

Altitude of 33L Departures at TEKKK 2010-2017

2018-05-06

Summary

This report investigates the altitude of flights departing Logan runway 33L as they pass near the TEKKK waypoint over Medford. Using flight track data from 2010-2017, it compares altitude over time. The study period spans the introduction of 33L RNAV in 2013 and includes two periods when 33L was closed.

There is a strong seasonal component to the altitude; the median altitude in winter is about 800 feet higher than the median summer altitude. This is true for all aircraft types. The seasonal variation may be explained by the effect of temperature and humidity on performance. Cold, dry air improves both engine performance and lift. ¹²

There is considerable variation in altitude across aircraft types. Of the jet aircraft, wide-body jets are the lowest. Regional jets are typically about 1000 feet higher than wide-body jets. Business jets (biz jets) are 1000 feet higher still. Single-aisle jets fall between wide-body and regional jets.

There may be a slight decreasing trend in altitude of single-aisle jets and an increasing trend in altitude of wide-body jets. At the end of the study period, their median altitudes are similar.

The seasonal variation is several times larger than any trend.

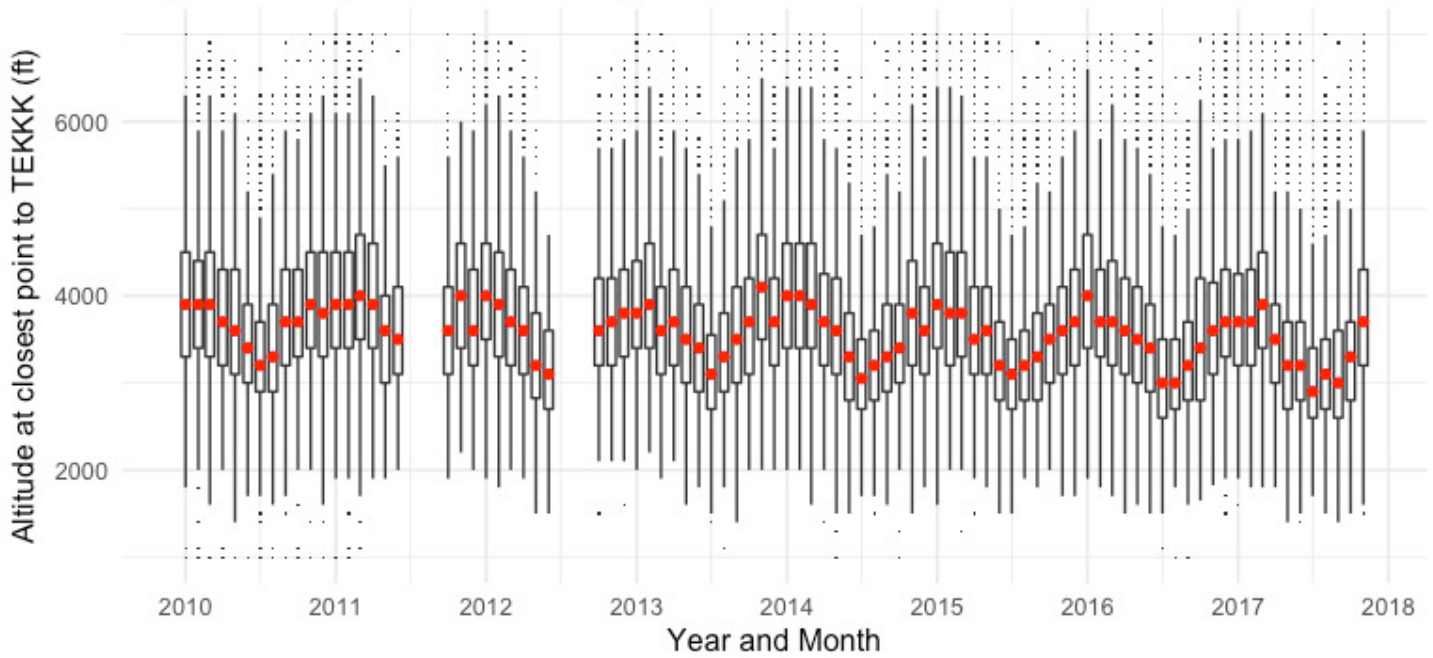
Median altitude

This chart shows the distribution of altitude of 33L departures at the point of nearest approach to TEKKK. The red dots are the median altitude.

This data shows a clear seasonal trend, with flights flying higher in winter than in summer.

Note: Runway 33L was closed for July-Sept 2011 and 2012. These months have been omitted from the chart.

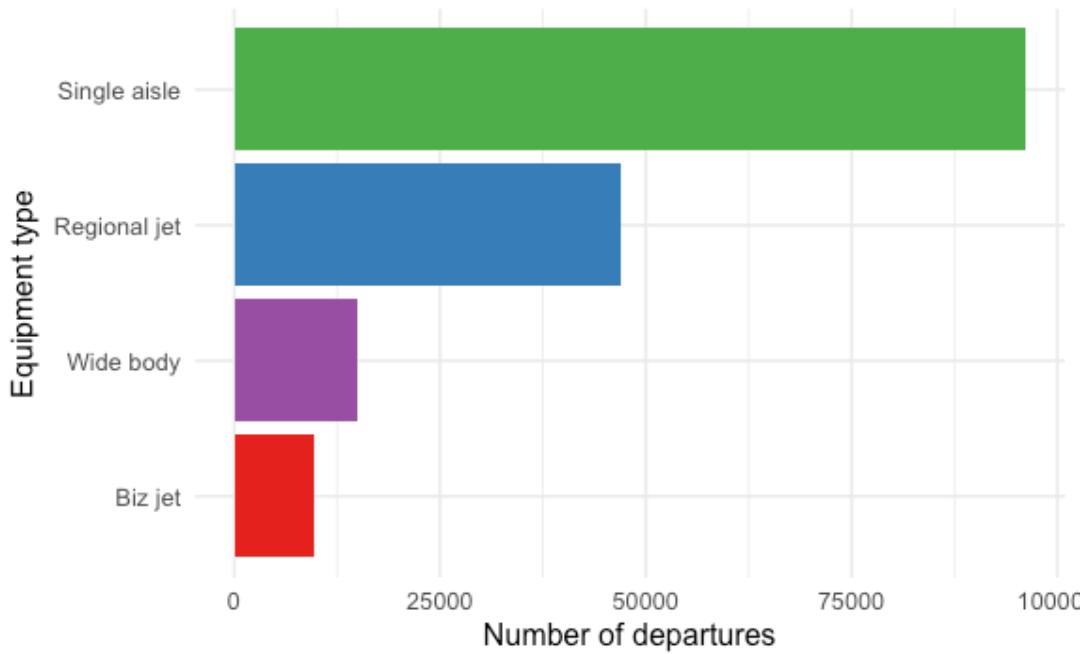
Logan 33L Departures - Monthly altitude at TEKKK

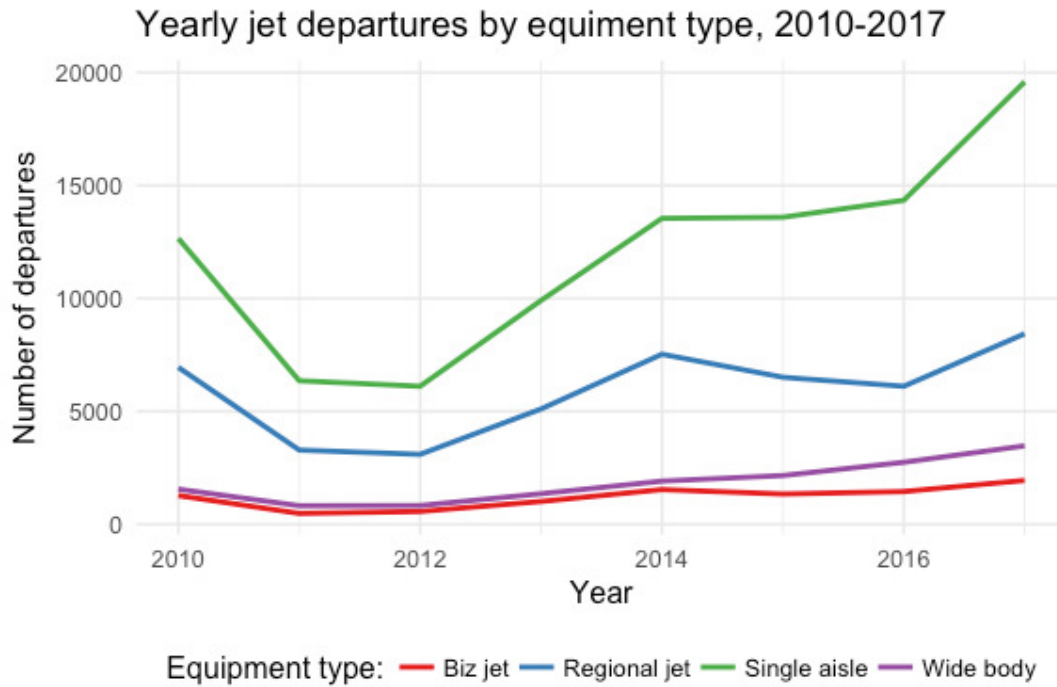


Equipment types

Single-aisle jets account for most jet departures on 33L. The number of departures has increased steadily since 2012 with the proportions remaining fairly constant.

Total jet departures by equipment type, 2010-2017



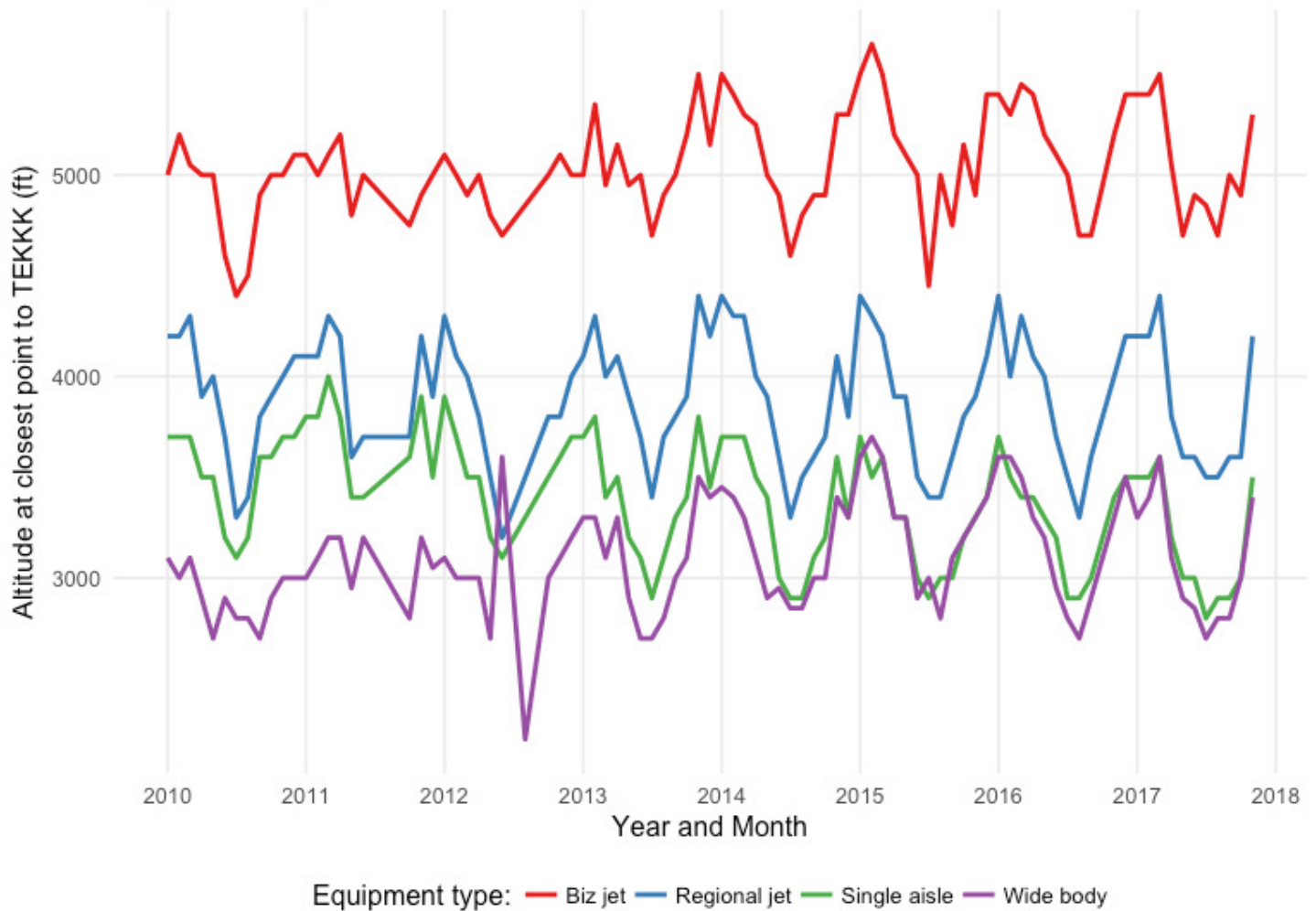


Altitude by equipment category

Wide-body jets have the lowest median altitude, followed by single-aisle jets, regional jets, and biz jets (the highest).

Seasonal variation occurs for all jet categories. Wide-body and single-aisle jets are the lowest; regional jets slightly higher and biz jets considerably higher.

Logan 33L Departures - Altitude at TEKKK



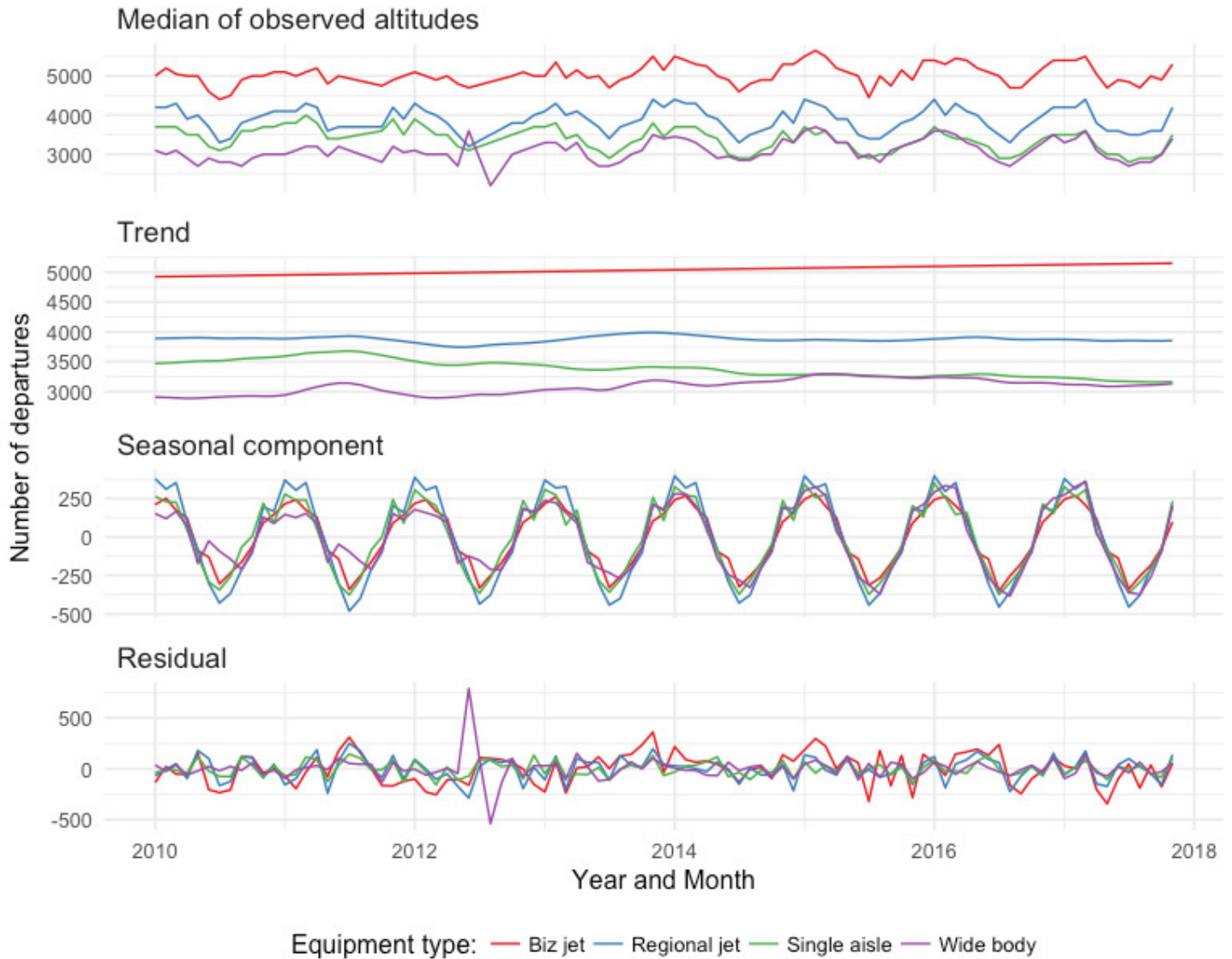
Seasonal variation and trend

Decomposing the median altitude into seasonal variation, trend, and residual shows a strong seasonal component. The single-aisle jets show a slight decreasing trend in altitude; wide-body jets show a slight increase in altitude. By the end of the period they are similar.

The seasonal component varies by about 800 feet from summer to winter.

Logan 33L Departures - Seasonality and Trend of Altitude at TEKKK

Jets only



Sources

Altitude data is derived from detailed flight track data obtained from the FAA via FOIA request for the period Jan. 2010 - Nov. 2017. Data for Oct. 2016 from ADS-B ground station recording.

For seasonal decomposition, the median altitudes for months without data were estimated by linear interpolation between the adjacent months.

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1. <http://theatlsgroup.biz/temperature-humidity-affect-aircraft-performance/>↔
2. http://www4.hcmut.edu.vn/~huynhqlinh/olympicvl/tailieu/physlink_askexpert/ae652.cfm.htm↔