Comments Re the FAA Neighborhood Environmental Survey (NES) Results
- National Noise Metric
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Thank you for the opportunity to comment on Aircraft Noise Research being sponsored by the FAA, and particularly on the notable results of the national Neighborhood Environmental Survey (NES). I have been a resident of the City of College Park, Georgia (home of KATL, world's busiest airport), since 2005. All KATL aircraft operations arriving to the East, and departing to the West, pass over College Park – 3 separate arrival tracks and 4 separate departure tracks. In fact, planes landing to the east on the northernmost runway (8L) pass over Main Street in downtown College Park at about 200 ft AGL

I began working with my Ward Councilman, our City Manager, and City Attorney after the opening of KATL's 5th runway in May of 2006 to help the City address noise from aircraft overflights in areas where there had been none, and still should have been none. My scientific and engineering background enabled me to learn how to track flight paths, and measure noise. Later after being elected to City Council in 2008, I worked with the KATL Tower and TRACON to adjust flight paths to minimize the noise impact on City residents, while meeting the safety and efficiency needs of FAA Flight Operations. The cooperation that we have received from the A80 TRACON, KATL Tower, and KATL staff has been exemplary. They have been particularly responsive when I have tracked and questioned occasional variations from normal traffic patterns.

Through our City's membership in the National Organization to Insure a Sound-controlled Environment (N.O.I.S.E.), I became a representative on the research Advisory Board to the Director of the FAA's PARTNER COE and its successor, the ASCENT COE. Thus, I am intimately familiar with aircraft noise as an impacted resident, local elected official, operator of noise measurement hardware & software, and a reviewer of ongoing noise research. At the same time I have acquired knowledge of air traffic operations, noise research advances and limitations, and flight management technology such as ADSB, RNAV, and RNP.

The National Curve resulting from the NES "shows a substantial increase in the percentage of people who are highly annoyed by aircraft noise over the entire range of aircraft noise levels considered, including at lower noise levels". Since by existing noise measurement standards modern aircraft are considered quieter, this result could be interpreted as people today simply being more sensitive to noise. However, I believe that there are factors that are unaccounted for by DNL's A-weighted dB average noise level that may explain the difference. **I believe that a new noise metric is needed to account for these factors.**

Modern aircraft have larger, high bypass engines that are more efficient and are considered to be quieter as measured on the A-weighted decibel scale (dBA). From my experience, when departing or applying reverse thrust on landing, they “appear” to radiate more noise energy in lower frequency 1/3 octave bands. The sound is more like rolling thunder. This might explain some of the NES study’s citizen comments regarding annoyed respondents being “startled, frightened, or awakened”. For example, my home is located 1.4 miles NW from the western end of runway 8L. During a Monday morning rush hour (pre-COVID) when wind is from the East at the right velocity, I experience a constant rumbling punctuated by spikes from reverse thrust on 8L, and runup and start of roll on 8R, for periods of 30 minutes or more. Larger aircraft cause the house to vibrate, which sometimes induces higher frequency, more audible sound from rattling windows, etc. The dBA measurement scale discounts lower frequencies, whereas measurements on my back porch using the C-weighted dB scale run about 10 dB higher - this more accurately reflects the degree of annoyance from these newer aircraft. **A new noise metric should consider C-weighted dB measurements to accommodate the more “ominous” lower frequency sound of newer aircraft engines.**

There is an excellent diagram on the FAA Aviation Noise web site that explains how a 65 DNL rating can be achieved with three different numbers of overflights having three different levels of resulting ground level noise (Another diagram characterizes these levels in terms of sound associated with everyday events.). In the first diagram, one aircraft overflight producing the noise of a rock band is equivalent to ten overflights producing the noise of a car horn at 3 ft., or 100 overflights producing the noise of a gas lawnmower at 3 ft. Despite producing the same average level of noise, I don’t believe they produce the same level of annoyance. If I had a choice, I’d pick one overflight at, say noon, Vs 10 throughout the day, especially if one or more of the ten were late at night. And I would pick the 10 flights over 100 flights. I believe that the number and magnitude of excursions during the day from the normal ambient noise level (noise floor) makes a difference. It is important to note that if I lived on a busy street with sirens, car horns, and traffic noise, the degree of excursion from the ambient noise floor would be less significant, and probably less annoying. Humans react to more than average noise. **The magnitude of an excursion from the ambient noise floor and the number of excursions per day are factors to be considered for inclusion in a new noise metric.**

During a “push” (rush hour) at KATL, planes can take off concurrently on 3 runways, and (pre-COVID) I have measured them taking off on one runway an average of 45 seconds apart for 20 minutes, before beginning to be spaced further apart as the push wanes. Residents who are directly under the flight path tell me that they learn to time their outdoor conversations to stop speaking for a few seconds every 45 seconds or so. I know that under the right conditions when I am speaking at an outdoor City event, I have learned to do so as well. Thus I believe that additional annoyance factors, that relate to the extent to which a number of overflights are compressed into a shorter period of time, should be considered for a new noise metric,**. These are the average length of the inter-flight interval, the length of the compressed period, the average noise level during the compressed period, the deviation of the average noise level during the compressed period from the ambient noise floor before/after the compressed period, and the number of such compressed time periods per day.**

Another distinguishing factor of modern aircraft is their Flight Management System (FMS) equipped with WAAS GPS, ADSB-Out, and RNAV/RNP. WAAS GPS determines the aircraft's position within feet (which is far more accurate than RADAR) and enables the FMS equipped with RNAV RNP to guide the aircraft to precisely follow pre-programmed flight paths, with accuracy easily within a city block of the path's centerline. ADSB-Out relays that precise locational information to Air Traffic Control (ATC), thus allowing ATC to safely pack planes closer together, resulting in even more tightly compressed rush hour periods (on narrower flight paths) than were possible with RADAR.

Residents located below the flight path who are further from the airport experience noise events at lower levels **(assuming that aircraft have climbed to higher altitudes)** but their distance to the overflying aircraft and the level of the received noise varies less, as the aircraft traverses a given ground distance, than it would if the plane were flying lower. **If the planes on a flight path are packed closely enough**, the sound at ground level of one plane may begin to overlap that from the previous one. It seems likely that during a compressed period, the noise may appear to be more continuous. This may explain why residents living further from the airport are now more acoustically (and visually?) annoyed, even though the dB levels for single overflight events are unchanged. Furthermore, the higher the aircraft are flying, the wider the corridor of sound (and visual) overlap effect below it. Thus, more residents potentially experience similar levels of noise exposure (i.e., the 10 dB falloff distance from the level at the centerline of the flight path increases with aircraft altitude). **Conversely, if aircraft are required to maintain a lower flight level,** say 3,000 ft AGL over a long distance, then the narrower precision flight path results in louder, more concentrated noise, whose intensity falls off more rapidly with distance along the ground. I.e., the perceived noise annoyance is different with varying altitude.

In summary, my recommendation is that the FAA sponsor research to determine which of the following additional factors should be incorporated into the National Noise Metric, so as to make it a more accurate predictor of annoyance for the wide variety of modern flight operations, airports, and residential circumstances occurring in the NAS:

C-weighted dB level measurements
Number per day, and magnitude, of overflight noise excursions from the ambient noise floor
Length of periods of compressed flight operations (rush hours)
Number per day of periods of compressed flight operations
Average inter-flight interval during a period of compressed flight operations
Average noise level during a period of compressed flight operations
Deviation of the average noise level during the compressed period from the ambient noise floor outside the compressed period
Consideration of the above factors for operations during nighttime (sleeping) hours