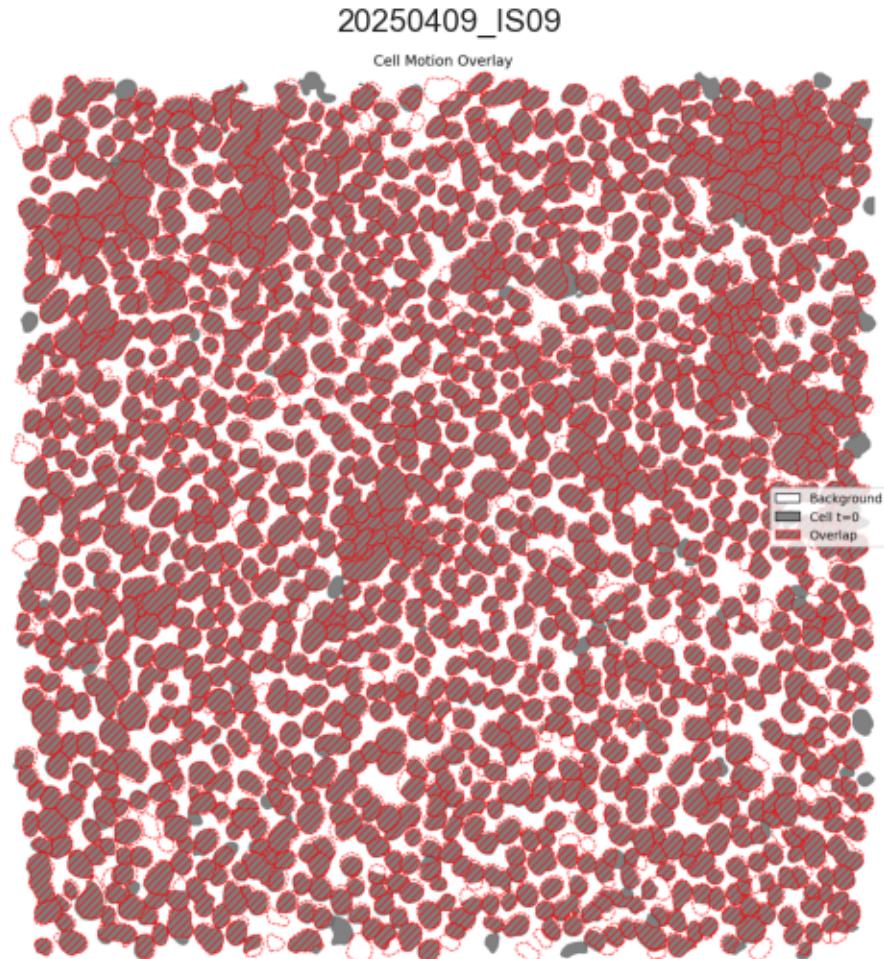


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

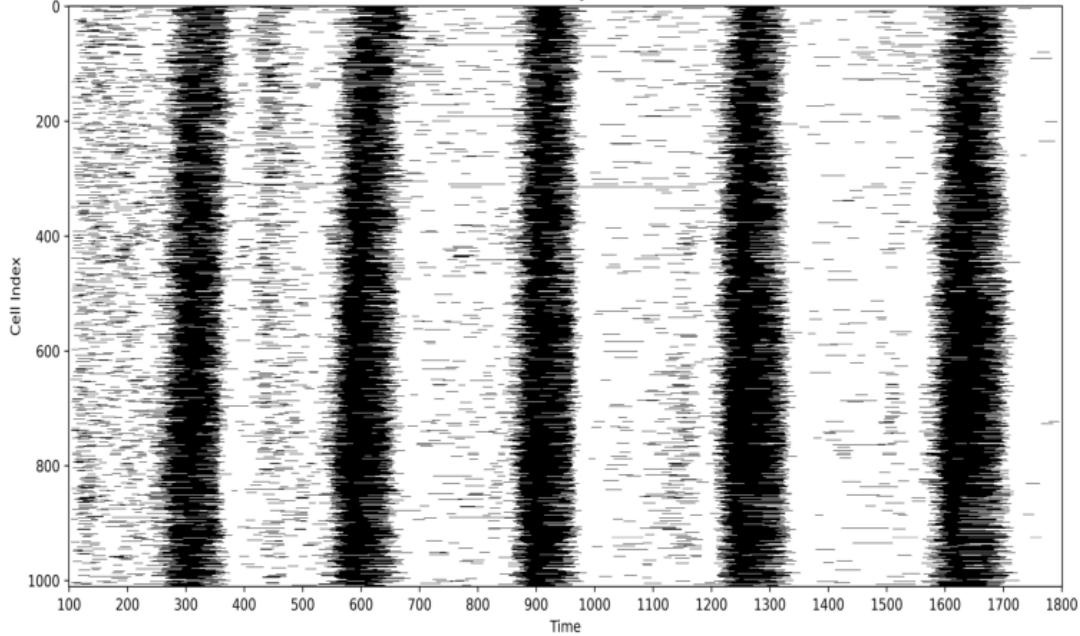
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

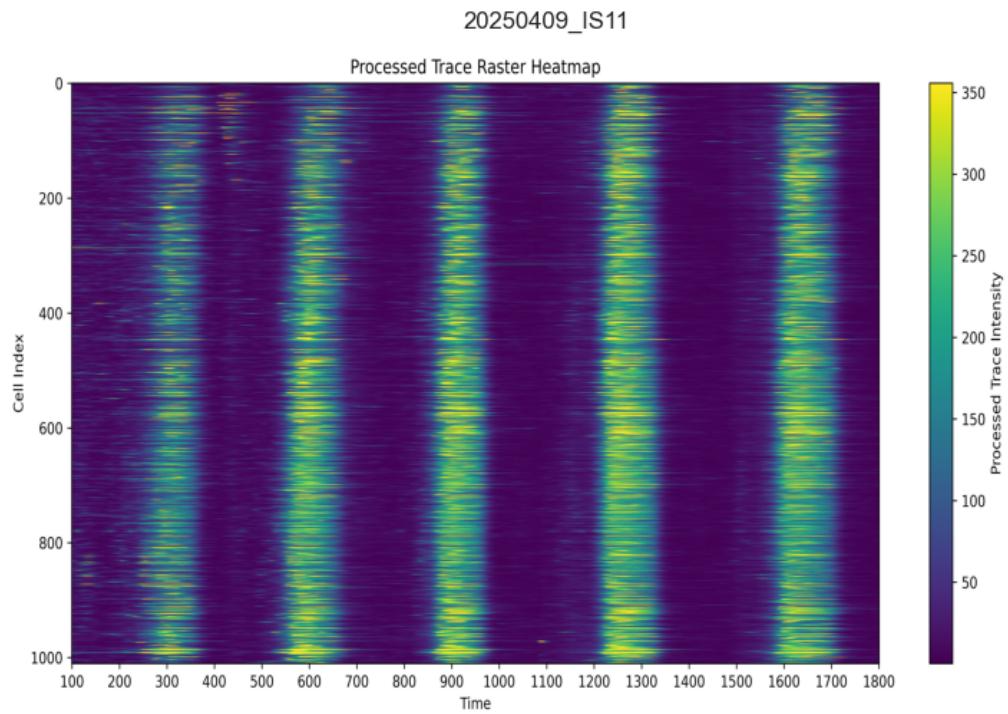
Binary Activity Raster Plot

20250409_IS11

Binarized Activity Raster Plot



Heatmap Activity Raster Plot



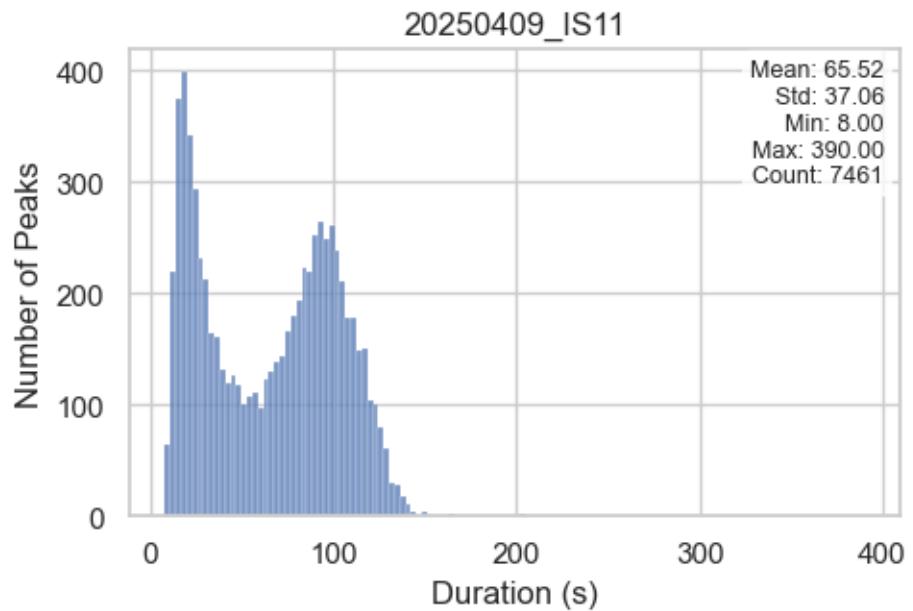
1.1.2 Peaks population

Total number of peaks: 7461

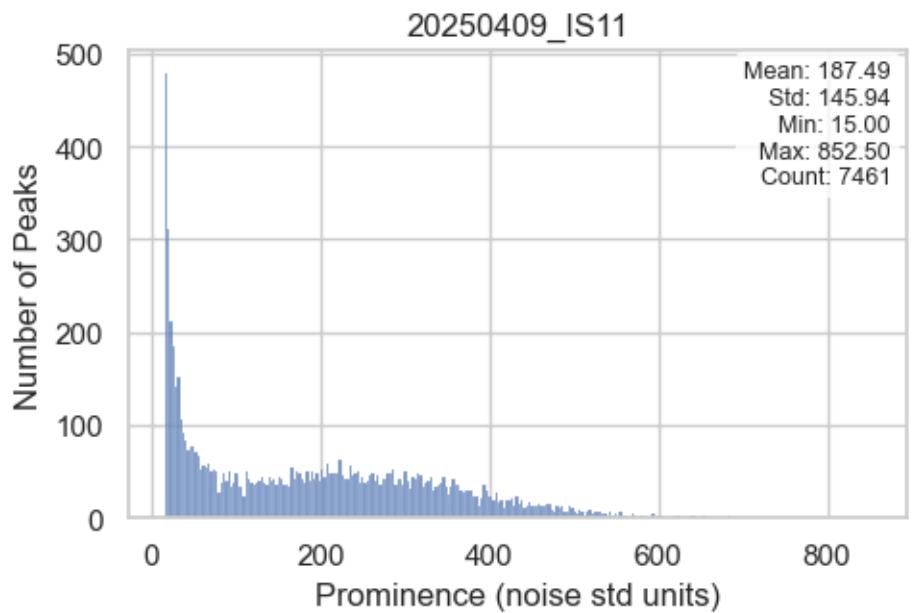
Total number of cells: 1011

1.1.3 Peaks statistics

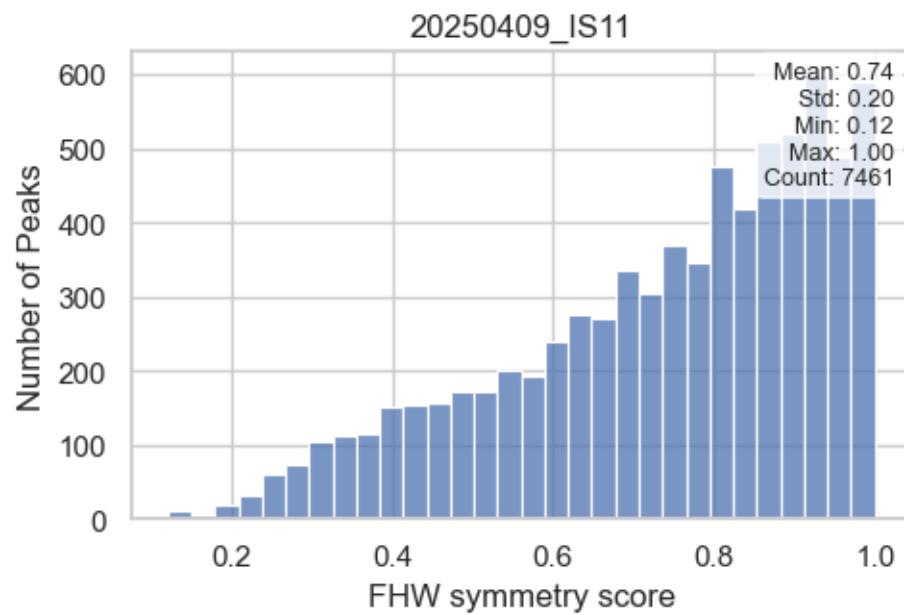
Distribution of Peak Durations



Distribution of Peak Prominences

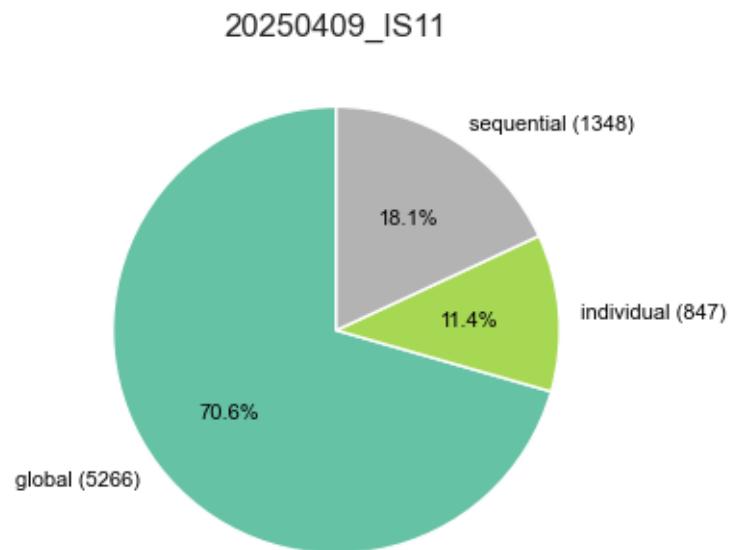


Distribution of Peak Symmetry Scores



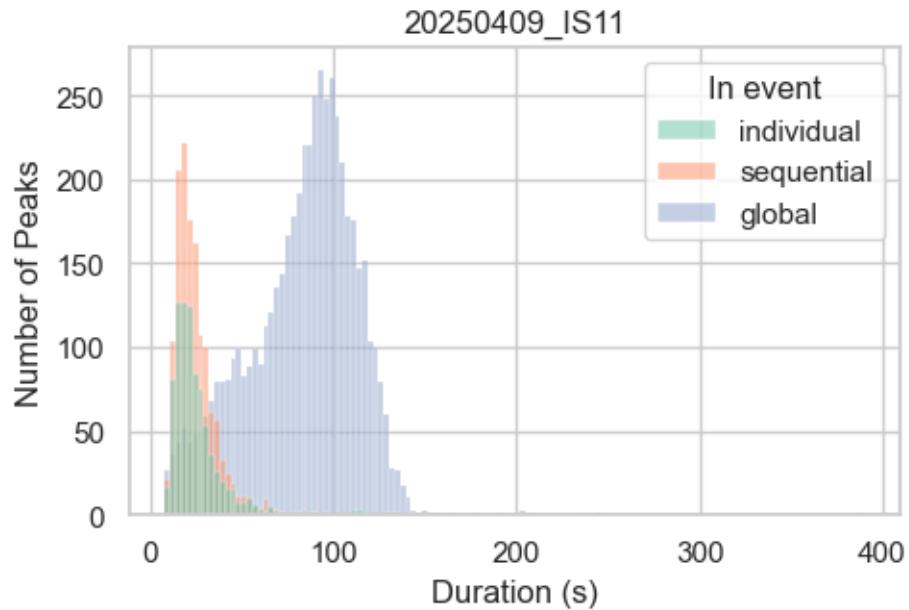
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

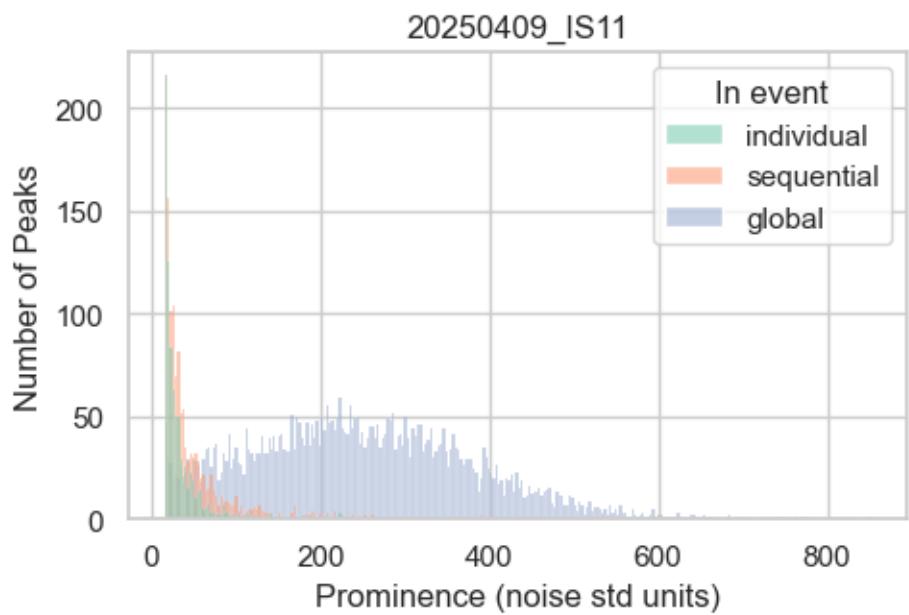


1.1.5 Peaks statistics per event types

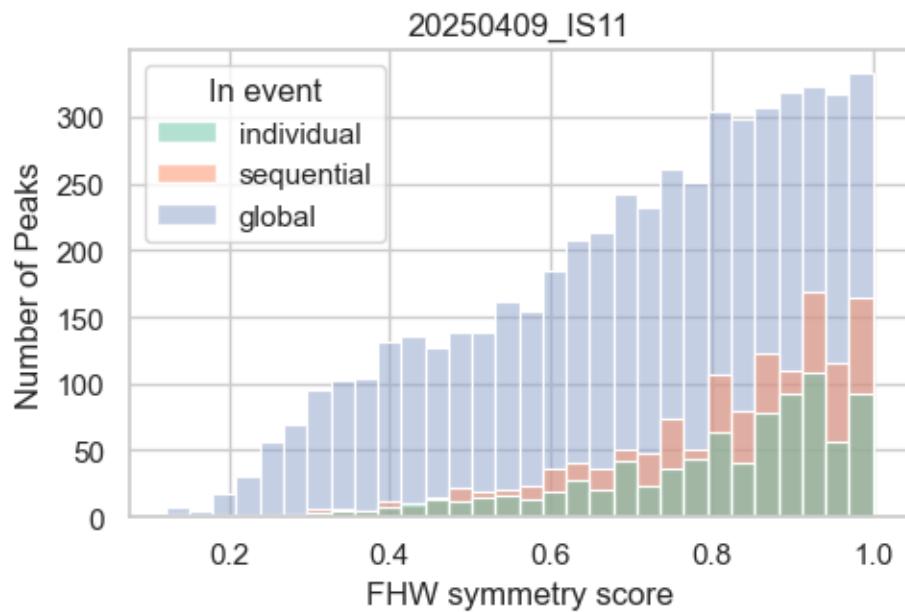
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

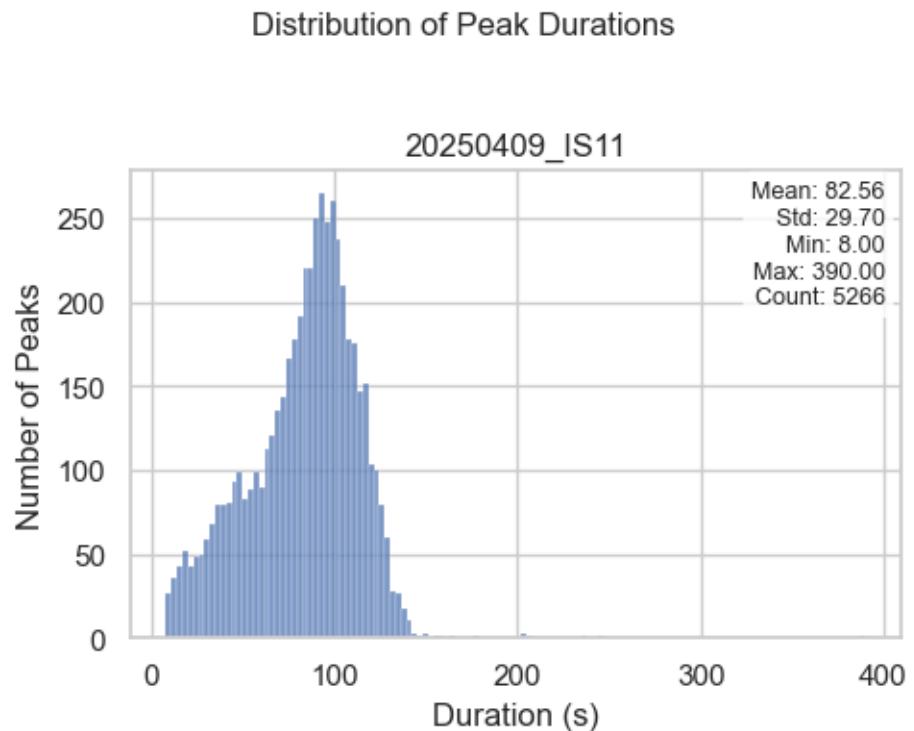


Distribution of Peak Symmetry Scores by Group

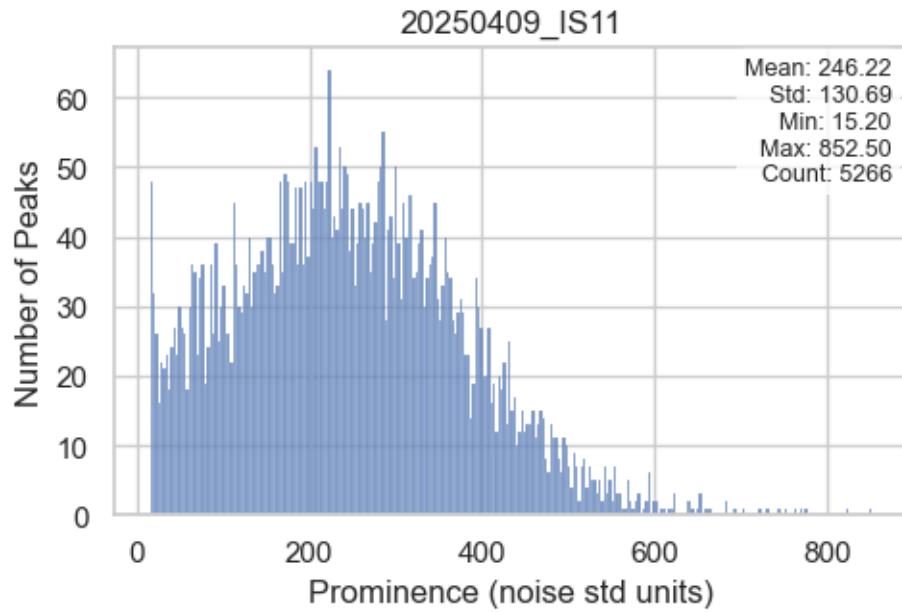


1.2 GLOBAL EVENTS

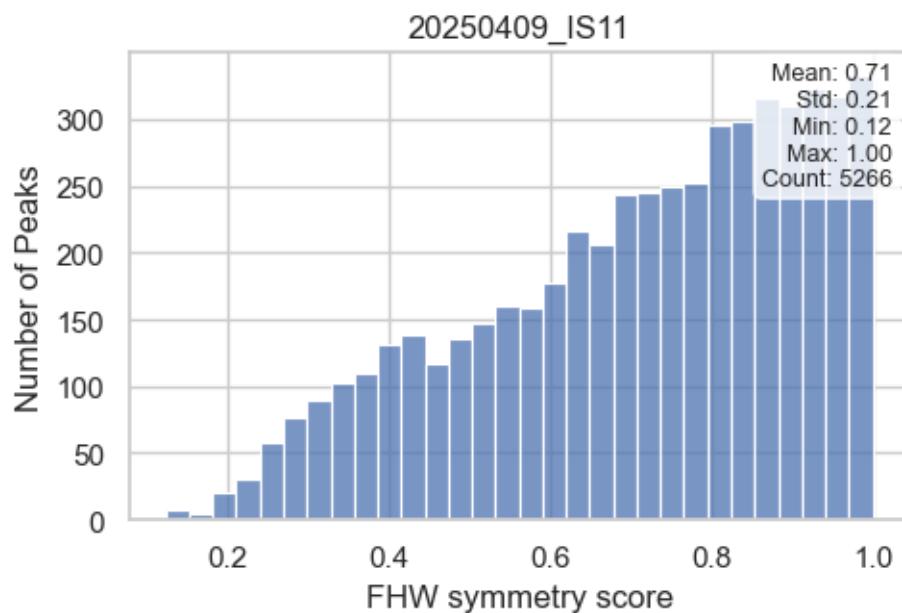
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

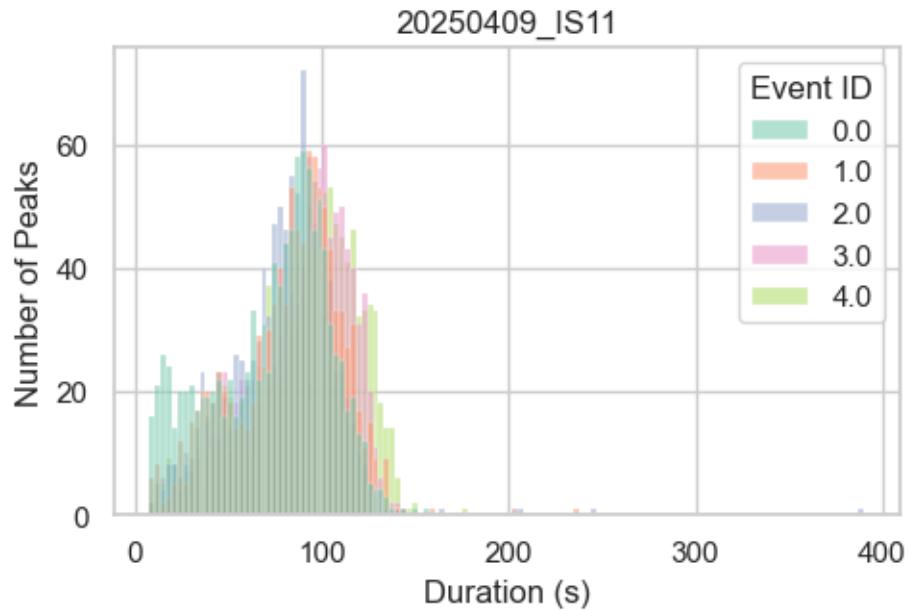


Distribution of Peak Symmetry Scores

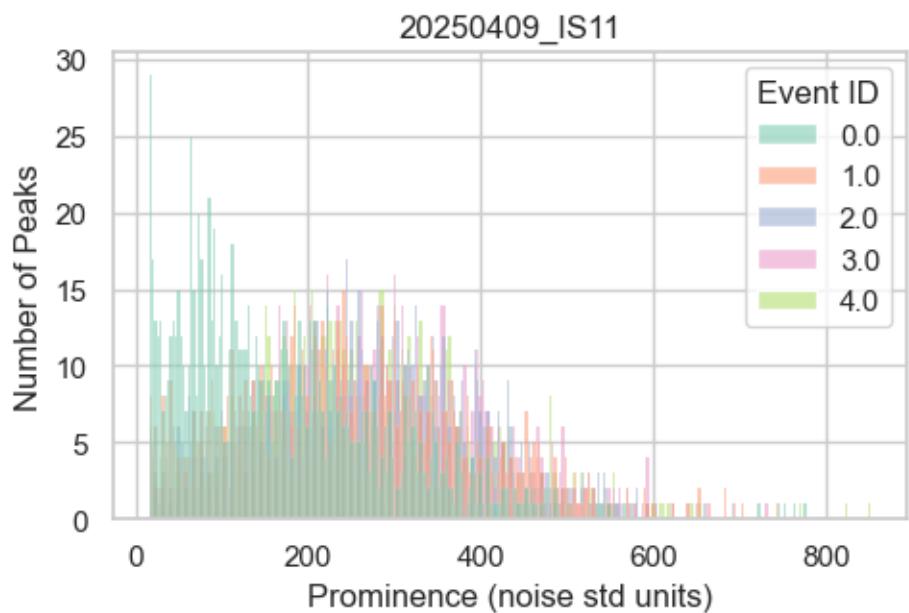


1.2.2 Peak statistics in global event per event ID

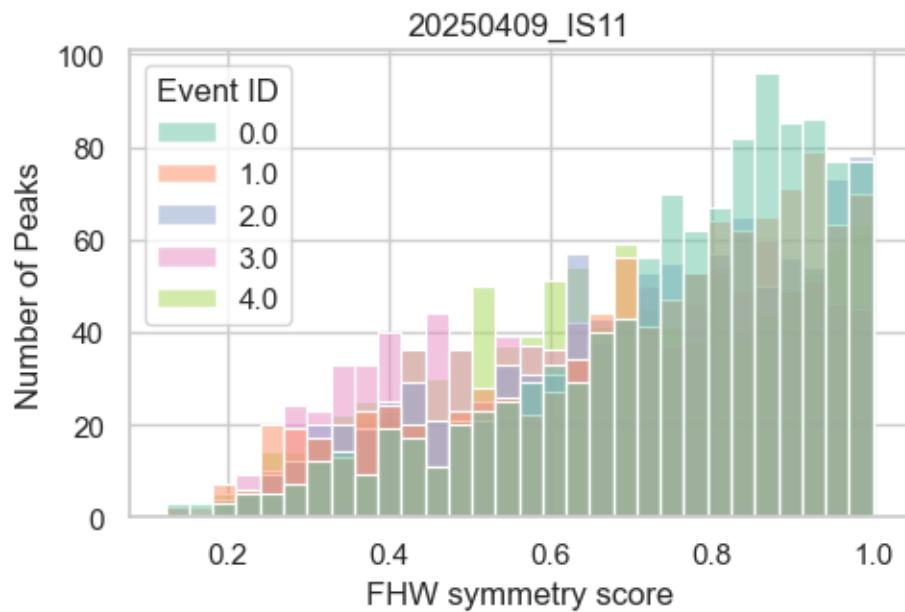
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



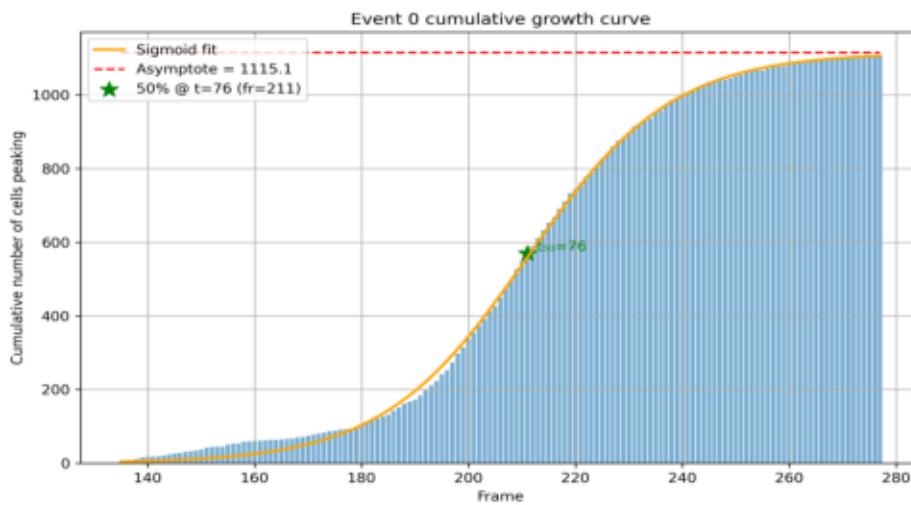
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

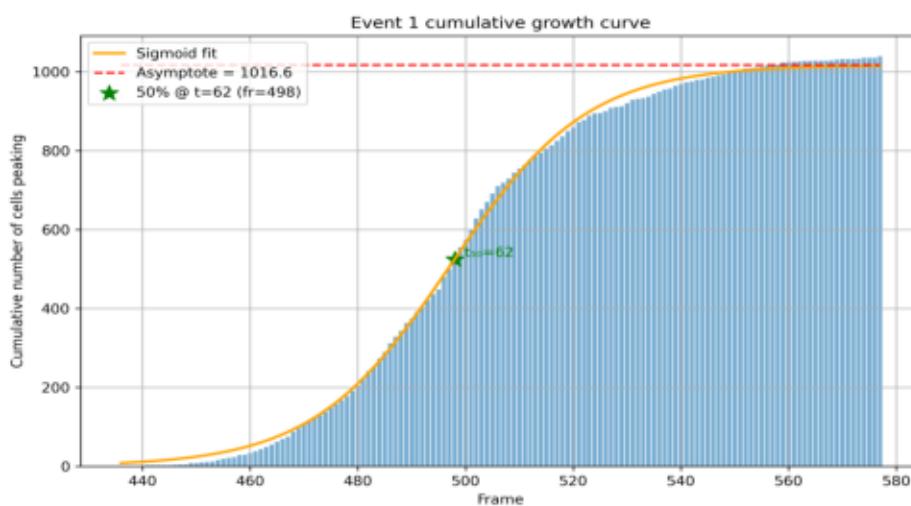
Event Activity Overlay (Event ID: 0)

20250409_IS11



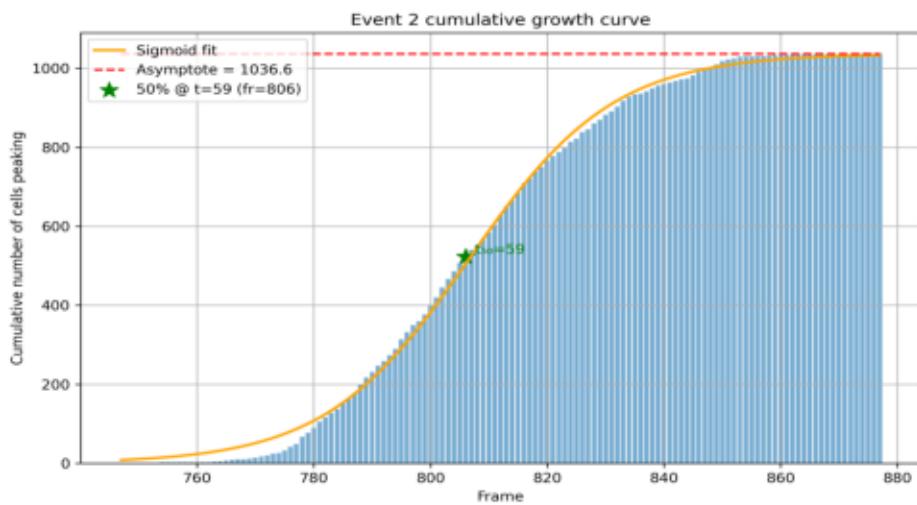
Event Activity Overlay (Event ID: 1)

20250409_IS11



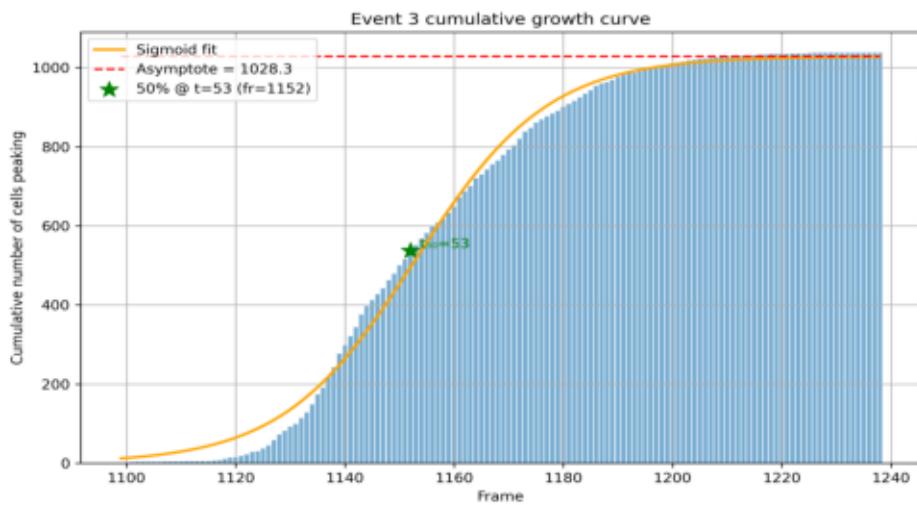
Event Activity Overlay (Event ID: 2)

20250409_IS11



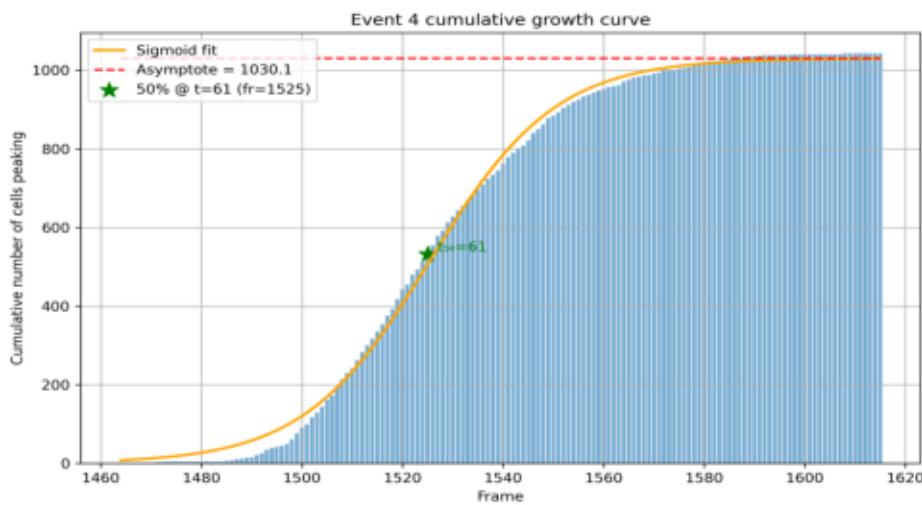
Event Activity Overlay (Event ID: 3)

20250409_IS11



Event Activity Overlay (Event ID: 4)

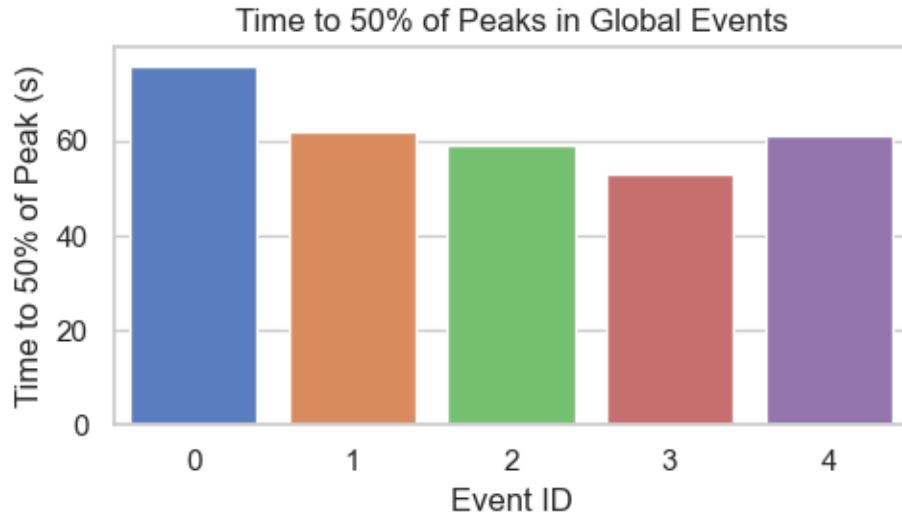
20250409_IS11



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

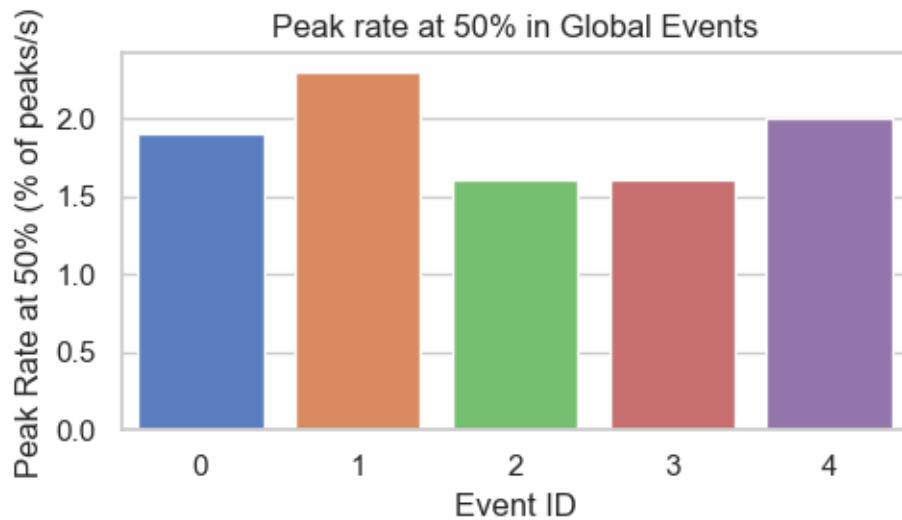
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys
is\visualizers.py:257: FutureWarning:
```

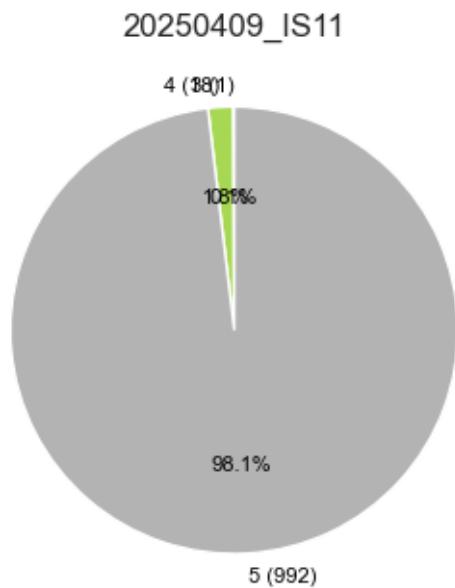
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



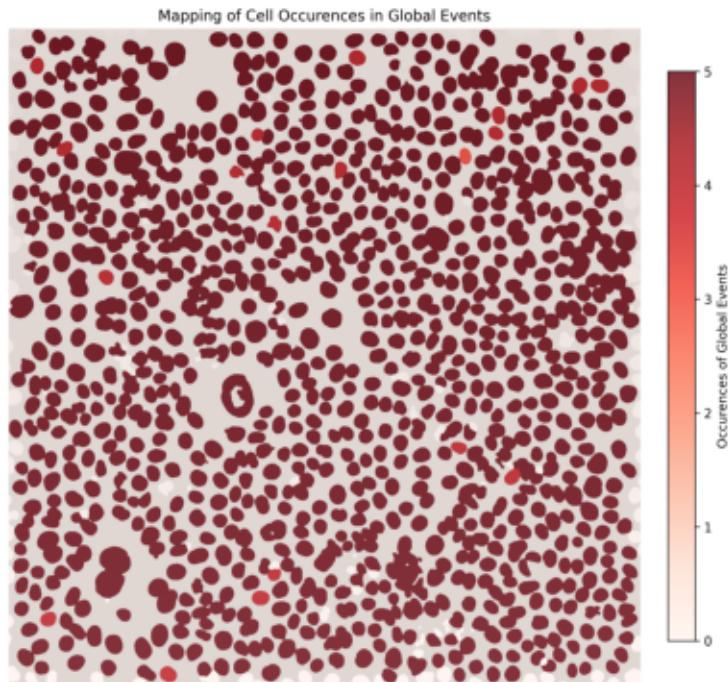
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

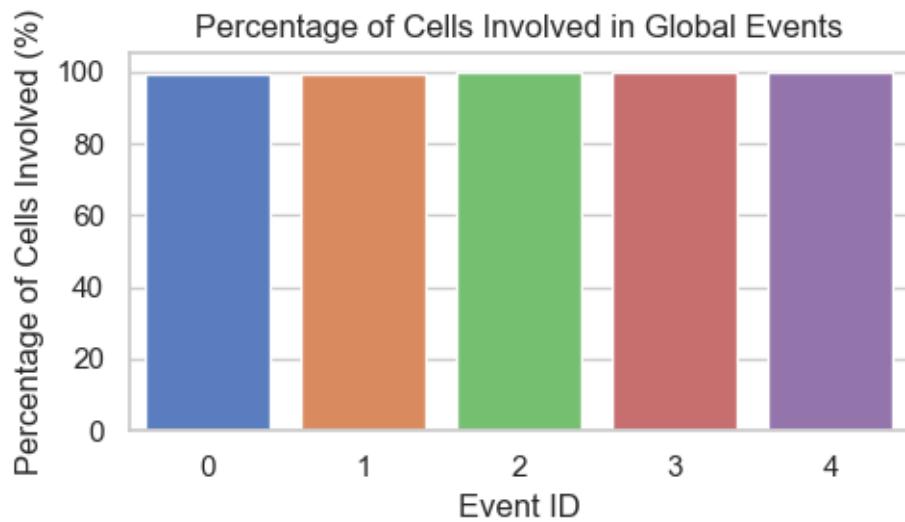
20250409_IS11



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.2.5 Inter-event interval analysis

Intervals between global event peaks: [288.0, 309.0, 350.0, 377.0]

Estimated periodicity: 0.905

The global events exhibit a regular periodic pattern.

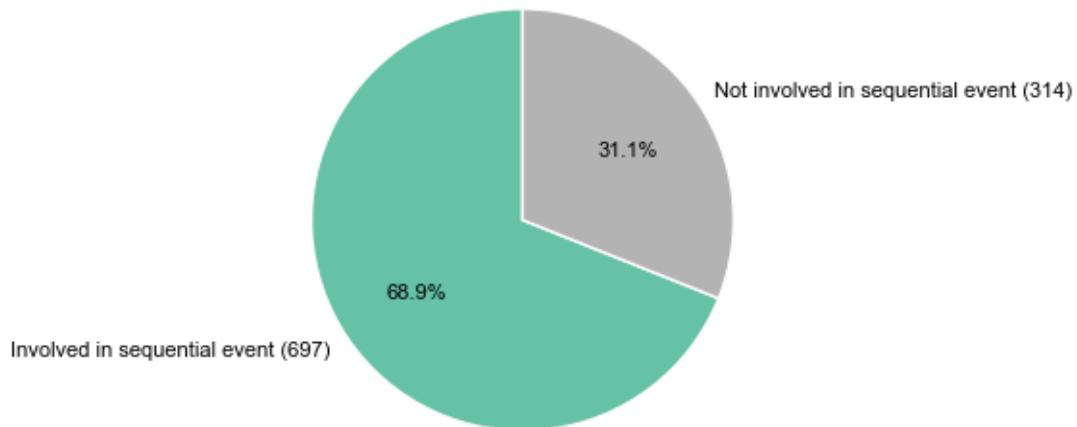
Estimated frequency (1/mean interval): 0.003 Hz

1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

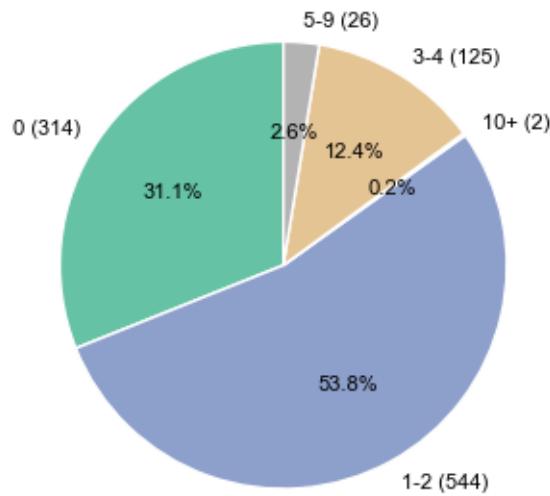
Distribution of Cells Involved in Sequential Events

20250409_IS11



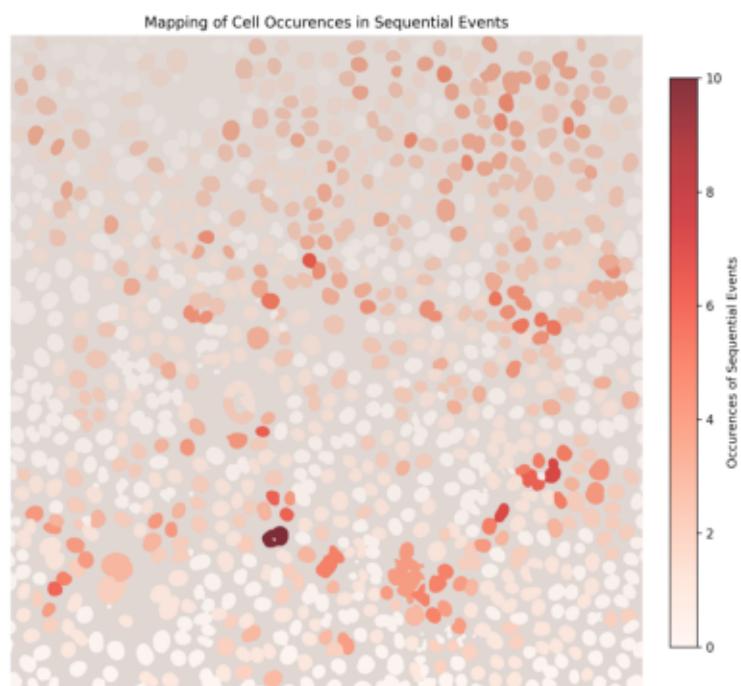
Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

20250409_IS11



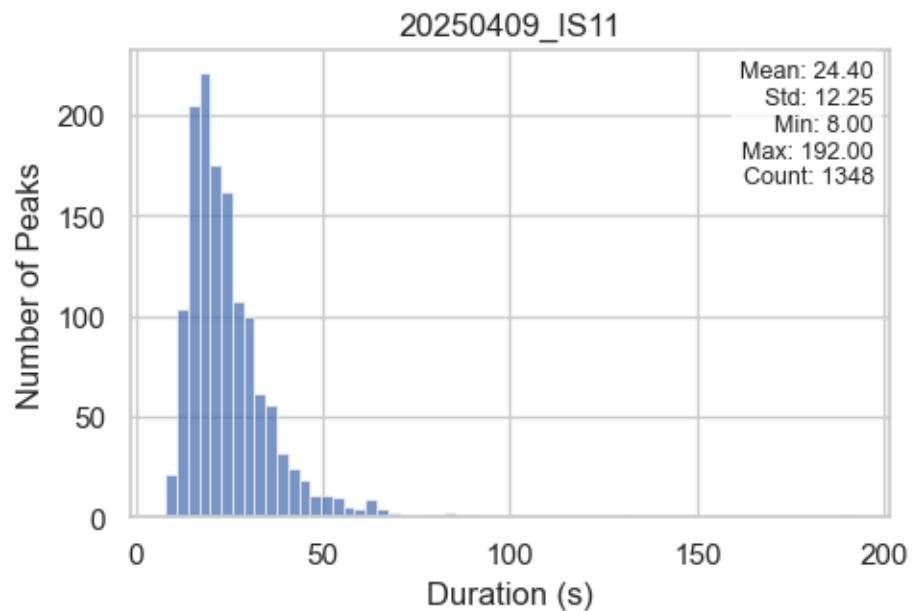
Cell Mapping with Occurrences in Sequential Events Overlay

20250409_IS11

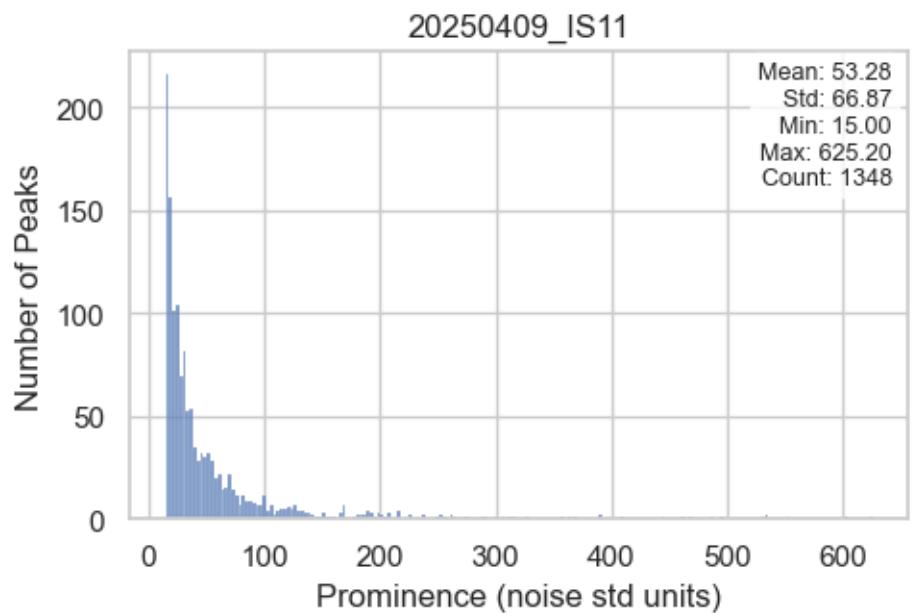


1.3.2 Peaks statistics in sequential events

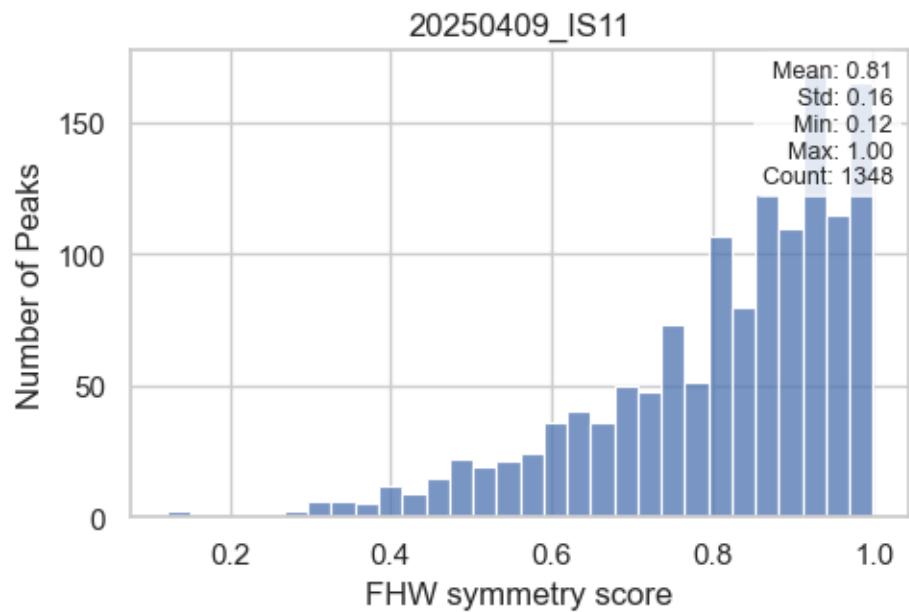
Distribution of Peak Durations



Distribution of Peak Prominences

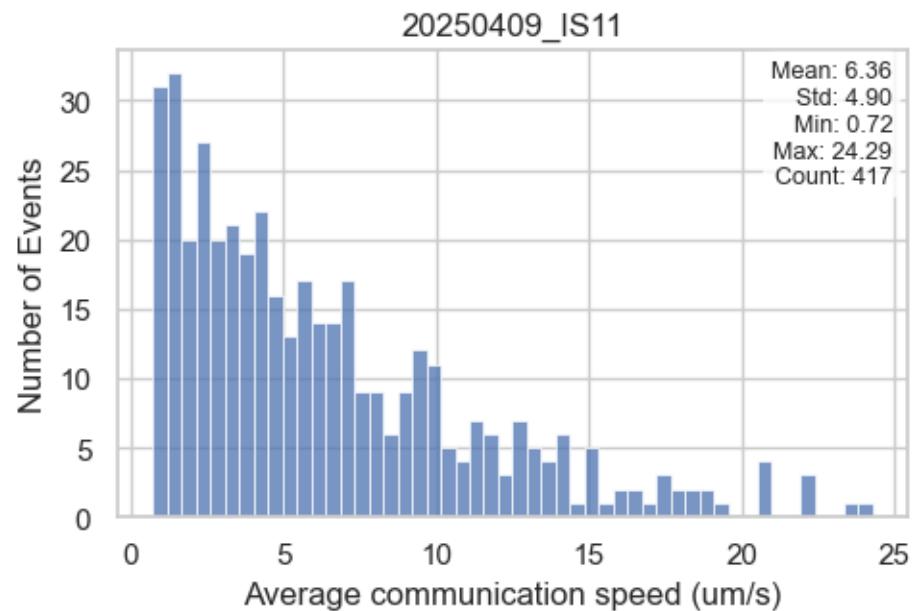


Distribution of Peak Symmetry Scores

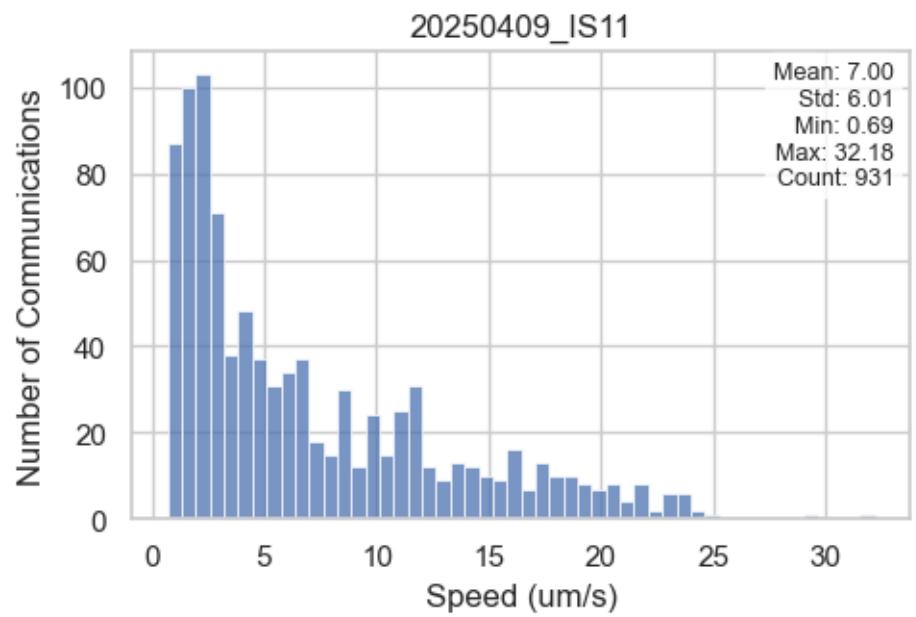


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

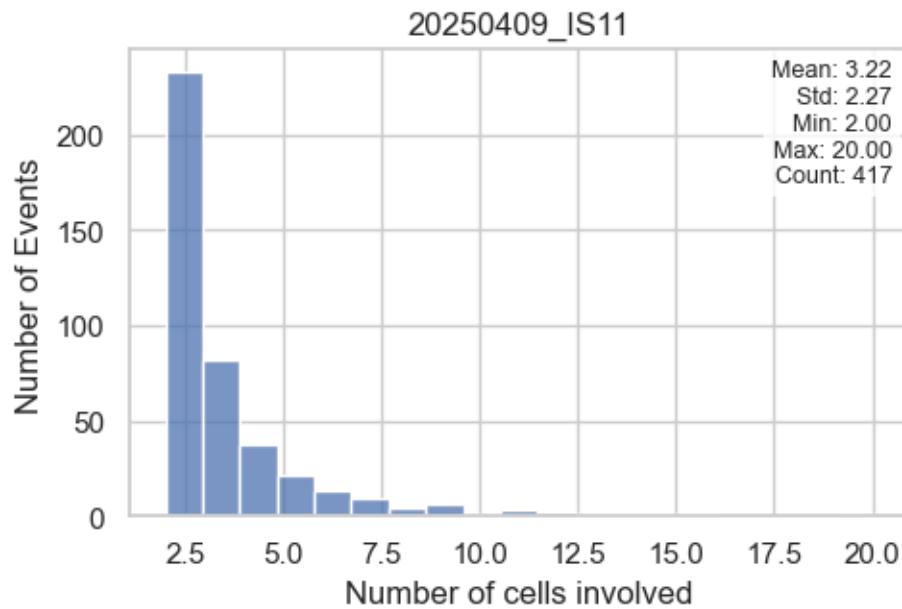


Distribution of Cell-Cell Communication Speeds



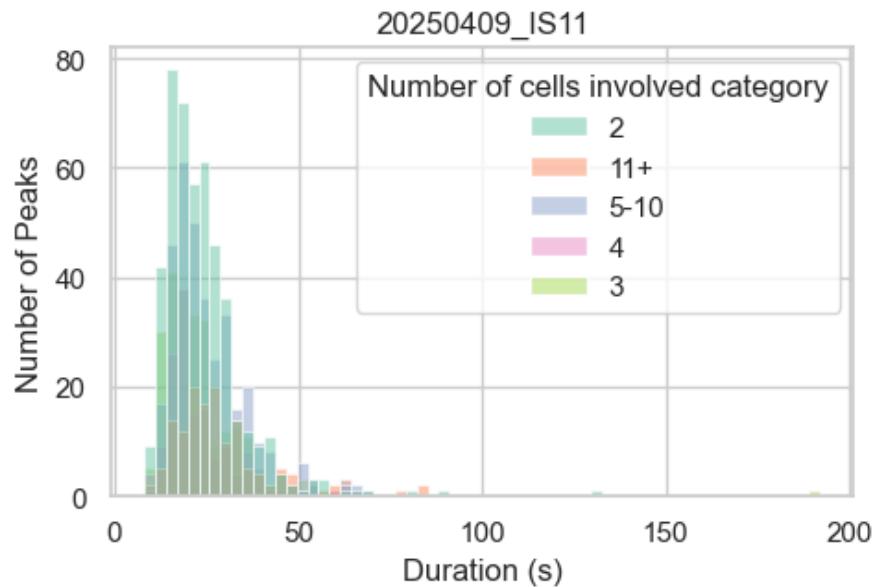
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

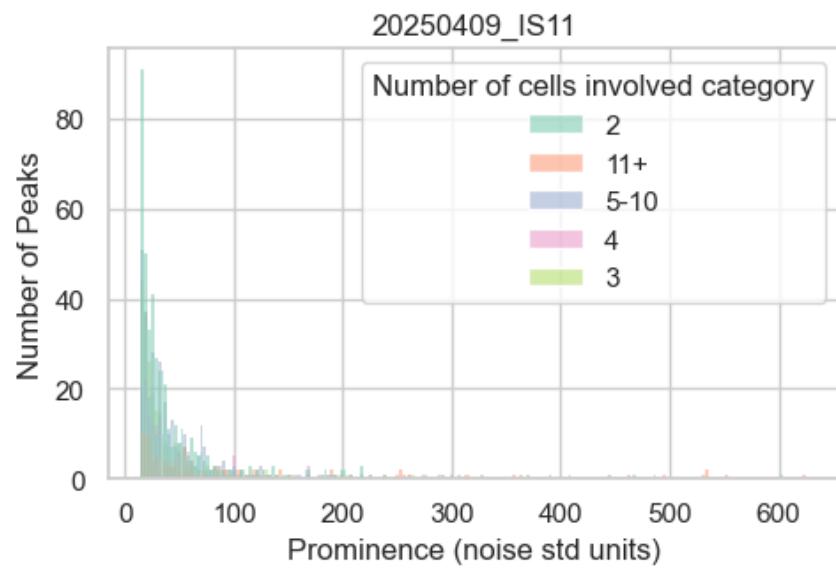


1.3.5 Influence of cell count per event on statistics

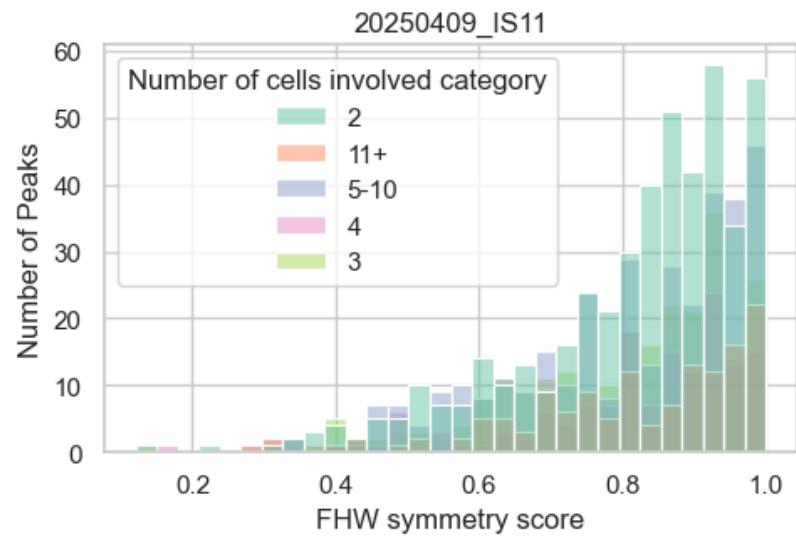
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



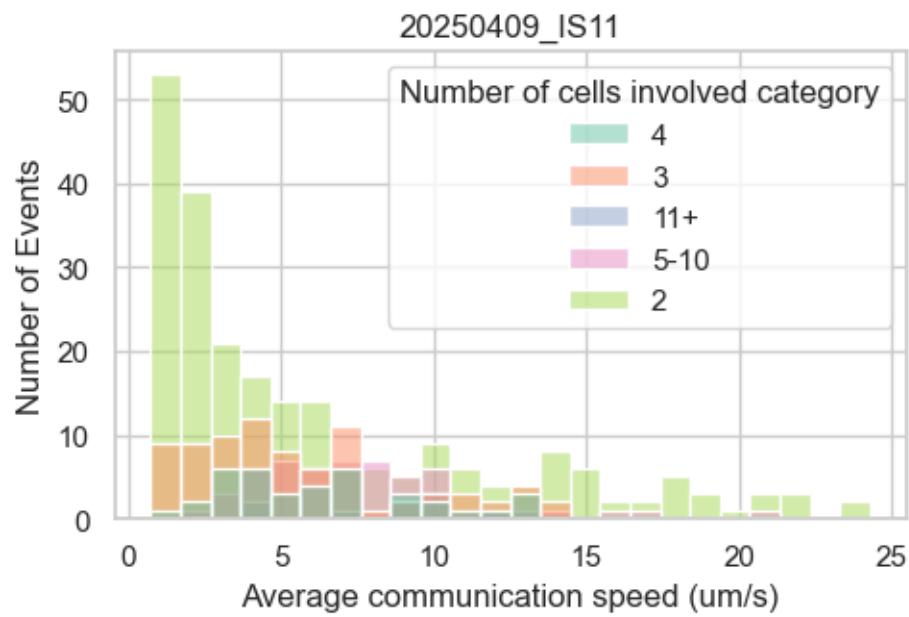
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



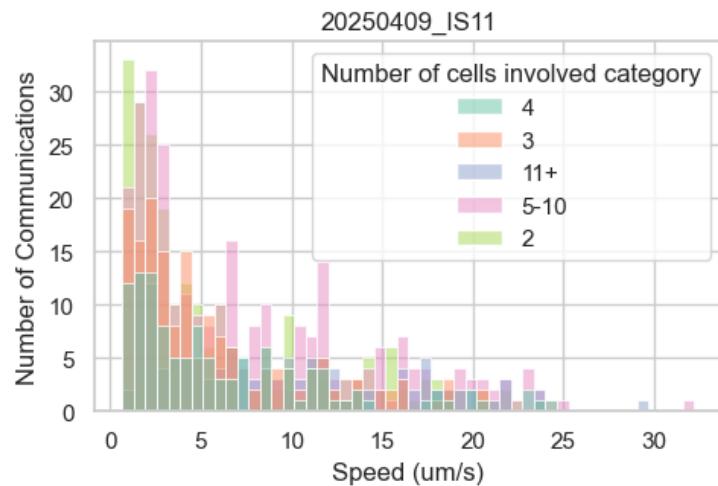
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

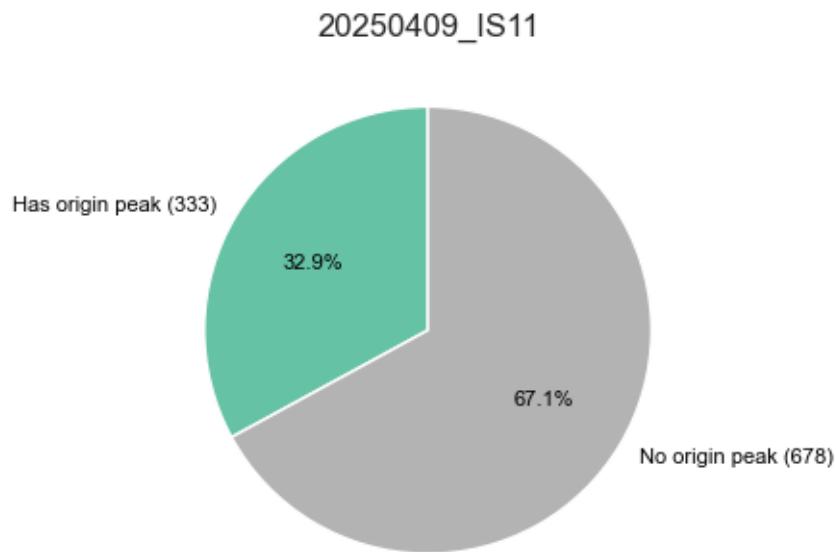


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

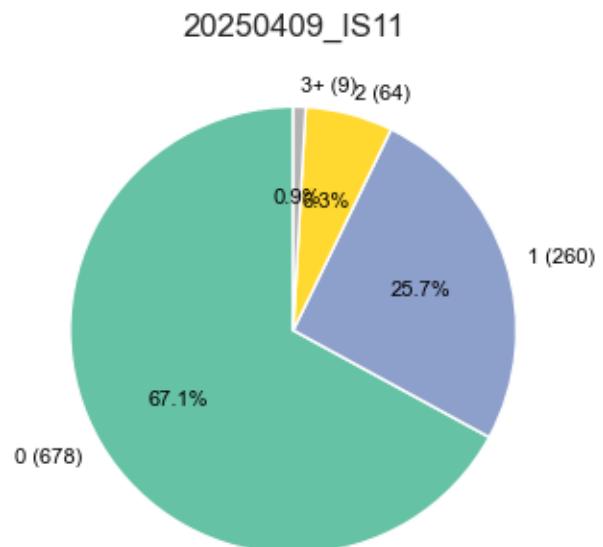


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

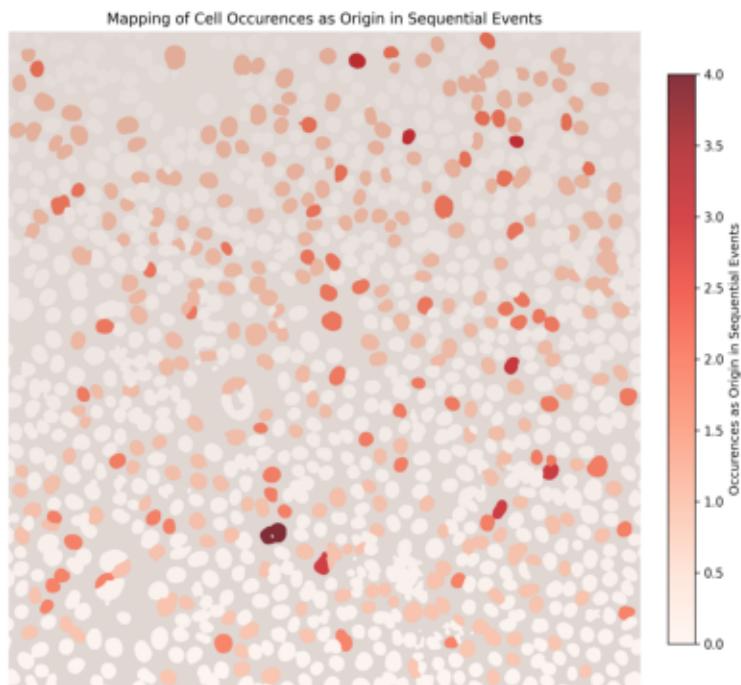


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

20250409_IS11

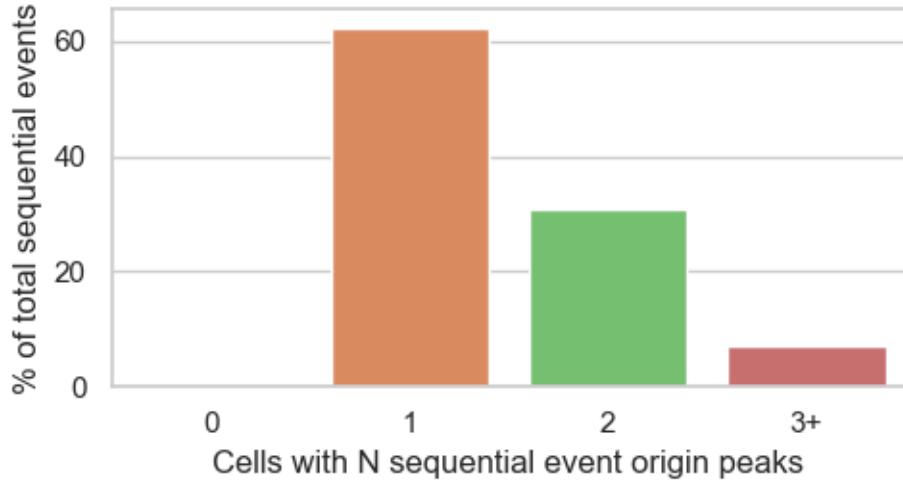


C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

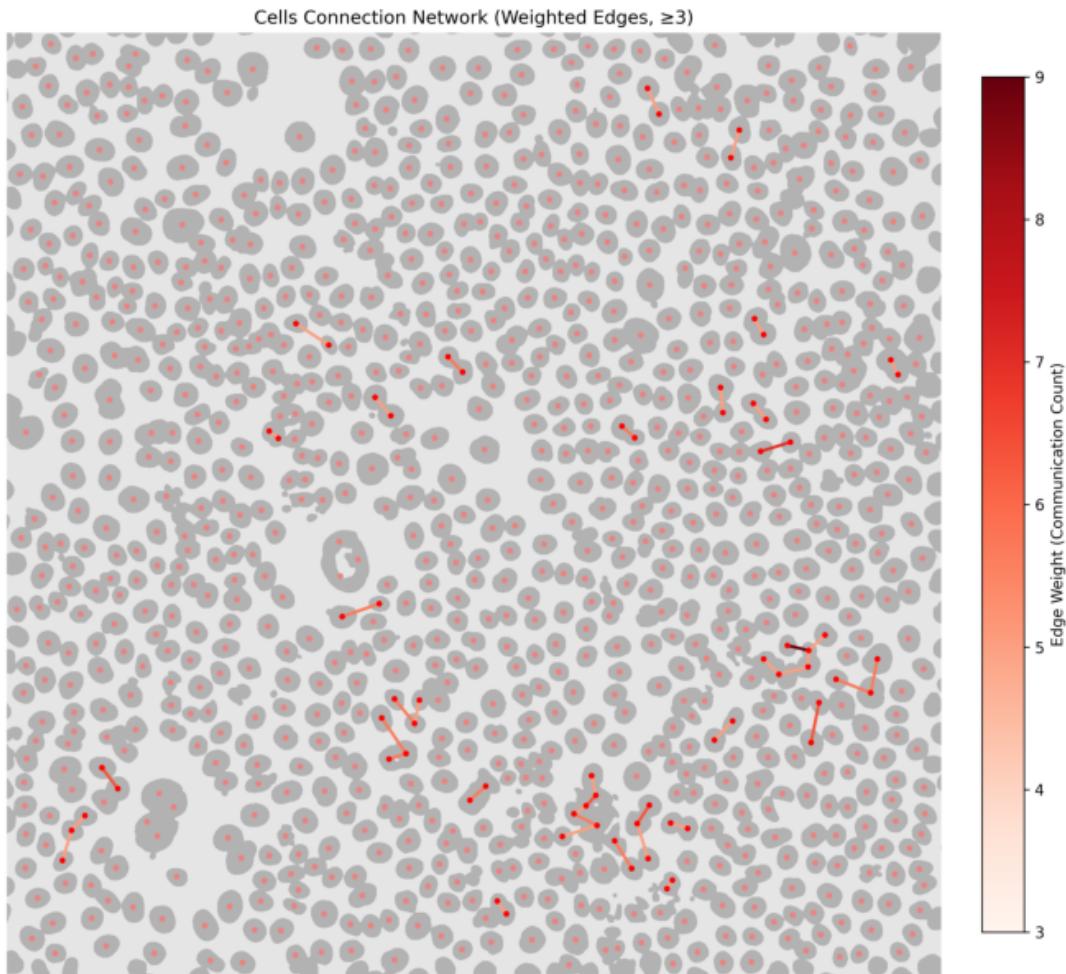
Distribution of Sequential Events per Cell by Number of Origin Peaks



1.3.7 Connection network between cells

Cell Connection Network Graph

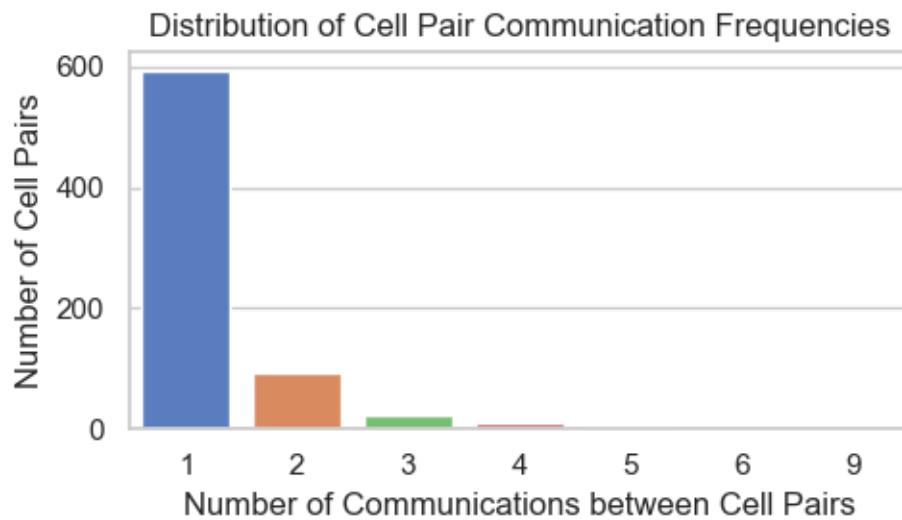
20250409_IS11



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.
```

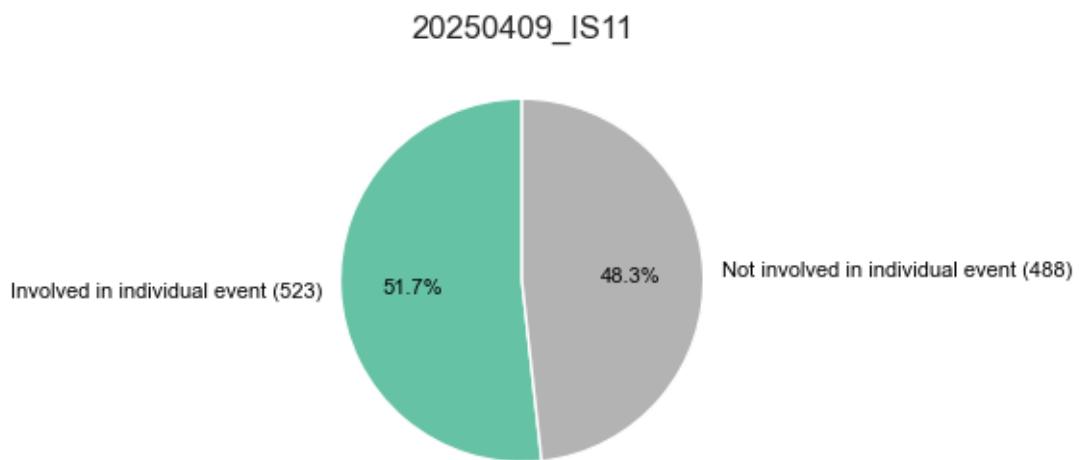
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



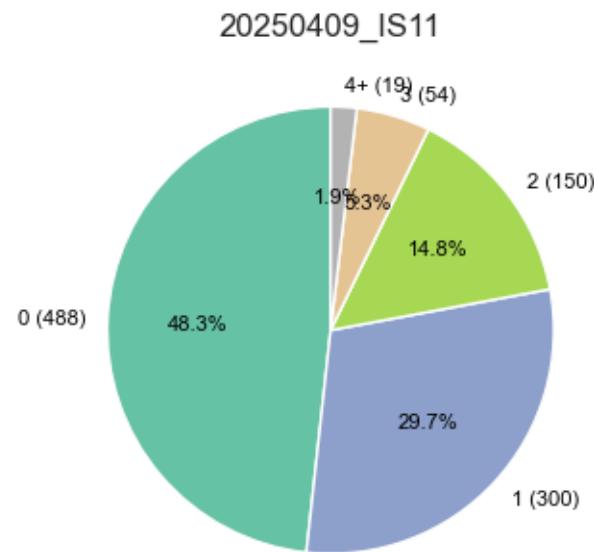
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

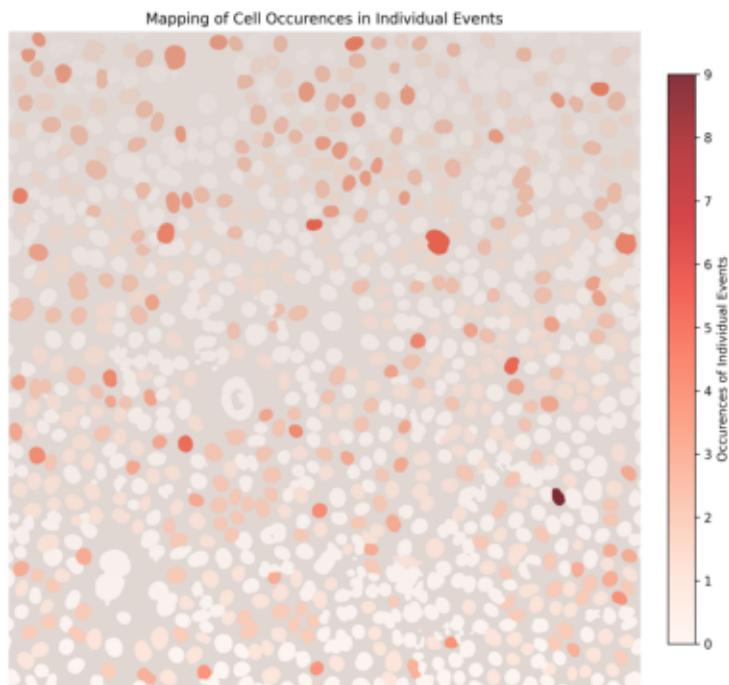


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)



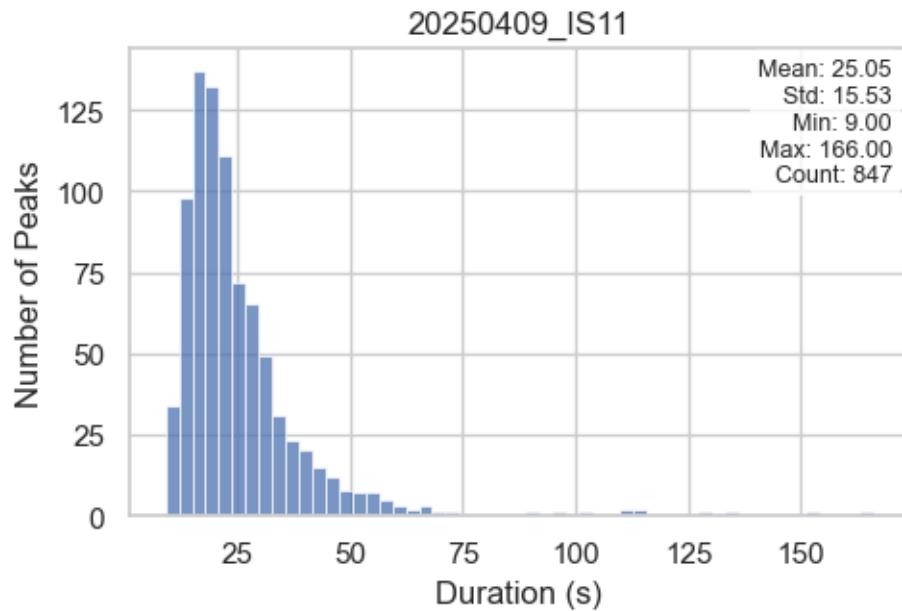
Cell Mapping with Occurrences in Individual Events Overlay

20250409_IS11

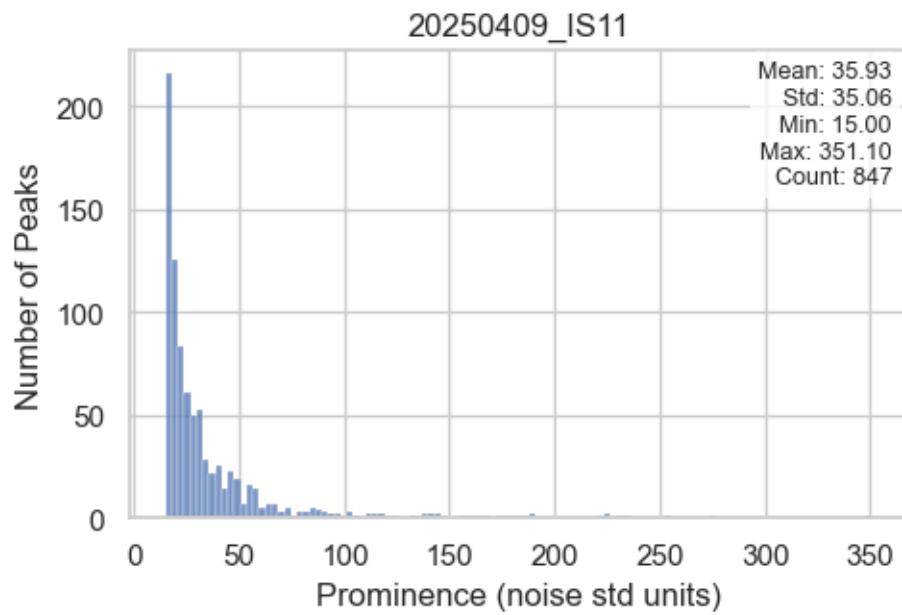


1.4.2 Peaks statistics in individual events

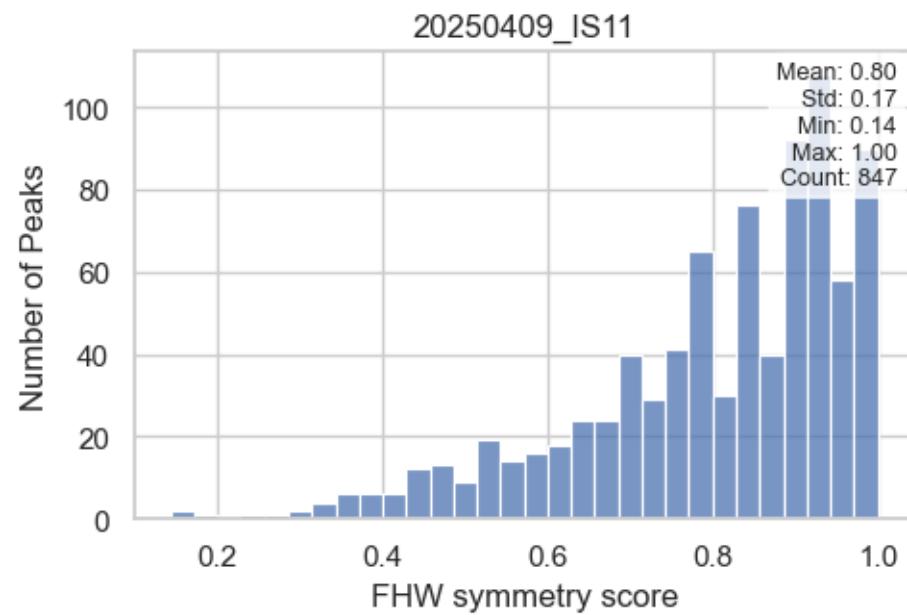
Distribution of Peak Durations



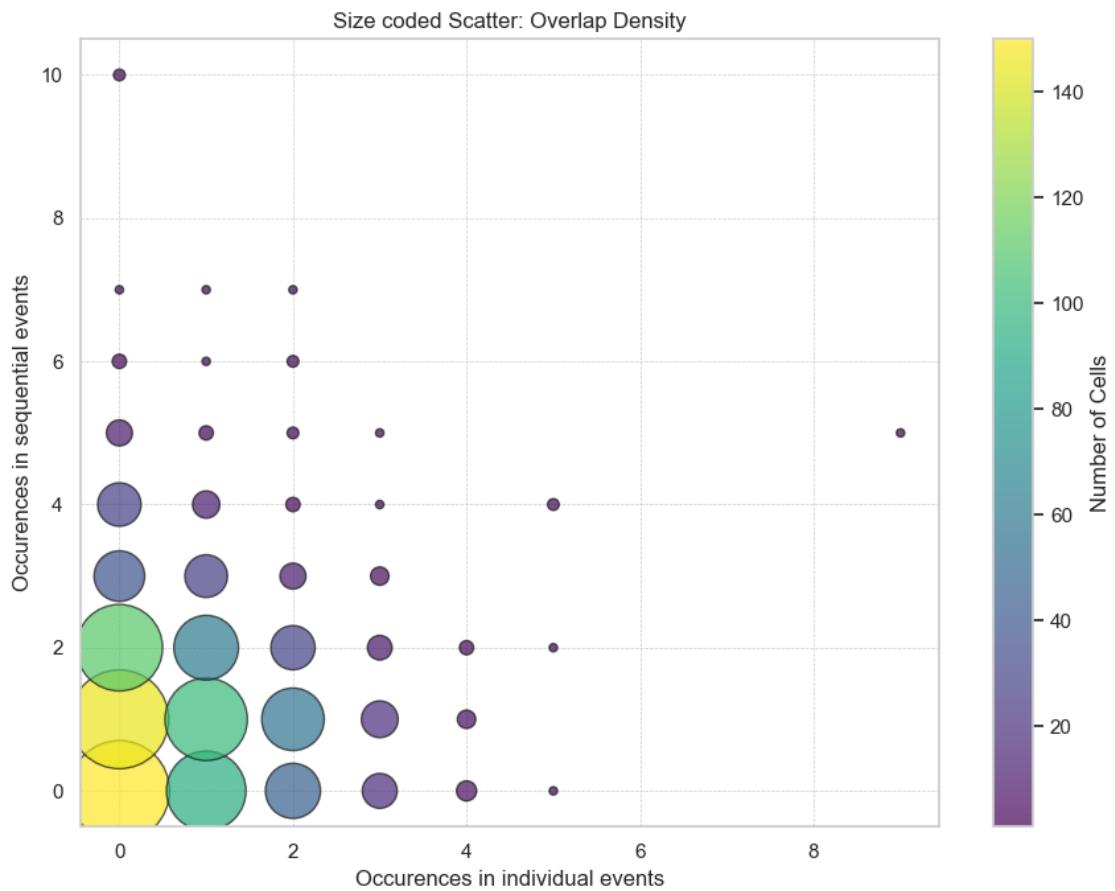
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

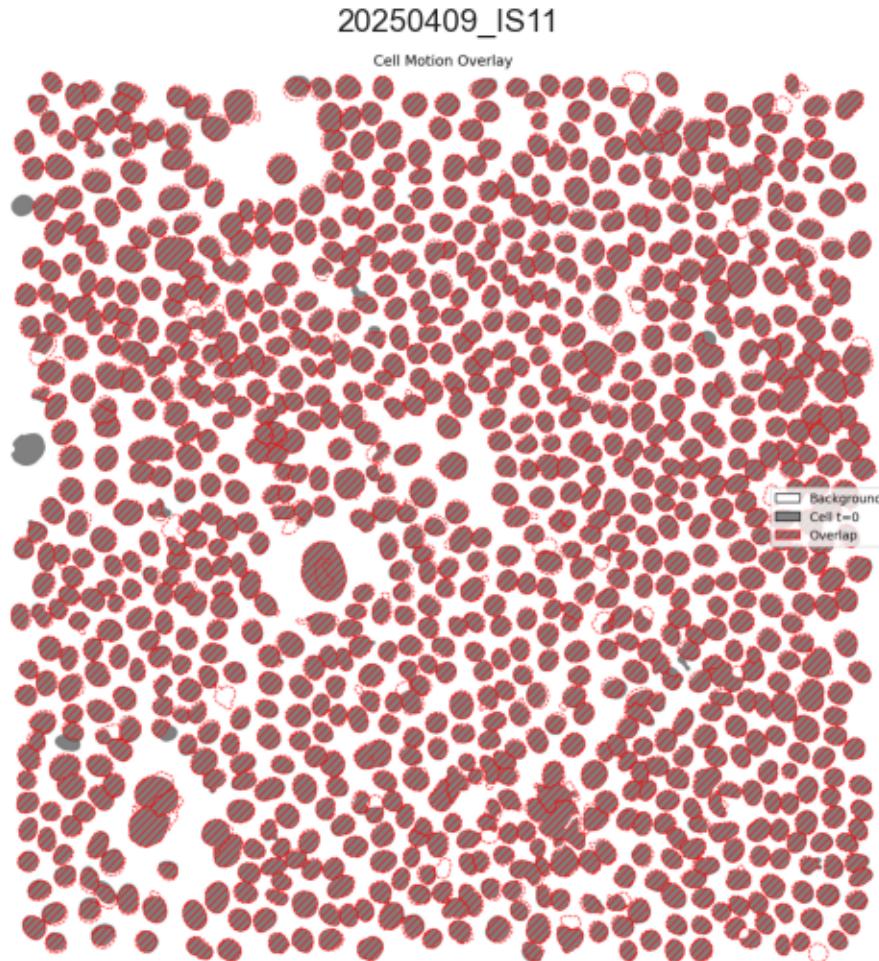


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 1011
- Hoechst image taken at t=1801: 1007
- Number of cells difference: absolute 4, relative 0.40%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 1078456
- Pixels segmented as cell at t=1801: 1126020
- Overlapping pixels between t=0 and t=1801: 1020007 (92.54% of total)
- Pixels exclusive to t=0: 58449 (5.42% of total)
- Pixels exclusive to t=1801: 106013 (9.41% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

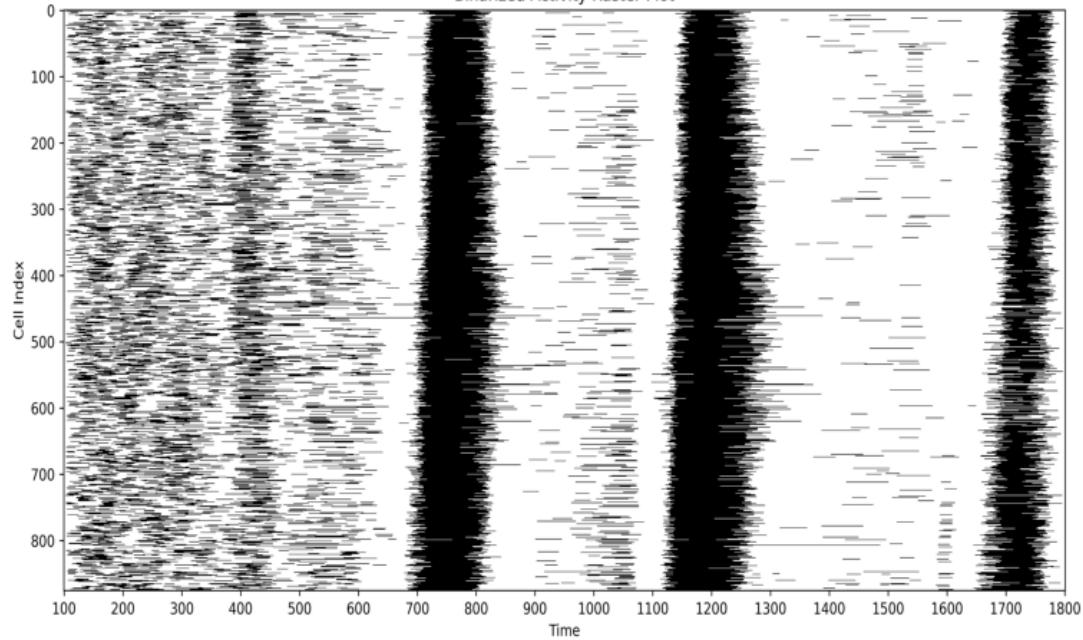
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

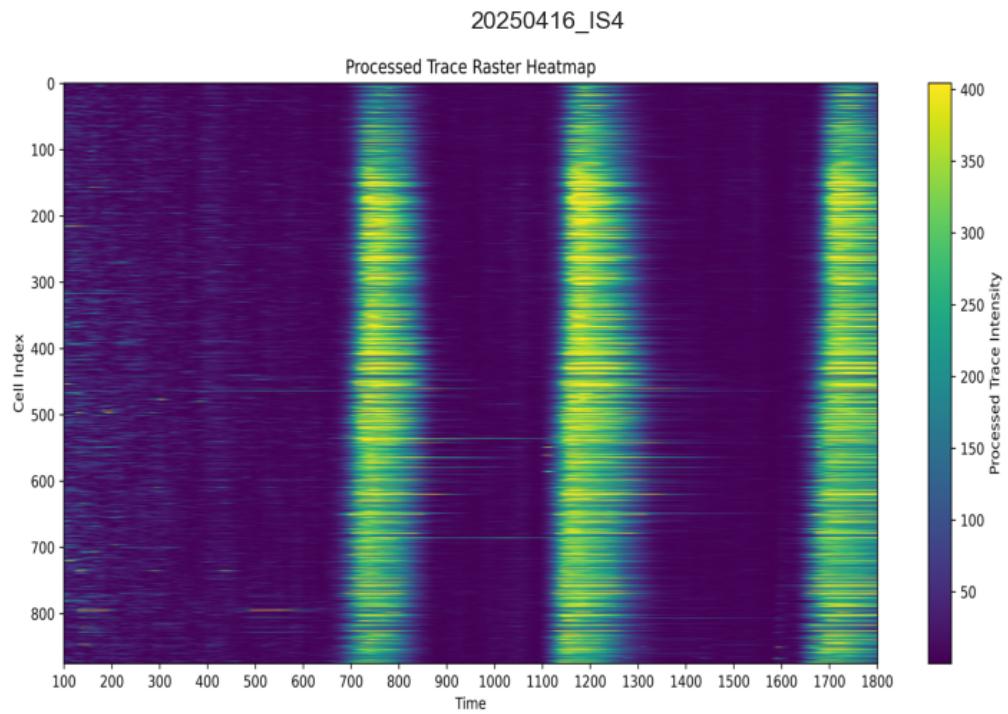
Binary Activity Raster Plot

20250416_IS4

Binarized Activity Raster Plot



Heatmap Activity Raster Plot



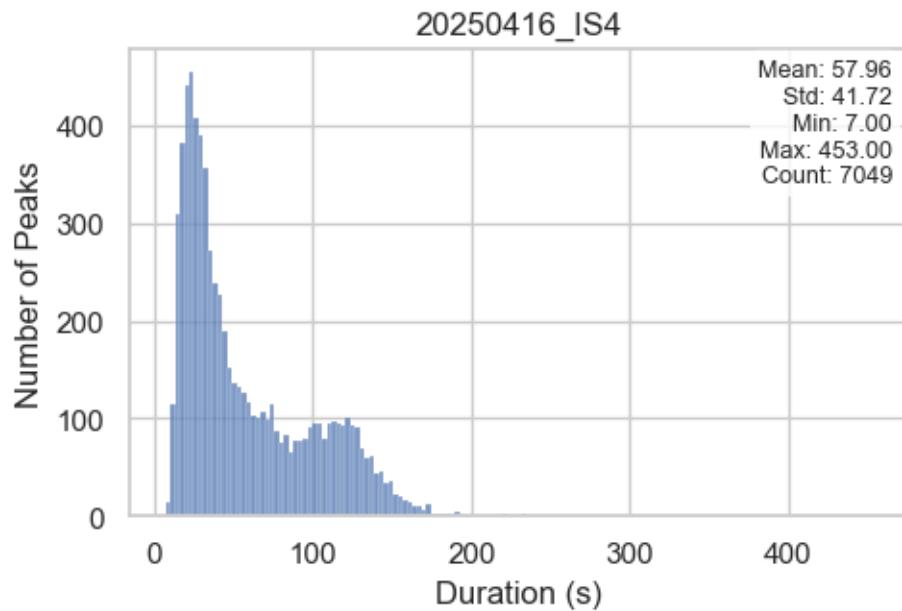
1.1.2 Peaks population

Total number of peaks: 7049

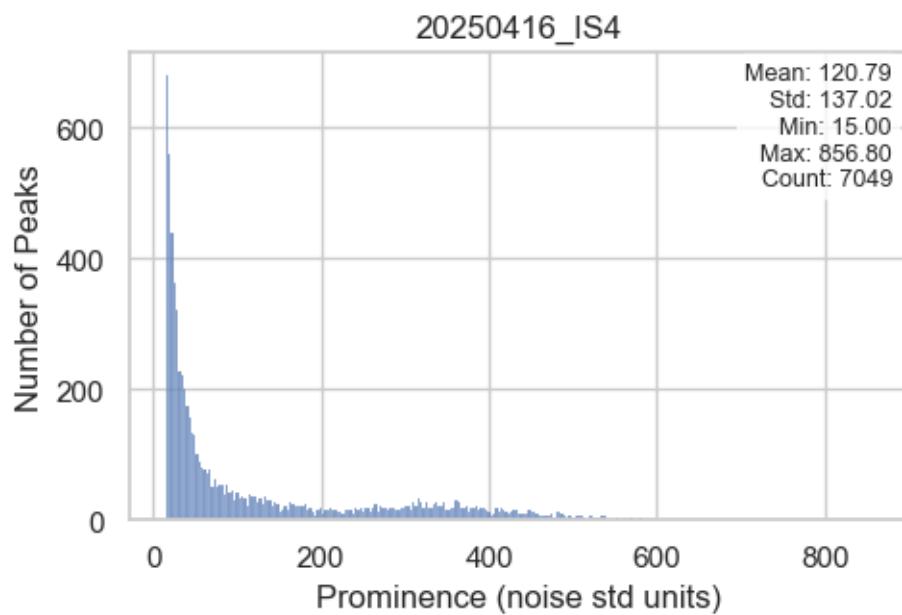
Total number of cells: 876

1.1.3 Peaks statistics

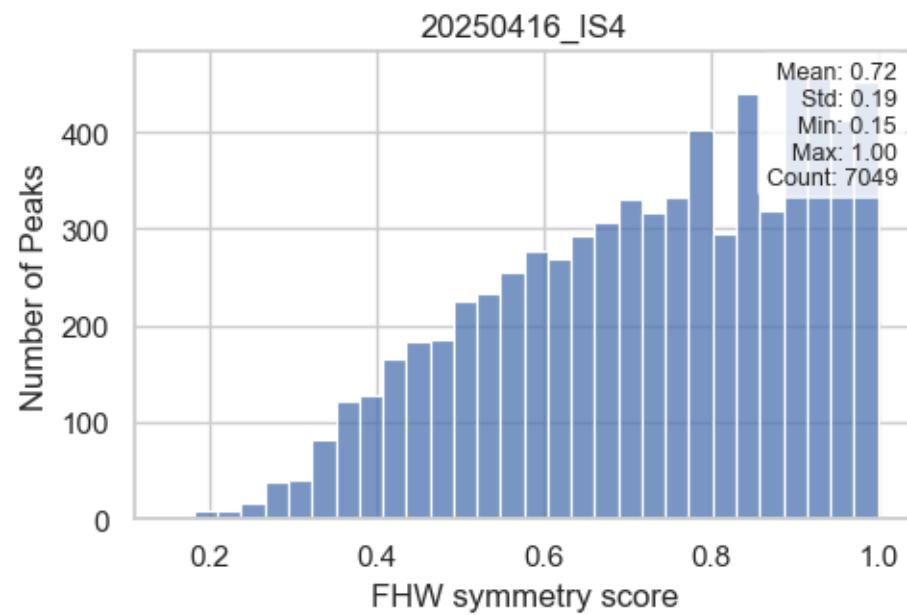
Distribution of Peak Durations



Distribution of Peak Prominences

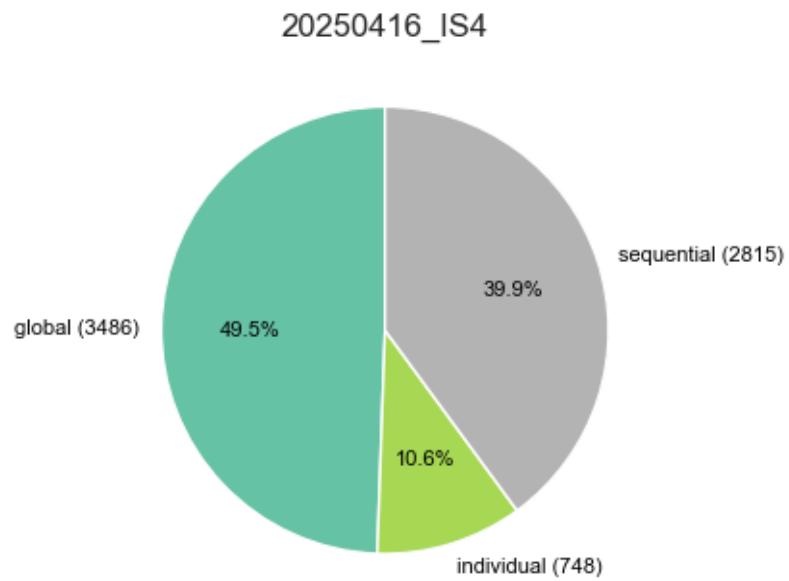


Distribution of Peak Symmetry Scores



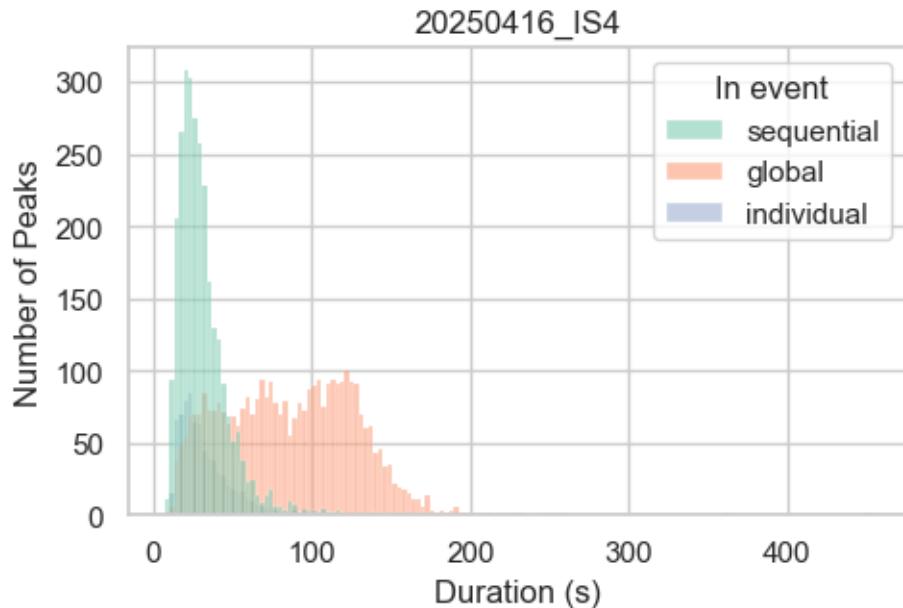
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

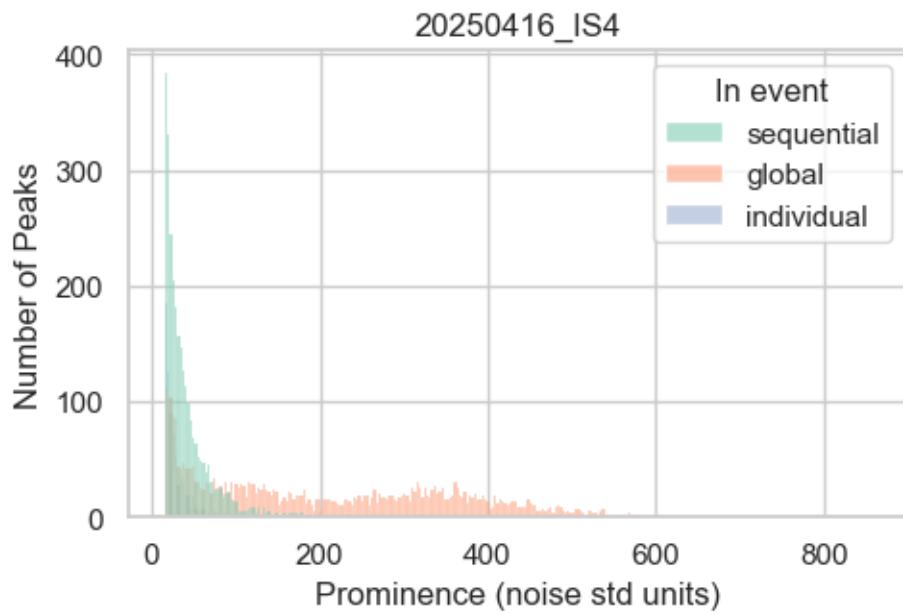


1.1.5 Peaks statistics per event types

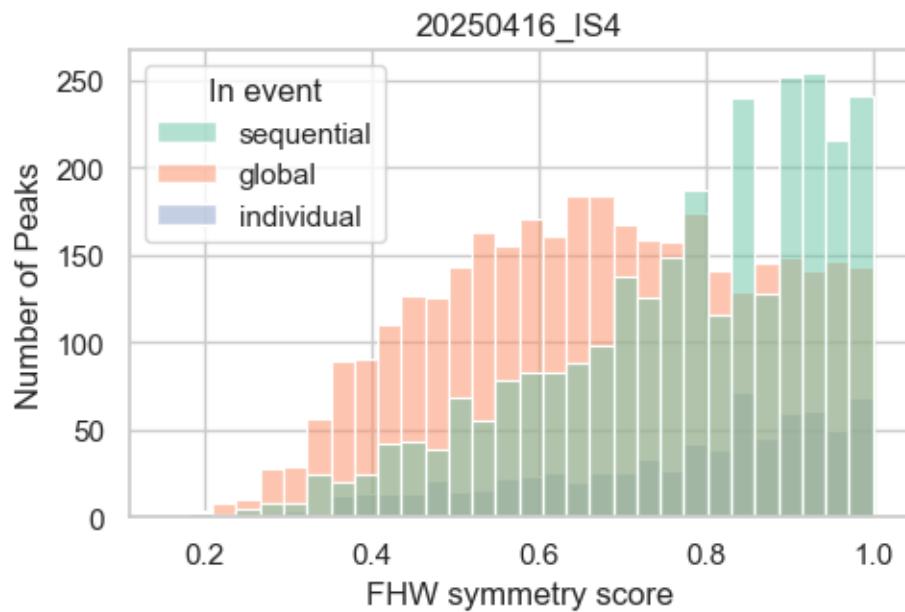
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

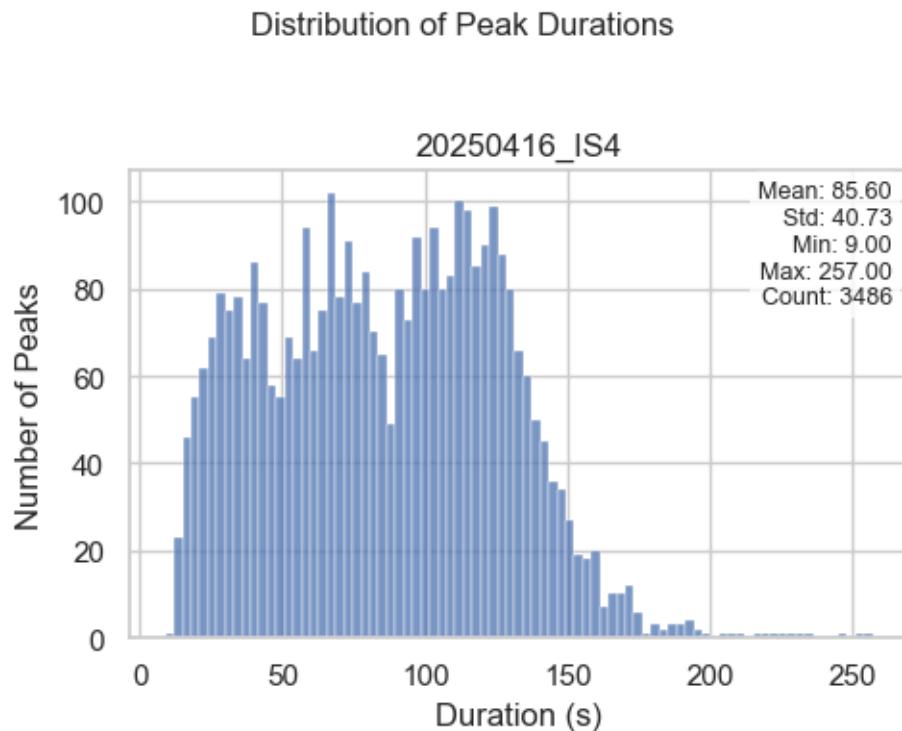


Distribution of Peak Symmetry Scores by Group

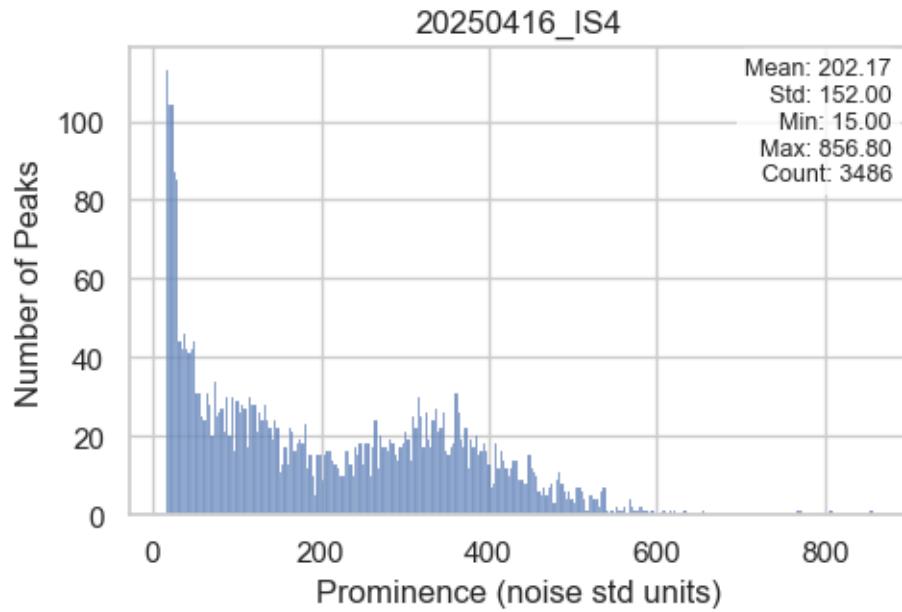


1.2 GLOBAL EVENTS

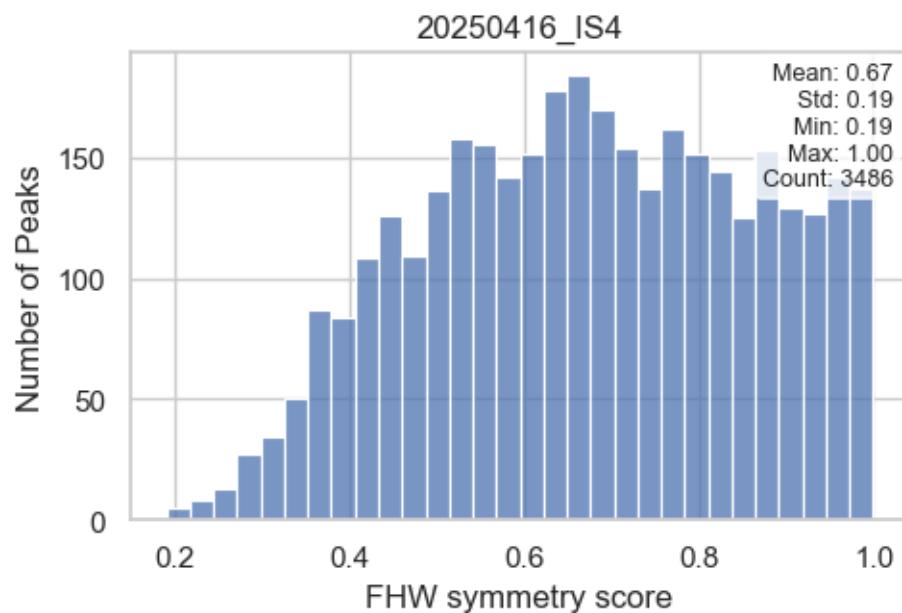
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

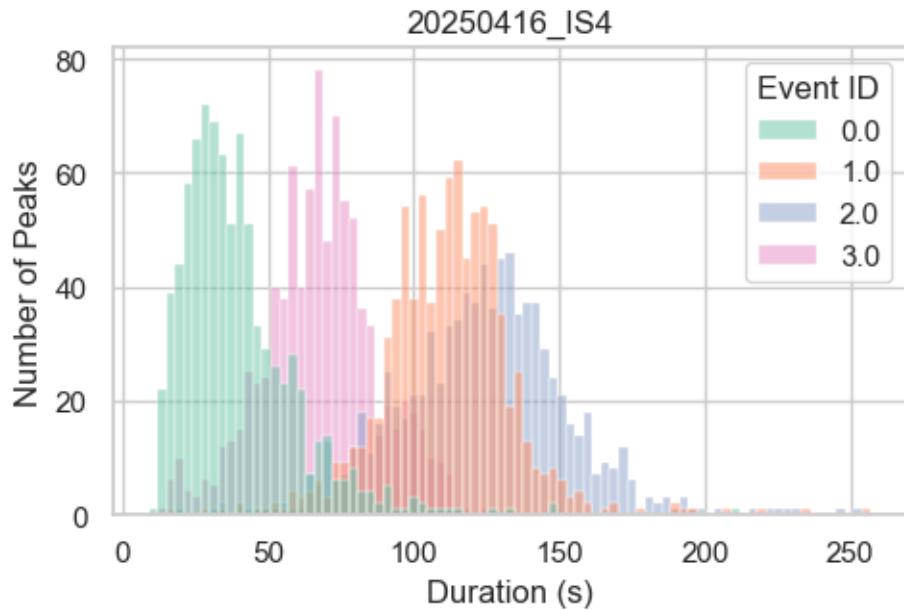


Distribution of Peak Symmetry Scores

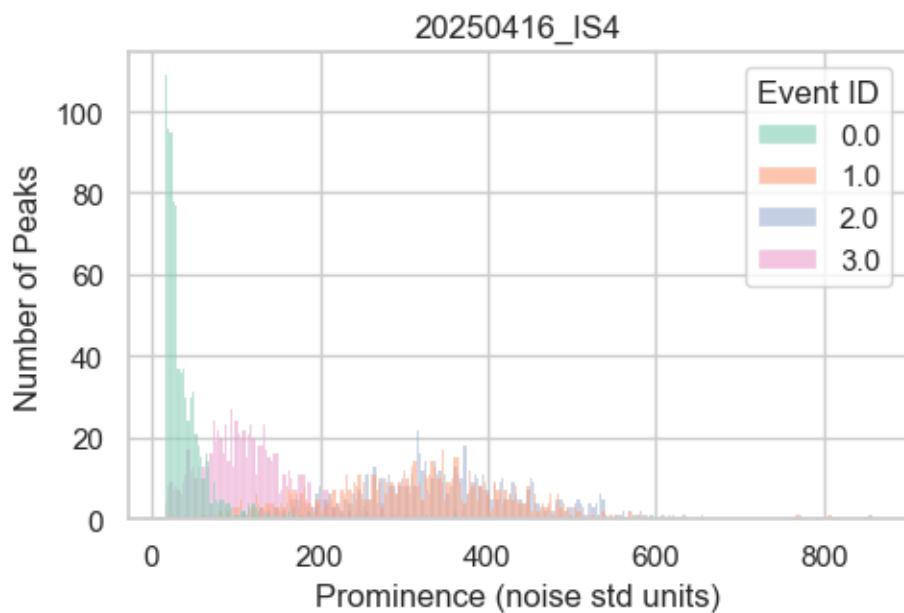


1.2.2 Peak statistics in global event per event ID

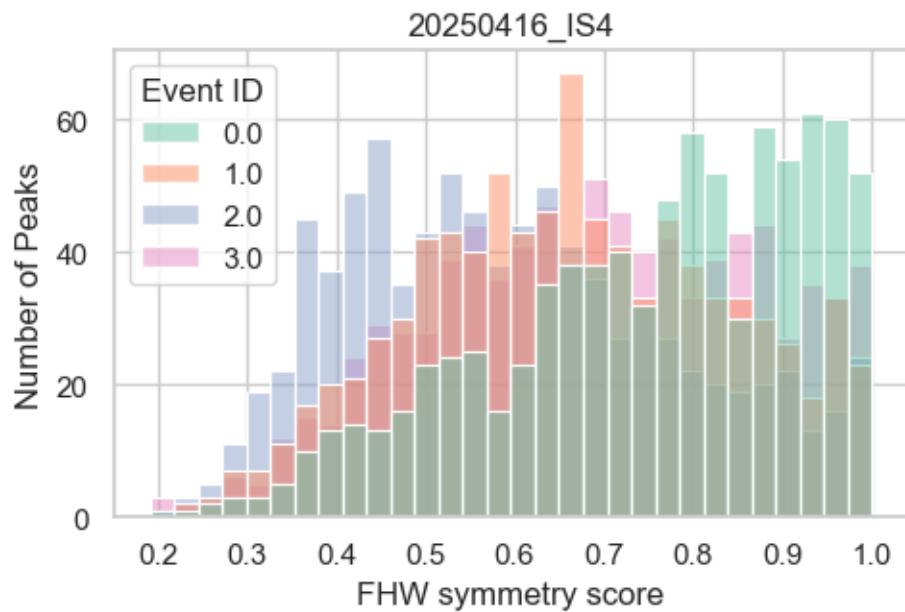
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



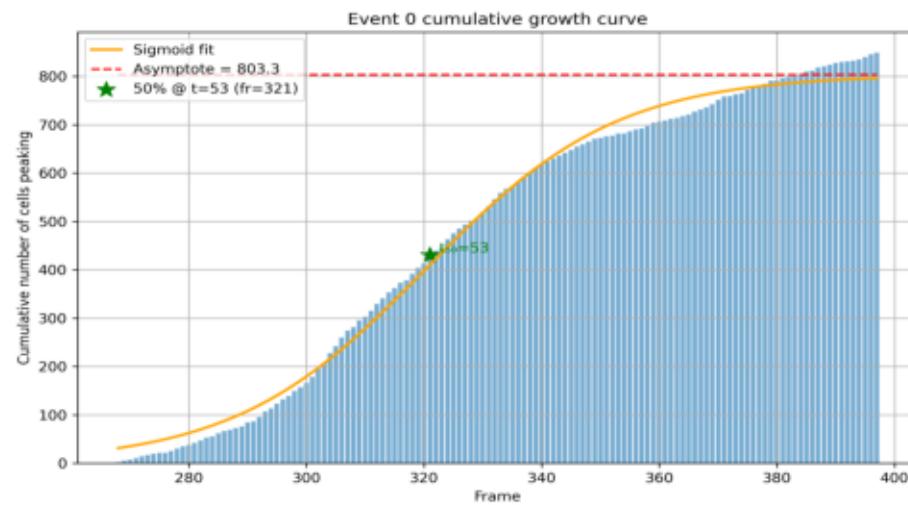
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

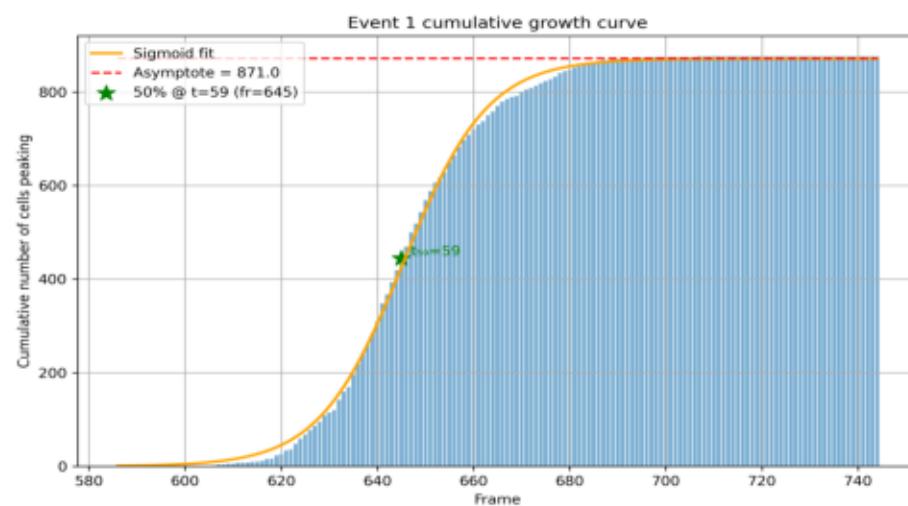
Event Activity Overlay (Event ID: 0)

20250416_IS4



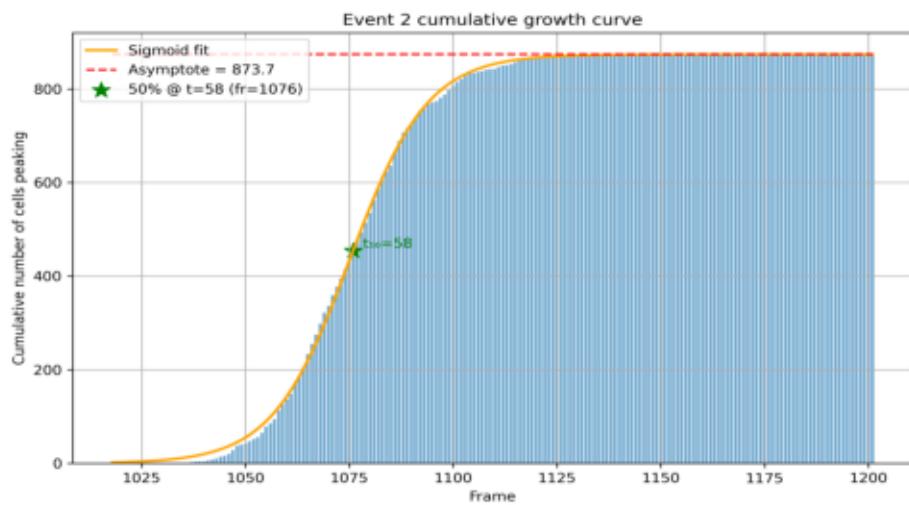
Event Activity Overlay (Event ID: 1)

20250416_IS4



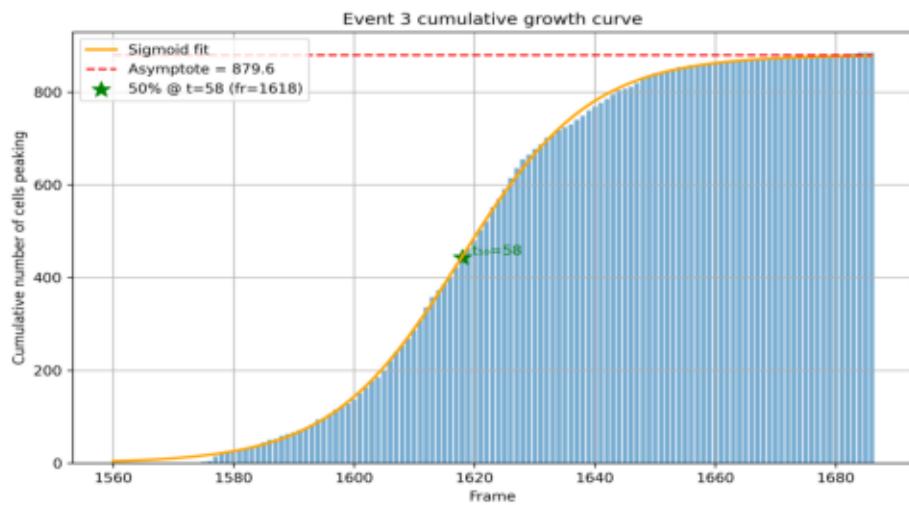
Event Activity Overlay (Event ID: 2)

20250416_IS4



Event Activity Overlay (Event ID: 3)

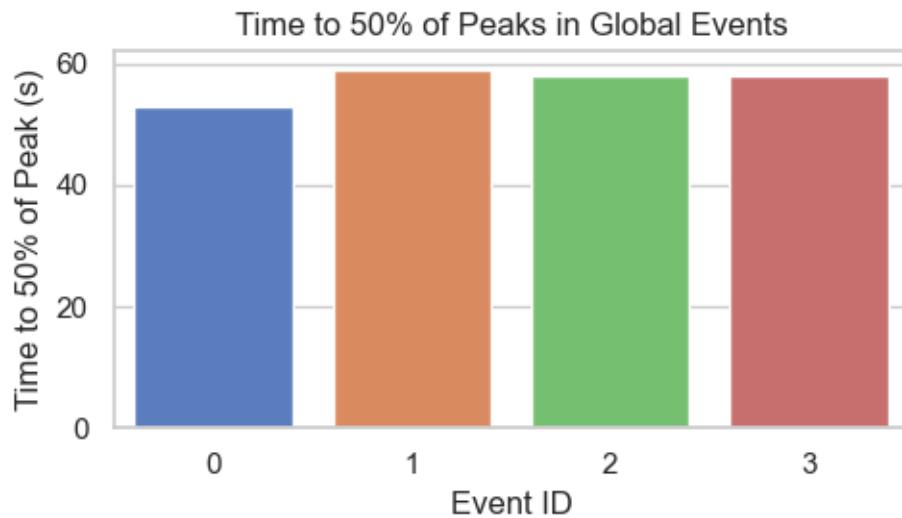
20250416_IS4



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

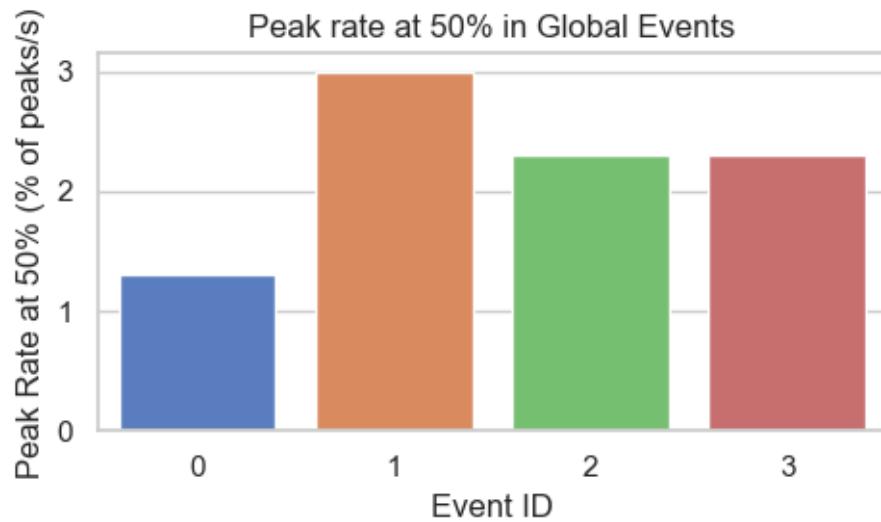
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

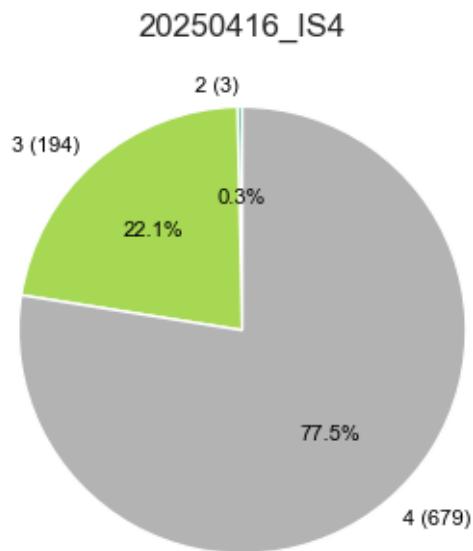
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



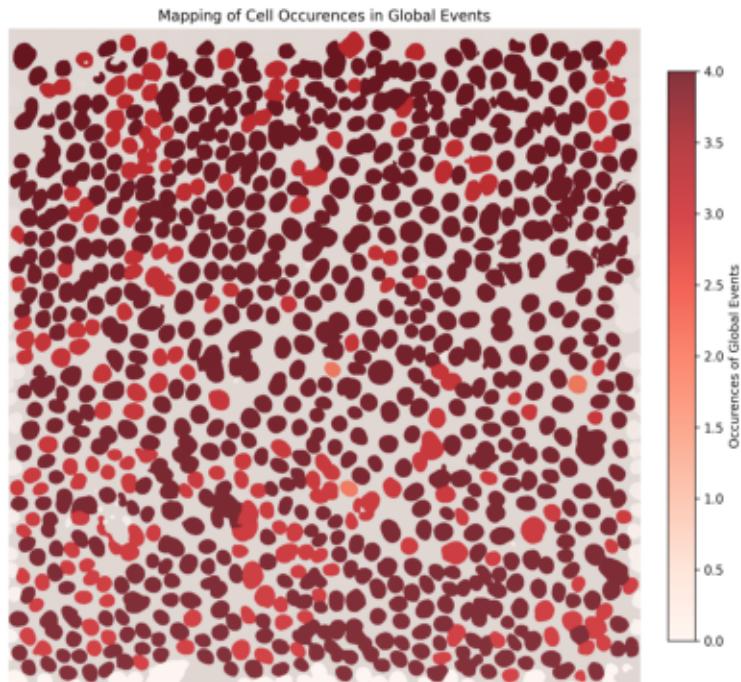
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

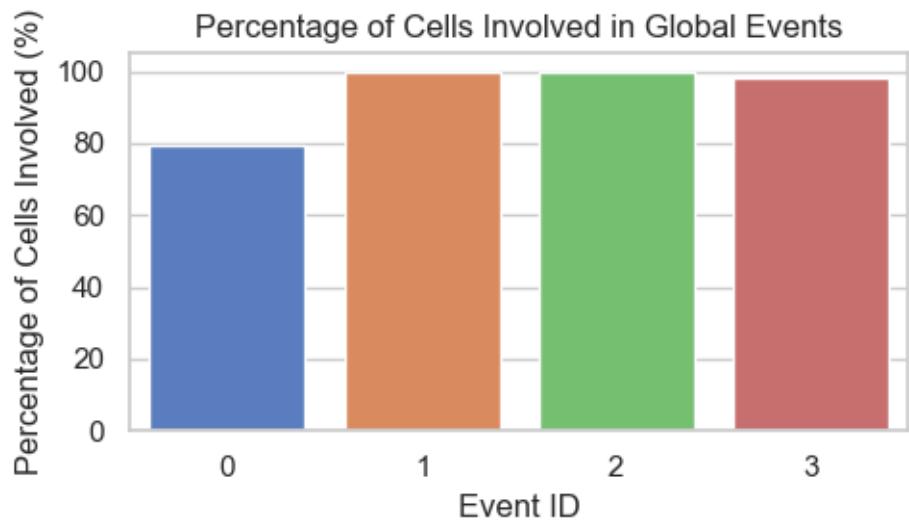
20250416_IS4



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.2.5 Inter-event interval analysis

Intervals between global event peaks: [343.0, 428.0, 540.0]

Estimated periodicity: 0.844

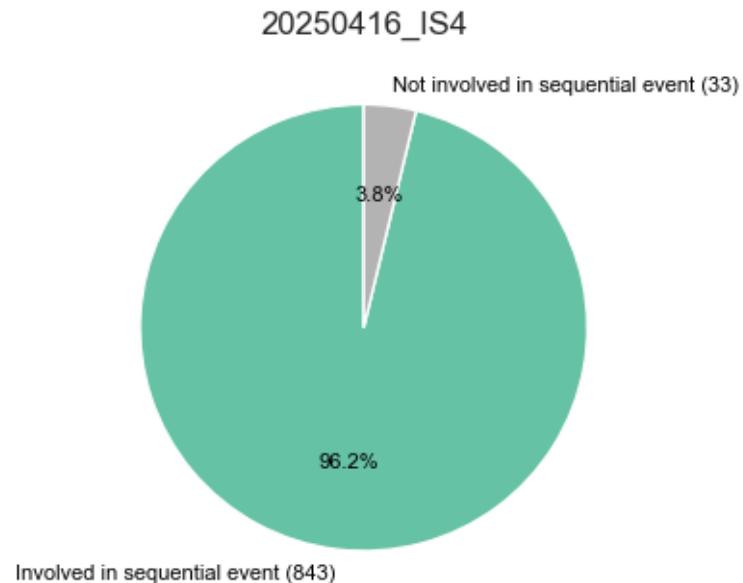
The global events exhibit a regular periodic pattern.

Estimated frequency (1/mean interval): 0.002 Hz

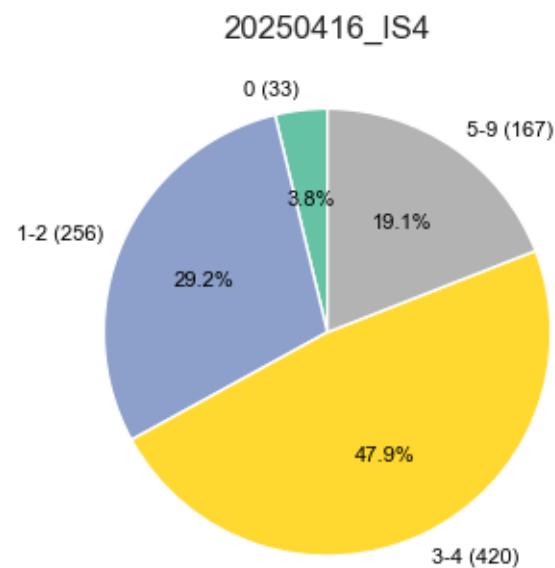
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

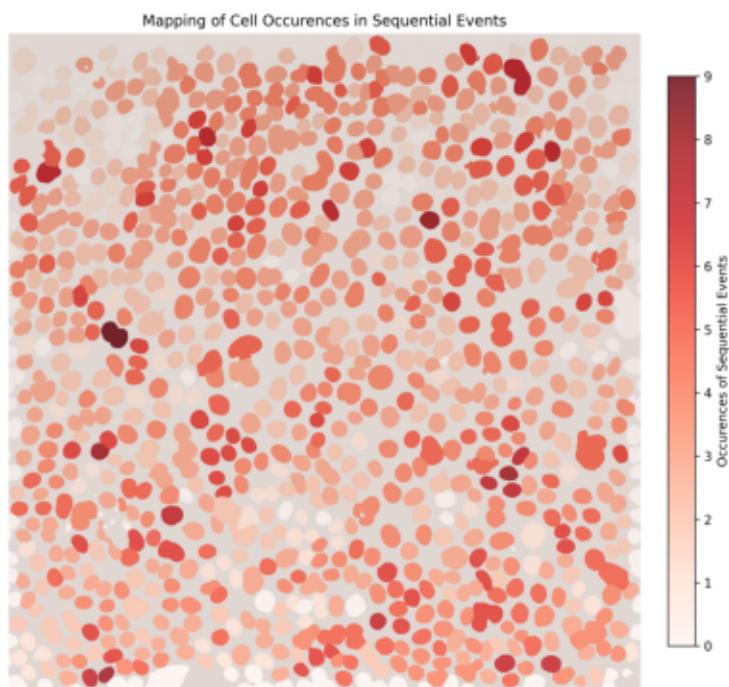


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

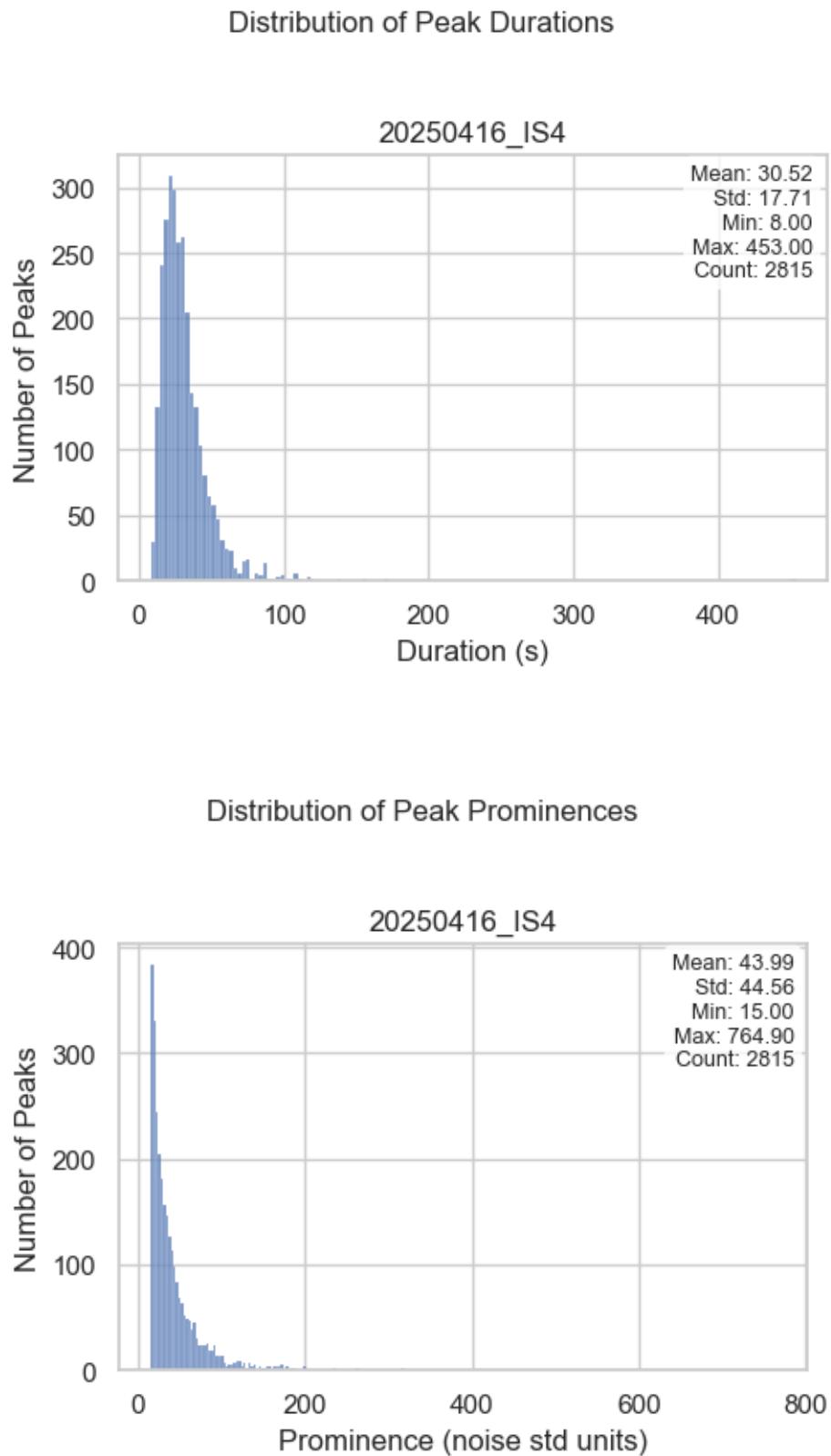


Cell Mapping with Occurrences in Sequential Events Overlay

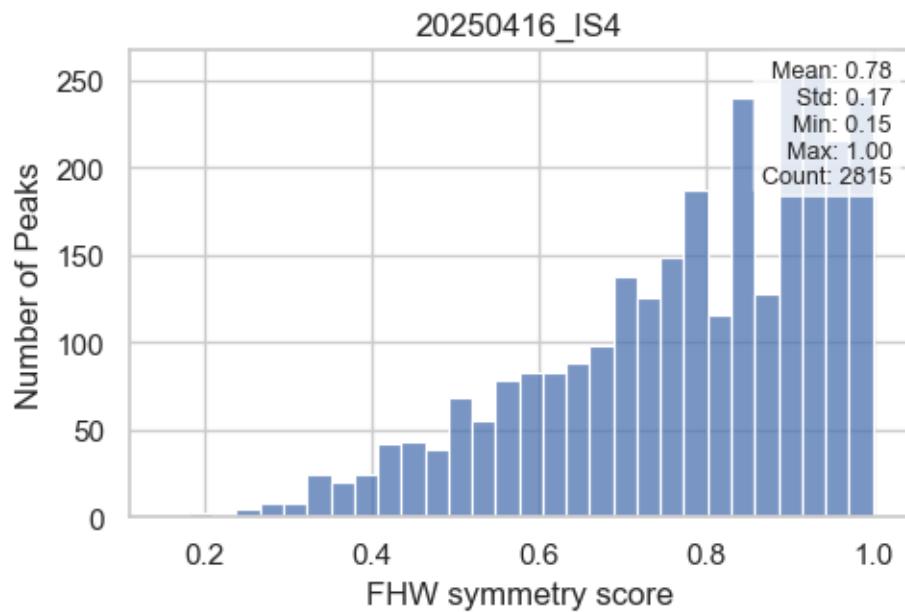
20250416_IS4



1.3.2 Peaks statistics in sequential events

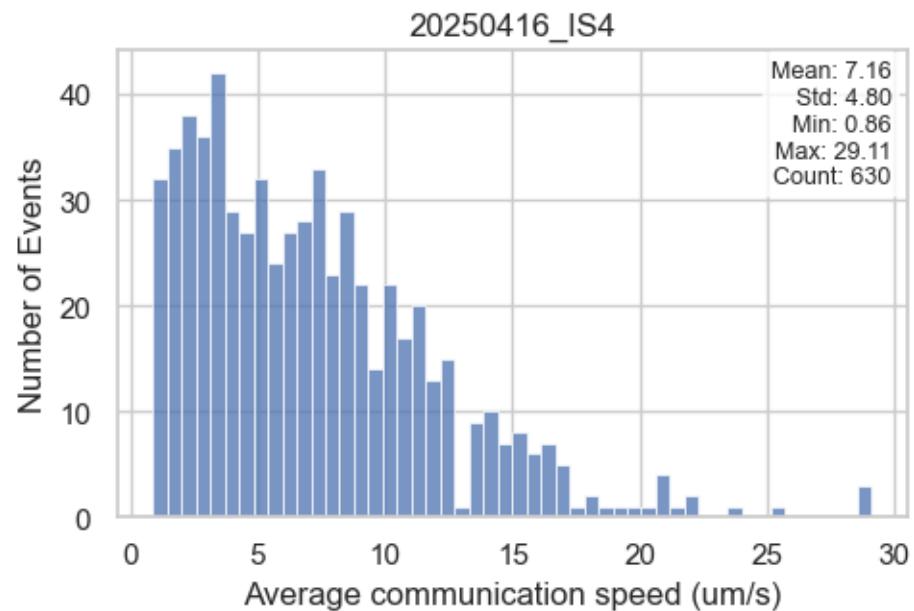


Distribution of Peak Symmetry Scores

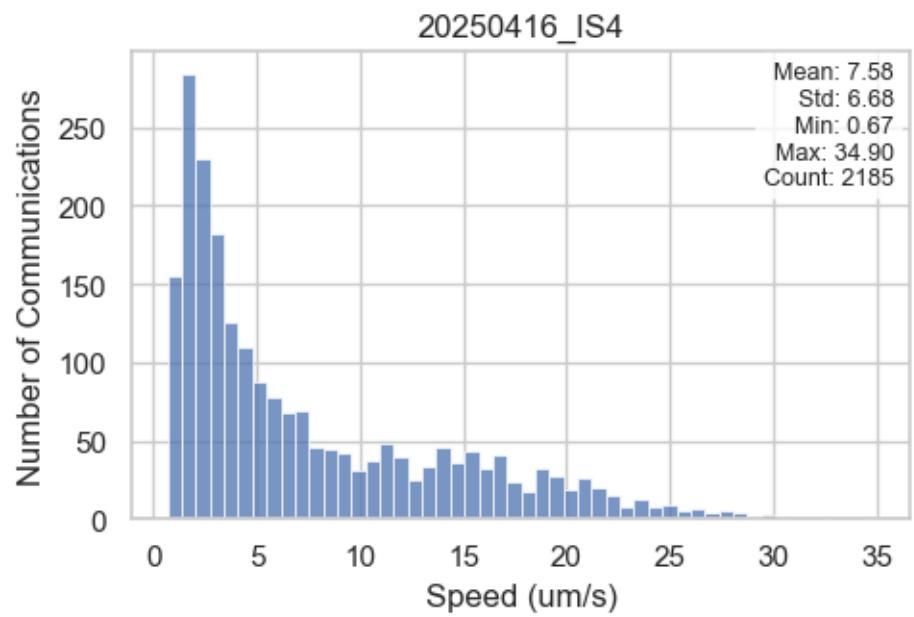


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

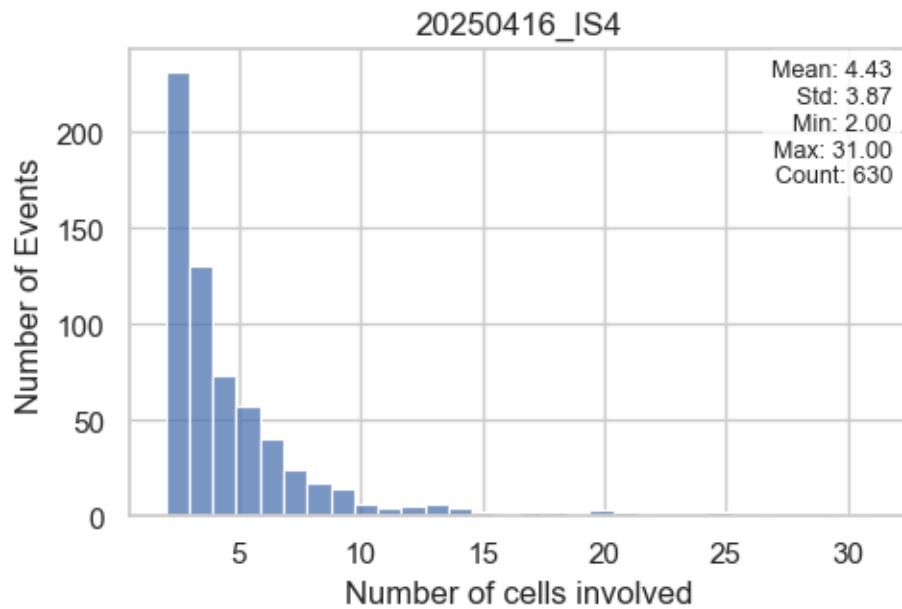


Distribution of Cell-Cell Communication Speeds



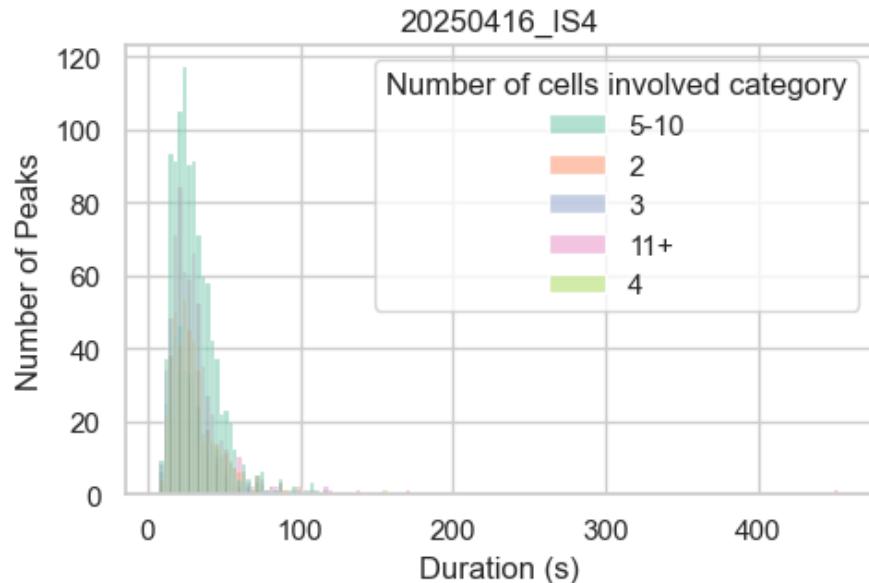
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

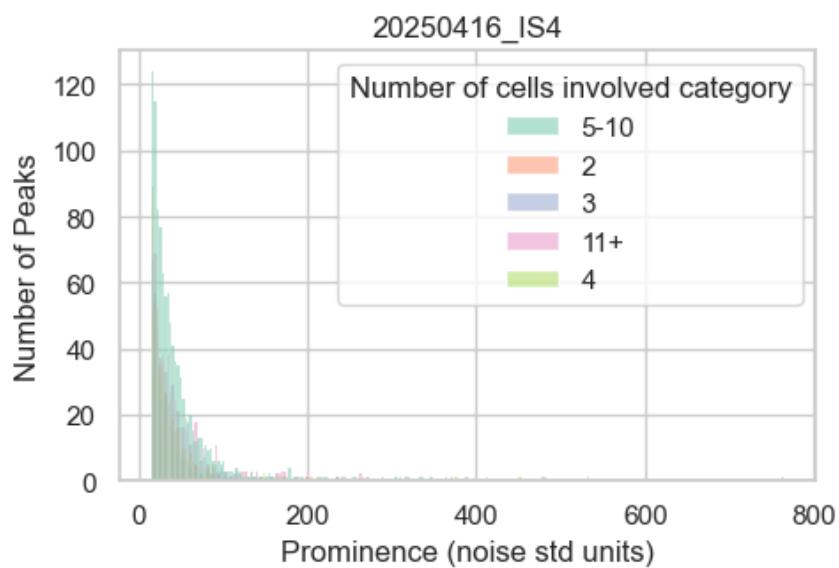


1.3.5 Influence of cell count per event on statistics

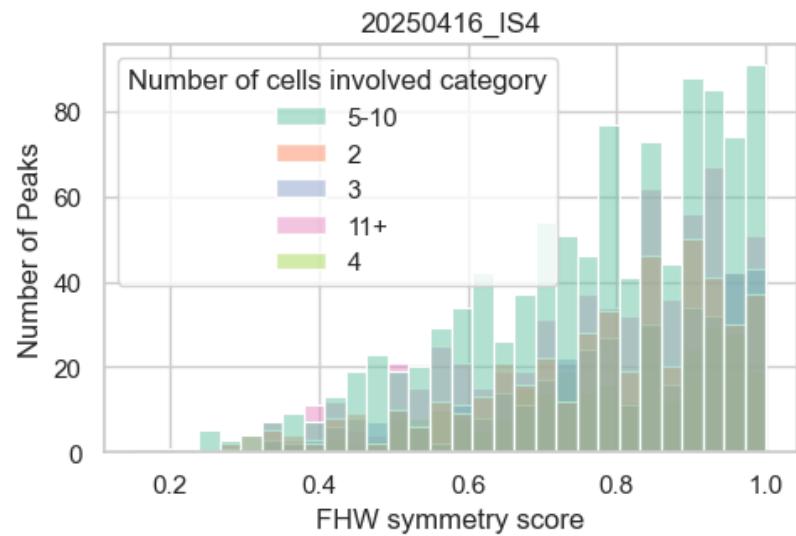
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



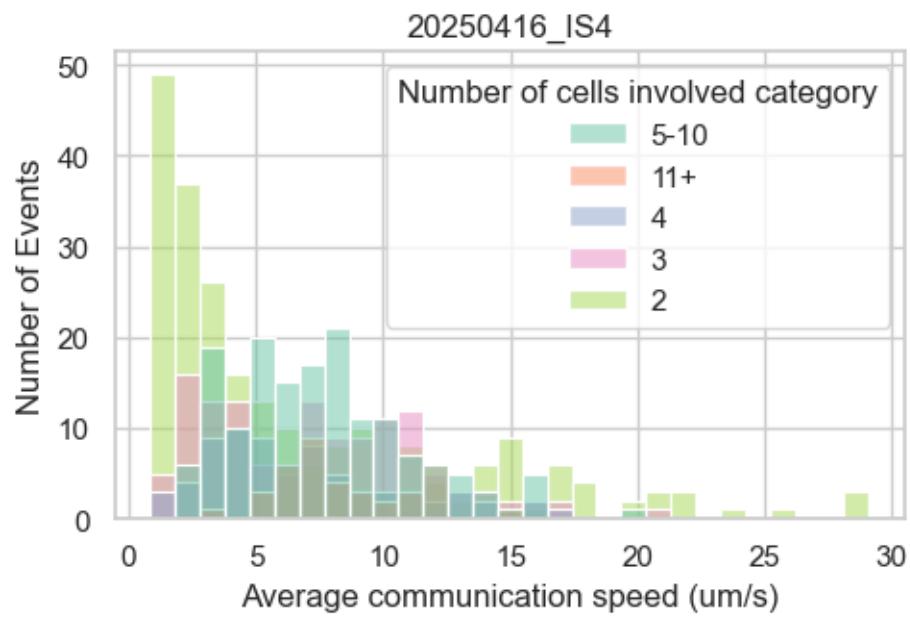
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



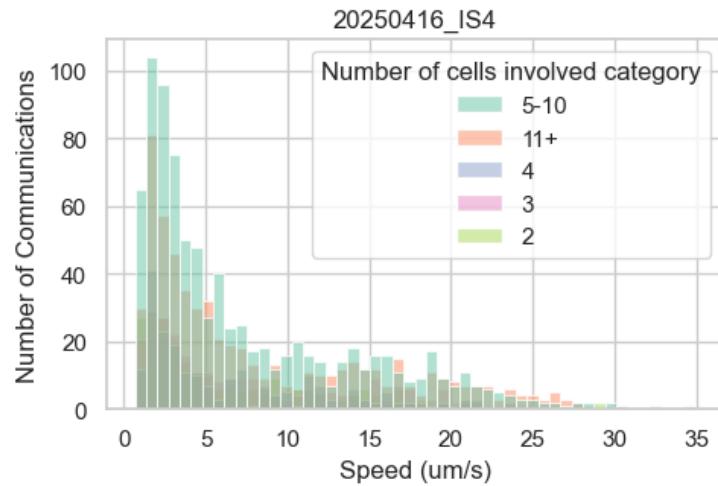
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

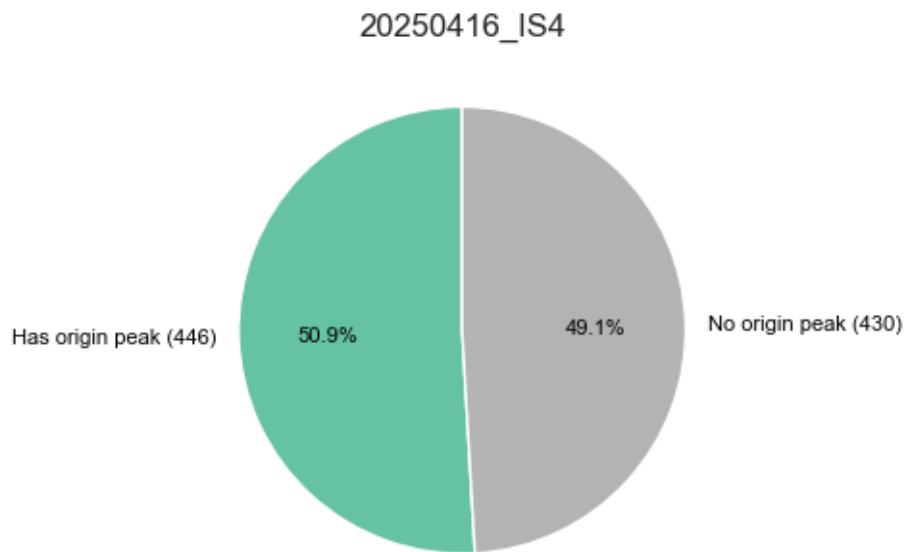


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

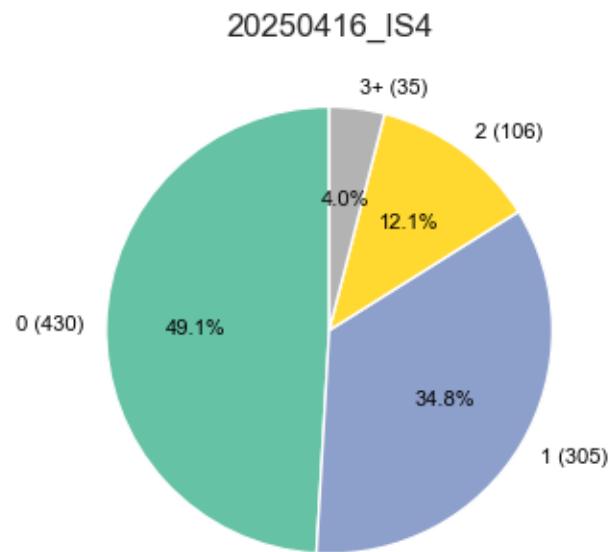


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

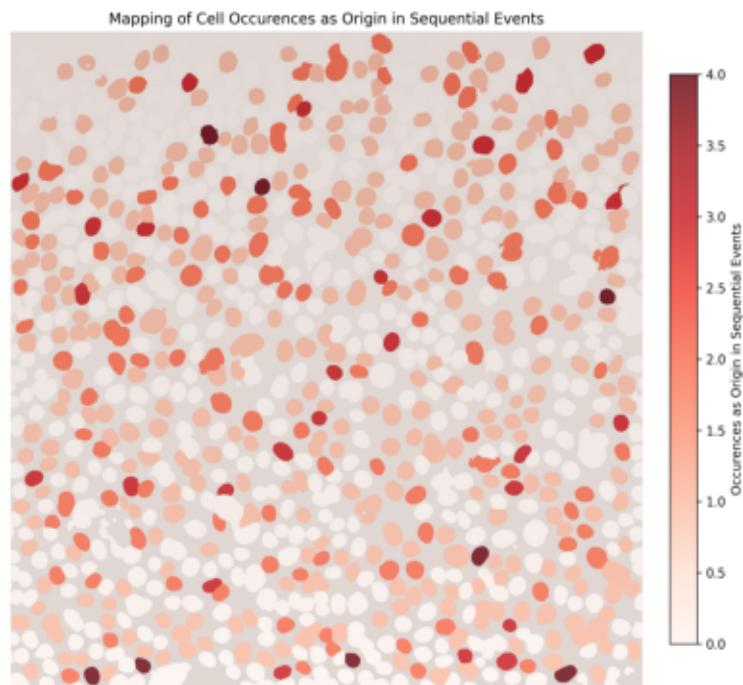


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

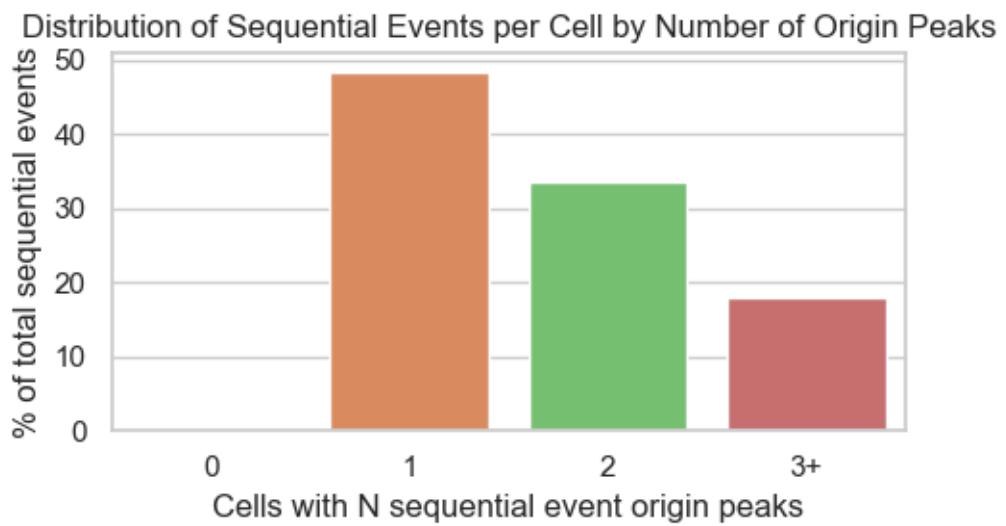
20250416_IS4



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

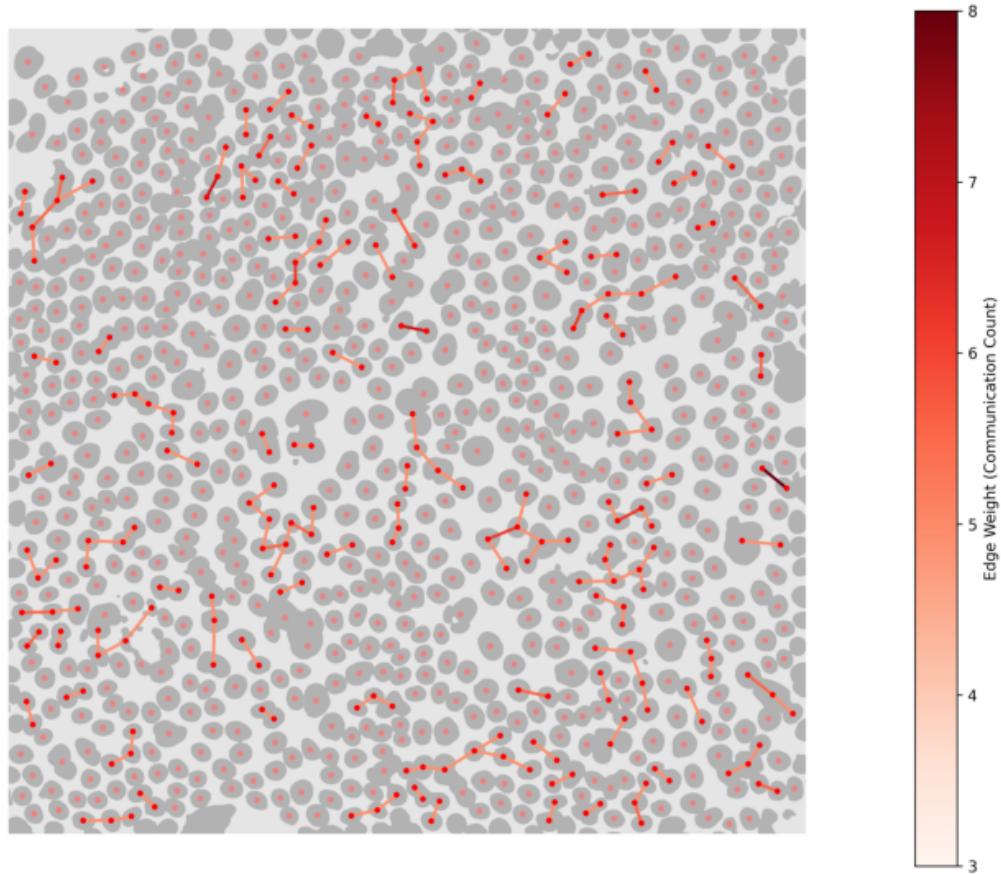


1.3.7 Connection network between cells

Cell Connection Network Graph

20250416_IS4

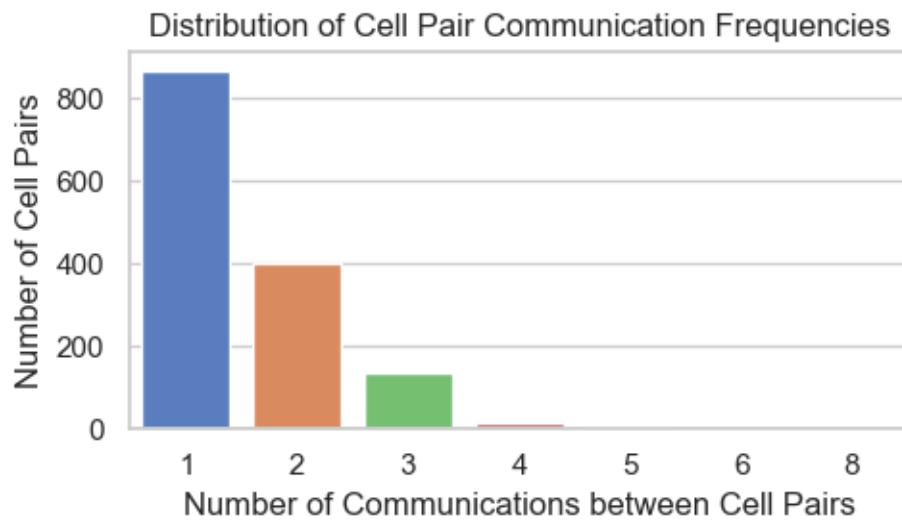
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

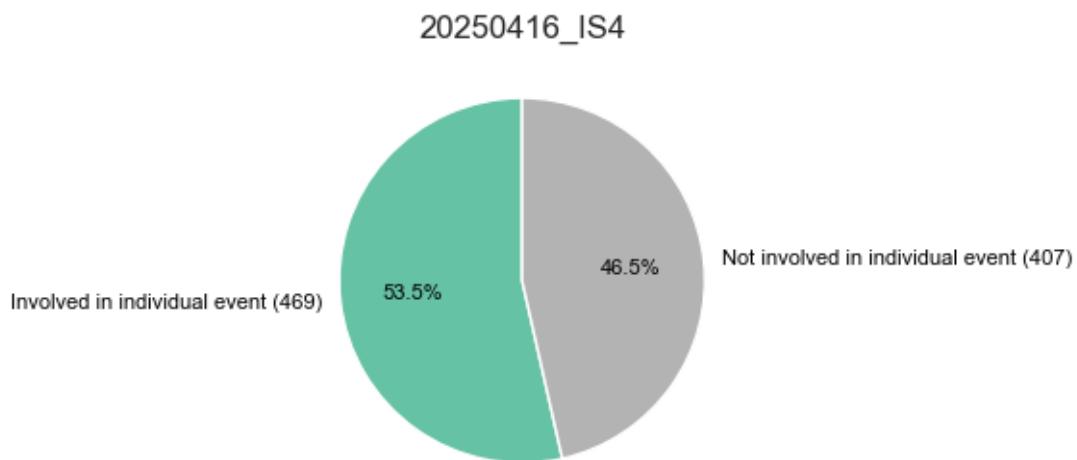
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



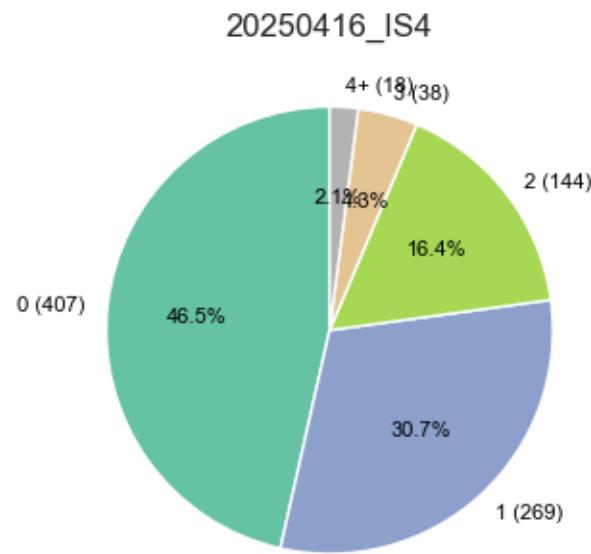
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

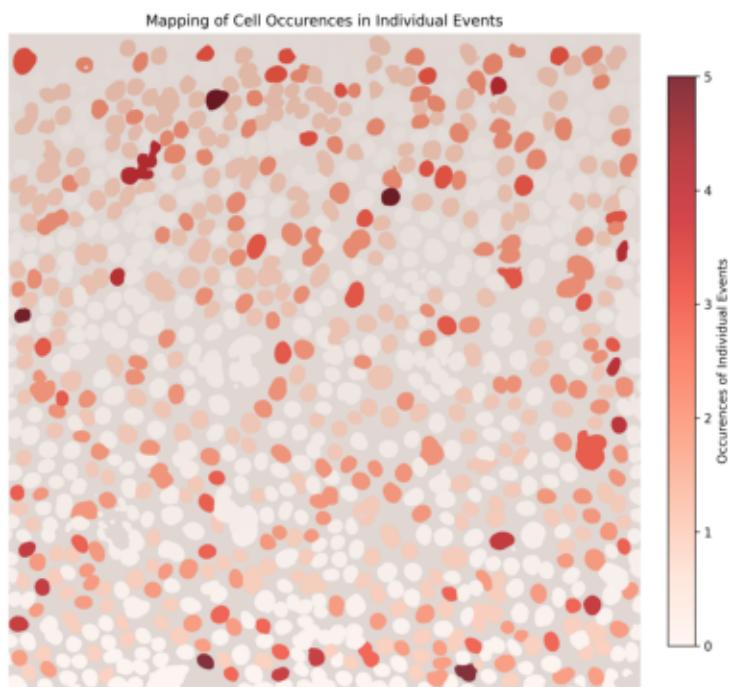


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)



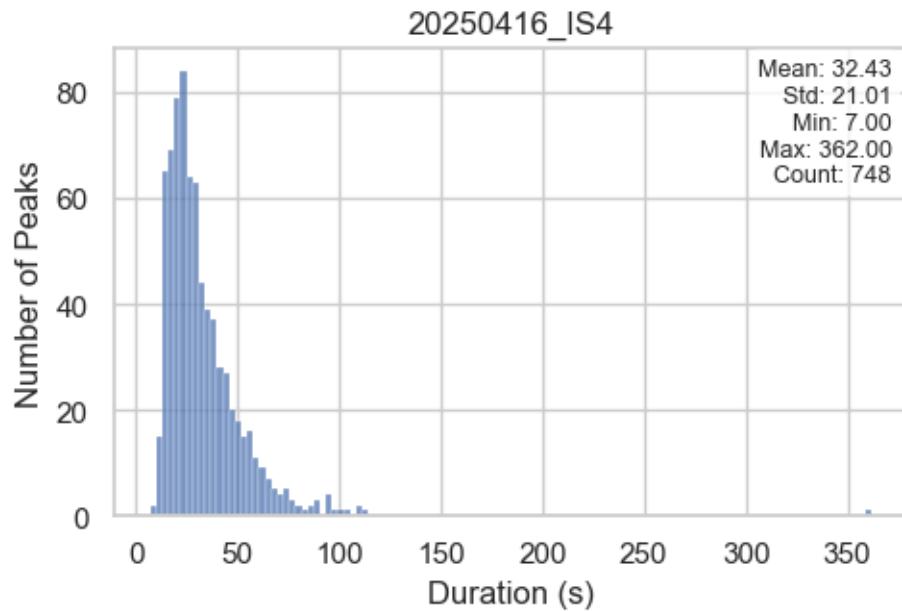
Cell Mapping with Occurrences in Individual Events Overlay

20250416_IS4

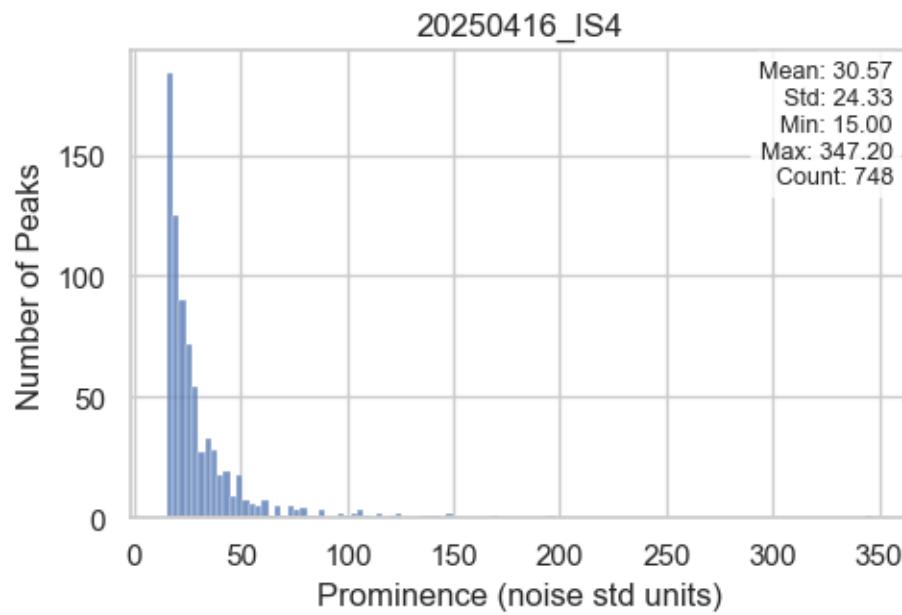


1.4.2 Peaks statistics in individual events

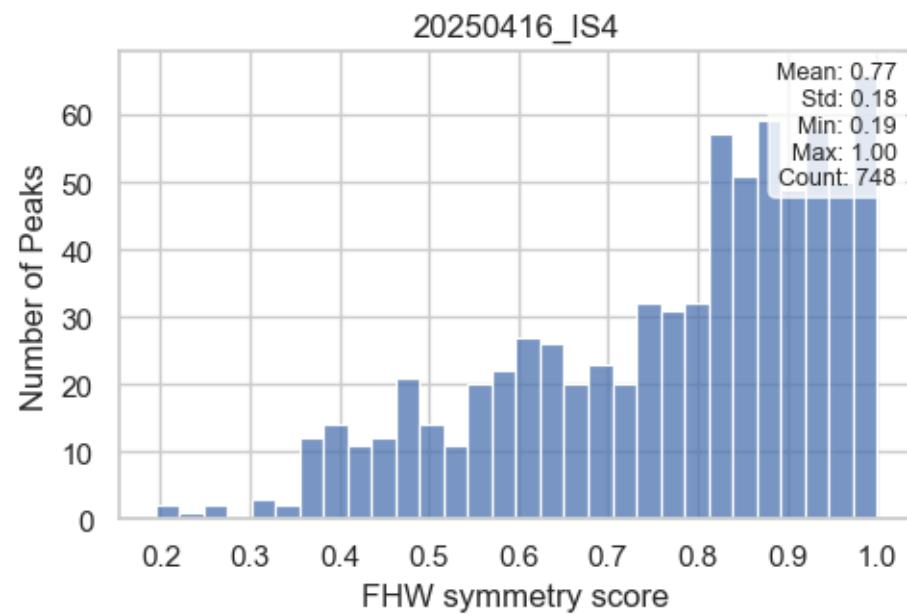
Distribution of Peak Durations



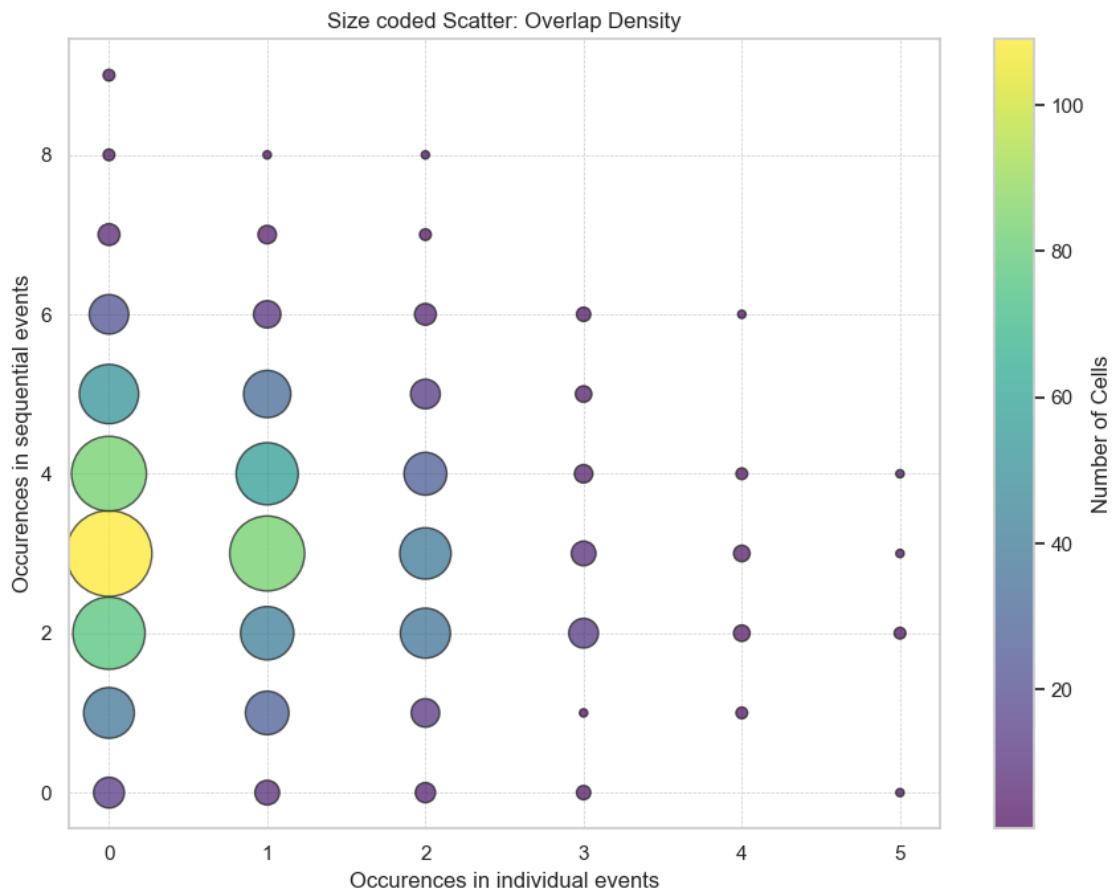
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

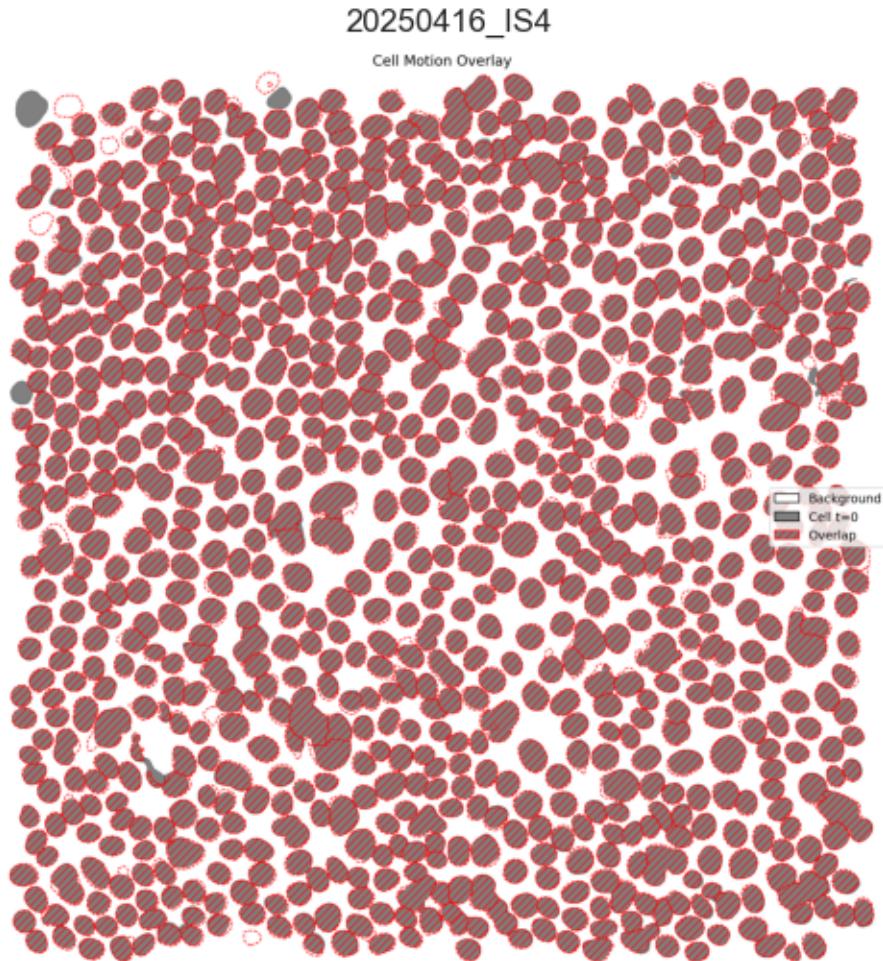


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 876
- Hoechst image taken at t=1801: 868
- Number of cells difference: absolute 8, relative 0.92%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 1254566
- Pixels segmented as cell at t=1801: 1290238
- Overlapping pixels between t=0 and t=1801: 1201518 (94.43% of total)
- Pixels exclusive to t=0: 53048 (4.23% of total)
- Pixels exclusive to t=1801: 88720 (6.88% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n      "Default Dataset": "/path/to/your/dataset"\n}'
```

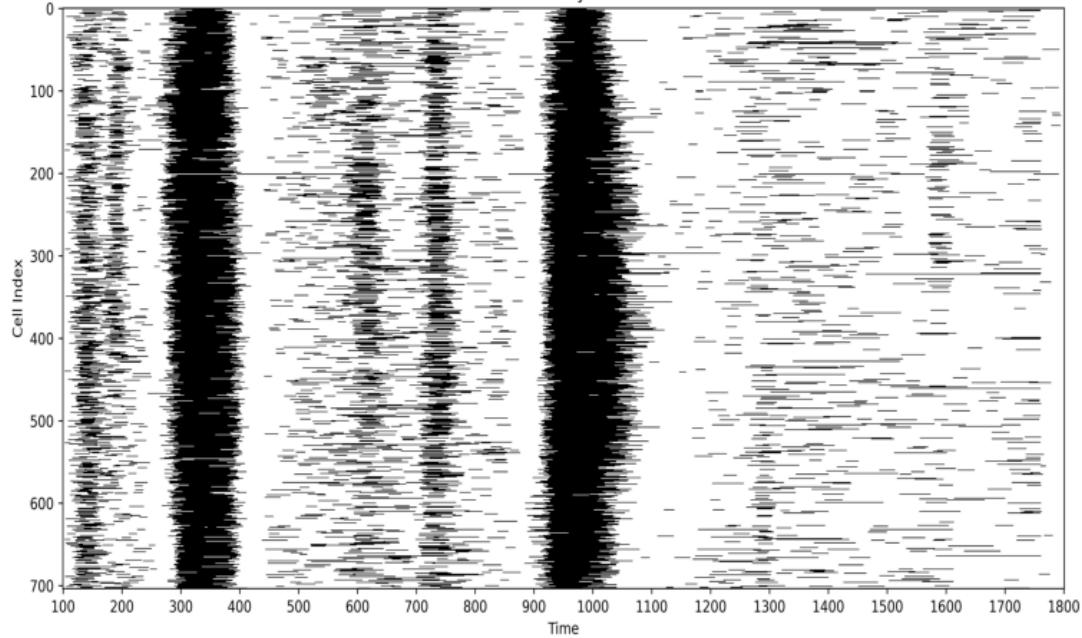
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

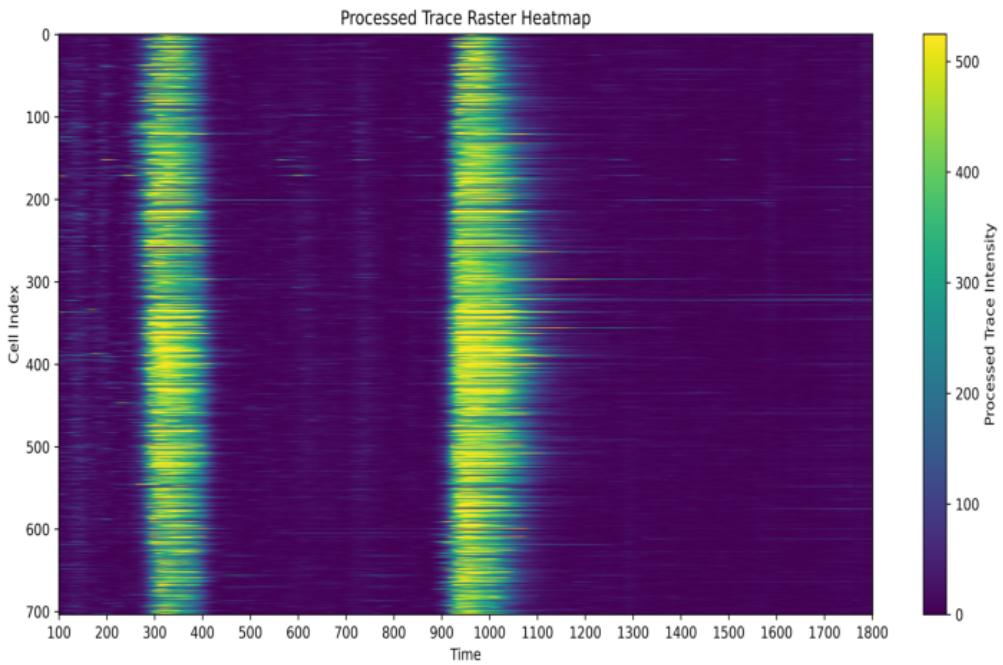
20250624_IS01

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250624_IS01



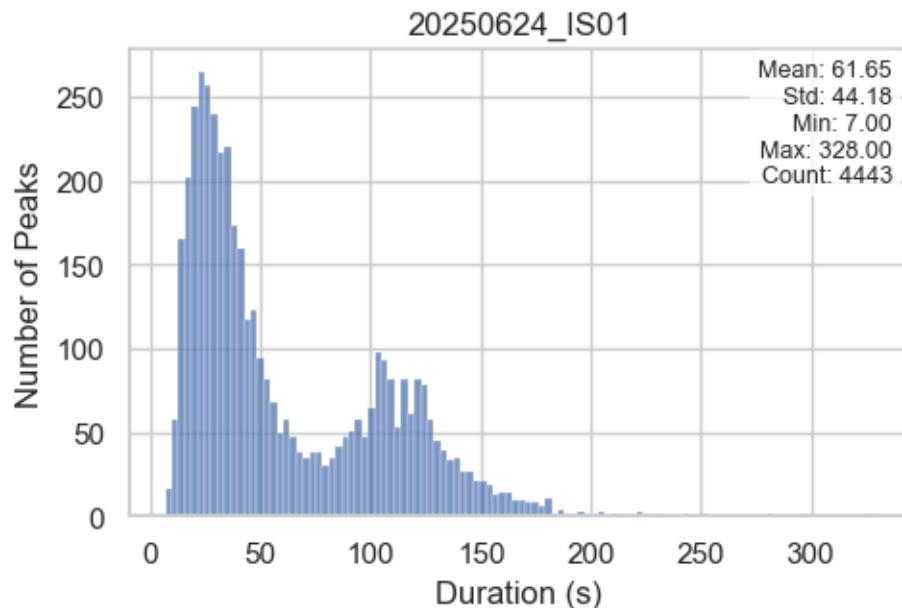
1.1.2 Peaks population

Total number of peaks: 4443

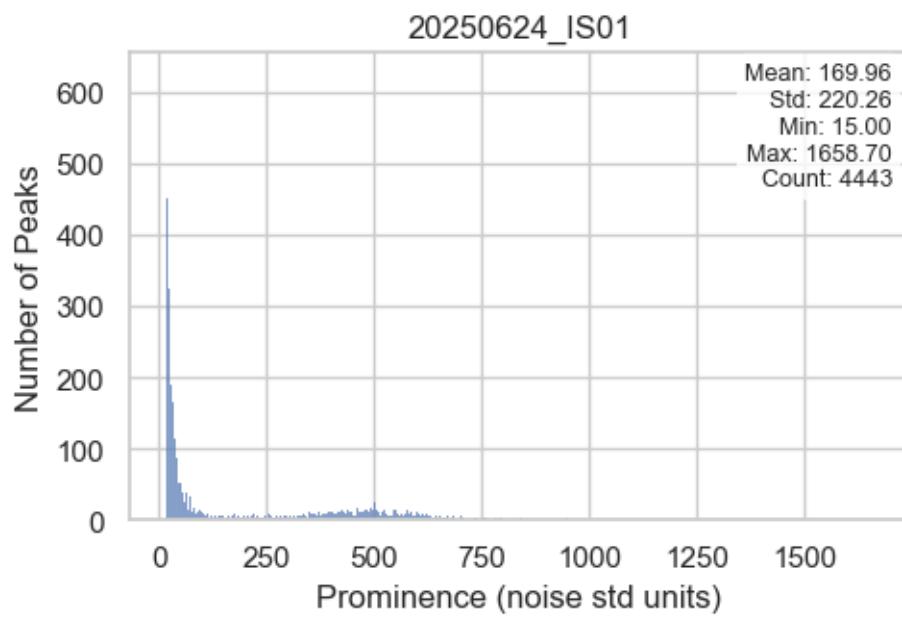
Total number of cells: 704

1.1.3 Peaks statistics

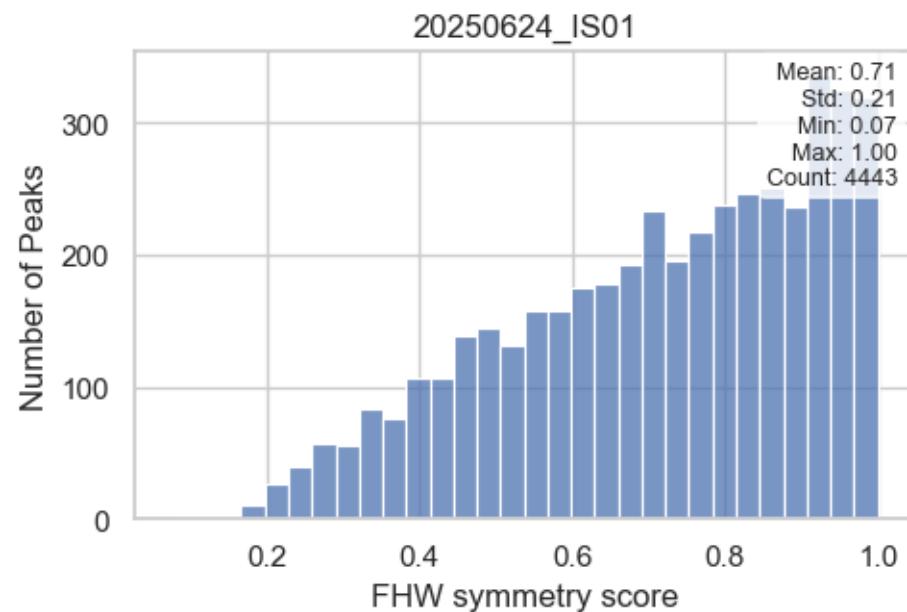
Distribution of Peak Durations



Distribution of Peak Prominences



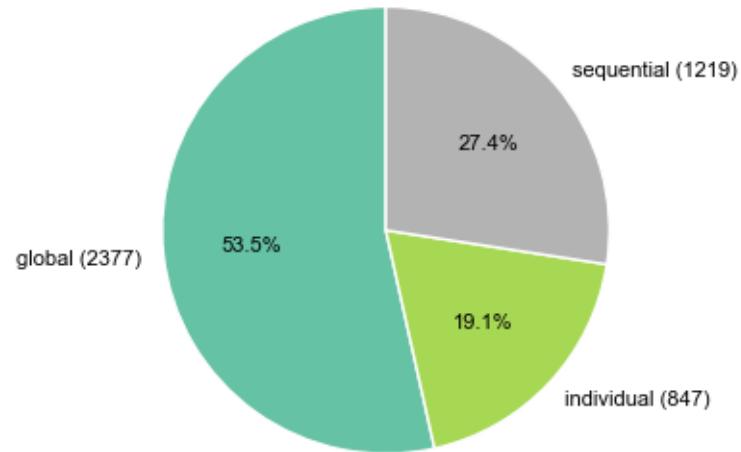
Distribution of Peak Symmetry Scores



1.1.4 Distribution of peaks per event types

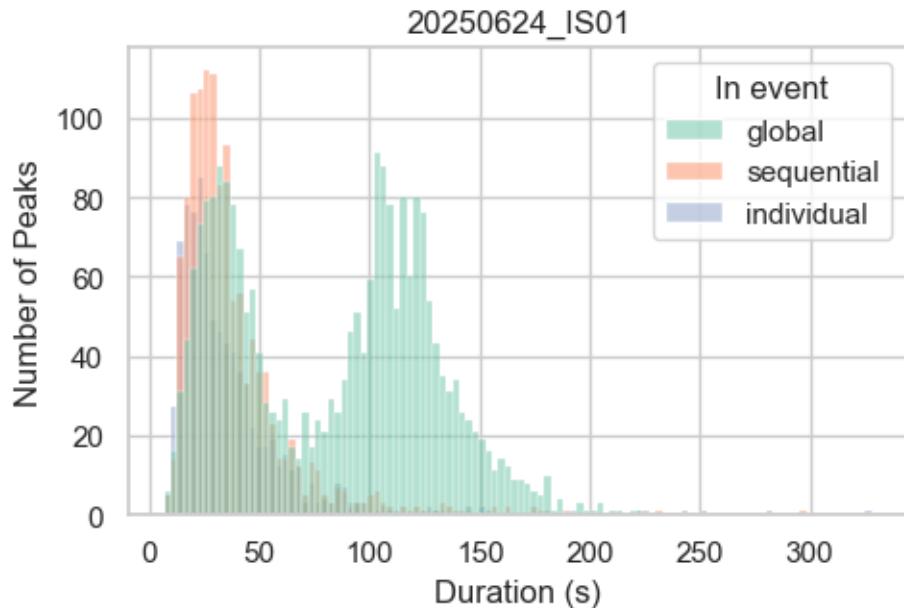
Distribution of Peaks by Event types

20250624_IS01

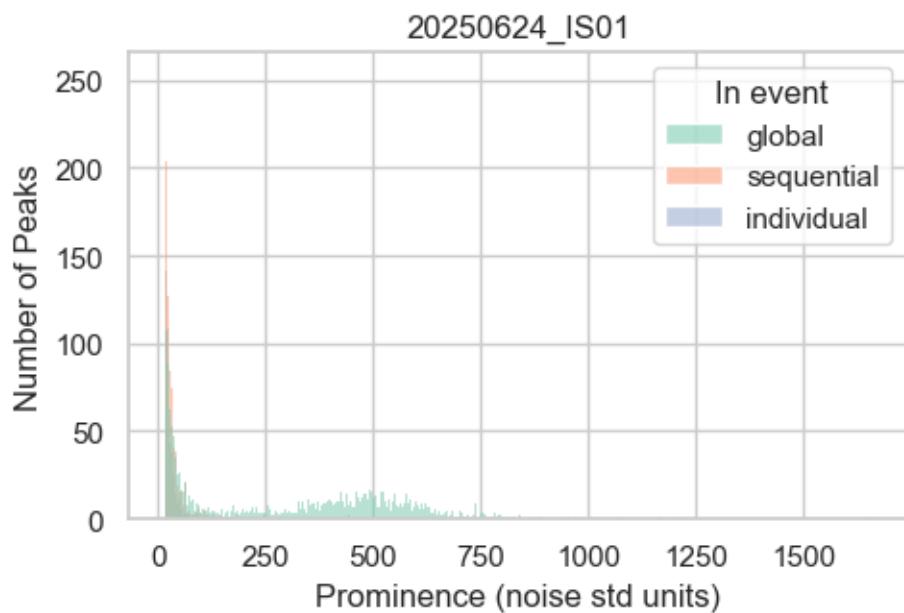


1.1.5 Peaks statistics per event types

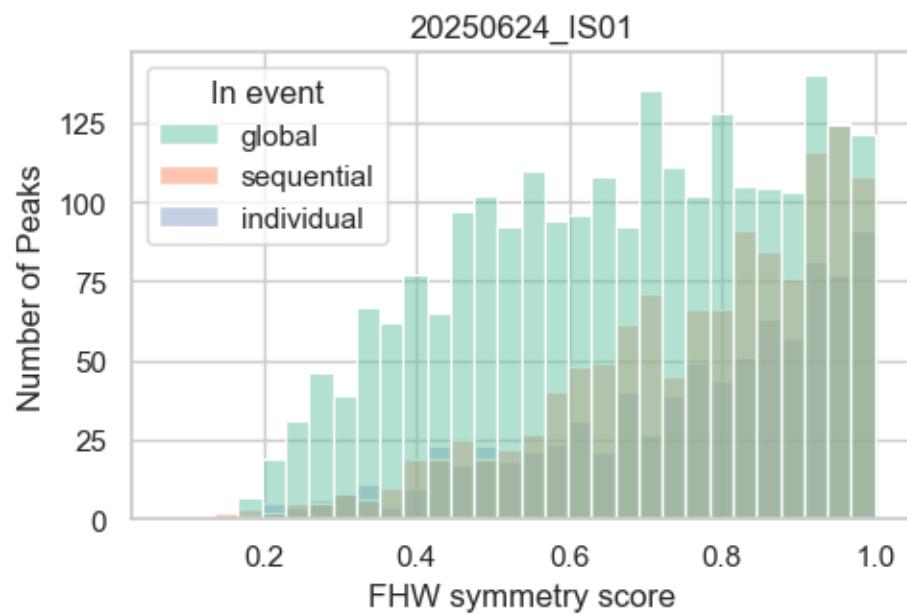
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

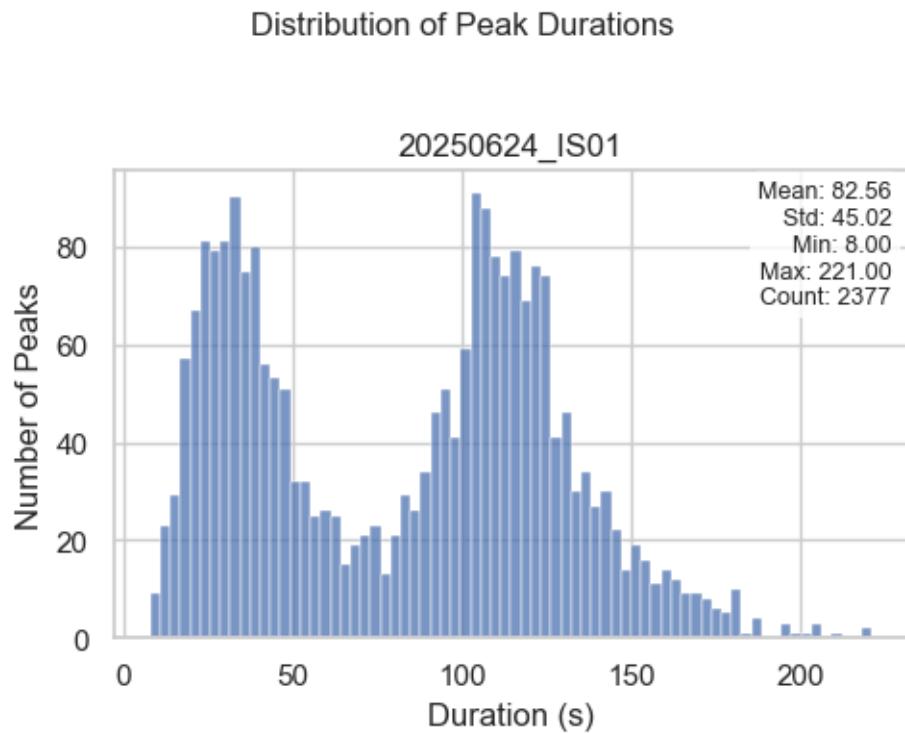


Distribution of Peak Symmetry Scores by Group

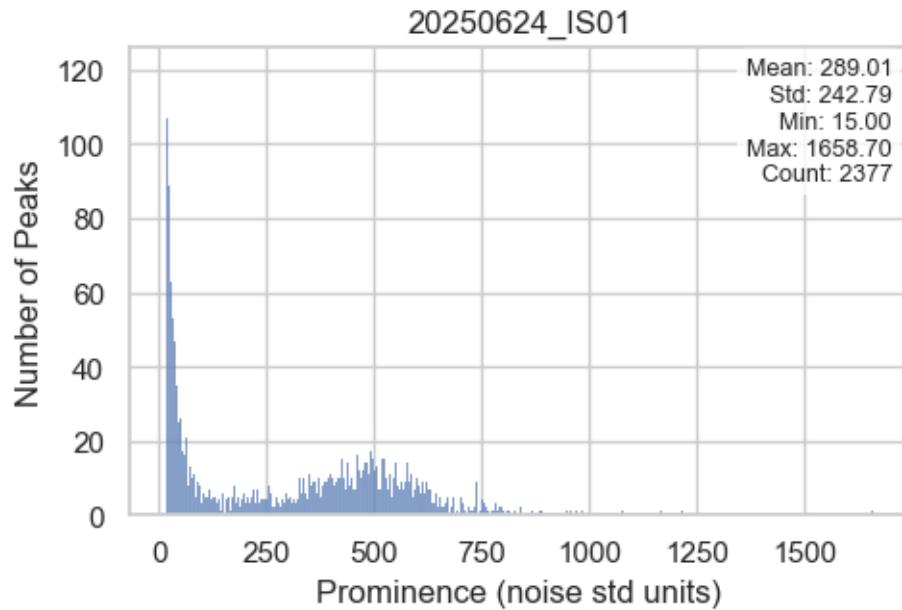


1.2 GLOBAL EVENTS

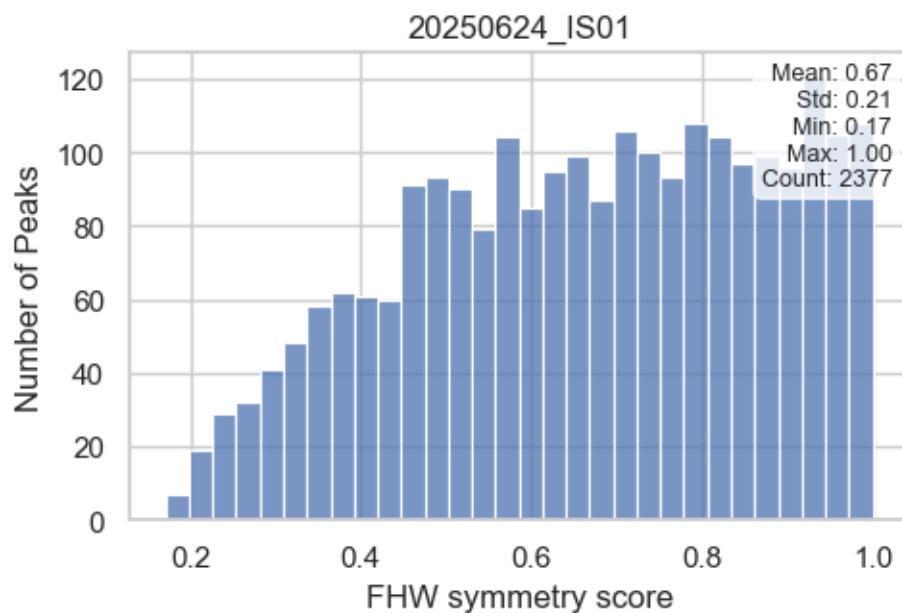
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

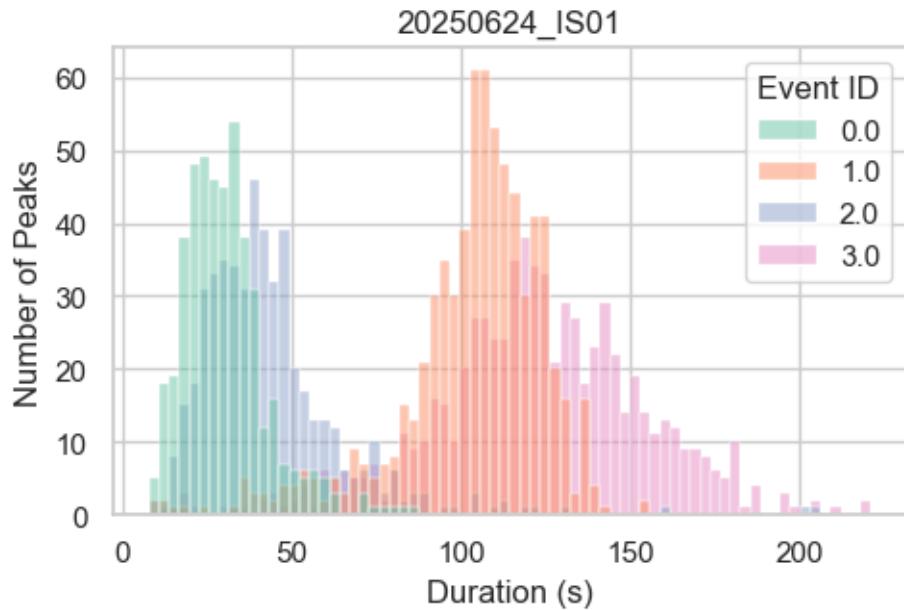


Distribution of Peak Symmetry Scores

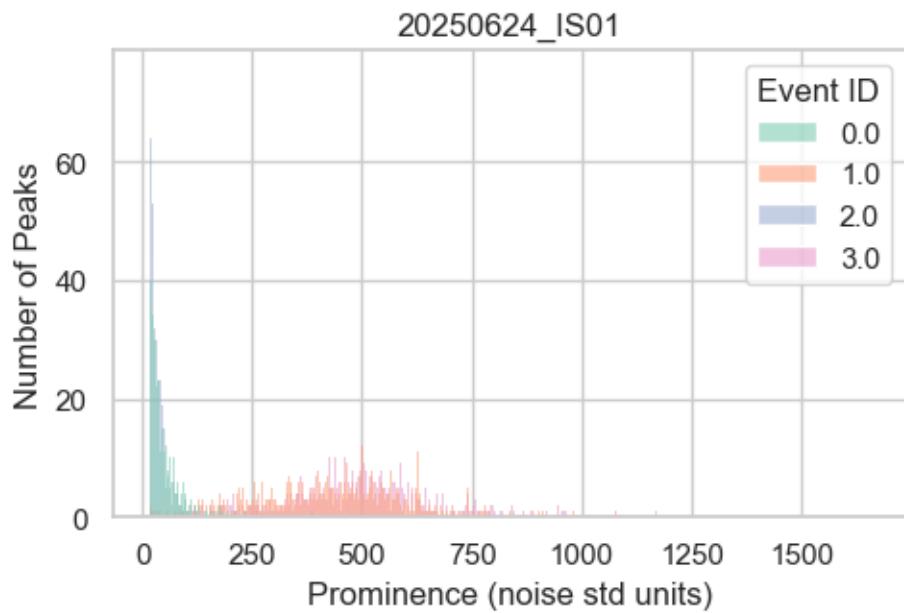


1.2.2 Peak statistics in global event per event ID

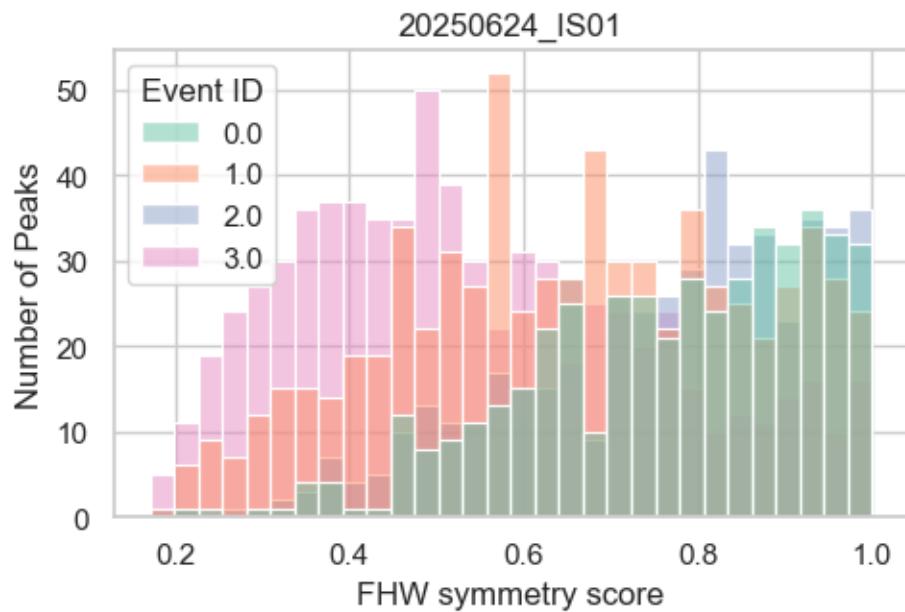
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



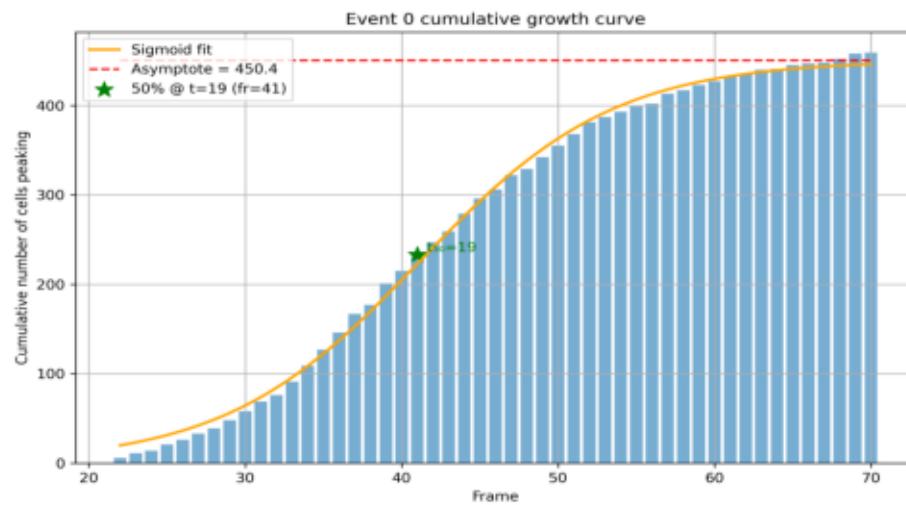
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

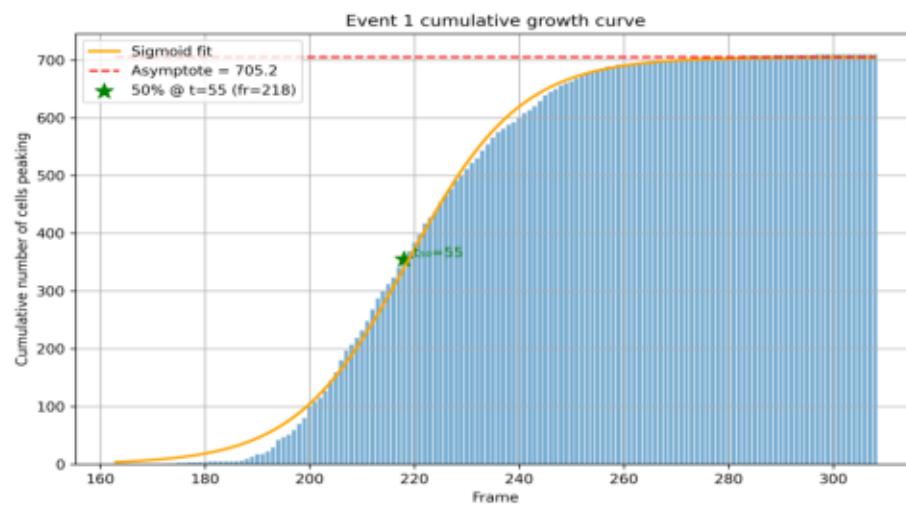
Event Activity Overlay (Event ID: 0)

20250624_IS01



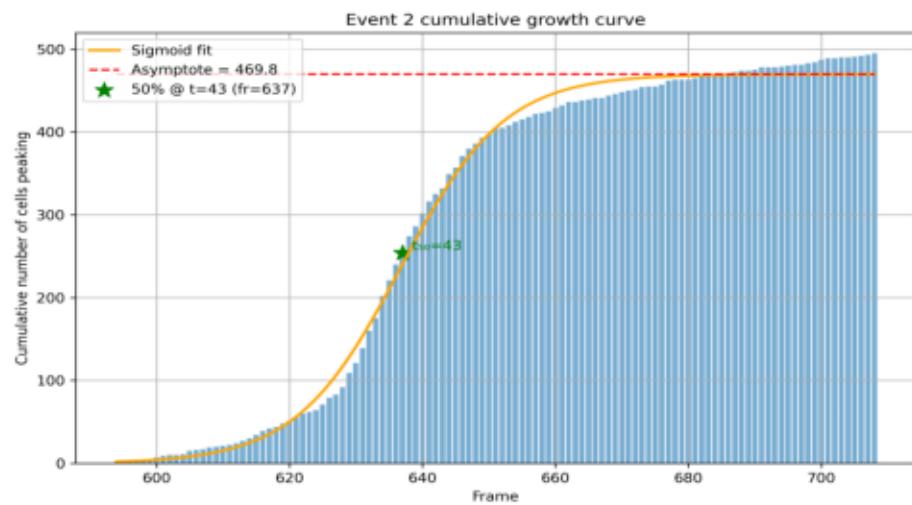
Event Activity Overlay (Event ID: 1)

20250624_IS01



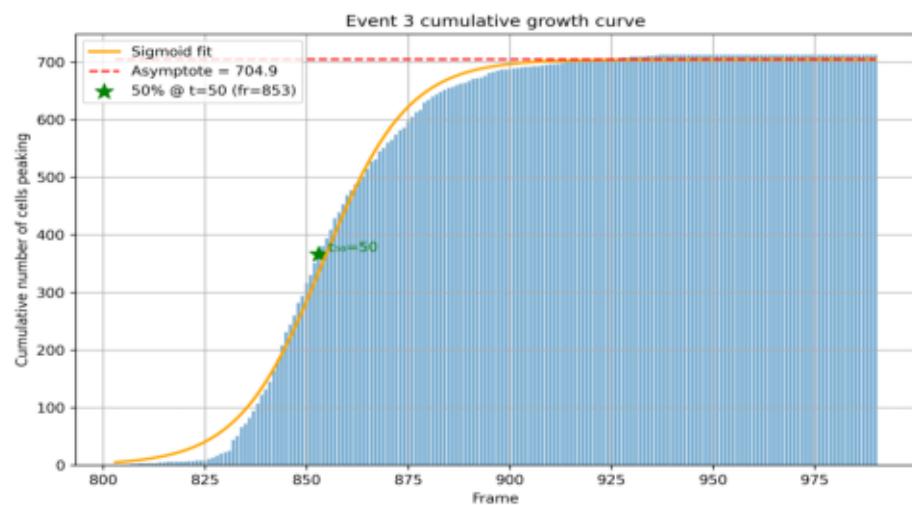
Event Activity Overlay (Event ID: 2)

20250624_IS01



Event Activity Overlay (Event ID: 3)

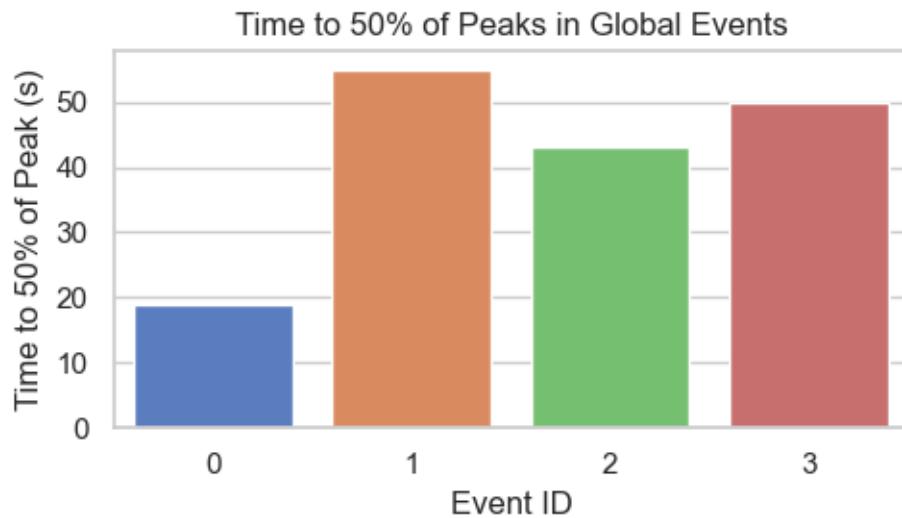
20250624_IS01



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

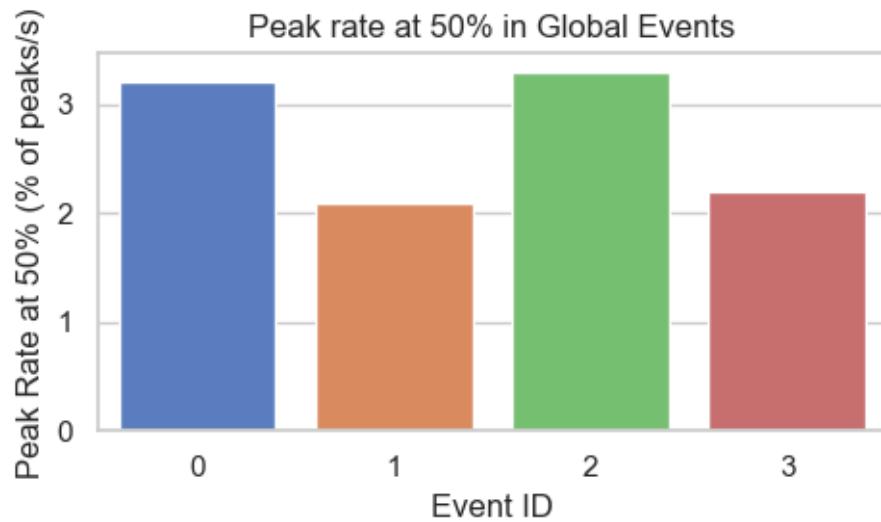
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

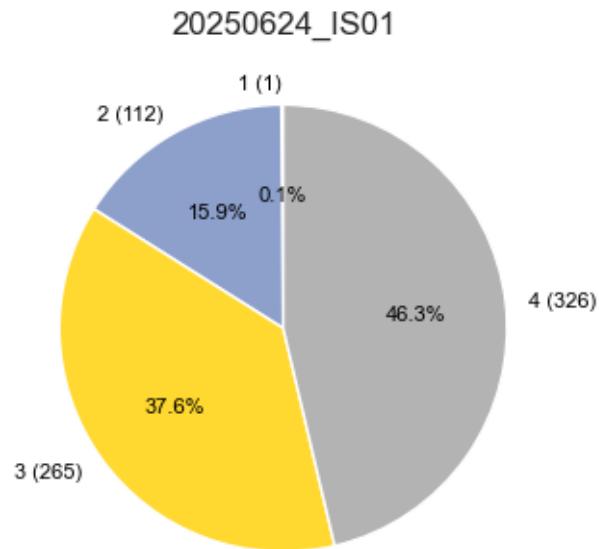
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



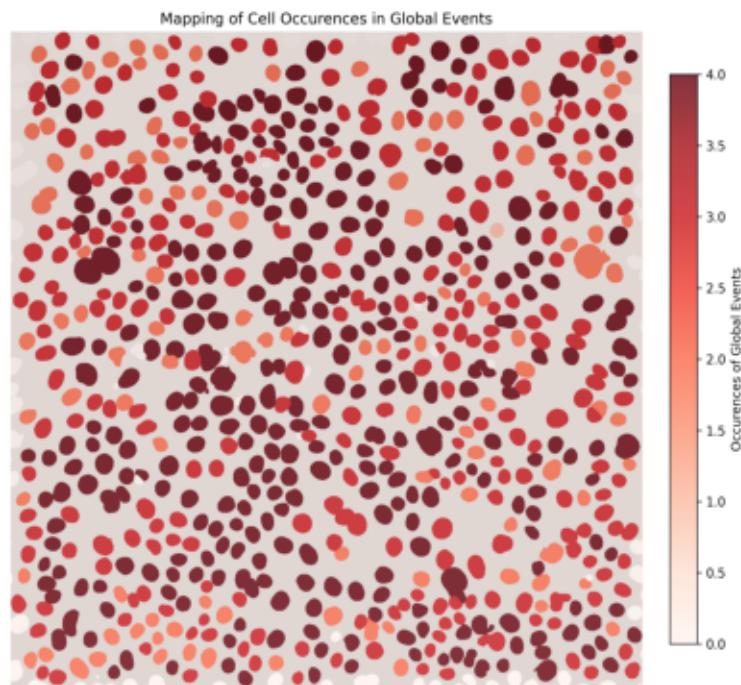
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

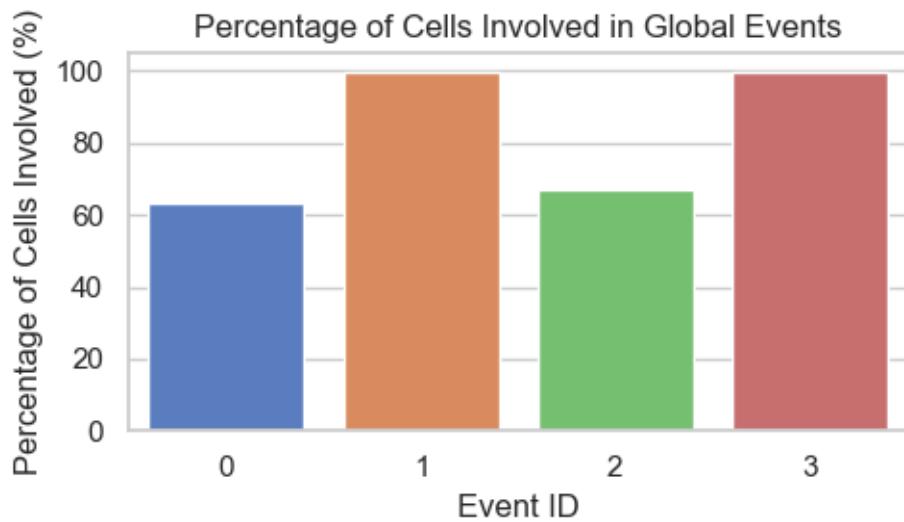
20250624_IS01



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



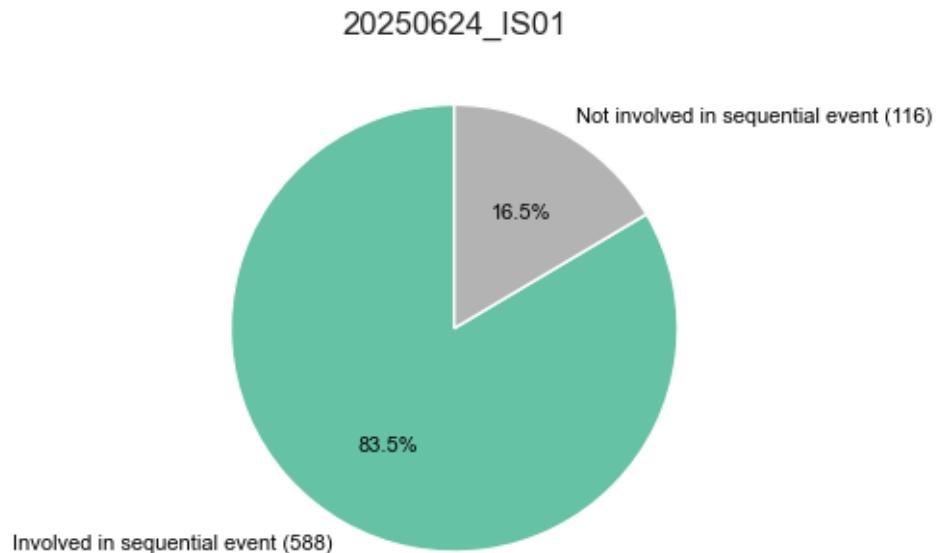
1.2.5 Inter-event interval analysis

Intervals between global event peaks: [188.0, 407.0, 232.0]
 Estimated periodicity: 0.745

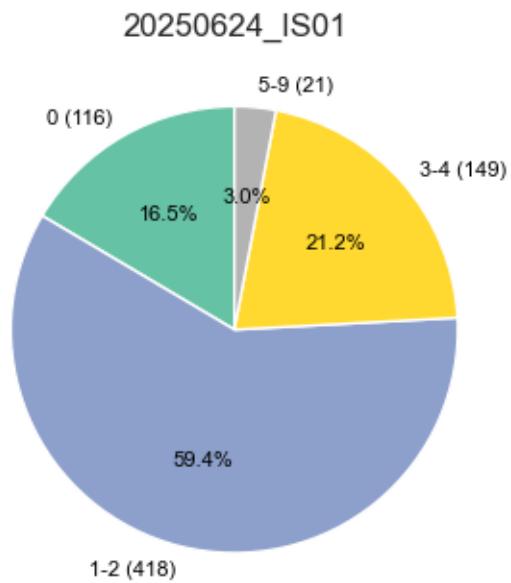
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequential events

Distribution of Cells Involved in Sequential Events

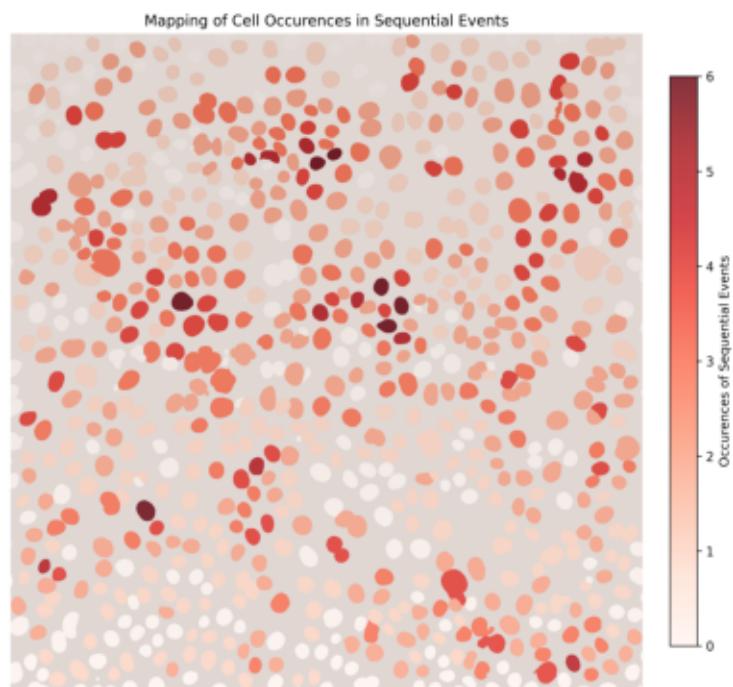


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

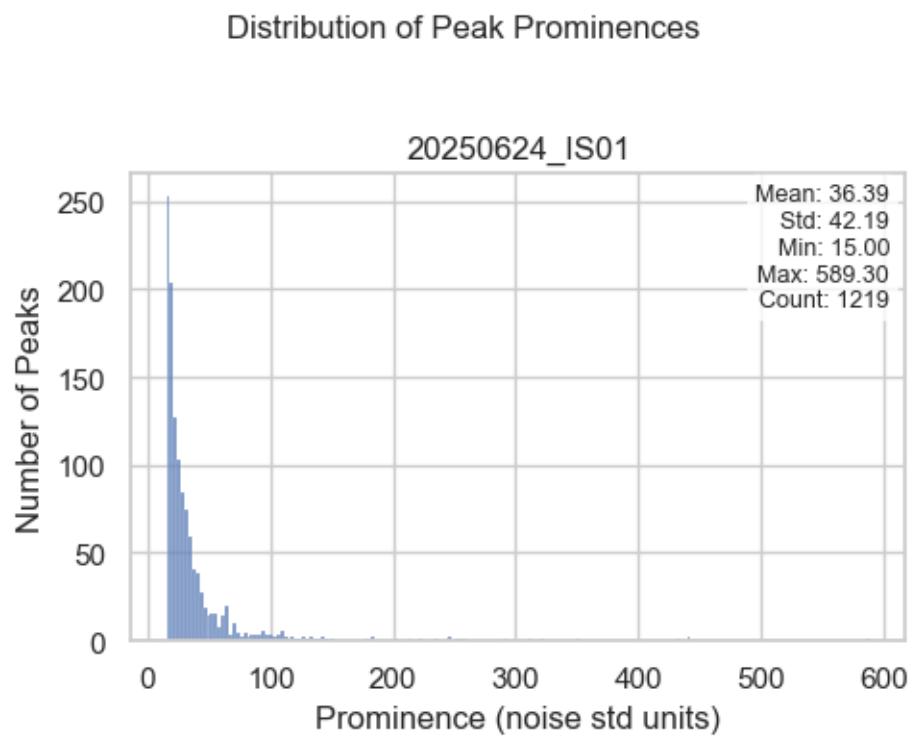
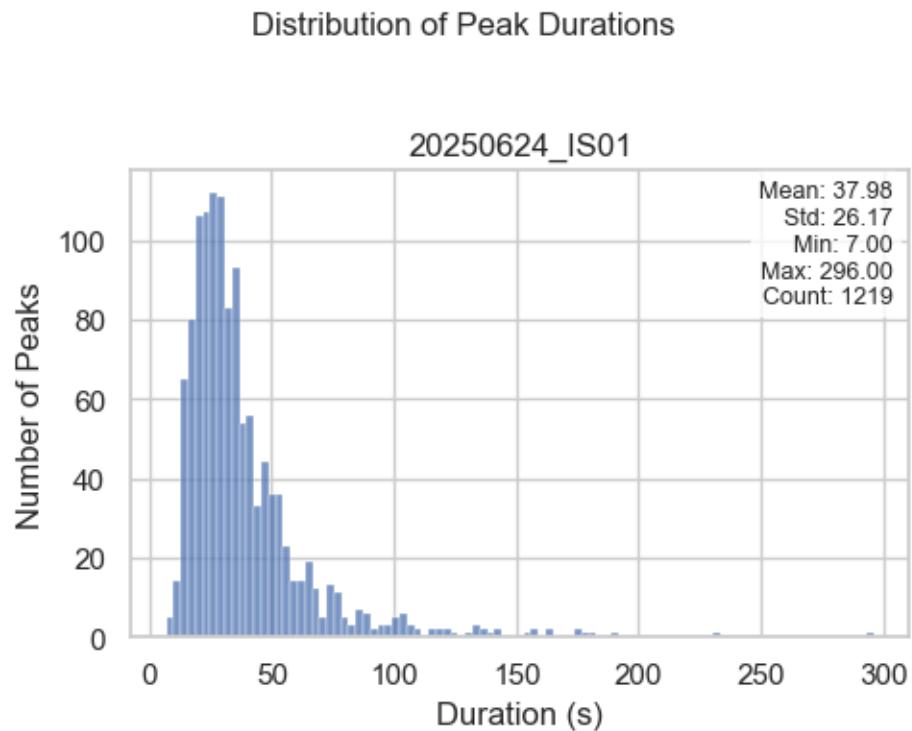


Cell Mapping with Occurrences in Sequential Events Overlay

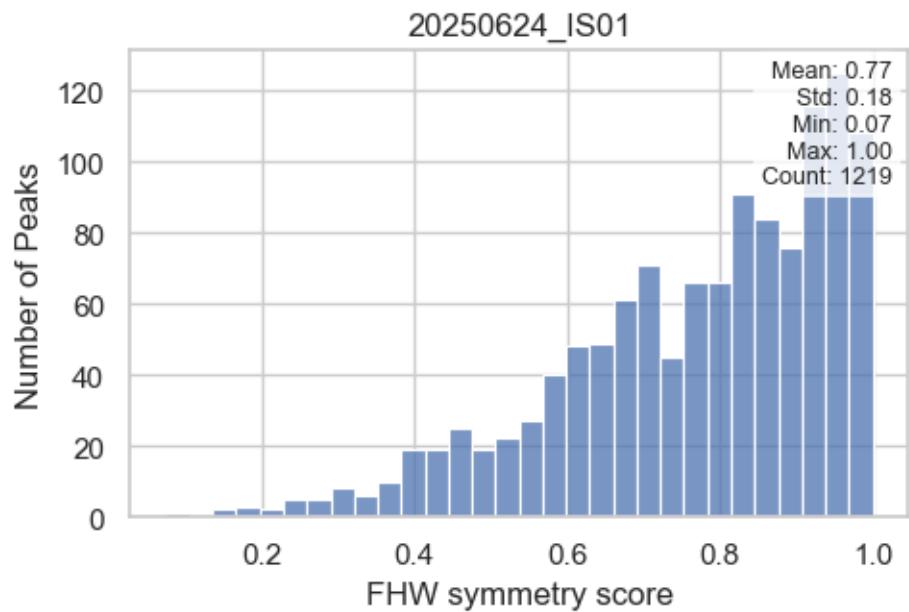
20250624_IS01



1.3.2 Peaks statistics in sequential events

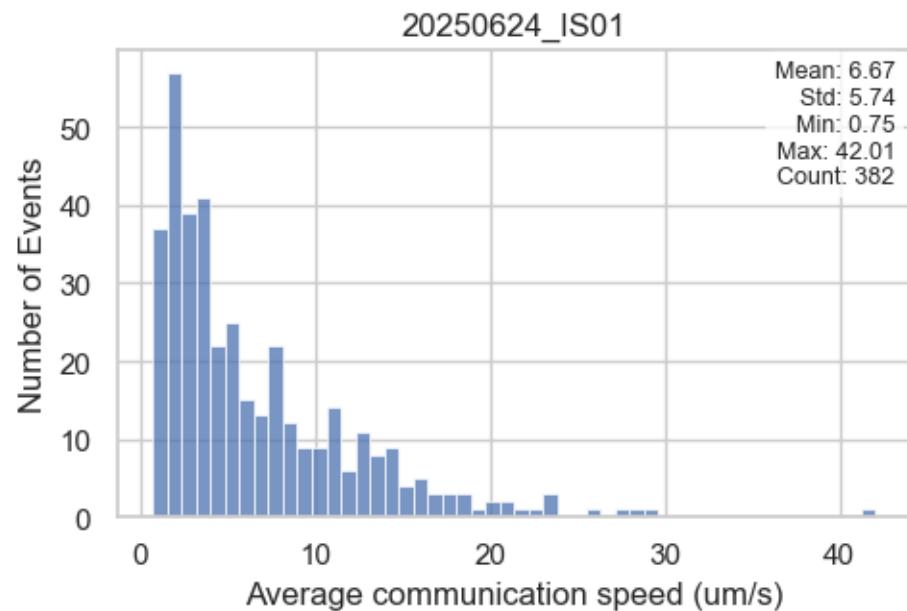


Distribution of Peak Symmetry Scores

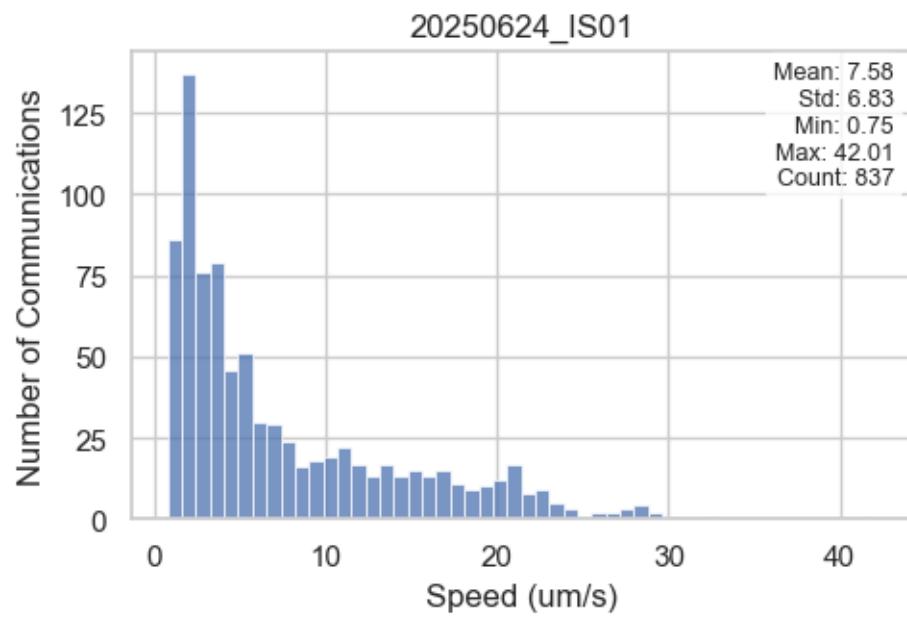


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

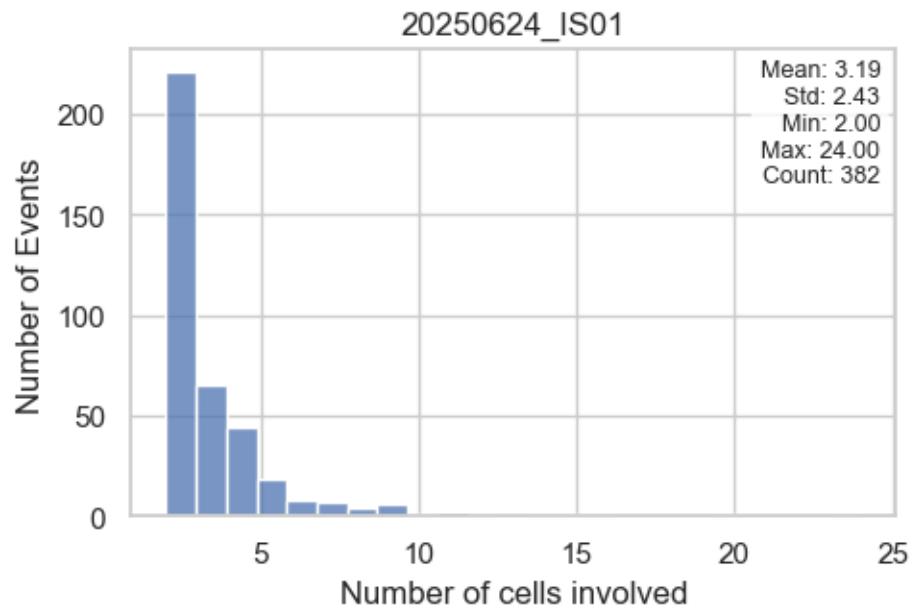


Distribution of Cell-Cell Communication Speeds



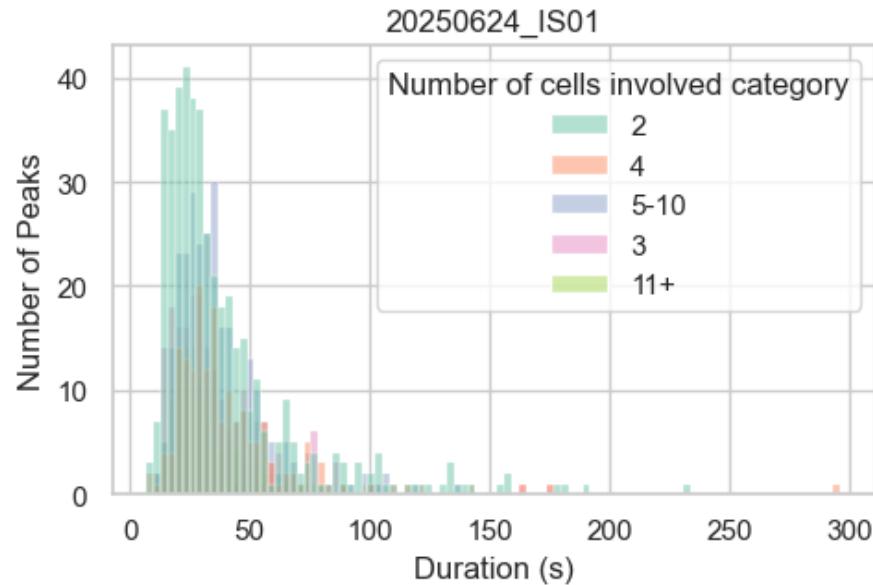
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

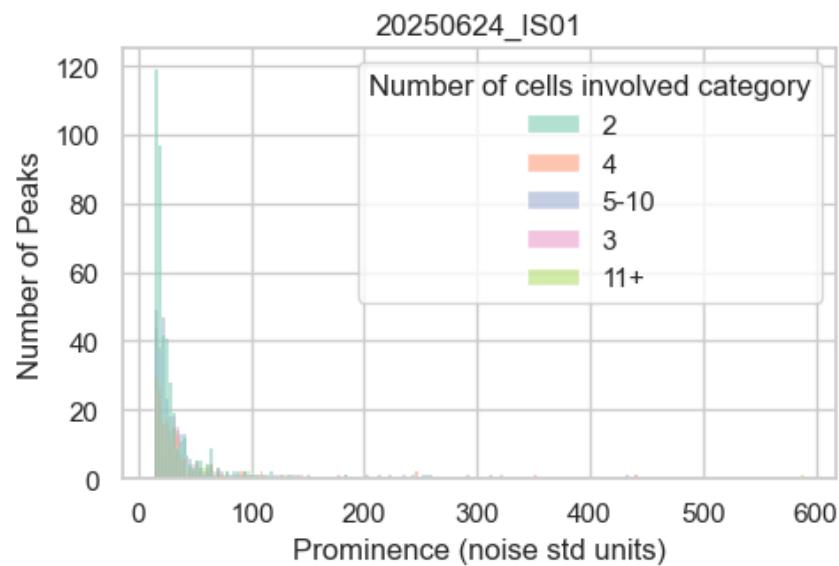


1.3.5 Influence of cell count per event on statistics

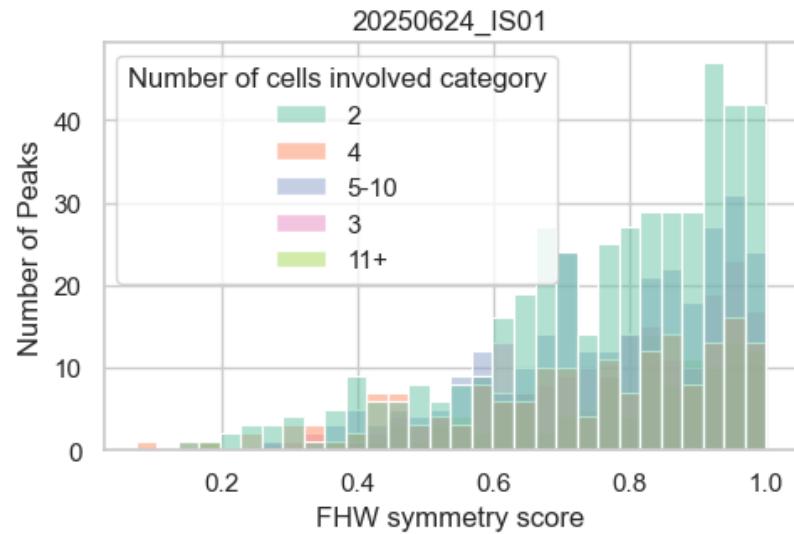
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



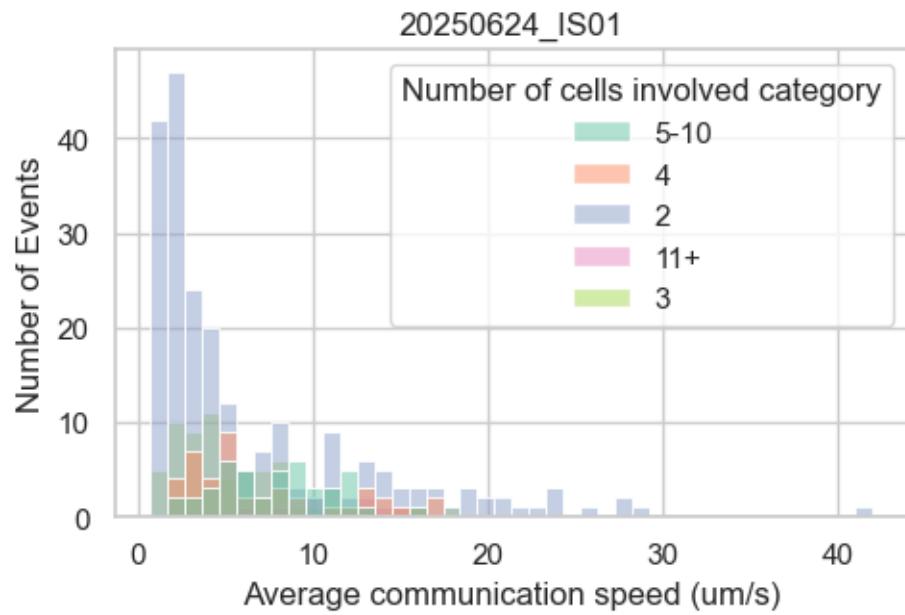
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



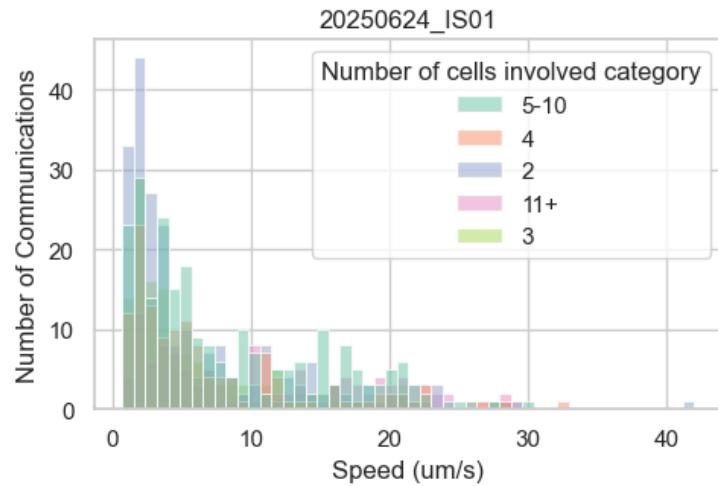
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

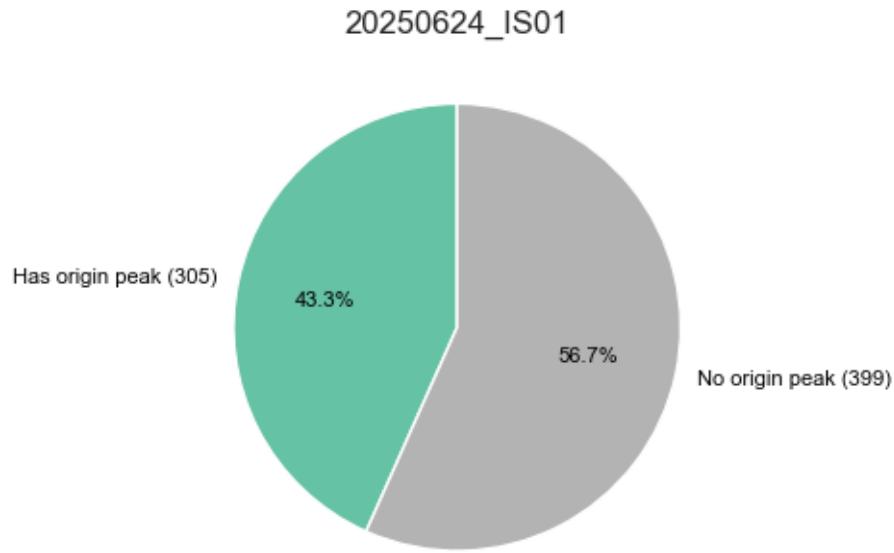


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

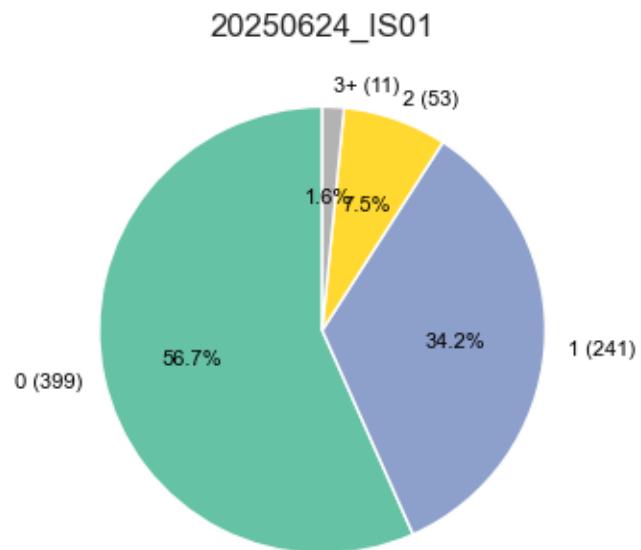


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

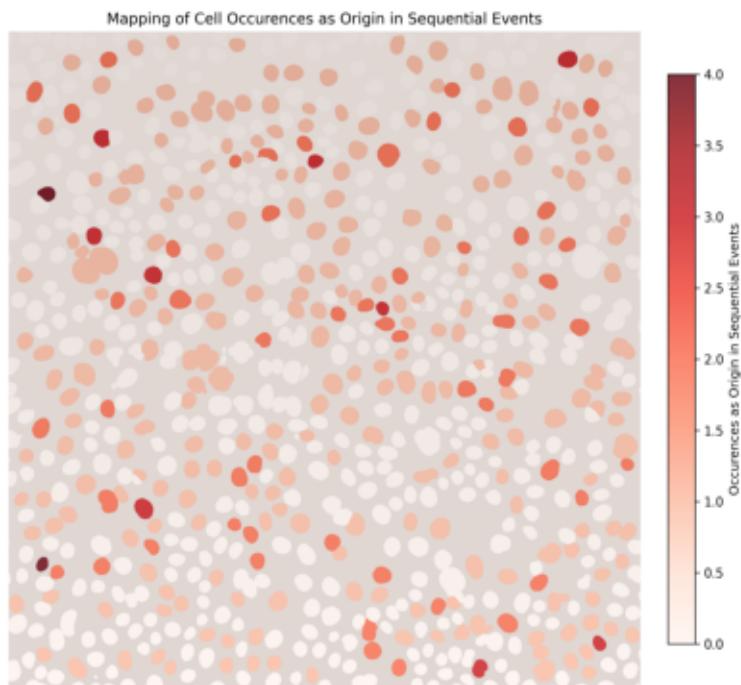


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

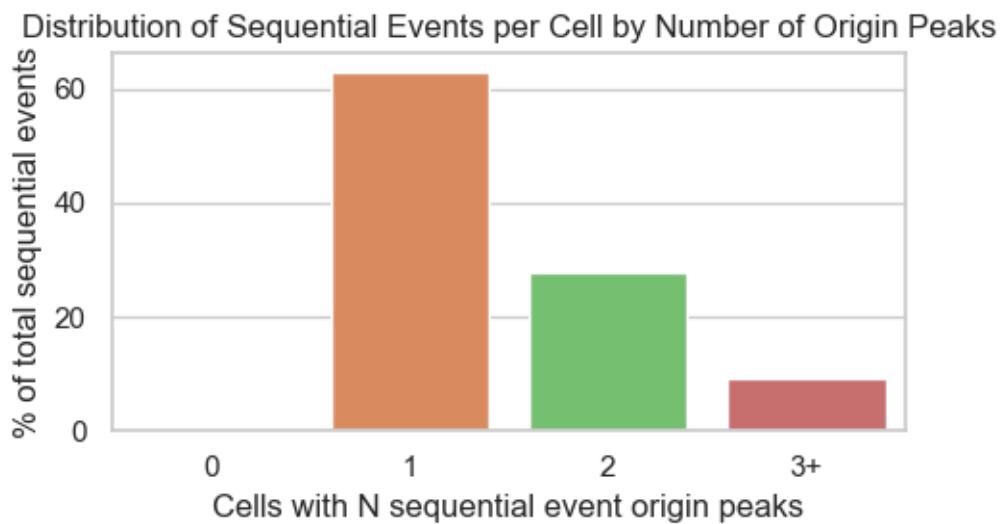
20250624_IS01



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

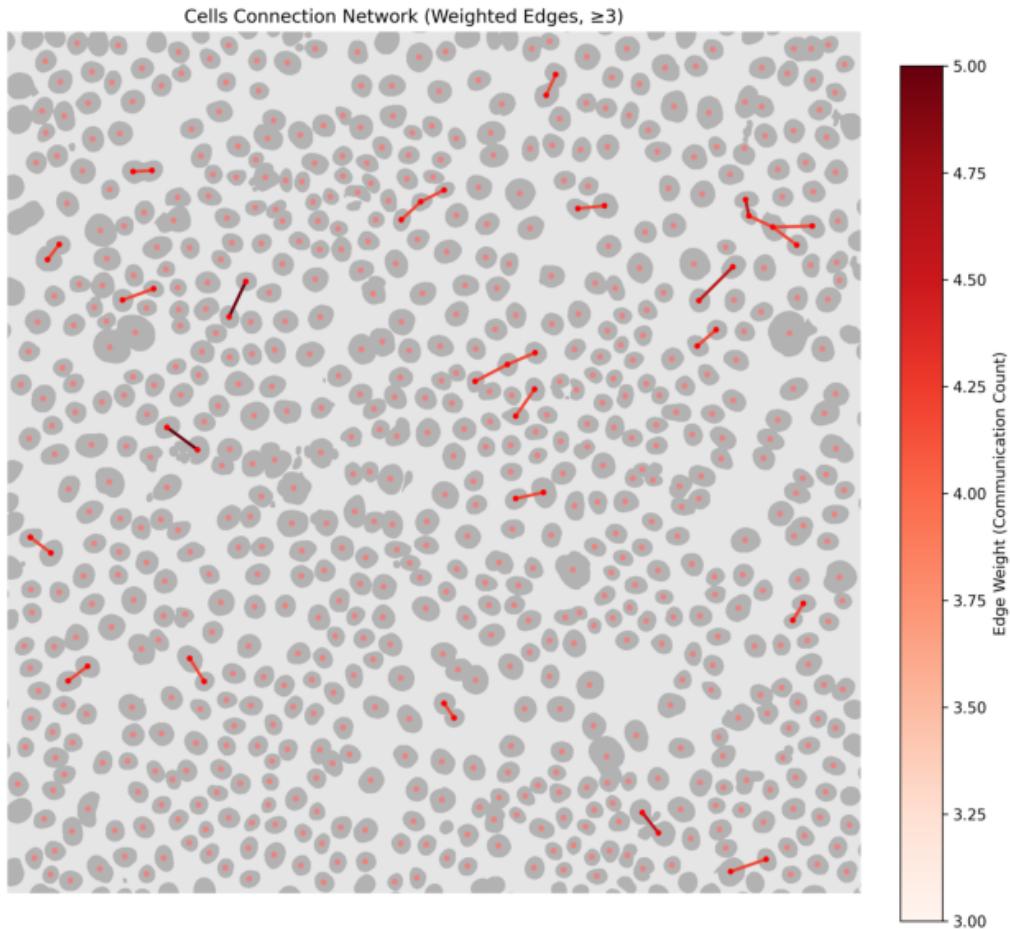
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.3.7 Connection network between cells

Cell Connection Network Graph

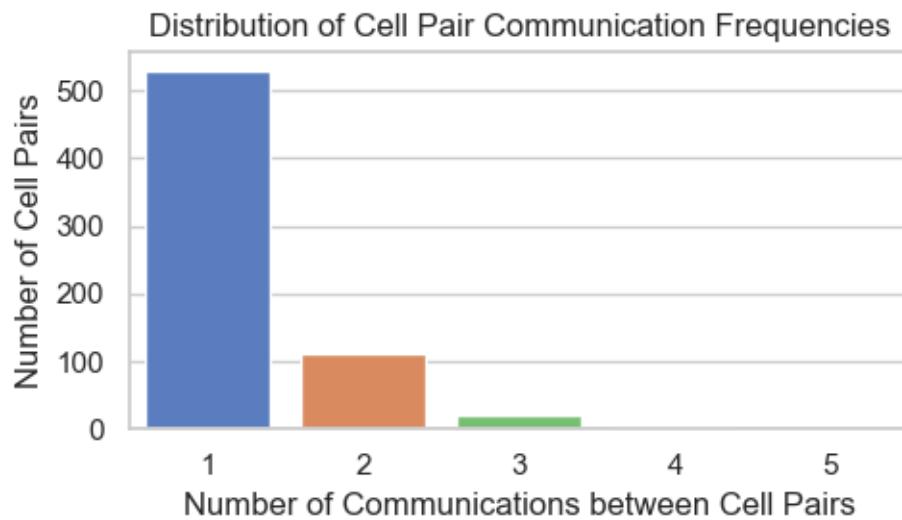
20250624_IS01



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

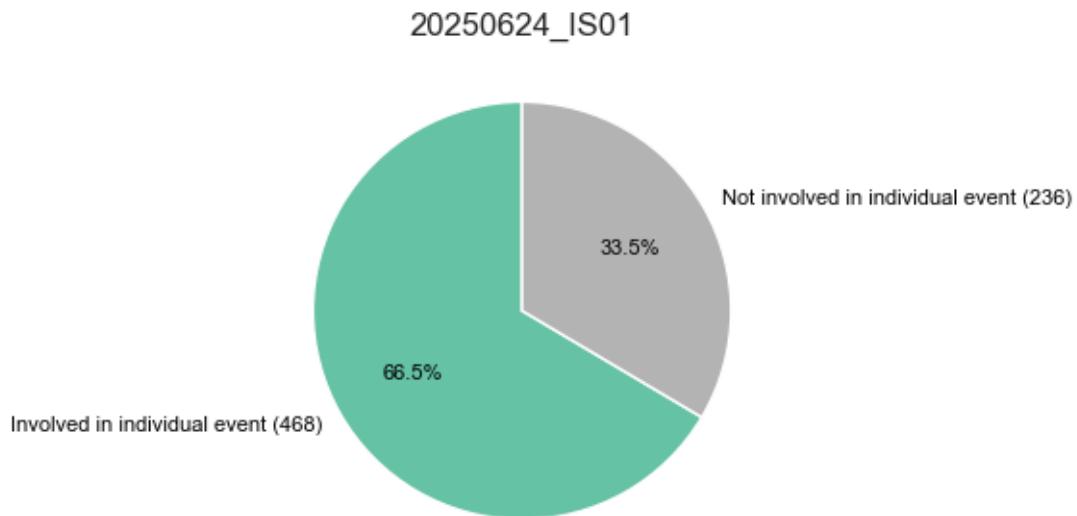
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



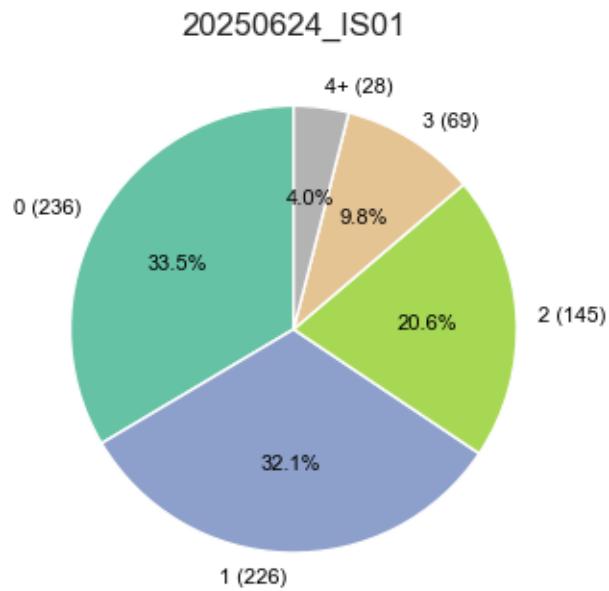
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

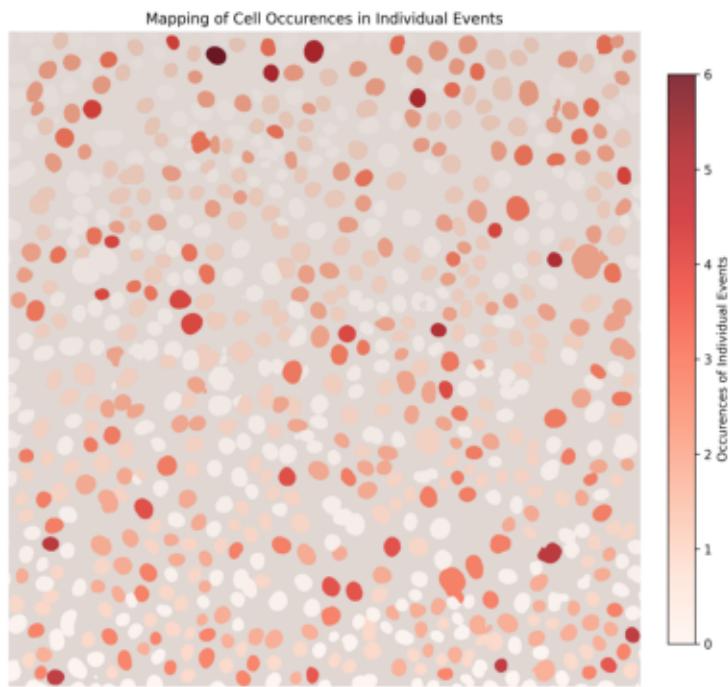


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)



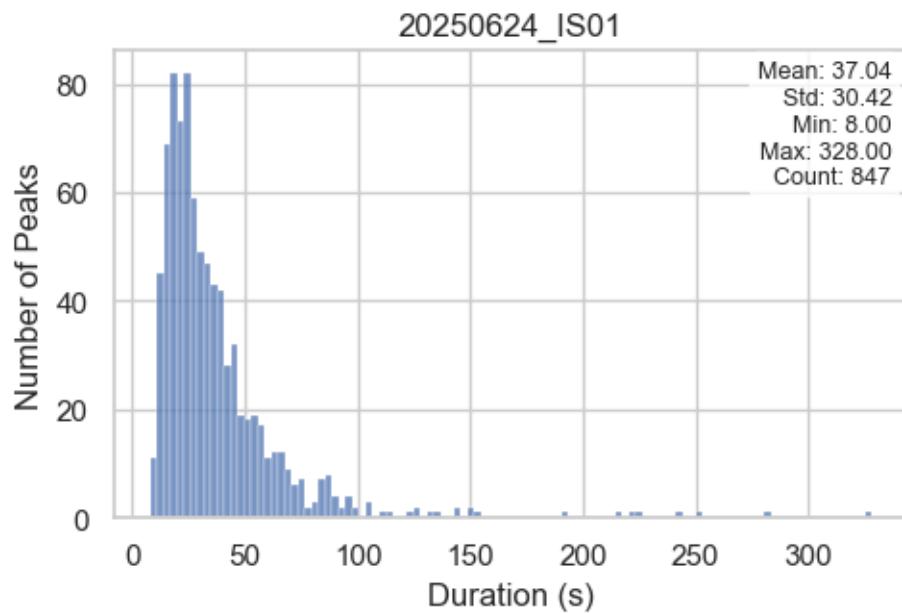
Cell Mapping with Occurrences in Individual Events Overlay

20250624_IS01

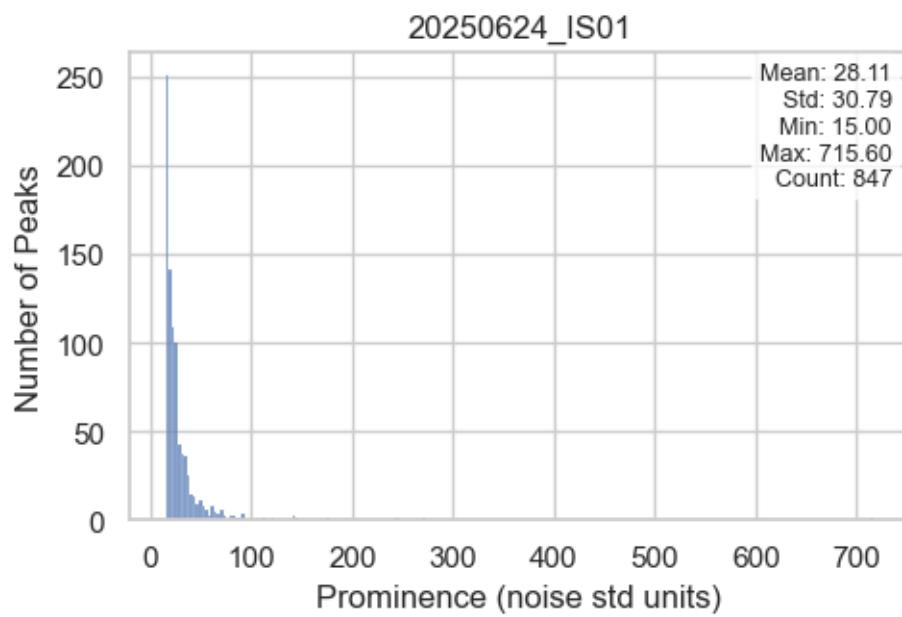


1.4.2 Peaks statistics in individual events

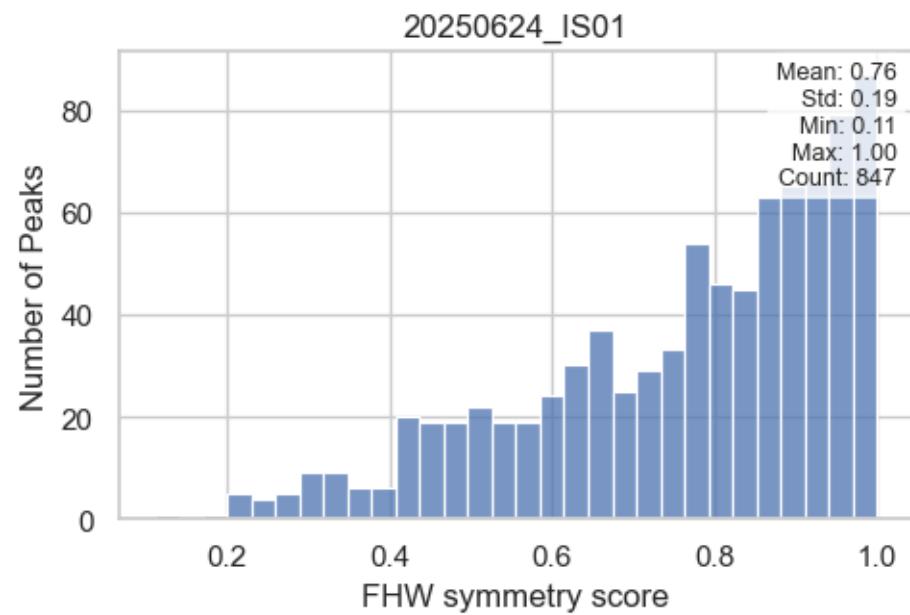
Distribution of Peak Durations



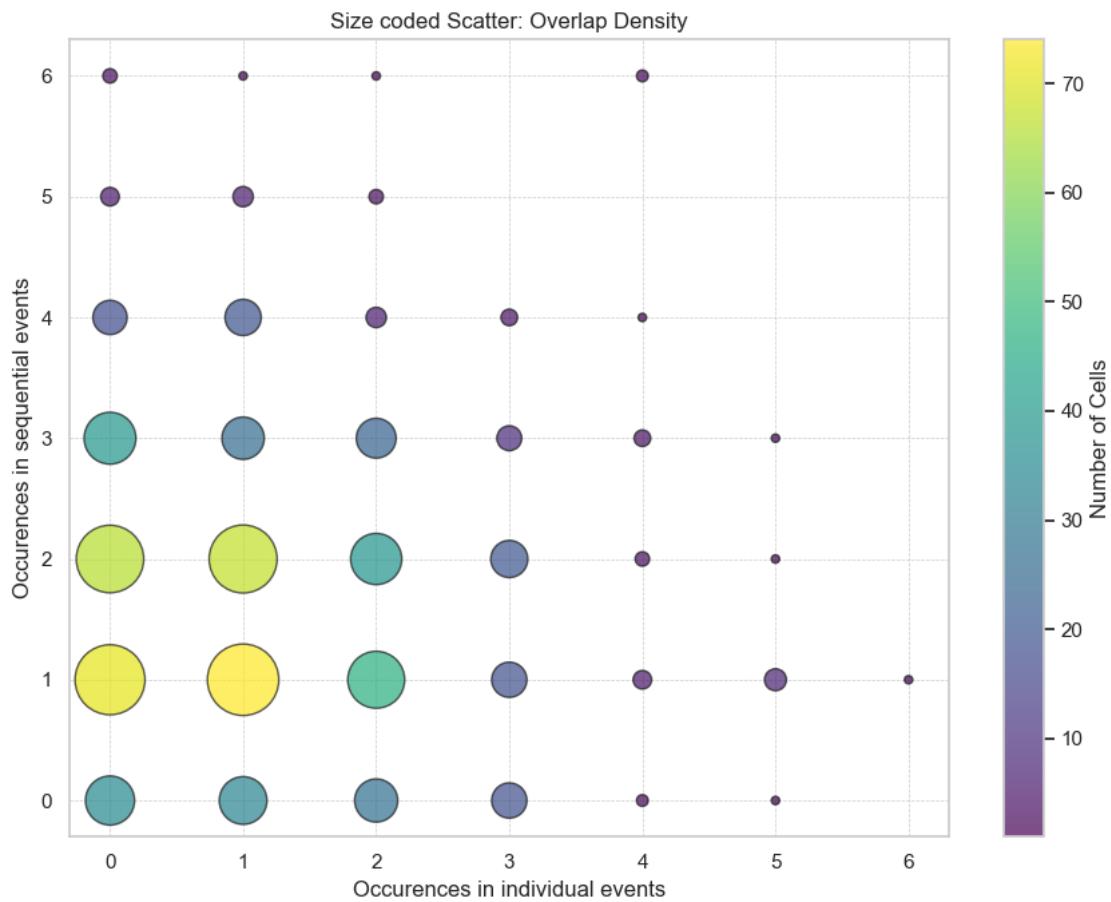
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

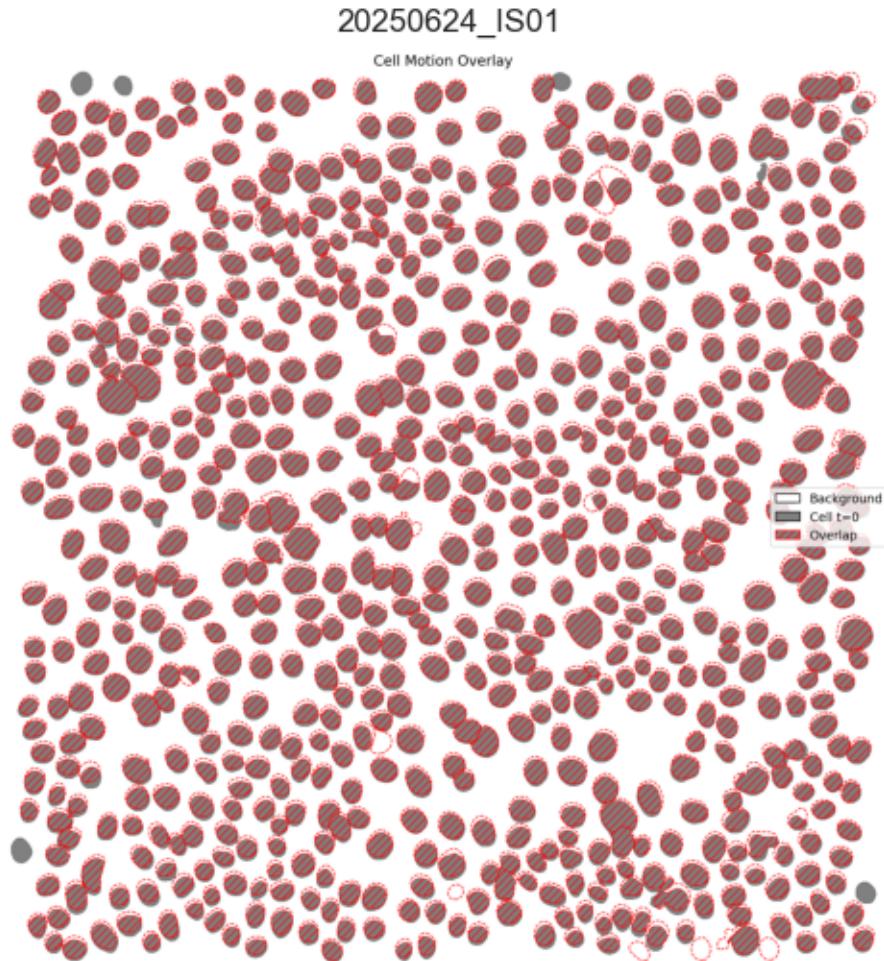


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 704
- Hoechst image taken at t=1801: 700
- Number of cells difference: absolute 4, relative 0.57%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 864200
- Pixels segmented as cell at t=1801: 858437
- Overlapping pixels between t=0 and t=1801: 706604 (82.04% of total)
- Pixels exclusive to t=0: 157596 (18.24% of total)
- Pixels exclusive to t=1801: 151833 (17.69% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n    "Default Dataset": "/path/to/your/dataset"\n}'
```

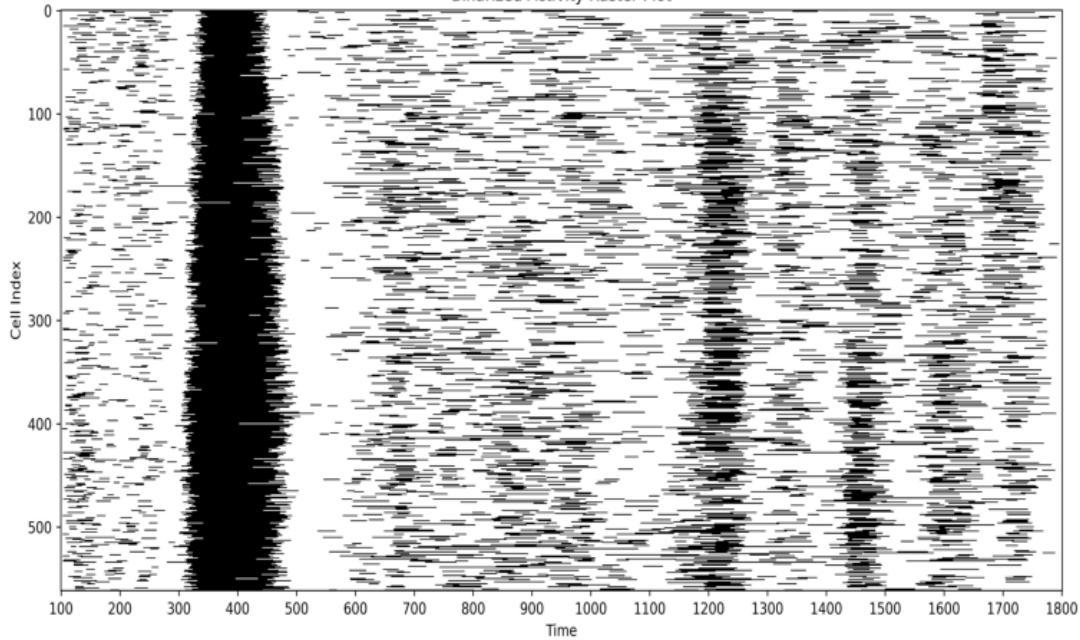
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

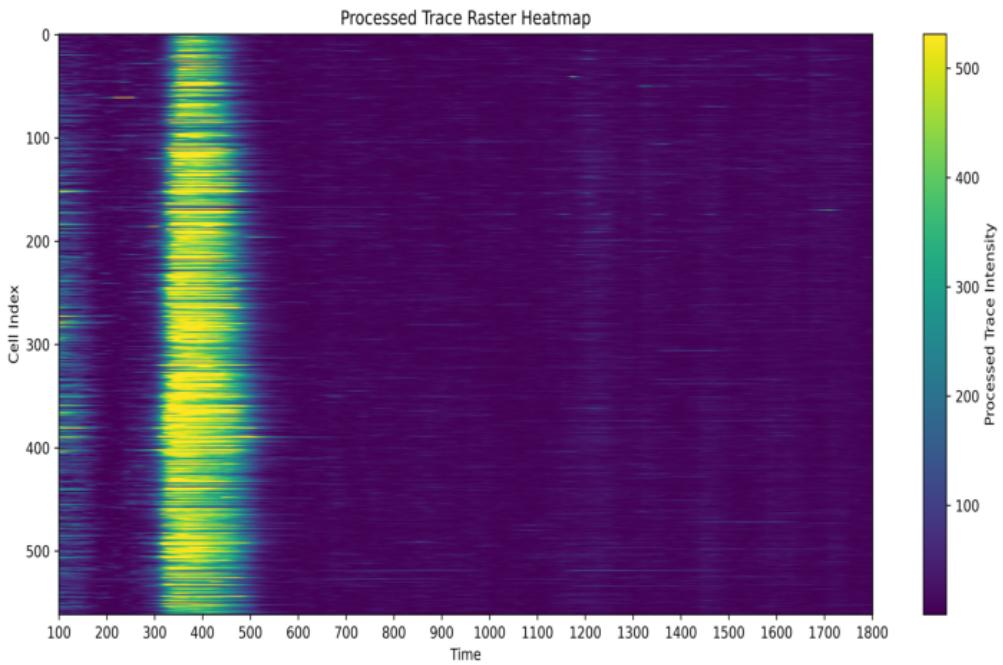
20250624_IS03

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250624_IS03



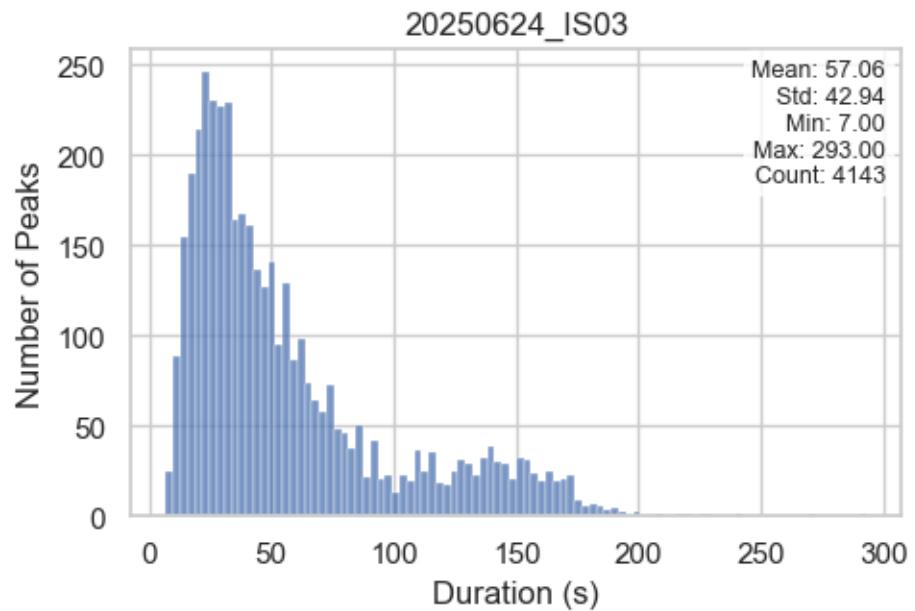
1.1.2 Peaks population

Total number of peaks: 4143

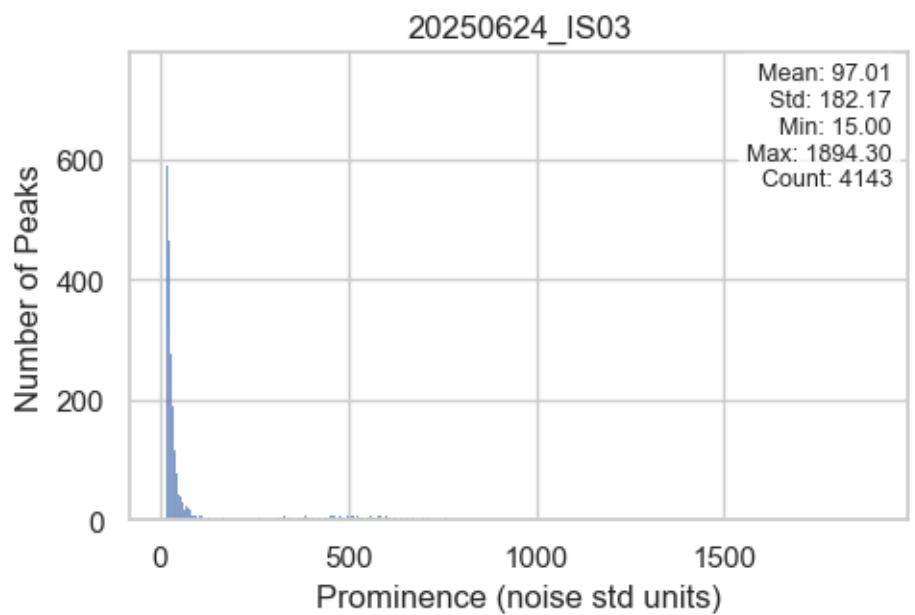
Total number of cells: 562

1.1.3 Peaks statistics

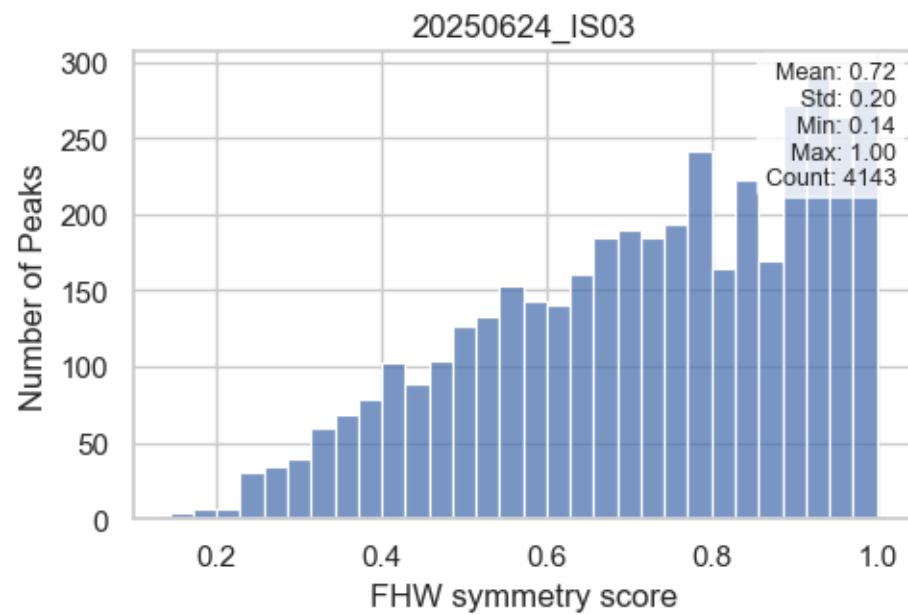
Distribution of Peak Durations



Distribution of Peak Prominences

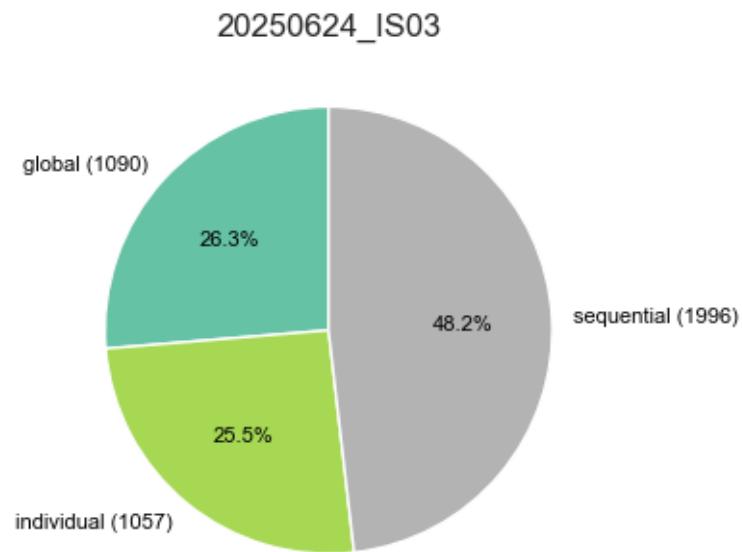


Distribution of Peak Symmetry Scores



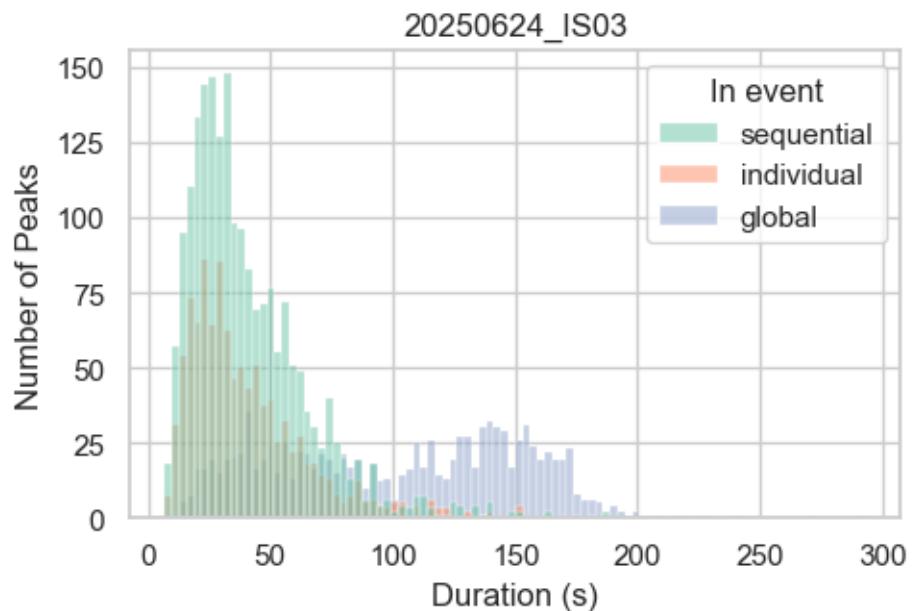
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

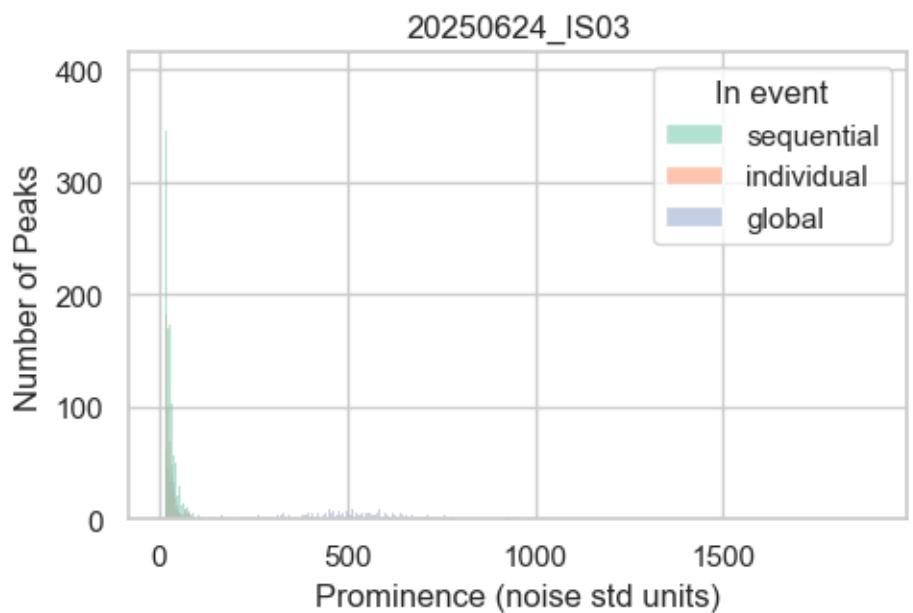


1.1.5 Peaks statistics per event types

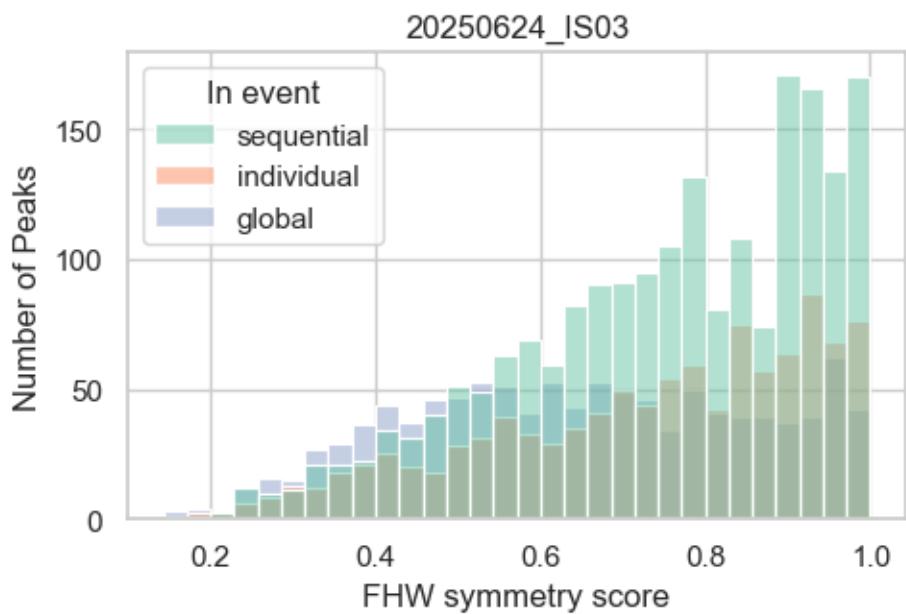
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

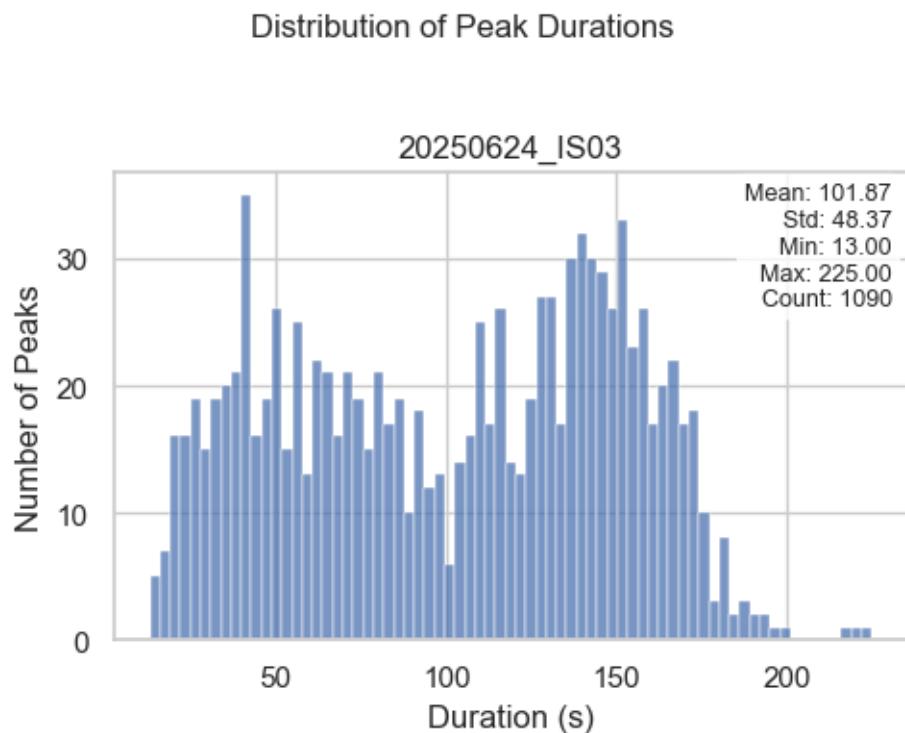


Distribution of Peak Symmetry Scores by Group

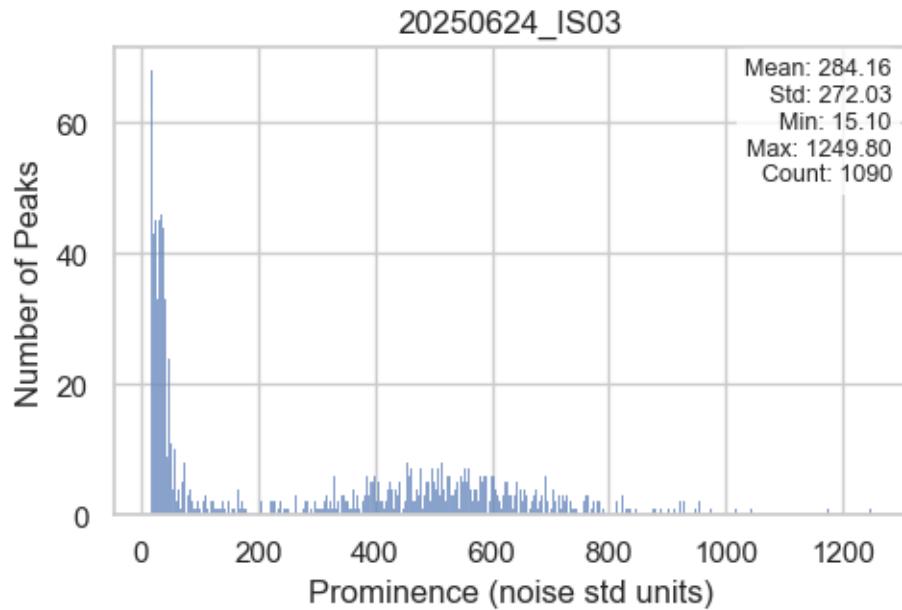


1.2 GLOBAL EVENTS

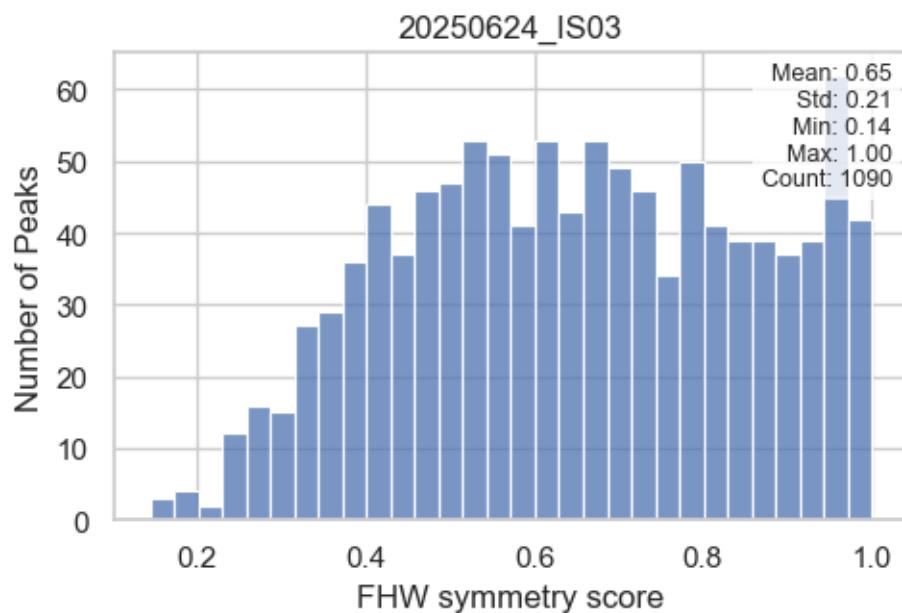
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

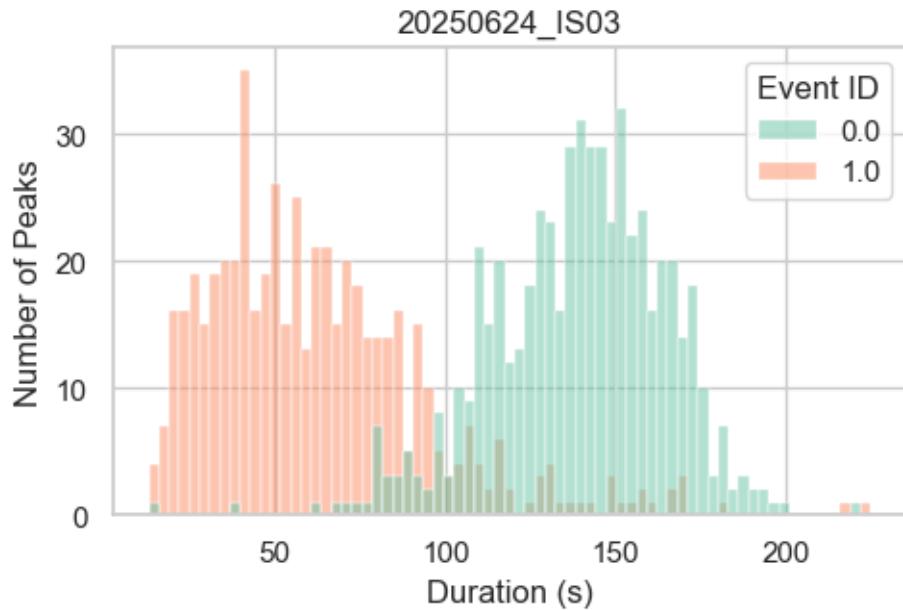


Distribution of Peak Symmetry Scores

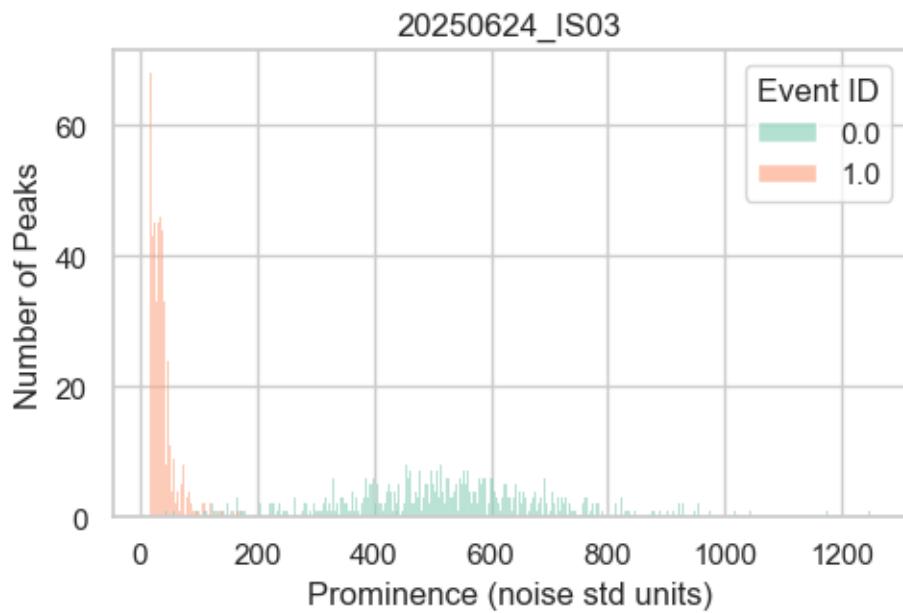


1.2.2 Peak statistics in global event per event ID

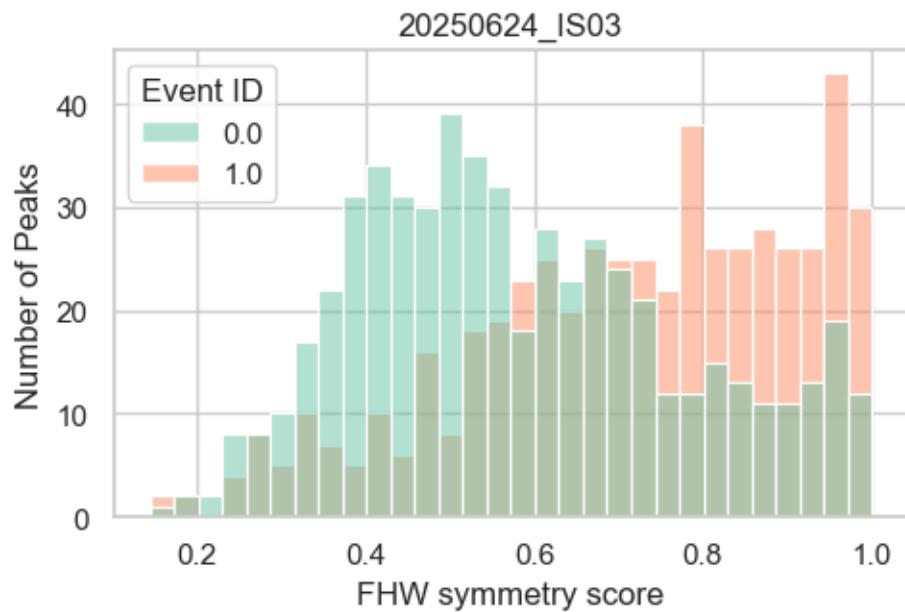
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



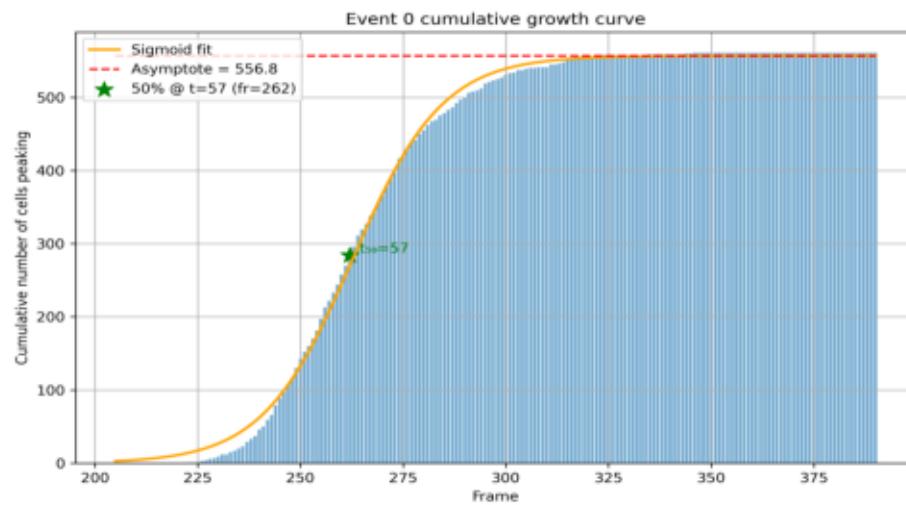
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

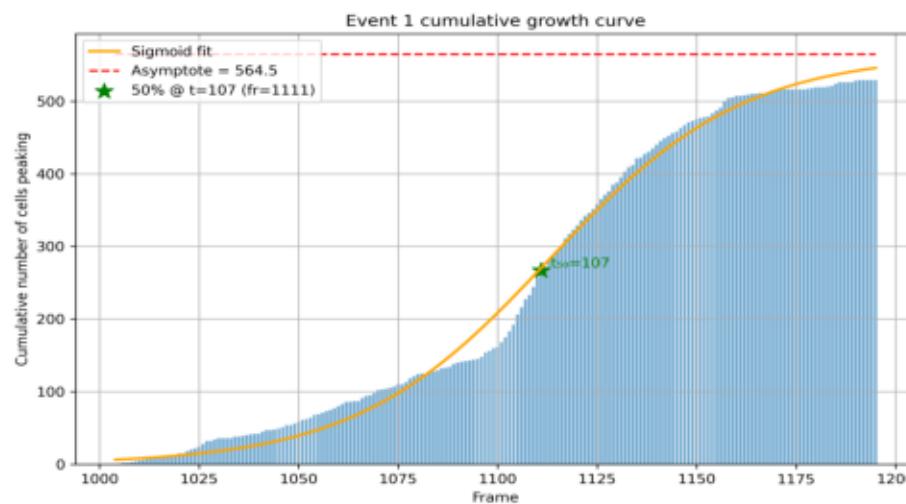
Event Activity Overlay (Event ID: 0)

20250624_IS03



Event Activity Overlay (Event ID: 1)

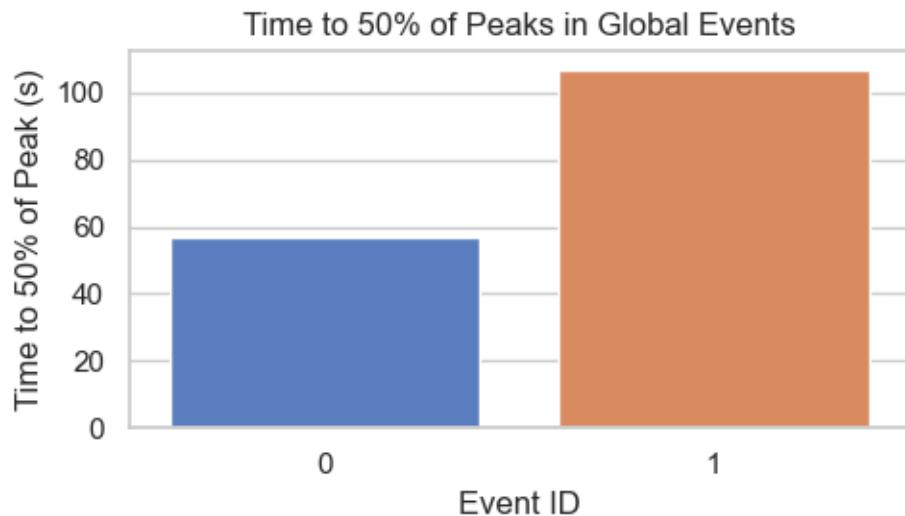
20250624_IS03



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

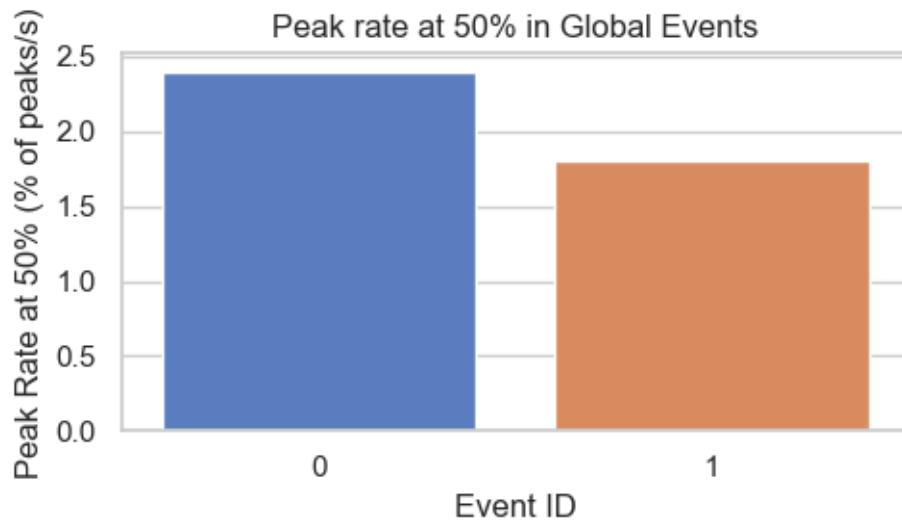
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

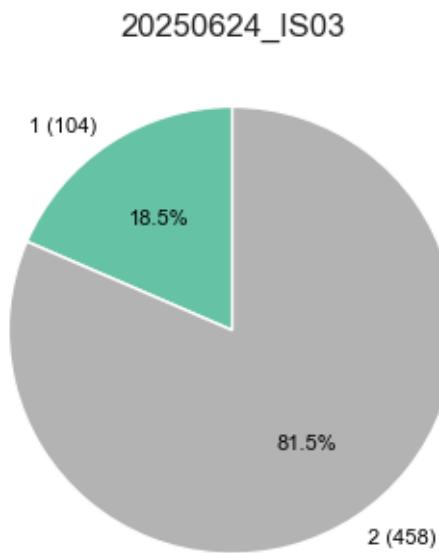
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



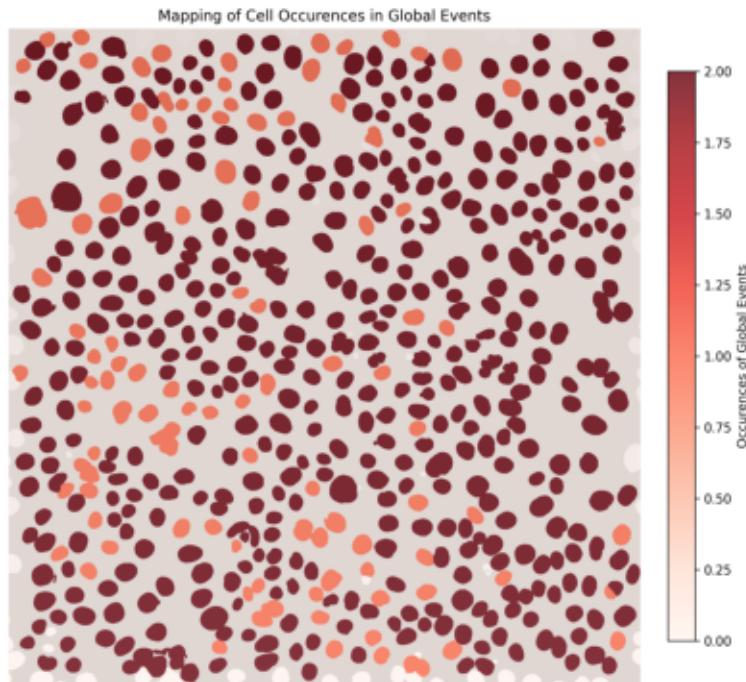
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

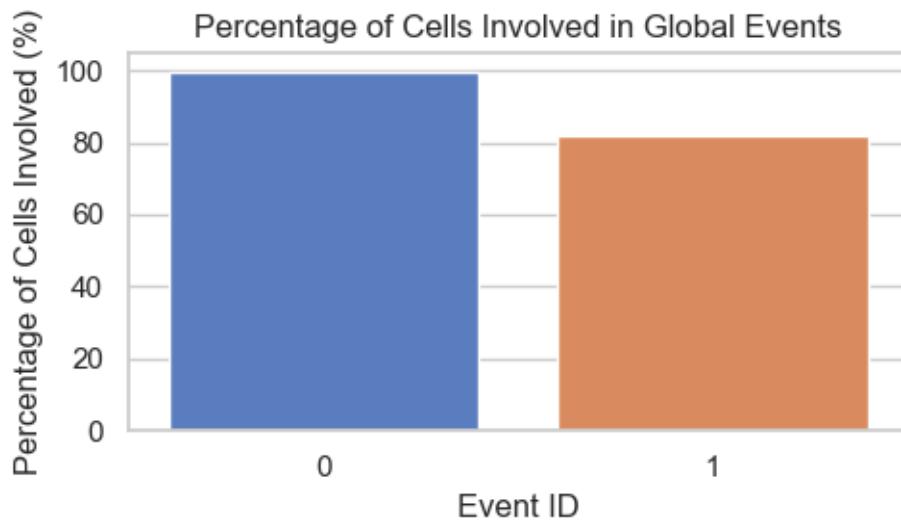
20250624_IS03



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



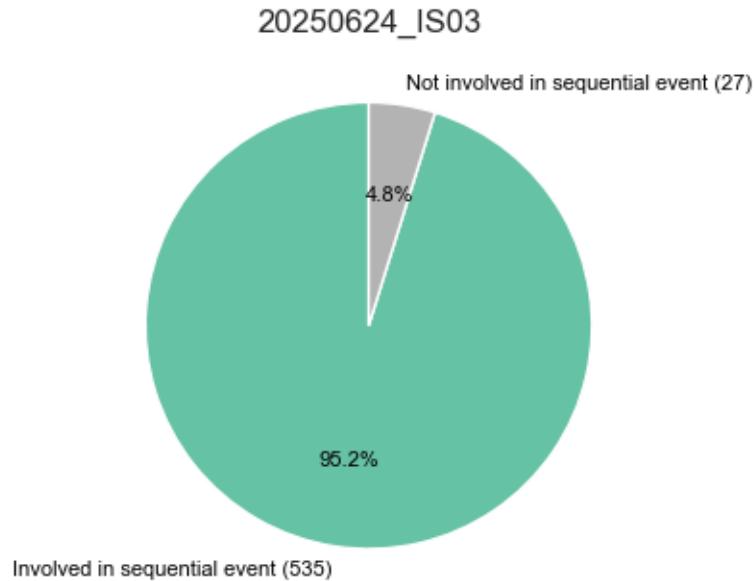
1.2.5 Inter-event interval analysis

Intervals between global event peaks: [832.0]

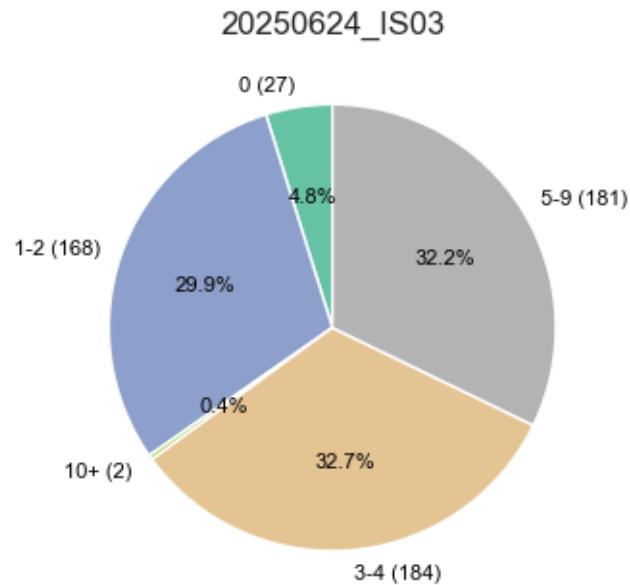
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

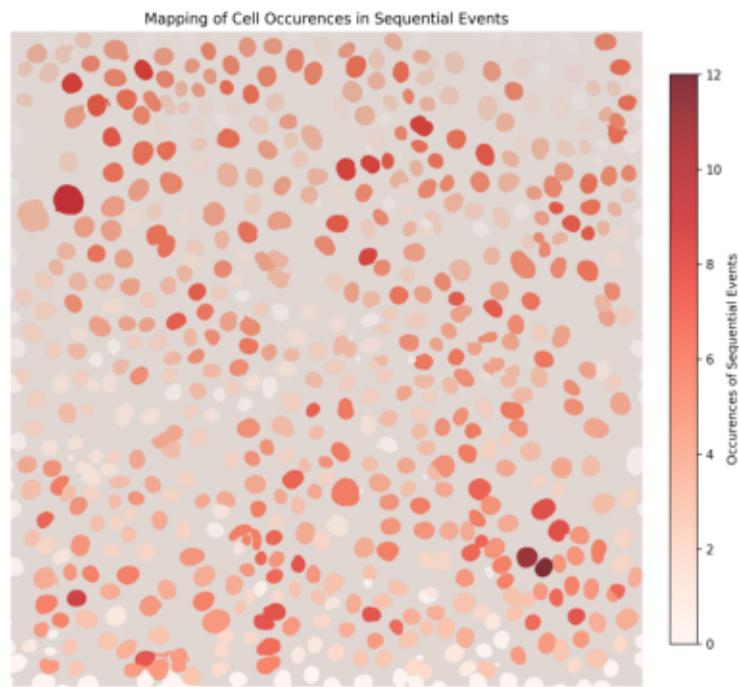


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

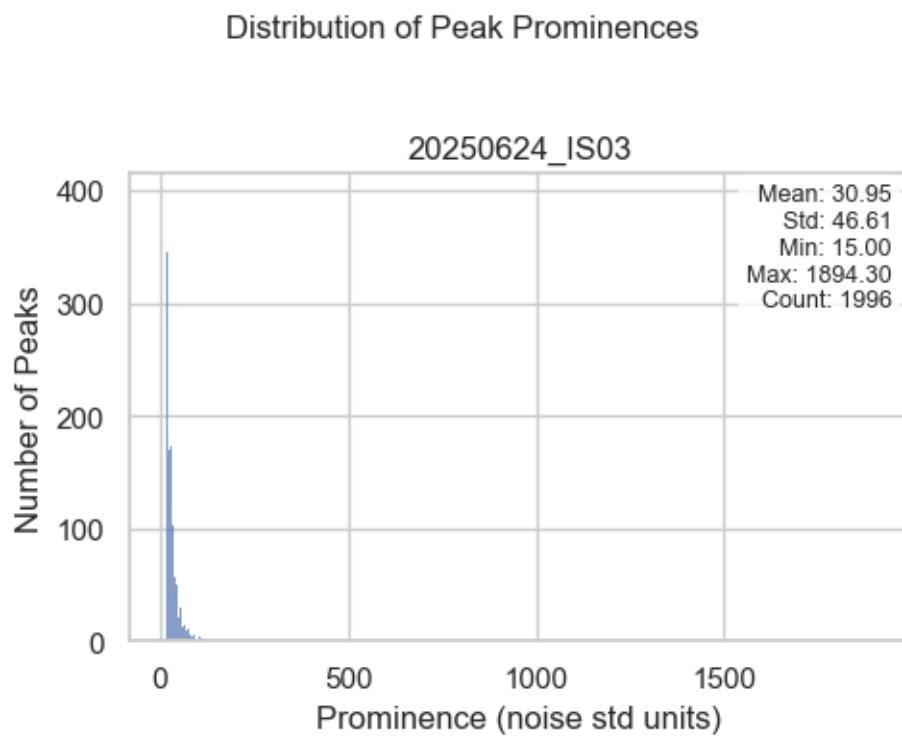
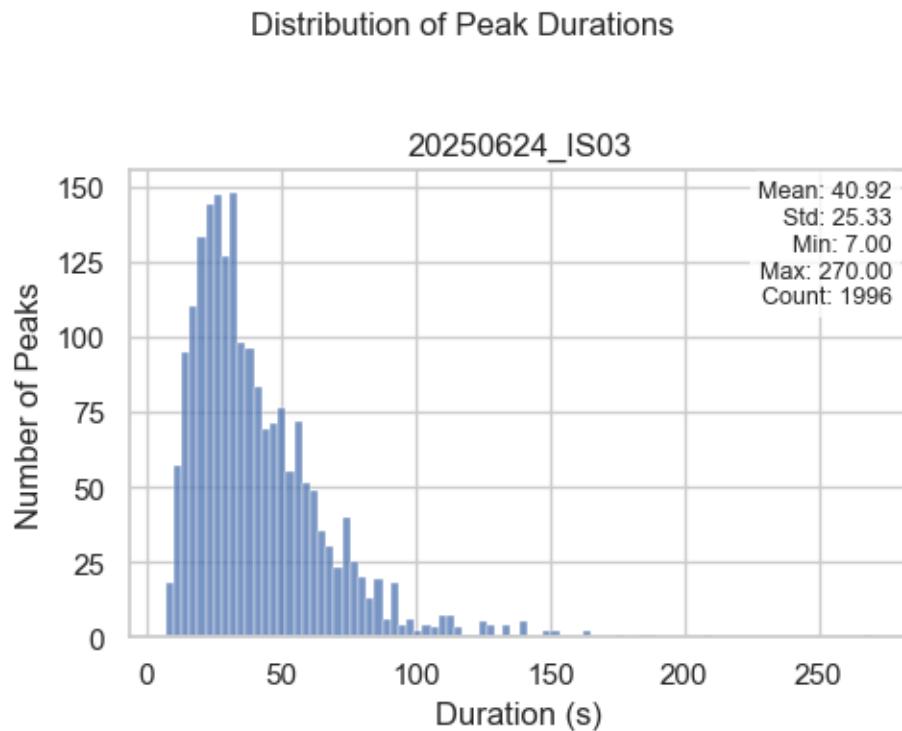


Cell Mapping with Occurrences in Sequential Events Overlay

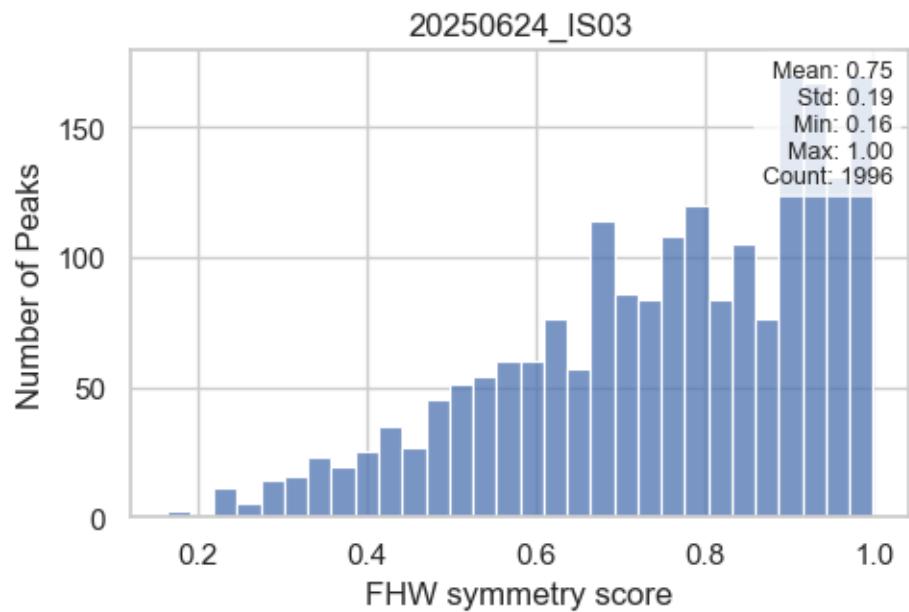
20250624_IS03



1.3.2 Peaks statistics in sequential events

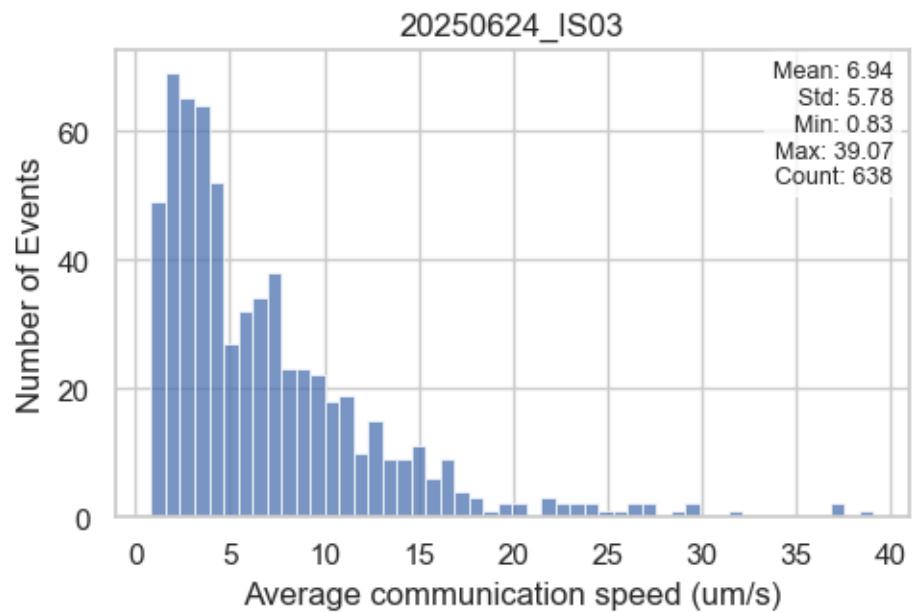


Distribution of Peak Symmetry Scores

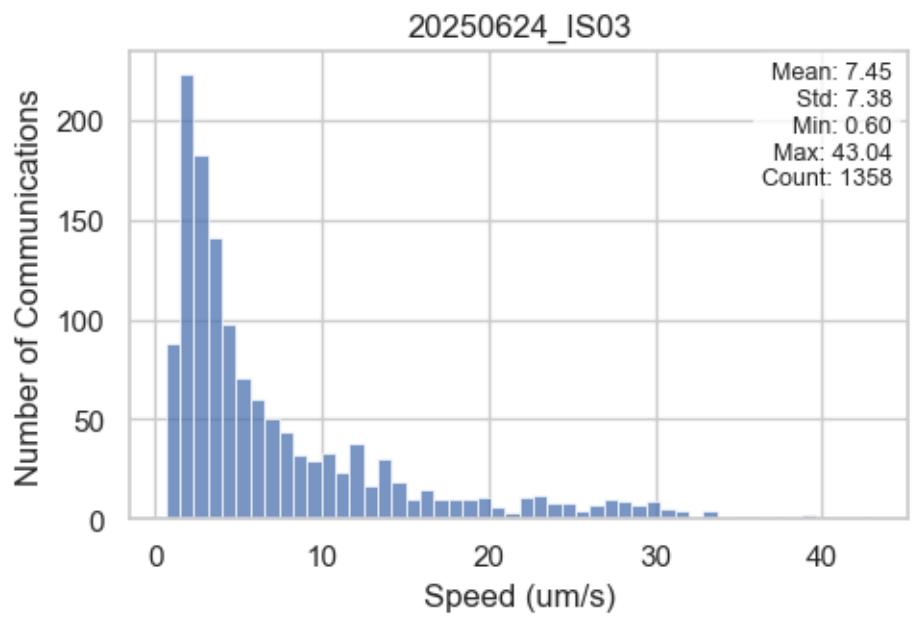


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

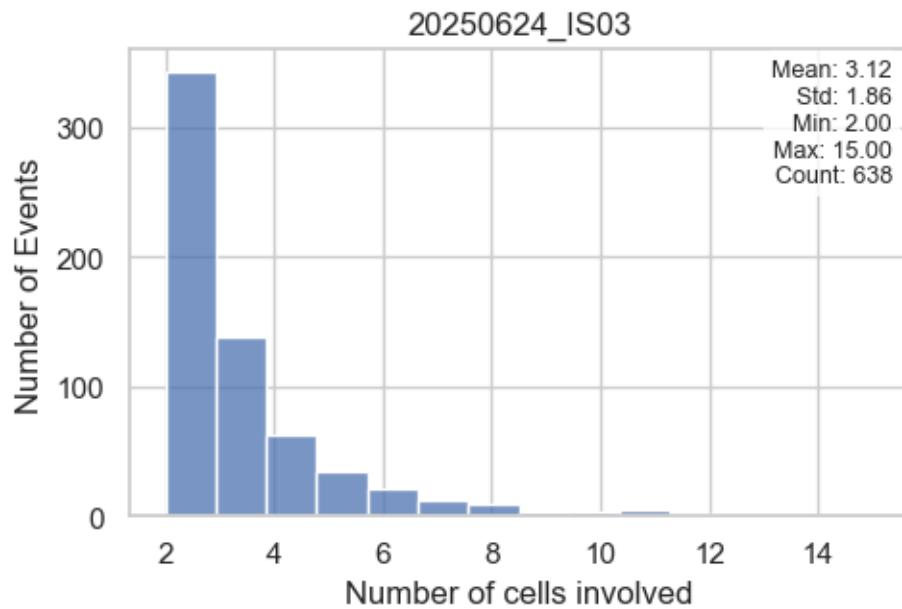


Distribution of Cell-Cell Communication Speeds



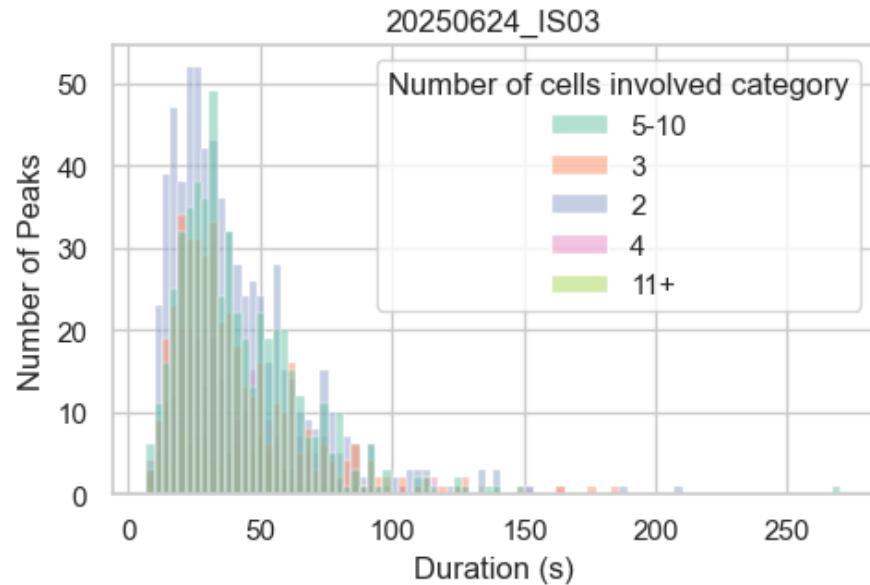
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

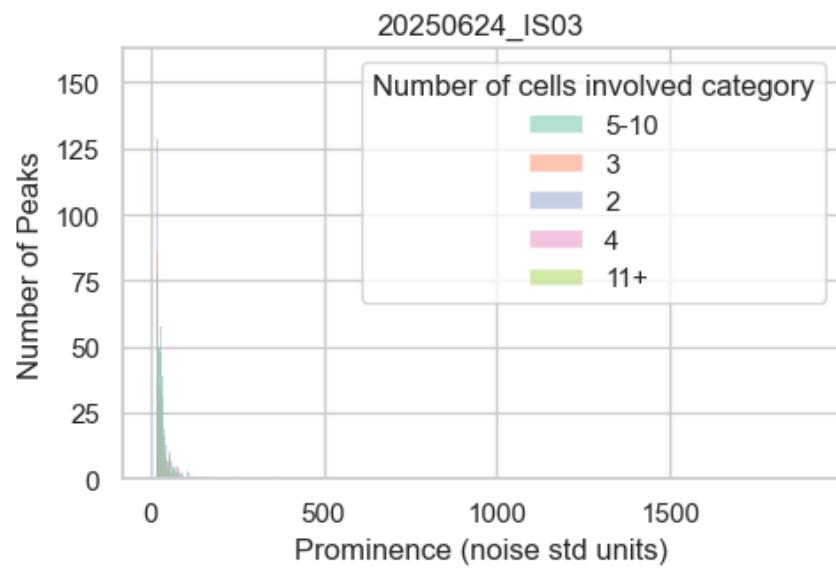


1.3.5 Influence of cell count per event on statistics

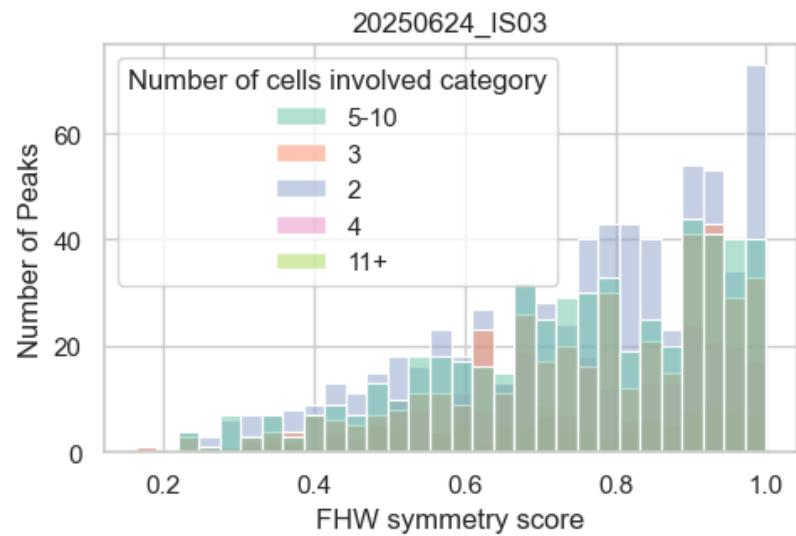
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



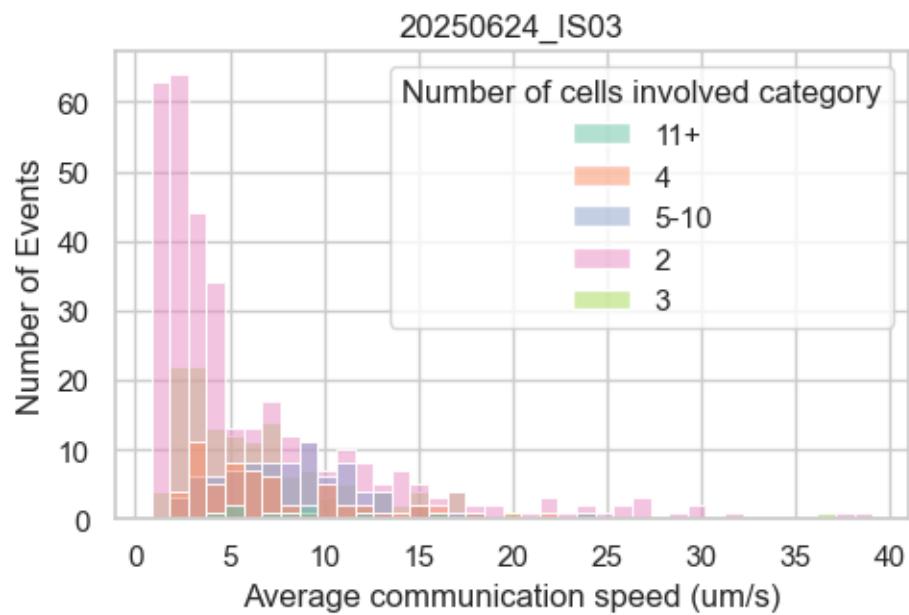
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



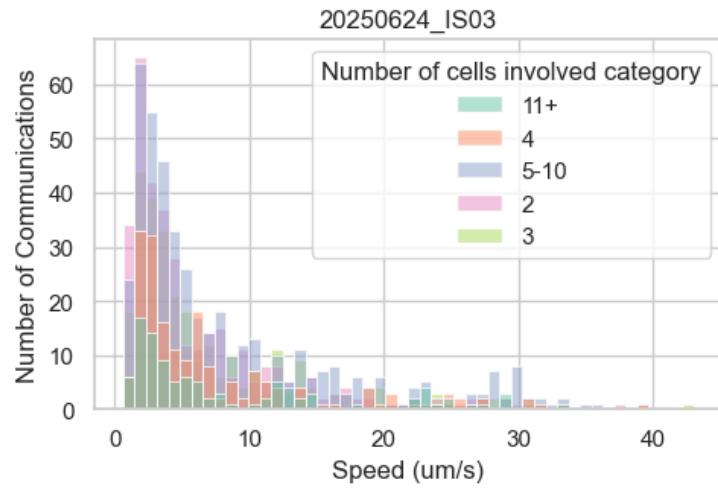
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

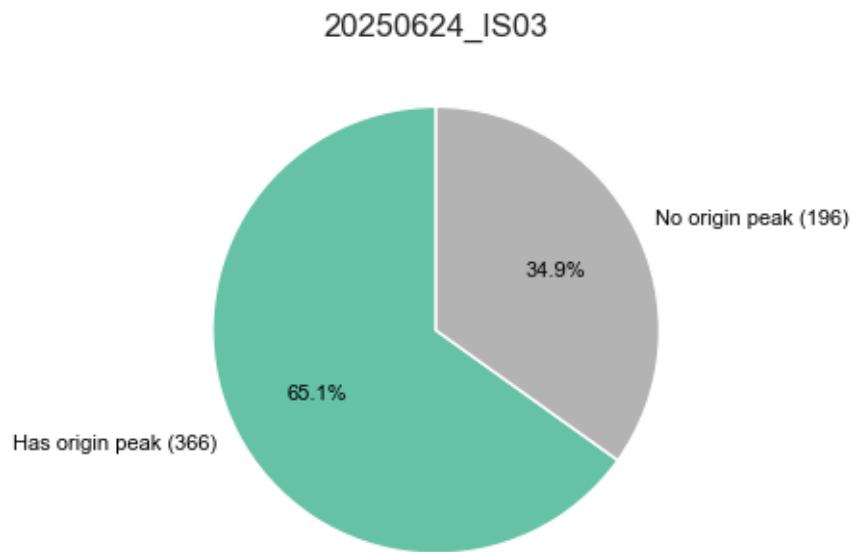


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events

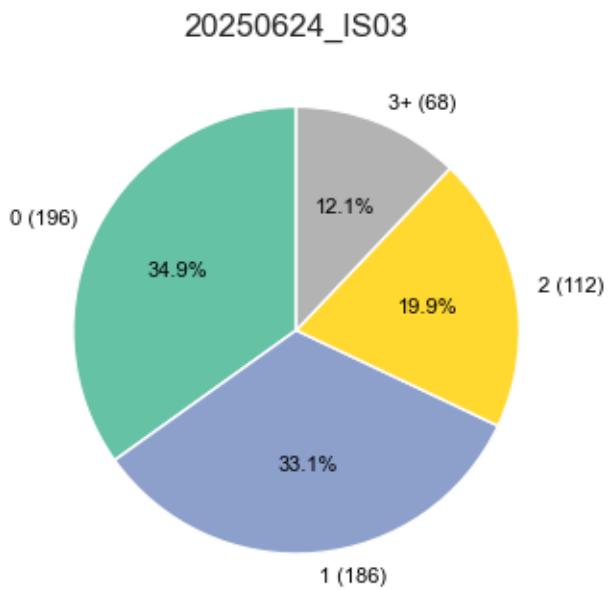


1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell

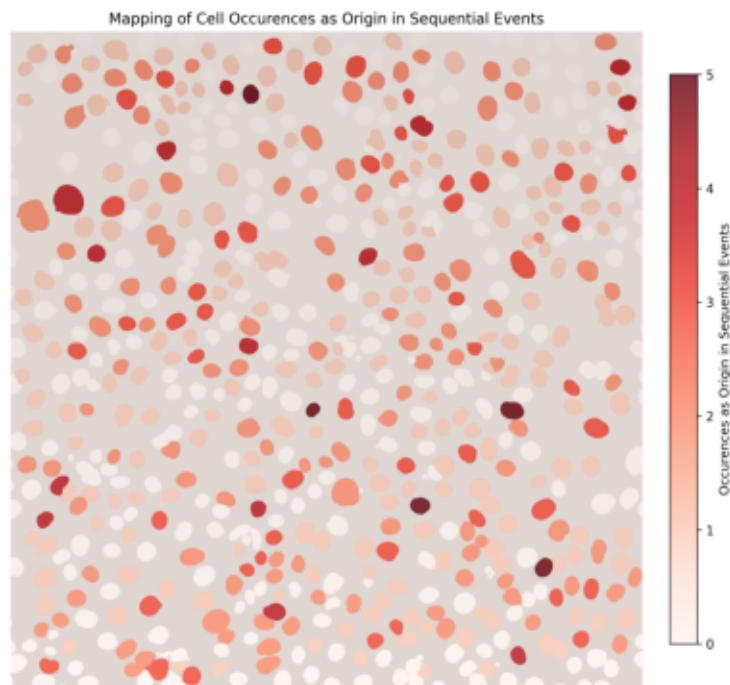


Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)



Cell Mapping with Origin Peaks Overlay

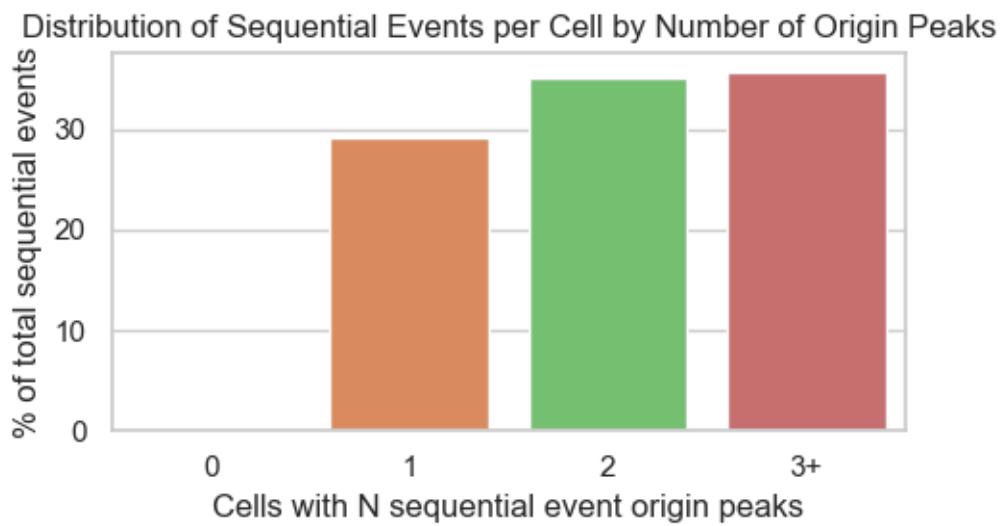
20250624_IS03



C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

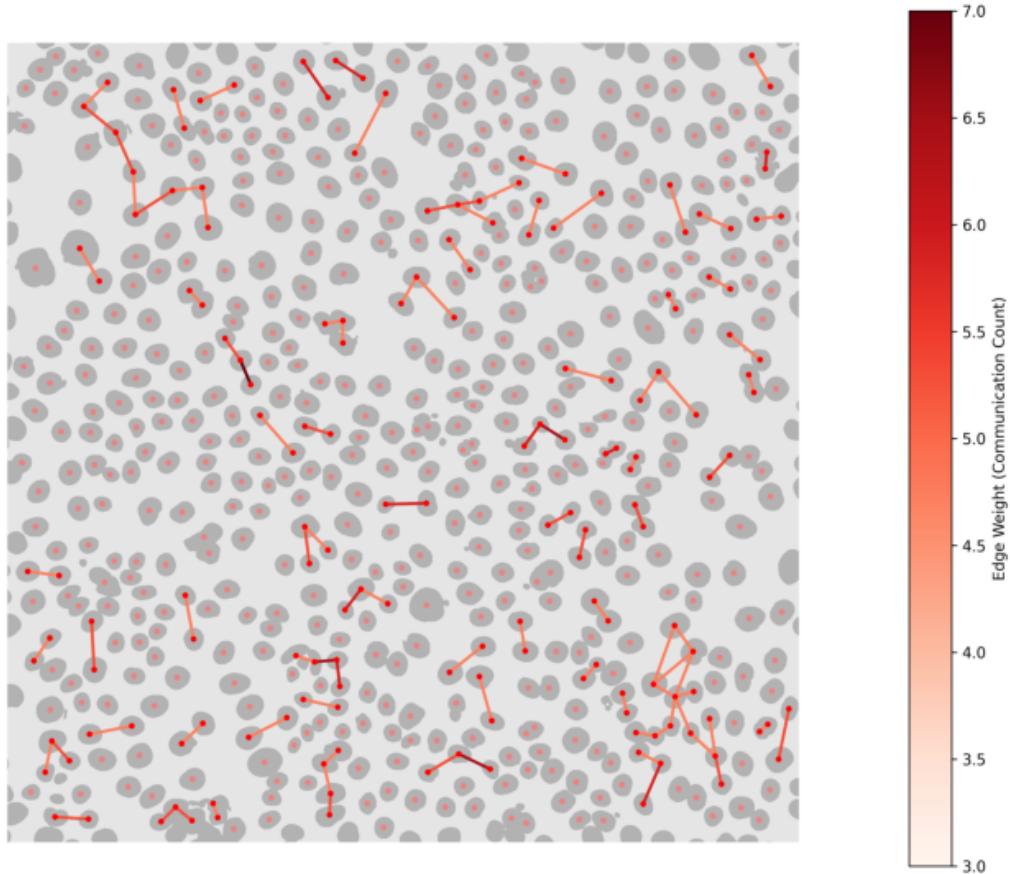


1.3.7 Connection network between cells

Cell Connection Network Graph

20250624_IS03

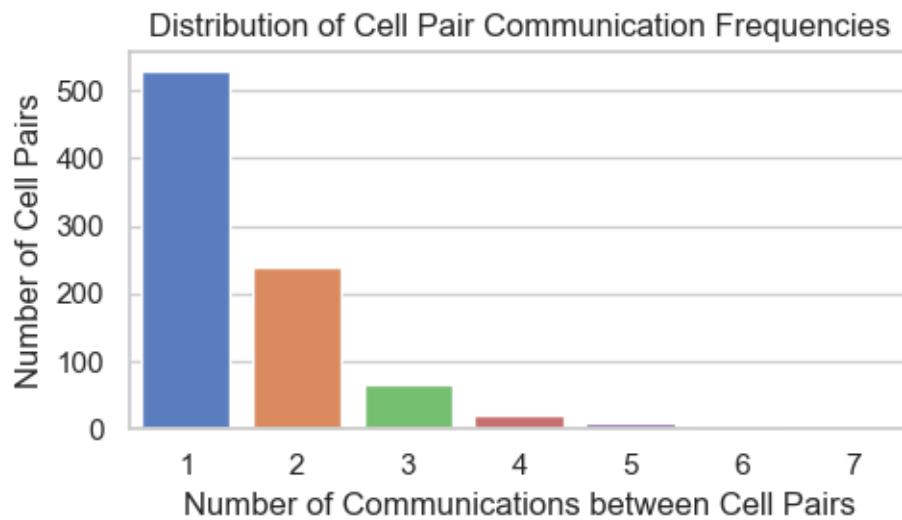
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

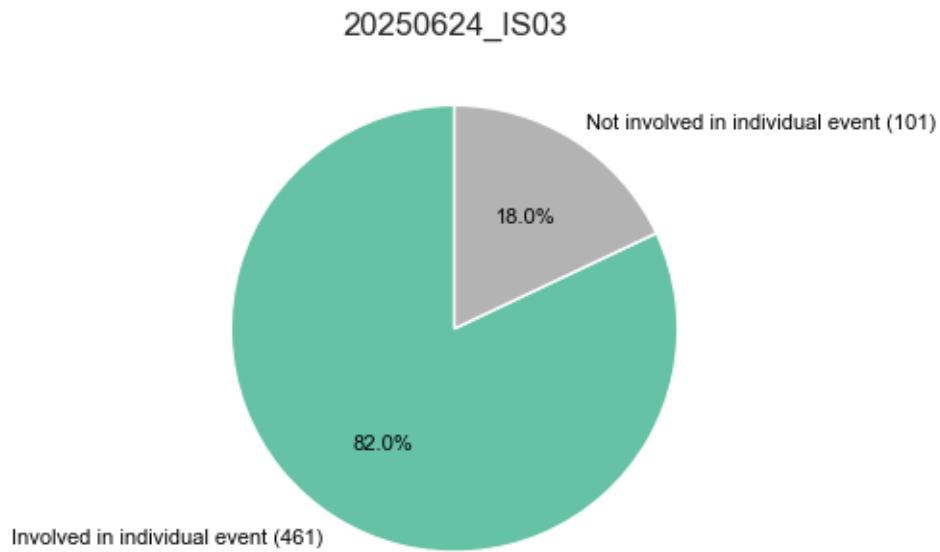
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.4 INDIVIDUAL EVENTS

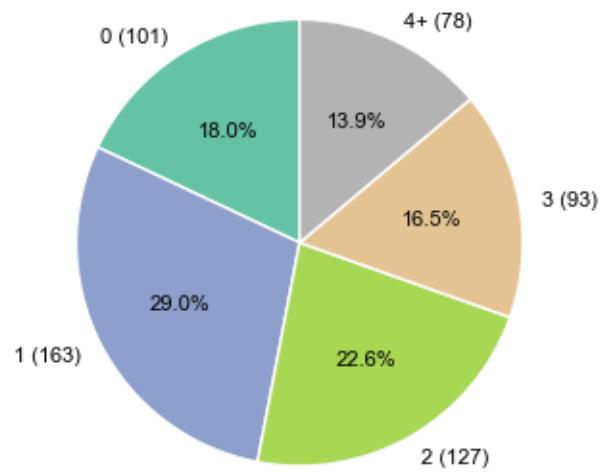
1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events



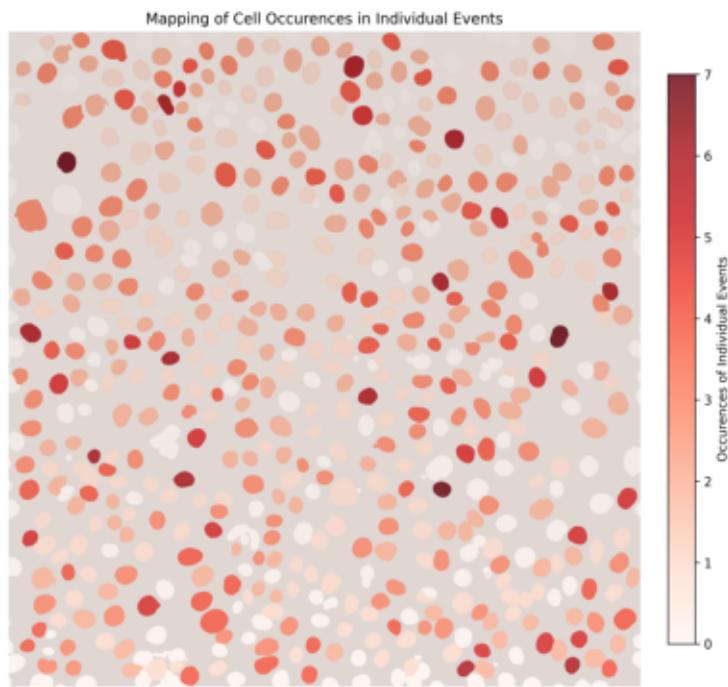
Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)

20250624_IS03



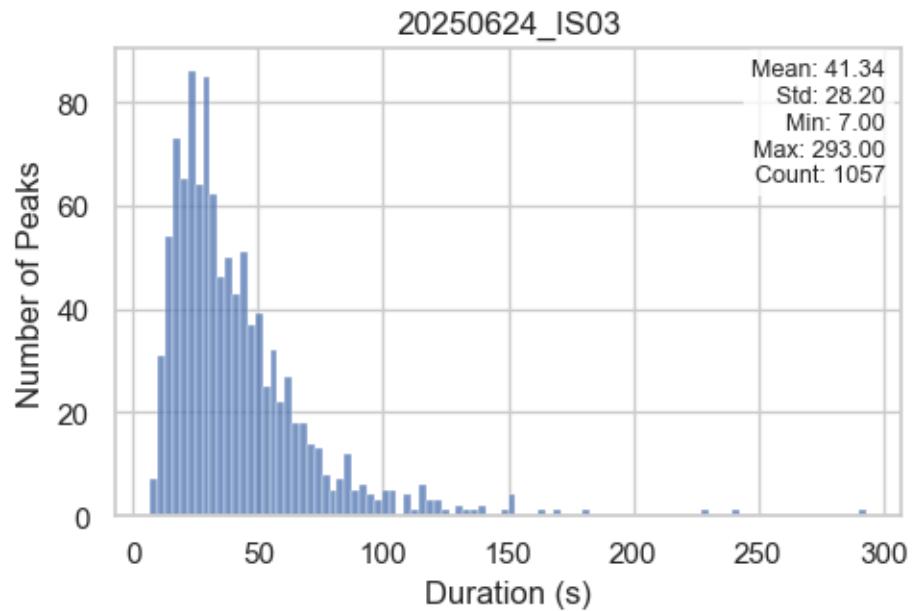
Cell Mapping with Occurrences in Individual Events Overlay

20250624_IS03

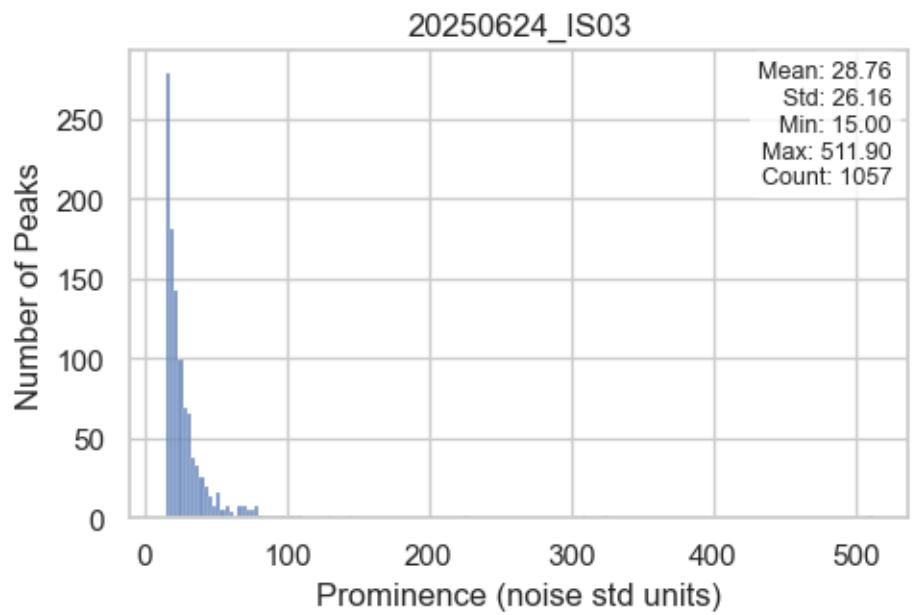


1.4.2 Peaks statistics in individual events

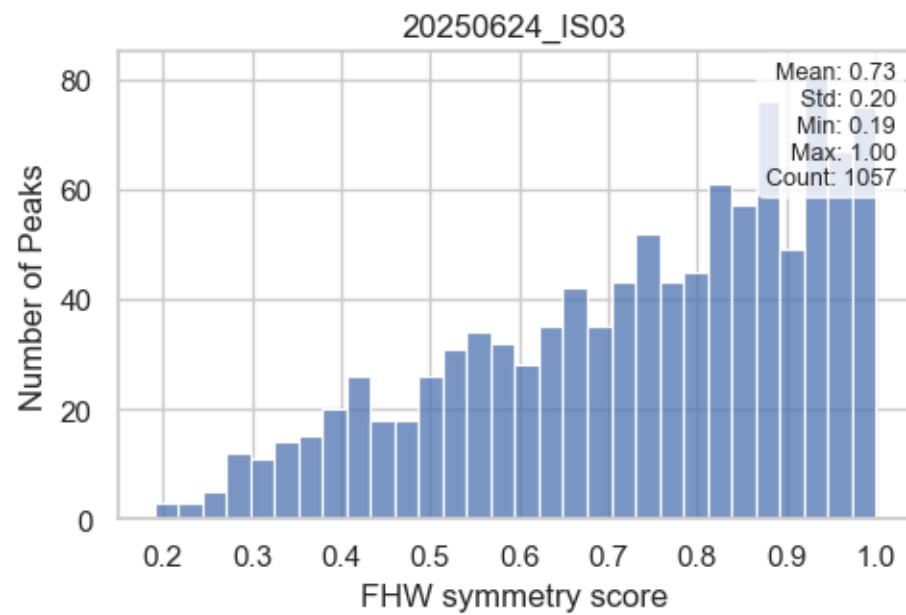
Distribution of Peak Durations



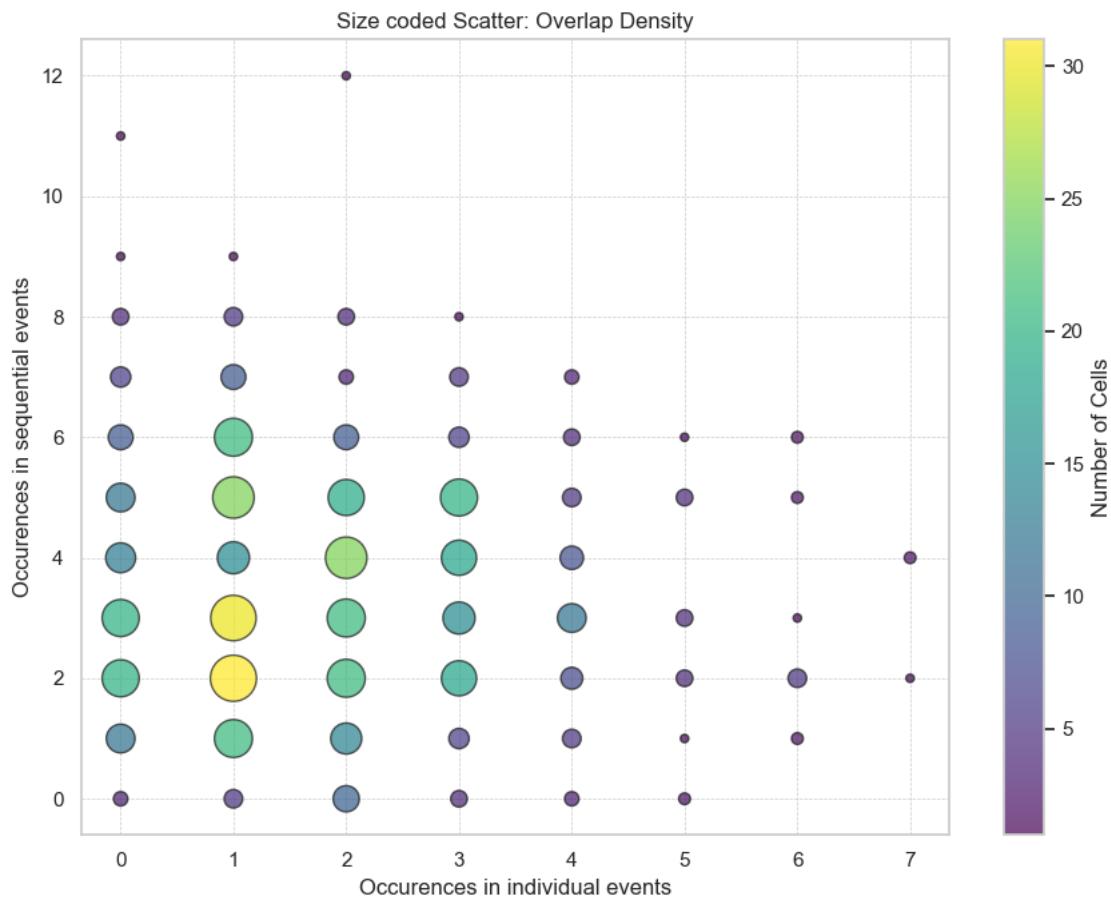
Distribution of Peak Prominences



Distribution of Peak Symmetry Scores

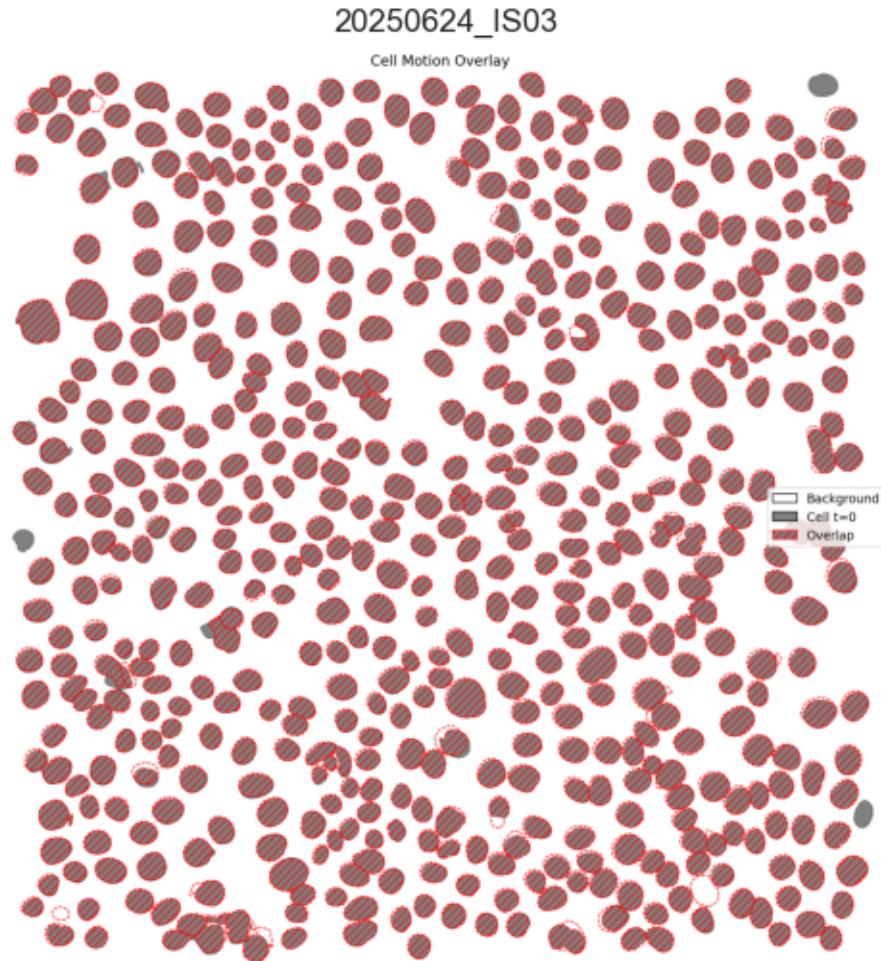


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



Number of cells:

- Hoechst image taken at t=0: 562
- Hoechst image taken at t=1801: 552
- Number of cells difference: absolute 10, relative 1.80%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 780011
- Pixels segmented as cell at t=1801: 787021
- Overlapping pixels between t=0 and t=1801: 725792 (92.63% of total)
- Pixels exclusive to t=0: 54219 (6.95% of total)
- Pixels exclusive to t=1801: 61229 (7.78% of total)

executed

August 6, 2025

1 ANALYSIS OF AN IMAGE SEQUENCE AFTER DATA GENERATION USING THE CALCIUM CHARACTERIZATION PIPELINE

1.0.1 Initialization

```
[2]: '\ncontrol_paths = {\n    "Default Dataset": "/path/to/your/dataset"\n}'
```

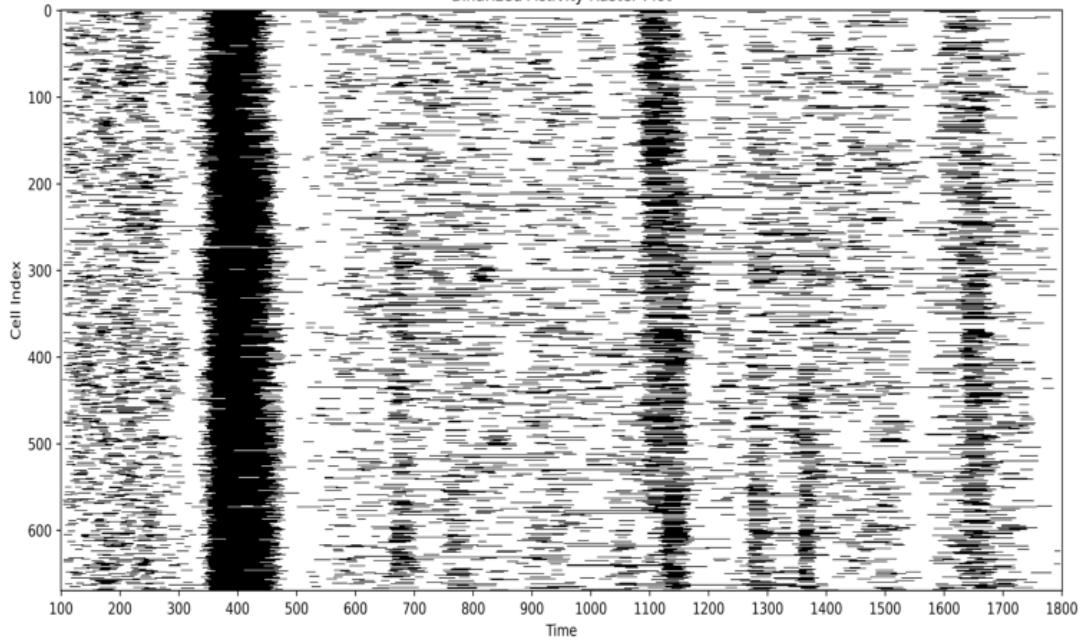
1.1 POPULATION

1.1.1 Binary & Heatmap Raster Plot

Binary Activity Raster Plot

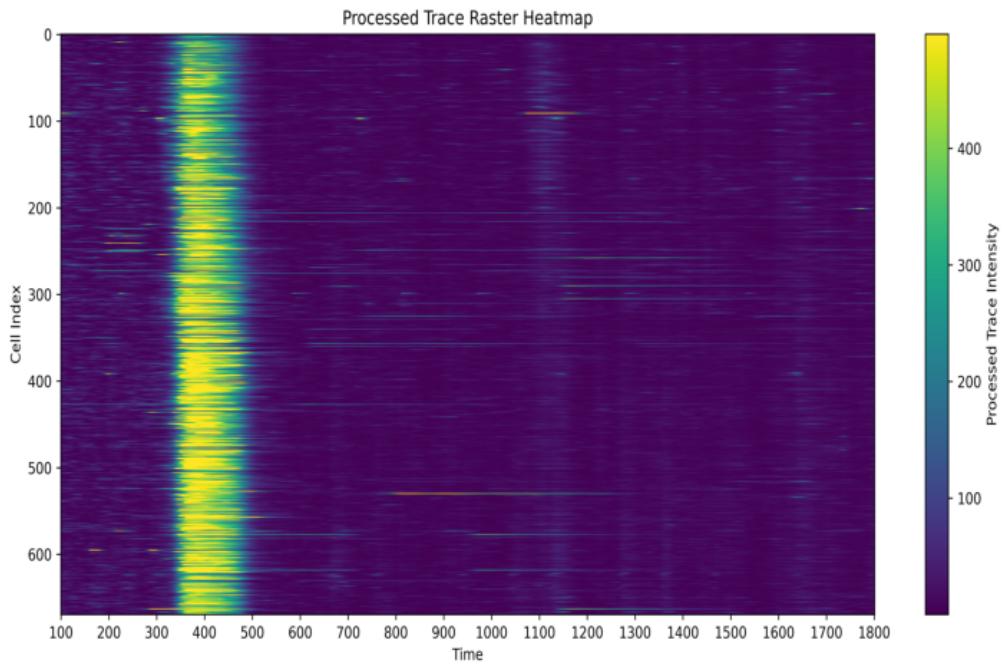
20250701_IS1

Binarized Activity Raster Plot



Heatmap Activity Raster Plot

20250701_IS1



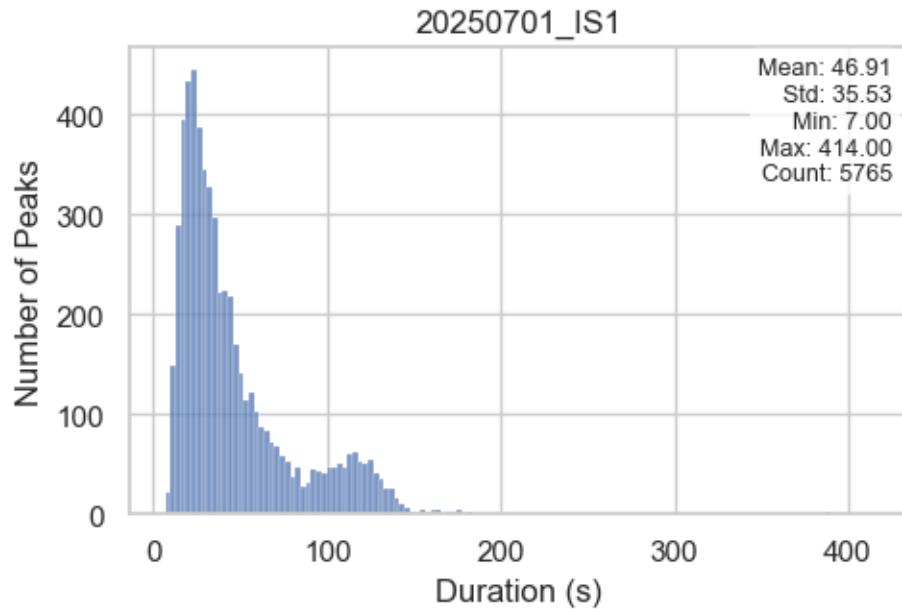
1.1.2 Peaks population

Total number of peaks: 5765

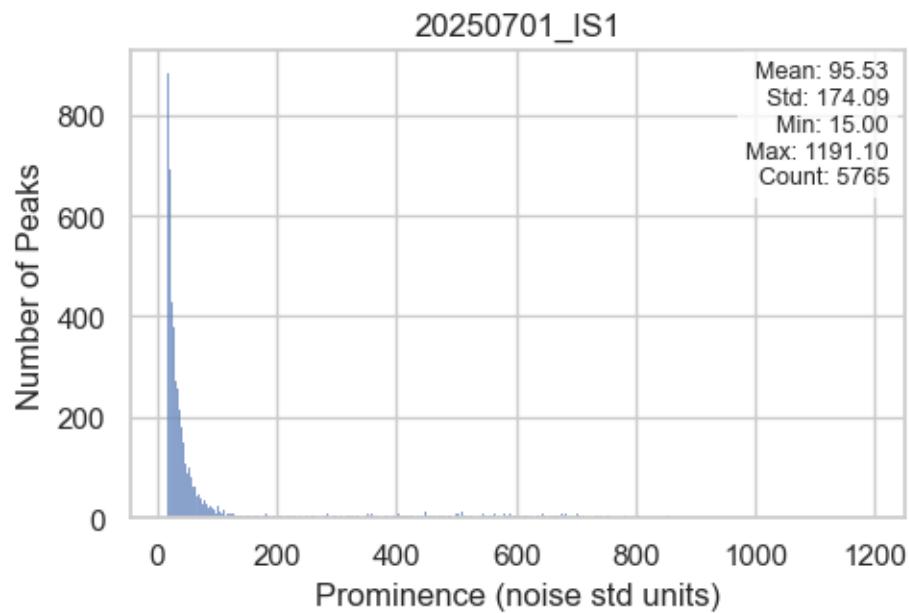
Total number of cells: 670

1.1.3 Peaks statistics

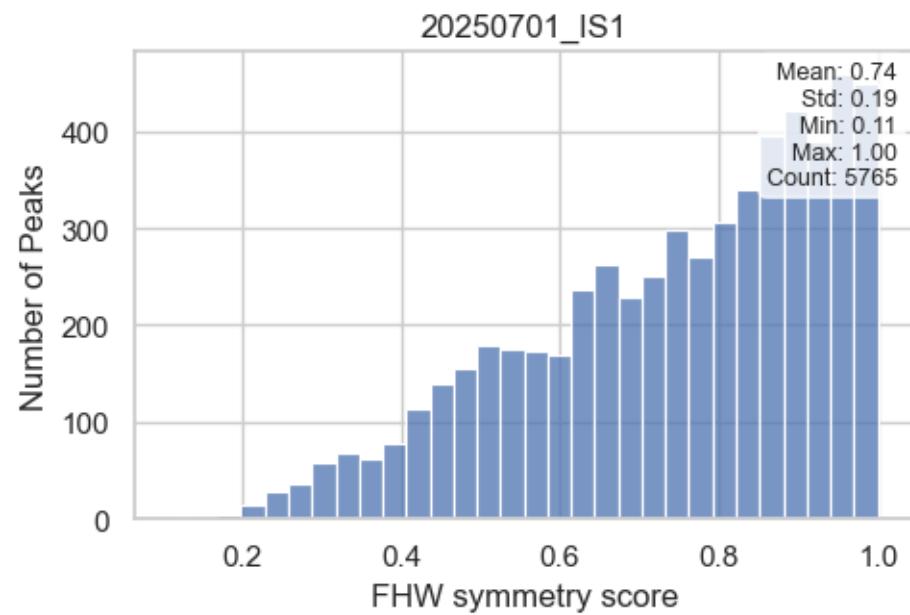
Distribution of Peak Durations



Distribution of Peak Prominences

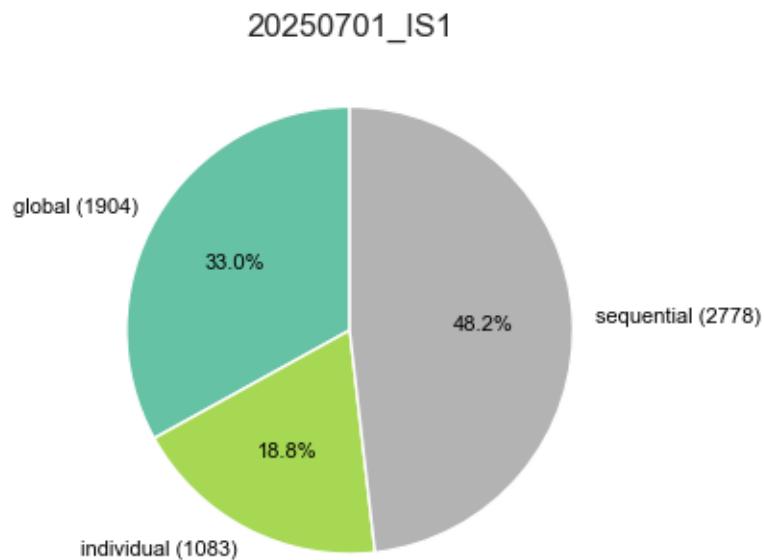


Distribution of Peak Symmetry Scores



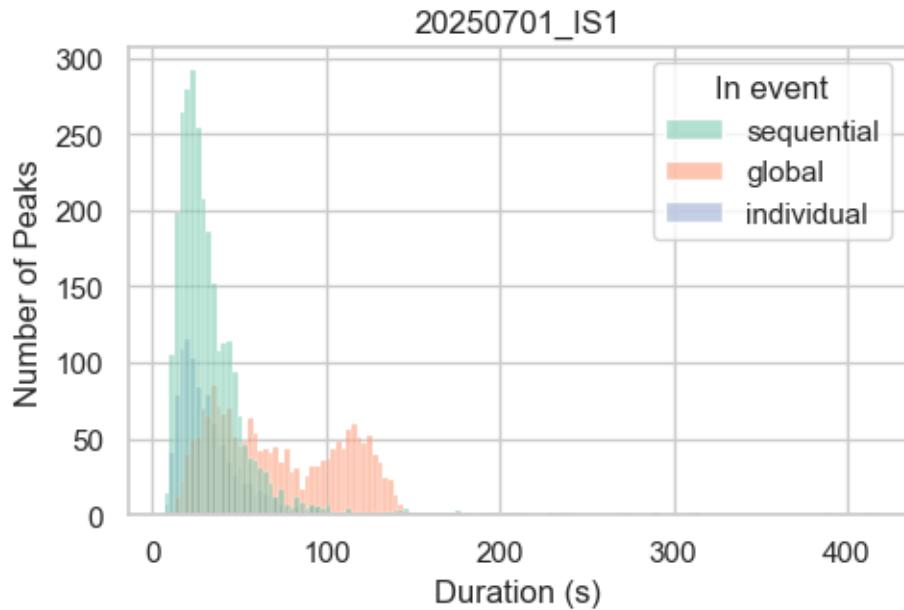
1.1.4 Distribution of peaks per event types

Distribution of Peaks by Event types

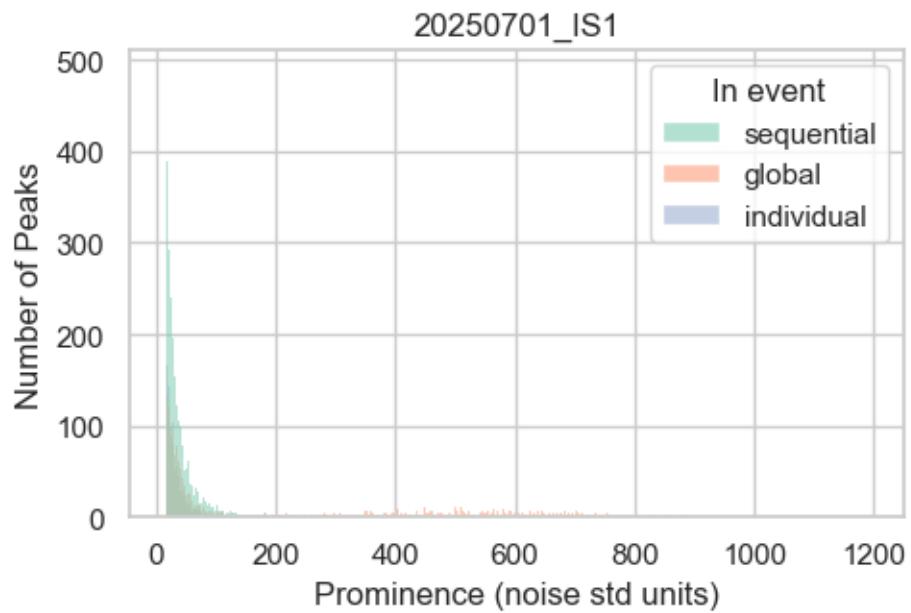


1.1.5 Peaks statistics per event types

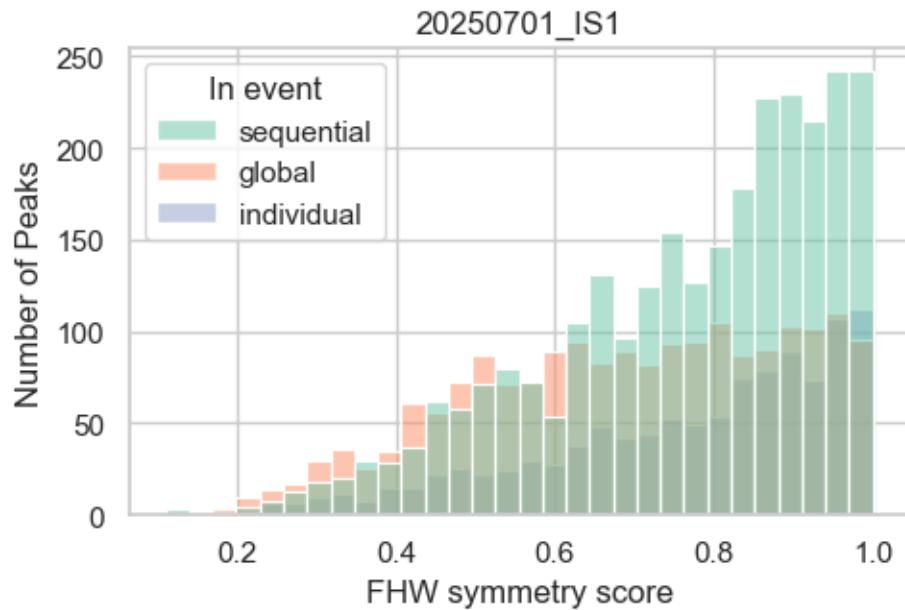
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group

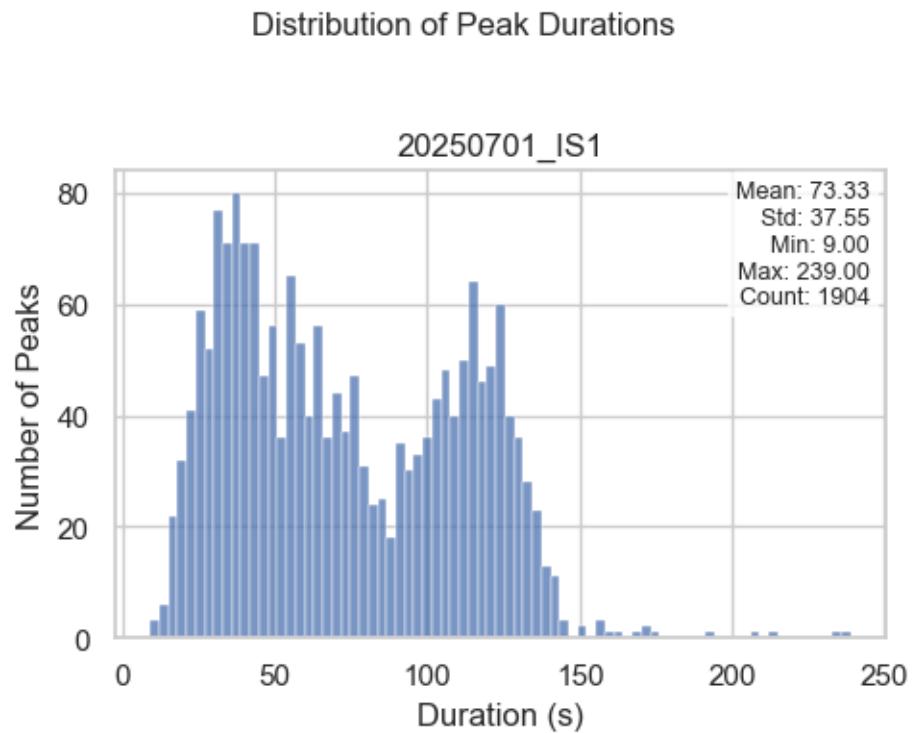


Distribution of Peak Symmetry Scores by Group

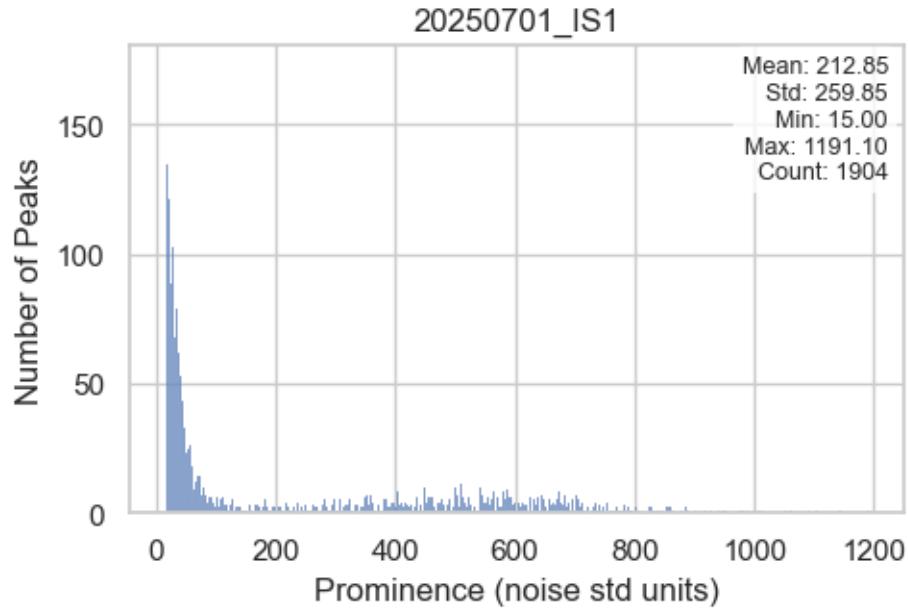


1.2 GLOBAL EVENTS

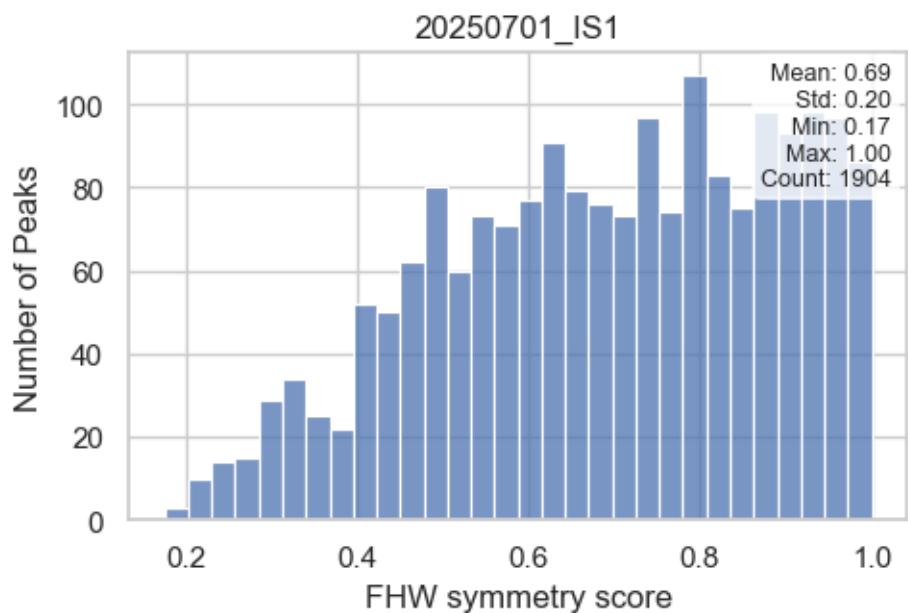
1.2.1 Peak statistics in global events



Distribution of Peak Prominences

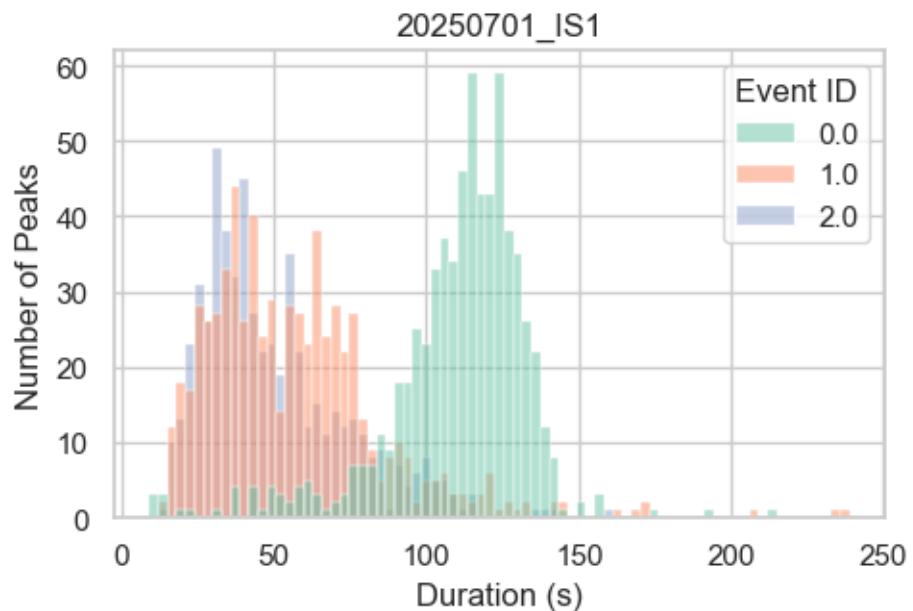


Distribution of Peak Symmetry Scores

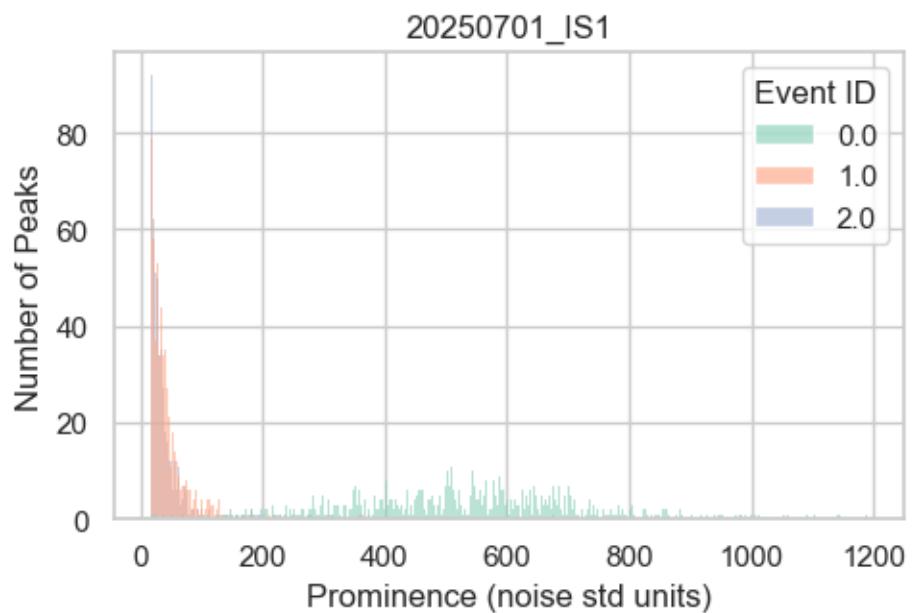


1.2.2 Peak statistics in global event per event ID

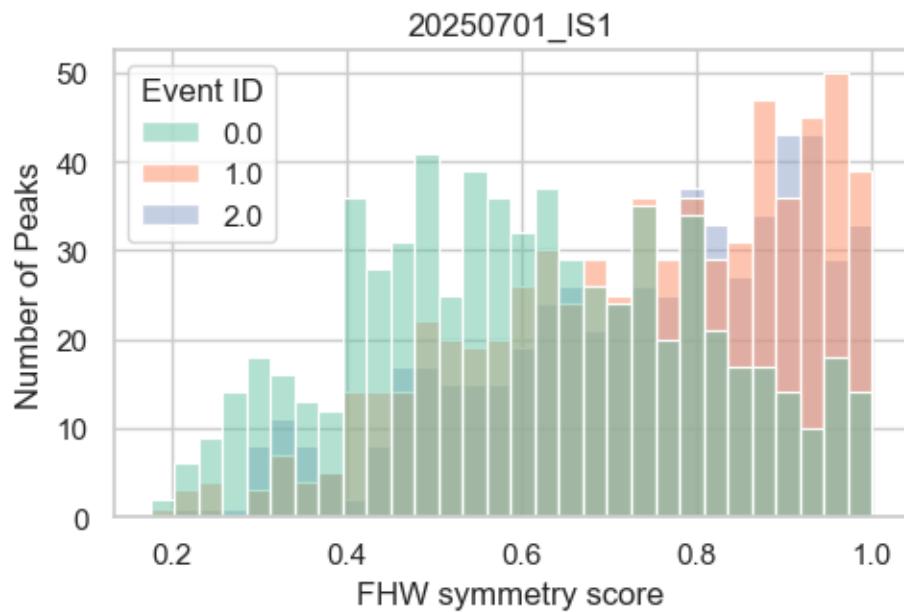
Distribution of Peak Durations by Group



Distribution of Peak Prominences by Group



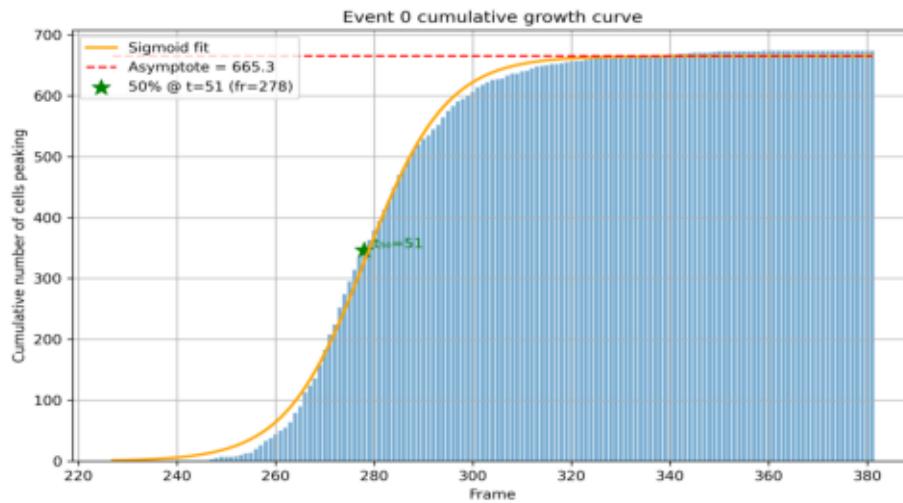
Distribution of Peak Symmetry Scores by Group



1.2.3 Kinetics of global events

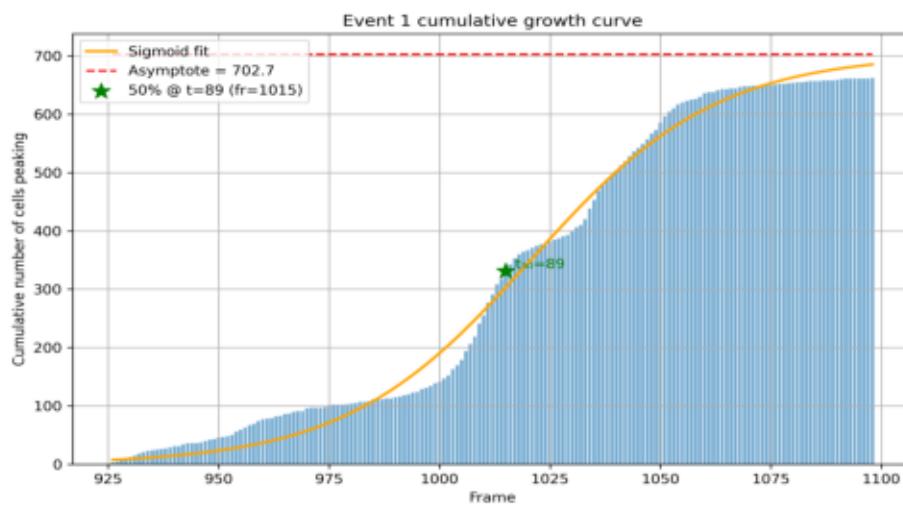
Event Activity Overlay (Event ID: 0)

20250701_IS1



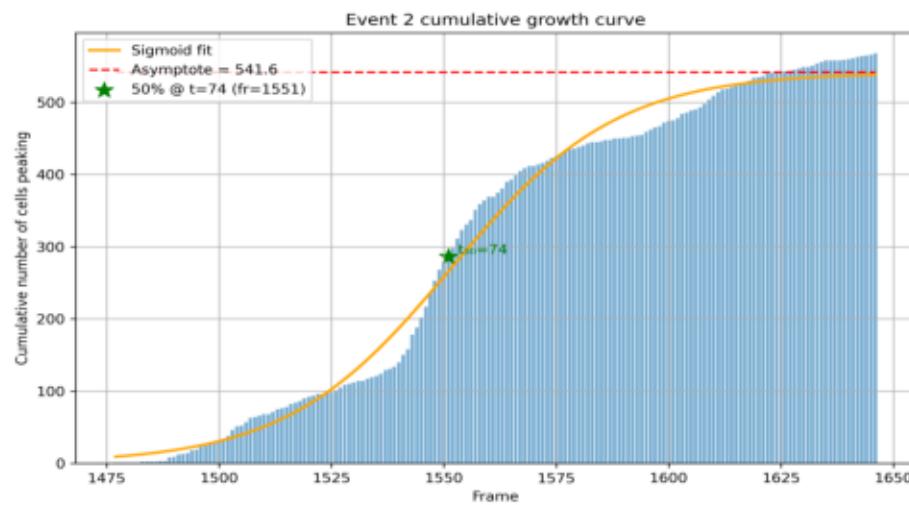
Event Activity Overlay (Event ID: 1)

20250701_IS1



Event Activity Overlay (Event ID: 2)

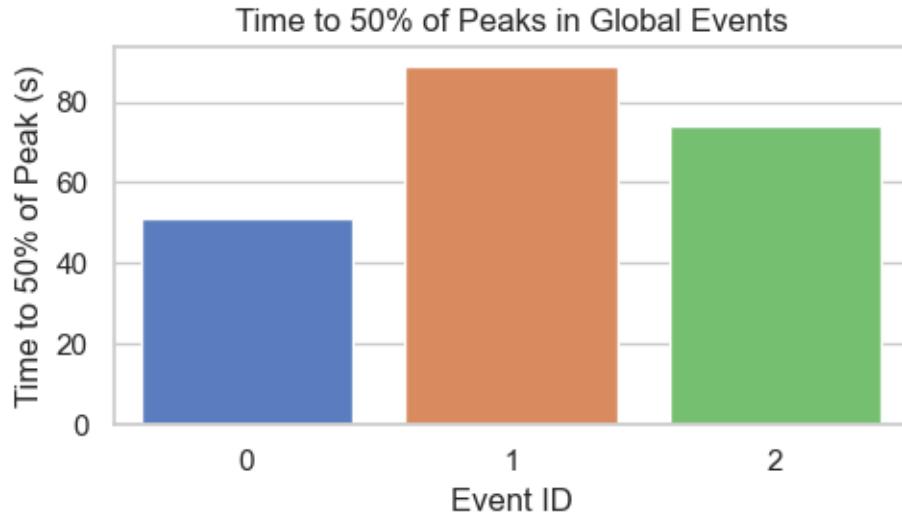
20250701_IS1



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analyses\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.
```

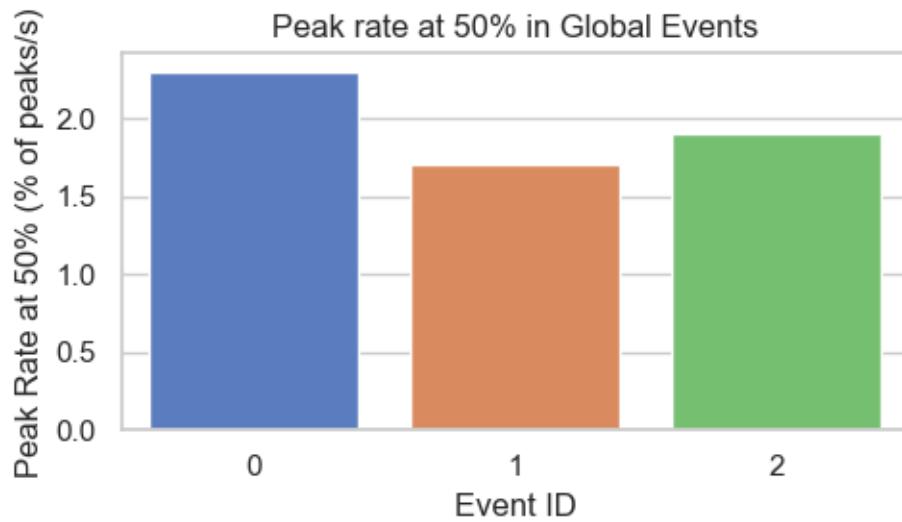
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column, dodge=False, palette=palette, legend=False)
```



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys
is\visualizers.py:257: FutureWarning:
```

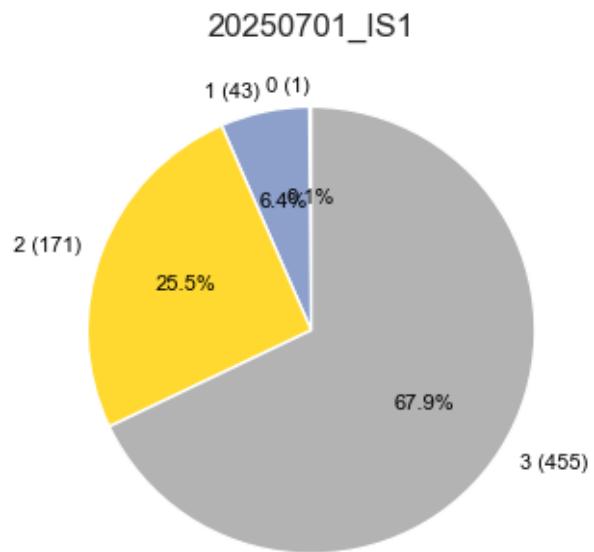
Passing `palette` without assigning `hue` is deprecated and will be removed in v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effect.

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,
dodge=False, palette=palette, legend=False)
```



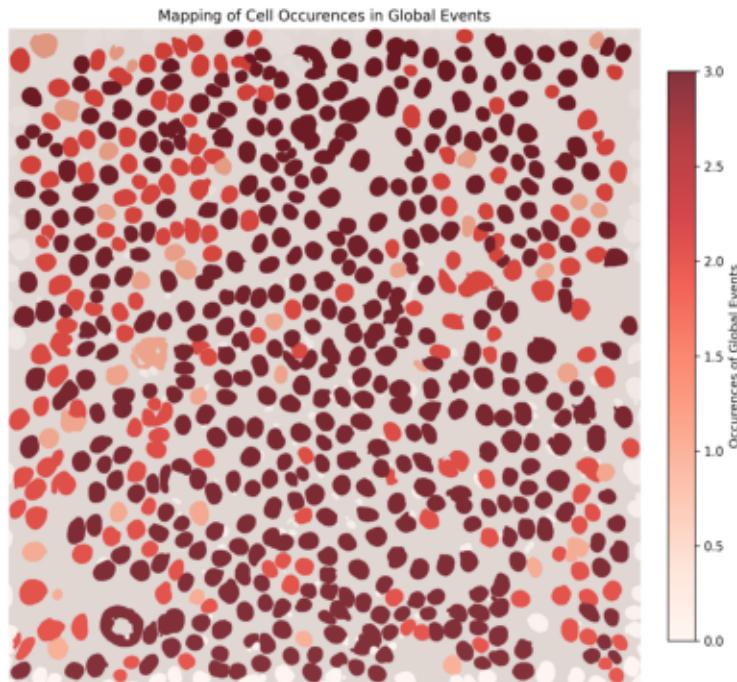
1.2.4 Cells occurrences in global events

Distribution of Unique Global Events per Cell



Cell Mapping with Occurrences in Global Events Overlay

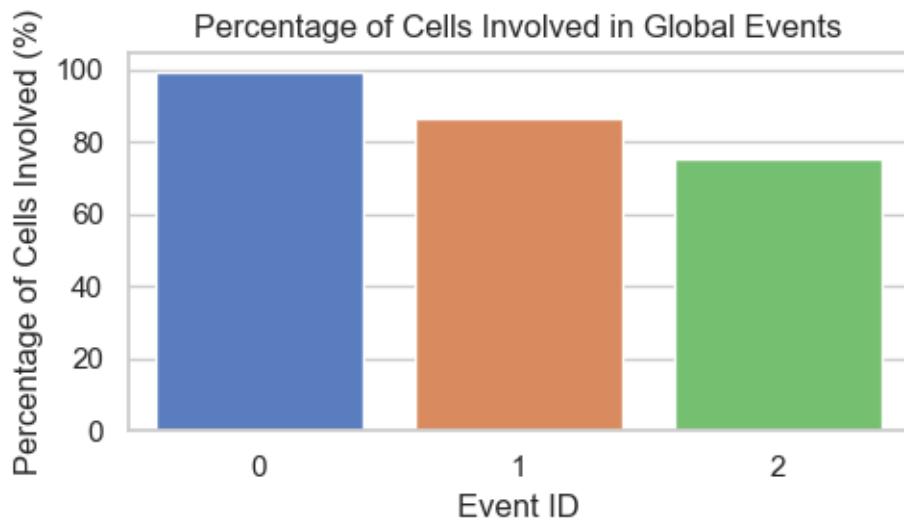
20250701_IS1



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



1.2.5 Inter-event interval analysis

Intervals between global event peaks: [744.0, 523.0]

Estimated periodicity: 0.851

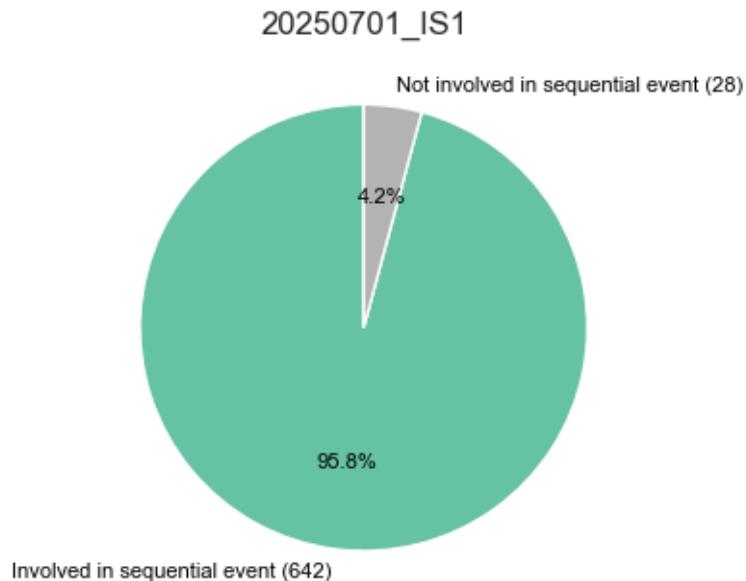
The global events exhibit a regular periodic pattern.

Estimated frequency (1/mean interval): 0.002 Hz

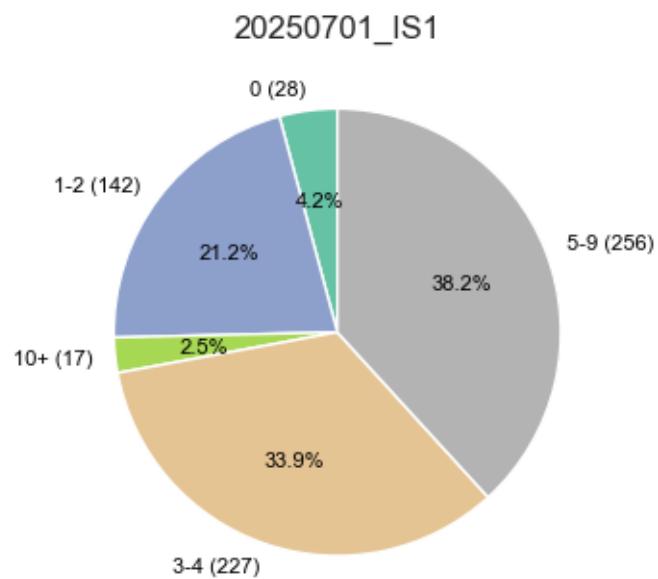
1.3 SEQUENTIAL EVENTS

1.3.1 Cells occurrences in sequencial events

Distribution of Cells Involved in Sequential Events

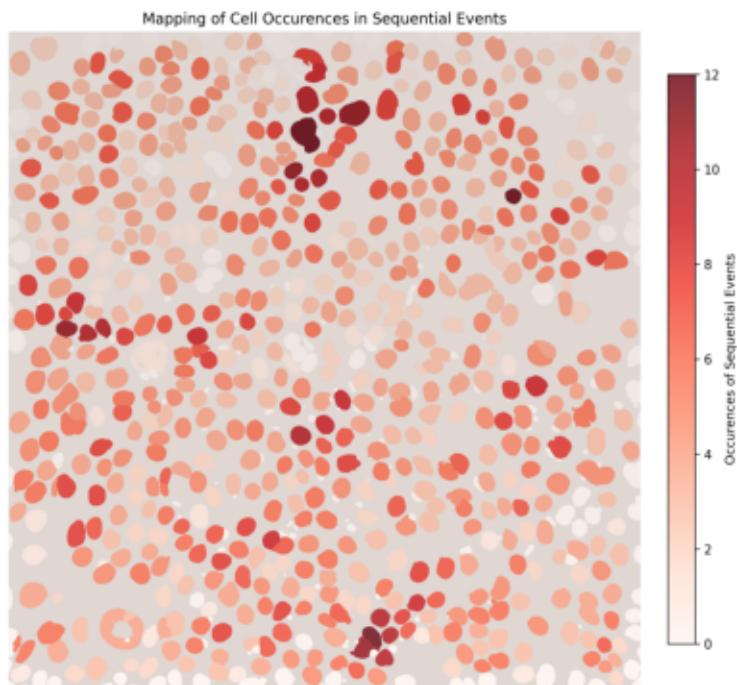


Distribution of Sequential Event Occurrences per Cell (0, 1-2, 3-4, 5-9, 10+)

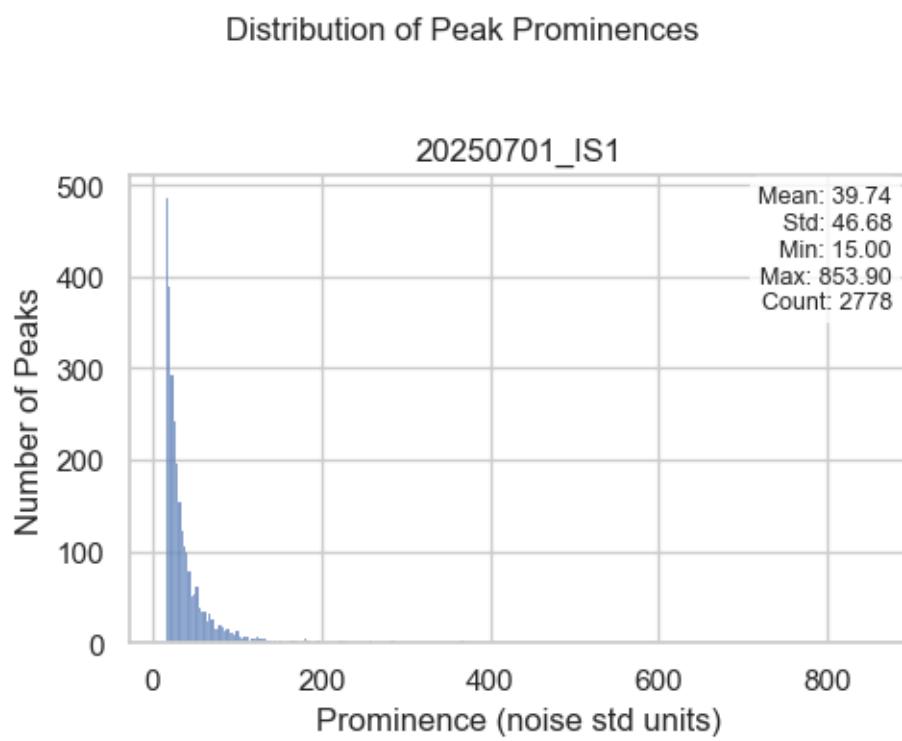
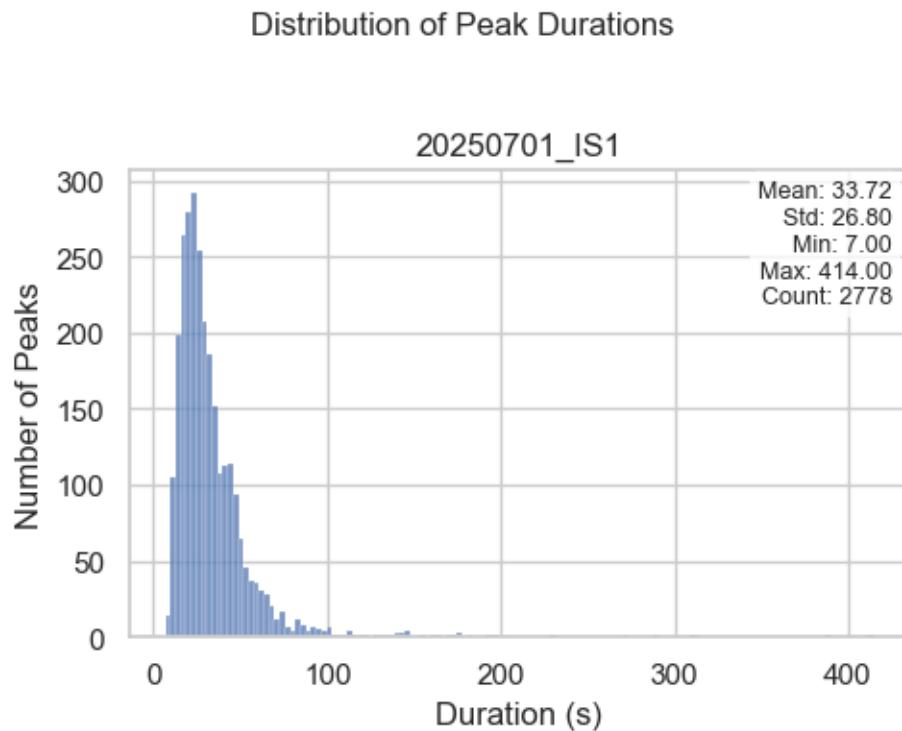


Cell Mapping with Occurrences in Sequential Events Overlay

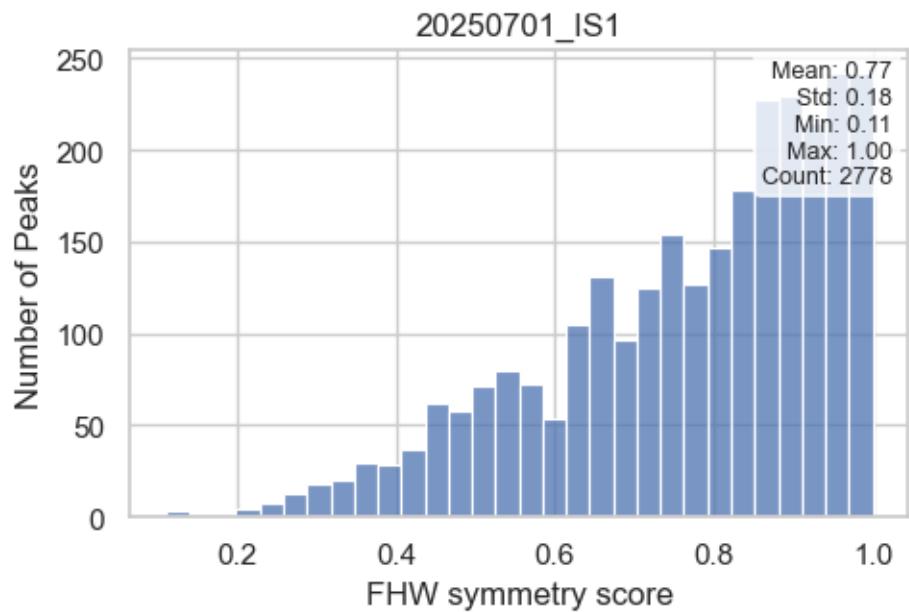
20250701_IS1



1.3.2 Peaks statistics in sequential events

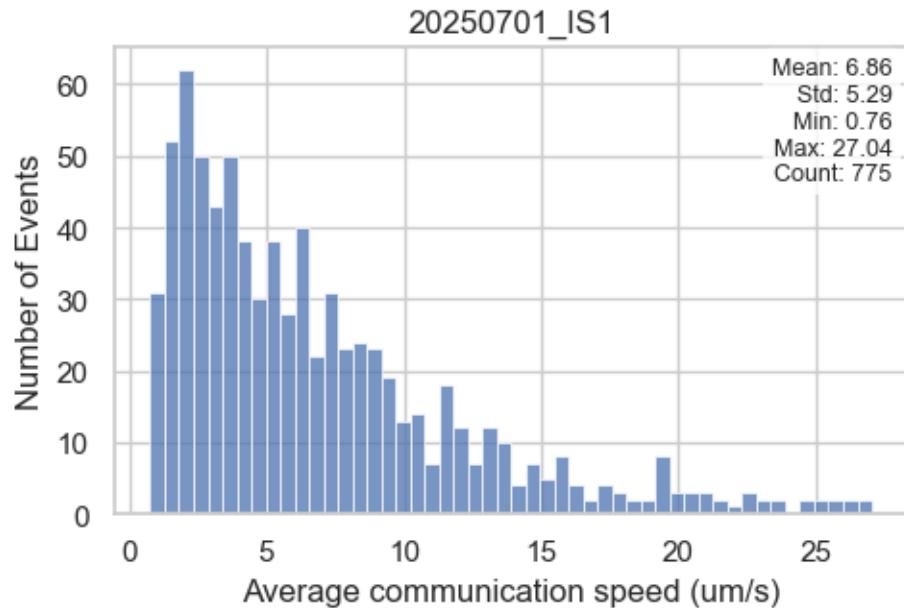


Distribution of Peak Symmetry Scores

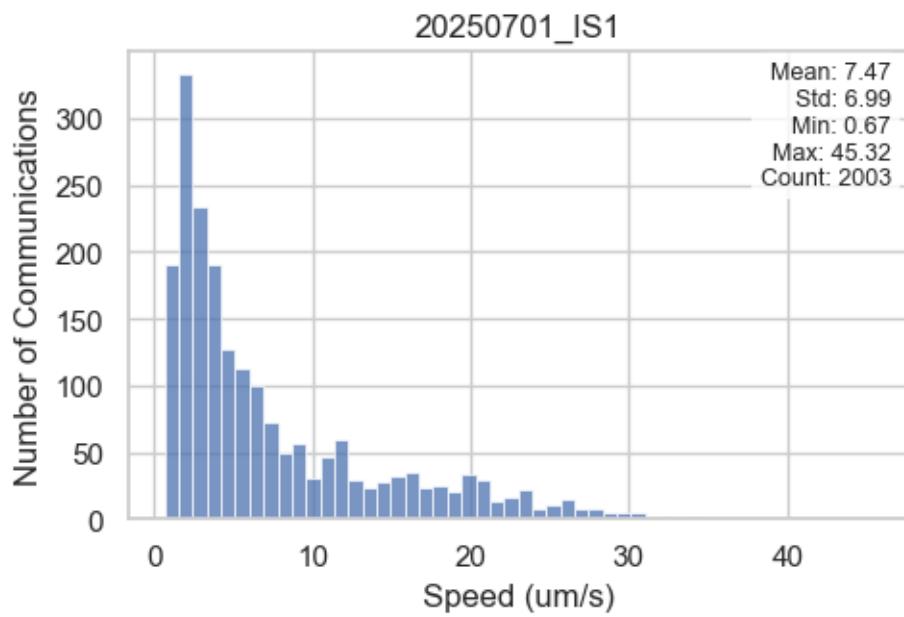


1.3.3 Cell-cell communication speed

Distribution of Average Communication Speeds in Sequential Events

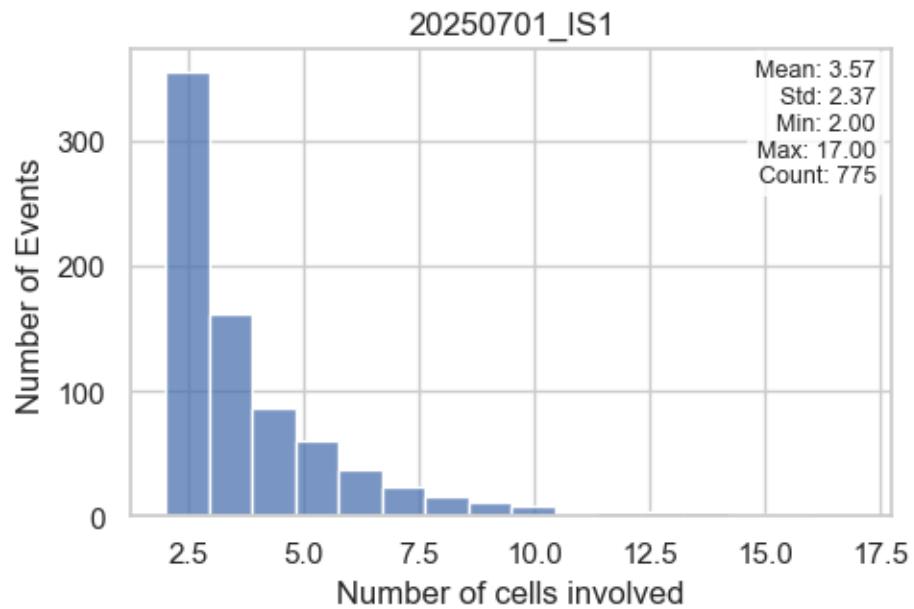


Distribution of Cell-Cell Communication Speeds



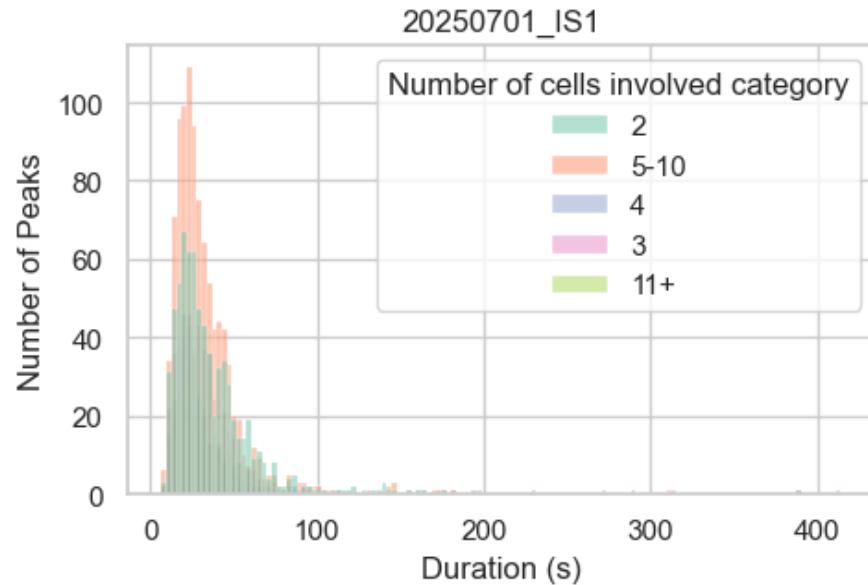
1.3.4 Number of cells involved per sequential events

Distribution of Number of Cells Involved in Sequential Events

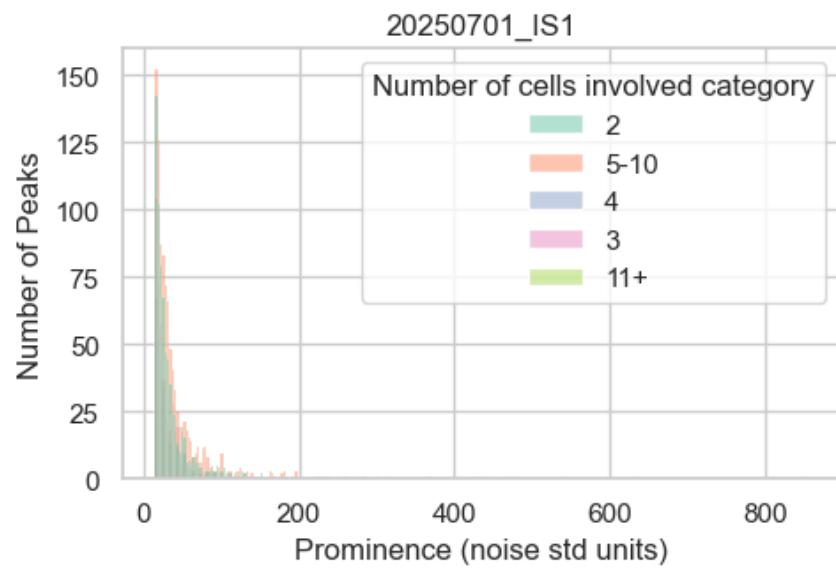


1.3.5 Influence of cell count per event on statistics

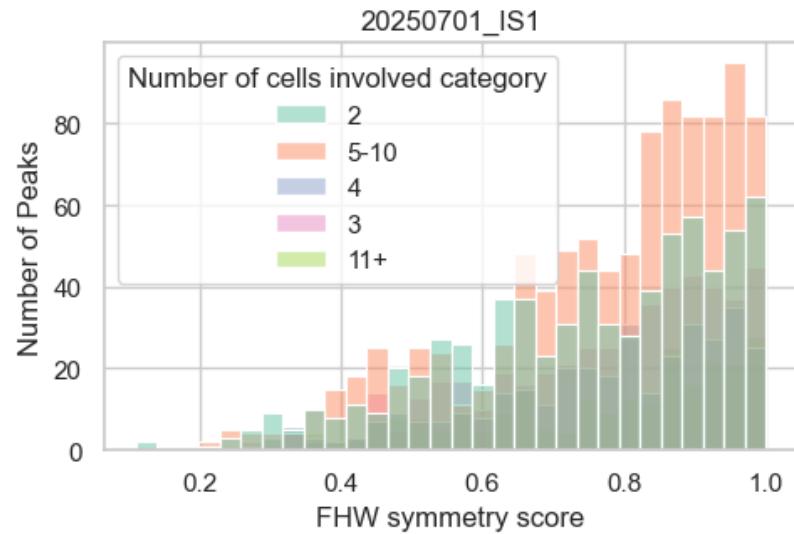
Distribution of Peak Durations by Number of Cells Involved in Sequential Events



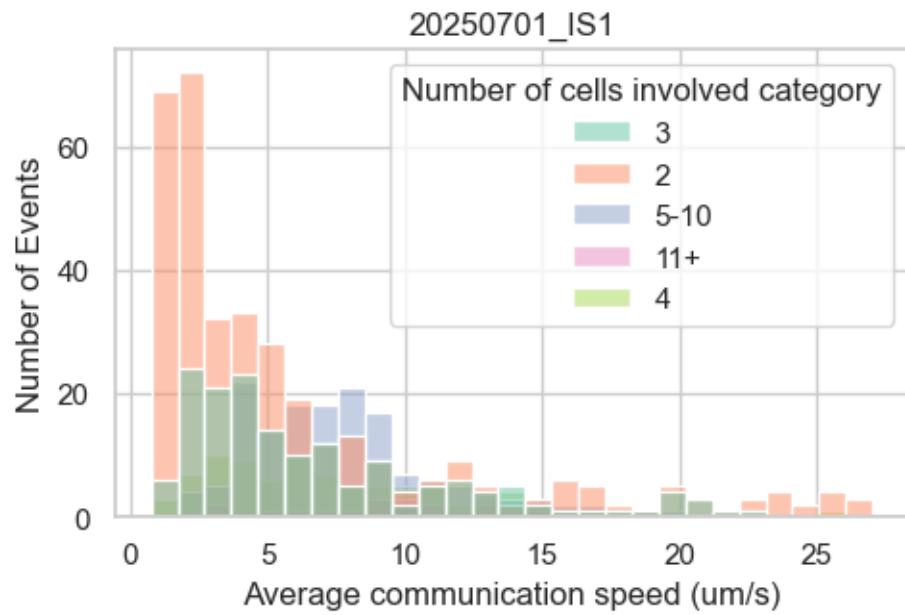
Distribution of Peak Prominences by Number of Cells Involved in Sequential Events



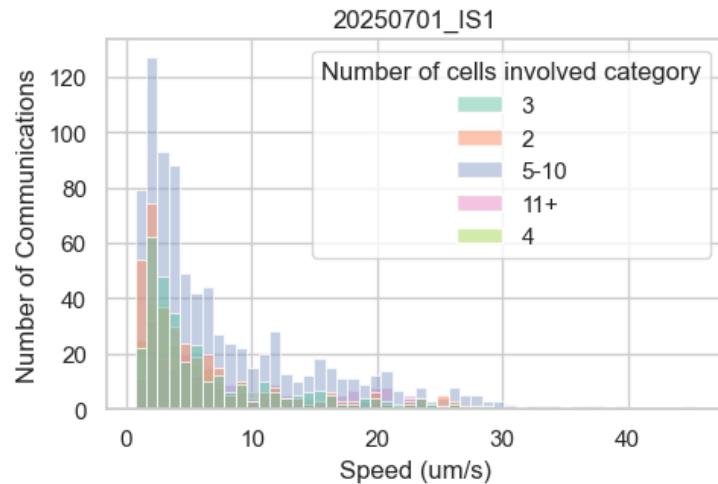
Distribution of Peak Symmetry Scores by Number of Cells Involved in Sequential Events



Distribution of Average Communication Speeds by Number of Cells Involved

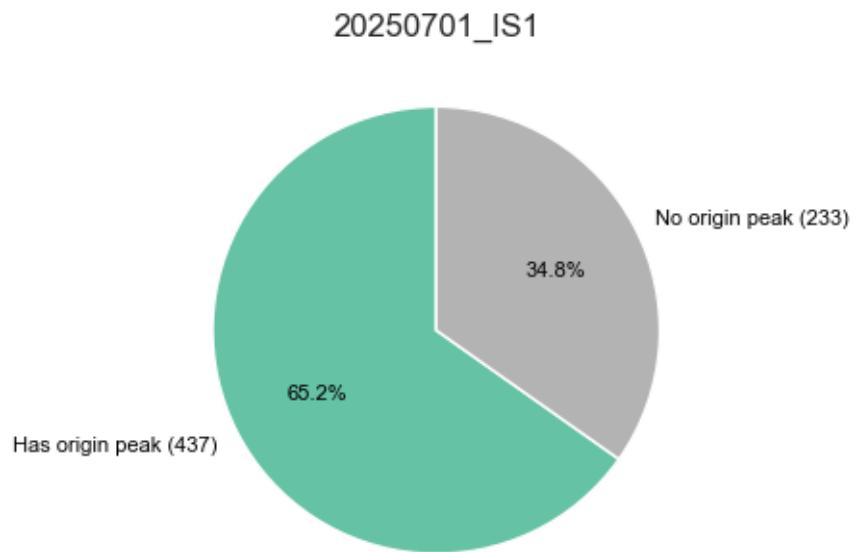


Distribution of Cell-Cell Communication Speeds by Number of Cells Involved in Sequential Events



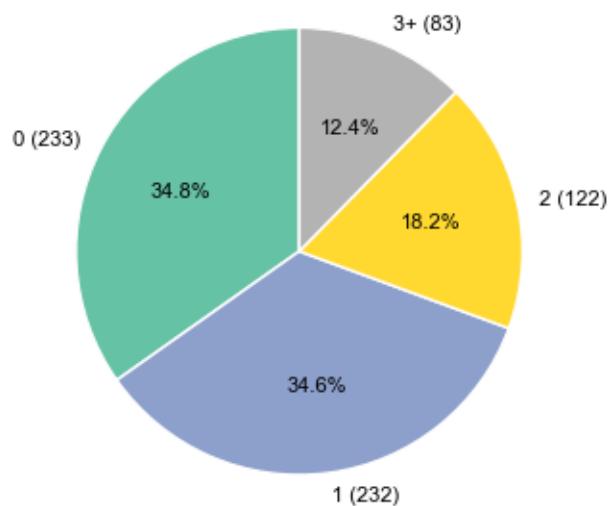
1.3.6 Cells occurrences as origin in sequential events

Distribution of Number of Sequential Event Origin Peaks per Cell



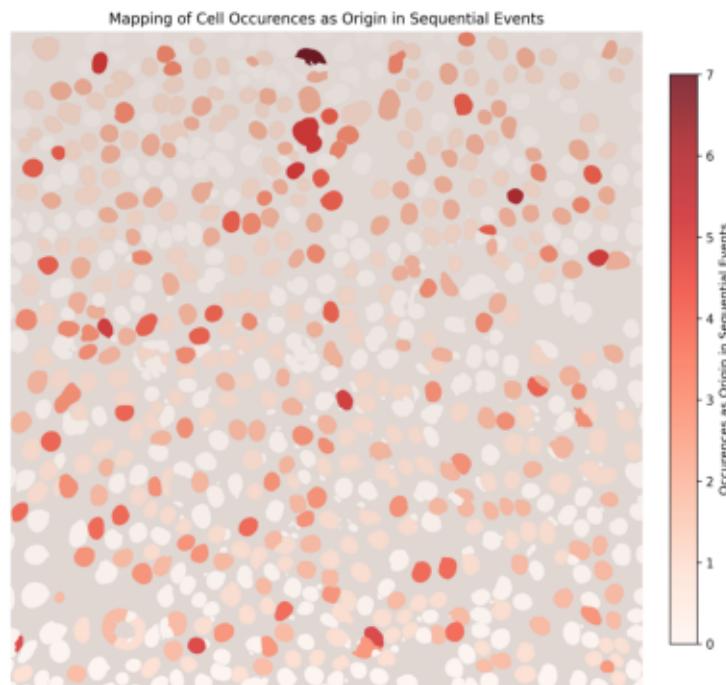
Distribution of Sequential Event Origin Peaks per Cell (0, 1, 2, 3+)

20250701_IS1



Cell Mapping with Origin Peaks Overlay

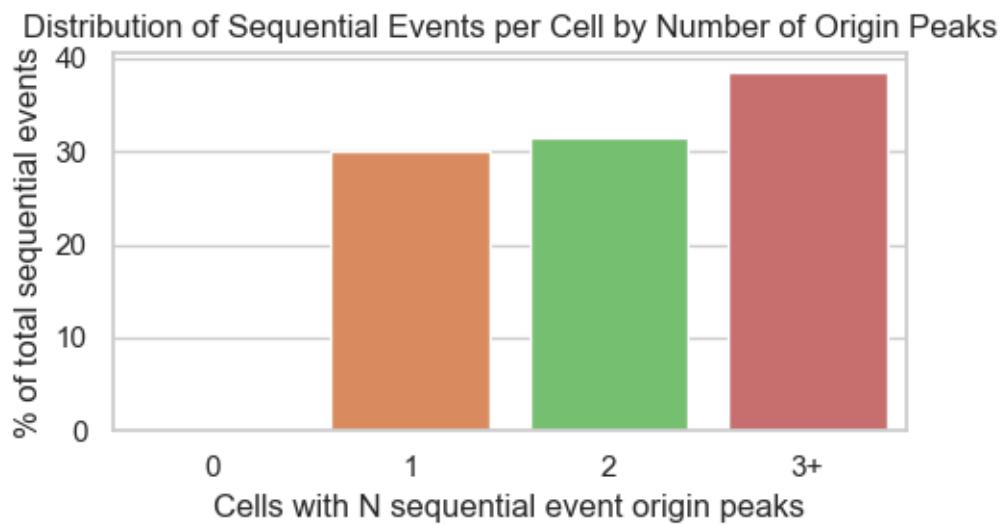
20250701_IS1



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```

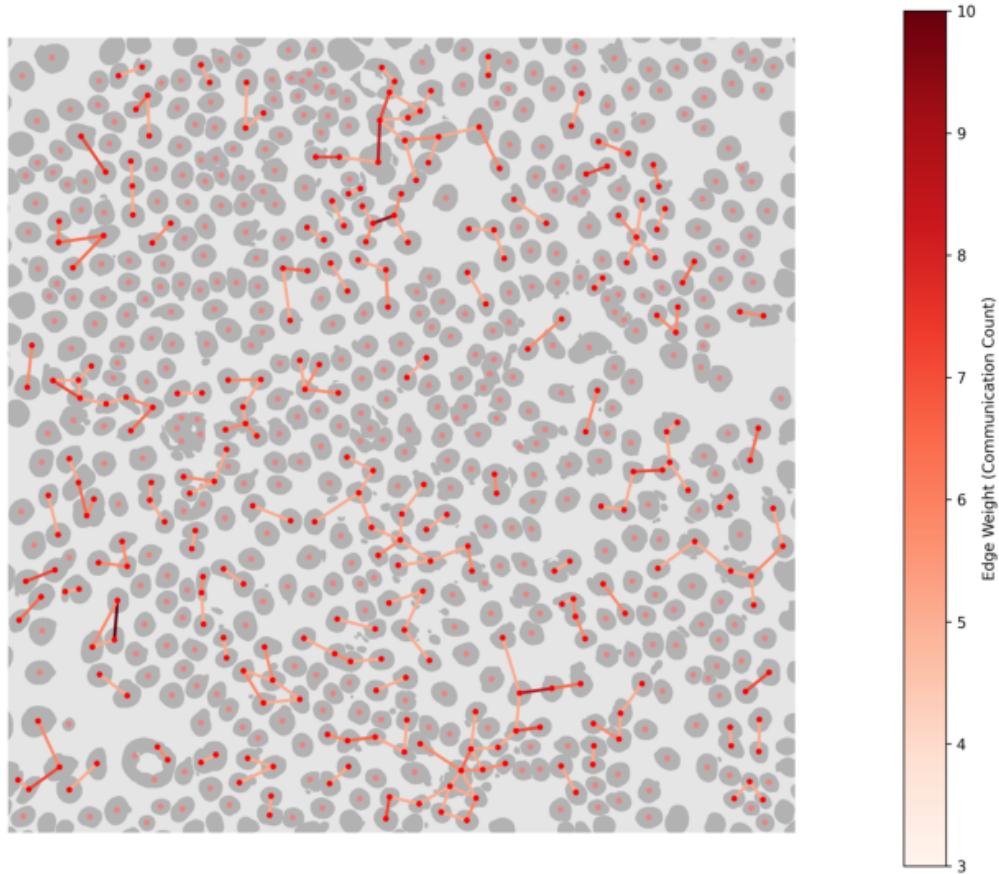


1.3.7 Connection network between cells

Cell Connection Network Graph

20250701_IS1

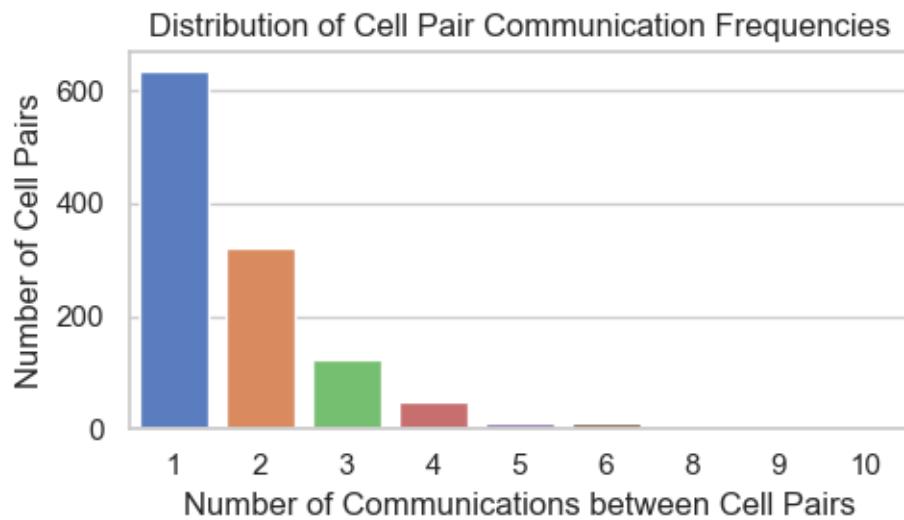
Cells Connection Network (Weighted Edges, ≥ 3)



```
C:\Users\poseidon\OneDrive\Documents\01_ETHZ\Master_Degree\Spring_Semester_2025\  
Master_Thesis\Coding\Image_analysis\src\calcium_activity_characterization\analys  
is\visualizers.py:257: FutureWarning:
```

```
Passing `palette` without assigning `hue` is deprecated and will be removed in  
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same  
effect.
```

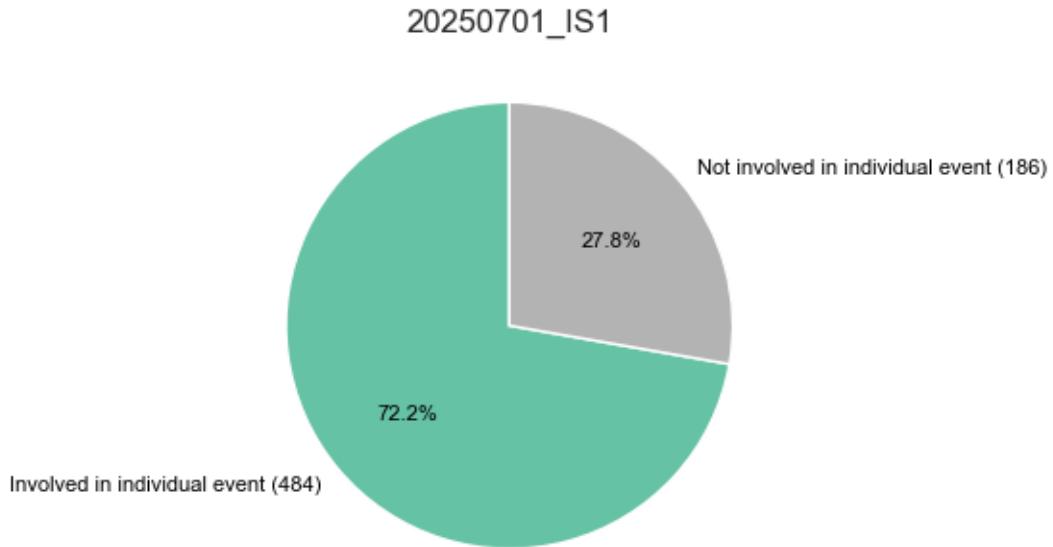
```
sns.barplot(data=df, x=axis_column, y=value_column, hue=hue_column,  
dodge=False, palette=palette, legend=False)
```



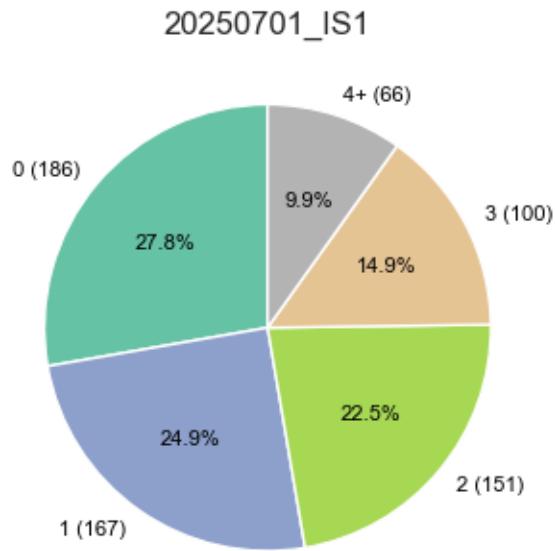
1.4 INDIVIDUAL EVENTS

1.4.1 Cells occurrences in individual events

Distribution of Cells Involved in Individual Events

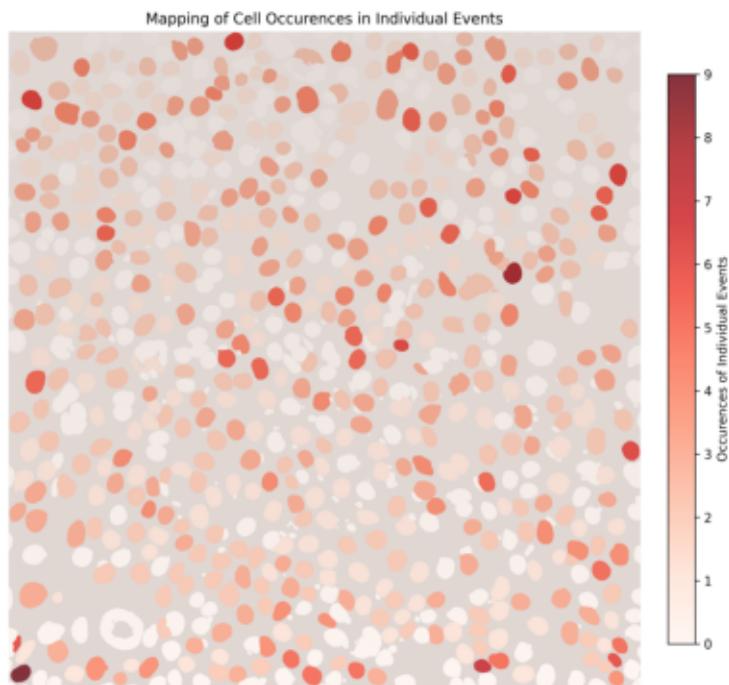


Distribution of Individual Event Occurrences per Cell (0, 1, 2, 3, 4+)

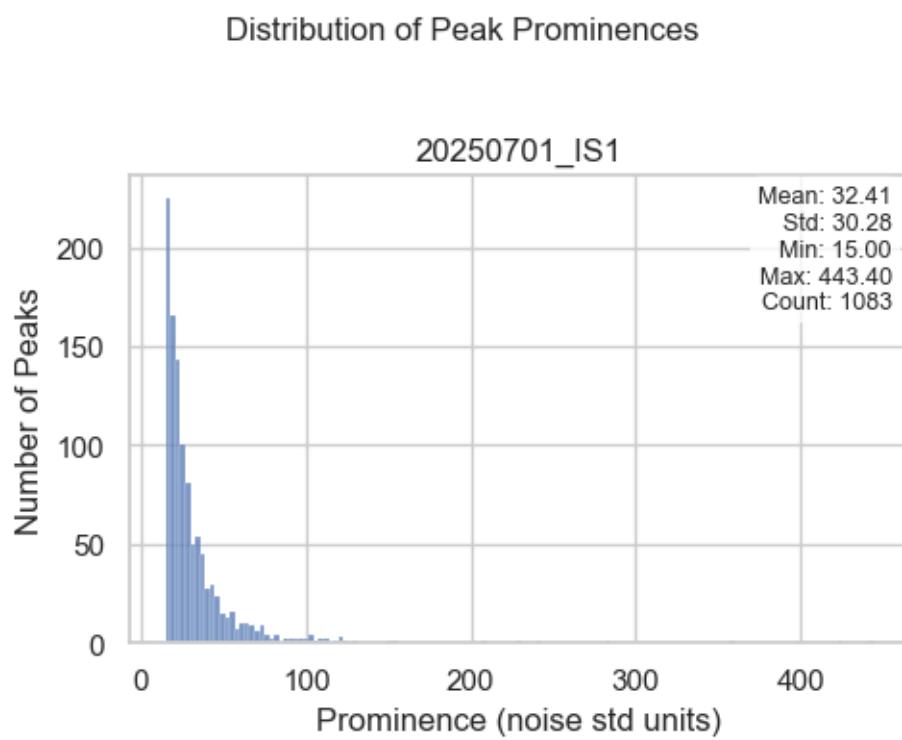
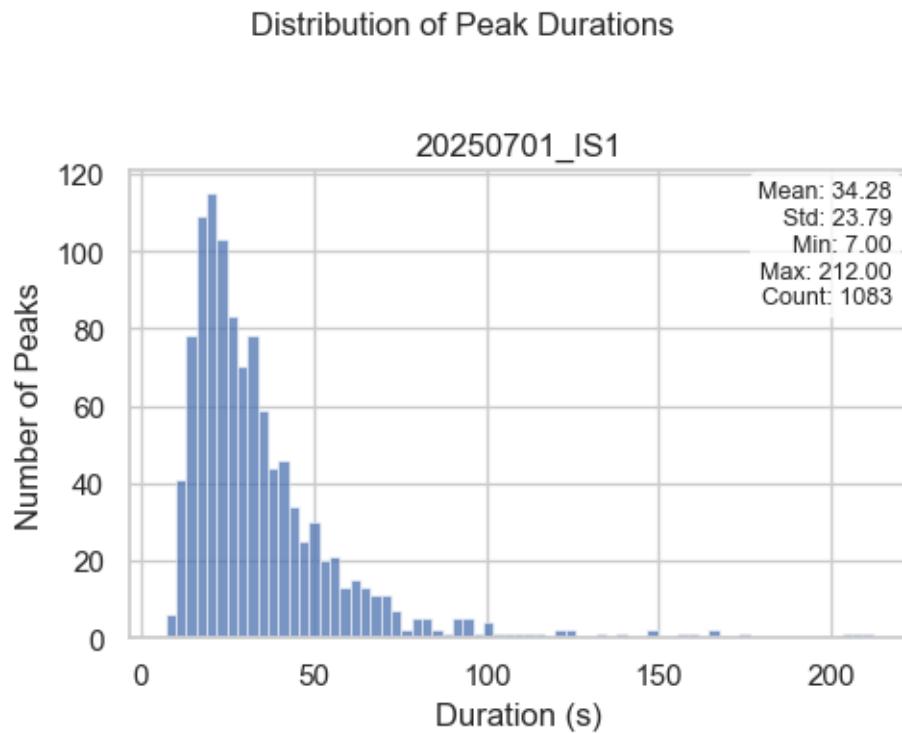


Cell Mapping with Occurrences in Individual Events Overlay

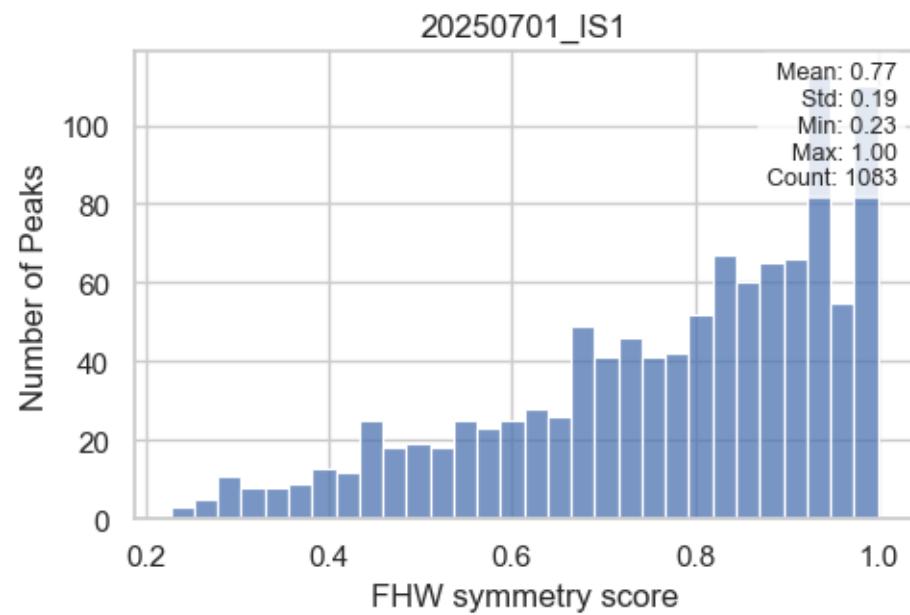
20250701_IS1



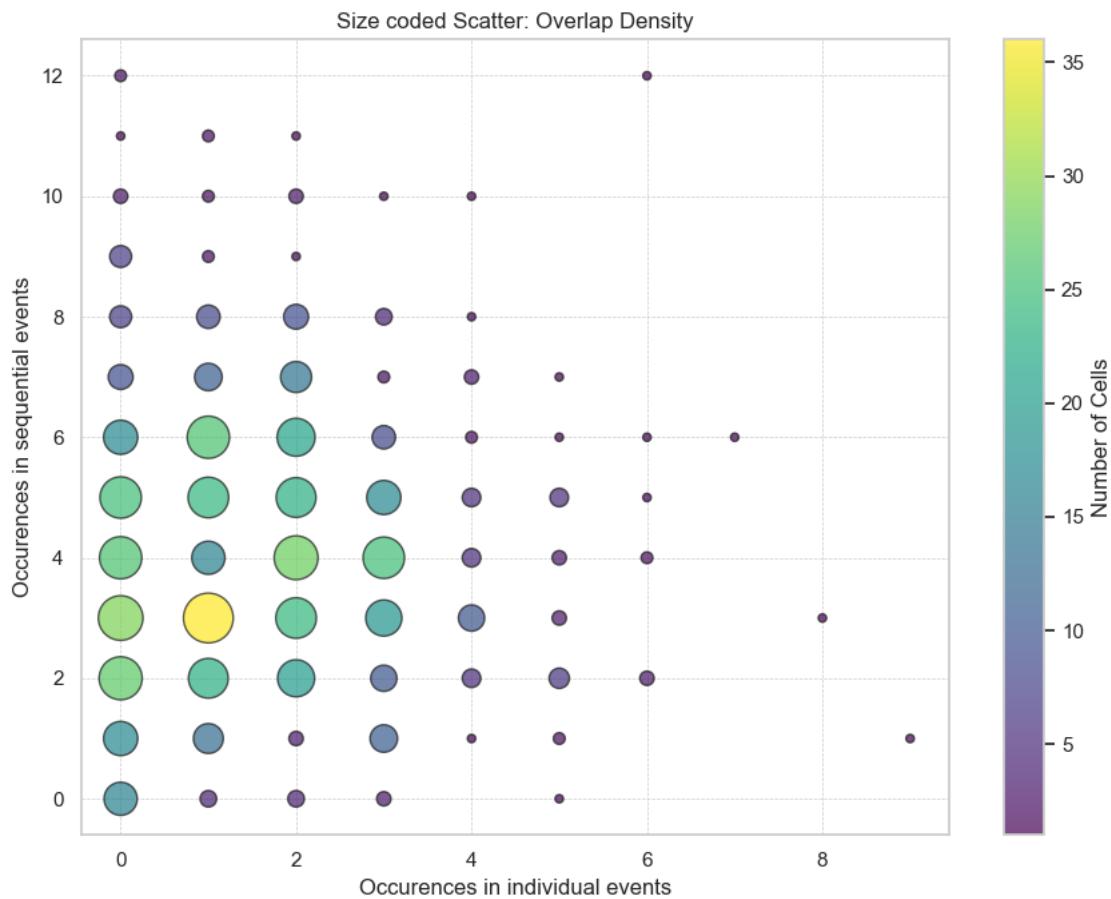
1.4.2 Peaks statistics in individual events



Distribution of Peak Symmetry Scores

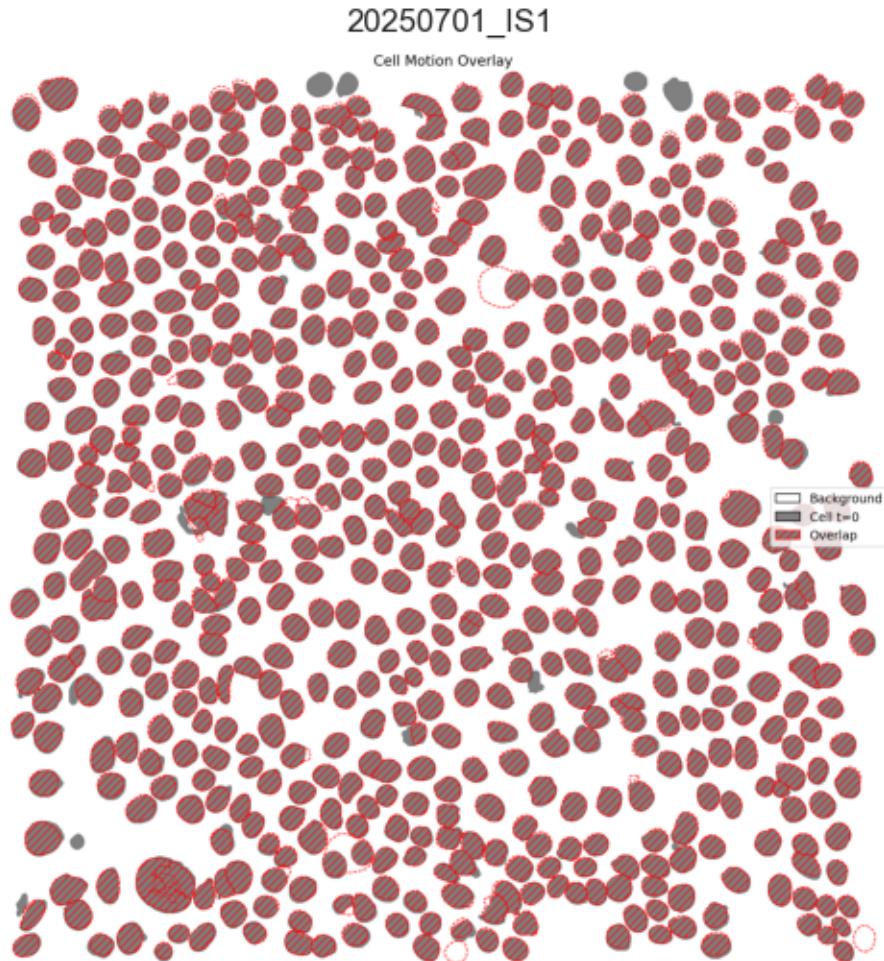


1.4.3 Correlation between event activity level & individual activity level



1.5 CELLS MOTION

Cell Motion Comparison Overlay



- Hoechst image taken at t=0: 670
- Hoechst image taken at t=1801: 649
- Number of cells difference: absolute 21, relative 3.18%

Pixel-level cell segmentation:

- Total number of pixels in image: 4194304
- Pixels segmented as cell at t=0: 989219
- Pixels segmented as cell at t=1801: 878100
- Overlapping pixels between t=0 and t=1801: 841293 (90.11% of total)
- Pixels exclusive to t=0: 147926 (14.95% of total)
- Pixels exclusive to t=1801: 36807 (4.19% of total)