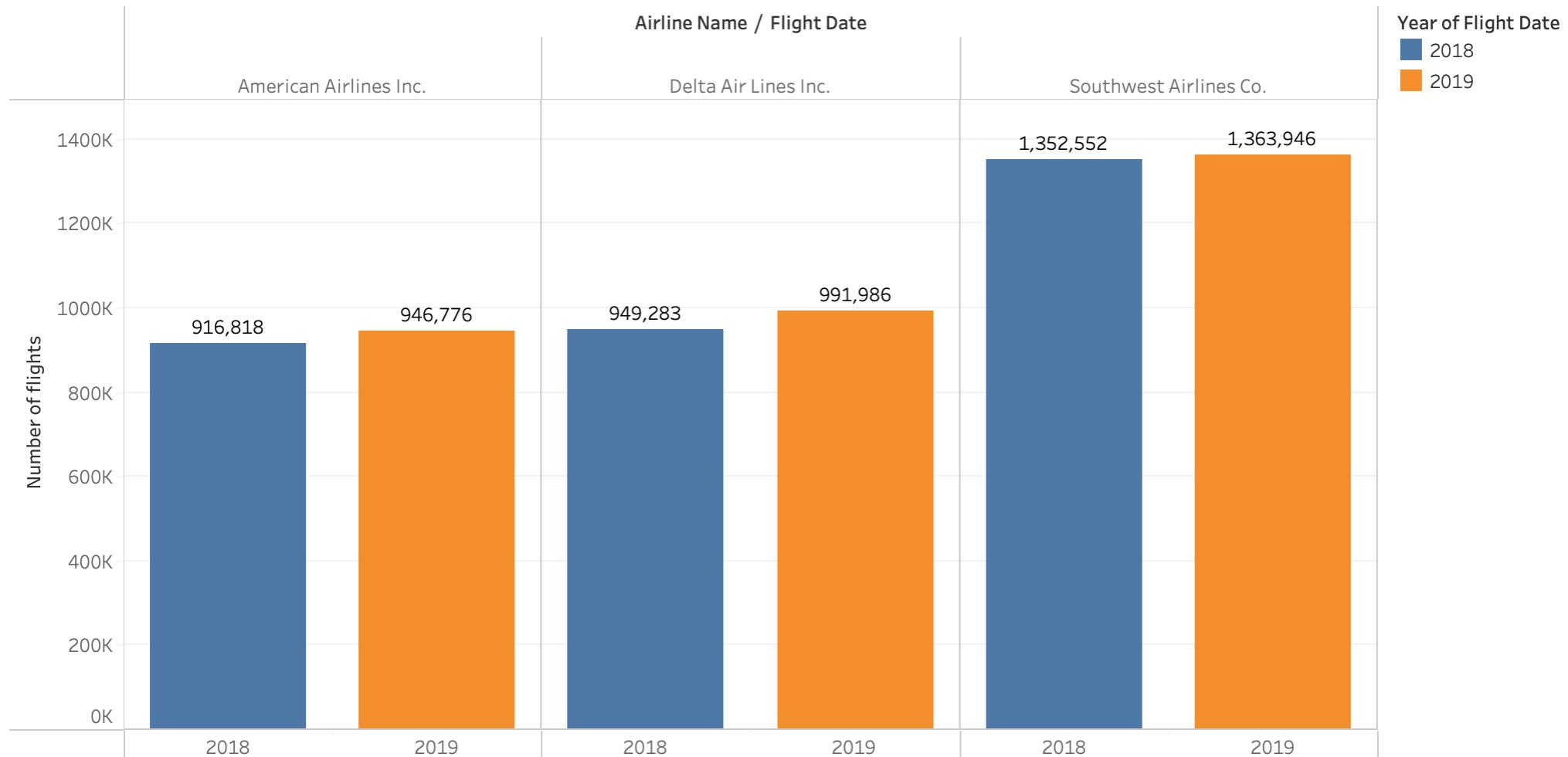


# Air-Traffic-Analysis--- Data-Analysis-in-Tableau

Owen Hsu

## <Q1.1> Comparing Total Flights Among Three Carriers from 2018 to 2019

Between 2018 and 2019, Southwest Airlines operated the highest number of flights among the three airlines, totaling 2,716,498 flights. Delta Air Lines followed with 1,941,269 flights, while American Airlines had the fewest flights at 1,863,594.

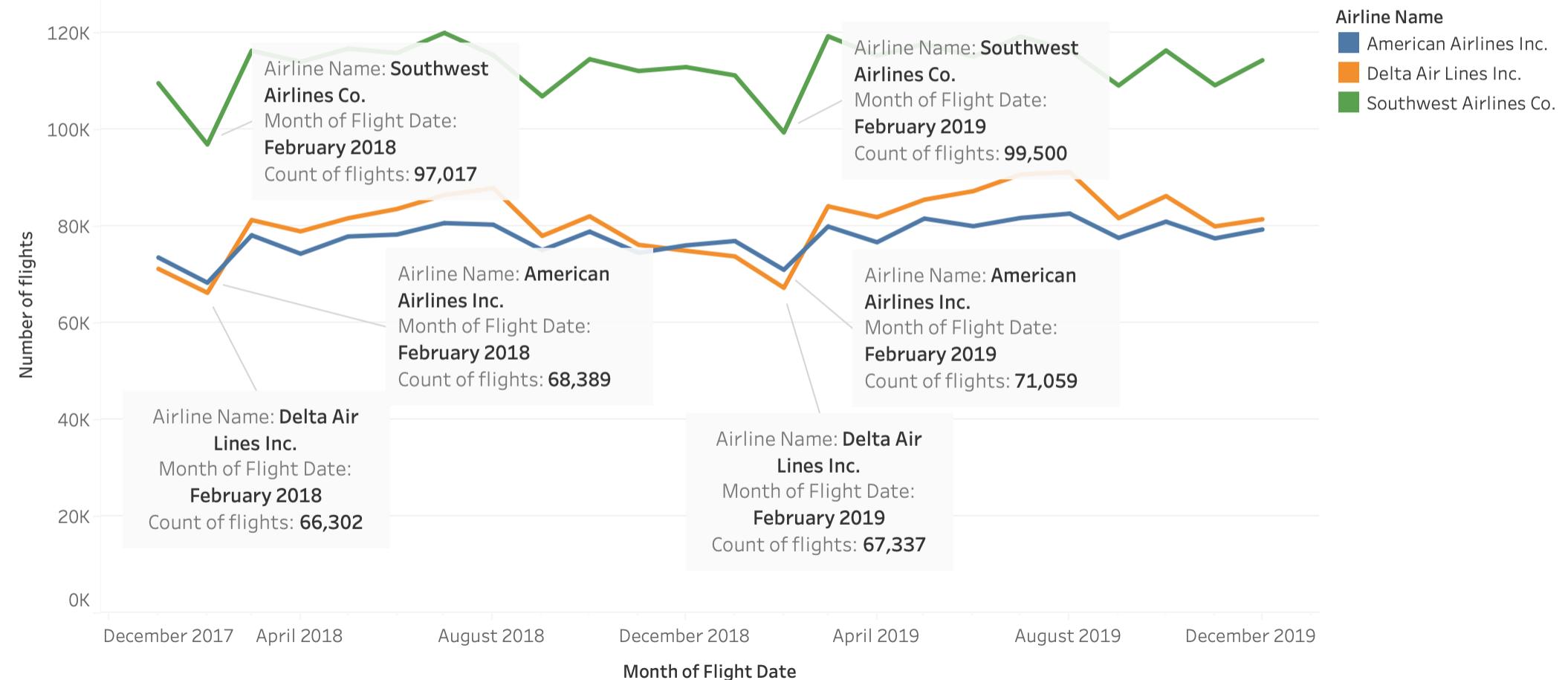


Count of flights for each Flight Date Year broken down by Airline Name. Color shows details about Flight Date Year. The marks are labeled by count of flights.

## <Q1.2> Monthly Flight Variations Over Time

The monthly flight patterns for these three airlines are consistent, with February showing the lowest number of flights and March to August experiencing the highest.

From September onwards, the number of flights begins to decrease, reaching its lowest point in the following February. This pattern seems repeats itself annually based on the data between 2018 and 2019.

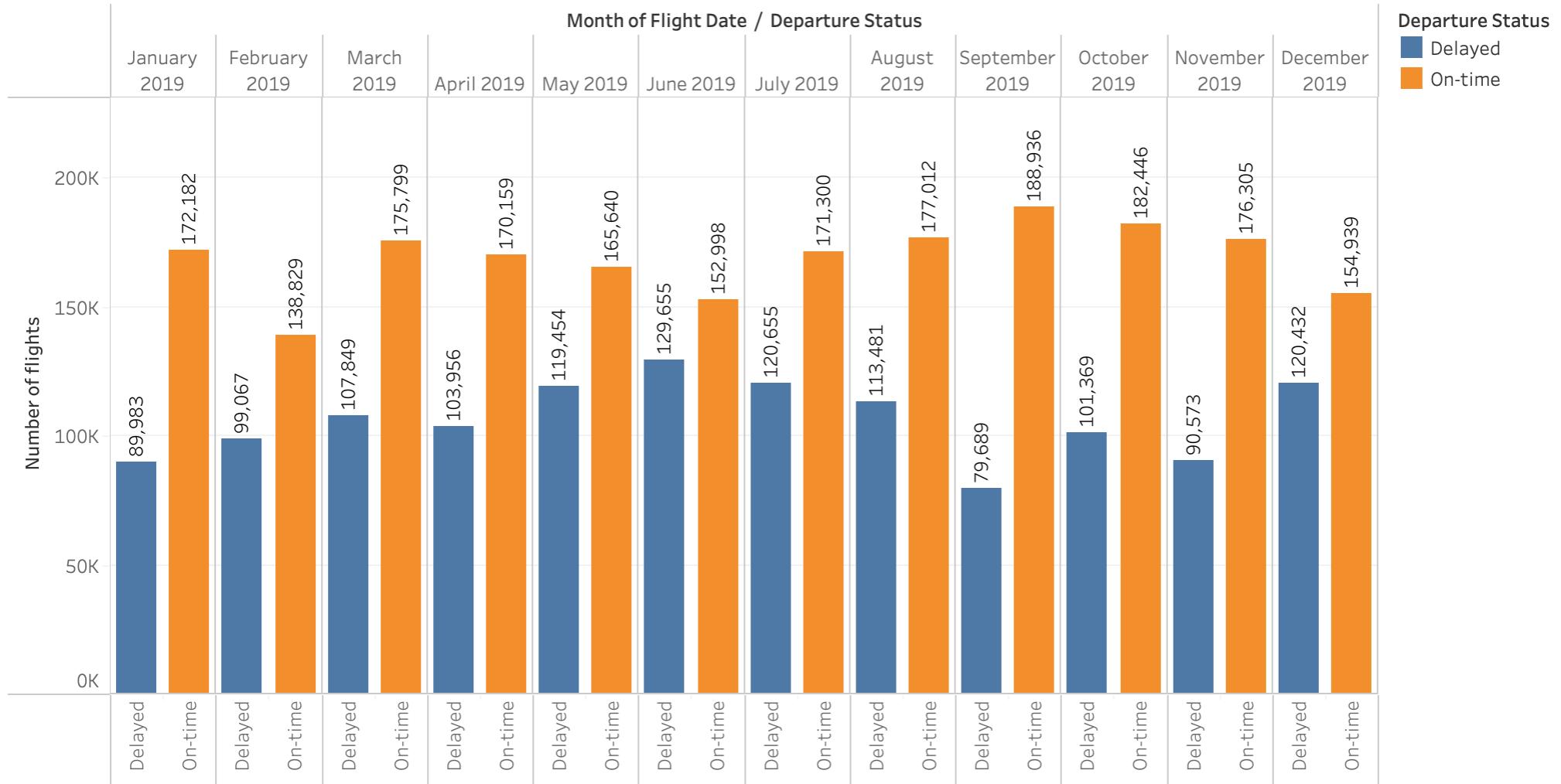


The trend of count of flights for Flight Date Month. Color shows details about Airline Name.



## <Q2.1> Month with Highest/Lowest Total Delayed Flights

In year 2019, June recorded the highest total number of delayed flights, with 129,655 occurrences, while September had the lowest number of delayed flights, with 79,689 occurrences.



Count of flights for each Departure Status broken down by Flight Date Month. Color shows details about Departure Status. The marks are labeled by count of flights. The data is filtered on Flight Date Year, which ranges from 2019 to 2019.

## <Q2.2> U.S. States with Highest Departure Delays

North Dakota had the highest departure delay for flights in Q3 2018, with an average departure delay of 103.92 minutes.

Based on the average delay time for flights, Wyoming, North Dakota, and South Dakota are the top three states with the highest delay flights. The reason these states experienced higher departure delays could be the weather conditions and limited airport capacity, which led to delays in departure times.

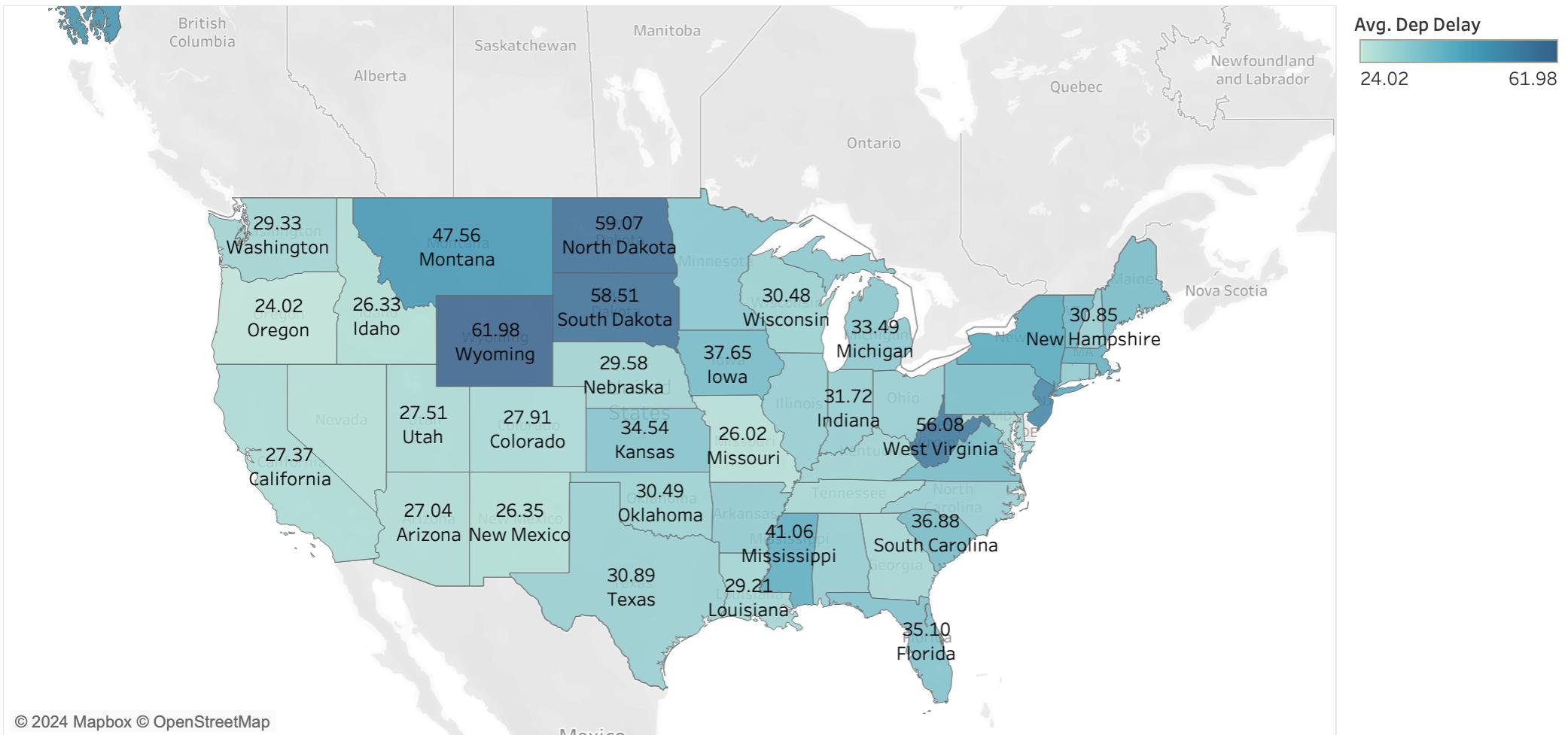
North Dakota had the highest average departure delay for flights in Q1 2019, with an average departure delay of 91 minutes, followed by West Virginia with 87.75 minutes delay and Wyoming with 84.66 minutes delay.

State	Flight Date								Avg. Dep Delay
	2018				2019				
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Wyoming	34.27	70.38	46.10	85.54	84.66	51.86	74.03	52.40	11.55
North Dakota	77.11	81.65	103.92	36.39	91.00	42.46	23.92	36.38	103.92
South Dakota	84.56	64.81	35.43	44.78	61.34	39.46	80.00	57.38	
West Virginia	35.63	74.25	55.43	98.06	87.75	55.50	14.06	23.07	
New Jersey	39.49	51.70	59.84	38.85	47.99	62.78	62.56	46.92	
Hawaii	52.03	53.32	59.89	53.51	52.62	46.73	53.29	42.25	
Alaska	48.26	57.21	52.55	58.93	41.58	52.91	35.58	54.57	
Montana	55.13	50.46	38.18	50.69	55.18	40.67	46.93	52.26	
U.S. Virgin Islands	31.20	38.21	65.87	48.63	39.91	31.14	42.65	45.93	
New York	36.34	40.71	47.50	33.93	38.80	46.93	53.03	35.89	
Mississippi	33.07	38.80	63.91	39.34	36.64	37.17	40.90	36.91	
Massachusetts	33.30	37.17	43.33	35.28	47.18	41.34	42.94	40.22	
Vermont	41.52	46.04	59.28	29.96	16.33	11.55	18.88	31.71	
Iowa	30.57	42.22	32.99	37.19	47.33	43.13	35.10	32.85	
Virginia	33.82	39.75	41.16	31.36	35.50	40.96	41.04	30.87	
Maine	33.95	42.26	42.98	38.89	40.89	33.61	35.47	25.02	
South Carolina	37.66	40.70	37.07	31.96	38.45	40.52	41.44	27.04	
Pennsylvania	29.67	35.70	41.67	31.63	34.58	41.32	42.78	32.50	
Puerto Rico	27.36	31.51	43.20	34.21	34.72	40.88	37.10	32.86	
Florida	29.25	36.54	42.23	30.66	31.46	40.18	41.91	27.83	
Kansas	40.86	32.55	38.51	24.46	31.91	43.18	31.40	31.62	
Minnesota	30.82	34.82	35.45	25.46	38.95	35.36	38.24	29.23	
Michigan	34.23	33.08	34.33	24.85	34.46	36.53	39.39	28.92	
Arkansas	28.23	33.68	33.84	21.35	27.54	36.46	43.43	33.57	
Rhode Island	26.77	33.45	33.89	30.68	32.35	40.91	35.03	27.92	
Connecticut	25.87	33.45	33.98	31.54	29.98	35.04	39.74	29.31	
Indiana	31.49	37.49	32.31	27.73	31.42	35.00	32.69	25.40	
Illinois	25.07	33.04	33.82	26.98	34.16	35.75	36.10	26.09	
Alabama	26.80	34.82	35.89	24.33	29.03	40.02	35.13	26.68	
North Carolina	29.11	30.31	34.13	25.17	27.46	37.35	37.12	26.17	
Ohio	32.70	32.59	33.54	28.08	30.55	34.99	32.32	24.36	
Texas	27.00	31.89	33.60	28.49	28.64	37.29	31.04	27.28	
New Hampshire	30.97	26.57	35.89	29.23	35.12	31.78	33.05	25.68	
Oklahoma	29.63	31.65	30.72	27.59	29.60	35.02	32.23	26.33	
Wisconsin	30.36	33.41	31.33	27.05	30.41	34.08	30.96	25.57	
Kentucky	28.74	31.82	32.01	24.49	30.58	35.09	31.20	25.72	
Nebraska	27.80	31.13	34.00	25.18	30.72	32.56	29.17	25.37	
Washington	24.78	26.31	29.36	29.32	38.82	30.25	29.04	27.72	
Louisiana	26.60	30.64	31.78	26.49	25.20	33.42	30.65	27.98	
Georgia	25.89	32.03	32.28	23.76	25.96	32.97	32.74	21.79	
Maryland	22.55	29.17	33.15	28.83	28.99	29.76	30.78	23.09	
Tennessee	25.74	29.62	29.86	25.70	26.68	31.96	30.86	24.27	
Colorado	25.78	29.15	29.41	22.28	29.24	32.27	28.78	25.77	
Utah	26.71	26.29	27.00	23.77	26.93	29.29	31.86	27.04	
California	27.82	26.95	27.41	26.06	28.65	28.52	26.55	26.88	
Arizona	24.62	25.66	32.49	24.32	26.12	29.36	28.82	25.13	
New Mexico	25.98	28.77	27.70	25.09	25.11	26.86	24.91	25.61	
Idaho	26.96	26.15	27.15	23.44	24.04	34.62	25.60	22.15	
Missouri	24.02	27.00	27.48	23.85	25.89	29.10	25.77	24.17	
Nevada	24.87	24.96	27.85	23.02	27.39	28.73	24.73	25.50	
Oregon	24.57	24.54	25.06	22.27	25.12	24.98	25.03	20.62	

Average of Dep Delay broken down by Flight Date Year and Flight Date Quarter vs. State. Color shows average of Dep Delay. The data is filtered on Departure Status, which keeps Delayed.

## <Q2.3> Average Departure Delay by U.S. State

The northern states, such as North Dakota, South Dakota, Wyoming, Montana, and Alaska, experienced higher average departure delays, followed by the northeast states, such as New Jersey, West Virginia, and New York. In contrast, the western and southern states had lower average departure delays.

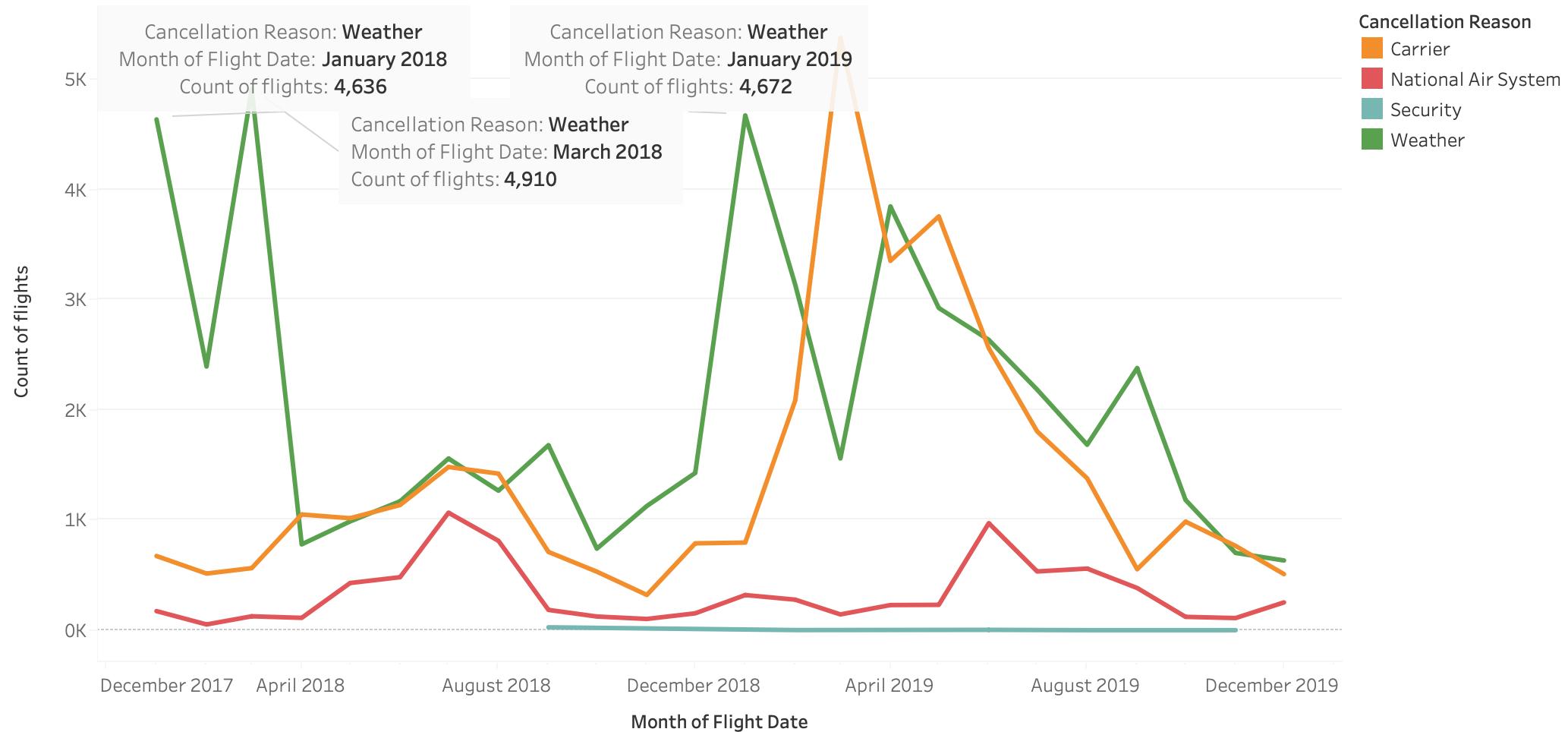


Map based on Longitude (generated) and Latitude (generated). Color shows average of Dep Delay. The marks are labeled by average of Dep Delay and State. Details are shown for State. The data is filtered on Departure Status, which keeps Delayed.

## <Q2.4> Reasons for Flight Cancellation by Month

Weather is the primary reason for flight cancellations, especially during January to March in 2018 and 2019.

Based on the analysis, from January to March in these two years, the number of cancellations due to weather was significantly higher compared to other months.

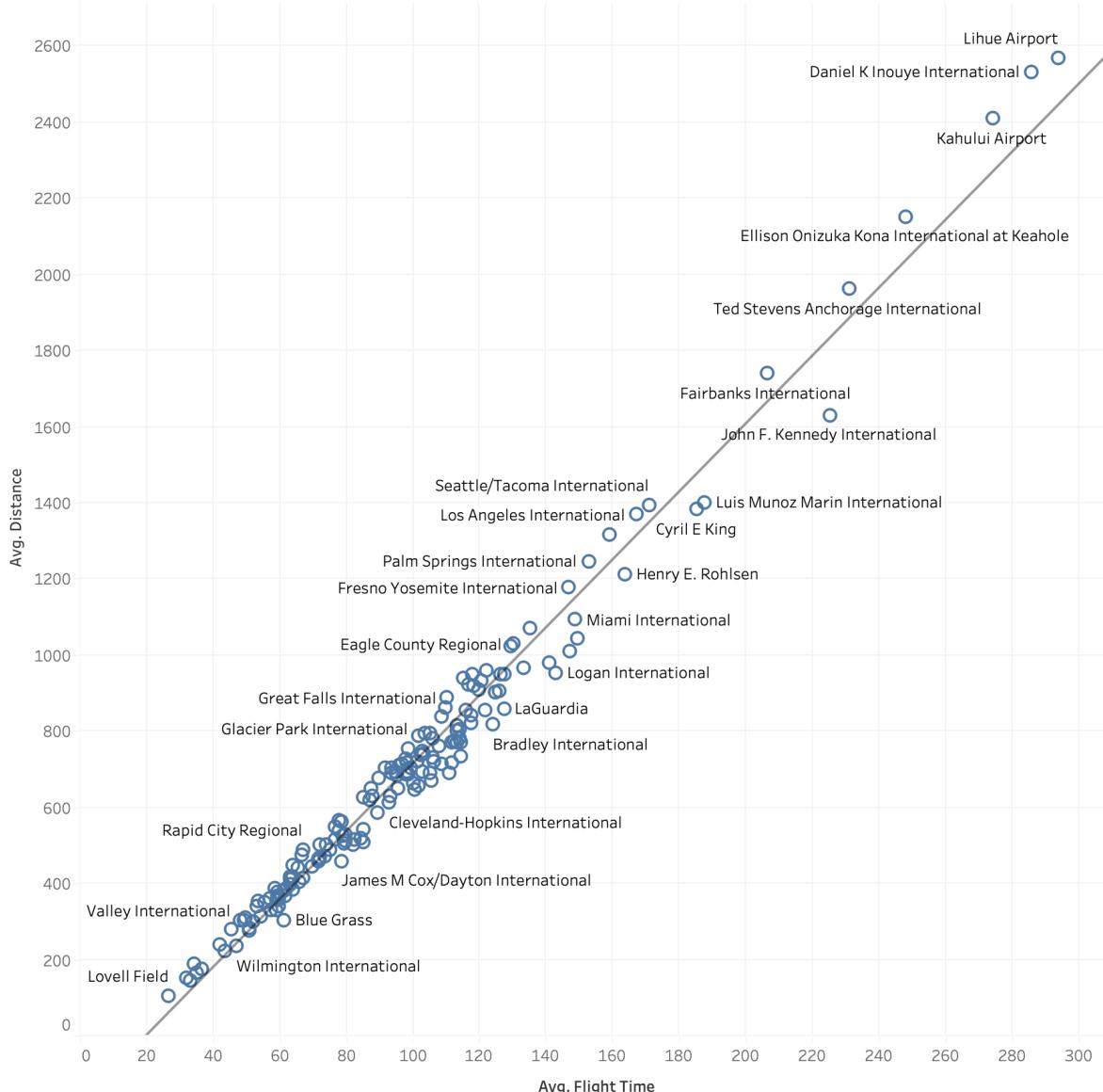


The trend of count of flights for Flight Date Month. Color shows details about Cancellation Reason. The view is filtered on Cancellation Reason, which has multiple members selected.

### <Q3.1> Relationship between Flight Times and Distances

Based on the scatter plot, the approximate range of flight times for most flights in this dataset is between 95 to 115 minutes.

Average flight time is highly correlated with average flight distance, which means that the longer the average distance, the longer the average flight time. There are no outliers in the dataset.



Average of Air Time vs. average of Distance. The marks are labeled by Airport Name. Details are shown for Airport Name. The data is filtered on Arr Time, which has multiple members selected.

## <Q3.2> Year 2018 and Year 2019 Comparison: Total Distance Flown and Number of Planes in Service

Delta Airlines had a 5.5% growth in total flight distance and 4.4% growth in the total number of planes in 2019 compared to 2018.

American Airlines had a 0.5% growth in total flight distance and 1% growth in the total number of planes in 2019 compared to 2018.

Southwest Airlines had a 0.1% decrease in total flight distance and a 0.4% growth in the total number of planes in 2019 compared to 2018.

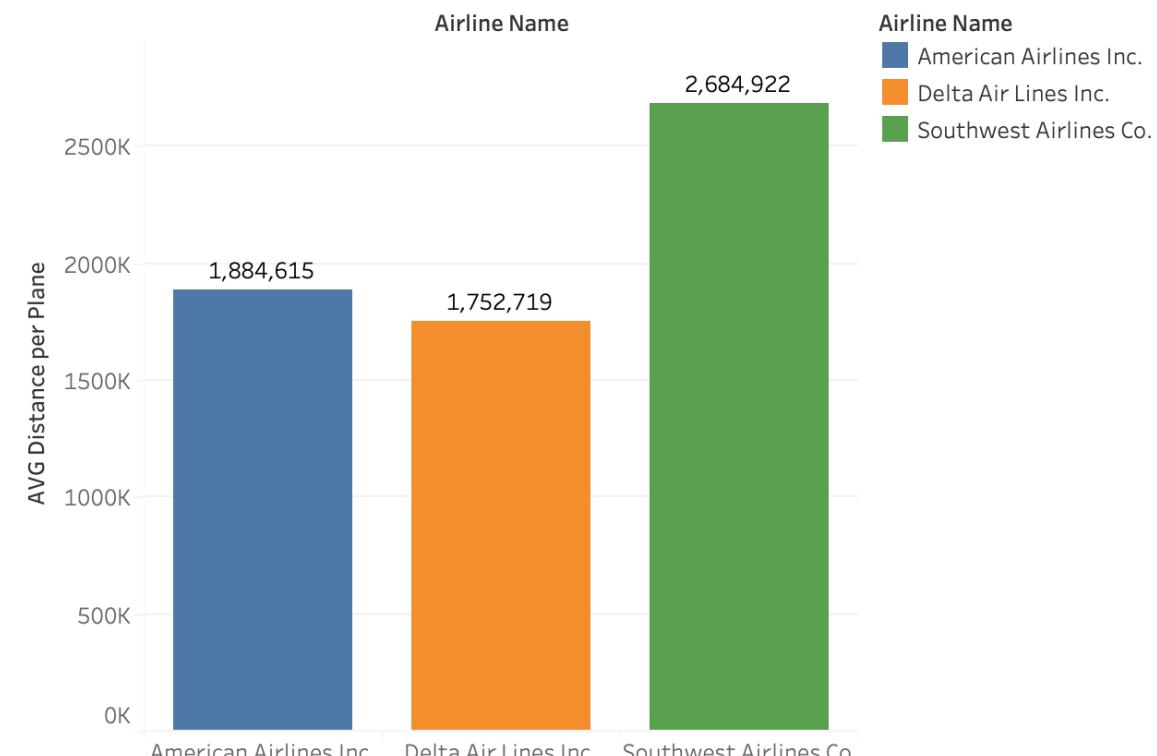


% Difference in Distinct count of Tail Number from the Previous Year of Flight Date and % Difference in Distance from the Previous Year of Flight Date for each Flight Date Year broken down by Airline Name. Color shows details about % Difference in Distinct count of Tail Number from the Previous Year of Flight Date and % Difference in Distance from the Previous Year of Flight Date.

### <Q3.3> Efficiency Analysis: Airlines' Costs per Mile Flown

Southwest Airlines had the highest average distance traveled per plane, with 2,684,922 miles per plane, followed by American Airline with 1,884,615 miles per plane and Delta Airlines with 1,752,719 miles per plane.

I would believe that the airline with the lowest costs per mile flown could be considered the most cost-efficient among these three airlines. Since we don't have cost or revenue data, I'd consider the airplane as equipment cost and assume Southwest Airlines is the most cost-efficient airline since it had the longest flight distance per airplane.



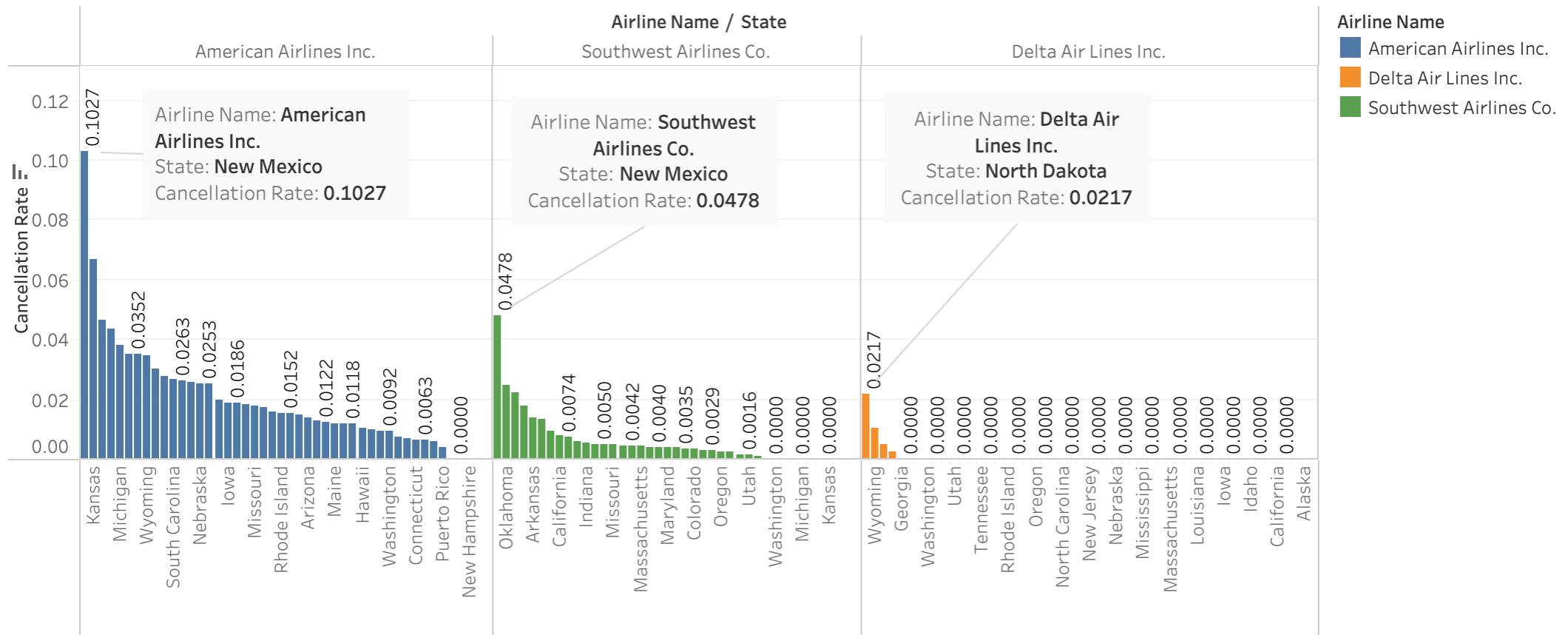
AVG Distance per Plane for each Airline Name. Color shows details about Airline Name. The marks are labeled by AVG Distance per Plane.

## <Q4> Cancellation Rate During Certain Period of Time in the U.S. Among Three Carriers

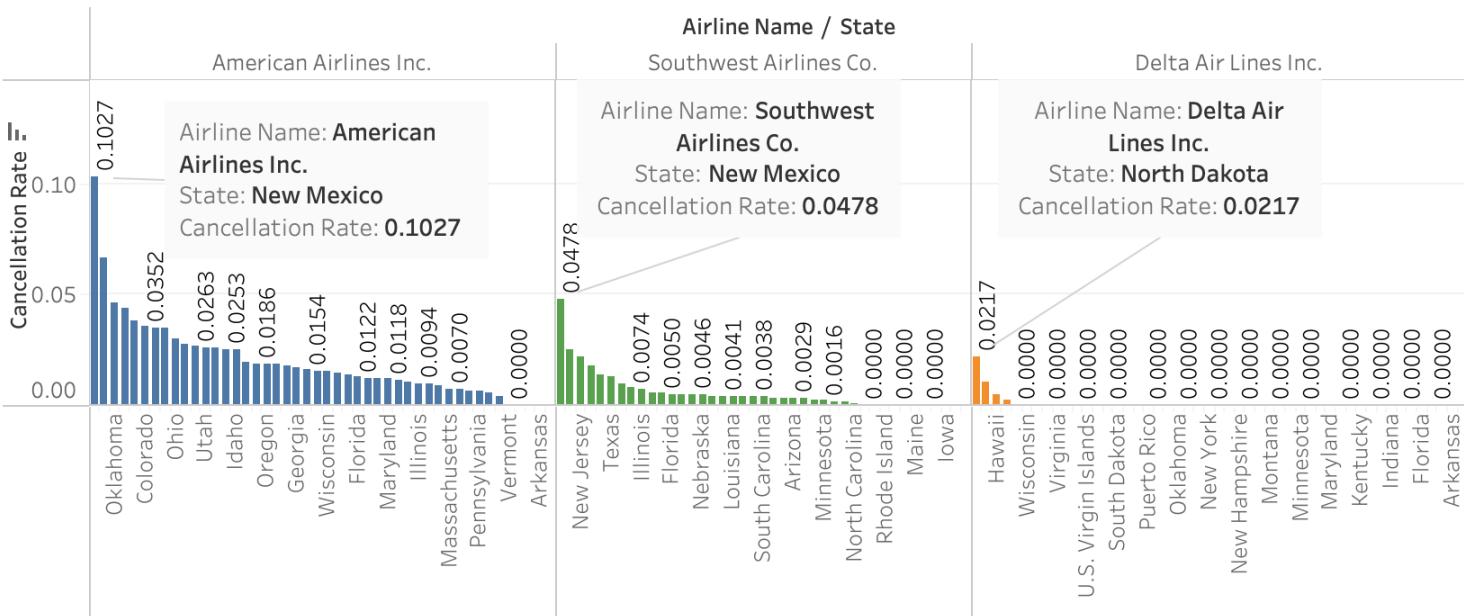
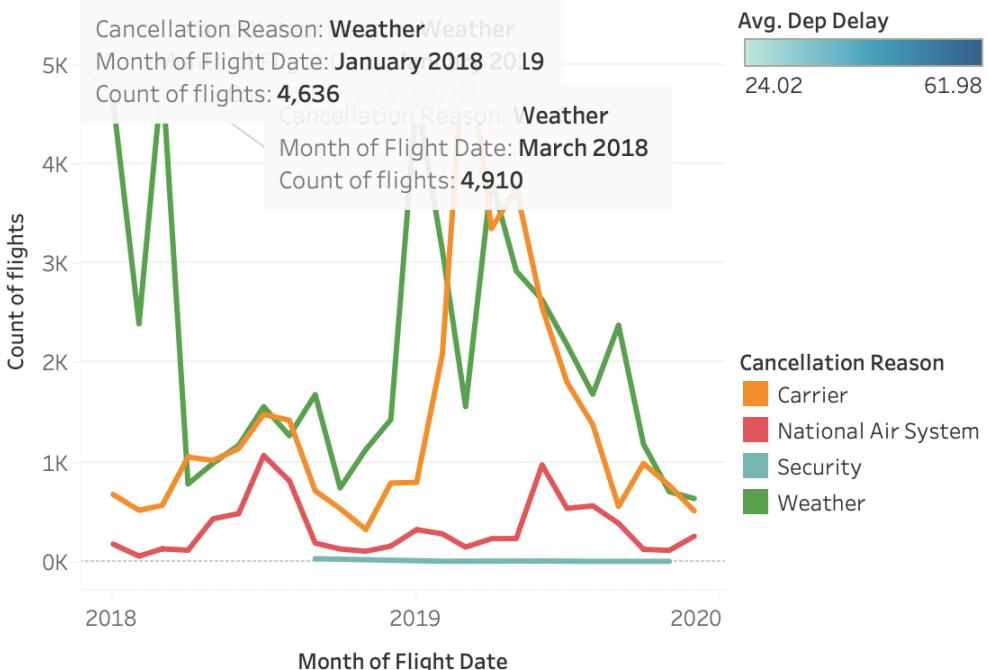
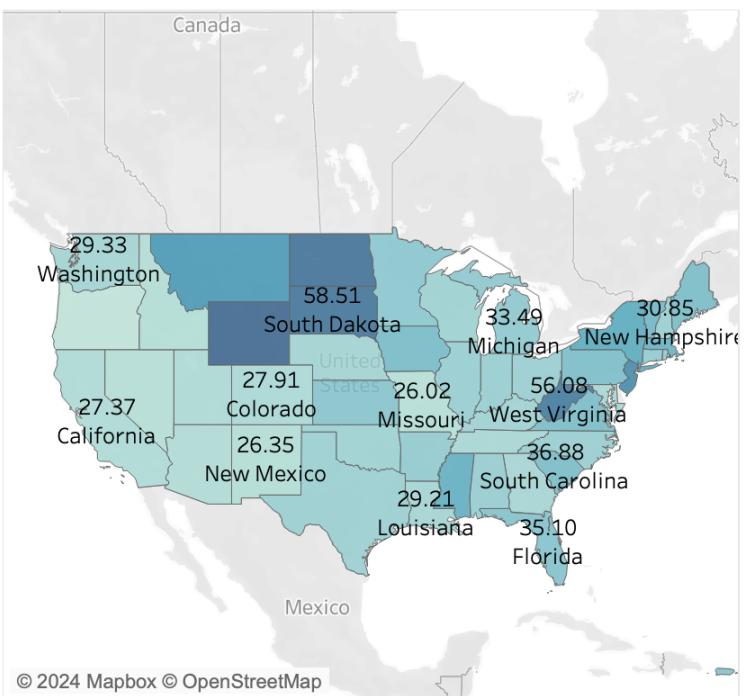
We compared the flight cancellation rates for three airlines during a specific time period (in this case, we analyzed the 2018 holiday season).

American Airlines had the highest cancellation rate in New Mexico at 1.72%, followed by Kansas at 6.6% and Oklahoma at 4.6%.

Southwest Airlines also had the highest cancellation rate in New Mexico at 4.7%, followed by Oklahoma at 2.4%, and New Jersey at 2.2%. Delta Airlines had the highest cancellation rate in North Dakota at 2.1%, followed by Wyoming at 1%, and Hawaii at 0.1%. It is recommended that passengers avoid airlines with high cancellation rates in the departure states during the holiday season.



Cancellation Rate for each State broken down by Airline Name. Color shows details about Airline Name. The marks are labeled by Cancellation Rate. The data is filtered on Flight Date, which ranges from 12/17/2018 to 1/7/2019.



Cancellation Rate for each State broken down by Airline Name. Color shows details about Airline Name. The marks are labeled by Cancellation Rate. The data is filtered on Flight Date, which ranges from 12/17/2018 to 1/7/2019.

Airline Name

- American Airlines Inc.
- Delta Air Lines Inc.
- Southwest Airlines Co.

Flight Date  
12/17/2018 to 1/7/2019