[N439] Aircraft Noise at Monitoring Stations under Flight Paths in Hong Kong

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ABSTRACT

The final-approach flight paths towards Runway 25 of the relocated Hong Kong International Airport (HKIA) at Chek Lap Kok pass through established residential districts at heights below 1370m. The initial public reactions to the impact of aircraft noise in these districts prompted the installation of round-the-clock aircraft noise- and flight-track-monitoring terminals along sides of the landing/departure flight paths. Large amounts of data have been recorded, and summaries of these data are placed on the government website for public access. Here we present our study and analysis on sets of these data on their consistency, regularity, predictability and dependence on factors such as aircraft type, wind speed and direction, rainfall, and other environmental factors.

INTRODUCTION

The relocation of HKIA since July 1998 to the reclaimed Chap Lap Kok (CLK) Island (Fig. 1) has enabled the continued growth of HKIA to 33.4 million passengers and 2.5 million tons of cargo in 2002 from the records of 29.5 million passengers and 1.54 million tons at its old Kai Tak site. Few complaints were made by the residents (760,000 living within the foot prints of NEF 25 and 380,000 within NEF 30) at Kai Tak despite the exposure to high noises from aircraft landing and departure [1].

Figure 1, Map of Noise Monitoring Terminals
(Courtesy of HKCAD)
The new HKIA is by design a remote location at the northwest corner of the Lantau Island. Practically, all forecast noise footprints above NEF 25 are on the airport and the surrounding waters. The outcry during the first month of HKIA’s opening was unexpected, 541 complaints mostly from residents living in districts under the landing flight path into Runway 25L. Operational measures were taken in October 1998 to avoid midnight-to-7am landing on Runway 25L or departure to the northeast. Another outbreak of complaints was lodged (224 for June 1999) when Runway 25R began operation in 26 May 1999. Since August 1999 aircraft departing to the northeast of the airport are required to adopt ICAO’s noise abatement take-off procedures. Since October 1999 noisy aircraft that do not comply with ICAO Chapter III noise standards cannot be scheduled to land between 11pm and 7am, and are totally banned from landing by July 2002. Since August 2000 aircraft landing from northeast are encouraged to adopt the low-power-low-noise Continuous Descent Approach.

To further respond to the affected communities’ demand for more information, a total of sixteen noise-monitoring terminals (NMT) have been installed at various areas in the vicinity of the flight paths. In addition, one mobile NMT was procured for noise measurement deployment. A webpage has been maintained and a static display in the Passenger Terminal Building to facilitate public access to aircraft noise and flight path information, http://www.info.gov.hk/cad/english/main.htm.

Complaints have been dropping from a monthly peak of 541 and average of 189 to the monthly peak of 43 and average of 27 in 2002, Table 1.

<table>
<thead>
<tr>
<th>Period of Complaints</th>
<th>Total</th>
<th>Mean Monthly</th>
<th>Peak Monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>July-December 98</td>
<td>1133</td>
<td>189</td>
<td>541</td>
</tr>
<tr>
<td>Jan-December 99</td>
<td>1002</td>
<td>84</td>
<td>224</td>
</tr>
<tr>
<td>Jan-December 00</td>
<td>419</td>
<td>35</td>
<td>67</td>
</tr>
<tr>
<td>Jan-December 01</td>
<td>369</td>
<td>31</td>
<td>43</td>
</tr>
<tr>
<td>Jan-December 02</td>
<td>325</td>
<td>27</td>
<td>43</td>
</tr>
</tbody>
</table>

The availability of an array of sensors and large volume of data since 1998, the regularity and frequency of flights, and typical ranges of subtropical conditions provide an opportunity to study various effects on the propagation and attenuation of aircraft noise. We give here an account of the conditions under which the data were taken and some preliminary results of our analysis on subsets of the data.

NMT under FLIGHT PATH

HKIA at CLK has two 3800x60m parallel runways, Fig. 1. The southern runways 07R/25L and northern runway 07L are Category II while the northern runway 25R is Category IIIA rated for Precision Approach in visibility as low as 200m. The flight paths for takeoff and landing are designed to exclude flight noise footprints of NEF 25 or higher from all residential developments, except for a few residents in north Lantau, predominantly in Sha Lo Wan, for which grants were provided for installation of noise mitigating measures. Six stationary computer-based flight track- and aircraft noise- monitoring terminals had been commissioned to provide round-the-clock recording of noise events at sites under flight paths of HKIA at Kai...