## Problem:

imagine working as data scientist at one airlines company and are given the problem of comparing and optimizing performance for that company.

## Data set:

On-Time Performance data, downloaded from Bureau of Transportation Statistics, covers passenger airline travel within the United States from January 2011 to March 2016. I selected 32 features, as shown below:

[1] "YEAR"                    "QUARTER"                    "MONTH"
[4] "DAY_OF_MONTH"            "DAY_OF_WEEK"                "FL_DATE"
[7] "UNIQUE_CARRIER"          "AIRLINE_ID"                 "CARRIER"
[10] "FL_NUM"                 "ORIGIN_AIRPORT_ID"
"ORIGIN_AIRPORT_SEQ_ID"
[13] "ORIGIN_CITY_MARKET_ID" "ORIGIN"                      "ORIGIN_CITY_NAME"
[16] "ORIGIN_STATE_ABR"       "ORIGIN_STATE_NM"
"DEST_AIRPORT_ID"
[19] "DEST_AIRPORT_SEQ_ID"    "DEST_CITY_MARKET_ID"    "DEST"
[22] "DEST_CITY_NAME"         "DEST_STATE_ABR"             "DEST_STATE_NM"
[25] "CRS_DEP_TIME"           "DEP_TIME"                   "DEP_DELAY"
[28] "DEP_DELAY_NEW"          "ARR_TIME"                   "ARR_DELAY"
[31] "ARR_DELAY_NEW"          "X"

Questions

1. Show the flight route of American Airlines in the early 2016.

2.Show the coverage of each carrier according to the number of flight records in each year.

3 What are the range of Arrive Delay of top six Airlines Co. in year 2016, 2015, 2014, 2013, 2012 and 2011?

4. What are the range of departure delay of the top six companies in year 2016, 2015, 2014, 2013, 2012 and 2011?

5. Mean Departure Delay at major Airports in 2016

6. Mean Arrival Delay at major Airports in 2016

Some interesting findings are presented in the following pages, in the order accordance with the order of the questions.

Flight Route of AA in the early 2016

**Coverage of Airlines in 2016**
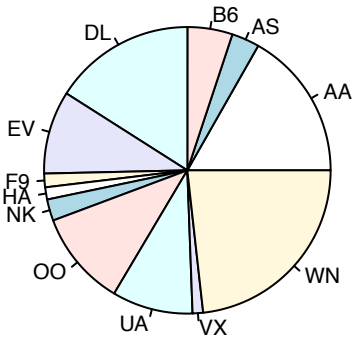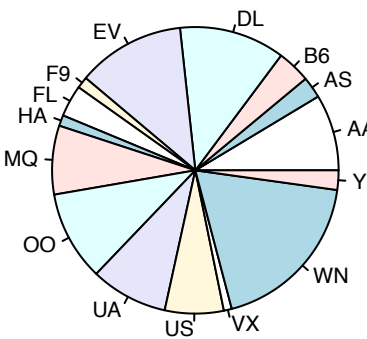


**Coverage of Airlines in 2015**
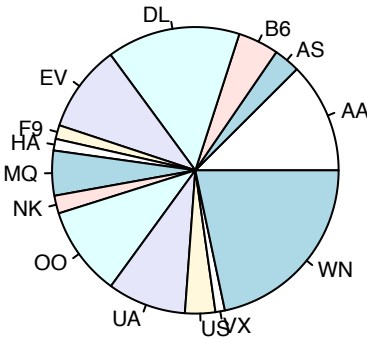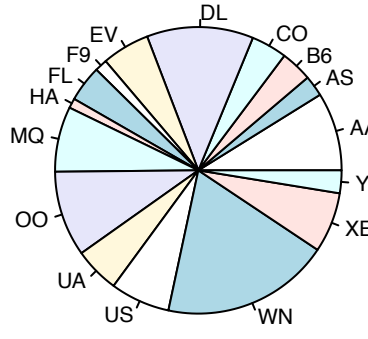


**Coverage of Airlines in 2014**
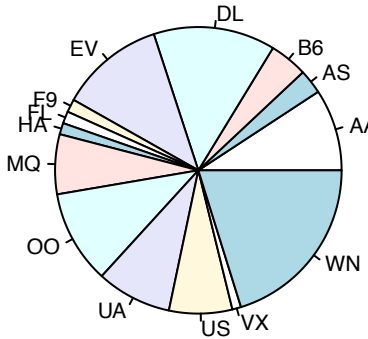


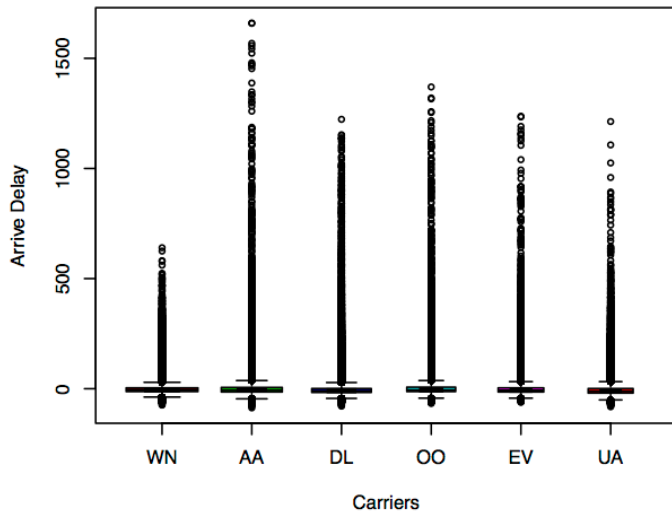**Coverage of Airlines in 2013**
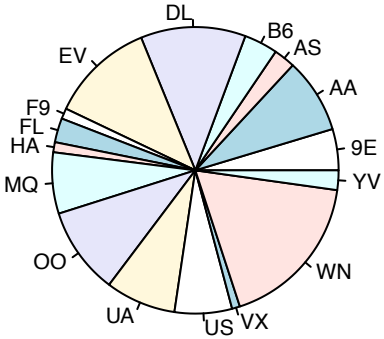


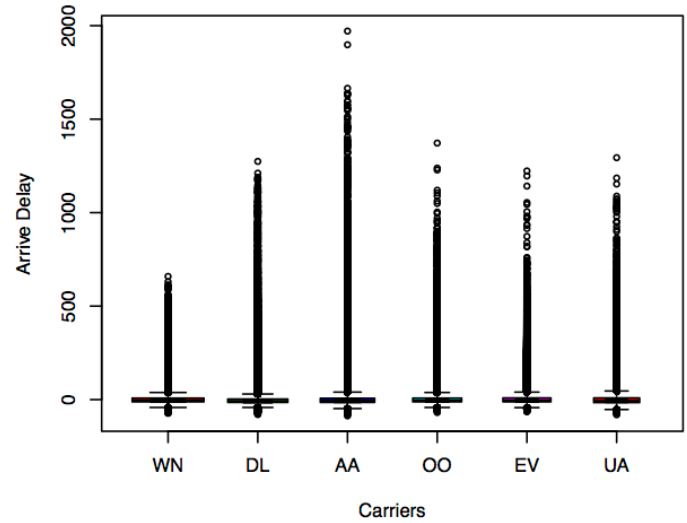**Coverage of Airlines in 2012**

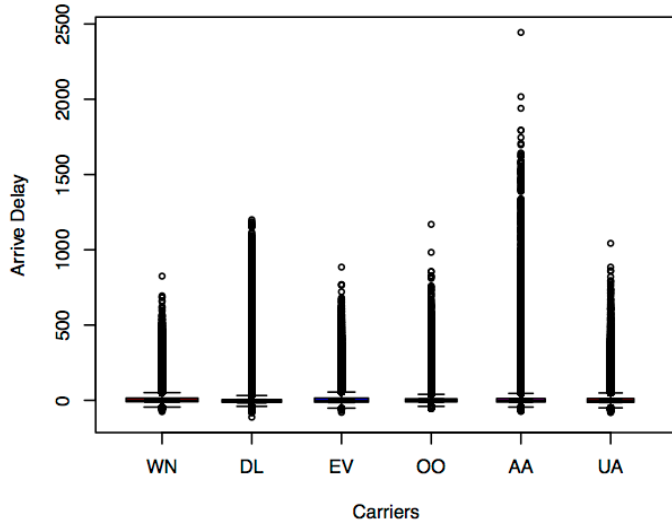

**Coverage of Airlines in 2011**
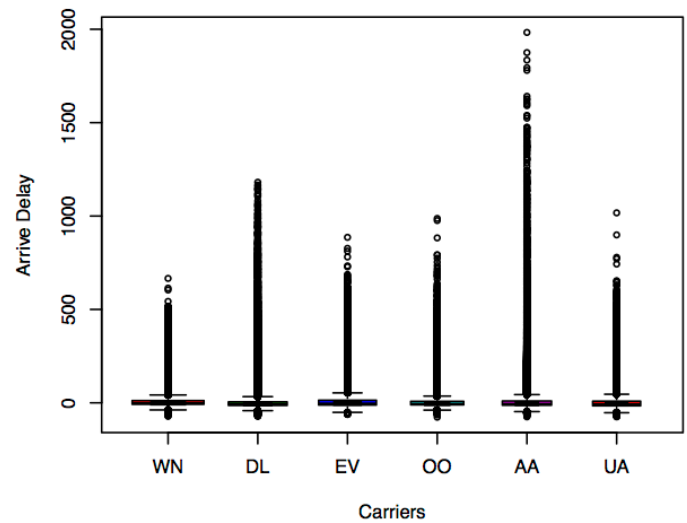
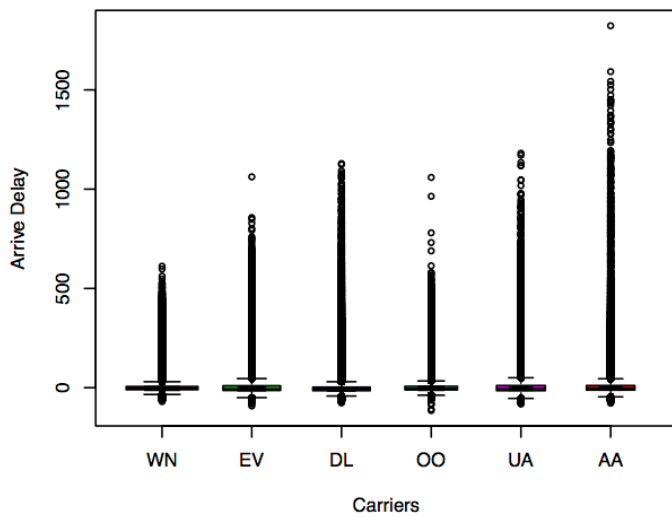**Range of Arrive Delay of top 6 Airlines in 2016**

**Range of Arrive Delay of top 6 carriers in 2015**

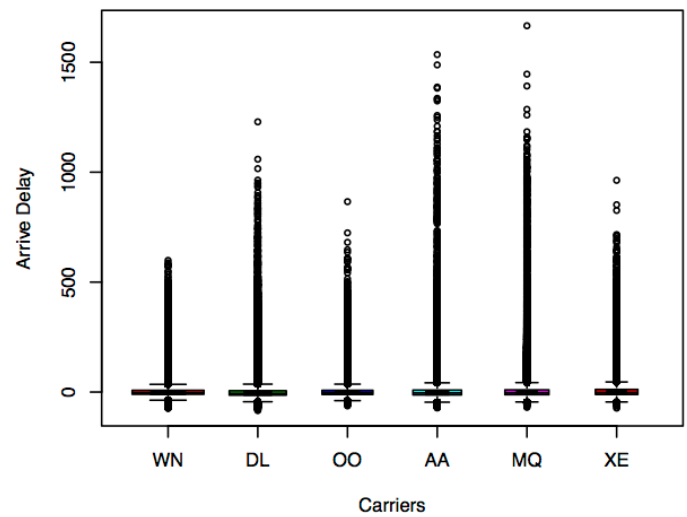**Range of Arrive Delay of top 6 carriers in 2014**

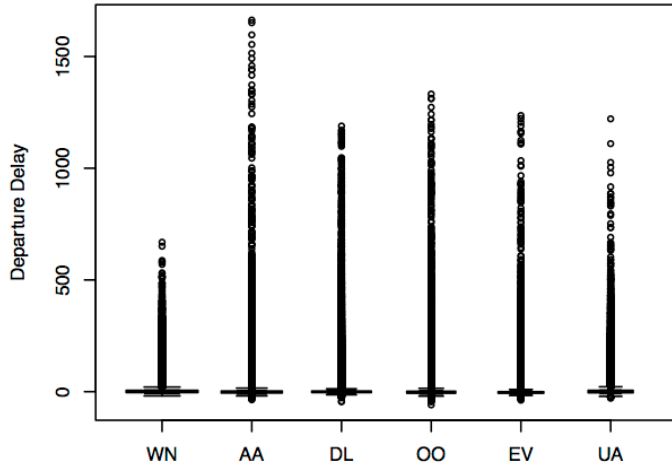**Range of Arrive Delay of top 6 carriers in 2013**
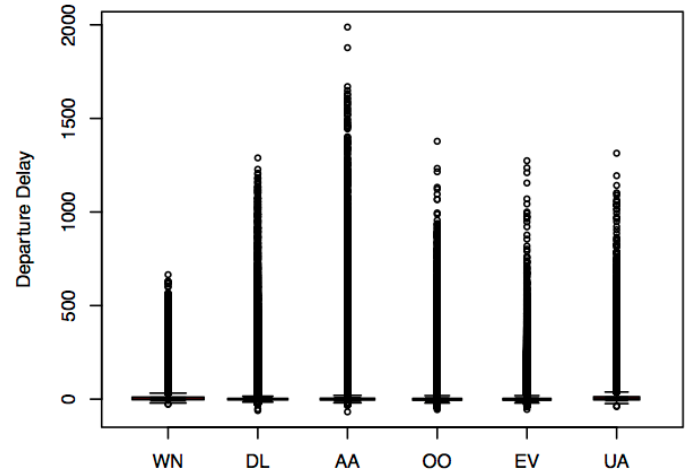
**Range of Arrive Delay of top 6 carriers in 2012**

**Range of Arrive Delay of top 6 carriers in 2011**
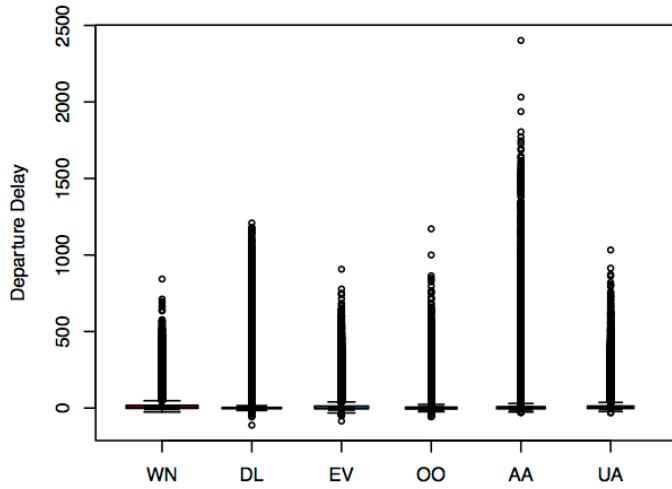
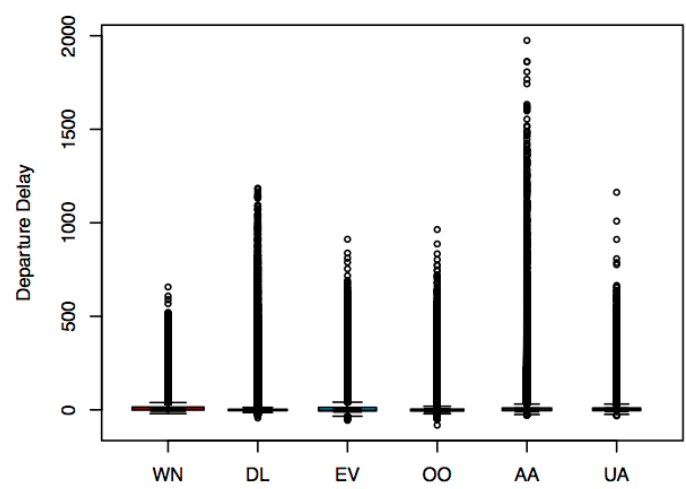**Range of Departure Delay of top 6 airlines in 2016**

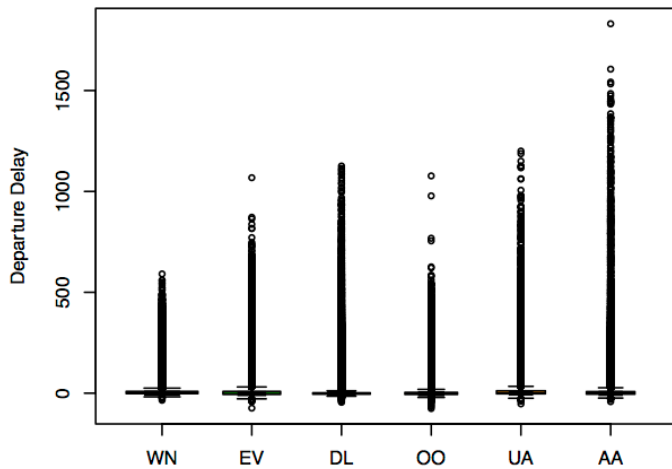**Range of Departure Delay of top 6 airlines in 2015**

**Range of Departure Delay of top 6 airlines in 2014**
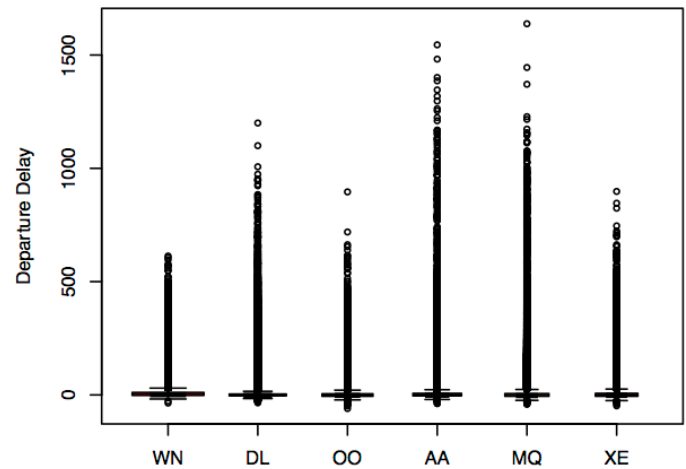
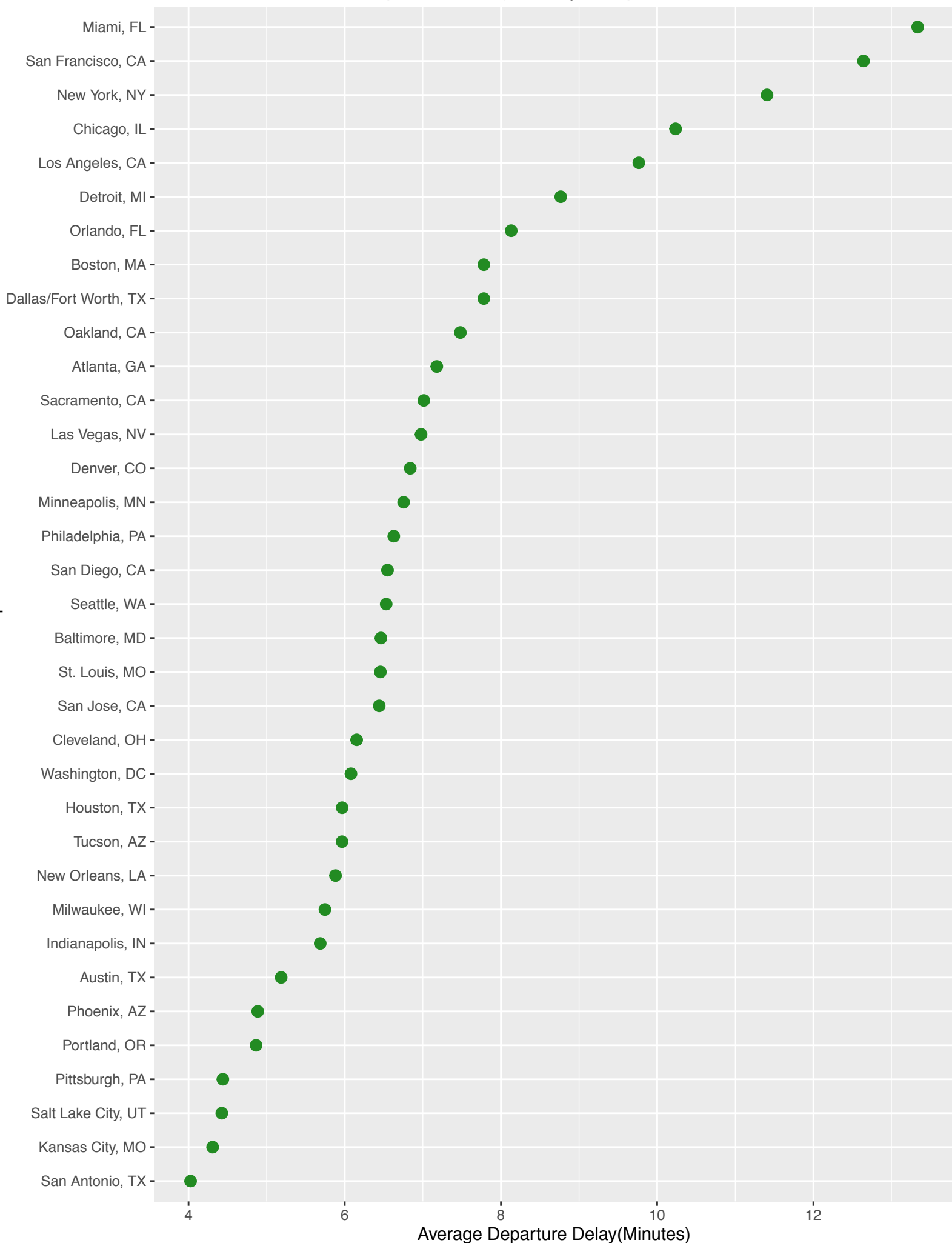**Range of Departure Delay of top 6 airlines in 2013**

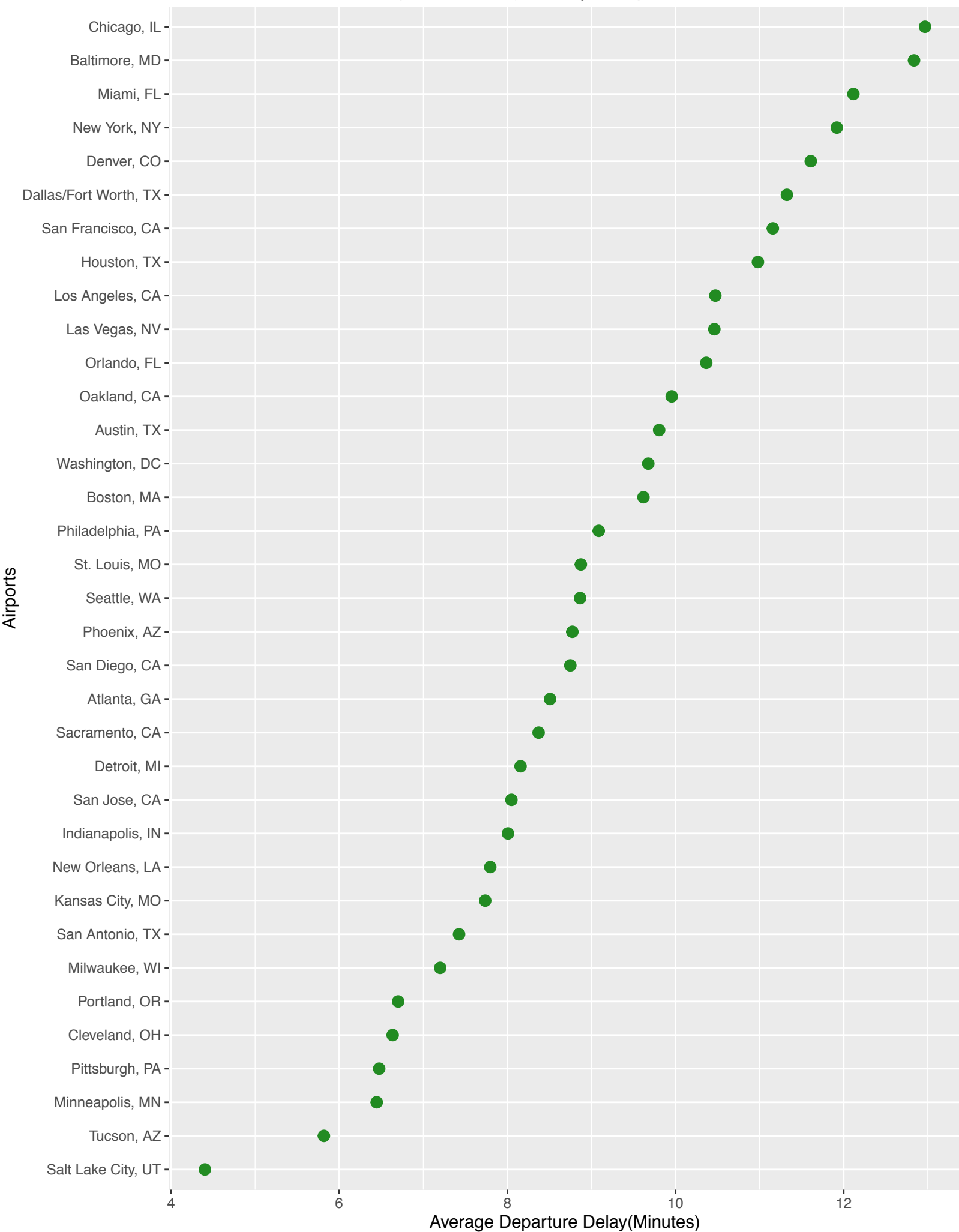**Range of Departure Delay of top 6 airlines in 2012**

**Range of Departure Delay of top 6 airlines in 2011**

Departure Delay at Major Airports in 2016

# Departure Delay at Major Airports in 2015



Airports (y-axis, top to bottom): Chicago, IL; Baltimore, MD; Miami, FL; New York, NY; Denver, CO; Dallas/Fort Worth, TX; San Francisco, CA; Houston, TX; Los Angeles, CA; Las Vegas, NV; Orlando, FL; Oakland, CA; Austin, TX; Washington, DC; Boston, MA; Philadelphia, PA; St. Louis, MO; Seattle, WA; Phoenix, AZ; San Diego, CA; Atlanta, GA; Sacramento, CA; Detroit, MI; San Jose, CA; Indianapolis, IN; New Orleans, LA; Kansas City, MO; San Antonio, TX; Milwaukee, WI; Portland, OR; Cleveland, OH; Pittsburgh, PA; Minneapolis, MN; Tucson, AZ; Salt Lake City, UT
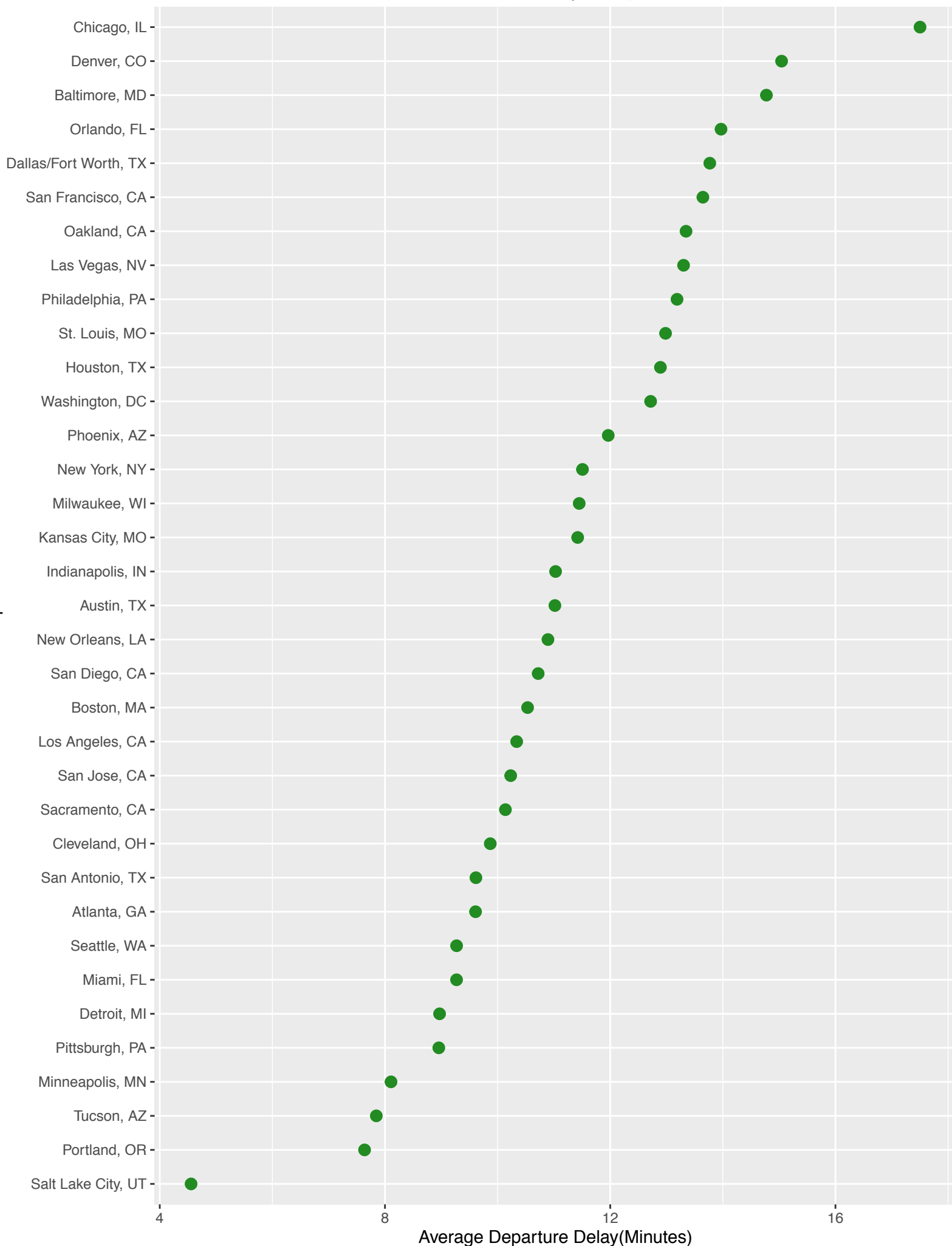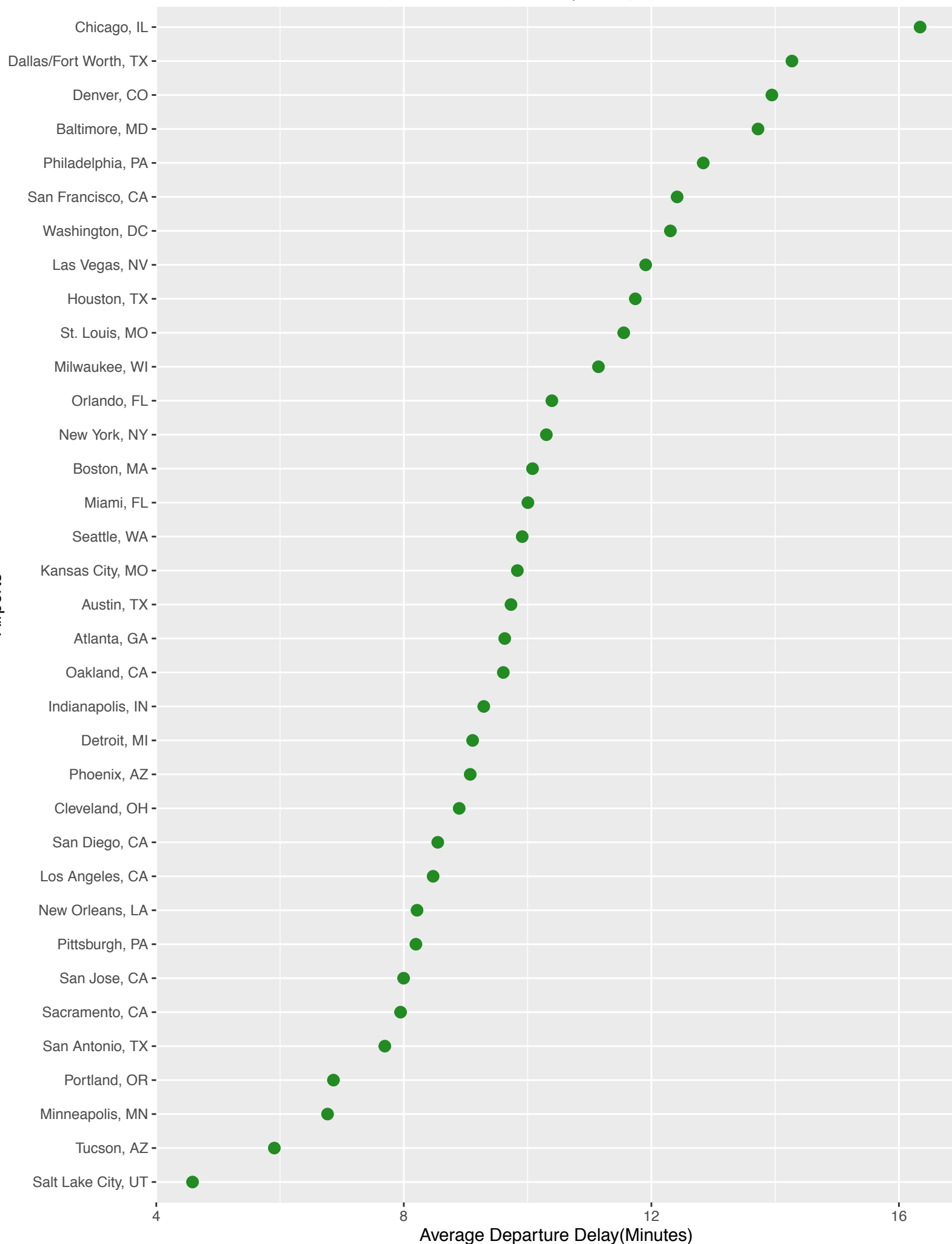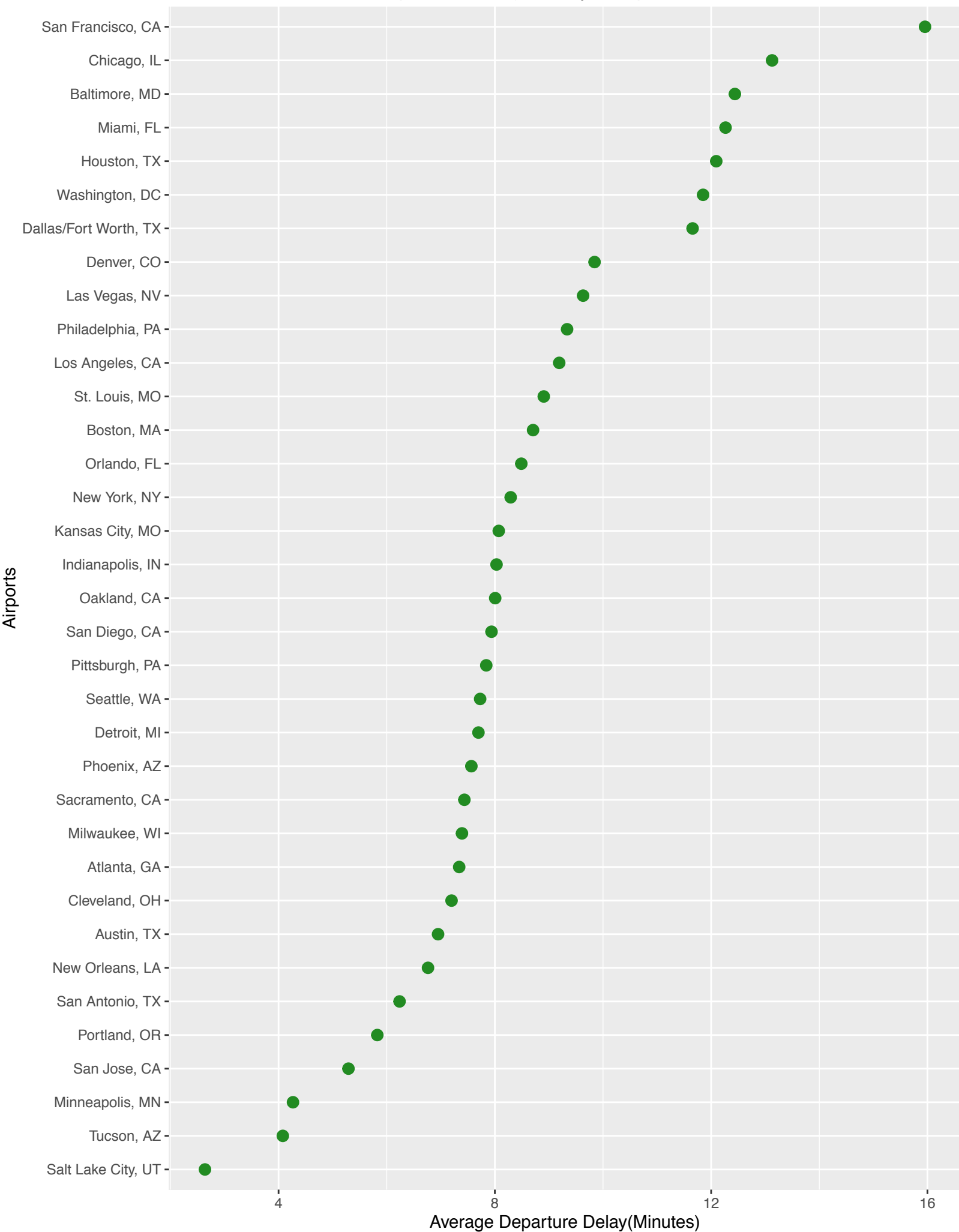
Average Departure Delay(Minutes)

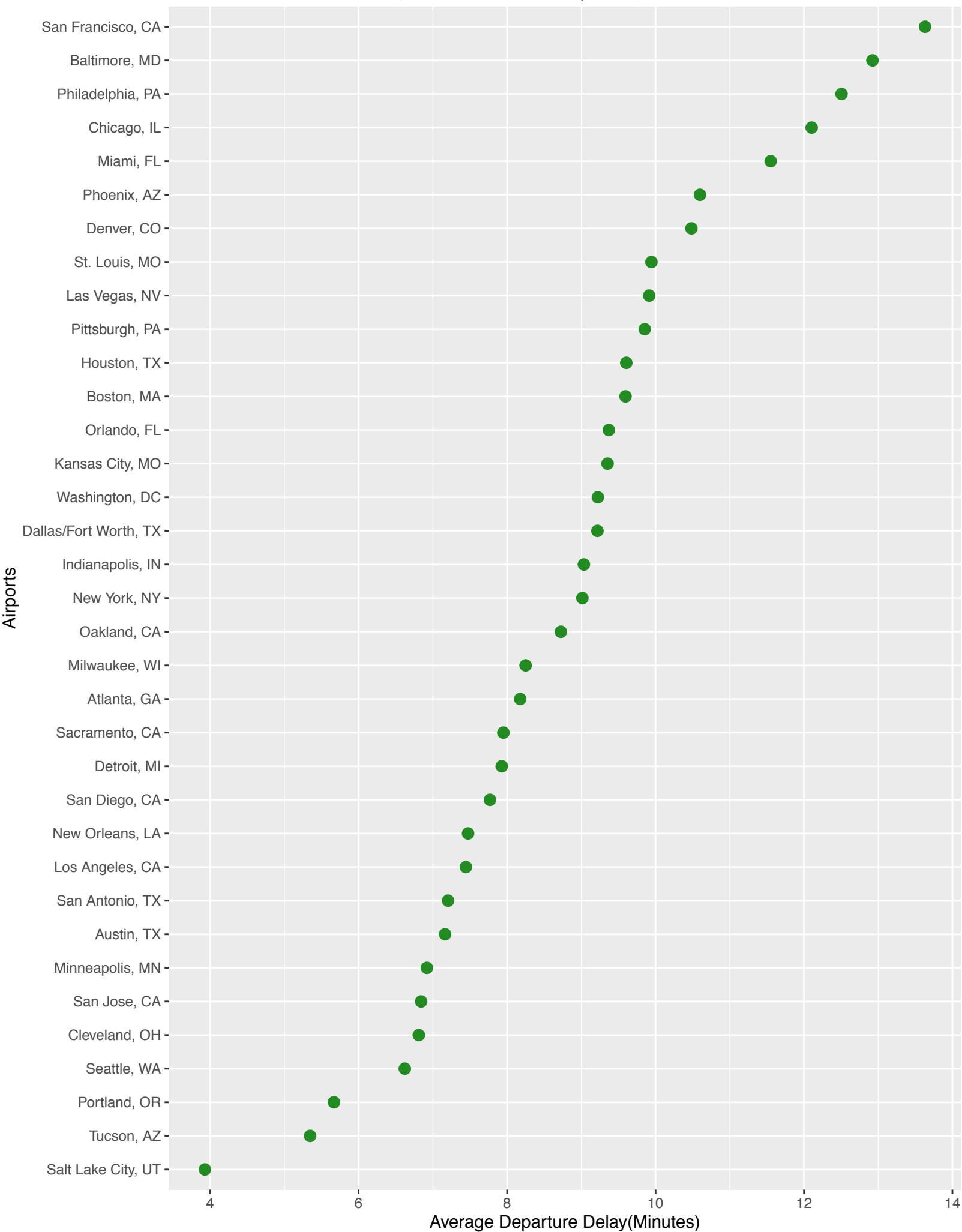Departure Delay at Major Airports in 2014
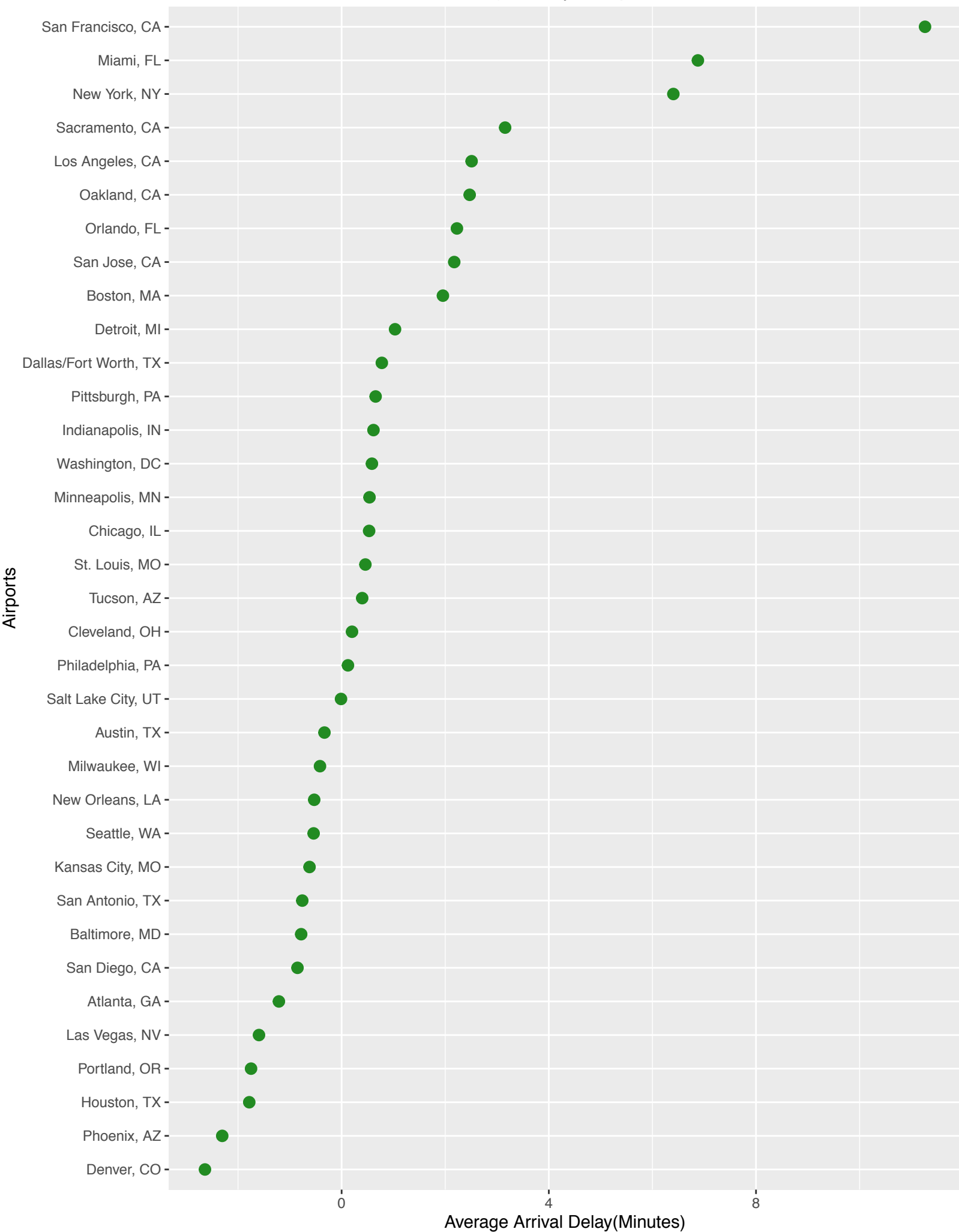
Departure Delay at Major Airports in 2013
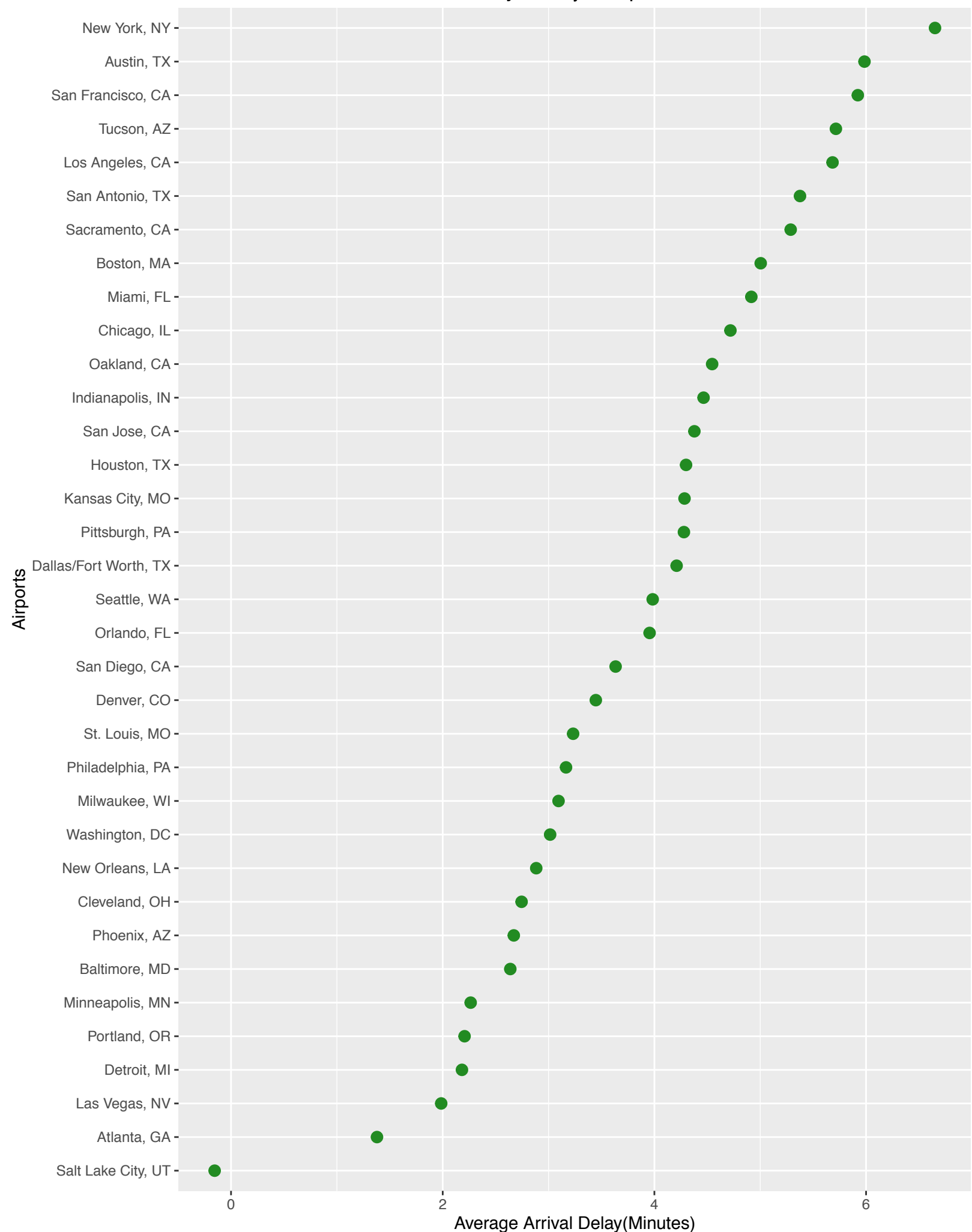
Departure Delay at Major Airports in 2012

Departure Delay at Major Airports in 2011

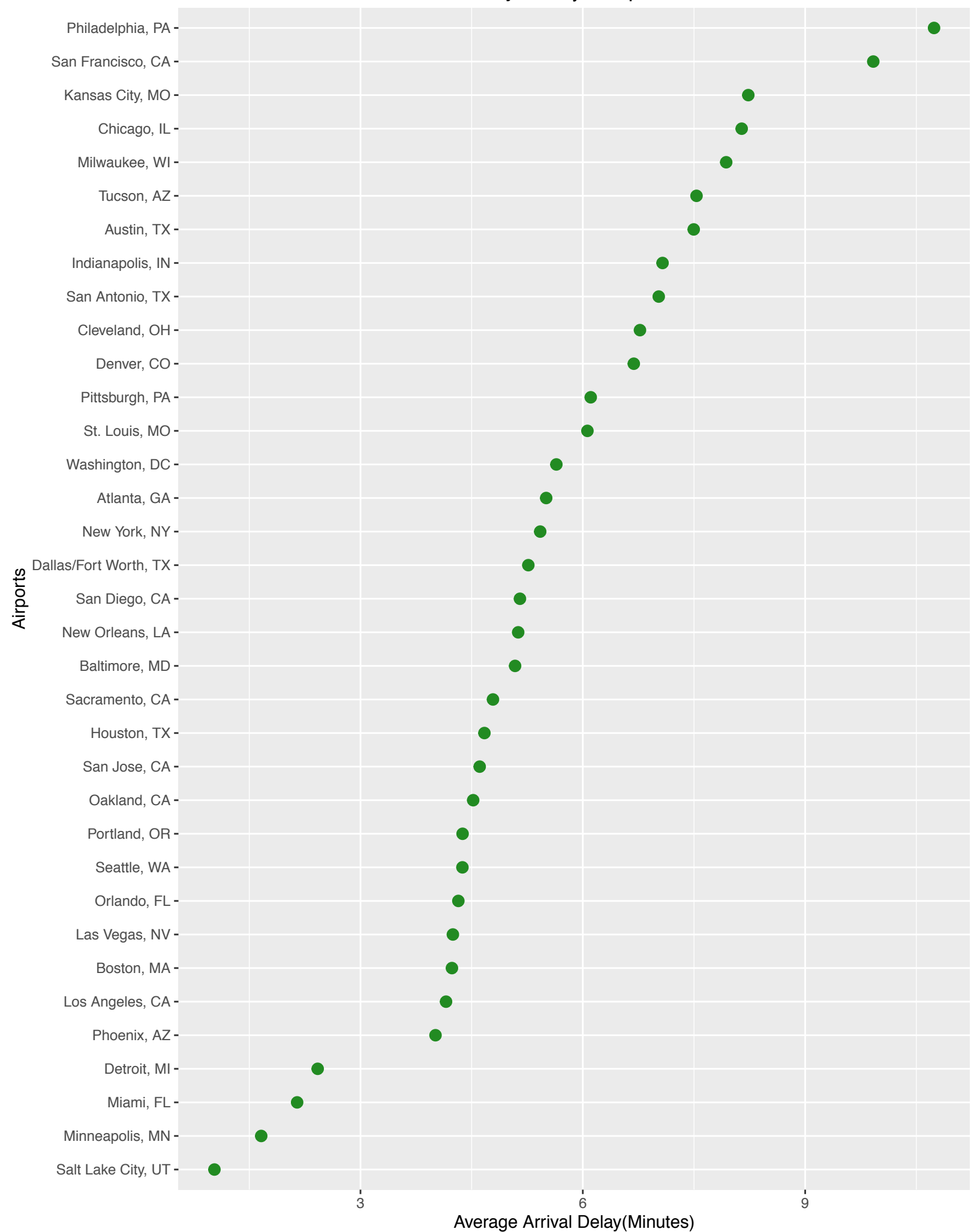Arrival Delay at Major Airports in 2016

Arrival Delay at Major Airports in 2015

Arrival Delay at Major Airports in 2014

Arrival Delay at Major Airports in 2013

Arrival Delay at Major Airports in 2012

Arrival Delay at Major Airports in 2011