Area_based_analysis

Brandon Titensor

2025-01-08

Surface Analysis 9: Cumulative Particle Area Distribution with Error Bars

Orange: Starshade Surface, Green: Witness Surface
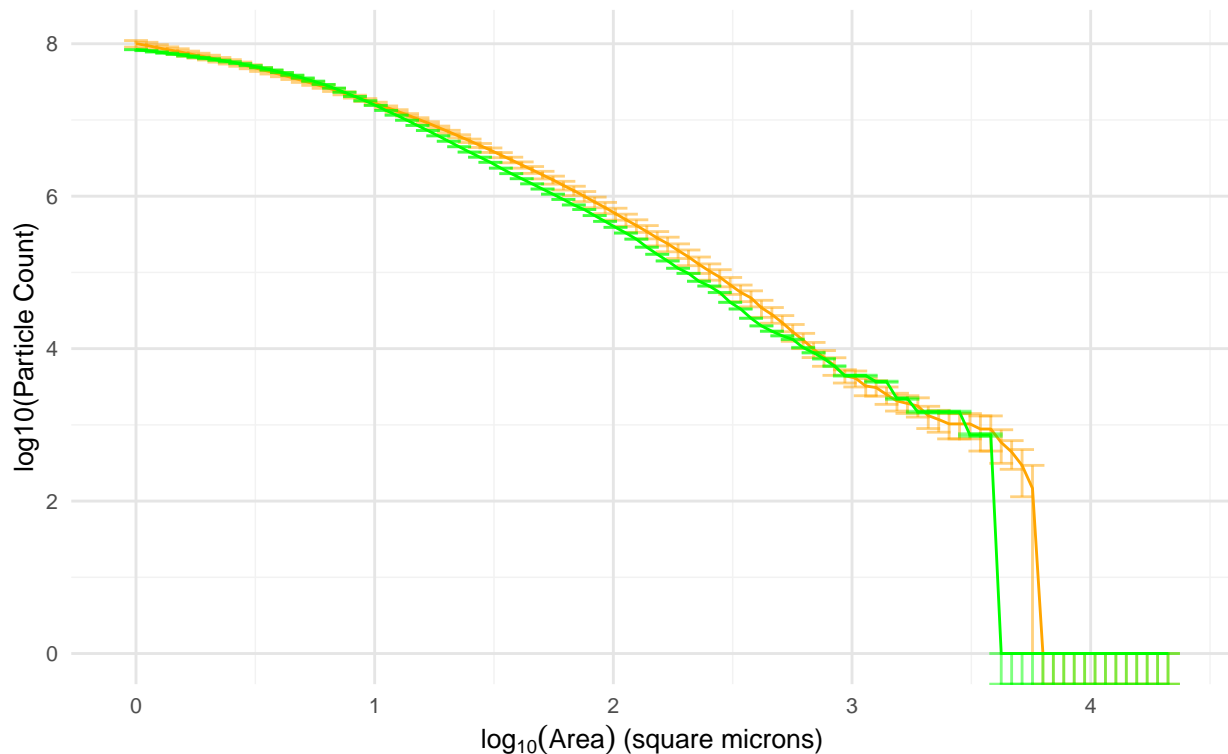
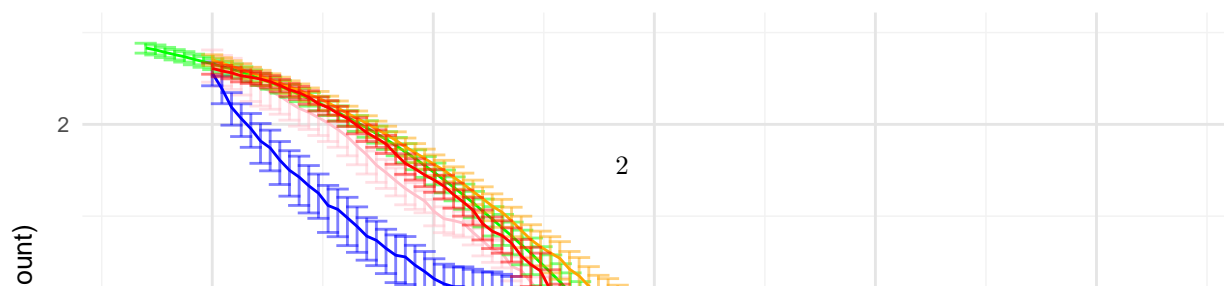**Edge Analysis 9: Cumulative Particle Area Distribution with Error Bars**

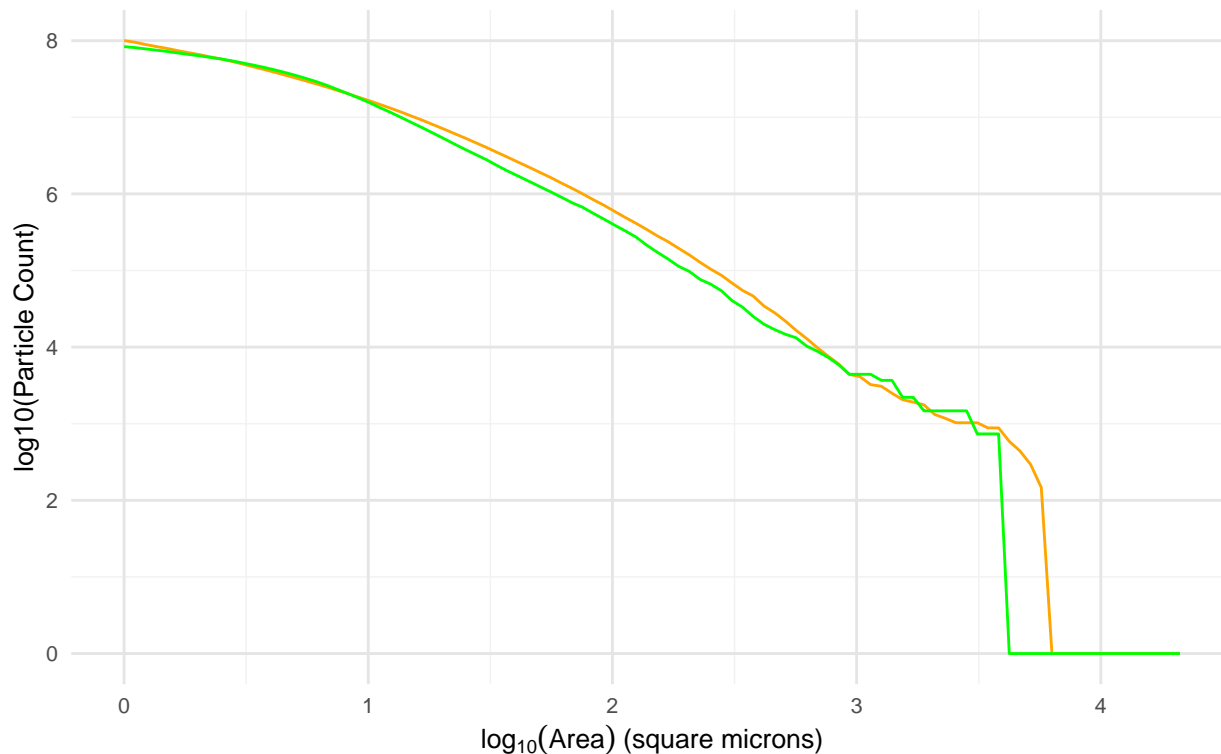k: Starshade Observed, Blue: Calibration Observed, Green: Model, Orange: SLSM Starshade, Red: SLSM
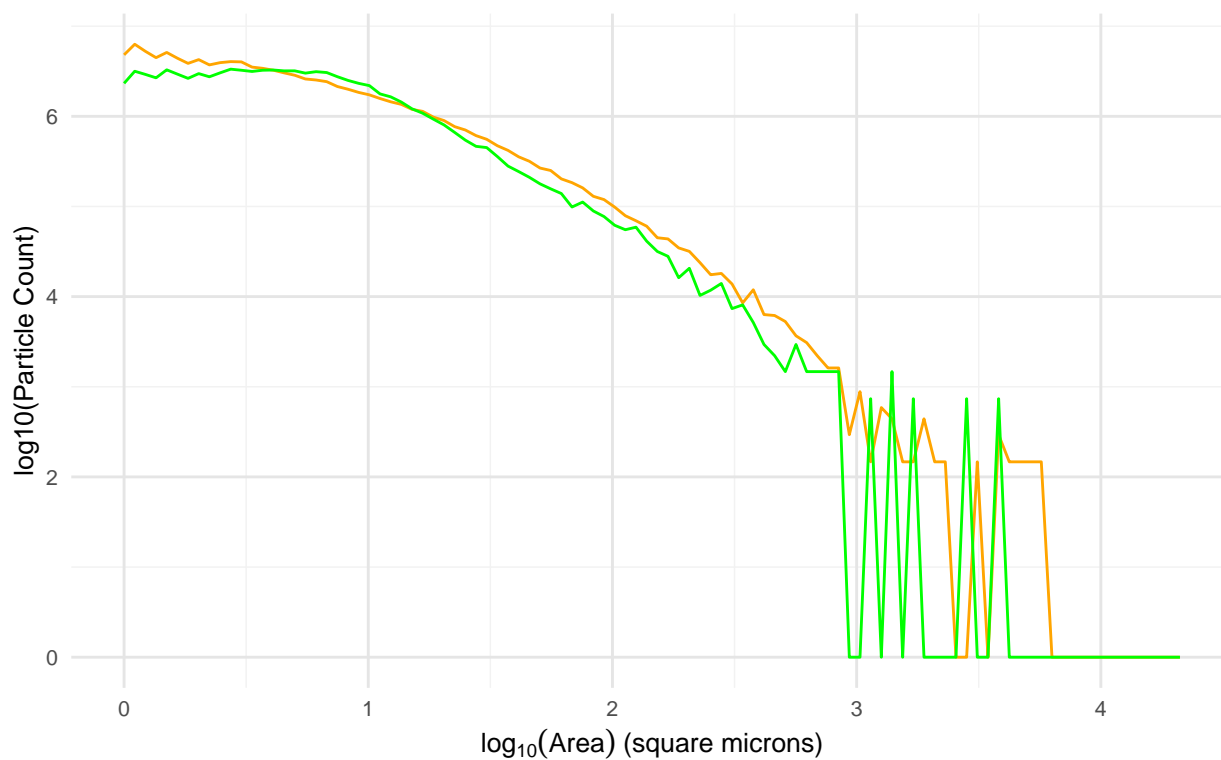
8. Trial Anlysis

8.1 Trial 9

Surface Analysis 9: Cumulative Particle Area Distribution over 0.1 square meters
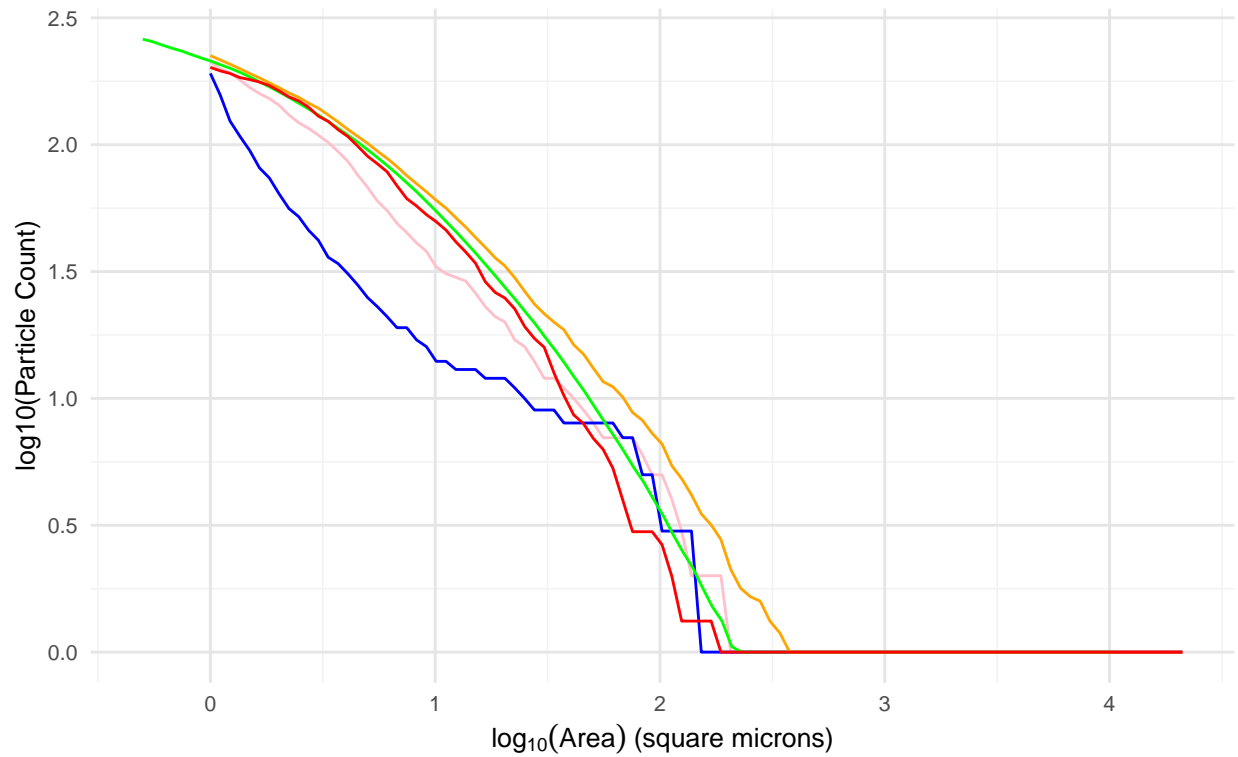
Orange: Starshade Surface, Green: Witness Surface

Surface Analysis 9: Binned Particle Area Distribution over 0.1 square meters

Orange: Starshade Surface, Green: Witness Surface

Edge Analysis 9: Cumulative Particle Area Distribution over 0.1 meter

k: Starshade Observed, Blue: Calibration Obvserved, Green: Model, Orange: SLSM Starshade, Red: SLSN

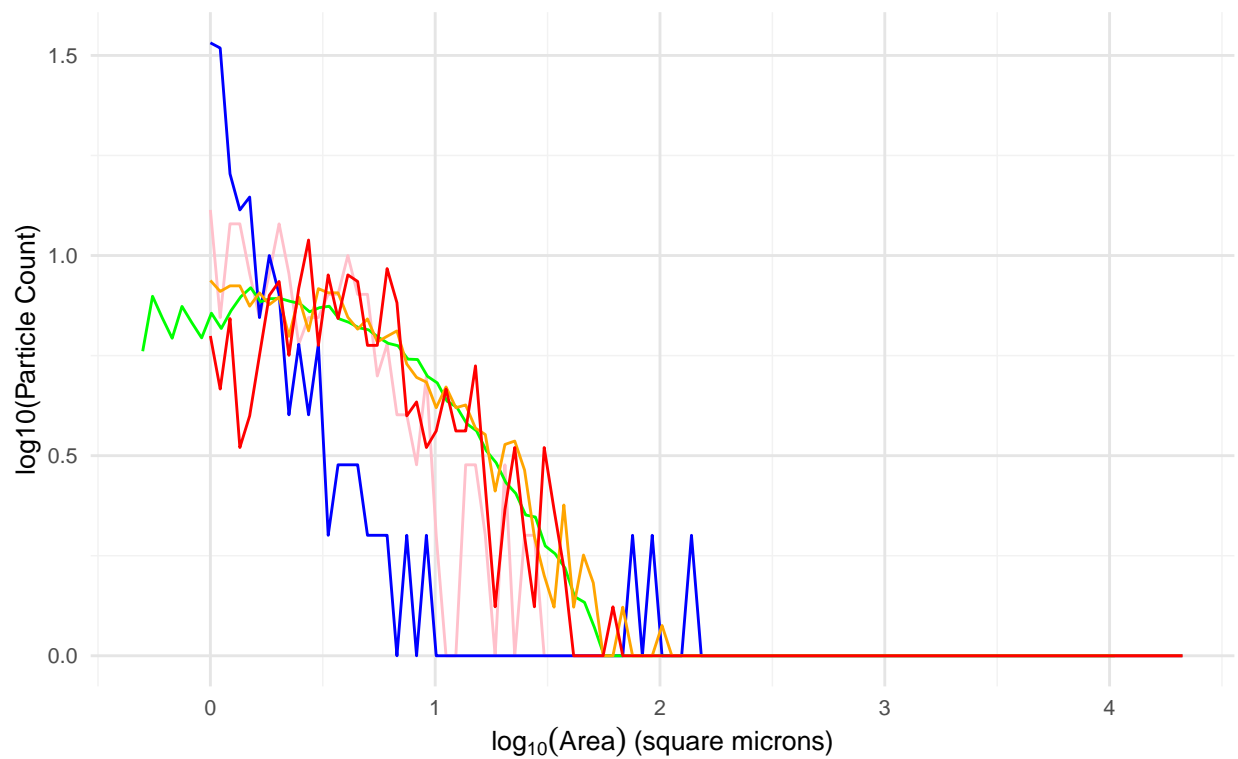**Edge Analysis 9: Cumulative Particle Area Distribution over 0.1 meter**

k: Starshade Observed, Blue: Calibration Obvserved, Green: Model, Orange: SLSM Starshade, Red: SLSN
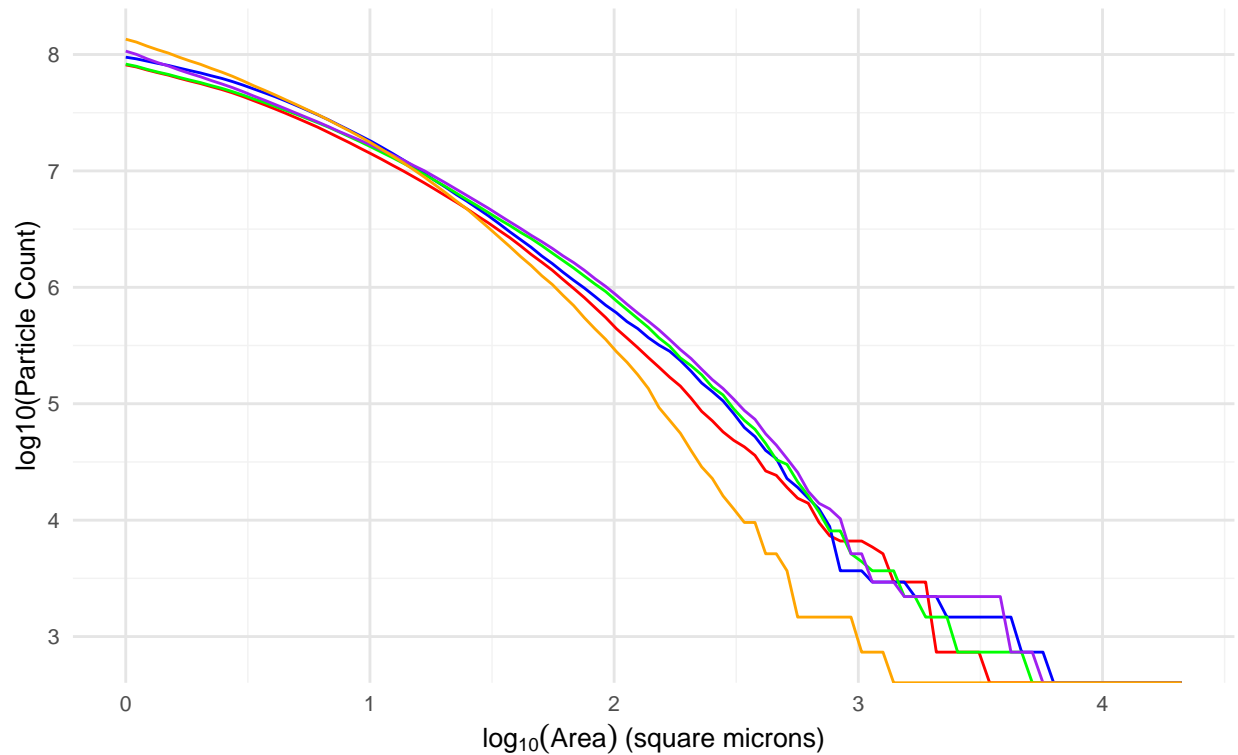
rface Analysis 9 – Samples : Cumulative Particle Area Distribution over 0.1 square

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

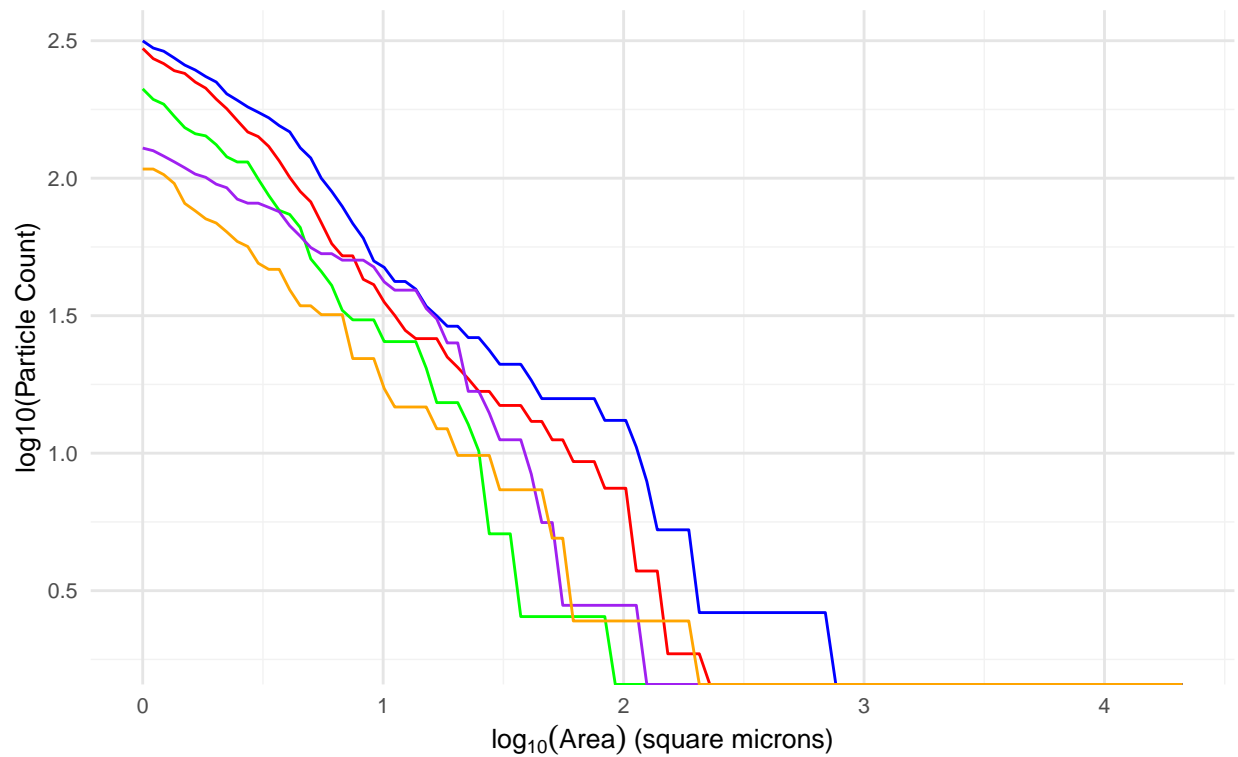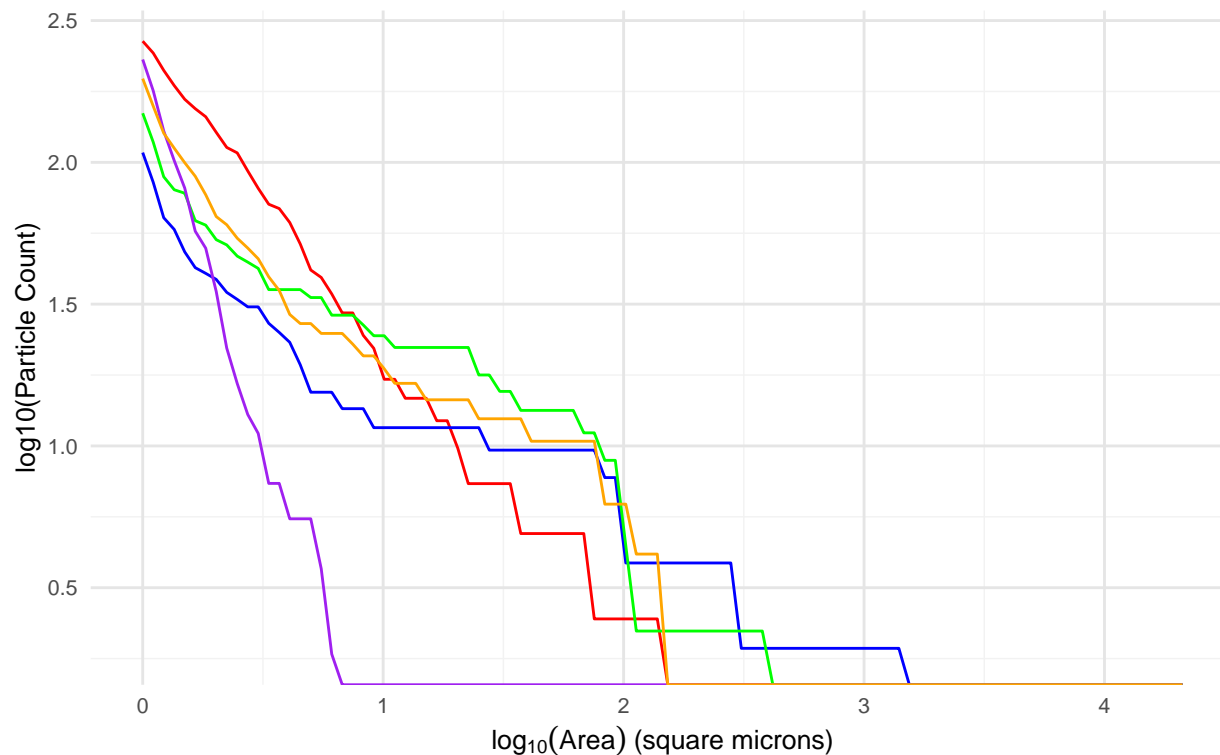

rface Analysis 9 – Samples : Cumulative Particle Area Distribution over 0.1 square

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5
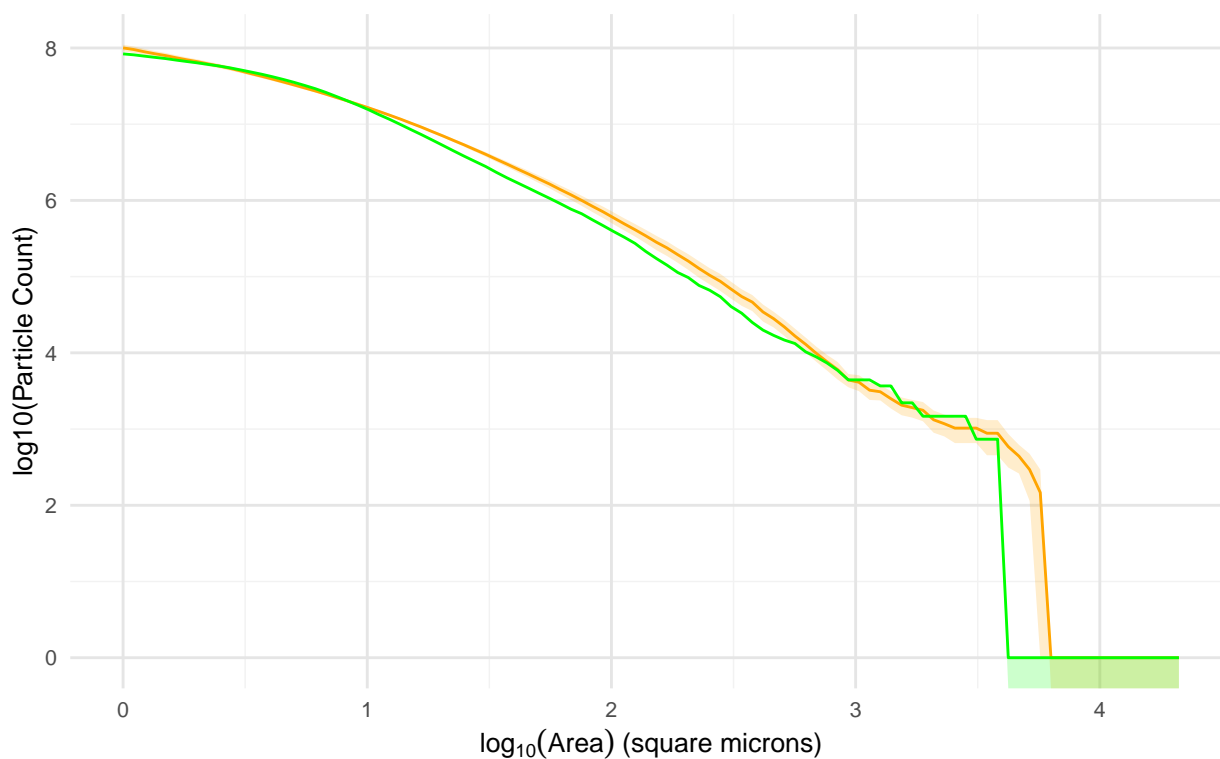
rface Analysis 9 – Samples : Cumulative Particle Area Distribution over 0.1 square

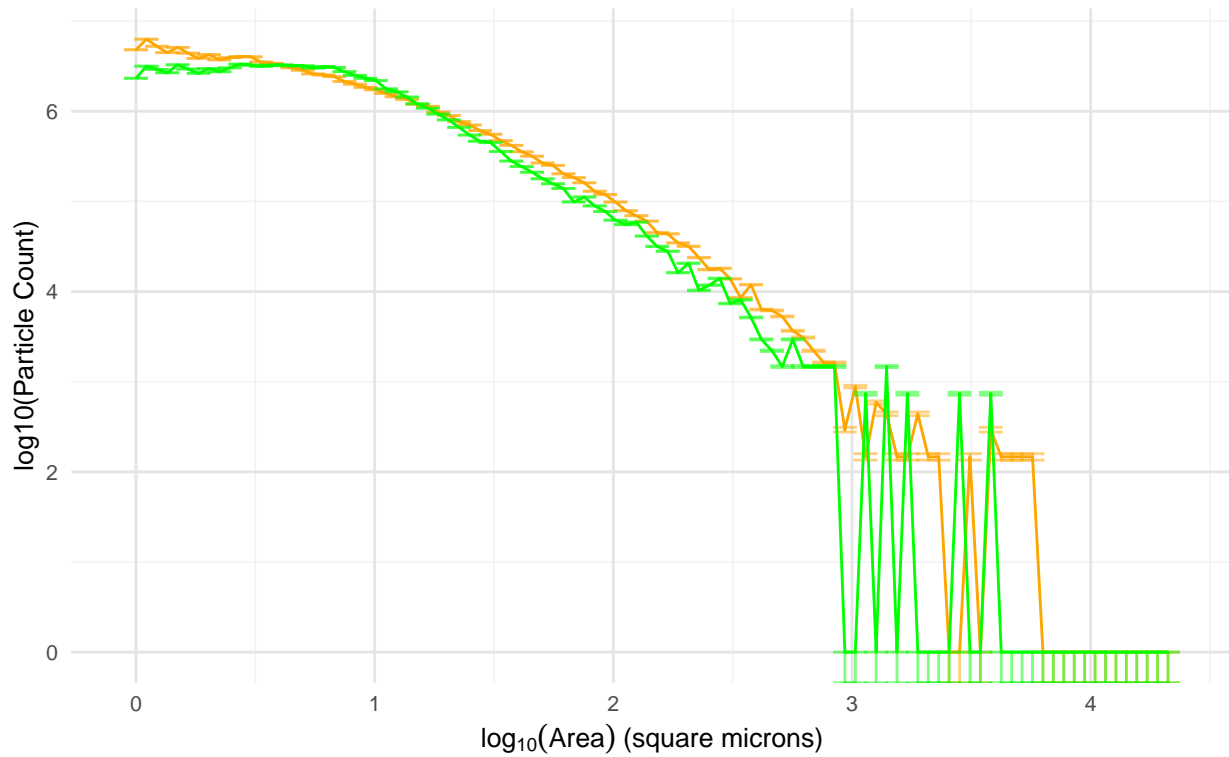Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 9: Cumulative Particle Area Distribution over 0.1 square meters

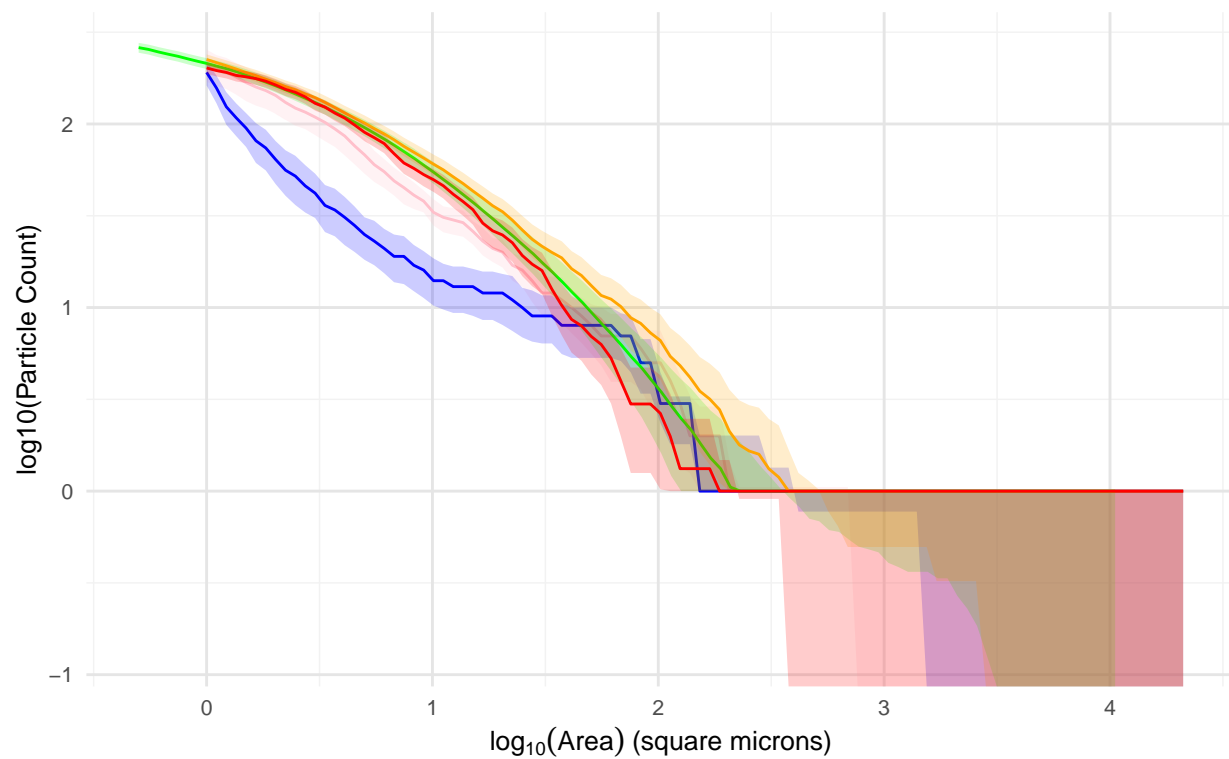Orange: Starshade Surface, Green: Witness Surface

Surface Analysis 9: Binned Particle Area Distribution over 0.1 square meters

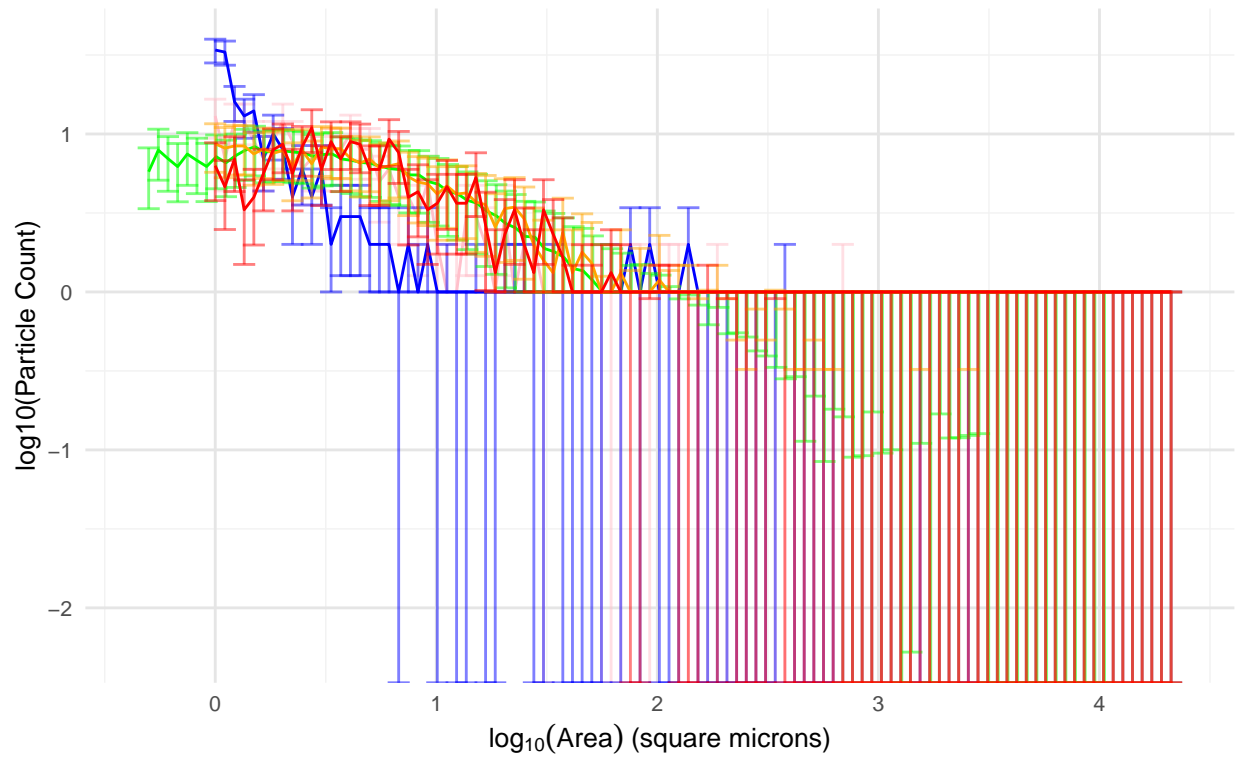Orange: Starshade Surface, Green: Witness Surface

Edge Analysis 9: Cumulative Particle Area Distribution over 0.1 meter

k: Starshade Observed, Blue: Calibration Observed, Green: Model, Orange: SLSM Starshade, Red: SLSM

Edge Analysis 9: Binned Particle Area Distribution over 0.1 meter

k: Starshade Observed, Blue: Calibration Observed, Green: Model, Orange: SLSM Starshade, Red: SLSM

Surface Analysis 9 – Samples: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 10: Cumulative Particle Area Distribution over 0.1 square meter

Orange: Starshade Surface, Green: Witness Surface

Surface Analysis 10: Binned Particle Area Distribution over 0.1 square meters

Orange: Starshade Surface, Green: Witness Surface

Edge Analysis 10: Cumulative Particle Area Distribution over 0.1 meter

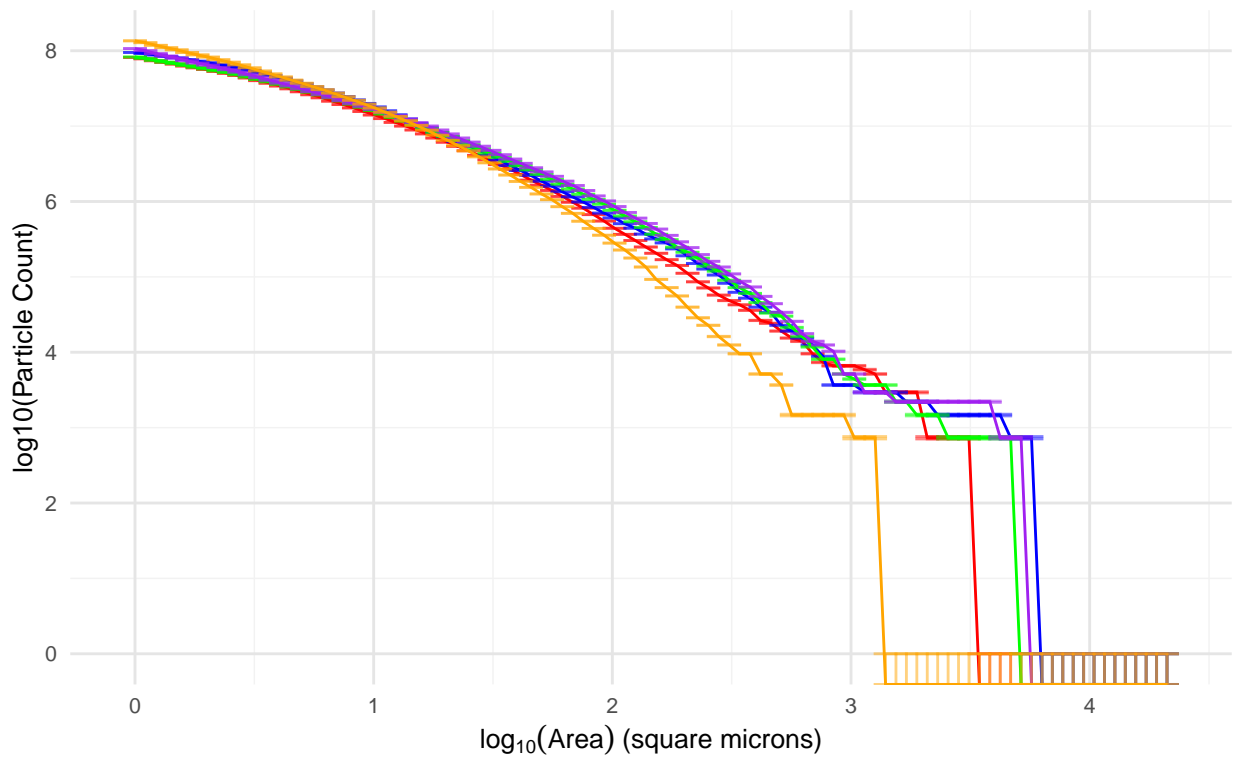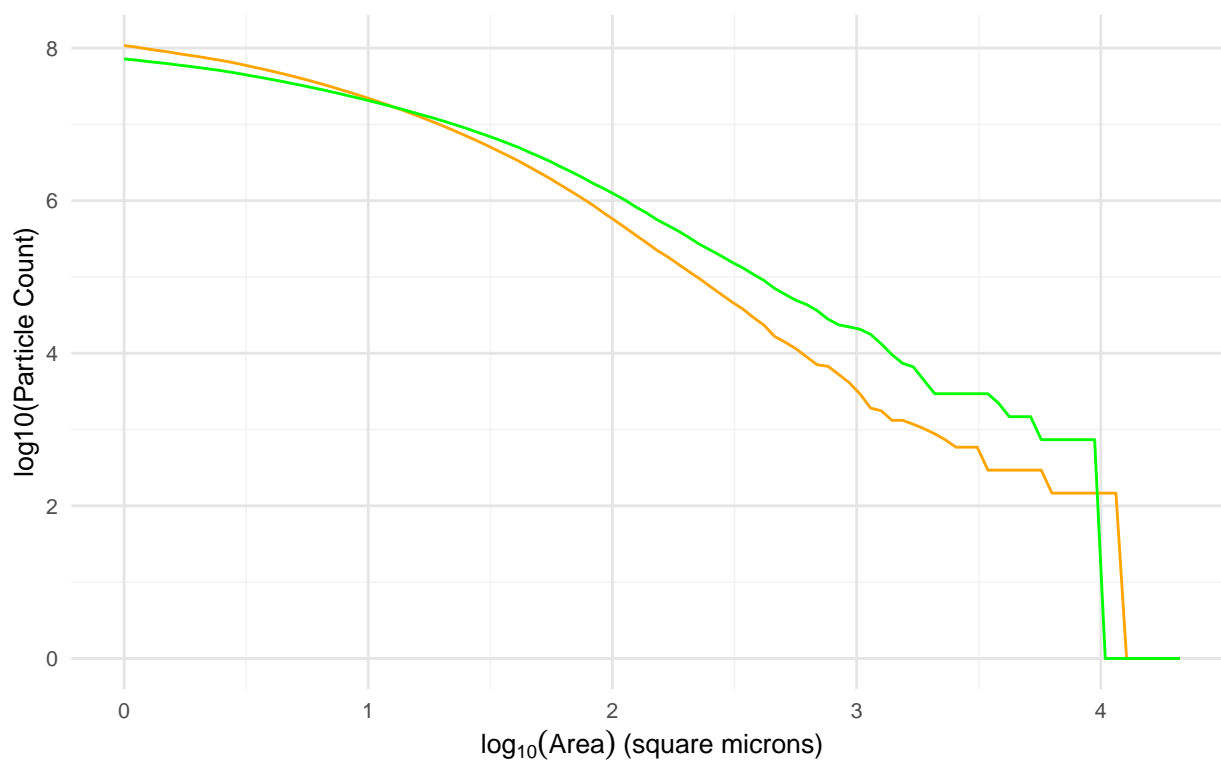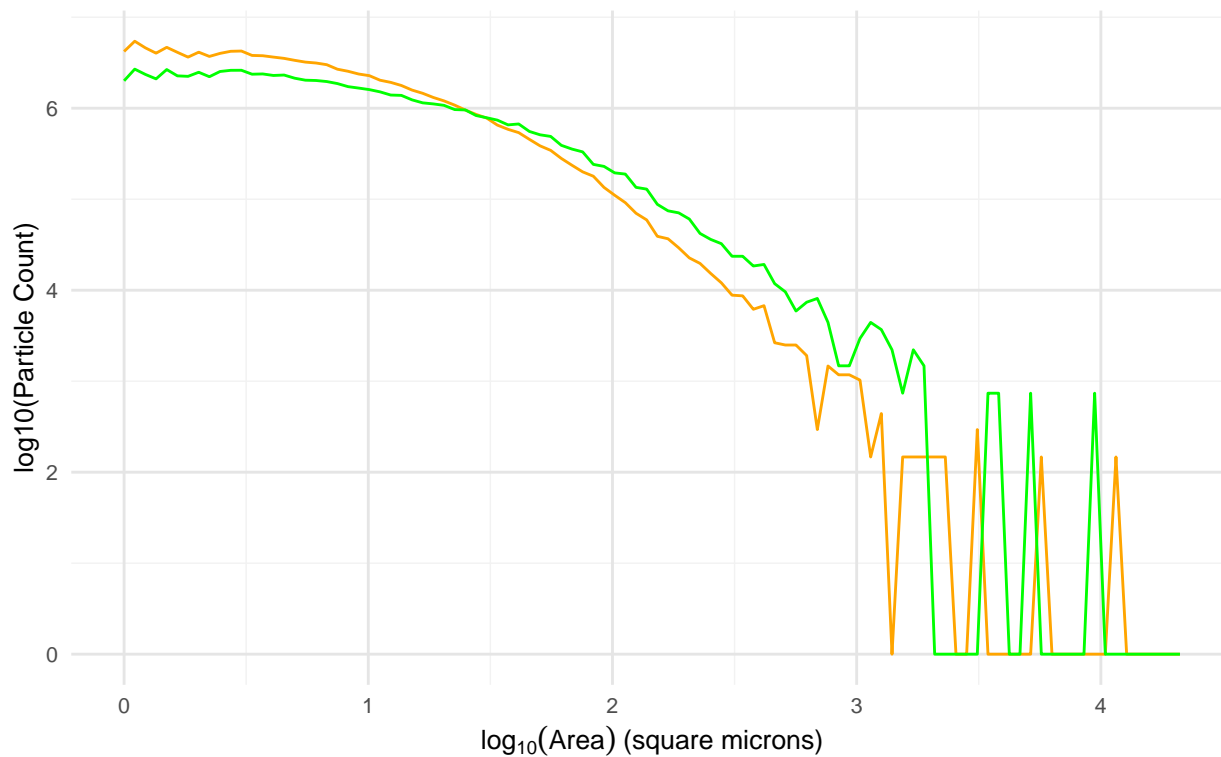Starshade Observed, Blue: Calibration Obvserved, Green: Model, Orange: SLSM Starshade, Red: SLSM

Edge Analysis 10: Cumulative Particle Area Distribution over 0.1 meter

Starshade Observed, Blue: Calibration Obvserved, Green: Model, Orange: SLSM Starshade, Red: SLSM

face Analysis 10 – Samples : Cumulative Particle Area Distribution over 0.1 square

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 10: Cumulative Particle Area Distribution over 0.1 square meters
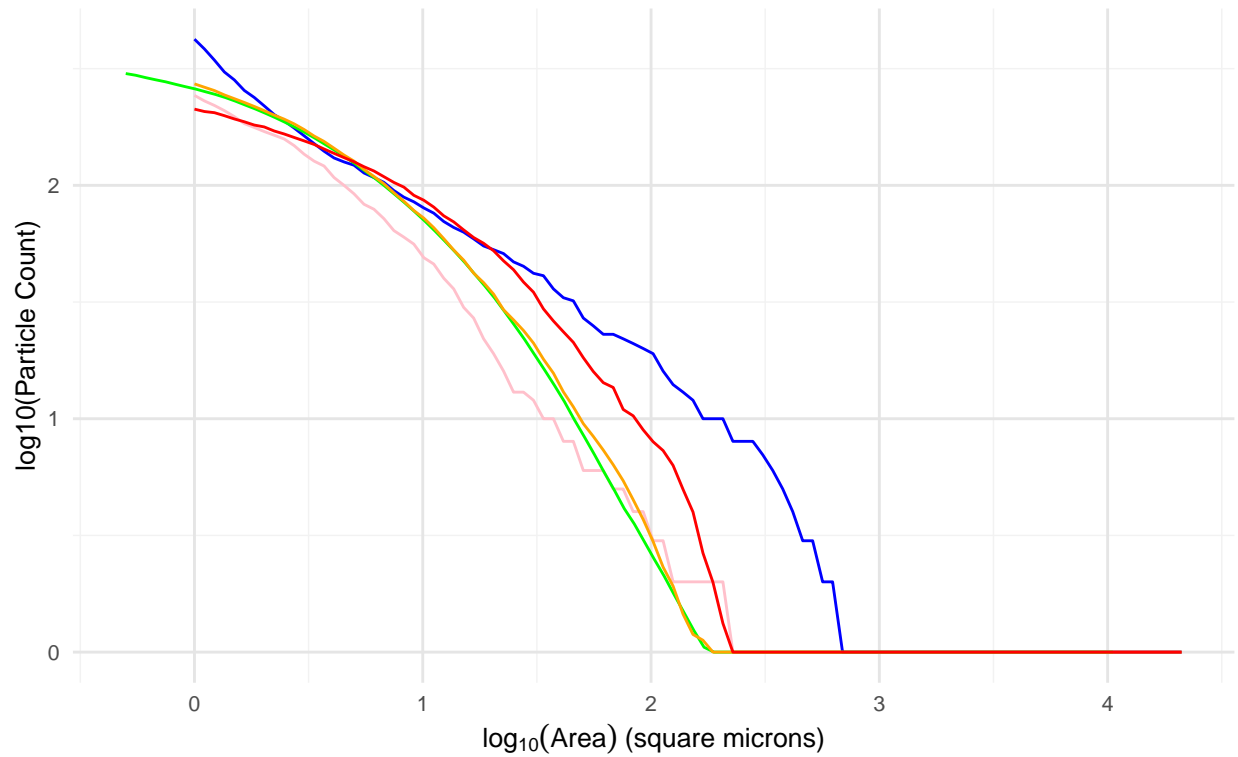
Orange: Starshade Surface, Green: Witness Surface

Surface Analysis 10: Binned Particle Area Distribution over 0.1 square meters
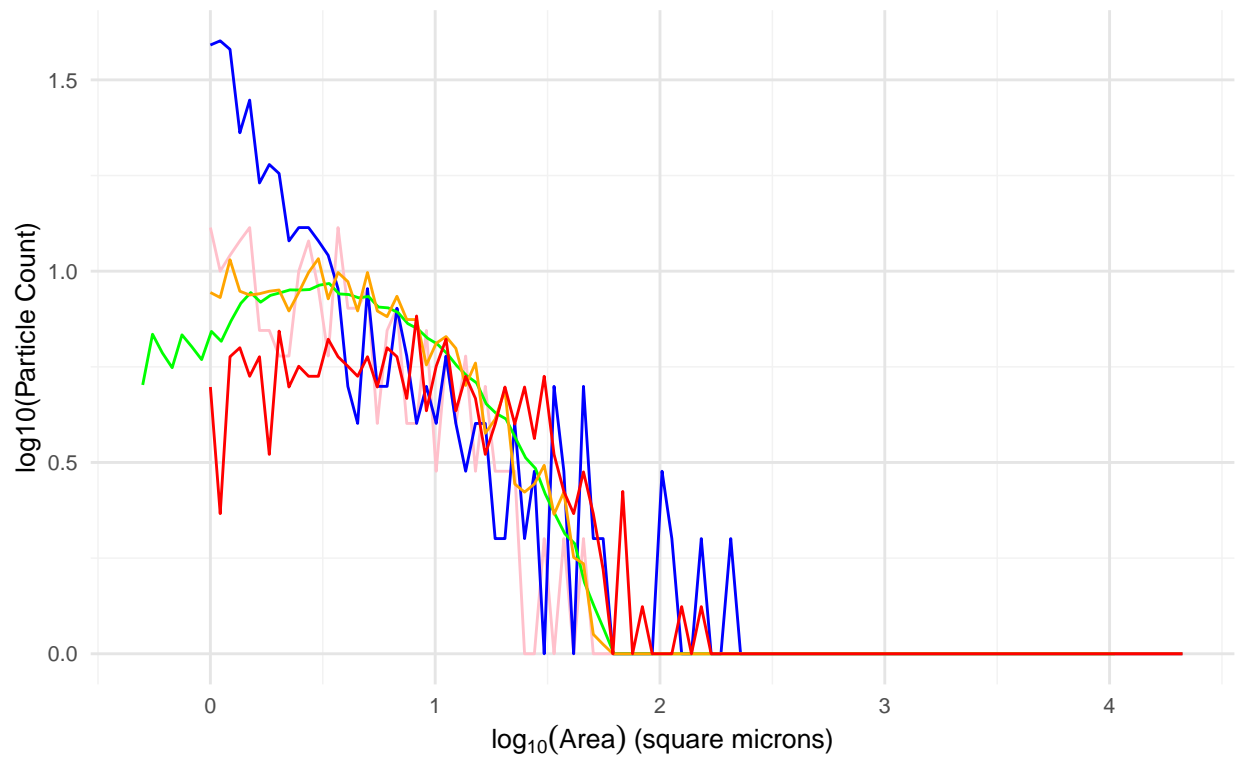
Orange: Starshade Surface, Green: Witness Surface

Edge Analysis 10: Cumulative Particle Area Distribution over 0.1 meter

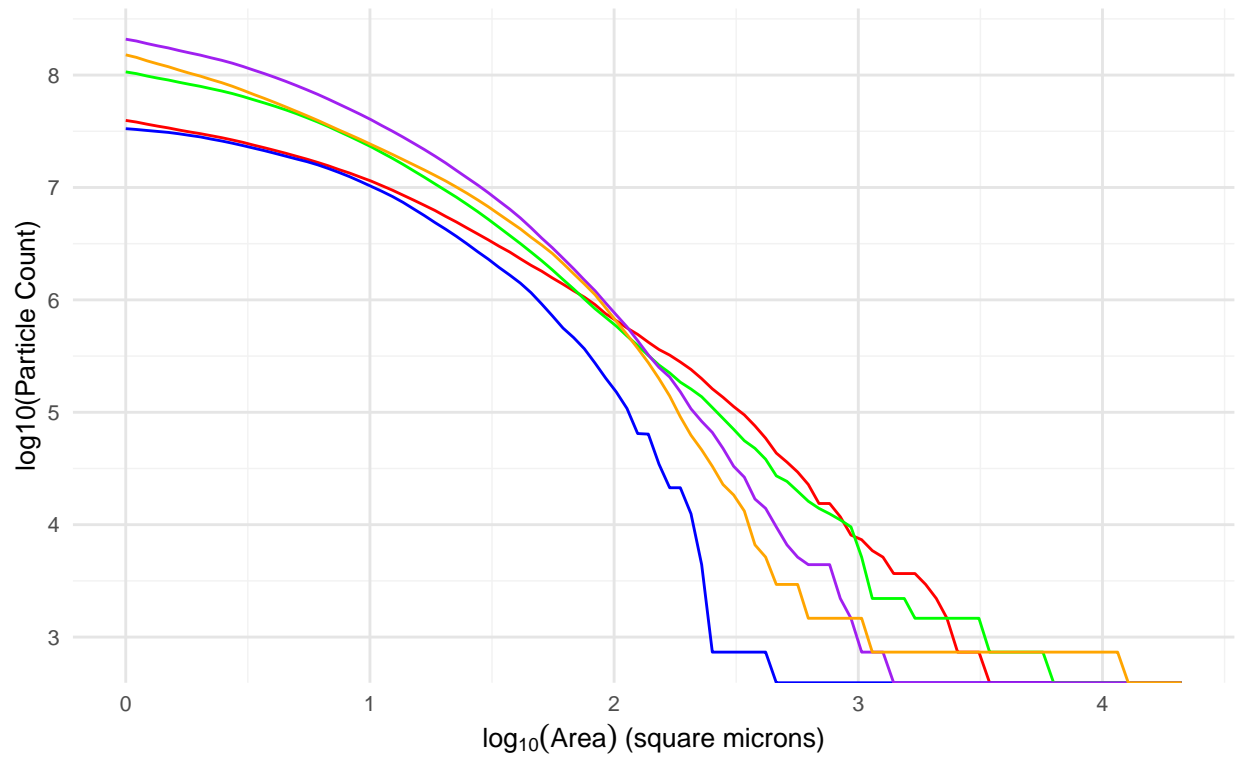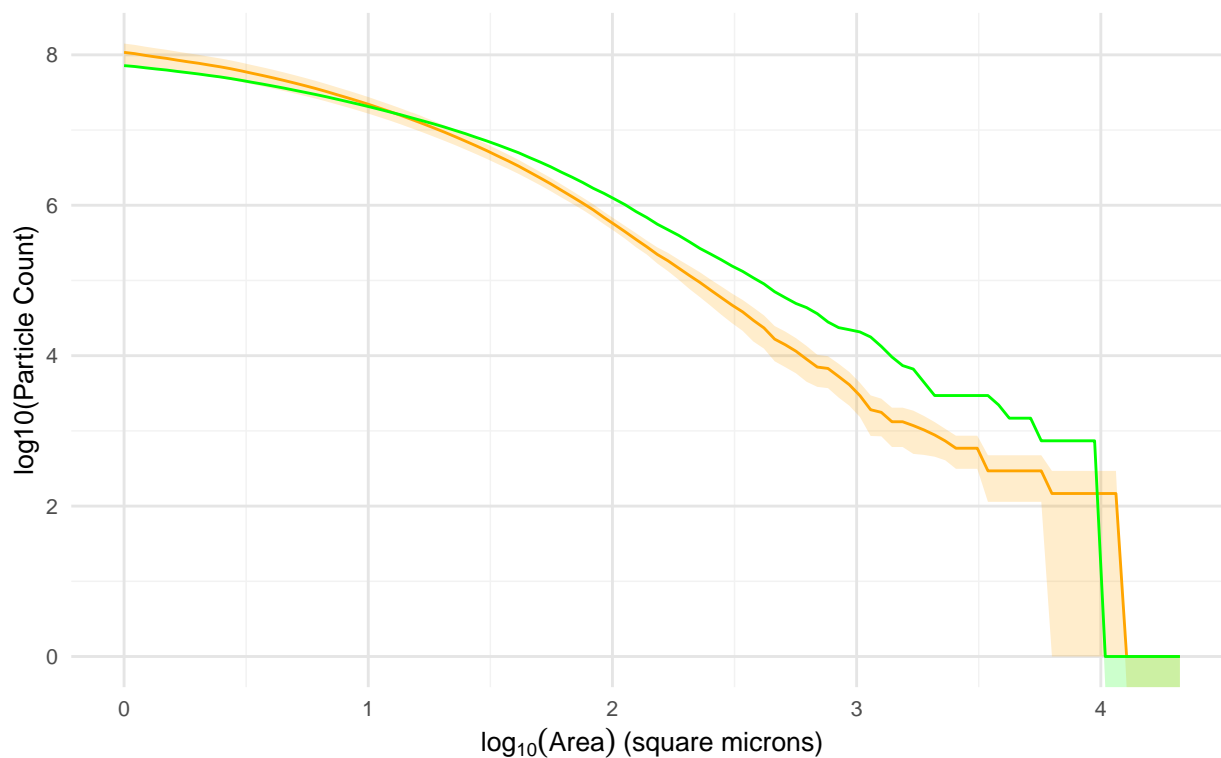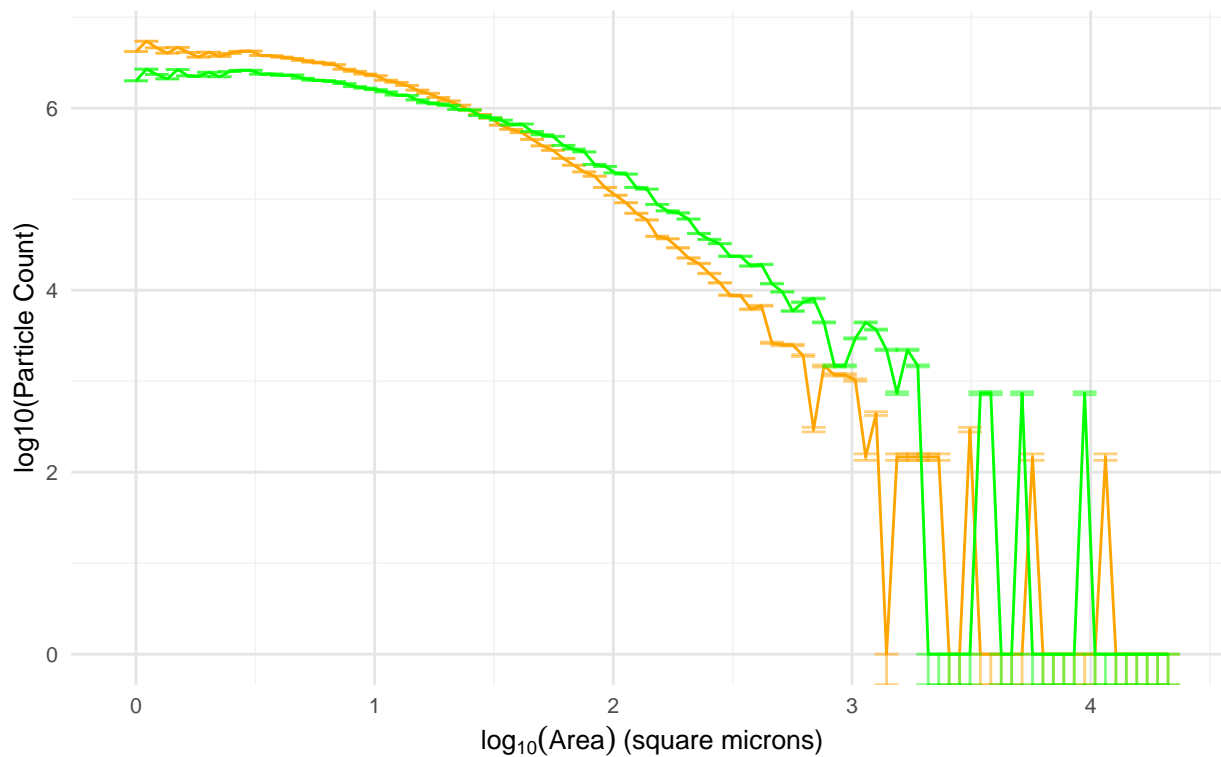Starshade Observed, Blue: Calibration Observed, Green: Model, Orange: SLSM Starshade, Red: SLSM

Edge Analysis 10: Binned Particle Area Distribution over 0.1 meter

k: Starshade Observed, Blue: Calibration Observed, Green: Model, Orange: SLSM Starshade, Red: SLSM

Surface Analysis 10 – Samples: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 11: Cumulative Particle Area Distribution over 0.1 square meter
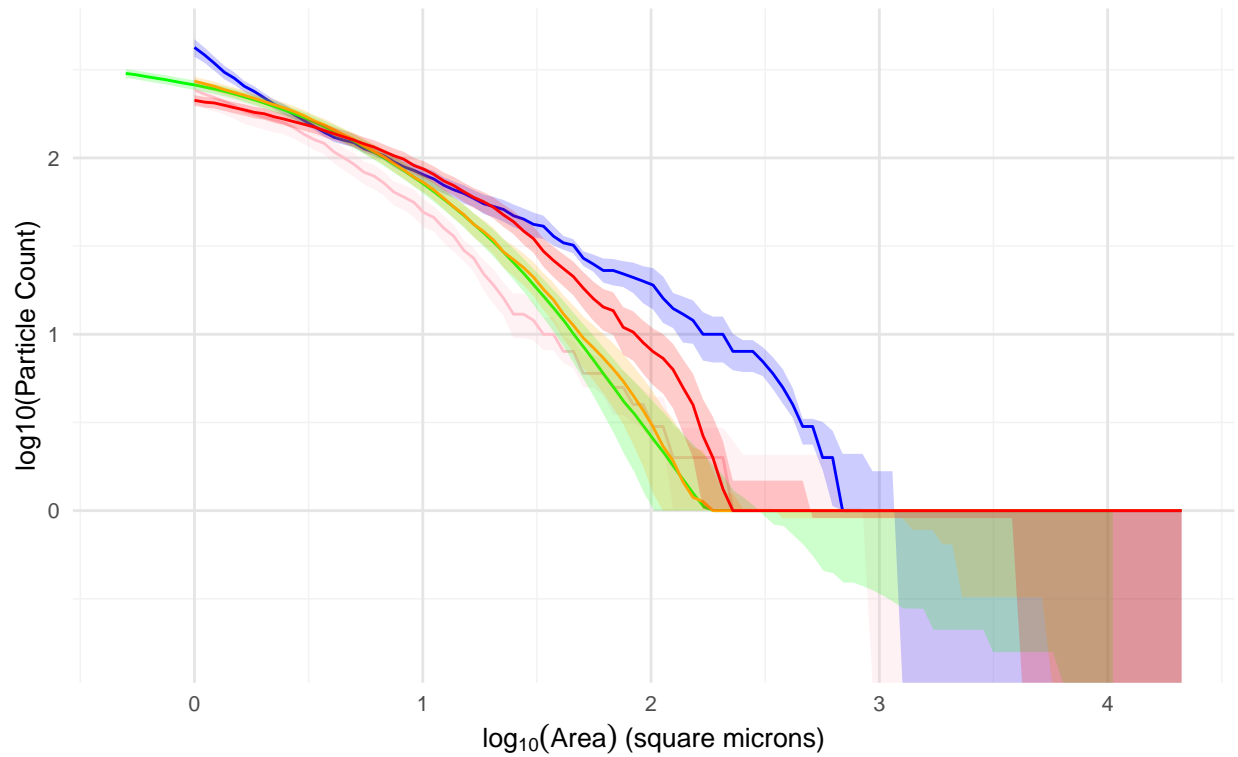
Orange: Starshade Surface, Green: Witness Surface

Surface Analysis 11: Binned Particle Area Distribution over 0.1 square meters
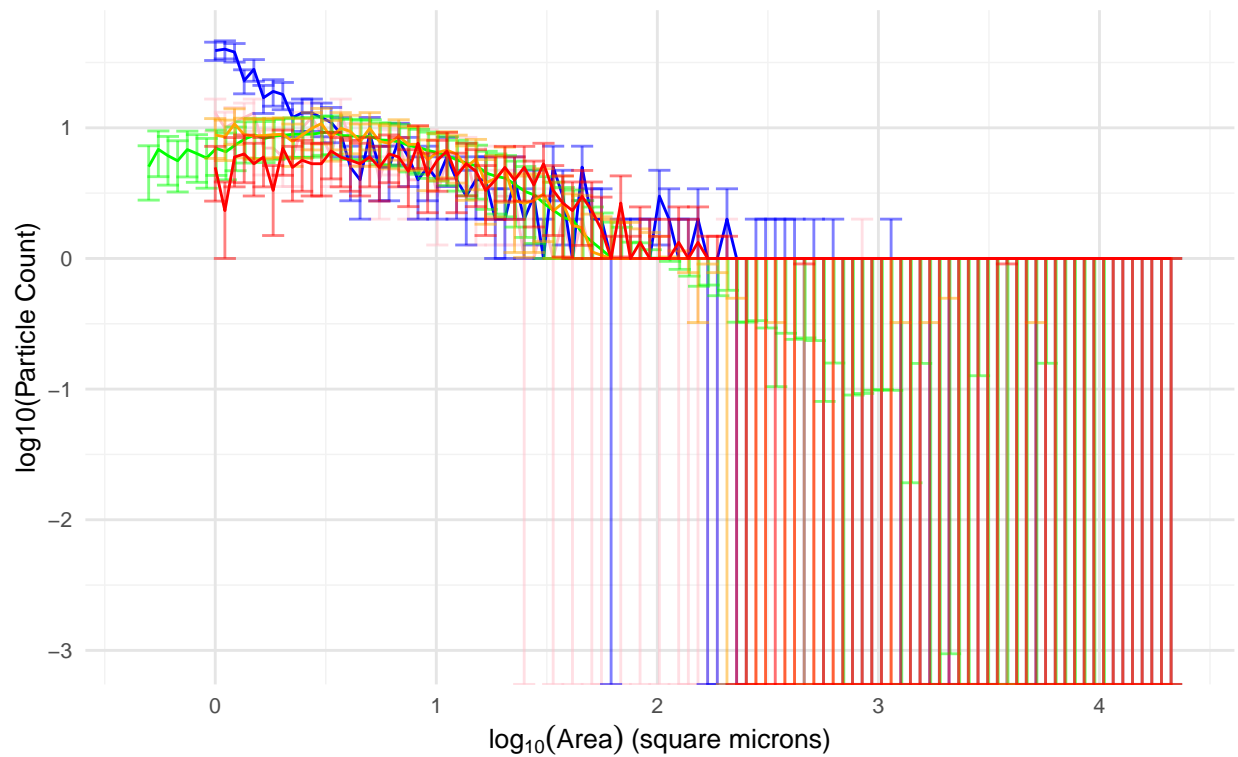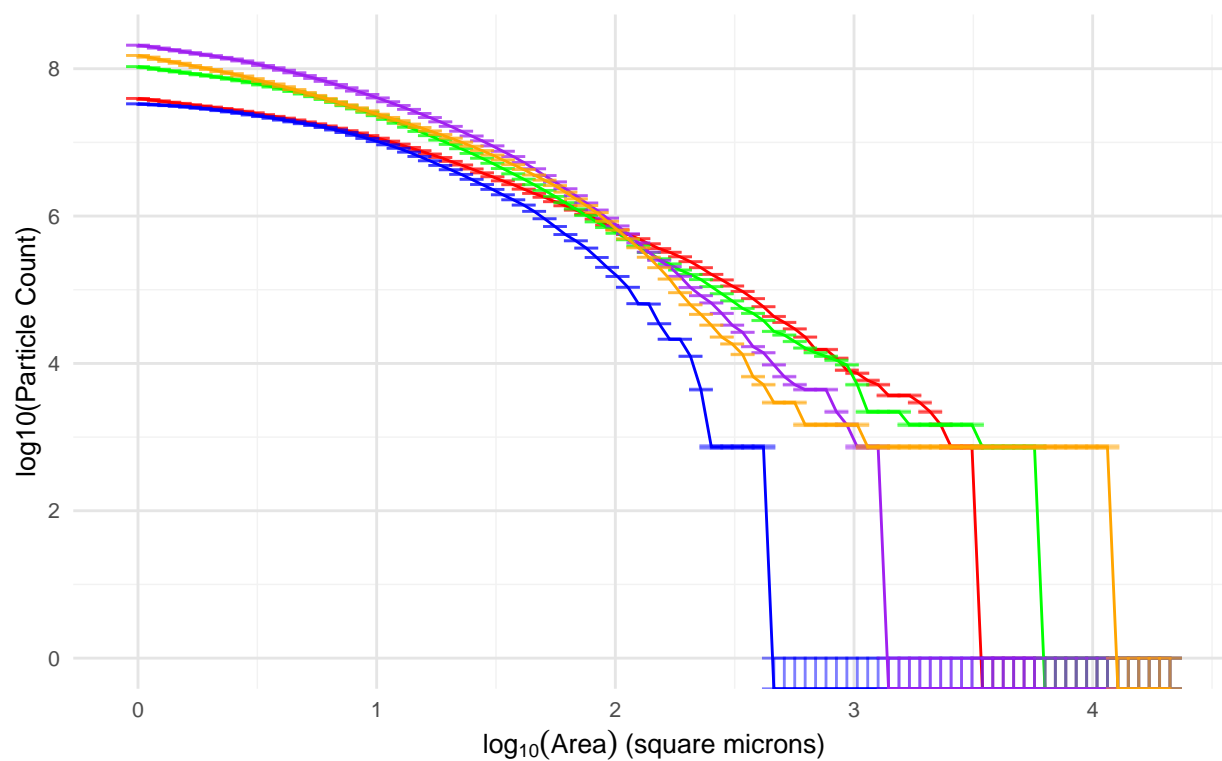
Orange: Starshade Surface, Green: Witness Surface

Edge Analysis 11: Cumulative Particle Area Distribution over 0.1 meter

Starshade Observed, Blue: Calibration Obvserved, Green: Model, Orange: SLSM Starshade, Red: SLSM

Edge Analysis 11: Cumulative Particle Area Distribution over 0.1 meter

Starshade Observed, Blue: Calibration Obvserved, Green: Model, Orange: SLSM Starshade, Red: SLSM

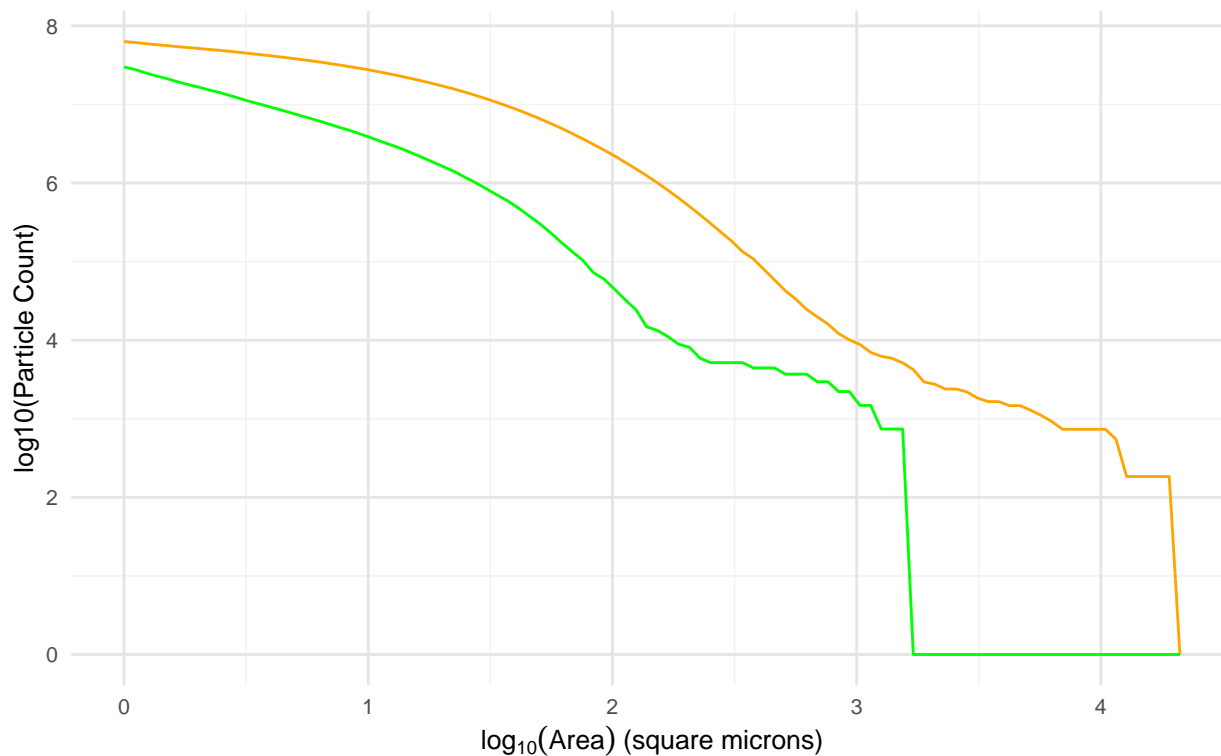**face Analysis 11 – Samples : Cumulative Particle Area Distribution over 0.1 square**

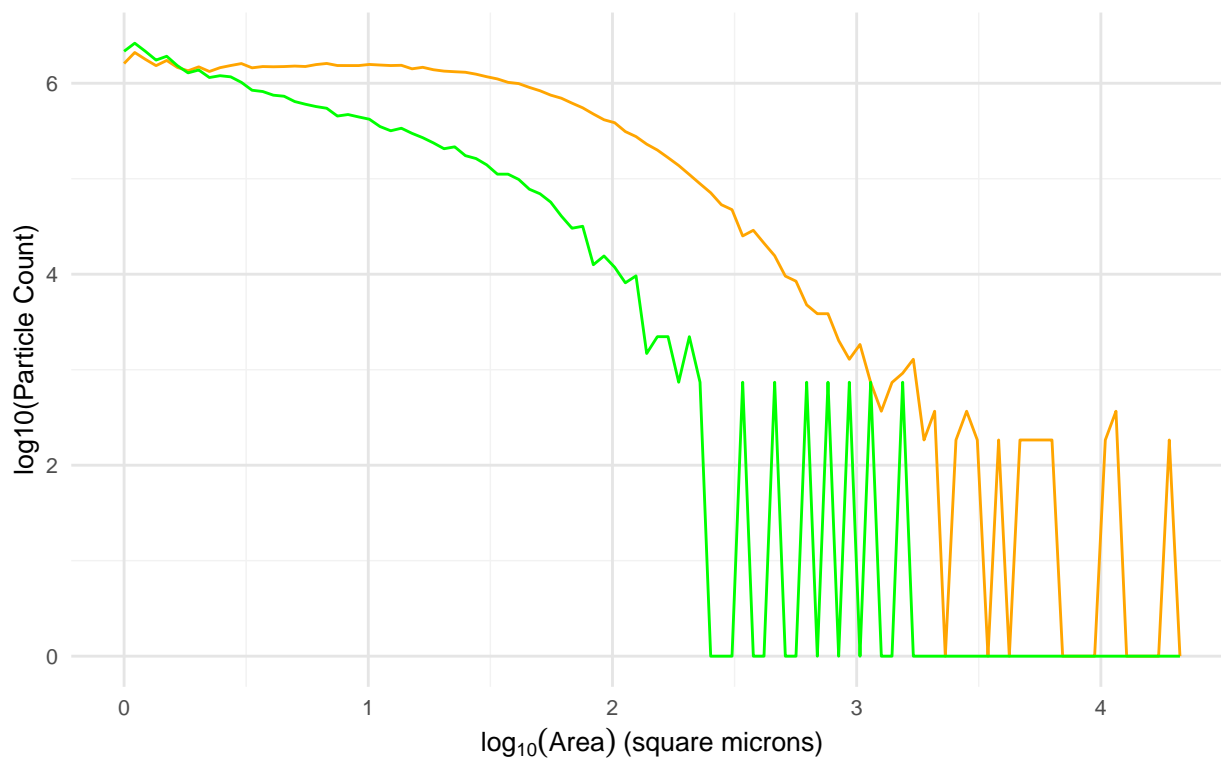Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 11: Cumulative Particle Area Distribution over 0.1 square meter
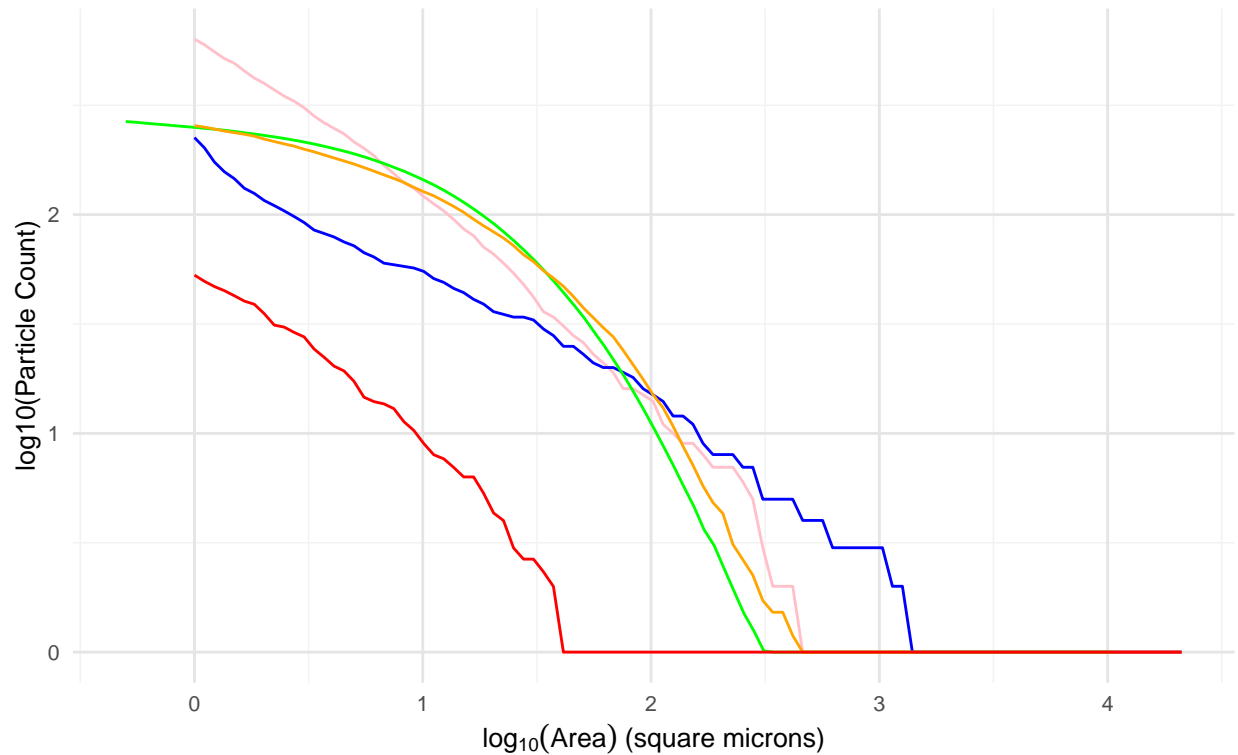
Orange: Starshade Surface, Green: Witness Surface

Surface Analysis 11: Binned Particle Area Distribution over 0.1 square meters
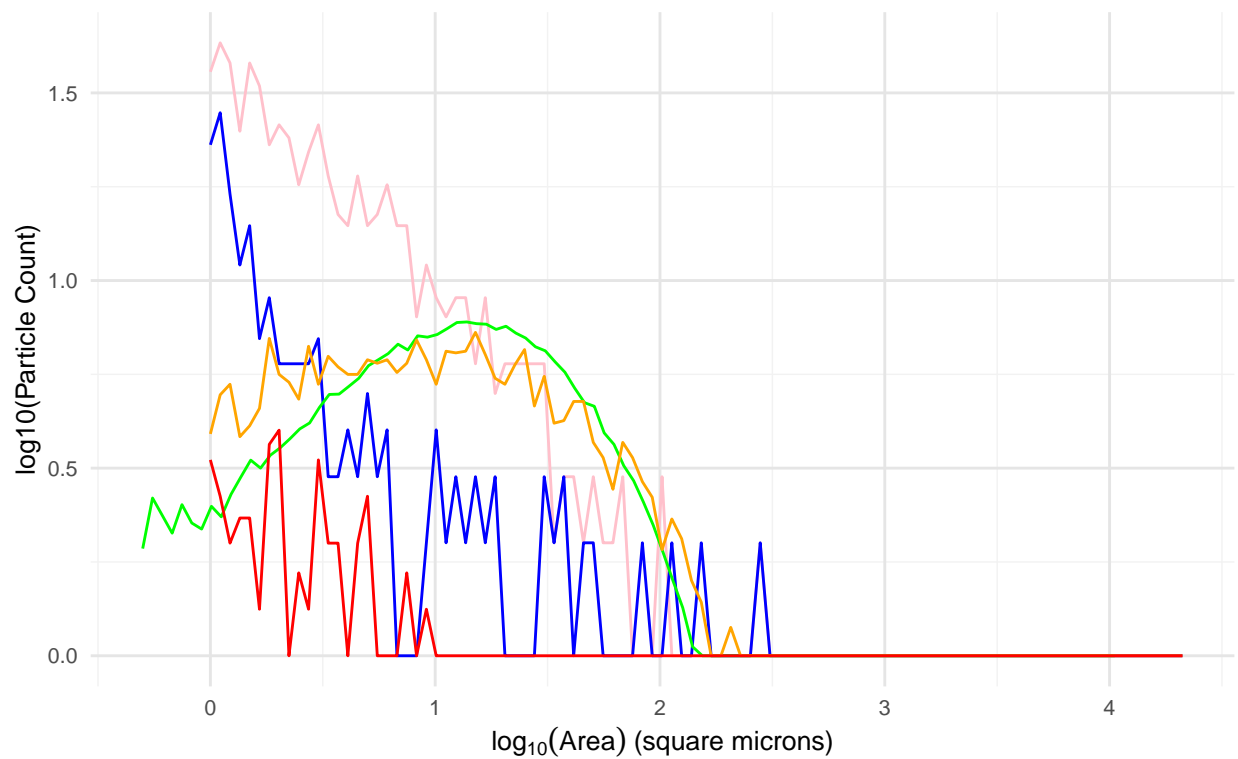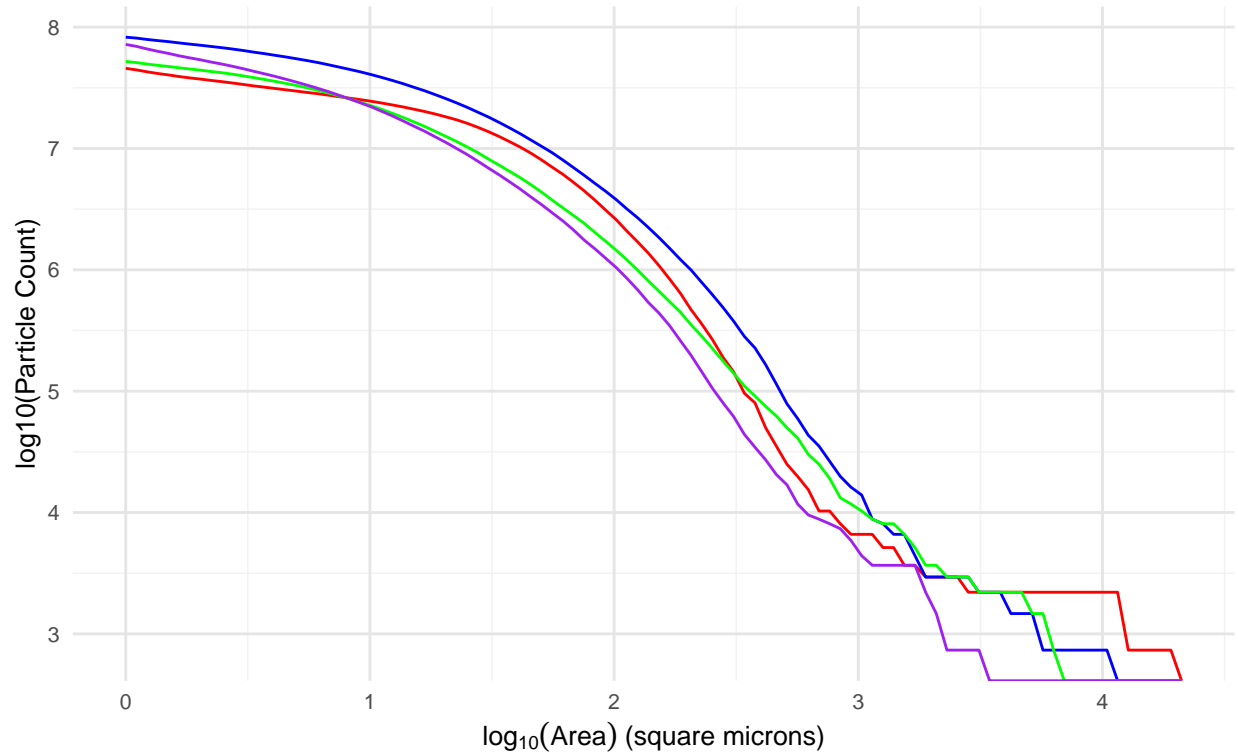
Orange: Starshade Surface, Green: Witness Surface

Edge Analysis 11: Cumulative Particle Area Distribution over 0.1 meter

ᴄ: Starshade Observed, Blue: Calibration Observed, Green: Model, Orange: SLSM Starshade, Red: SLSM
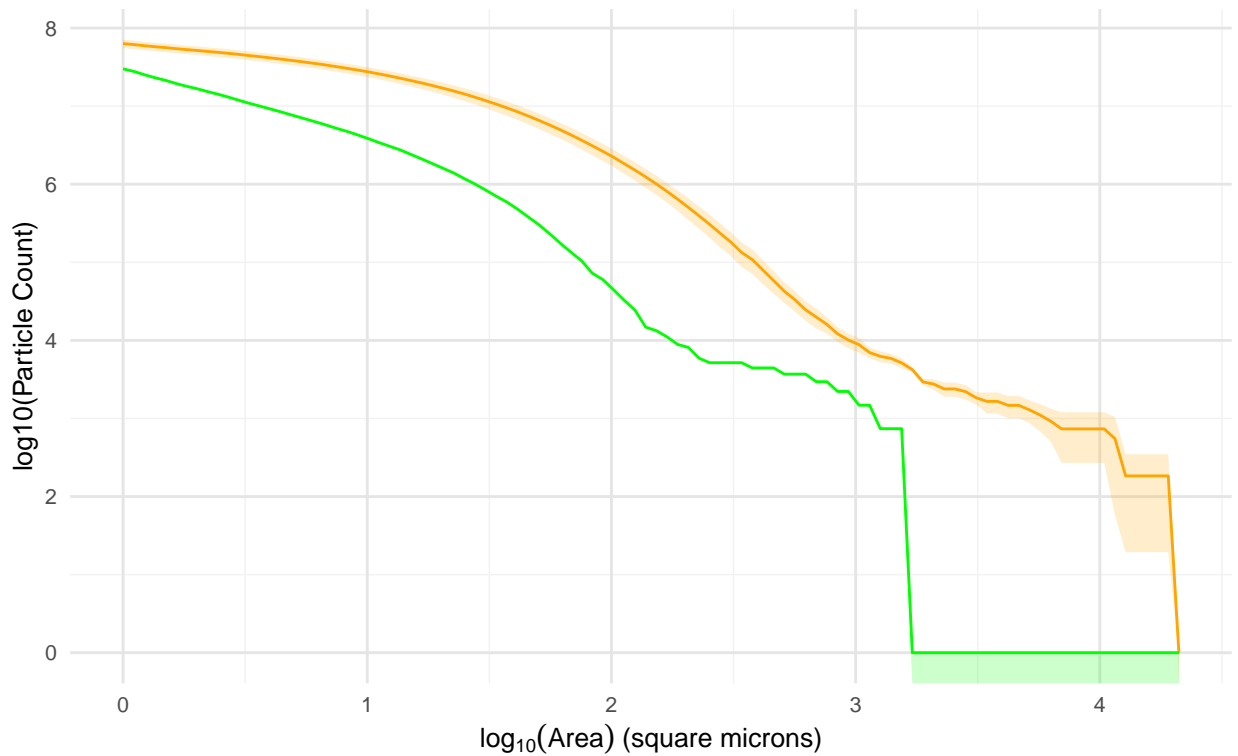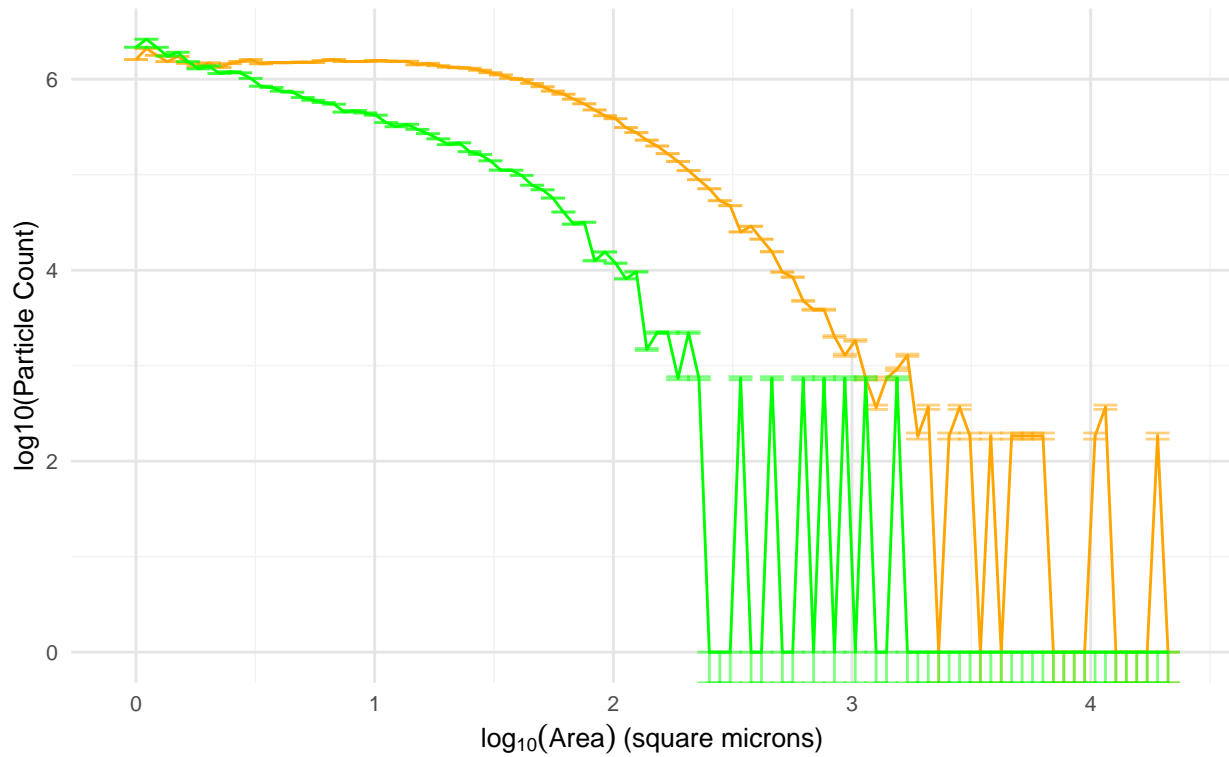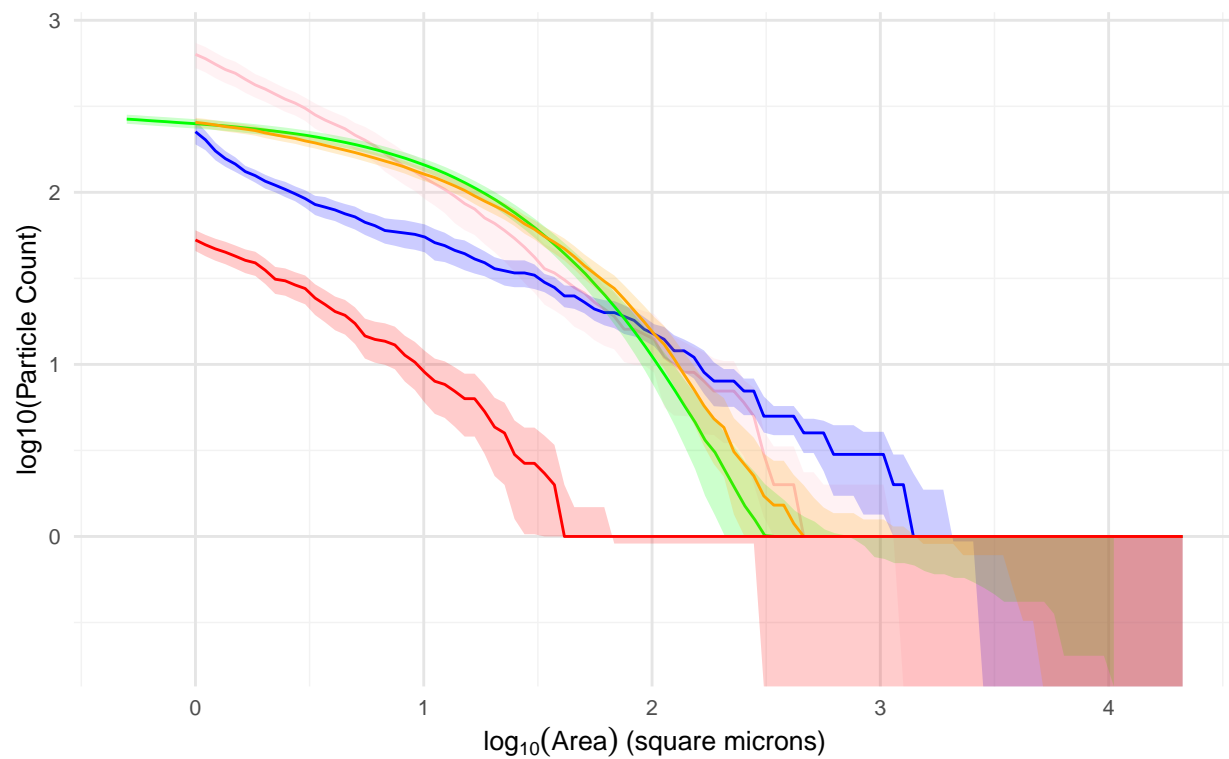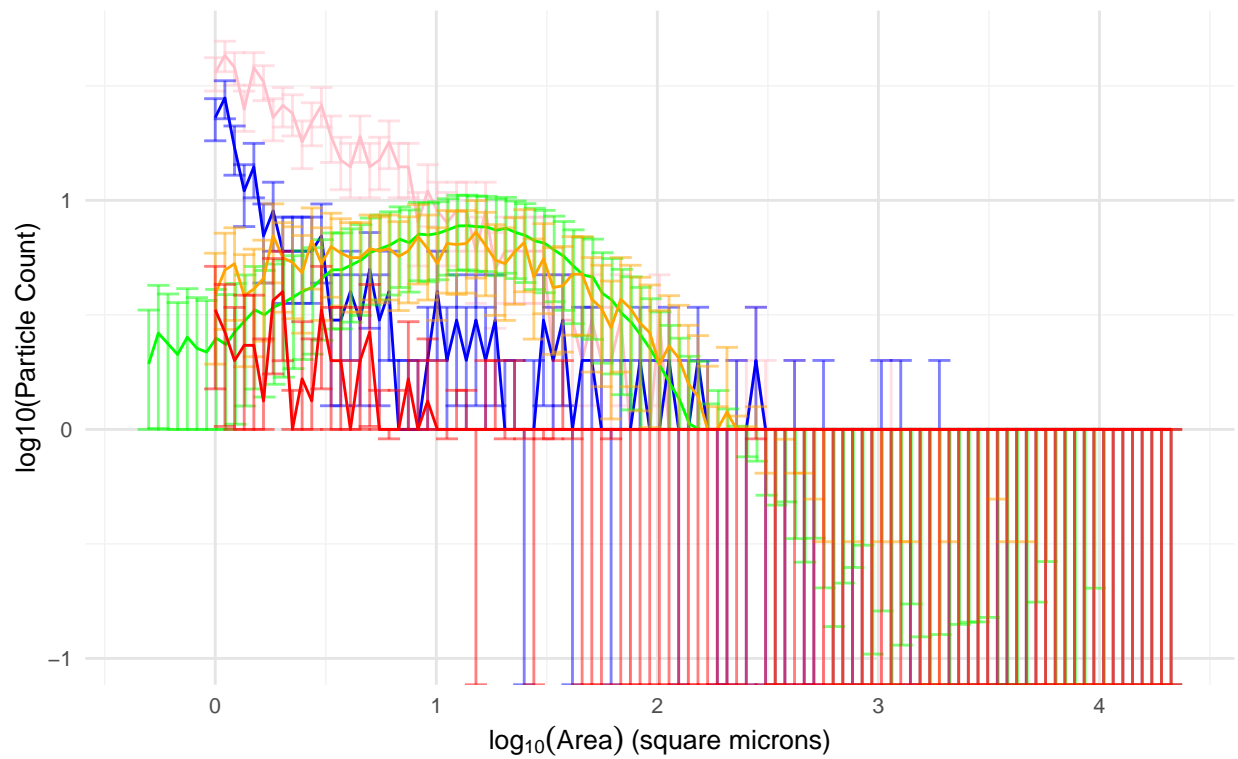
Edge Analysis 11: Binned Particle Area Distribution over 0.1 meter

k: Starshade Observed, Blue: Calibration Observed, Green: Model, Orange: SLSM Starshade, Red: SLSM

Surface Analysis 11 – Samples: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 12: Cumulative Particle Area Distribution over 0.1 square meter

Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface

Surface Analysis 12: Binned Particle Size Distribution over 0.1 square meters

Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface

Edge Analysis 12: Cumulative Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Obvserved, Green: Model,
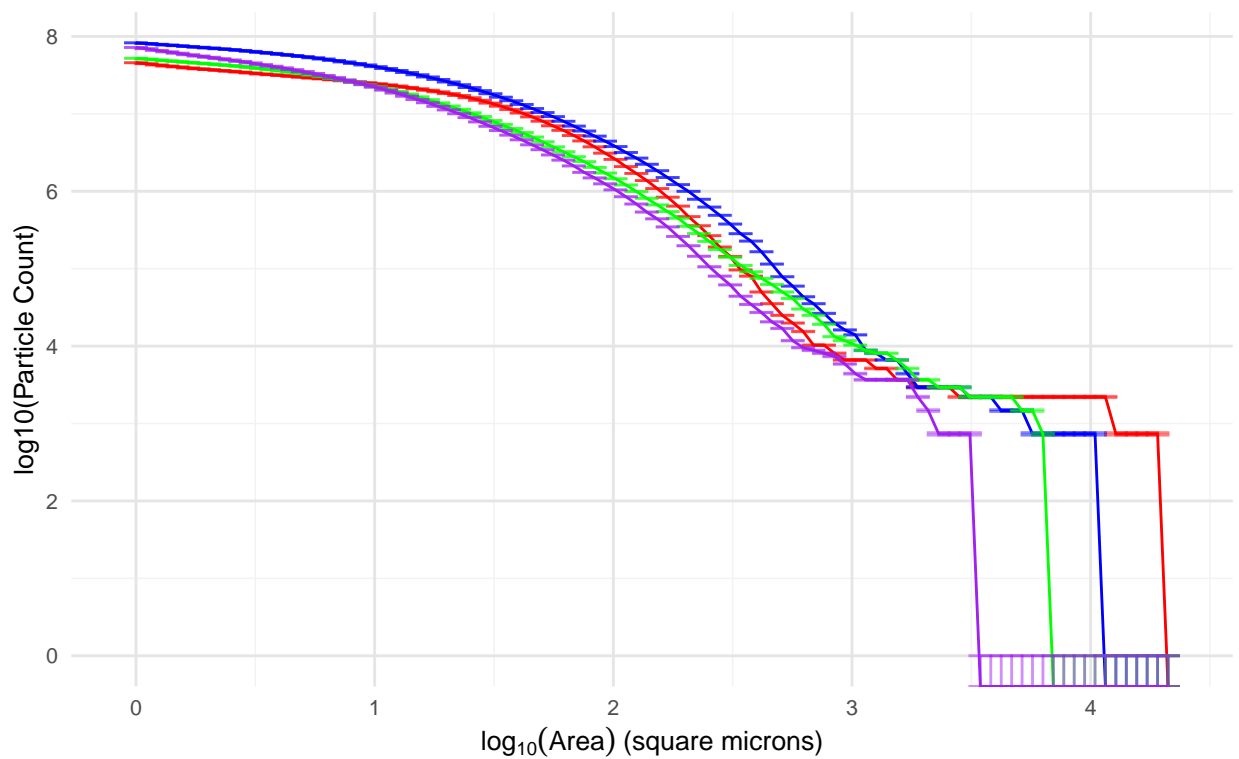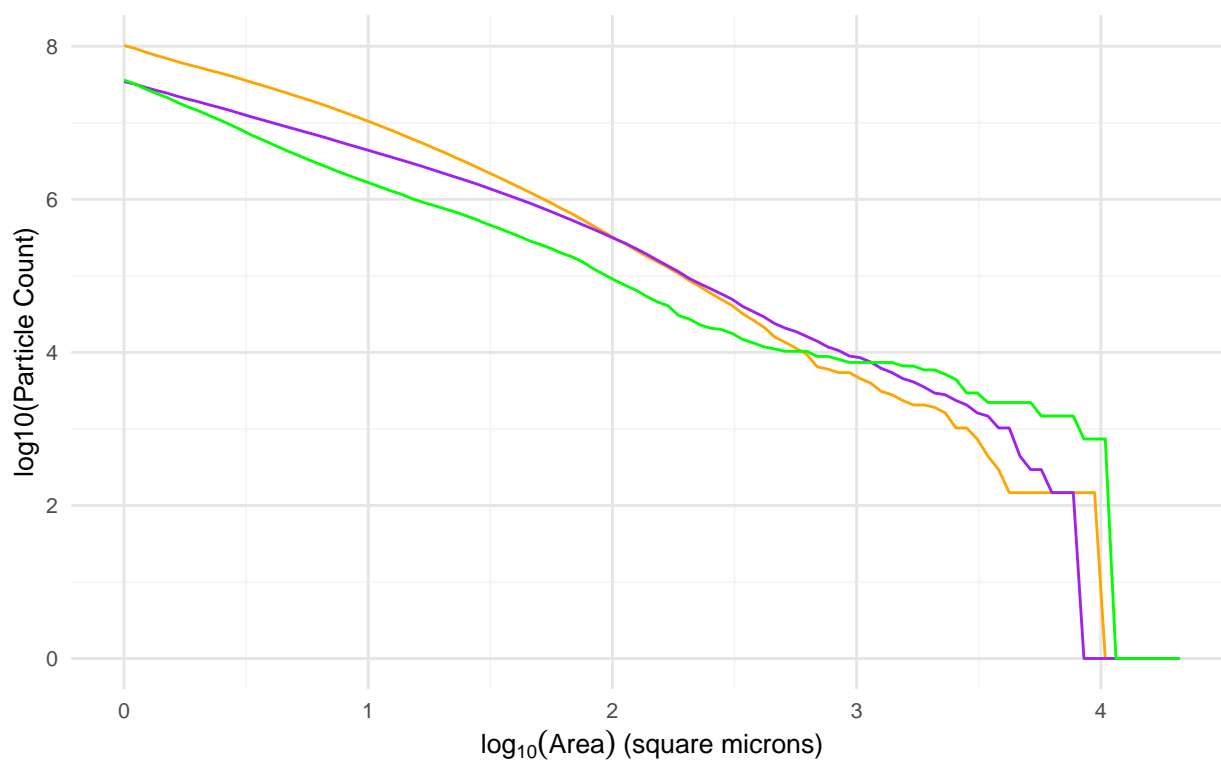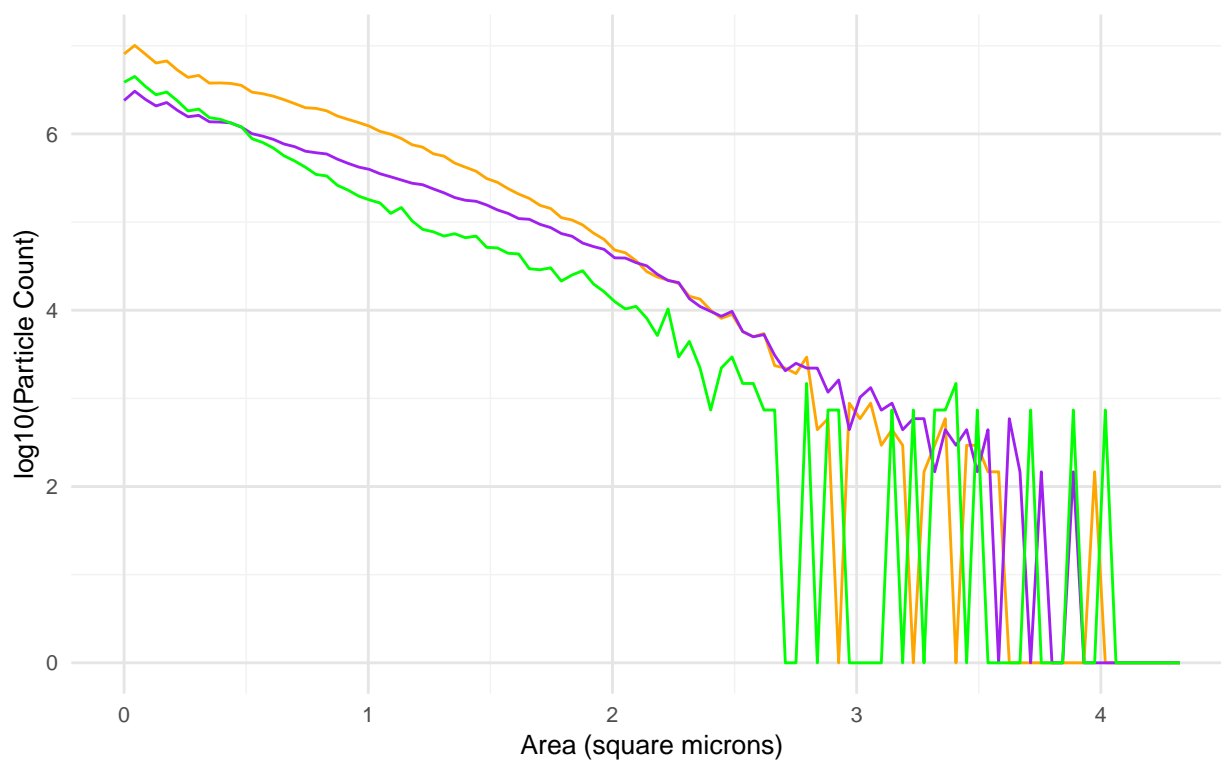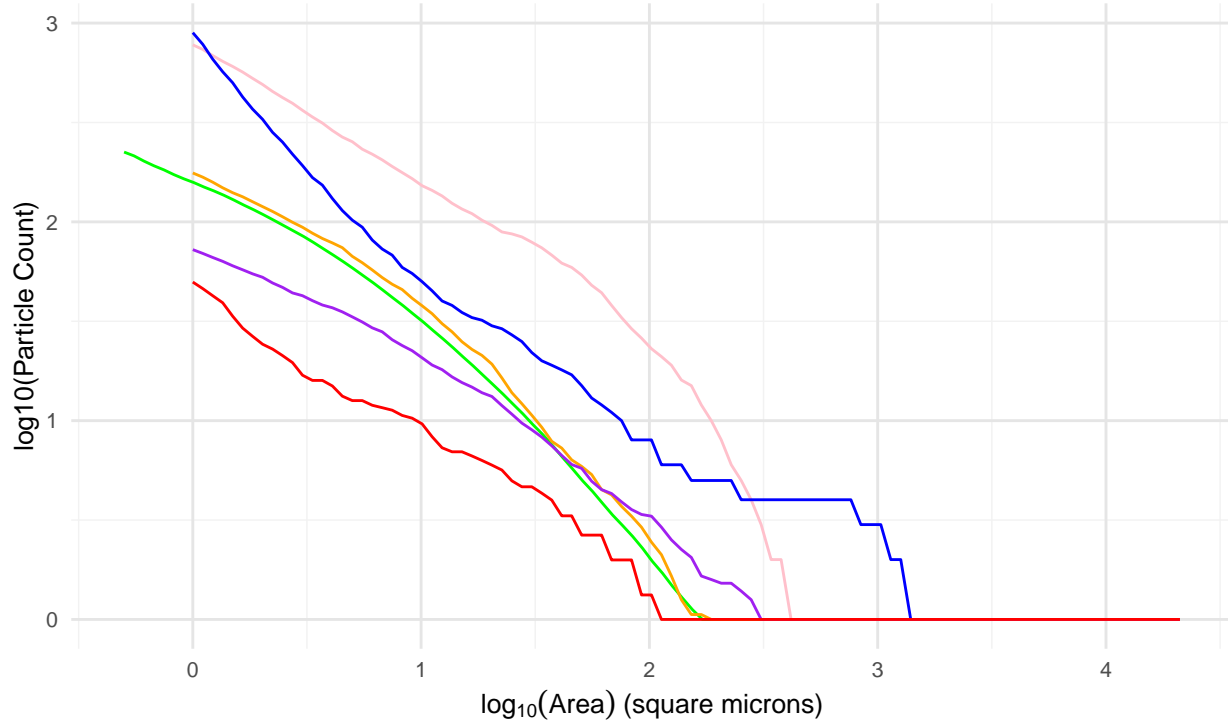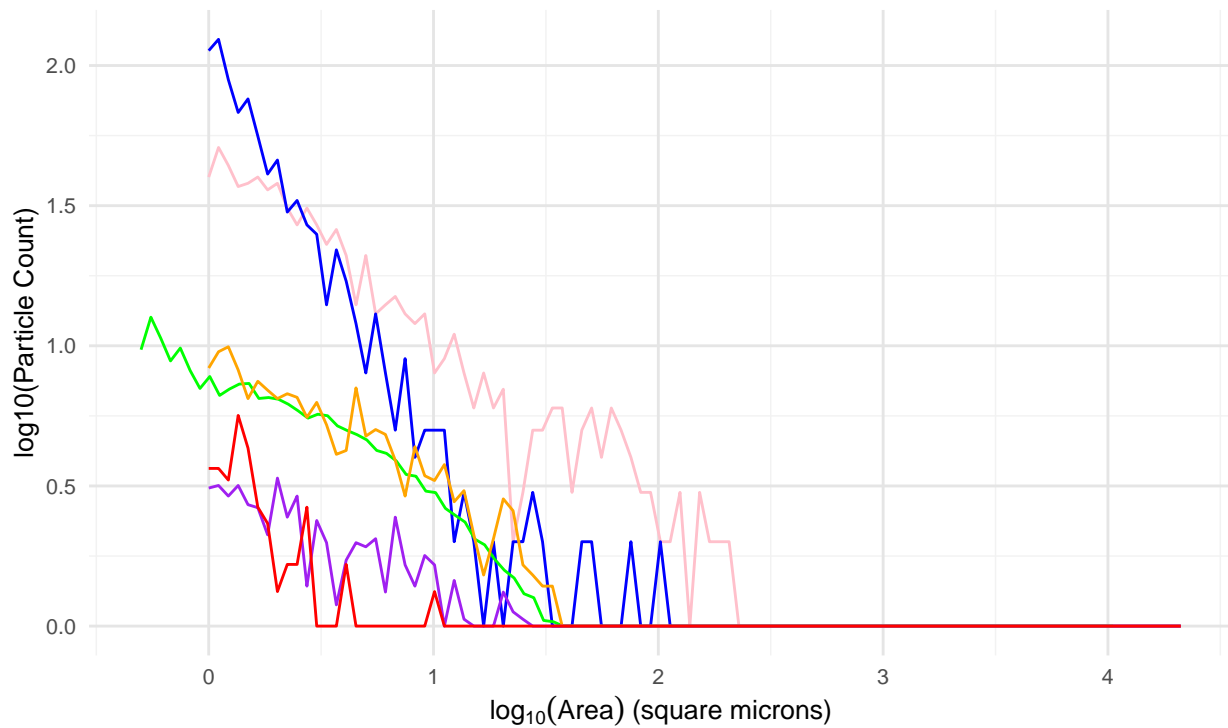Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness
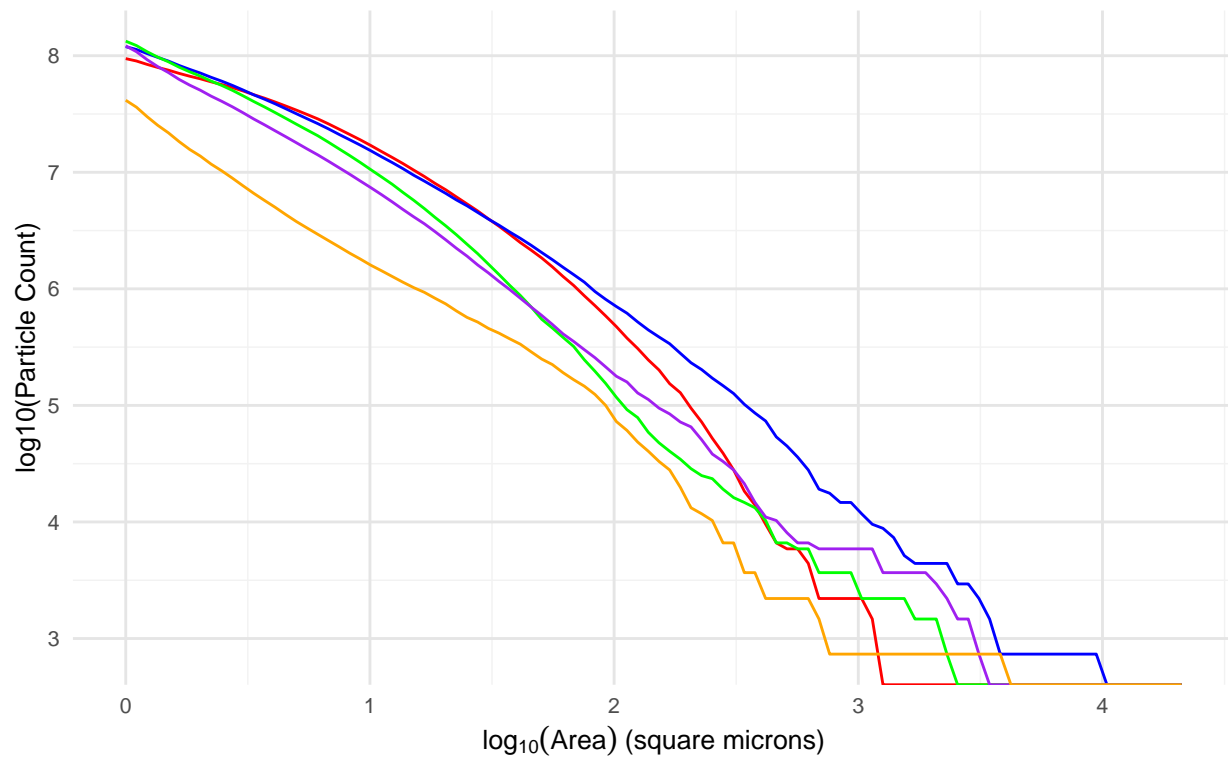

Edge Analysis 12: Binned Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Obvserved, Green: Model,
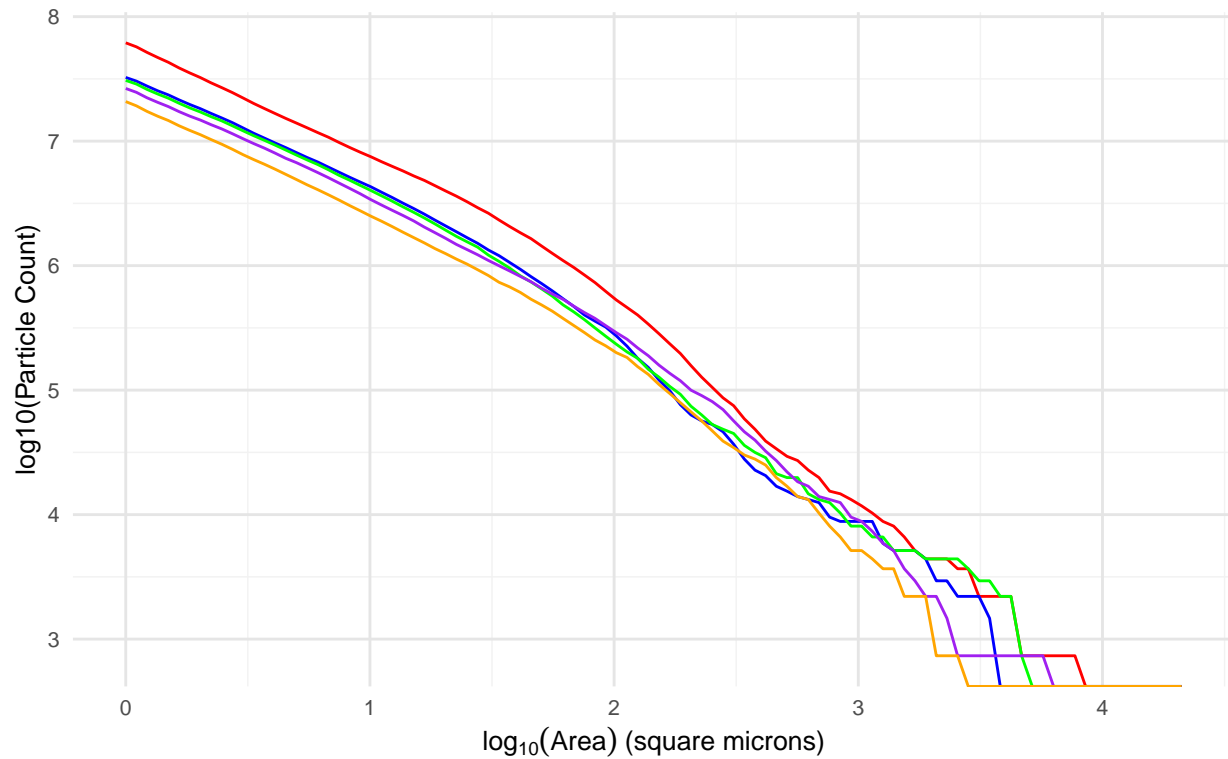Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

urface Analysis 12 – Samples : Cumulative Particle Area Distribution over 0.1 squar

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

rface Analysis 9 – Samples : Cumulative Particle Area Distribution over 0.1 square

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

rface Analysis 9 – Samples : Cumulative Particle Area Distribution over 0.1 square

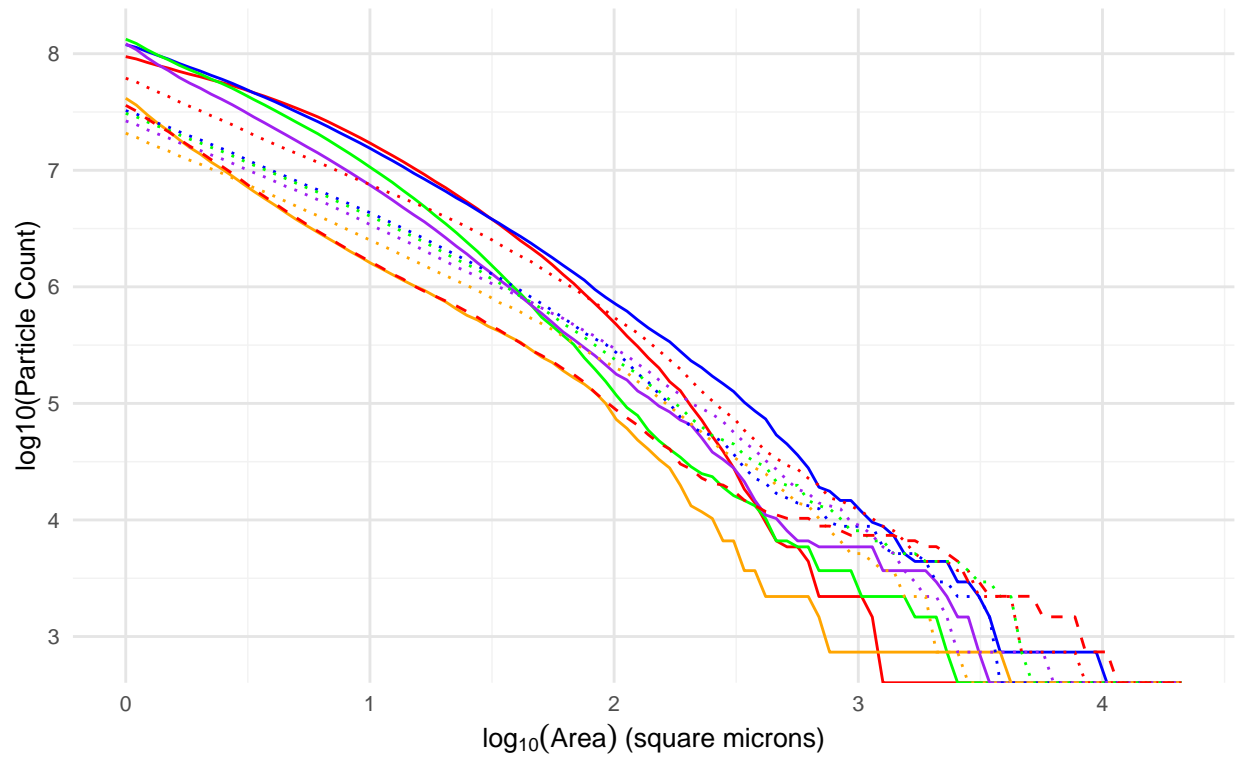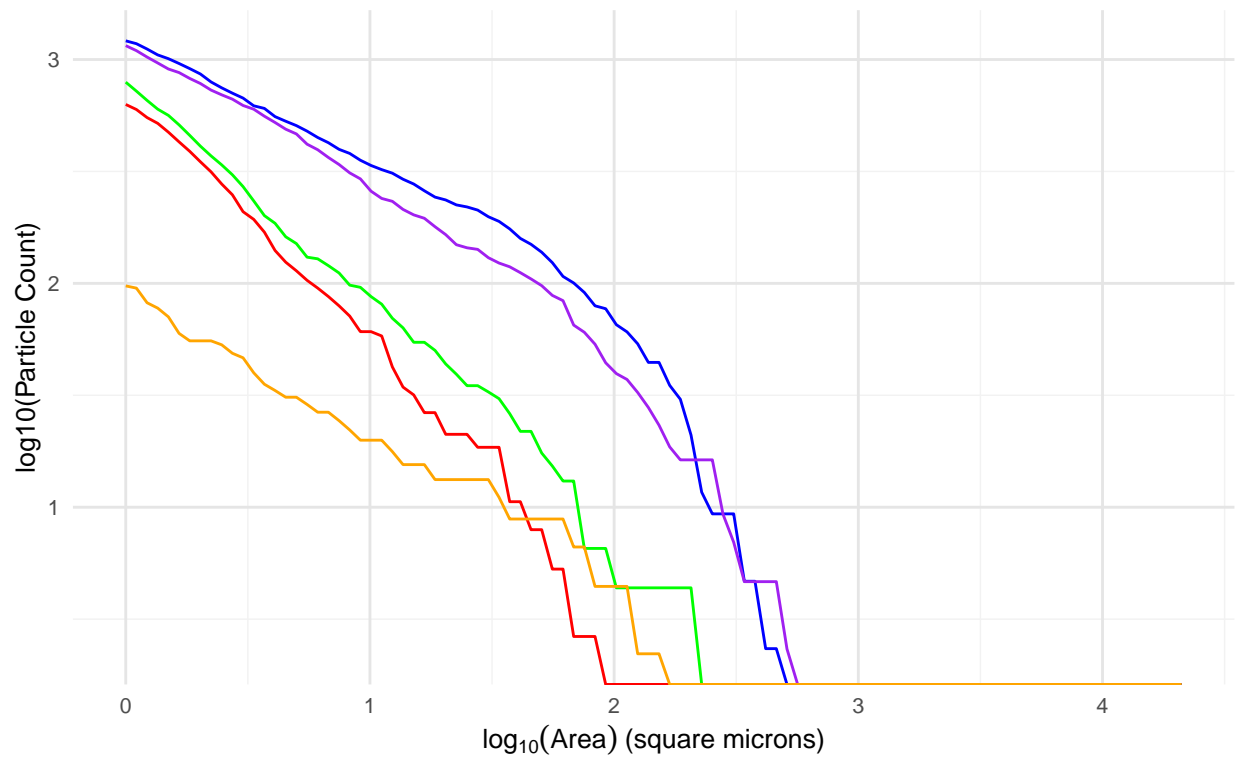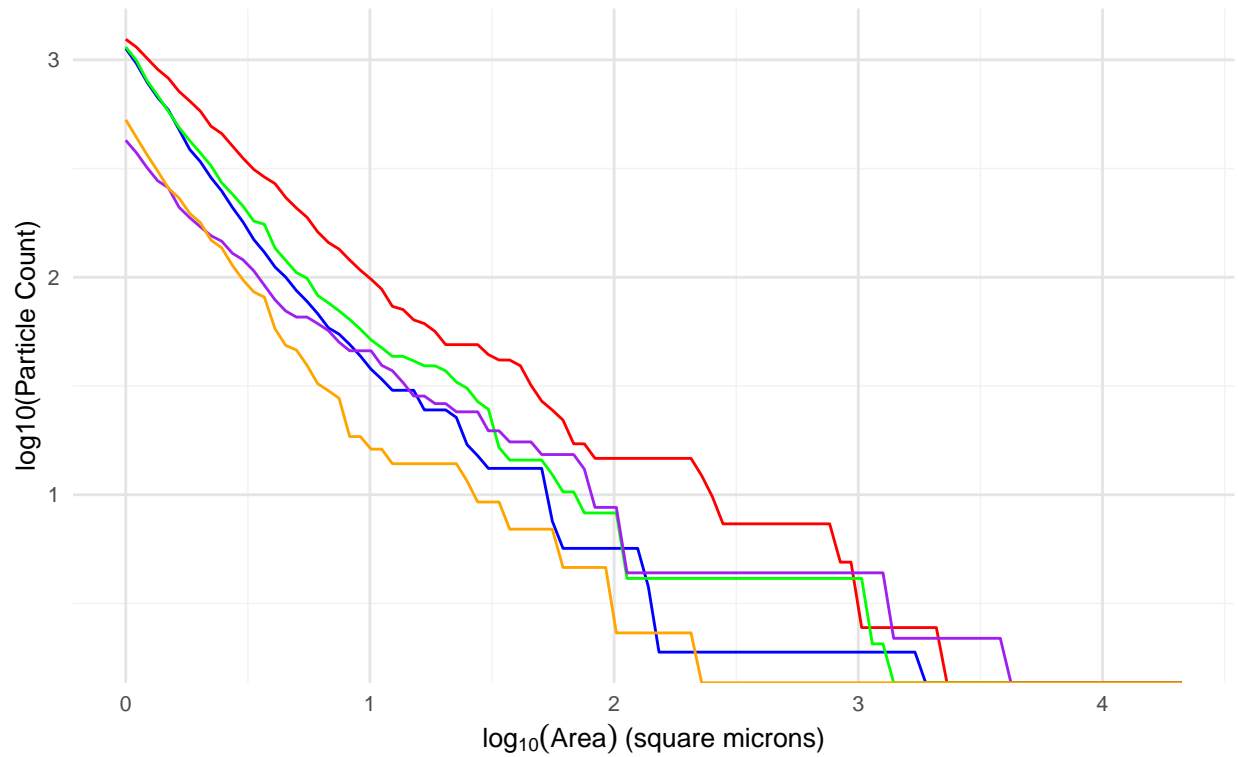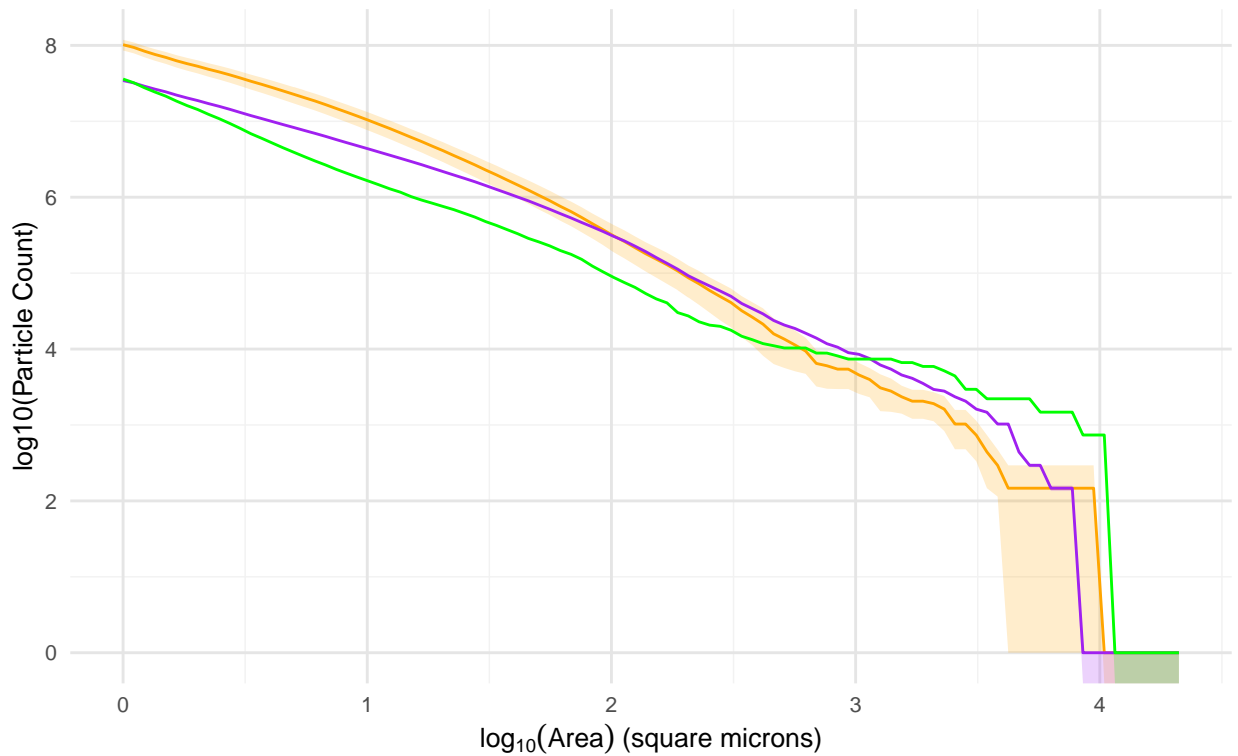Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 12: Cumulative Particle Area Distribution over 0.1 square meter

Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface

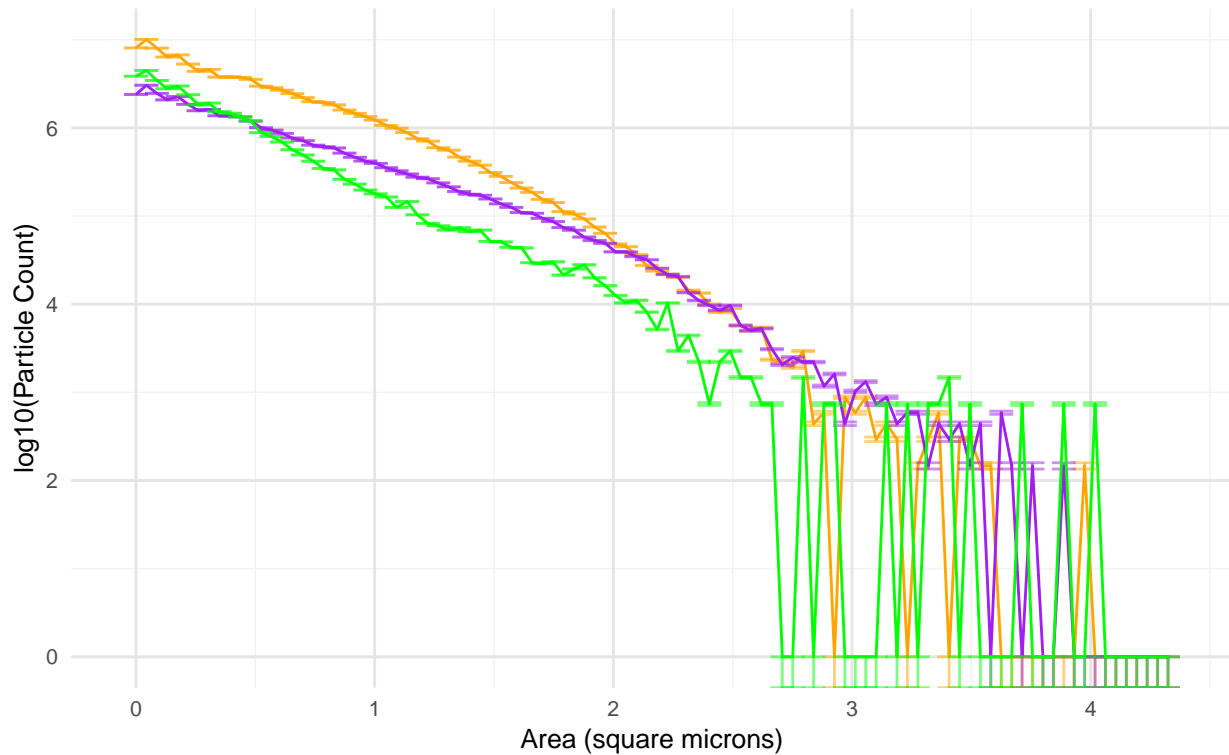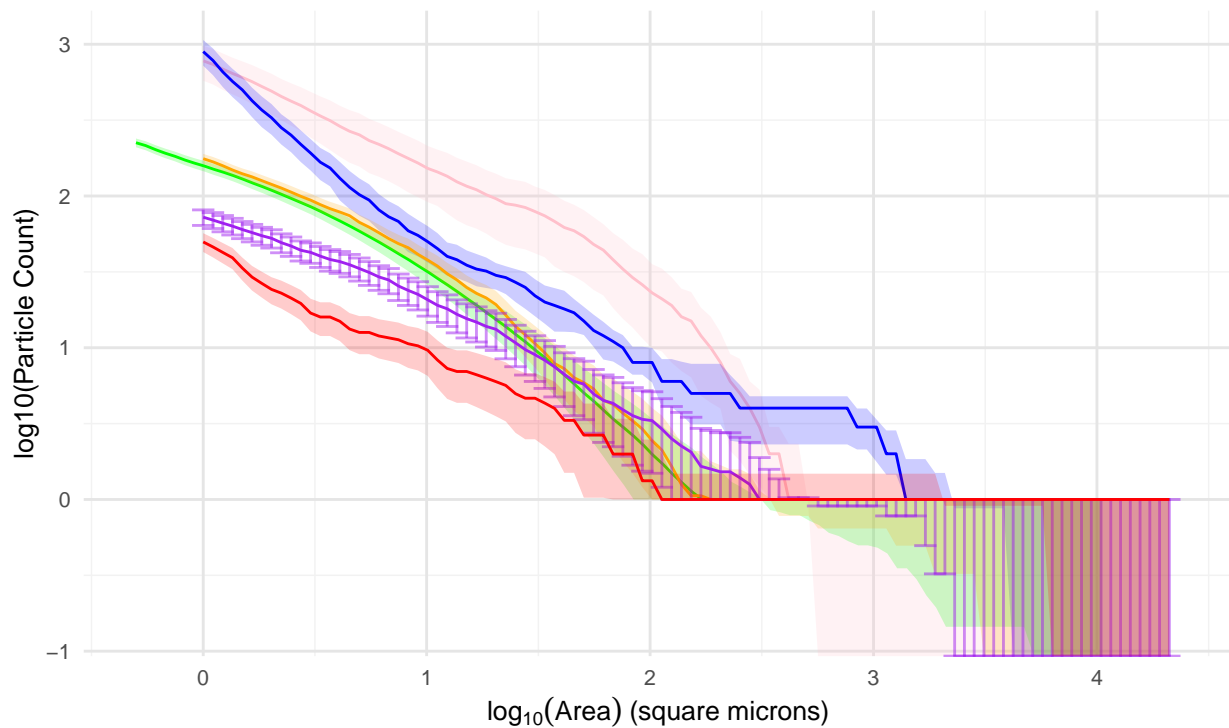**Surface Analysis 12: Binned Particle Size Distribution over 0.1 square meters**

Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface

Edge Analysis 12: Cumulative Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Observed, Green: Model,
Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness
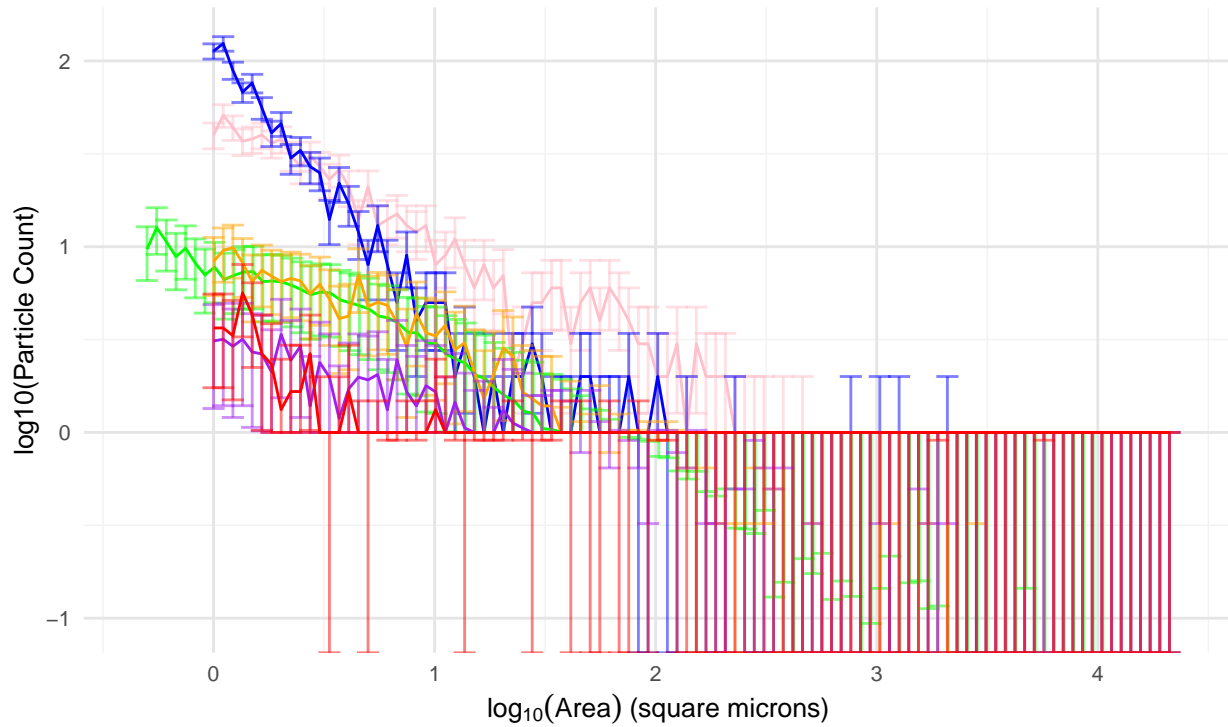
Edge Analysis 12: Binned Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Observed, Green: Model,
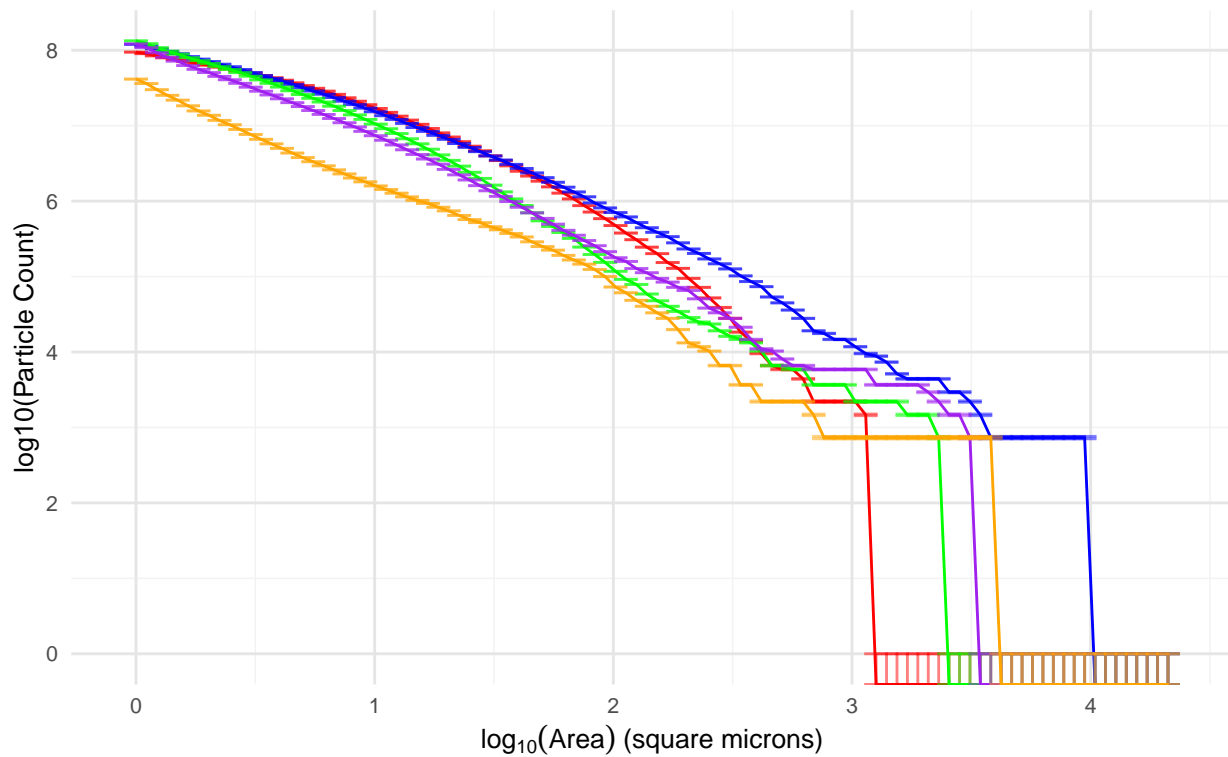Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness

Surface Analysis 12 – Samples: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Calibration Analysis 12 – Sample: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

All Surface Analysis 12 – Samples: Cumulative Particle Area Distribution

Solid: Starshade Samples, Dotted: Calibration Samples, Dashed: Witness Sample
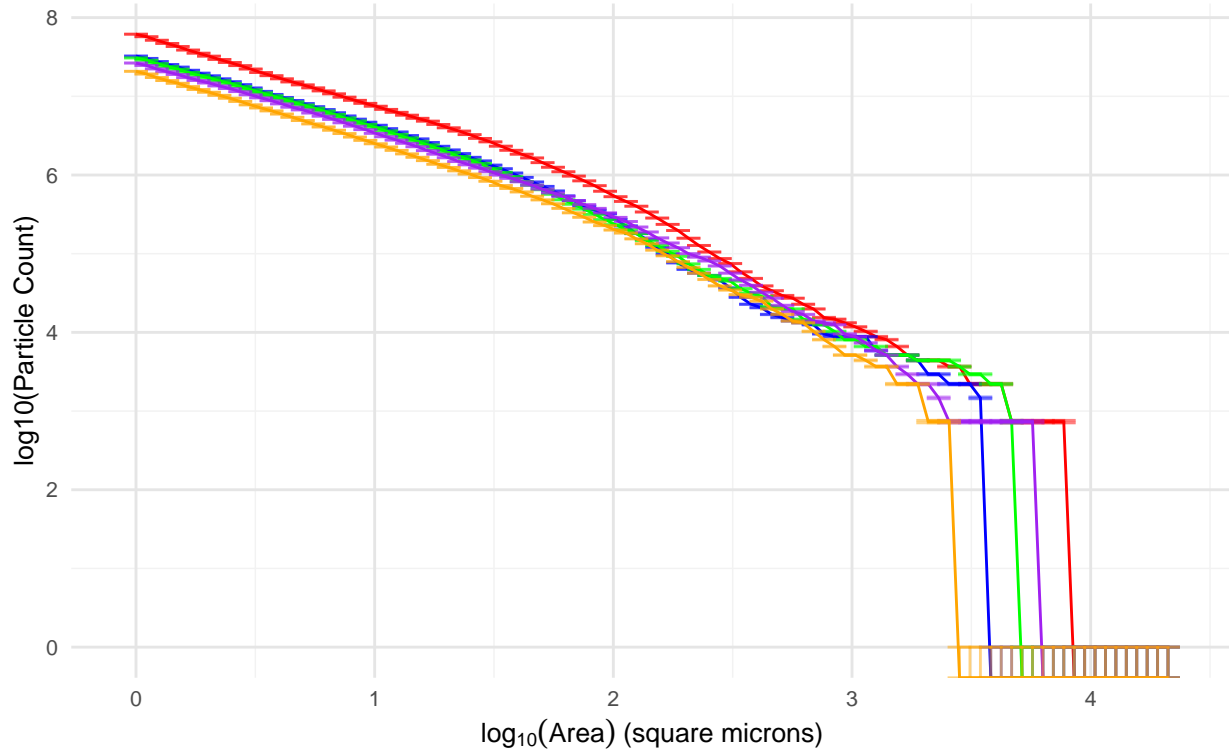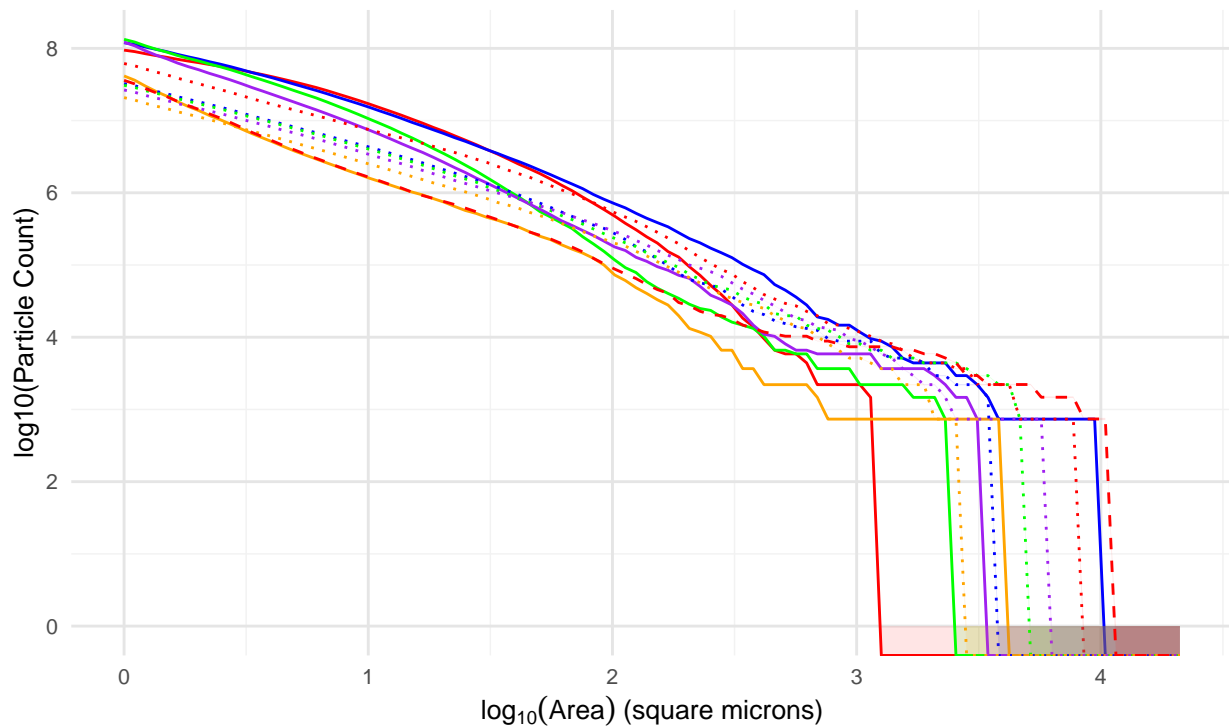Colors: Red (1), Blue (2), Green (3), Purple (4), Orange (5)

Edge Analysis 12 – Samples: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

log10(Particle Count)

$\log_{10}$(Area) (square microns)

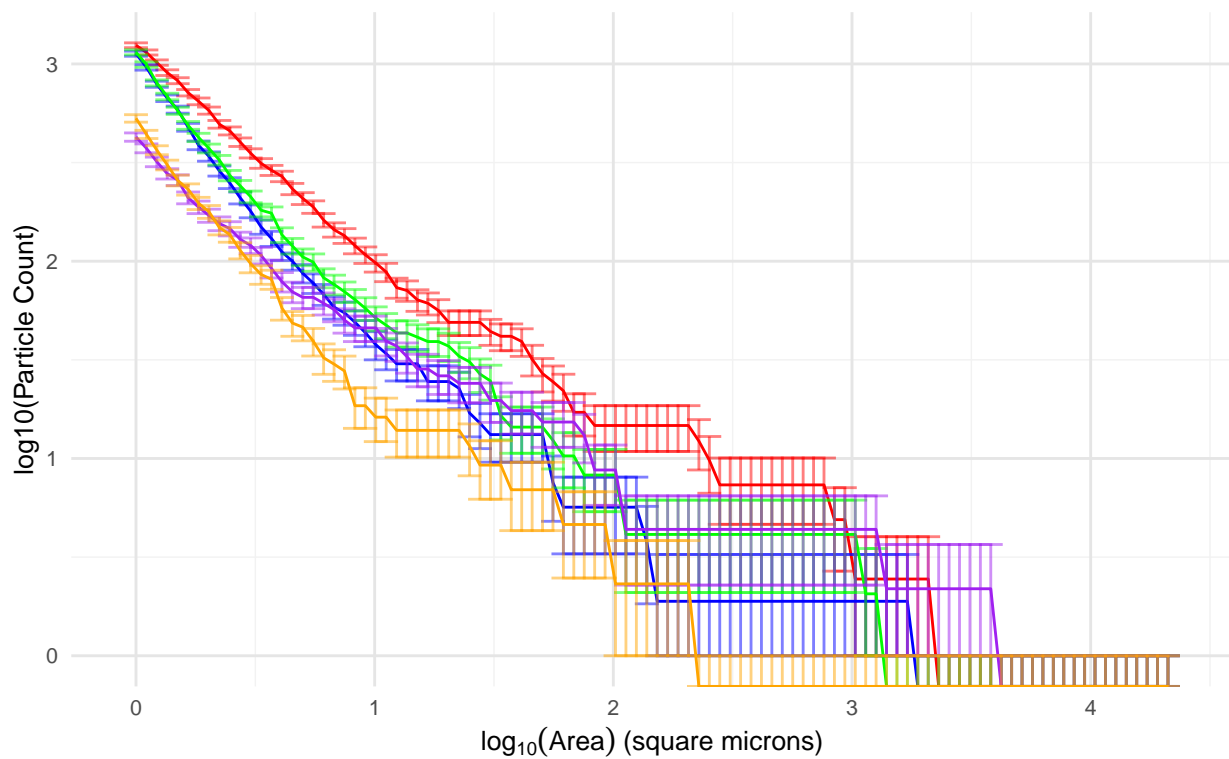# Calibration Edge Analysis 12 – Samples: Cumulative Particle Area Distribution

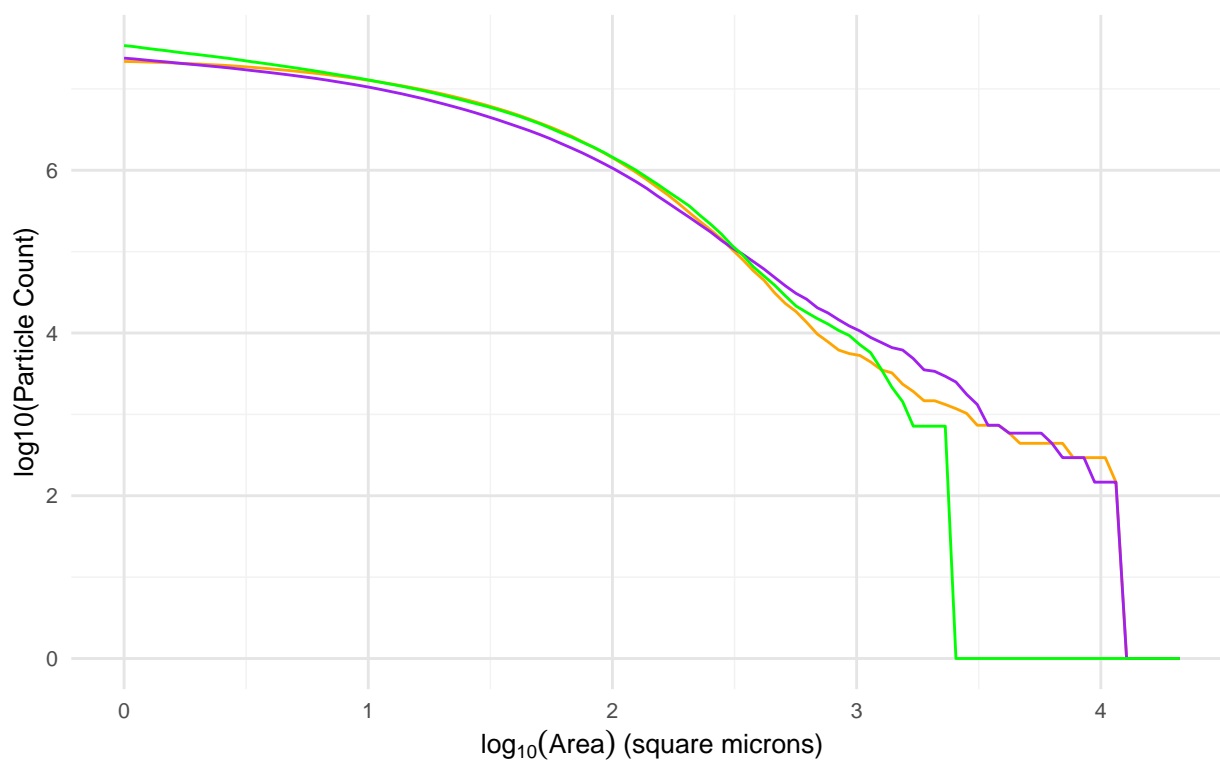Red: Sample 31, Blue: Sample 32, Green: Sample 33, Purple: Sample 34, Orange: Sample 35

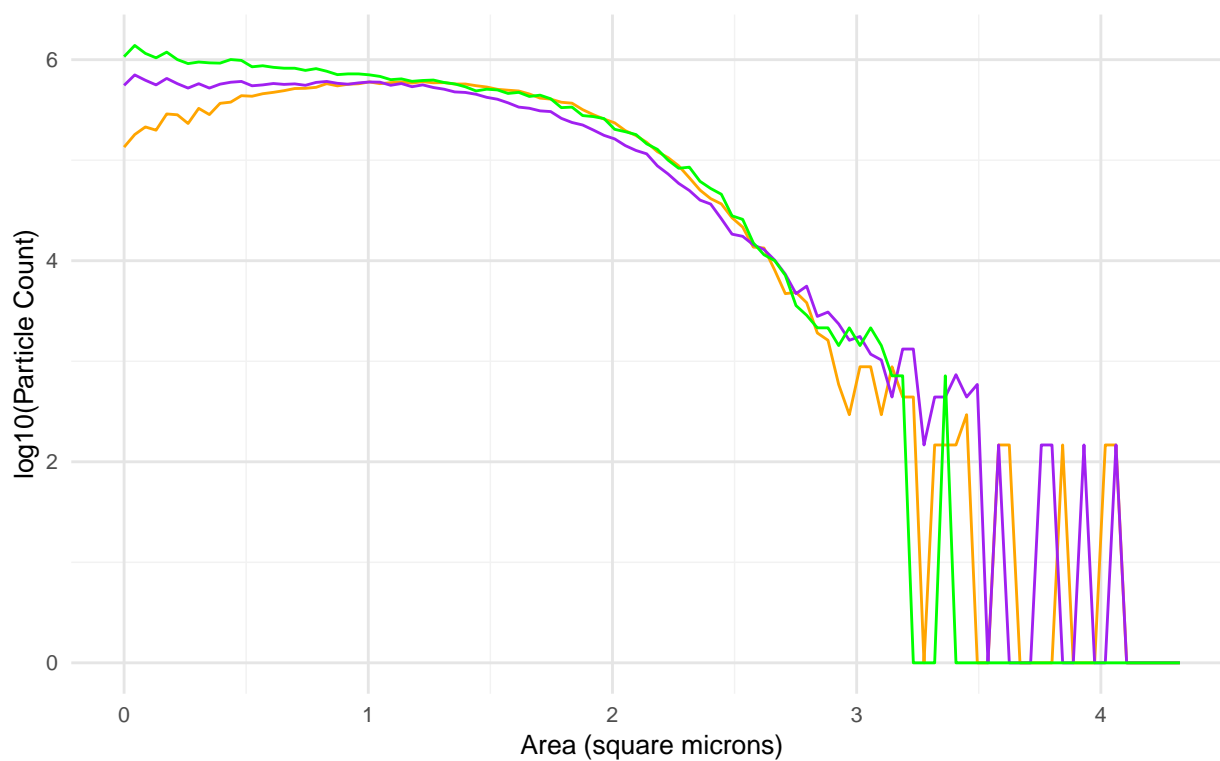log10(Particle Count)

$\log_{10}$(Area) (square microns)

Surface Analysis 13: Cumulative Particle Area Distribution over 0.1 square meter

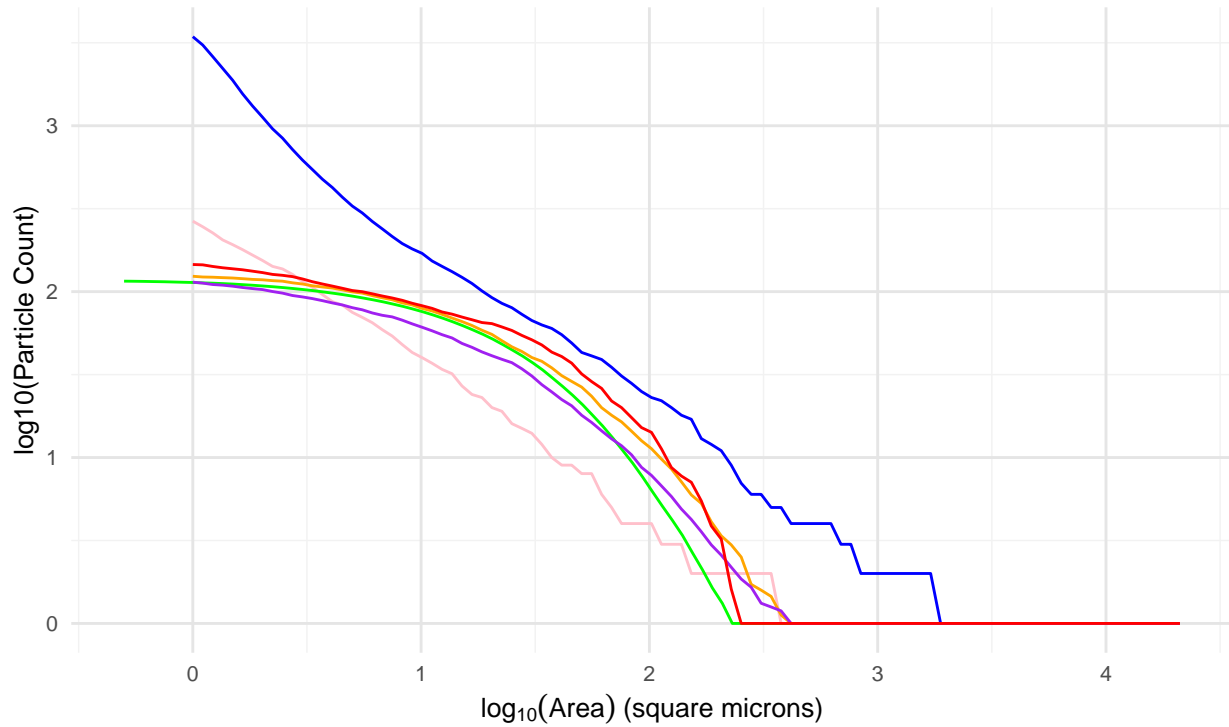Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface

Surface Analysis 13: Binned Particle Size Distribution over 0.1 square meters

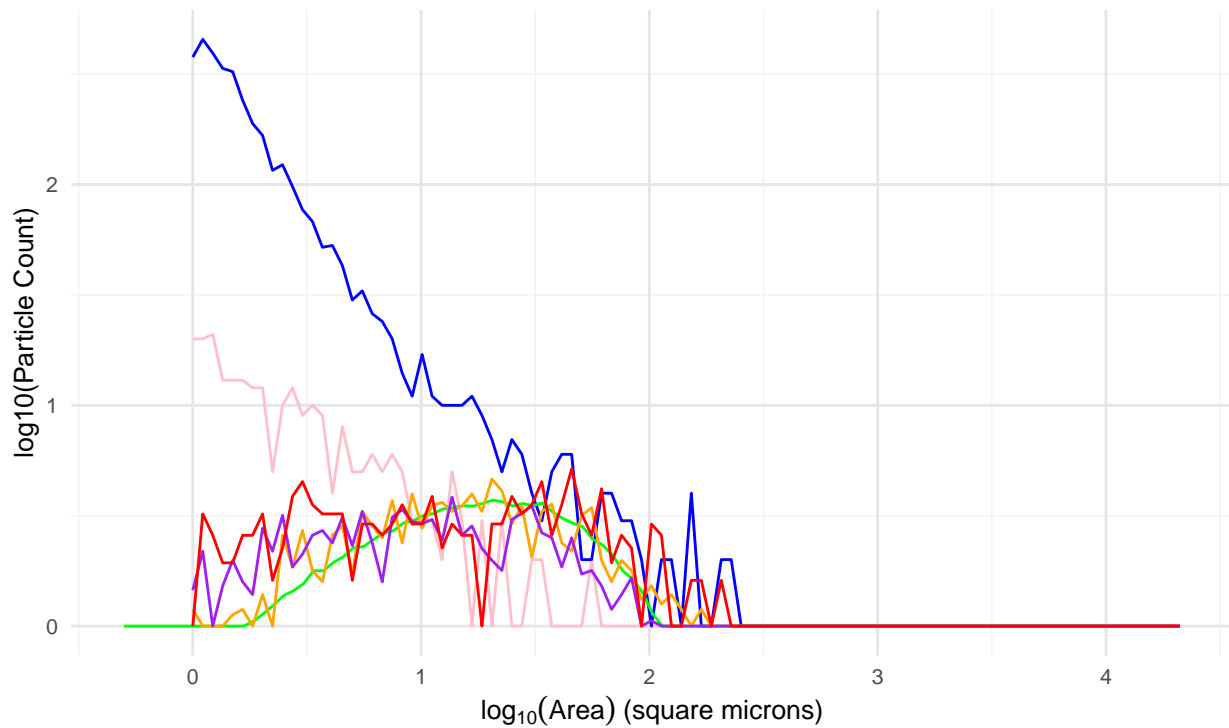Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface

Edge Analysis 13: Cumulative Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Obvserved, Green: Model,
Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness

Edge Analysis 13: Binned Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Obvserved, Green: Model,
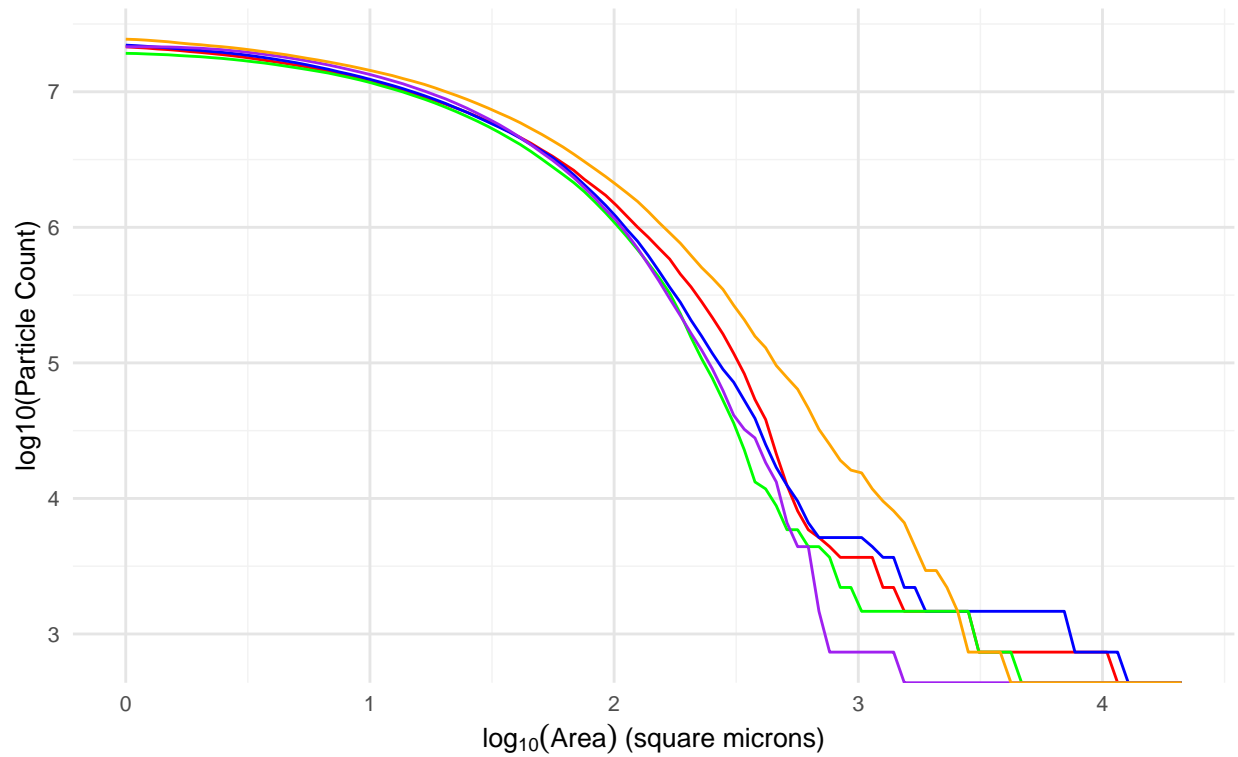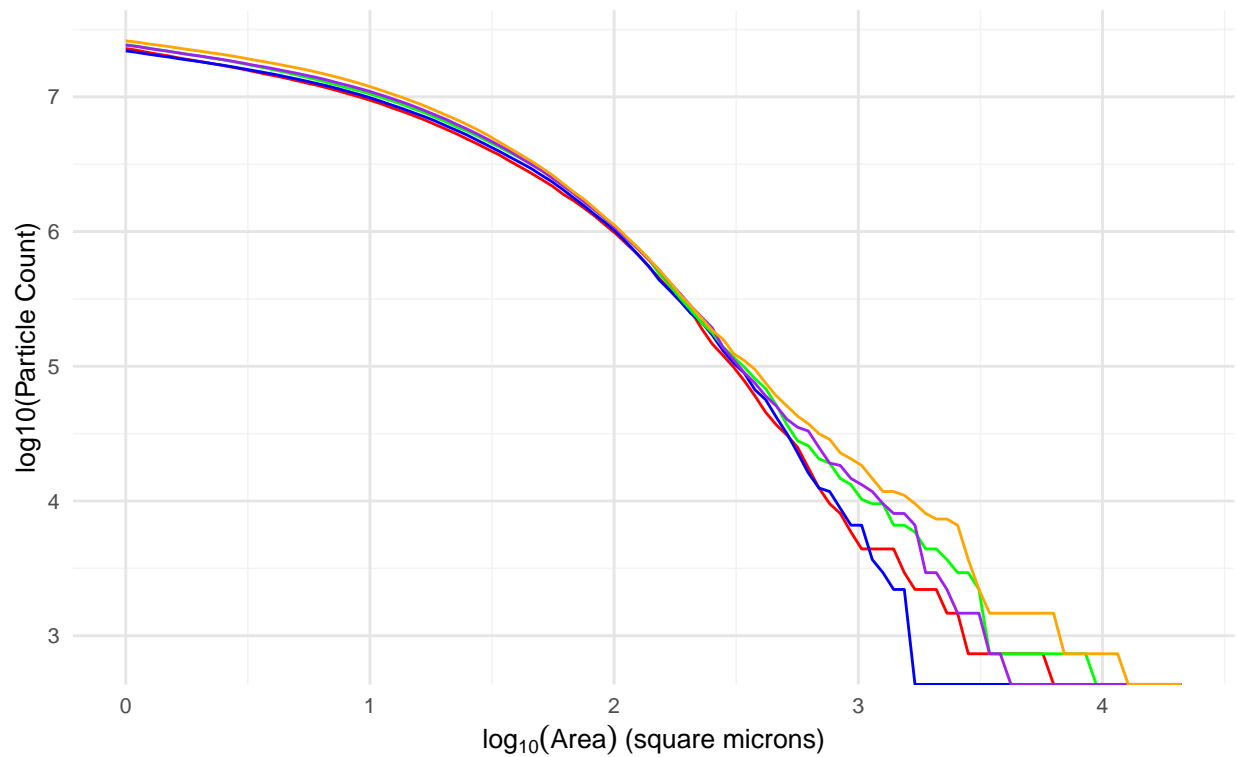Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness

rface Analysis 13 – Samples : Cumulative Particle Area Distribution over 0.1 square

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

oration Analysis 13 – Sample: Cumulative Particle Area Distribution over 0.1 square

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

Surface Analysis 13 – Samples : Cumulative Particle Area Distribution over 0.1 squar

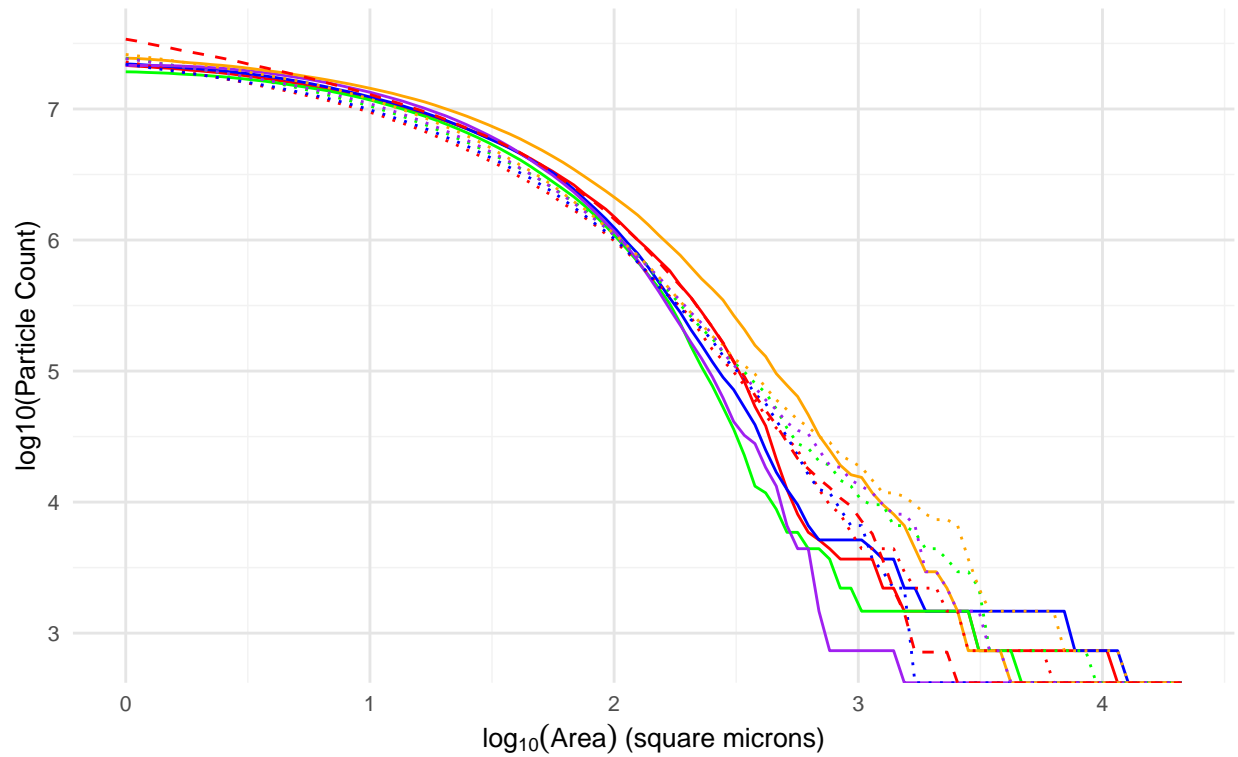Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5
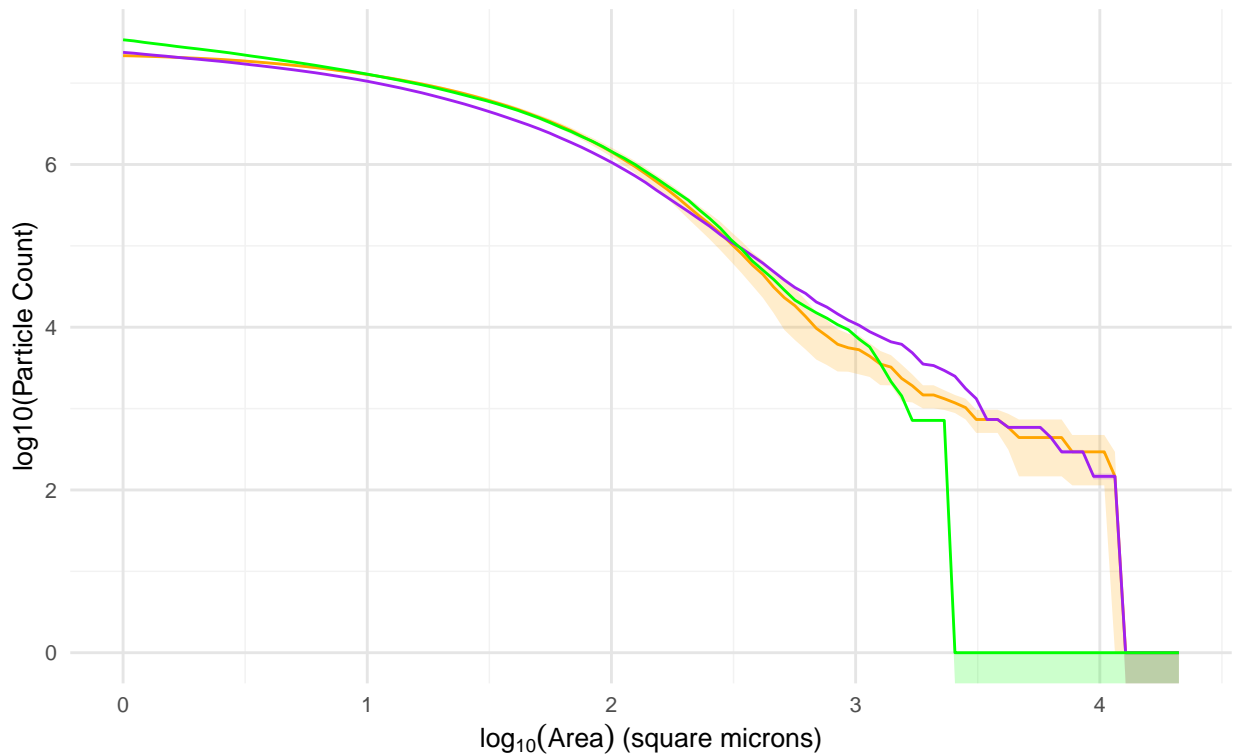

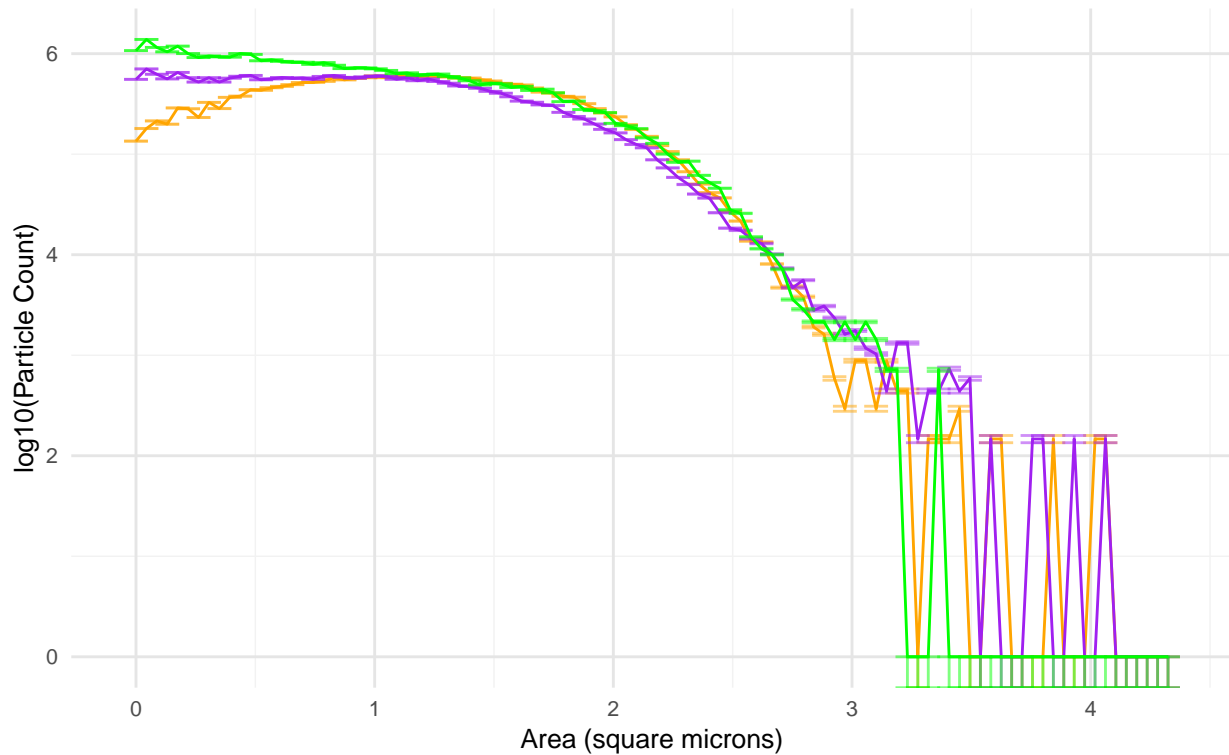## Surface Analysis 13: Cumulative Particle Area Distribution over 0.1 square meter

Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface
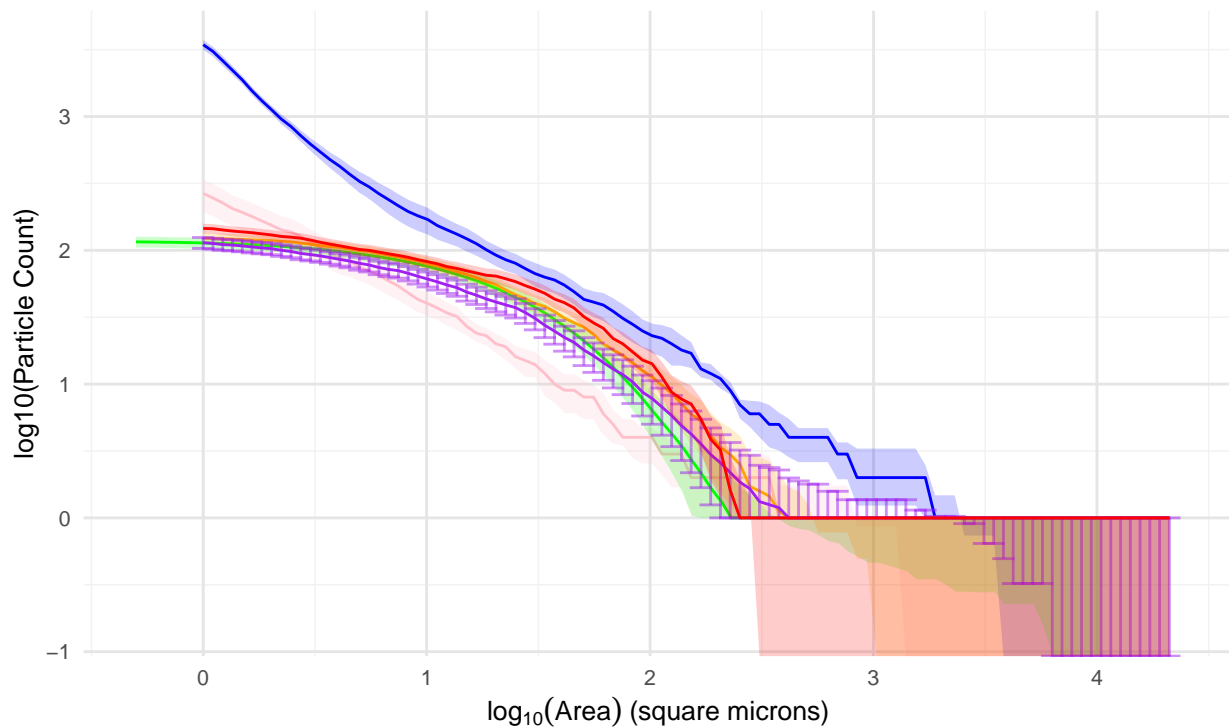
Surface Analysis 13: Binned Particle Size Distribution over 0.1 square meters

Orange: Starshade Surface, Purple: Calibration Surface, Green: Witness Surface
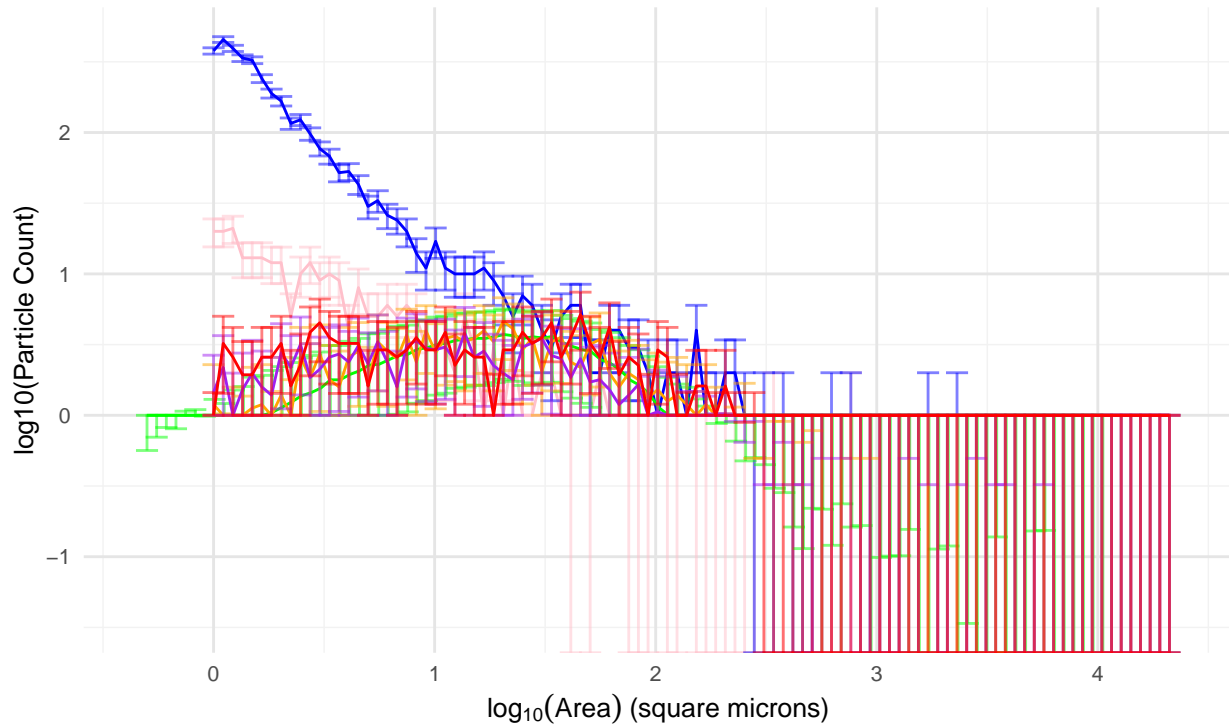

Edge Analysis 13: Cumulative Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Observed, Green: Model,
Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness

Edge Analysis 13: Binned Particle Area Distribution over 0.1 meter

Pink: Starshade Observed, Blue: Calibration Observed, Green: Model,
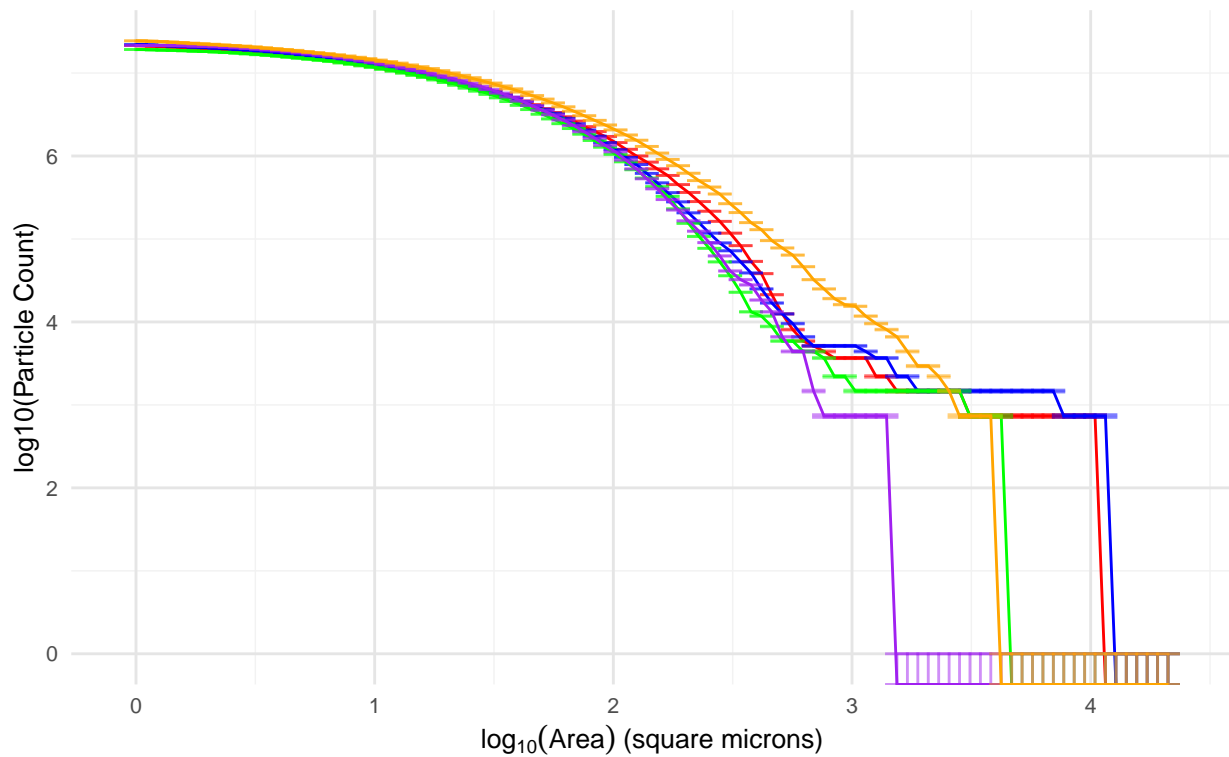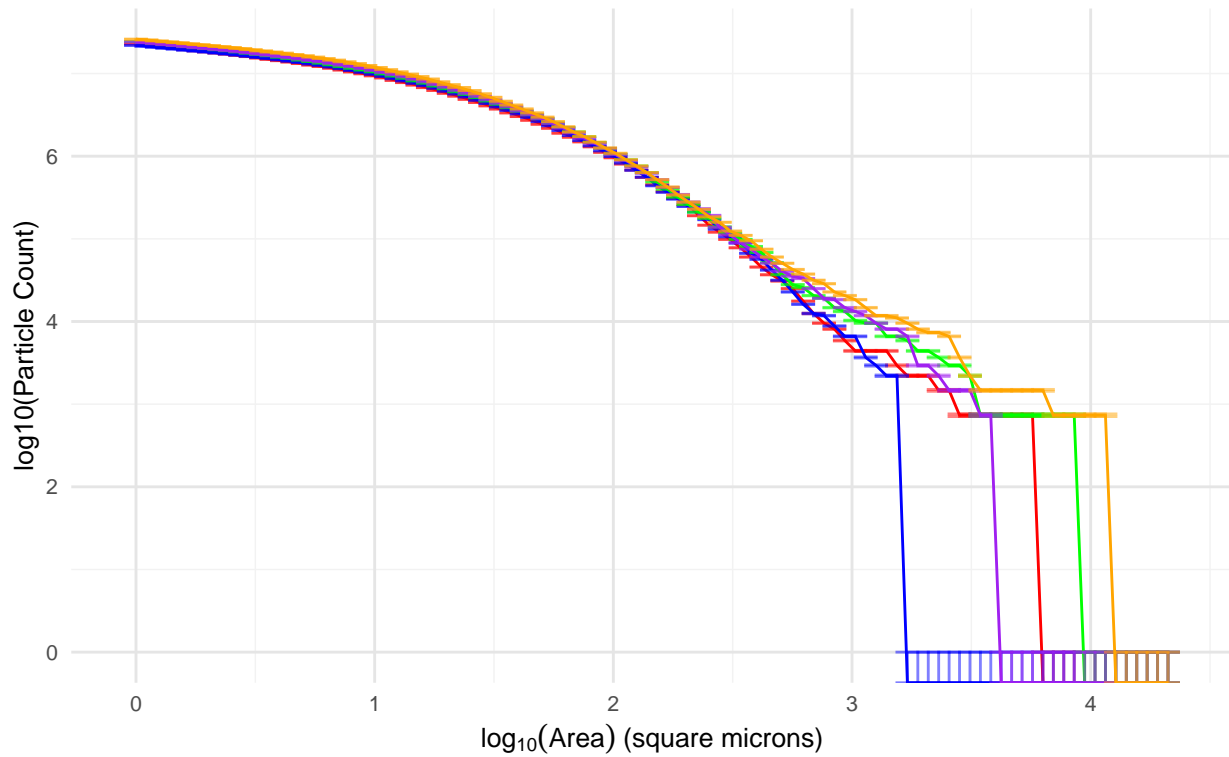Orange: SLSM Starshade, Purple: SLSM Calibration, Red: SLSM Witness

Surface Analysis 13 – Samples: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5
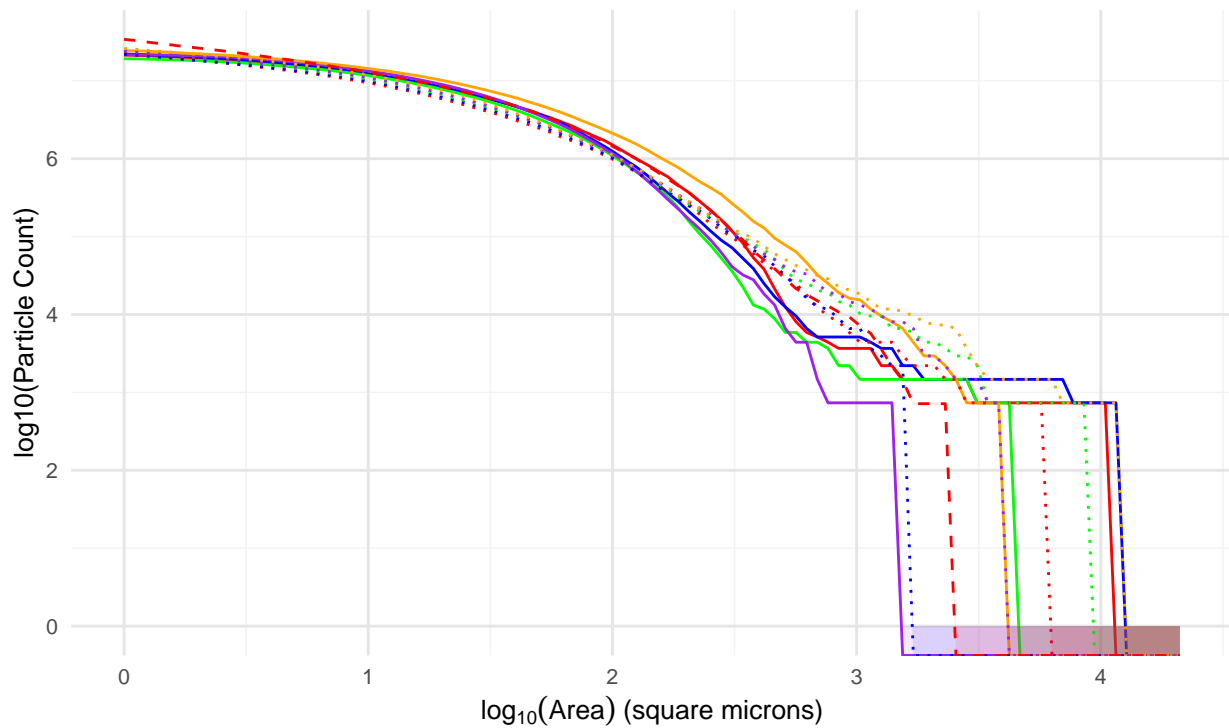
Calibration Analysis 13 – Sample: Cumulative Particle Area Distribution

Red: Sample 1, Blue: Sample 2, Green: Sample 3, Purple: Sample 4, Orange: Sample 5

log10(Particle Count)

log$_{10}$(Area) (square microns)

All Surface Analysis 13 – Samples: Cumulative Particle Area Distribution

Solid: Starshade Samples, Dotted: Calibration Samples, Dashed: Witness Sample
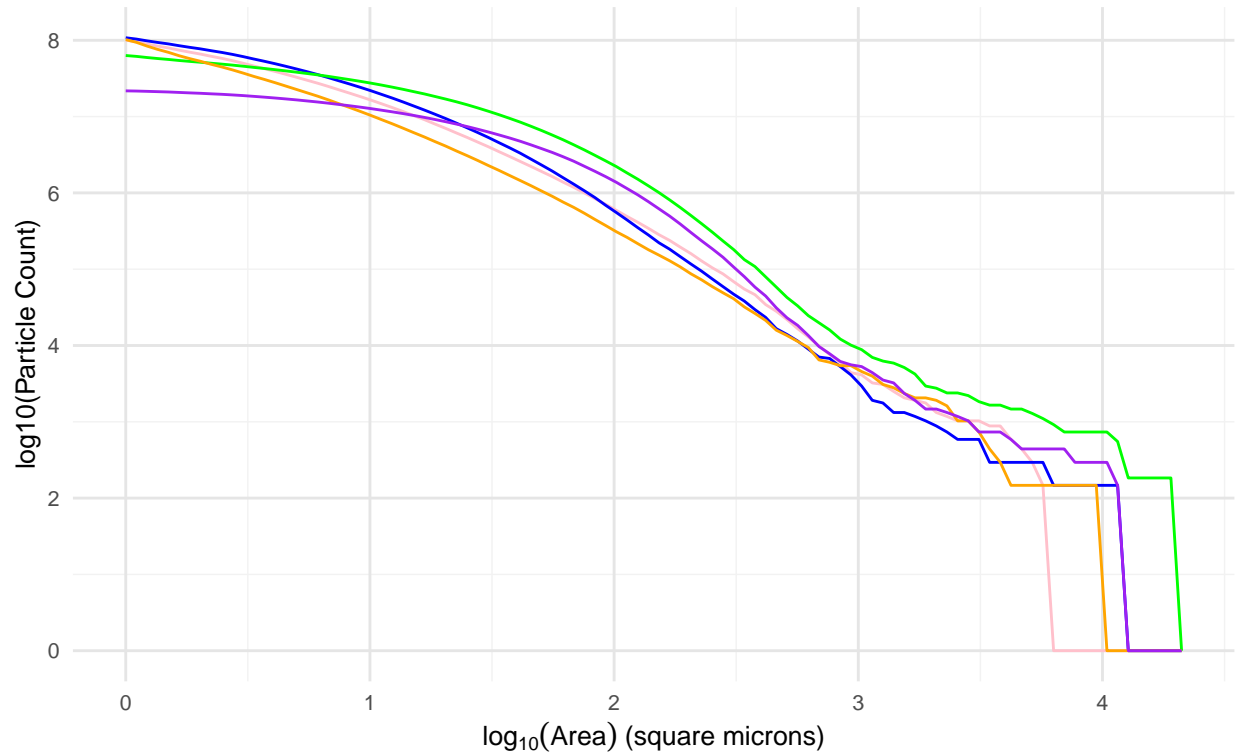Colors: Red (1), Blue (2), Green (3), Purple (4), Orange (5)

log10(Particle Count)

log$_{10}$(Area) (square microns)

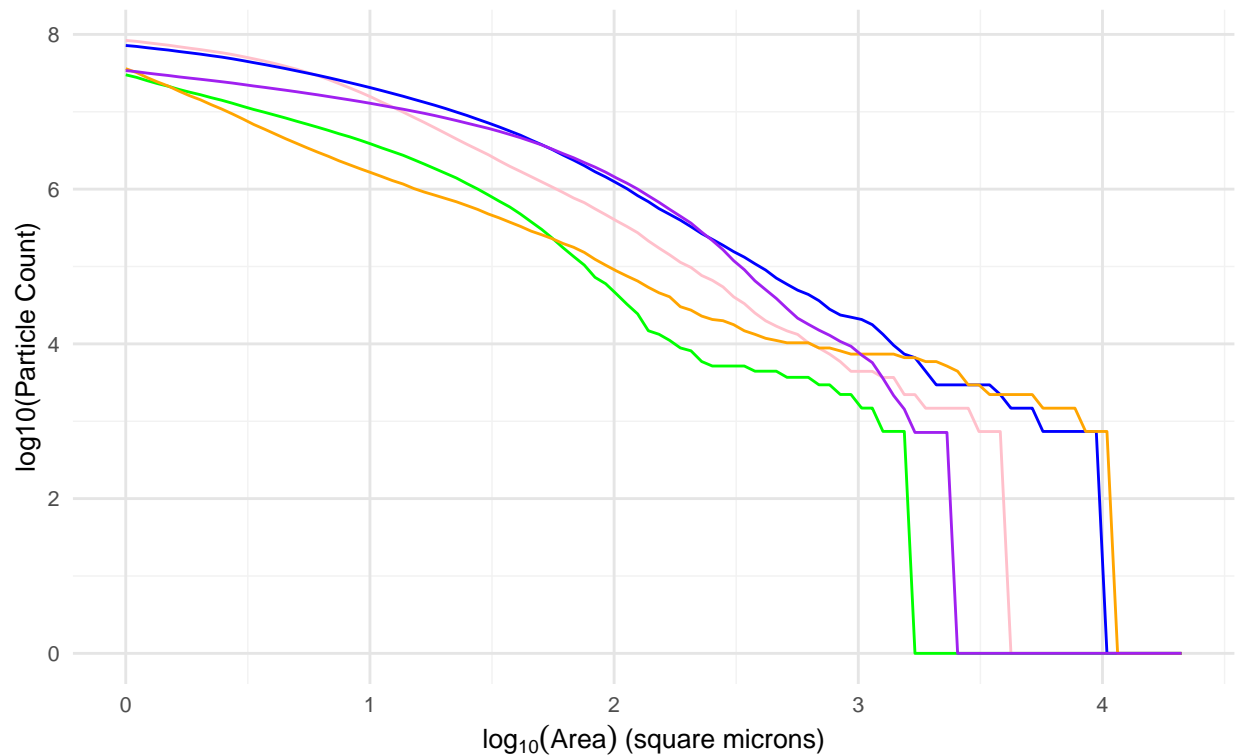# 9. Combined Analysis and Comparison

9.1 Cumulative Comparison

tarshade Surface Analysis: Cumulative Particle Area Distribution over 0.1 square m

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12, Purple: Trial 13

Witness Surface Analysis: Cumulative Particle Area Distribution over 0.1 square me

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12, Purple: Trial 13
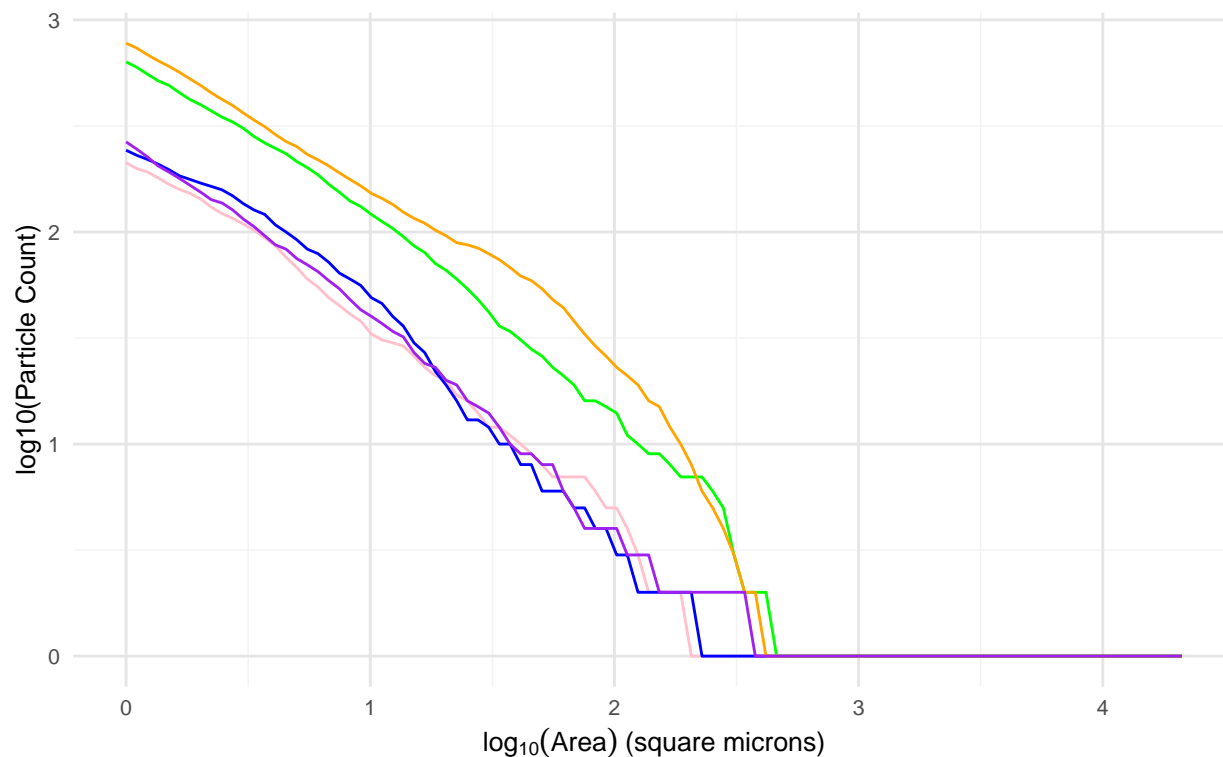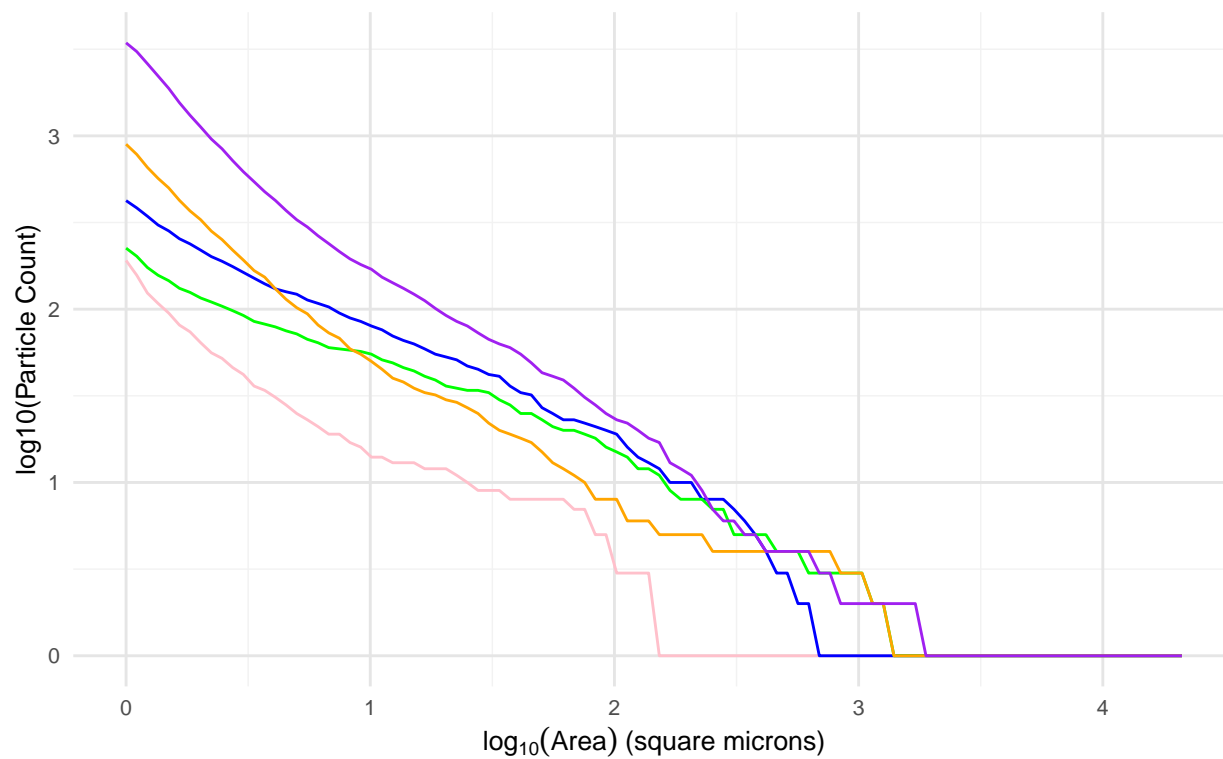
Starshade Edge Analysis: Cumulative Particle Area Distribution over 0.1 meter

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12, Purple: Trial 13

Calibration Edge Analysis: Cumulative Particle Area Distribution over 0.1 meter

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12, Purple: Trial 13

Model Edge Analysis: Cumulative Particle Area Distribution over 0.1 meter

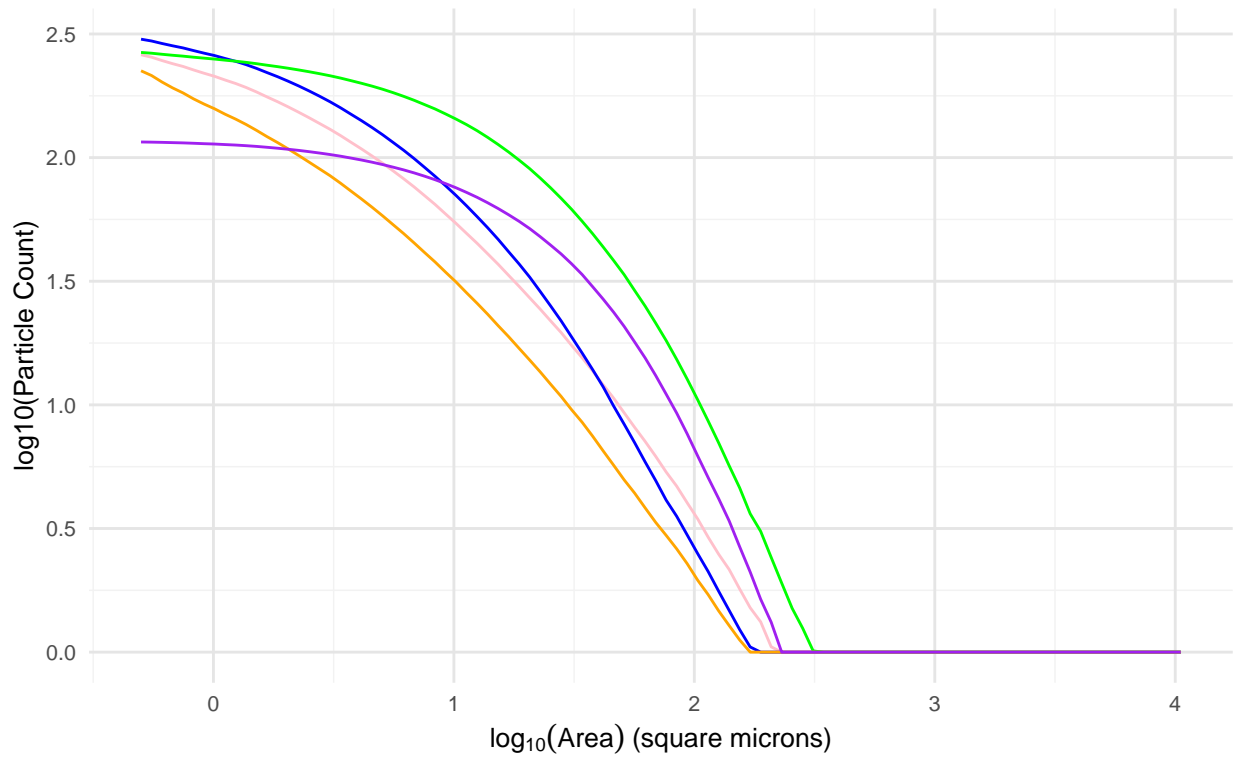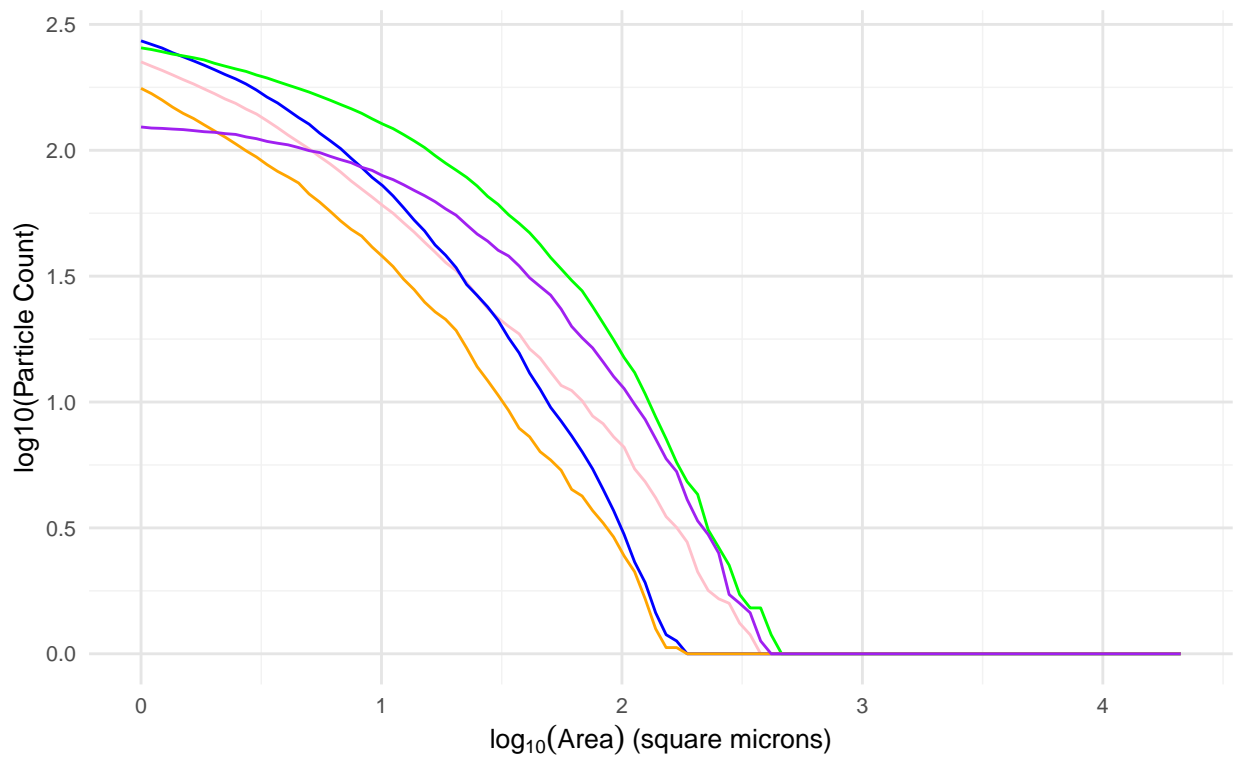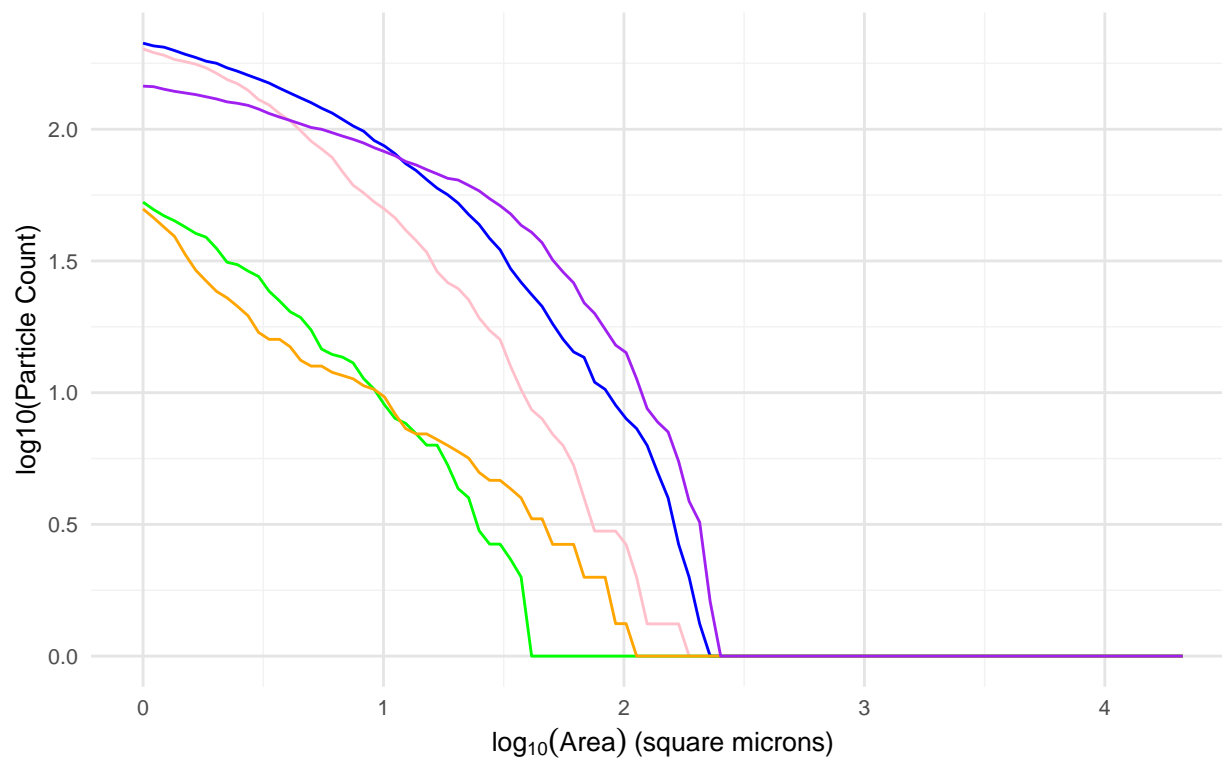Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12, Purple: Trial 13

SLSM Starshade Edge Analysis: Cumulative Particle Area Distribution over 0.1 m

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12, Purple: Trial 13

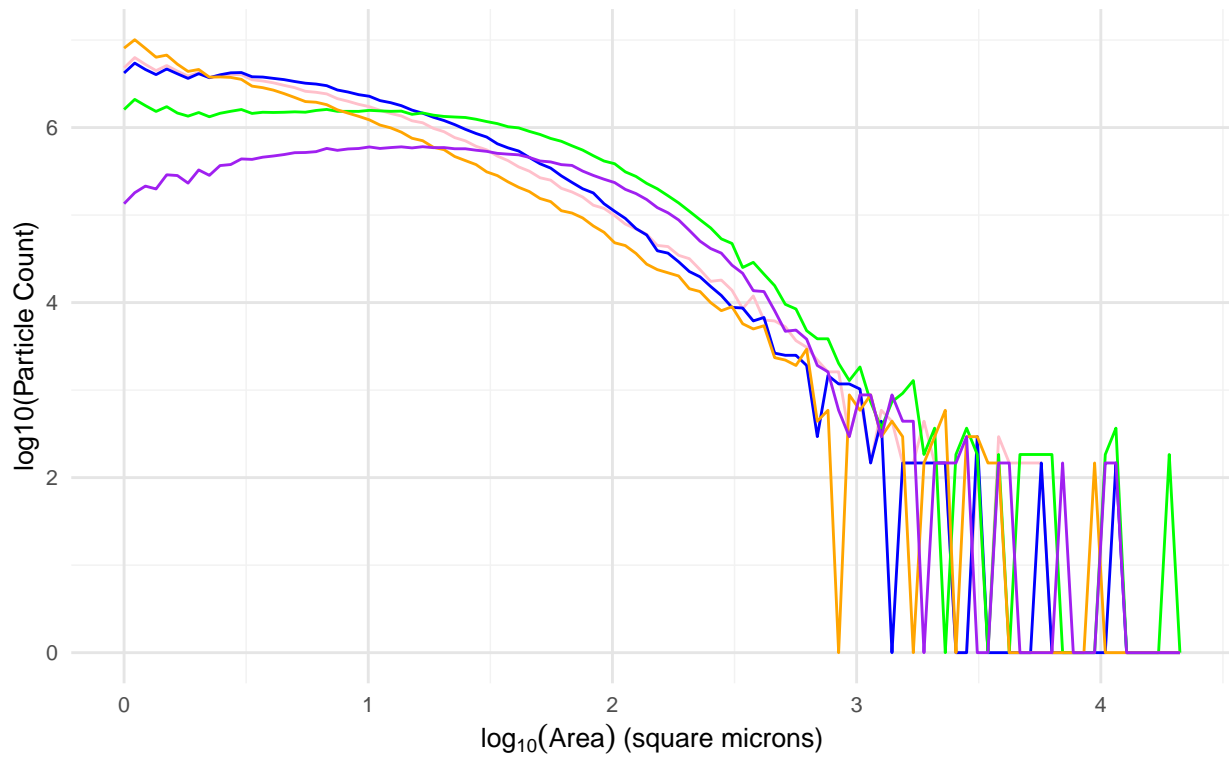**SLSM Witness Edge Analysis: Cumulative Particle Area Distribution over 0.1 me**

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12, Purple: Trial 13
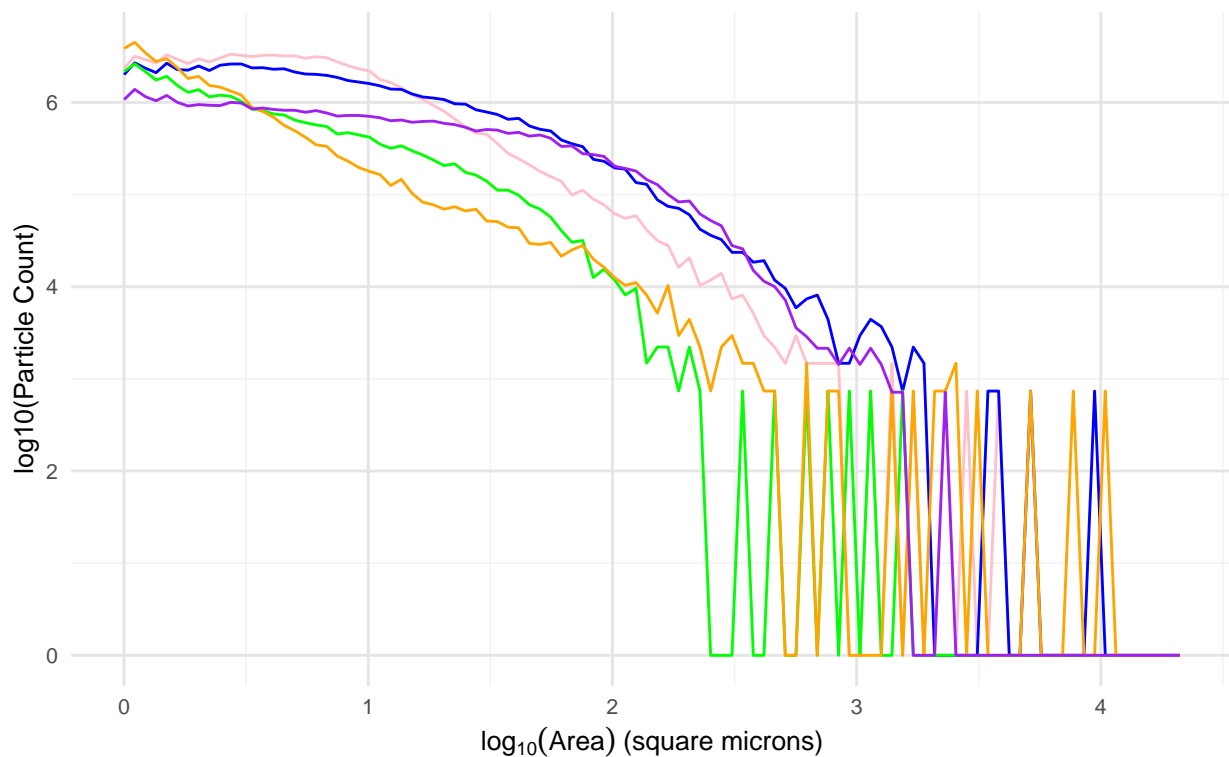
9.2 Binned Comparison

Starshade Surface Analysis: Binned Particle Area Distribution over 0.1 square met

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12

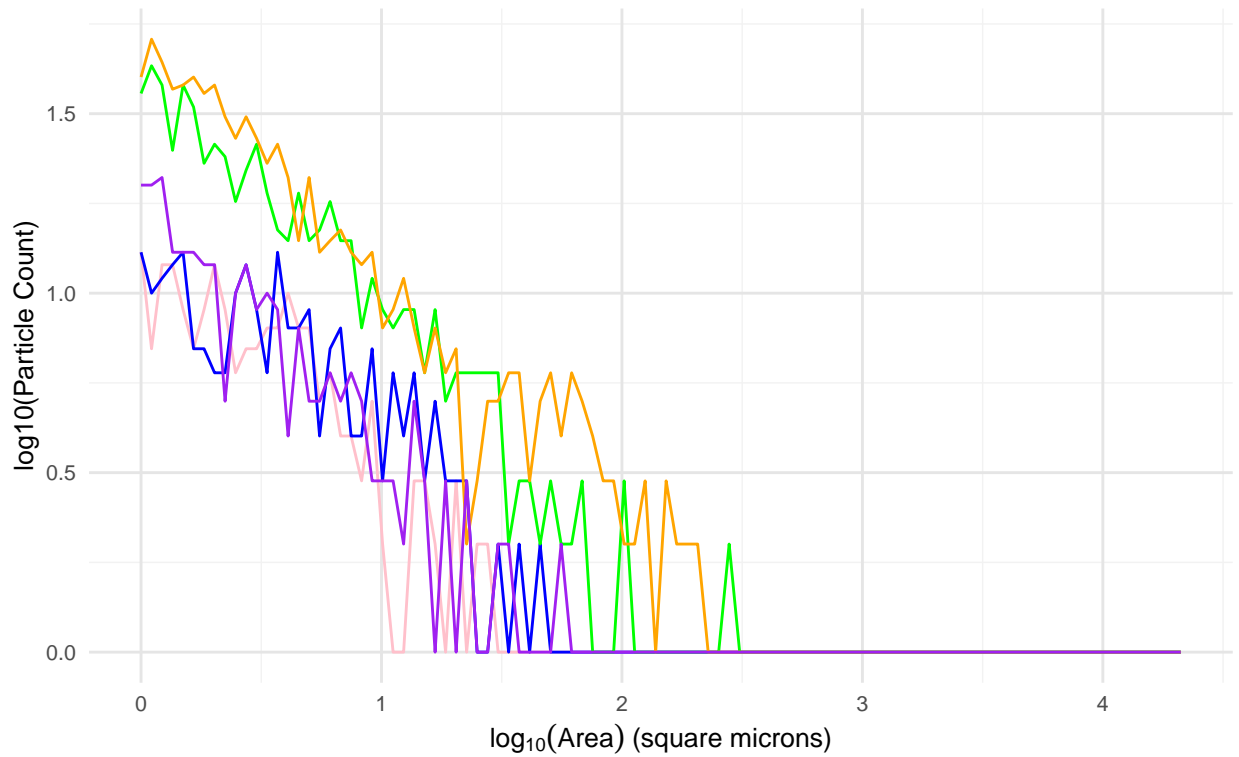**Witness Surface Analysis: Binned Particle Area Distribution over 0.1 square met**

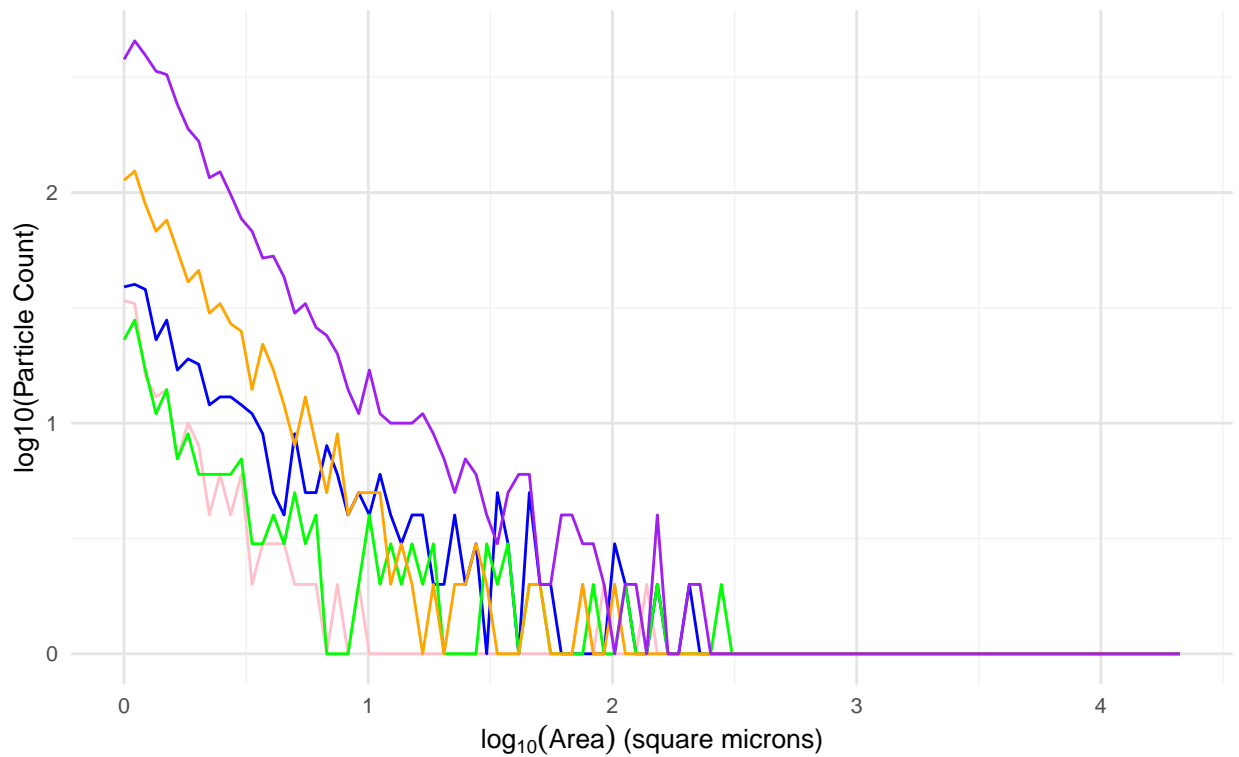Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12

Starshade Edge Analysis: Binned Particle Area Distribution over 0.1 meter

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12
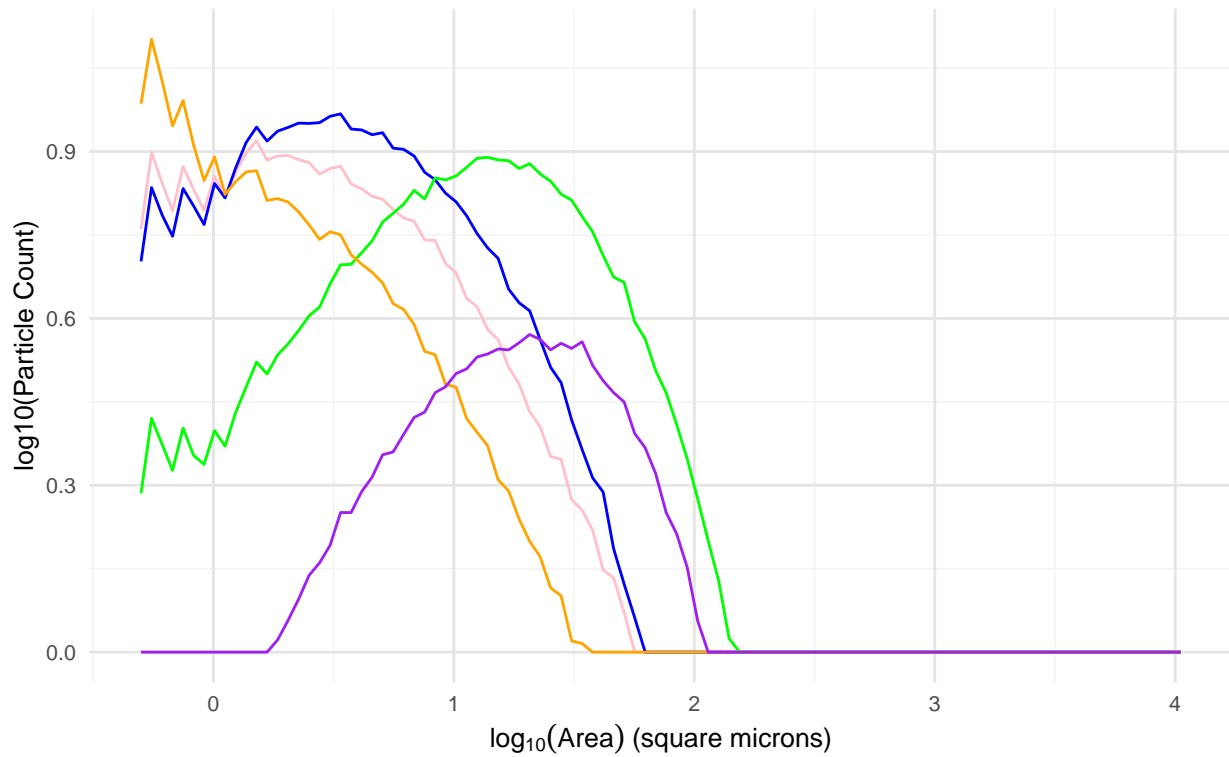

Calibration Edge Analysis: Binned Particle Area Distribution over 0.1 meter

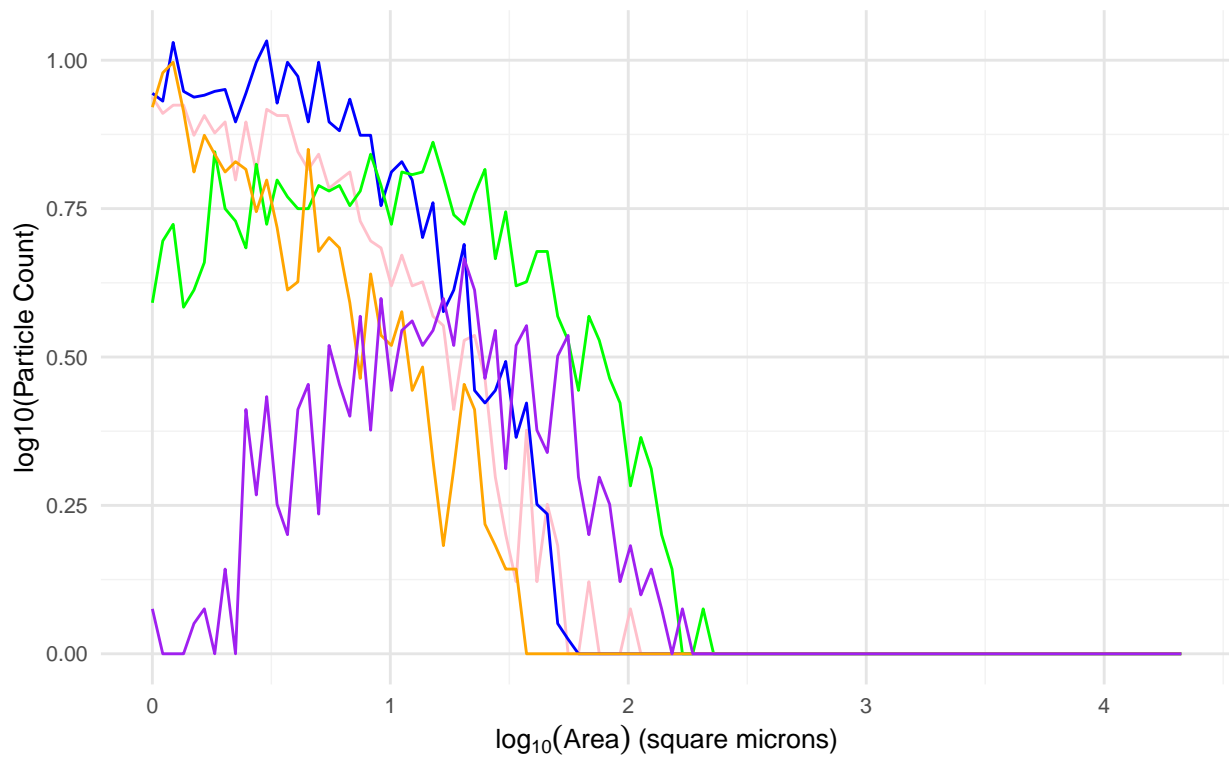Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12

Model Edge Analysis: Binned Particle Area Distribution over 0.1 meter

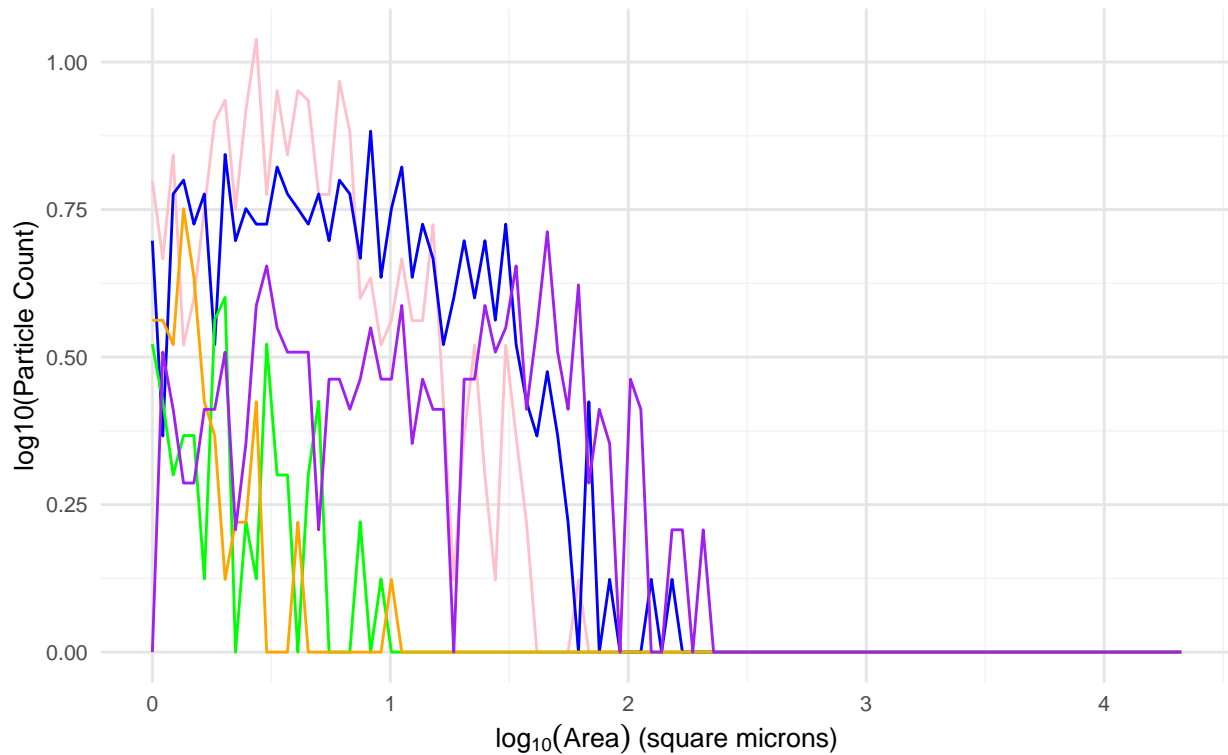Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12

SLSM Starshade Edge Analysis: Binned Particle Area Distribution over 0.1 met

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12

SLSM Witness Edge Analysis: Binned Particle Area Distribution over 0.1 mete

Pink: Trial 9, Blue: Trial 10, Green: Trial 11, Orange: Trial 12

10. Multiple Line analysis

11. Statistical Analysis

11.1 Trial 9

11.2 Trial 10

11.3 Trial 11

11.4 Trial 12

11.5 Cumulative Combined

11.6 Multiple Line

12. Paper Comparisons