J Acoust Soc Am. 2000 Jun;107(6):3245-53. doi: 10.1121/1.429396.

Community reaction to aircraft noise: time-of-day penalty and tradeoff between levels of overflights

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PMID: 10875369 DOI: 10.1121/1.429396

Abstract

A decrease in the level of sound events can compensate for an increase in the level of other events, but noise metrics assume different tradeoffs. Noise metrics also differ in the penalty applied to noise in the evening and to noise in the night, and in the definition of these periods. These two aspects of noise metrics, i.e., the tradeoff and the penalty for the nighttime (23-7h), are investigated. A general model of the relation between SELs of sound events (aircraft overflights) and noise annoyance is presented which allows for a wide range of tradeoffs and time-of-day penalties. The (tradeoff and time-of-day penalty) parameters of the model are fitted to the data from an aircraft noise study conducted around Amsterdam Airport Schiphol, which is especially suited for investigating the tradeoff and time-of-day penalties. It was found that in this study the tradeoff between the levels of events in metrics based on L(Aeq)'s, such as L(Aeq)(24 h), DNL, and DENL, is approximately correct for the prediction of noise annoyance. Furthermore, it was found that the strongest correlation with annoyance is obtained with a nighttime penalty of circa 10 dB. No suitable data were available for further tests of the tradeoff. The result with respect to the nighttime penalty was weakly further supported by the outcome of analyses of the original data from four other aircraft noise surveys (one survey conducted around British airports, and three coordinated surveys carried out around Paris Orly, Amsterdam Schiphol, and Glasgow Abbotsinch).