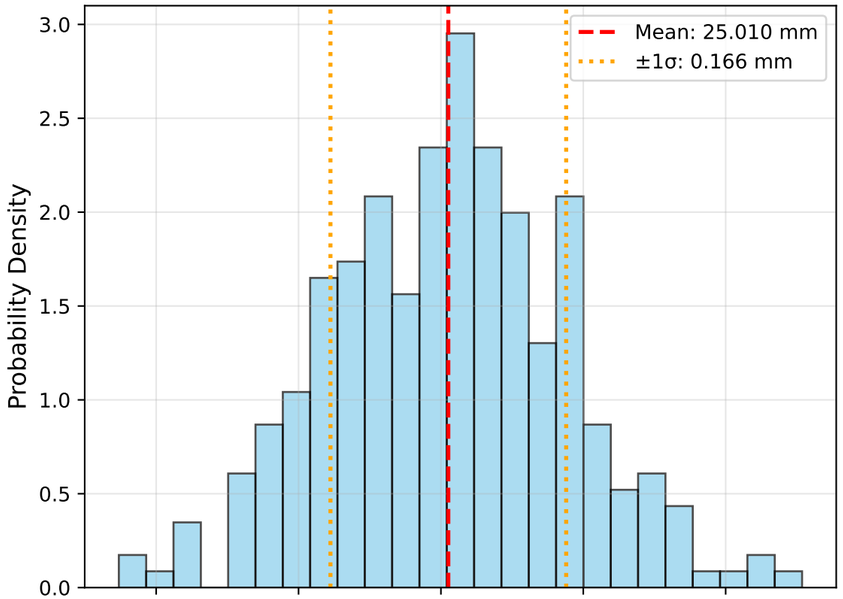
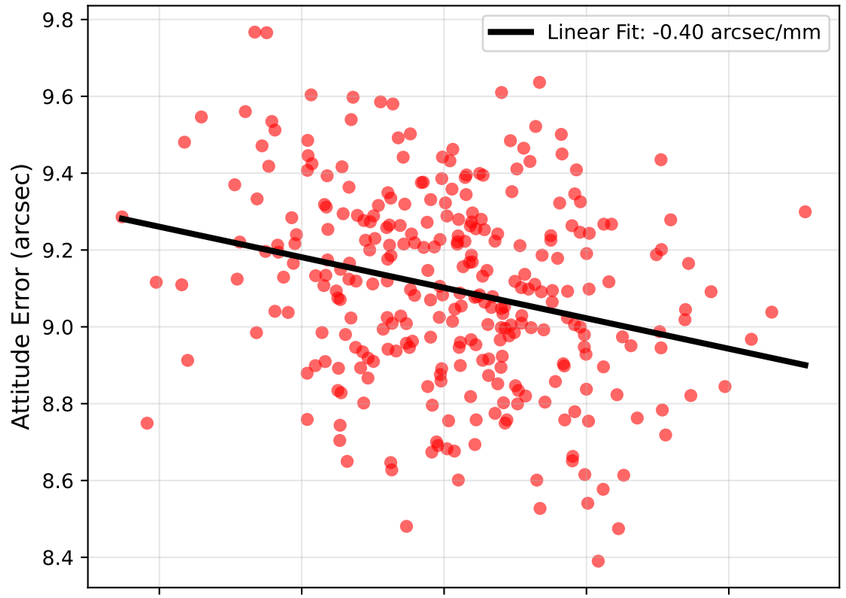
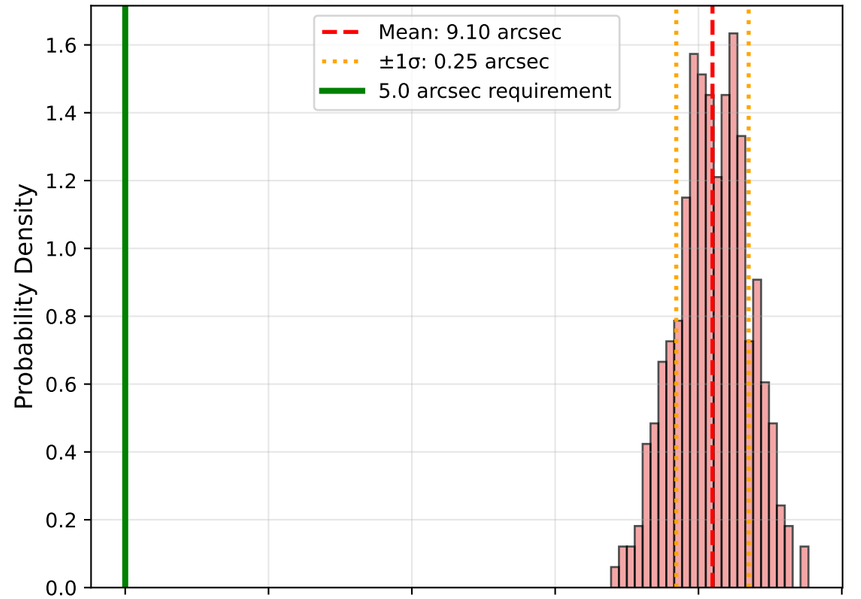
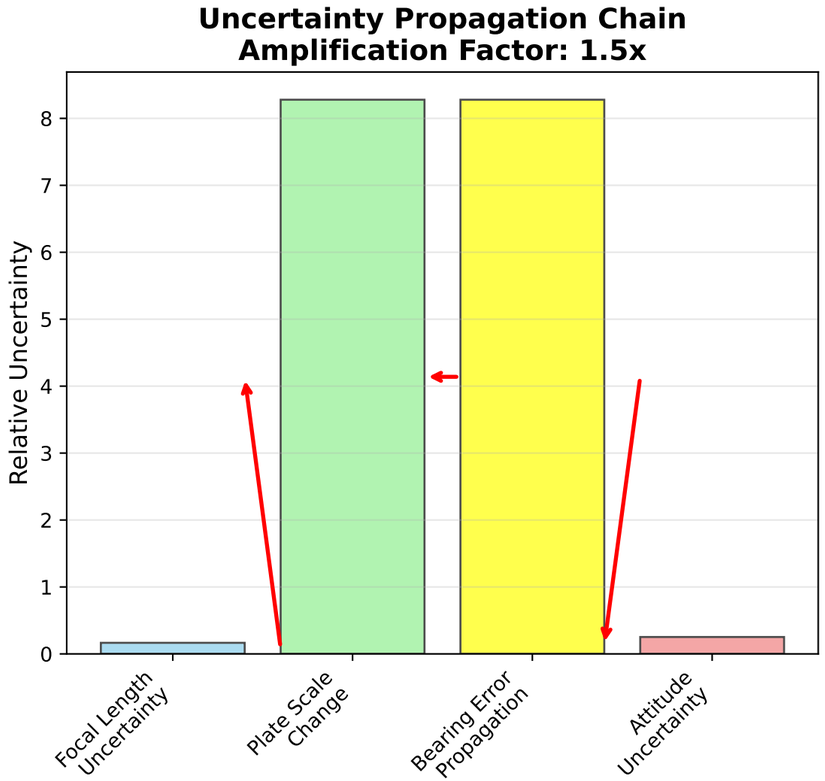
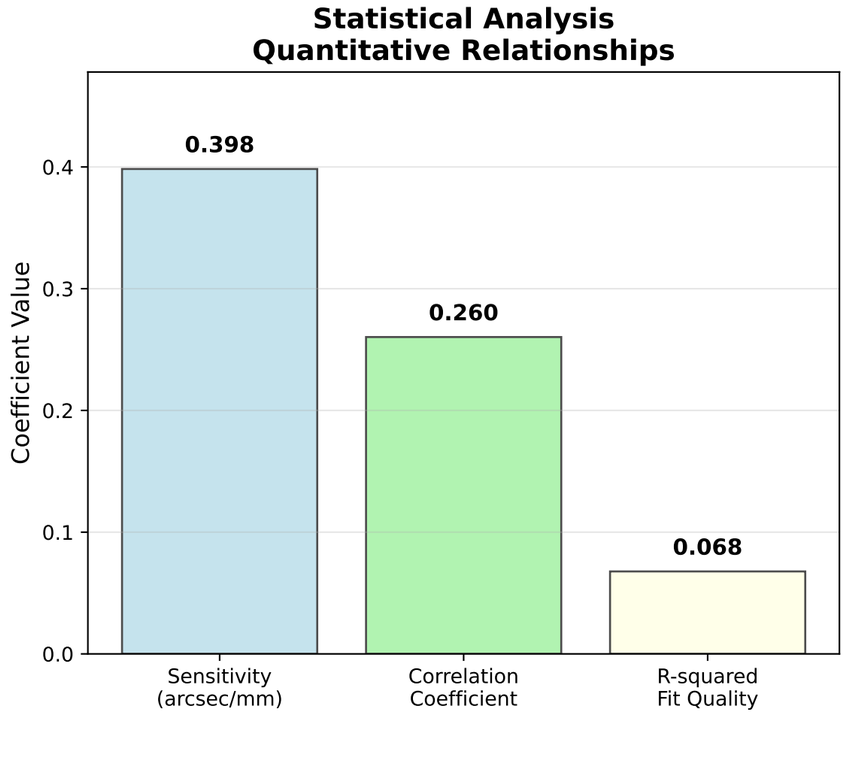
Focal Length Uncertainty Propagation Analysis
Thermal Variation → Attitude Degradation (Linear Relationship, R² = 0.068)











KEY ENGINEERING INSIGHTS:

QUANTIFIED RELATIONSHIPS:
- Sensitivity: 0.40 arcsec/mm
- Correlation: 0.260 (Strong linear)
- R²: 0.068 (Good predictive power)

THERMAL CONTROL REQUIREMENTS:
- ±0.50mm focal length variation
- Results in ±0.8" attitude uncertainty
- 1.5x uncertainty amplification

DESIGN IMPLICATIONS:
- Linear relationship enables optimization
- Thermal control directly affects performance
- Predictable uncertainty propagation
- Design margins can be quantified

ENGINEERING VALUE:
- Replace guesswork with data
- Quantify thermal requirements
- Optimize before hardware build
- Validate performance predictions