31 Day Aircraft Movements - Interactive Visualisation – Tutorial.

Introduction

The 31 Day Aircraft Interactive visualisation offers so much insight and understanding regarding aircraft movements that overfly requested postcode areas.

The raw flight data is shared by the OpenSky Network for community projects and academic research. The aircraft noise interpretation of the raw data is derived by ourselves by applying layers of rules-based logic that has been field tested and refined since 2019.

The dataset used by the visualisation is scoped by two set of parameters; a) the geo-location for a postcode, and b) the Assessment radius i.e. 0 to 1 mile, 0 to 2 miles and 0 to 3 miles.

For this tutorial we have used the postcode SO22 5FQ which is located to the west of Winchester, Hampshire, United Kingdom.

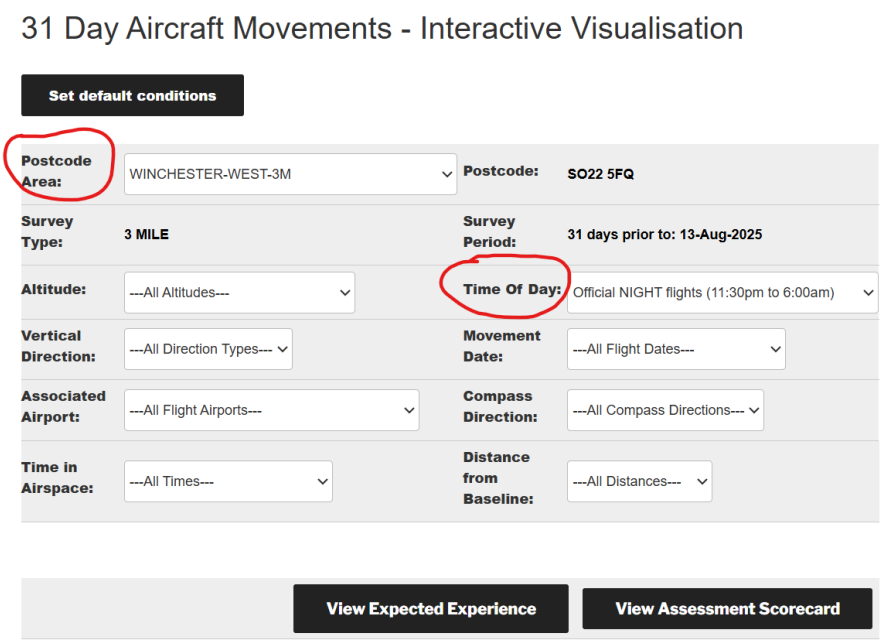
The area of interest is located on the edge of the city within a residential area, surrounded to the west by fields and farms. However, the road network around Winchester is busy and that includes major A roads and the nearby M3 Motorway. During the day the ambient background noise typically ranges from 40 dBs to 70 dBs. At night the ambient background noise typically ranges from 25 dBs to 50 dBs, with little road noise.

Our analysis shows the area is overflown by flights that originate from multiple domestic and international airports throughout the day and night.

Visualisation

The interactive visualisation consists of 4 sections.

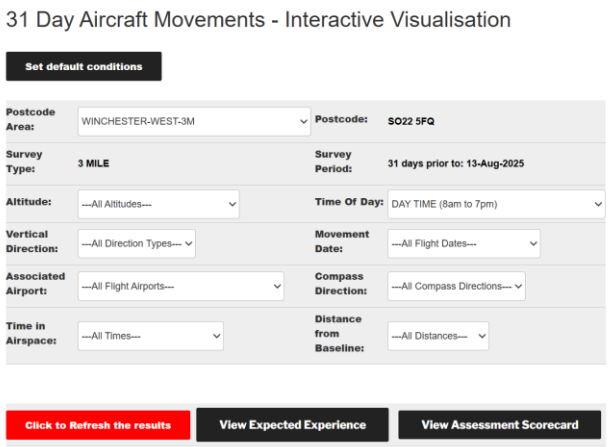
Section 1 – The Query panel



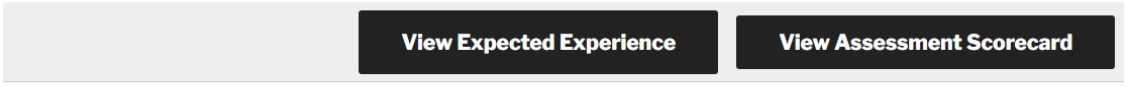
By default, the **Time Of Day** defaults to the "night flights" filter. This is done simply to speed up the initial response time.

Once the visualisation is fully loaded you then have the option to amend any of the above filters. However, if the **Postcode Area** is subsequently changed then all the filters will be reset to the default settings as shown above apart from the **Postcode Area** itself.

To apply the filters, in other words to go and fetch the data that meets your specified filter criteria you will need to manually select the Red button, as shown below. It can take between 15 to 50 seconds to fully refresh the page. It all depends on the number of flights meet your criteria



Section 2 – Basic Stats.



Basic Stats: *No. of flights meeting the above criteria are:* ***265*** *(****8.5*** *per day) out of a total of* ***5465*** *flights* ***(i.e. 4.8%)***

Vertical Direction represented as; *Red = Ascending (* ***7%*** *), Blue = Descending (* ***10%*** *), Black = Overflying (* ***83%*** *)*

Total flight time in airspace; ***162.60 minutes,*** *or* ***2.71 hours*** *with an average Altitude of:* ***36079*** *feet.*

The **Basic Stats** not only provide a heads-up for the data returned but also recalculates based on any search criteria that you may have entered into the **Search:** box. The **Search:** box is covered in more detail later in this Tutorial.

1st line.

The first line shows both the number of flights that meet your filter conditions as well as the total number of flights there are regardless of the filter conditions. In the case above, which is the default conditions, out of the 5465 flights over the 31 day analysis period, 265 of those flights relate to Night Flights. I.e. Night flights made up 4.8% of the overall flights. Of course, the interpretation of the **Basic Stats** changes as they are dependent upon your filters.

2nd line.

The second line provides information about the vertical direction for the flights that meet your filter conditions. The vertical direction describes whether the plane was; ascending/climbing, descending/dropping or overflying/remaining level. Why this is important in terms of aircraft noise is; the nosiest flight activity is, Ascending, followed by Overflying and then Descending.

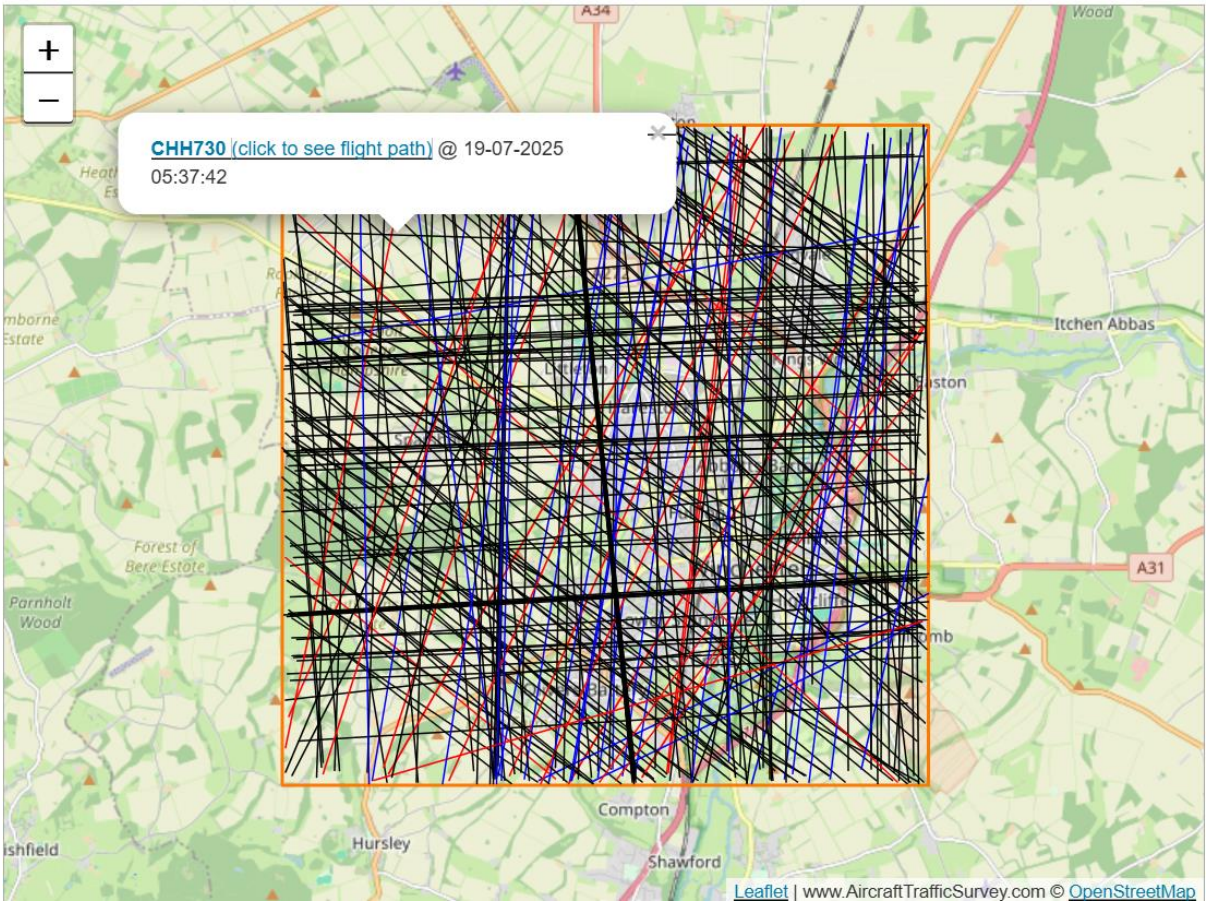
In the case above, 7% of the 265 flights are ascending, 10% descending, and 83% are overflying.

3rd line.

The third line shows the total airspace time, in minutes and hours, the filtered aircraft spent in the area. Additionally, the average altitude for those flights is also included as there is a complex relationship between height and resulting noise. The worst scenario is where there is a high percentage of Ascending and/or Overflying planes at lower altitudes (<15k feet).

Section 3 – Map Visualisation.

The expandable postcode map is also interactive and is also colour coded and shows all the flights that met both your **filter** conditions and any **Search:** criteria.



Colour code 1 - the Container.

A colour coded container of individuals flights that met the filter and/or search criteria, in this case the colour is Orange. The colour range represents the result of the Noise Assessment where; a) Green: minimal aircraft noise, b) Yellow: intermittent aircraft noise, c) Orange: Regular aircraft noise, and d) Red: high aircraft noise.

Colour code 2 – the Flight lines.

The flight lines themselves are also colour coded based on their vertical movement over the area; a) Red: ascending/climbing, b) Blue: descending/dropping, and c) Black: overflying/remaining level. The thicker the coloured line then the greater the concentration of flights.

Flight drill through.

Using the mouse- pointer it is possible to select an individual flight line. This is performed by moving the mouse- pointer over the flight lines until the shape changes into a hand. Once this happens, and it can be fiddley on a small screen, you then left-button click with the mouse. Up will pop the flight details and also a link to the complete flight path, as shown above. The flight path is displayed by a left-button mouse click.

Section 4 –The Flight Detail Table.

The flight details are displayed in a dynamic table and contains all the flights that met both your **filter** conditions and any **Search:** criteria. By default, only the first 100 entries are shown.

The table columns can be sorted by Clicking on the column name. The number of entries **shown:** in the table can be increased to 500 rows or to All Rows.

Show 100 entries Search:

Showing 265 of 265 or 100%

Flight date/time	Call Sign	ICAO24	Airport	Vertical Rate / Compass Direction	Altitude (feet)	Distance (miles)	Airspace (seconds)	Ground speed MPH
13-08-2025 01:04:40	RYR2UZ (click to see flight path)	4cade6	EAST MIDLANDS AIRPORT	descending ==>North<==	36447	2	38	566
12-08-2025 23:58:37	HLE56 (click to see flight path)	406ec5	SOUTHAMPTON AIRPORT	overflying ==>South-East<==	1600	2.14	15	121
12-08-2025 05:18:02	UAL19 (click to see flight path)	a1d8fd	TRANSATLANTIC FLIGHT?	overflying ==>East<==	37000	1.28	33	625
12-08-2025 04:45:12	DAL82 (click to see flight path)	a16273	TRANSATLANTIC FLIGHT?	overflying ==>South-East<==	36000	2.96	15	567

Search – the search Box:

The default on loading the page is for no search criteria, meaning you will see all the flight entries that were returned by the pre-defined filter conditions, see Section1 above.

Using the **Search**: box you can enter text or numbers to further refine the number of entries shown to perhaps a sub-group or even an individual flight. As your search text is typed the Table, the Base Stats, and the Map Visualisation are updated in real-time.

To see all UAL19 flights then enter **UAL19**. This can then be further refined by entering part of the Vertical Rate description such as **descending** or **overflying**, and/or part of the airport name.

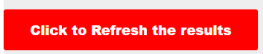
Please note that wild card, mathematical comparisons and fuzzy logic are not supported by the search function.

Case Studies – Query Panel

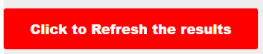
In this section we discuss real-life case studies and how we use the Query Panel to really understand what's happening behind the scenes.

There are several factors that influence the perceived scale of aircraft annoyance. Sometimes the issues are related to visual impact. So let's see how we build the dataset that enables us to understand the source airport and the type of plane.

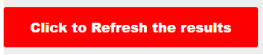
1. Which flight could have a Visual Impact?

Step 1	Select a Postcode Area from the pull-down list. This will reset the default **Filter Conditions** and also the Table **Search**: box content.
Step 2	Select the value "VISUAL IMPACT 300 – 5000 feet…" from the **Altitude:** picking list.
Step 3	Select the value "-- All Times of Day---" from the **Time Of Day:** picking list.
Step 4	Click the refresh button 
Step 5	The flight details are then returned to the dynamic table, the map is update and so too are the **Base Stats**. This process could take several seconds to run.
Step 6	Review the results and then optionally refine the query by entering the Heathrow into the **Search** box: and again, review the results.
Step 7	Remove all the entered content from the **Search** box:

2. Which flights are travelling North, specifically to/from Heathrow?

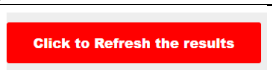
Step 1	Keep the same Postcode Area as above, but this time click the Default button  . This will reset the default **Filter Conditions** and the Table **Search**: box content.
Step 2	Select the value "-- All Times of Day---" from the **Time Of Day:** picking list.
Step 3	Select the compass value "North" from the **Compass Direction**: picking list.
Step 4	Click the refresh button 
Step 5	The flight details are then returned to the dynamic table, the map is update and so too are the **Base Stats**. This process could take several seconds to run.
Step 6	Review the results and then optionally refine the query by entering the Heathrow into the **Search** box: and again, review the results.

3. Which flights are travelling North, specifically Heathrow for a defined day?

Step 1	Keep the same Postcode Area and Compass Direction as above but this time select a flight date: from the **Movement Date:** picking list. Note: the list of dates are dependent on the original Assessment period.
Step 3	Click the refresh button 

Step 4	The flight details are then returned to the dynamic table, the map is update and so too are the **Base Stats**. This process could take several seconds to run.
Step 5	Review the results and then optionally refine the query by entering the Heathrow into the **Search** box: and again, review the results.

4. How many flights are there 1 to 3 miles away?

Step 1	Keep the same Postcode Area as above, but this time click the Default button  . This will reset the default **Filter Conditions** and the Table **Search**: box content.
Step 2	Select the value "-- All Times of Day---" from the **Time Of Day:** picking list.
Step 3	Select the distance from baseline value "1-3 miles only" from the **Distance From Baseline**: picking list.
Step 4	Click the refresh button 
Step 5	The flight details are then returned to the dynamic table, the map is update and so too are the **Base Stats**. This process could take several seconds to run.
Step 6	Review the results and then optionally refine the query by entering the Heathrow into the **Search** box: and again, review the results.

The updated map should look similar to: