

Area_based_analysis

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1. Data Loading and Preprocessing

1.1 Edge Data

1.2 Surface Data

1.3 Calibration Wafer Data

2. Surface Area Distribution Analysis

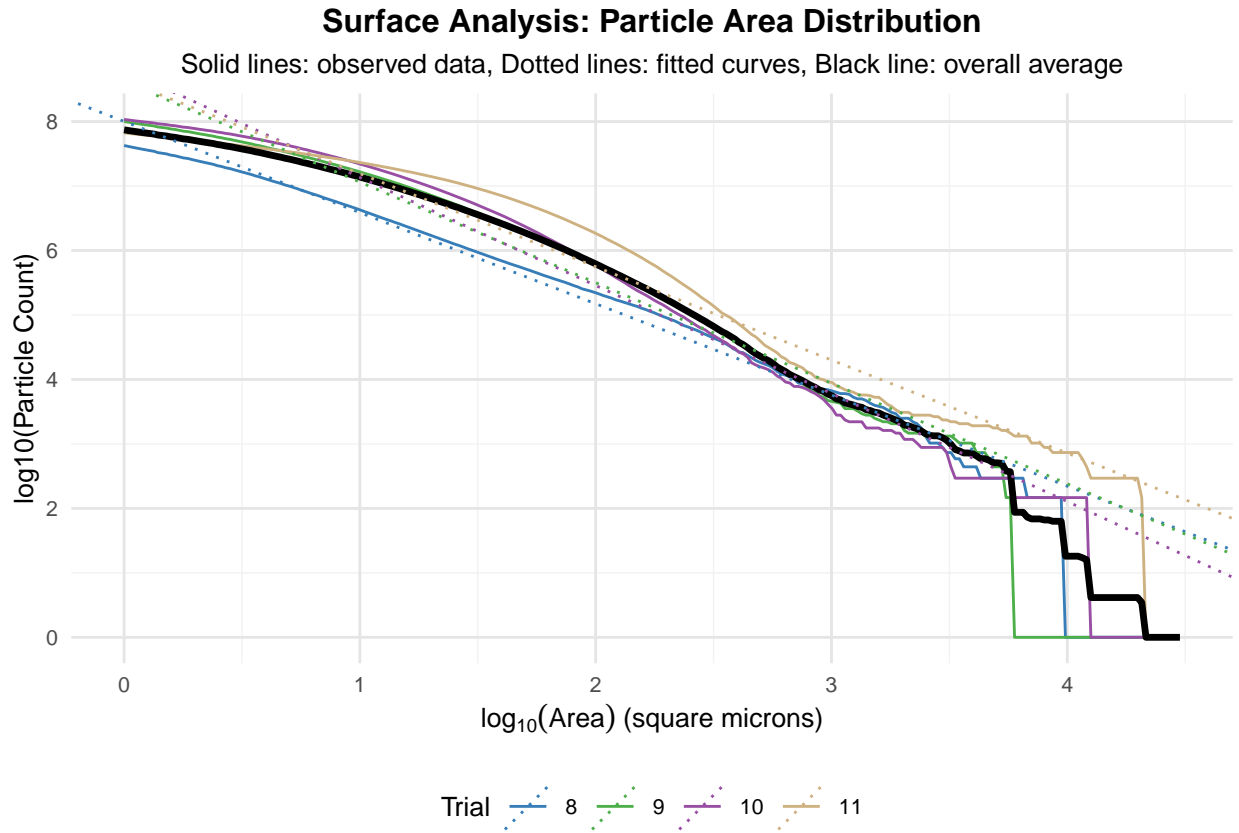


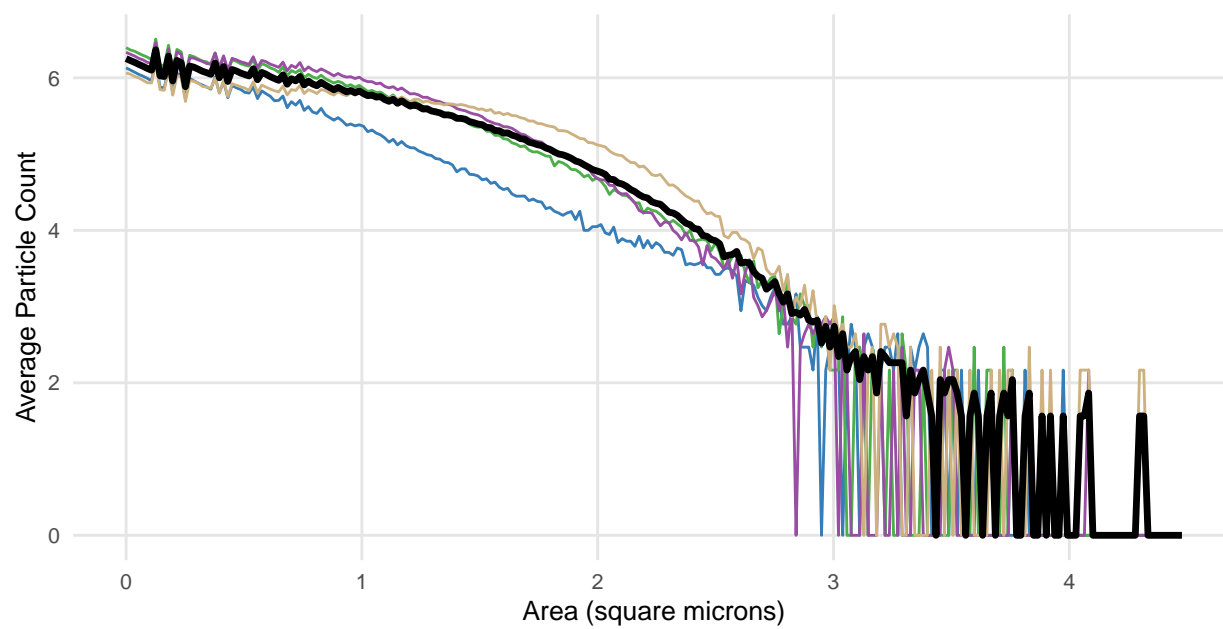
Table 1: PCL and Slope Statistics for Surface Analysis

| Trial | slope | intercept | PCL |
|-------|-----------|-----------|----------|
| 8 | -1.414344 | 8.002269 | 454919.4 |
| 9 | -1.560118 | 8.621256 | 335759.4 |
| 10 | -1.675337 | 8.807418 | 180760.3 |
| 11 | -1.445151 | 8.636981 | 947380.7 |

Surface Analysis: Binned Particle Size Distribution

Particles binned by area thresholds

Black line: overall average



Trial 8 9 10 11

3. Edge Area Distribution Analysis

Edge Analysis: Particle Area Distribution

Solid lines: observed data, Dotted lines: fitted curves, Black line: overall average

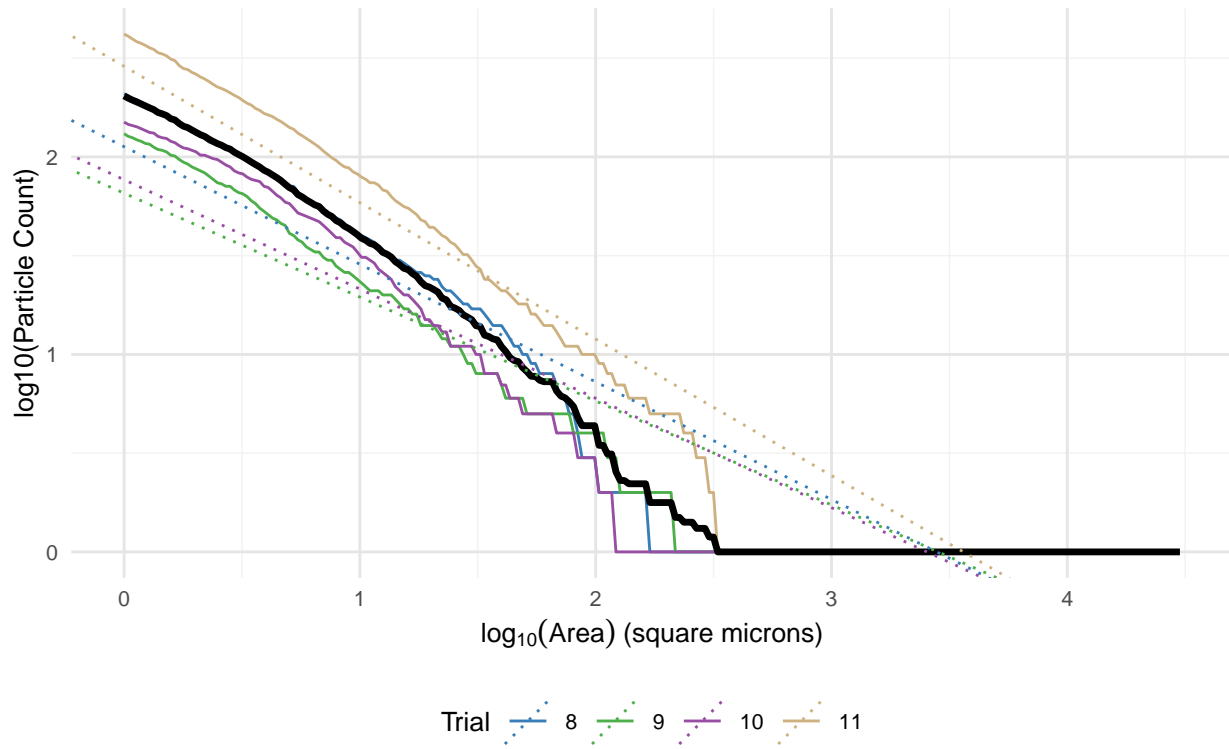


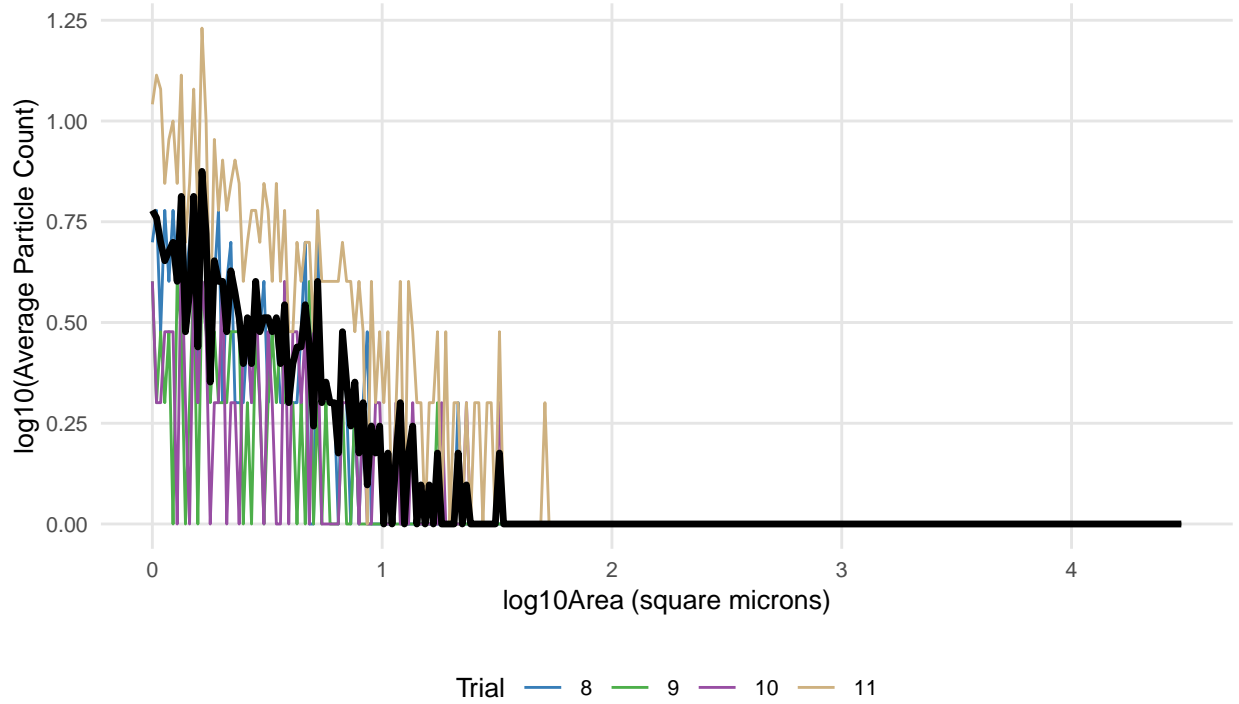
Table 2: Edge Analysis Summary Statistics

| Trial | PCL | slope |
|-------|----------|------------|
| 8 | 2791.892 | -0.5954639 |
| 9 | 2833.037 | -0.5261156 |
| 10 | 2540.784 | -0.5534584 |
| 11 | 3628.061 | -0.6907242 |

Edge Analysis: Binned Particle Size Distribution

Particles binned by logarithmic area thresholds

Black line: overall average



4. Calibration Wafer Analysis - Edge

Calibration Wafer Analysis: Particle Area Distribution

Solid lines: observed data, Dotted lines: fitted curves, Black line: overall average

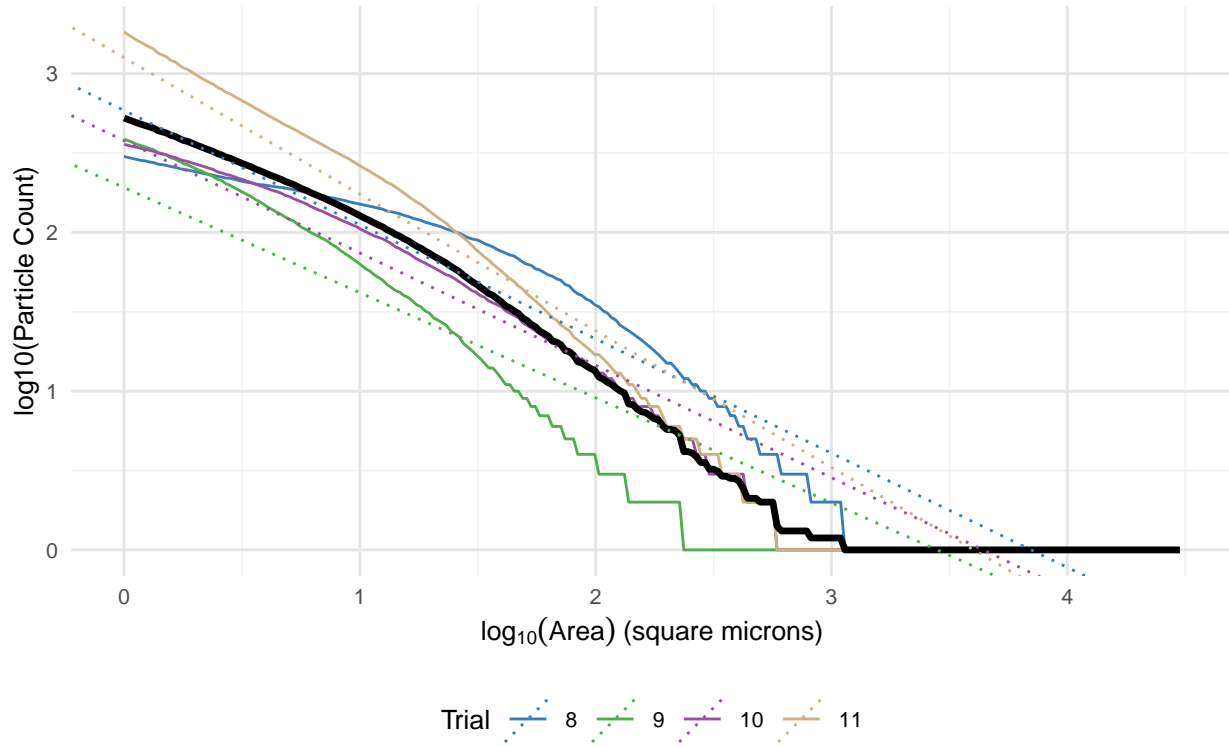


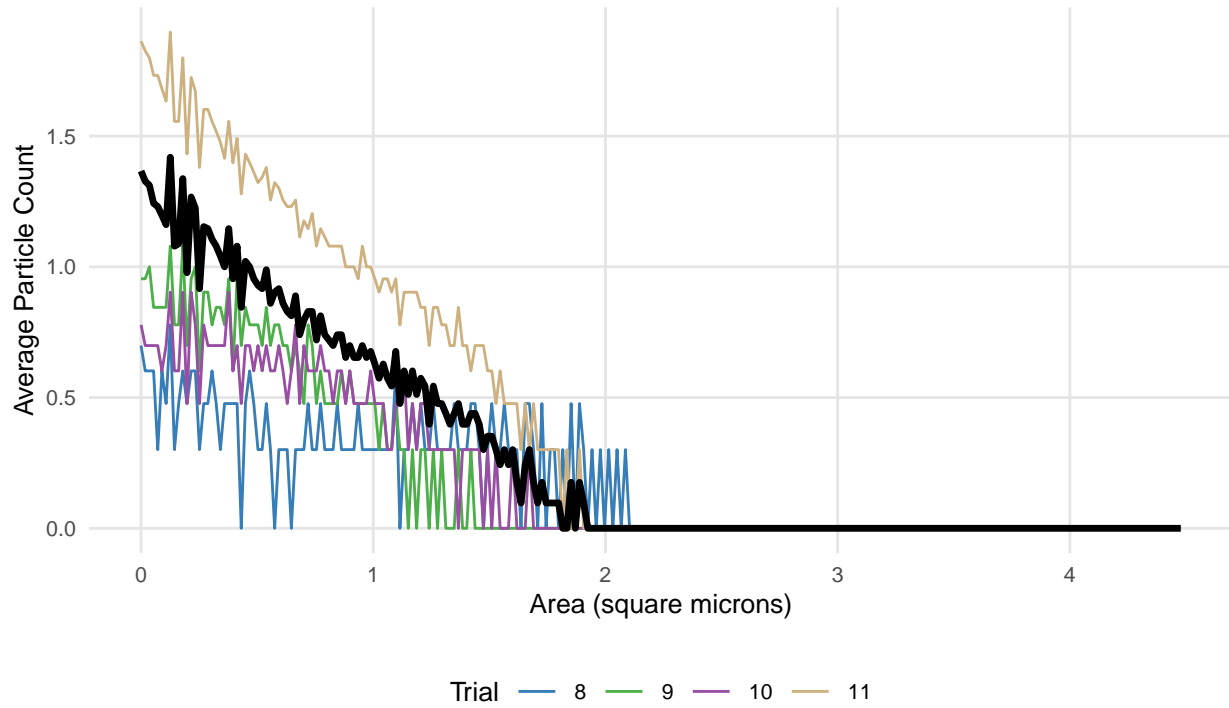
Table 3: Calibration Wafer Analysis Summary Statistics

| Trial | slope | intercept | PCL |
|-------|------------|-----------|----------|
| 8 | -0.7195185 | 2.768056 | 7032.263 |
| 9 | -0.6618983 | 2.282122 | 2804.432 |
| 10 | -0.7075888 | 2.577982 | 4398.792 |
| 11 | -0.8603154 | 3.100470 | 4016.758 |

Calibration Wafer Analysis: Binned Particle Size Distribution

Particles binned by logarithmic area thresholds

Black line: overall average



5. Edge Model Analysis

Edge Model Analysis: Particle Area Distribution

Solid lines: modeled data, Dotted lines: fitted curves, Black line: overall average

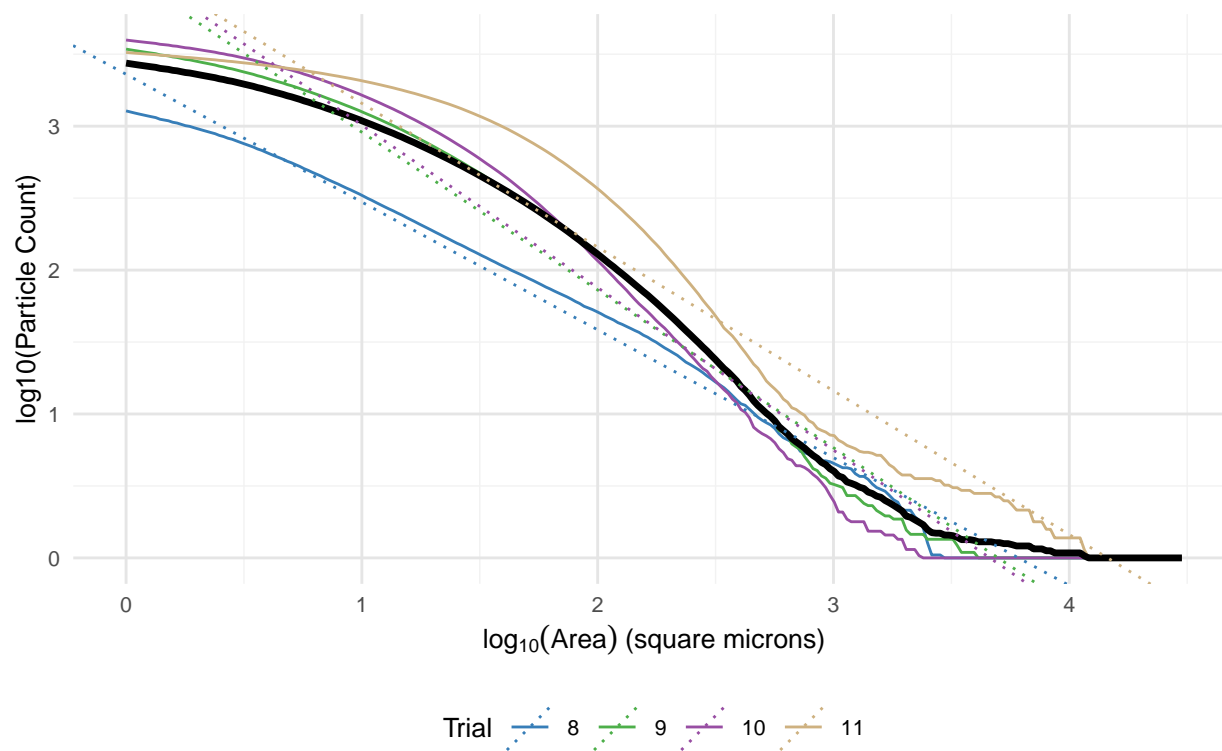


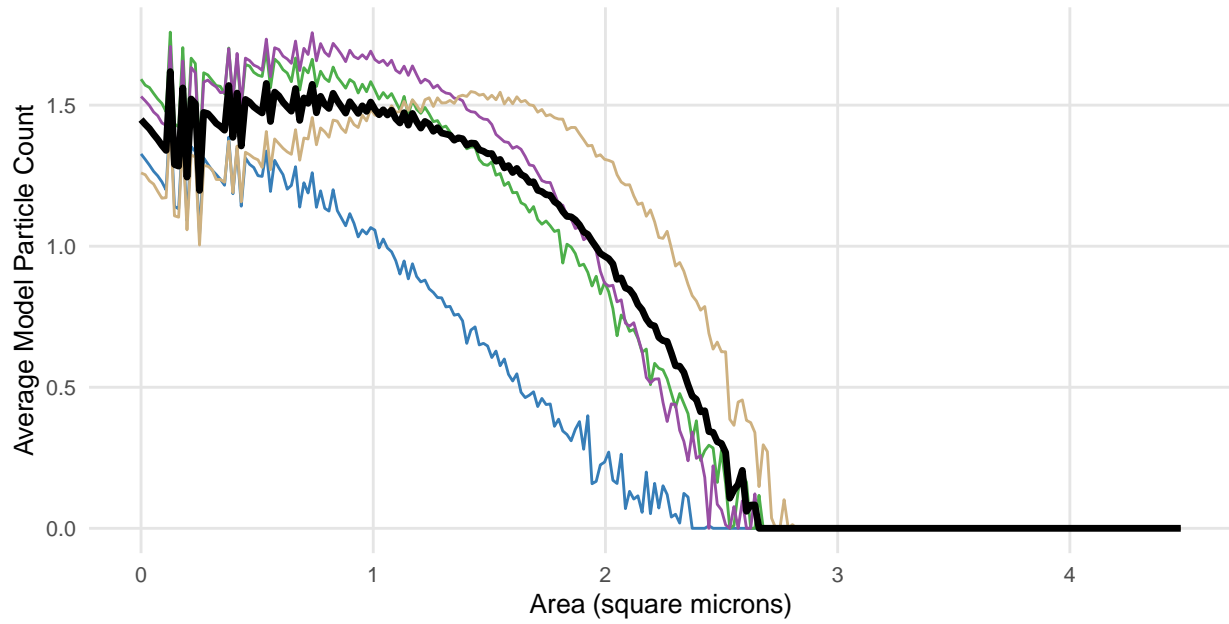
Table 4: Edge Model Analysis Summary Statistics

| Trial | PCL | slope |
|-------|-----------|------------|
| 8 | 6089.263 | -0.8879721 |
| 9 | 4995.962 | -1.0960481 |
| 10 | 4604.788 | -1.1290403 |
| 11 | 14538.417 | -0.9986871 |

Edge Model Analysis: Binned Particle Size Distribution

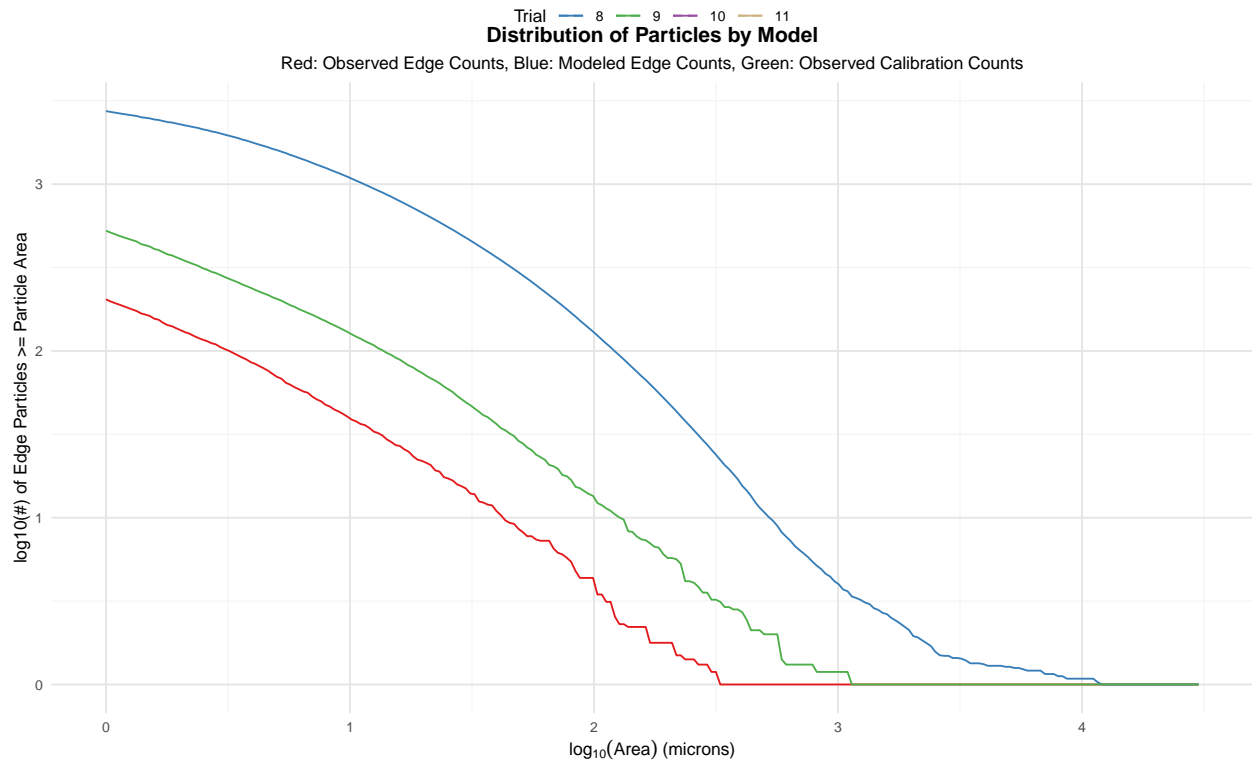
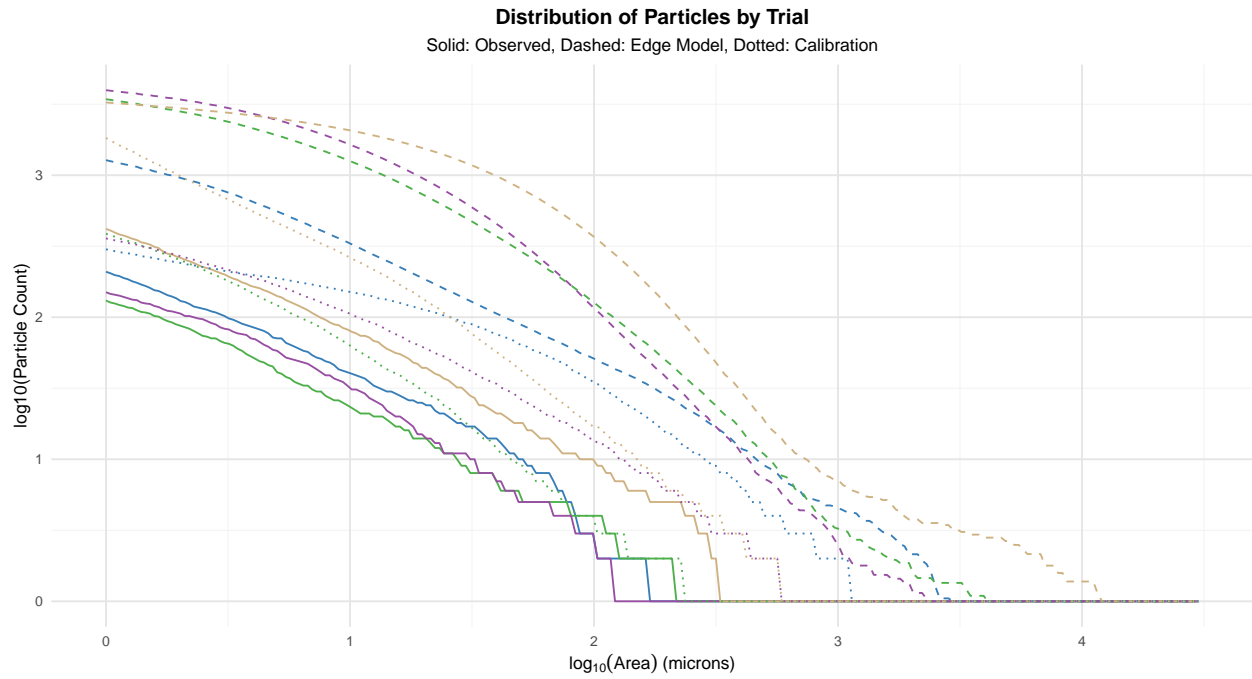
Particles binned by area thresholds

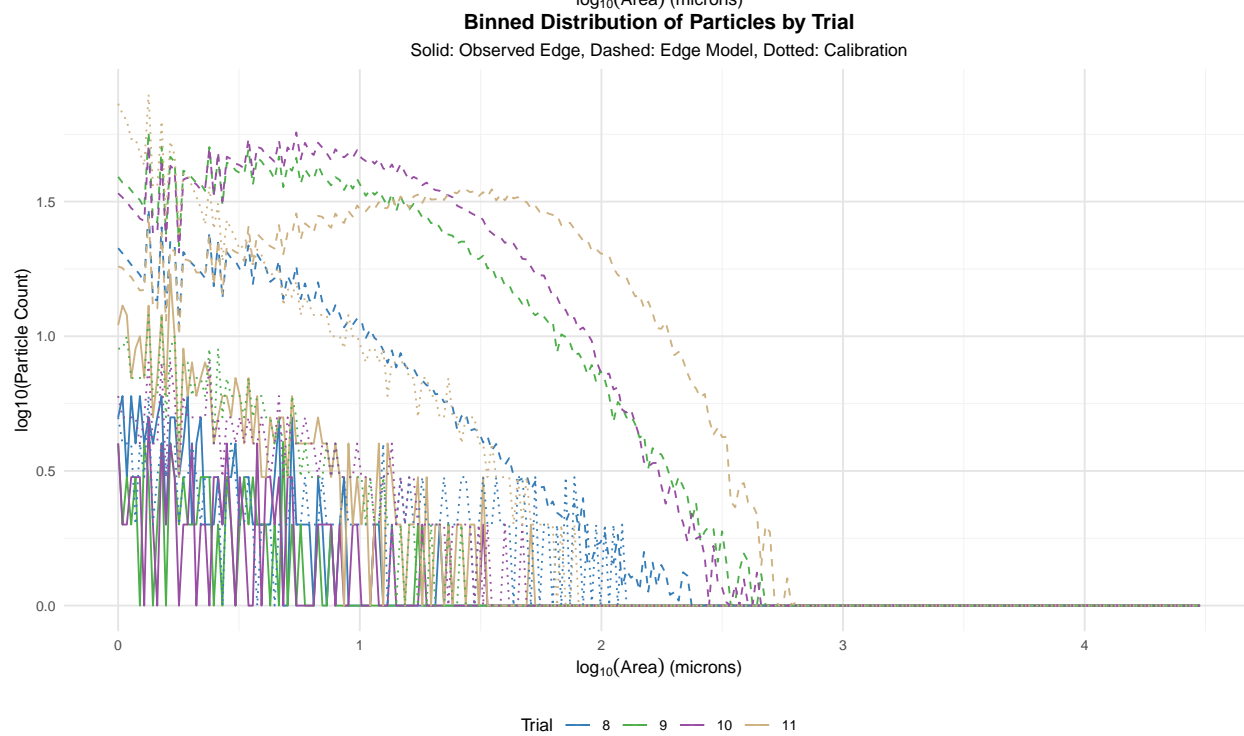
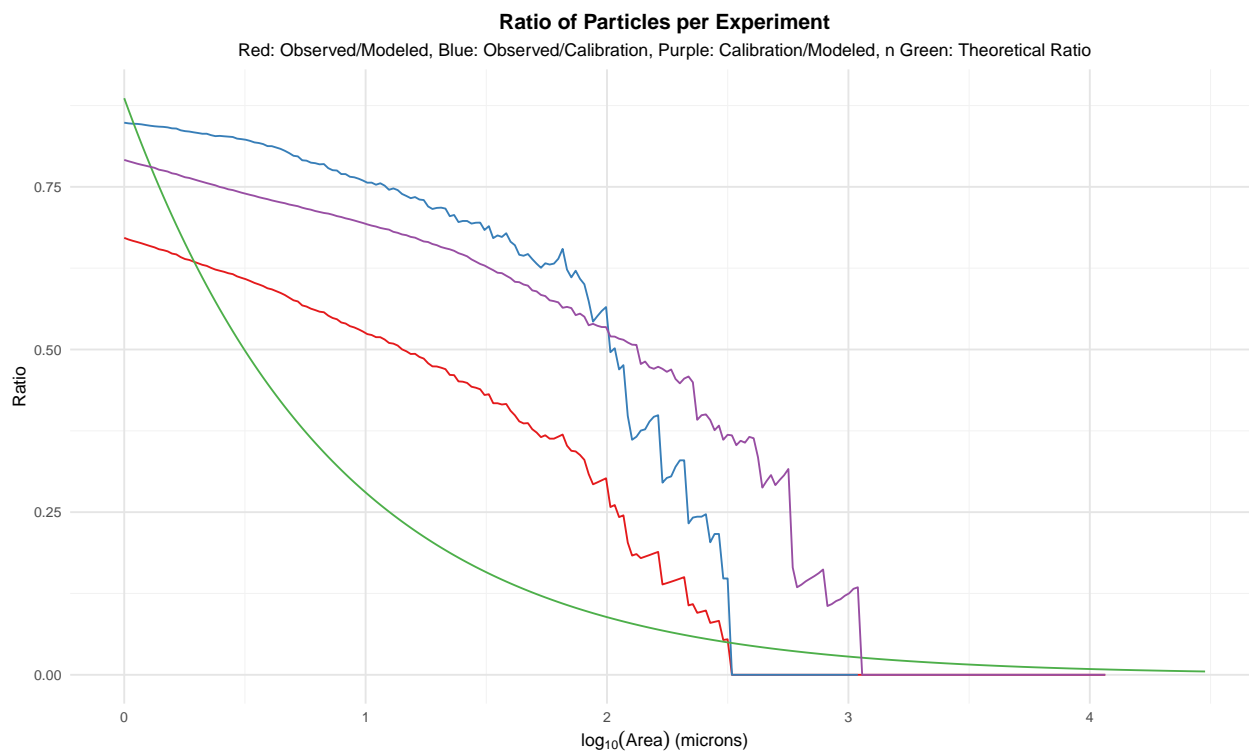
Black line: overall average

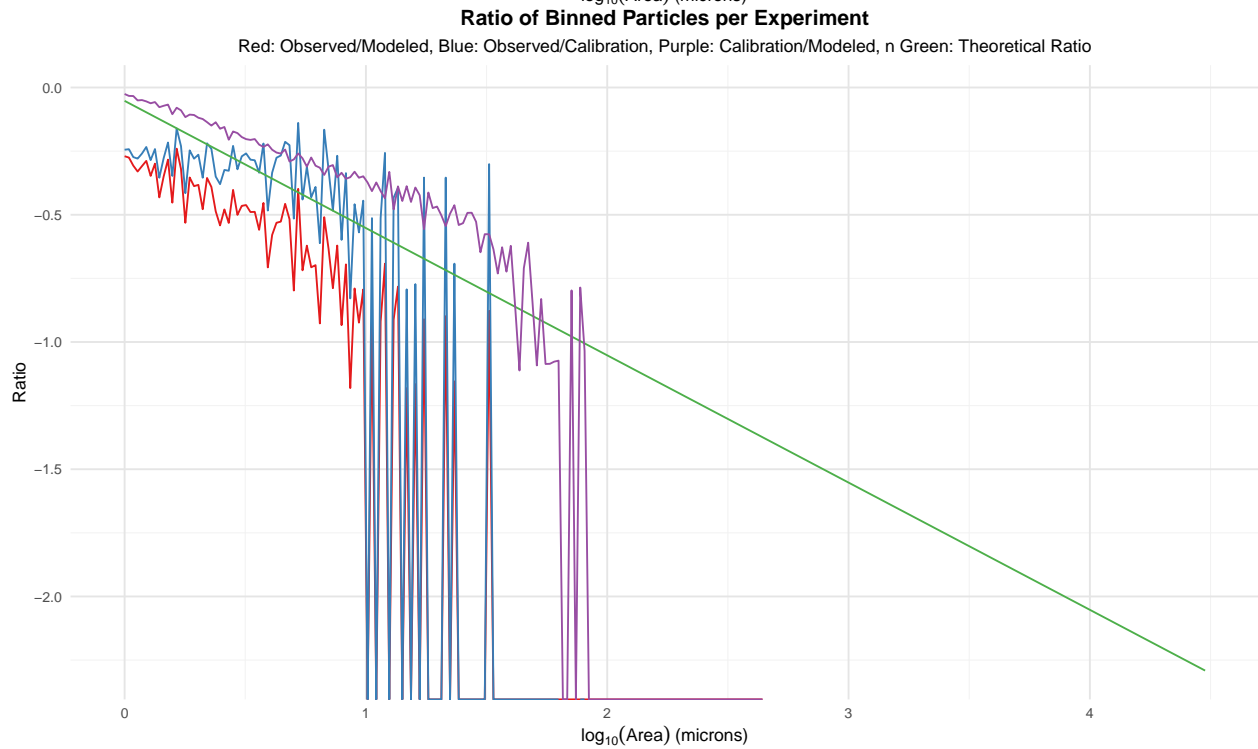
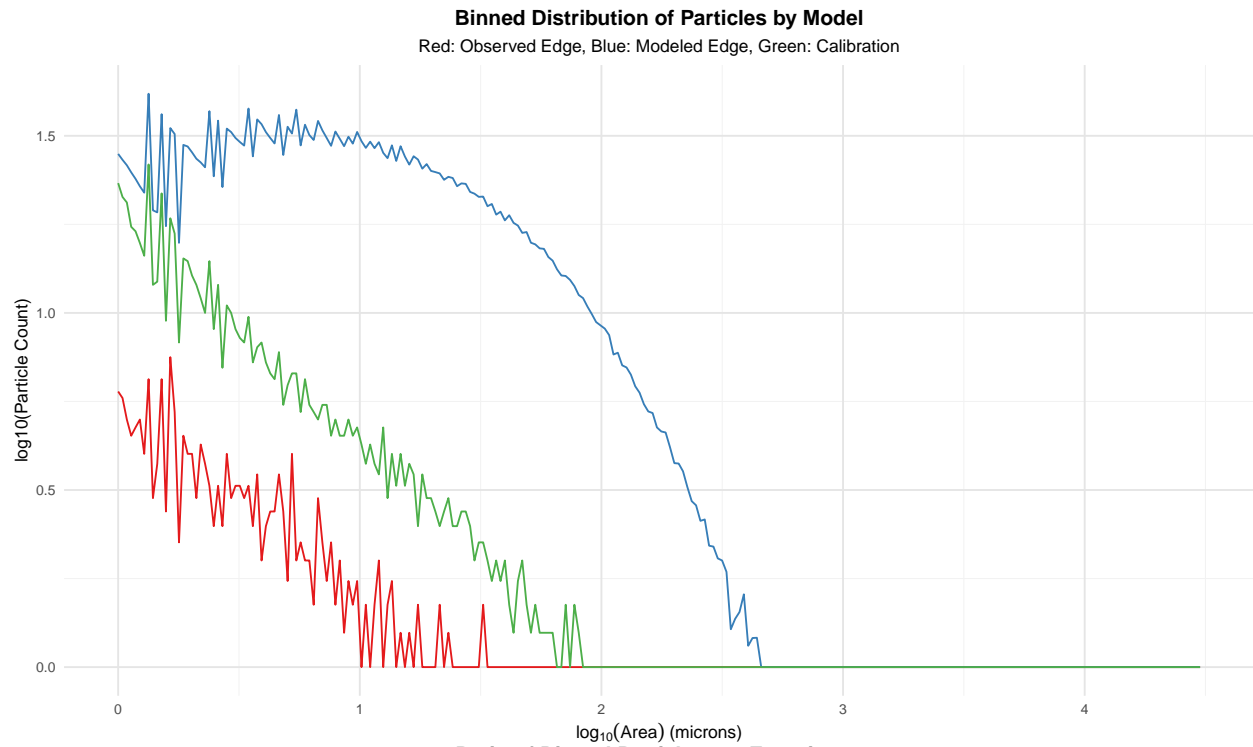


Trial 8 9 10 11

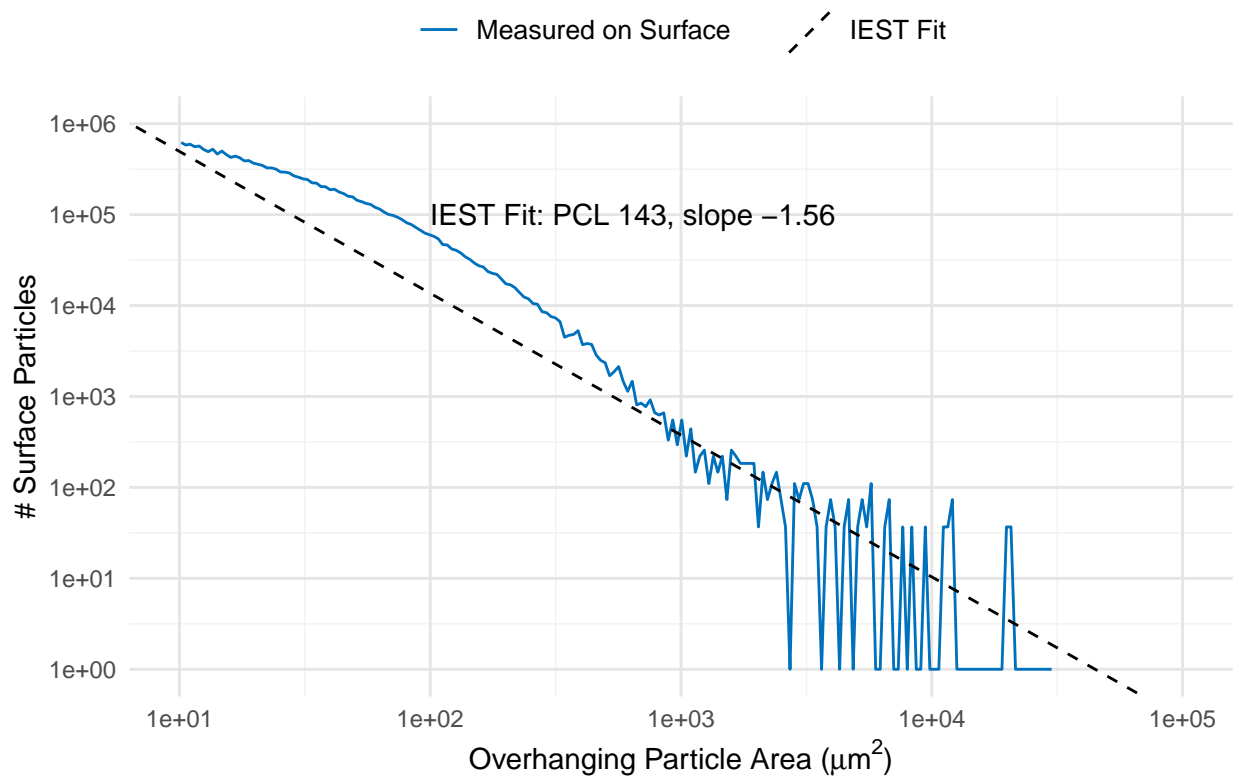
6. Combined Analysis and Comparison



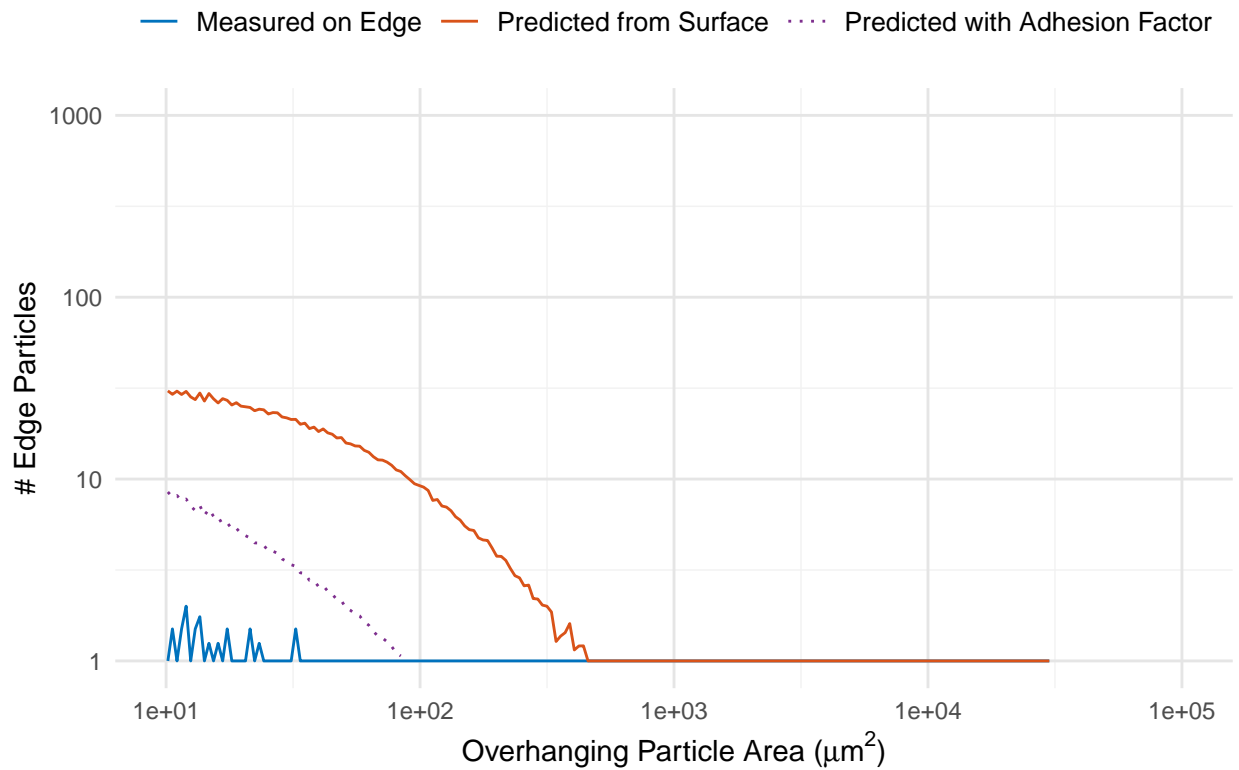




Total Measured Surface Particulate Distribution



Total Measured Edge Particulate Distribution



Normalized Edge Particulate Distributions

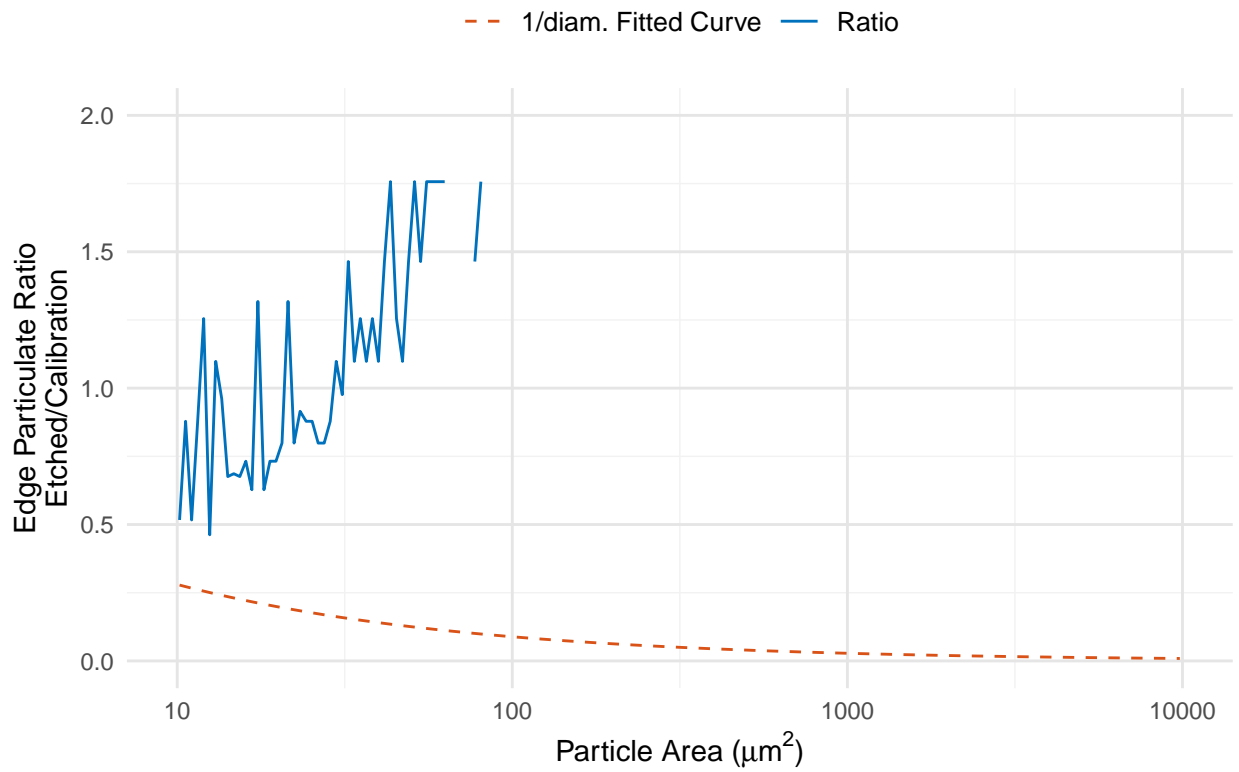
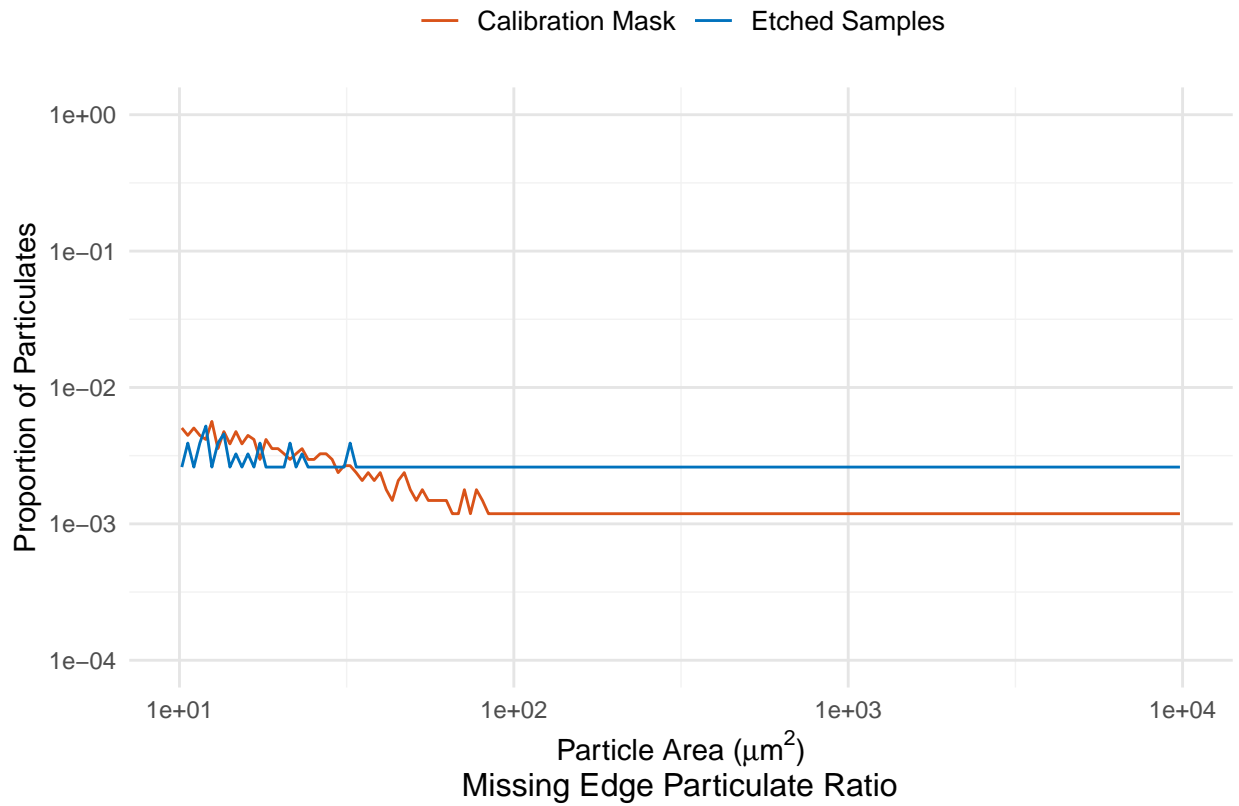


Figure 15: Etched Samples Comparison

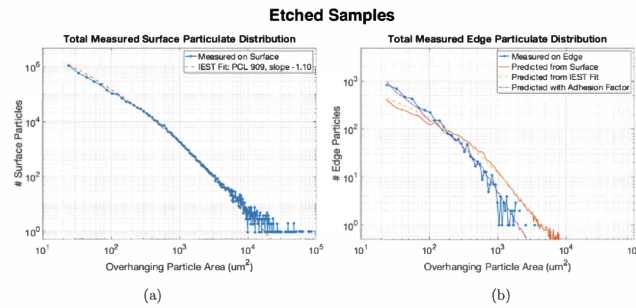


Figure 15. (a) Total surface particulate distribution detected on the etched samples, and a fit to the IEST distribution. (b) Total edge particulate distribution detected on the etched samples, compared to predictions from the surface.

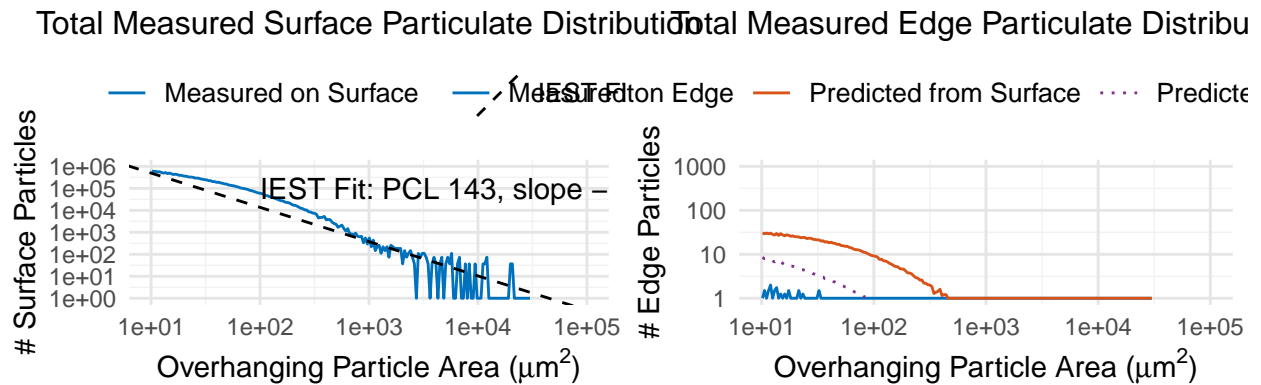


Figure 16: Comparative Analysis Comparison

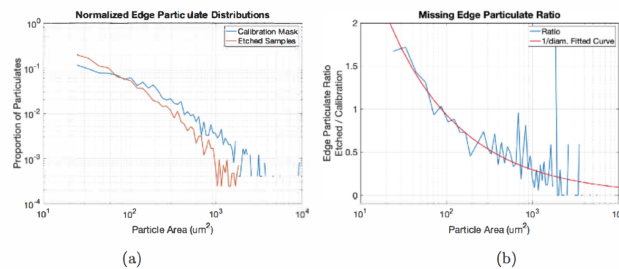


Figure 16. (a) Normalized edge particulate distributions for the calibration mask and the etched samples. Each distribution has been normalized based on the total number of edge particulates. (b) Ratio of the normalized edge distributions, representing the portion of particulates missing from the etched samples. The ratio decreases with particulate size inversely proportional to the particle diameter.

