OBJECTIVES Sleep is vital for the recovery of physical and mental capacities. Environmental noise is a potential disrupter of the sleep process. In order to develop scientifically sound criteria for the restriction of nocturnal air traffic, the DLR-Institute of Aerospace Medicine investigated the influence of nocturnal aircraft noise on sleep, mood and behavior in four representative laboratory and two field studies between 1999 and 2003.

METHODS In the lab, 128 subjects aged 18-65 were investigated during 13 consecutive nights (total: 1664 nights). Between 4 and 128 aircraft noise with L_{AS,max} between 45 and 80 dB(A) were played back between 11 p.m. and 7 a.m. Results were compared to the findings of two field studies with 64 subjects and 576 nights in total. Here, sound pressure levels were simultaneously measured indoors and outdoors. Electrophysiological signals included polysomnography, EKG, plethysmography, respiration and actigraphy. Synchronous recording with acoustic data assured event related analysis.

RESULTS Random effects logistic regression was used for the prediction of noise induced awakenings depending on L_{AS,max} and the calculation of dose–response curves. A comparison of the awakening probability between lab and field revealed striking differences. Based on these results, new criteria for the restriction of nocturnal air traffic were developed and will be presented.

CONCLUSIONS: The combination of a huge database and new statistical procedures allows the precise prediction of the influence of nocturnal aircraft noise on sleep, which again can be used for the proposal of enhanced laws for the protection of residents living near airports.