Number of ground measurements needed for narrow aircraft sonic boom metric 90% confidence intervals

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Five Sonic Boom Metrics Analyzed

- A-, B-, E-weighted sound exposure level
- Stevens Mark VII Perceived Level
- Indoor Sonic Boom Annoyance Predictor
- Sound energy summation
- Perceived tone loudness equivalent
- Includes building vibration penalty

Removing microphones from average

Every, every 2nd, every 3rd,... mic

Randomly select various numbers of mics

Sets of adjacent mics with various lengths

Elbow Analysis

- Narrow confidence intervals are desirable
- The three microphone removal techniques have an elbow character
- To the right of the elbow bend, there is low benefit for including more microphones
- To the left of the elbow bend, there is great benefit for including more measurements
- In each case shown, the elbow occurs at roughly 7 microphones

Conclusions

- Elbow bends occur between 5 and 10 microphones
- SEL<sub>B</sub> has the narrowest confidence intervals
- Use at least 7 microphones for ground measurements of sonic booms to see around ± 4 dB 90% confidence intervals

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