

2018 UC Davis
Aviation Noise & Emissions Symposium

Mitigating Aviation Noise

Presented by:

Steve Alverson, ESA

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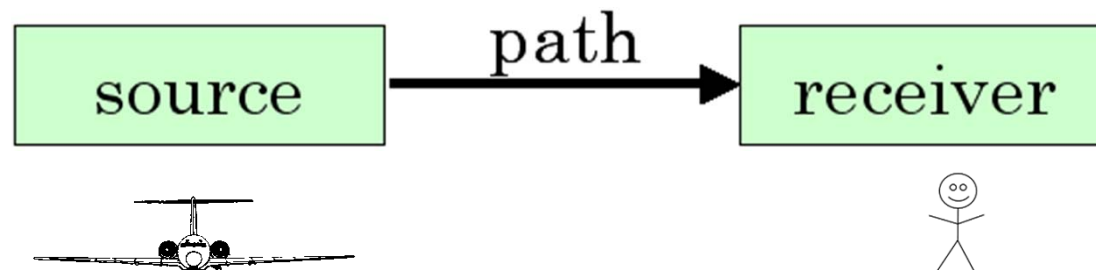
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Presentation Outline

- Mitigating Aviation Noise
- Noise Abatement Options
 - Airfield Design
 - Operational
 - Restrict Operations
 - Management
- Noise Mitigation Options
 - Preventive
 - Remedial

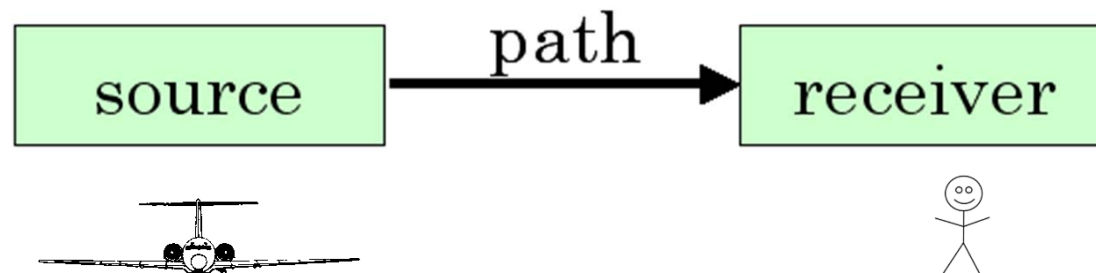
Mitigating Aviation Noise

- Source
- Path
- Receiver



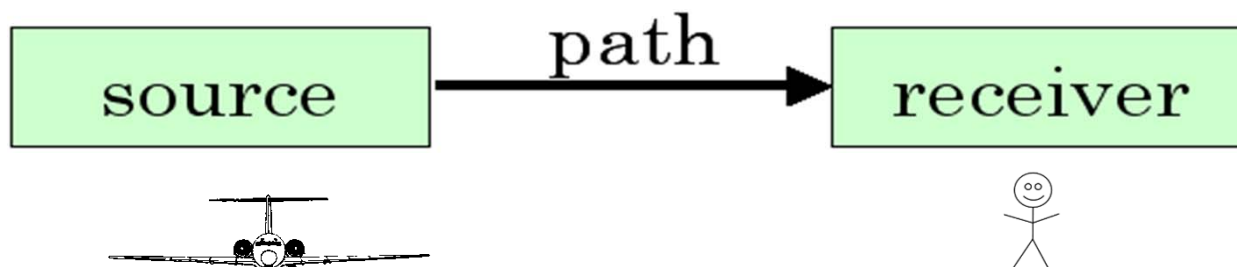
Mitigating Aviation Noise

- Reduce the source level
 - FAA is responsible for aircraft noise certification
 - Pilots may use reduced thrust
 - Ground crews can minimize APU use
 - Reduce or eliminate engine runups



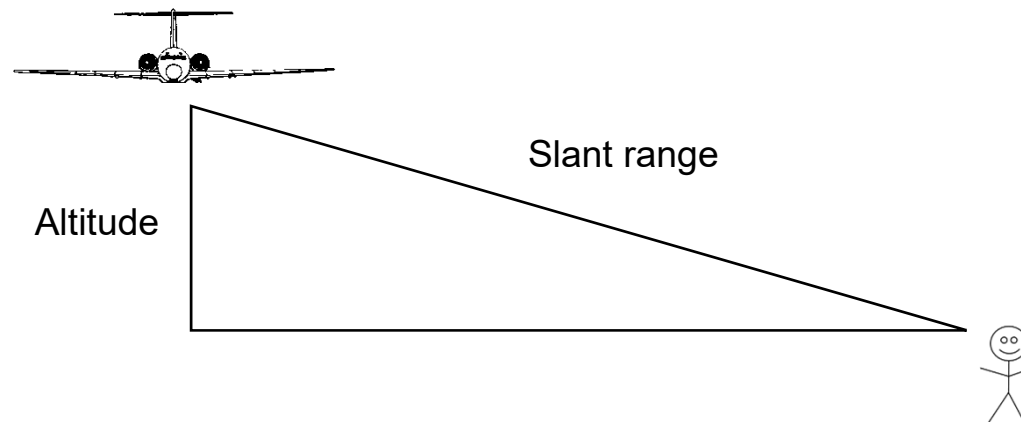
Mitigating Aviation Noise

- Move the source or the receiver
 - Relocated runways, relocated taxiway, relocated run-up areas
 - Displaced takeoff or landing thresholds
 - Relocate noise sensitive uses



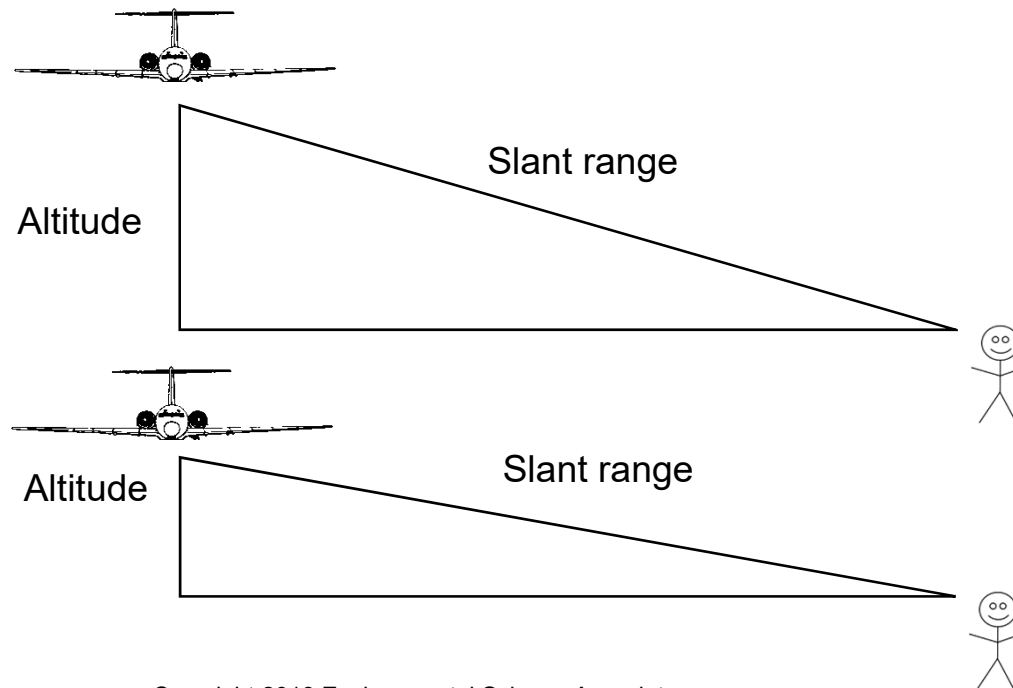
Mitigating Aviation Noise

- Remember: when moving aircraft away from residents, it takes a doubling of the distance to achieve a 6 dB reduction in the noise level
- Except for direct overflight, slant range is more important than altitude



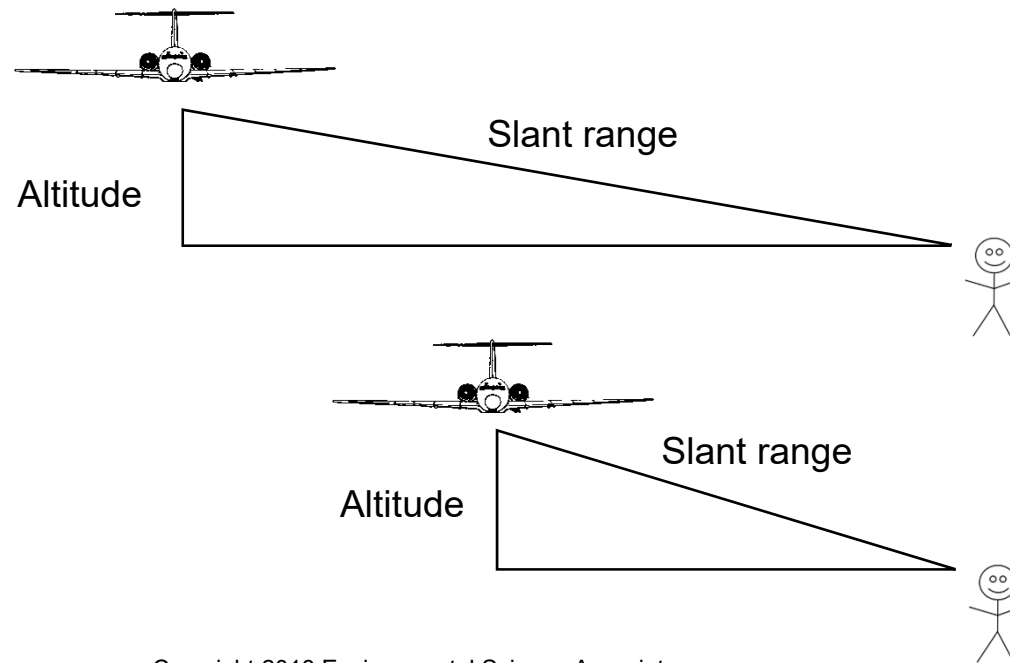
Noise Abatement – Aircraft in Flight

- Example: Double the altitude



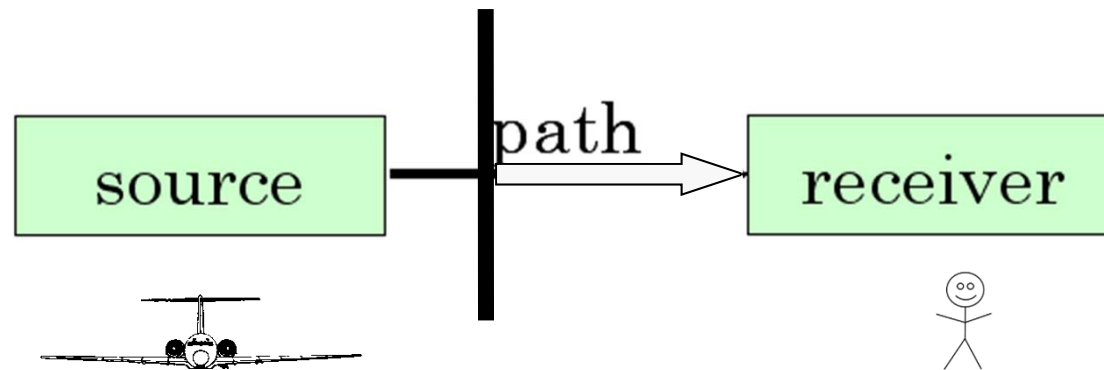
Noise Abatement – Aircraft in Flight

- Example: Double the slant range



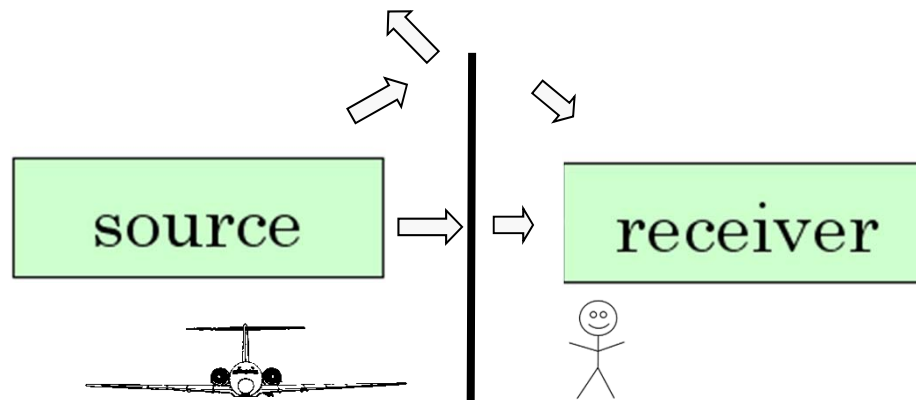
Mitigating Aviation Noise

- Block the path – insertion loss
 - Barriers, berms, buildings



Mitigating Aviation Noise

- Maximum insertion loss is achieved when the source and receiver are close to the barrier
 - Highway noise barriers, ground run-up enclosures



PDX Ground Run-up Enclosure

- Port of Portland's GRE utilizes insertion loss to reduce aircraft engine run-up noise



NCP Measures That Are Required to Be Considered (14 CFR Part 150, Section B150.7)

Noise Abatement	Noise Mitigation
Preferential runway system	Property acquisition and aviation easements
Noise abatement flight procedures and flight tracks	Noise barriers and acoustical shielding
Aircraft operating restrictions based on noise characteristics*	
Other actions to control or abate noise recommended by stakeholders	
Other actions recommended for airport-specific analysis by the FAA	

* Subject to further notice, review, and approval requirements in 14 CFR Part 161

Major NCP Strategy Options

Noise Abatement

- Noise abatement flight tracks
- Preferential runway use
- Arrival/departure procedures
- Airport layout modifications
- Runup enclosures
- Use restrictions*
- Other actions proposed by stakeholders

Land Use

- Remedial Mitigation
 - Land acquisition
 - Sound insulation
 - Avigation easements
- Preventative Mitigation
 - Land use controls
 - Zoning
 - Building codes
 - Comprehensive plans
 - Real estate disclosures
- Other actions proposed by stakeholders

Programmatic

- Implementation tools
- Promotion, education, signage, etc.
- Monitoring
- Reporting
- NEM update
- NCP revision
- Other actions proposed by stakeholders

* Subject to further notice, review, and approval requirements in 14 CFR Part 161

Noise Abatement Options

- Noise abatement techniques can be applied to address:
 - Ground noise
 - Noise from aircraft in flight
- Techniques should be safe, cost effective, environmentally balanced, and capable of being implemented to be successful

Noise Abatement Options

- Standard evaluation criteria
 - Level of noise reduction
 - Effects on airfield capacity and aircraft delay
 - Effects on airspace/air traffic control procedures
 - Consistency with FAA safety and other standards
 - Other environmental effects (e.g., air quality)
 - Operational effects and costs
 - Financial feasibility
 - Consistency with policies adopted by Airport Proprietor

Noise Abatement Options

- Airfield Design
 - Runway extensions, new runway construction
 - Decommission existing runways
 - Relocate runway thresholds
- Operational
 - Dispersing departure flight tracks
 - Advanced navigational technologies
 - Change departure flight profiles
 - Modify arrival flight profiles
 - Rotational runway use
 - Ground run-up facility

Noise Abatement Options

- Restrict operations*
 - Ground run-up restrictions
 - Curfews
 - Noise level restrictions
 - Noise budget
 - Limit number of operations
- Management
 - Pilot awareness program
 - Fly Quiet program
 - Noise sensitive areas noted in navigation charts

*Subject to ANCA and potentially 14 CFR Part 161

Noise Abatement Options

- Ground noise can come from several sources:
 - Aircraft taxiing on the airfield
 - Reverse thrust on landing roll out
 - Maintenance activities on the airfield
 - Ground equipment for aircraft servicing
 - Auxiliary power units

Noise Abatement Options

- Noise abatement techniques to consider for addressing noise from taxiing aircraft:
 - Changes in runway location, length, or strength
 - Installation of high-speed exit taxiways
 - Terminal relocation
 - Noise barriers or berms
 - Establish preferential runway use
 - Establish restrictions on ground aircraft movement
 - Establish use restrictions (e.g., single-engine taxiing)
 - Tug to runway ends or into gates

Noise Abatement Options

- Noise abatement techniques to consider for addressing noise from ground support equipment:
 - Relocation of terminals or aircraft parking stands
 - Ground power plug-ins
 - Noise barriers
 - Establish limits on the use of ground equipment
 - Establish use restrictions

Noise Mitigation Options

- Remedial
 - Property acquisition
 - Redevelopment programs
 - Sound insulation
 - Avigation easements
 - Transaction assistance
- Preventive
 - Comprehensive planning
 - Growth management
 - Noise overlay zones
 - Property disclosure statements

Noise Mitigation Options

Property Acquisition

- This strategy is generally used for properties located within areas exposed to the highest noise levels (> 75 dB DNL)
- Properties are purchased and residents are relocated
- Some local communities dislike this practice because the purchase of the property removes it from the local tax roll
- However, the new compatible uses can be tax generating

Noise Mitigation Options

Property Acquisition (cont.)

- Need to evaluate the potential for fragmentation or elimination of neighborhoods
- Only way airport operator can be assured of long-term protection for compatible land use
- This strategy can be very costly
- Public relations value of the program can be very positive or very negative

Noise Mitigation Options

Sound Insulation

- This strategy is generally used for properties located within noise levels between 65 DNL and 75 DNL
- Homes receive new doors, windows, sealing of leaks, and other treatments to bring the interior noise level in the home to 45 dBA
- The general condition, age, and home state of repair will determine degree of soundproofing needed

Noise Mitigation Options

Sound Insulation (cont.)

- FAA also requires at least a 5-dB reduction in the exterior to interior sound level
- FAA Order 5100.38D requires that the home be both within the FAA-accepted 65 DNL contour and the interior noise level be greater than 45 dB DNL

Noise Mitigation Options

Sound Insulation (cont.)

- Avigation Easements are often secured in return for accepting the sound insulation package, the homeowner will not sue the airport over aircraft noise levels
- This strategy is generally favored by most airports due to lower cost and community acceptance when compared to acquisition, but can be costly

Noise Mitigation Options

Avigation Easements

- Airport operator pays the property owner a monetary sum in exchange an agreement that the property owner will not sue the airport for damages associated with aircraft noise
- Not a popular option with most airports because it does not change the incompatibility with aircraft noise levels
- FAA has stopped funding this option for the reason stated above

Noise Compatibility Programs

- All measures must:
 - Reduce incompatible land use and prevent or reduce future incompatible land use
 - Ensure safety and efficiency
 - Be consistent with the powers and duties of the FAA
 - Be subject to revision if necessary

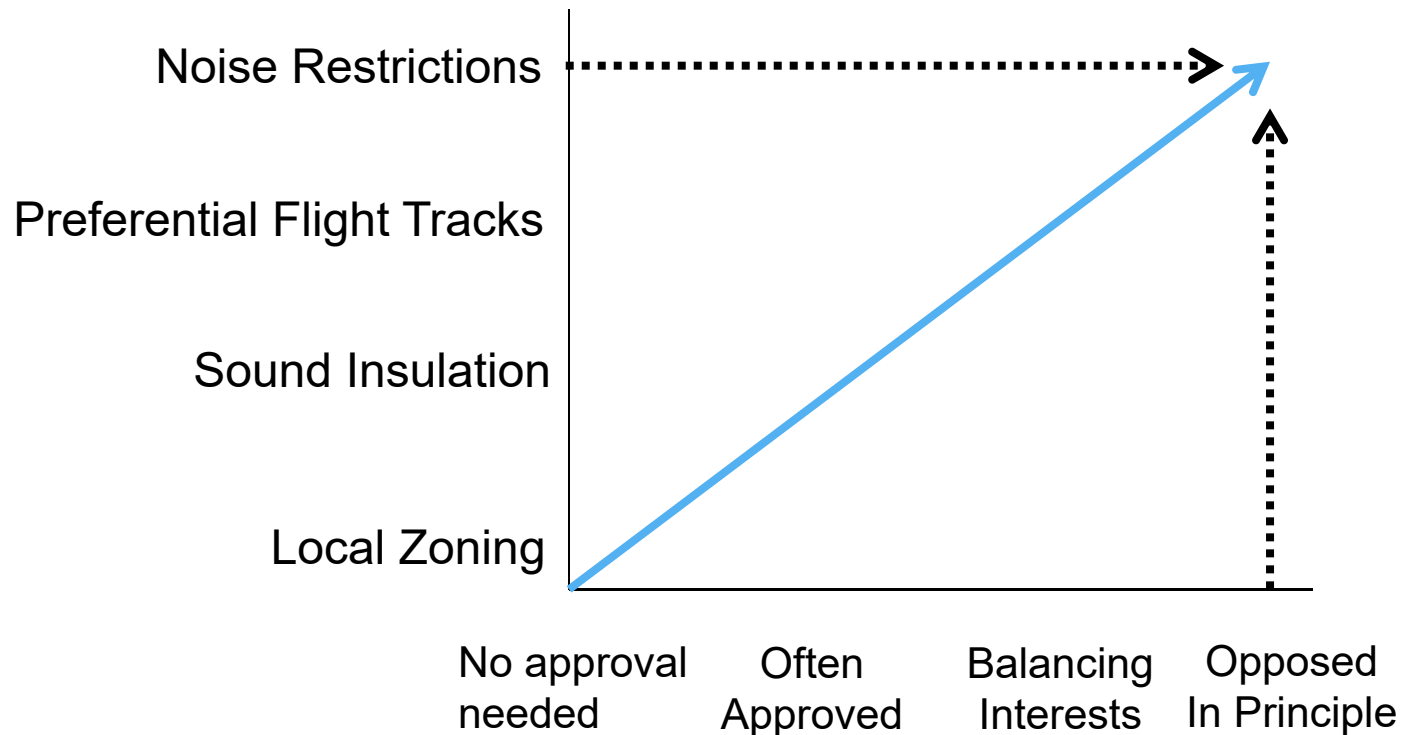
Noise Compatibility Programs

- Noise restrictions or rules must:
 - Not unjustly discriminate
 - Not impose an undue burden on interstate commerce (requires balancing of interests)
 - Meet both local needs and national air transportation system needs

Noise Compatibility Programs

- May be subject to ANCA and 14 CFR Part 161
 - Curfews, noise limits, etc.
 - FAA does not approve noise rules and restrictions through 14 CFR Part 150
- Even if not subject to 14 CFR Part 161, must withstand rigorous scrutiny
 - Reduce existing land use incompatibility above DNL 65 dB
 - Be reasonable and not unjustly discriminatory
 - No undue burden on interstate commerce

Noise Compatibility Programs Difficulty of Obtaining FAA Approval



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