Barometric Pressure & Tide Levels at the Oregon Coast

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Research Question

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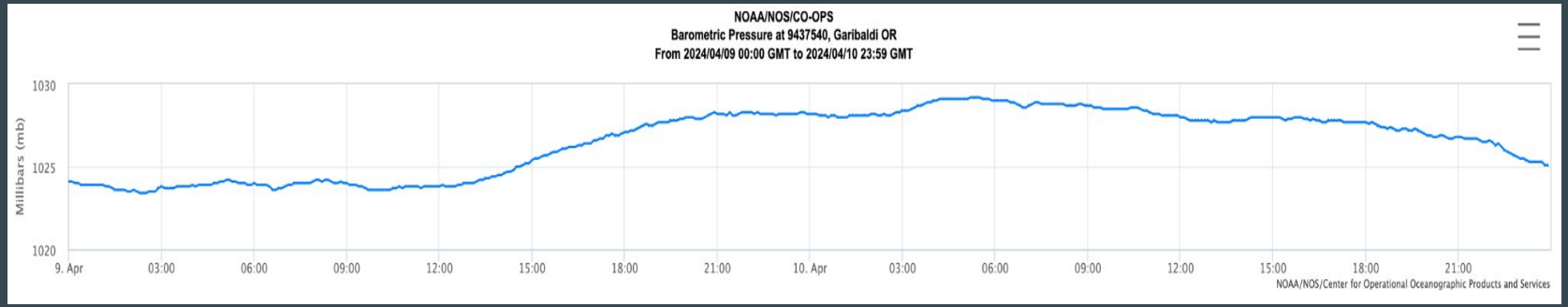
What is the relationship between tide levels and barometric pressure levels on the Oregon Coast?

API - Barometric Pressure



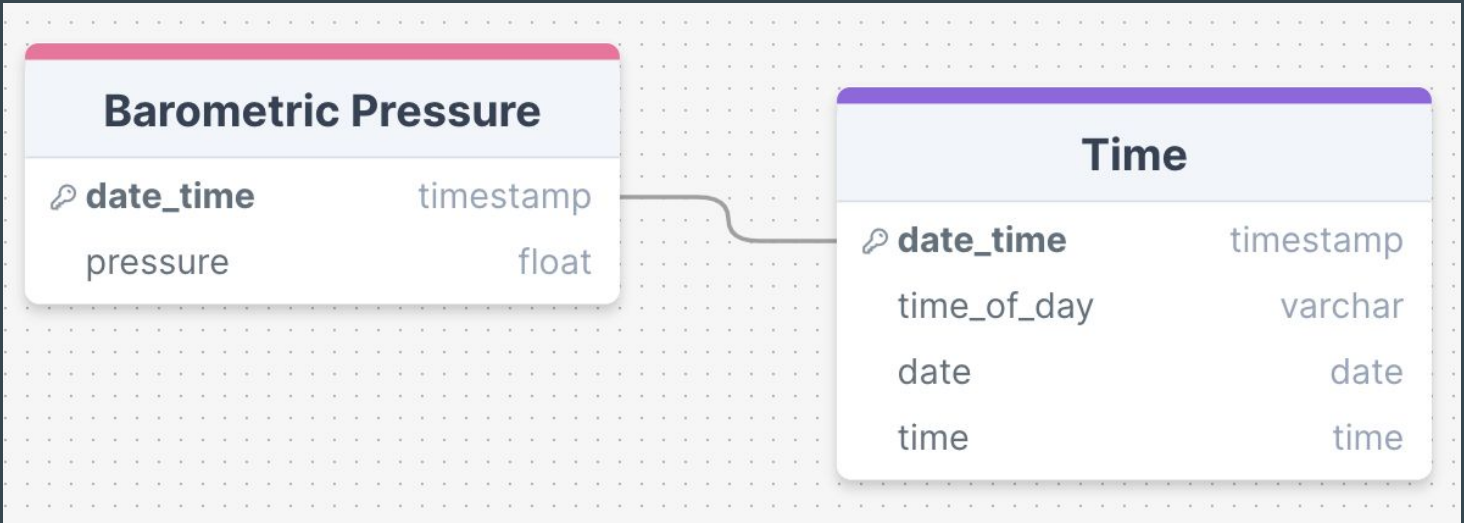
https://api.tidesandcurrents.noaa.gov/api/prod/datagetter?product=air_pressure&application=NOS.COOPS.TAC.MET&begin_date=20240331&end_date=20240427&station=9437540&time_zone=GMT&units=english&interval=6&format=json

Data Transformation - Barometric Pressure

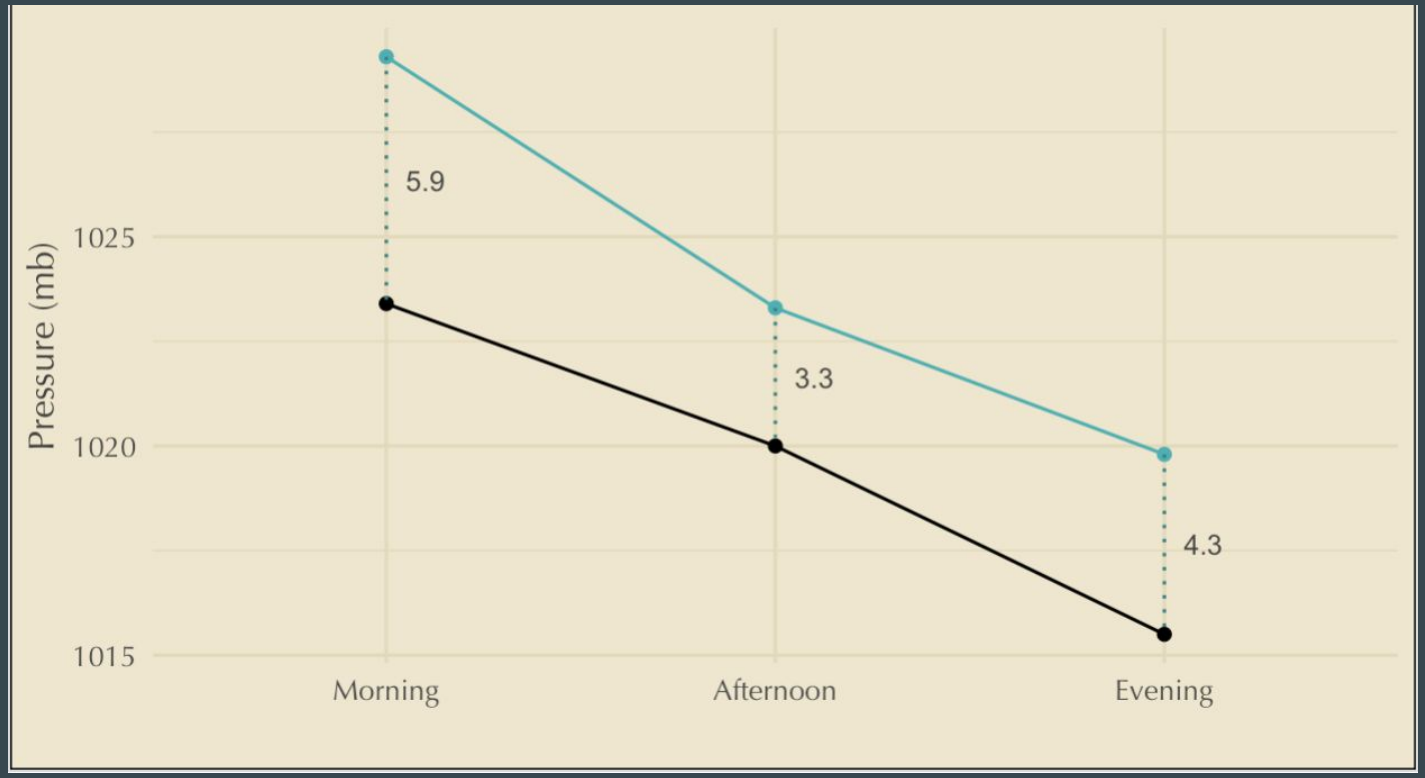
	id int4(32,0)	raw_json jsonb	time_added timestamp(6)
1	1	{"data":[{"f":"0,0,0","t":"2024-03-31 00:00","v":"1012.5"},{"f":"0,0,0","t":"2024-03-31 00:06","v":"...	2024-04-27 03:40:03.328197

id int4(32,0)	date_time timestamp(6)	pressure float8(53)	time_of_day varchar
1178	2024-03-31 00:00:00	1012.5	Morning
1179	2024-03-31 00:06:00	1012.6	Morning
1180	2024-03-31 00:12:00	1012.7	Morning
1181	2024-03-31 00:18:00	1012.6	Morning

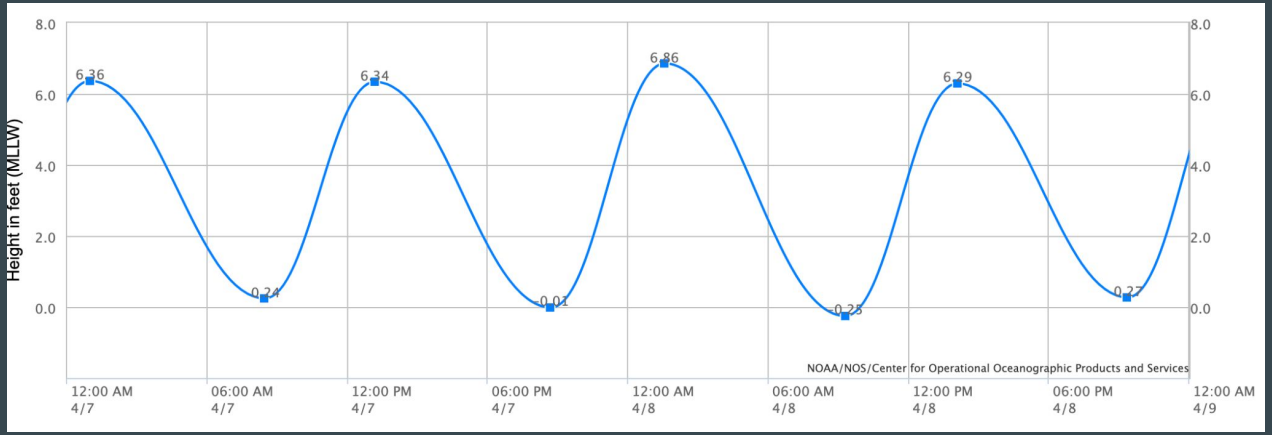
Entity Relationship Diagram - Barometric Pressure



Evaluating Barometric Pressure



API - Tide Levels



https://api.tidesandcurrents.noaa.gov/api/prod/datagetter?product=predictions&application=NOS.COOPS.TAC.WL&begin_date=20240407&end_date=20240505&datum=MLLW&station=9437331&time_zone=lst_ldt&units=english&interval=hilo&format=json

Data Transformation - Tide Levels

id int4(32,0)	raw_json jsonb	time_added timestamp(6)
1	{"predictions":[{"t":"2024-04-07 00:59","v":"...	2024-04-07 18:37:45...

id int4(32,0)	date_time timestamp(6)	tide_level numeric	tide_type varchar(1)
1	2024-04-07 00:59:00	6.364	H
2	2024-04-07 08:28:00	0.242	L
3	2024-04-07 13:10:00	6.341	H
4	2024-04-07 20:42:00	-0.014	L
5	2024-04-08 01:34:00	6.856	H

	id int4(32,0)	date_time timestamp(6)	tide_level numeric	tide_type varchar(1)	time_of_day varchar
1	1	2024-04-07 00:59:00	6.364	H	Morning
2	2	2024-04-07 08:28:00	0.242	L	Morning
3	3	2024-04-07 13:10:00	6.341	H	Afternoon
4	4	2024-04-07 20:42:00	-0.014	L	Evening

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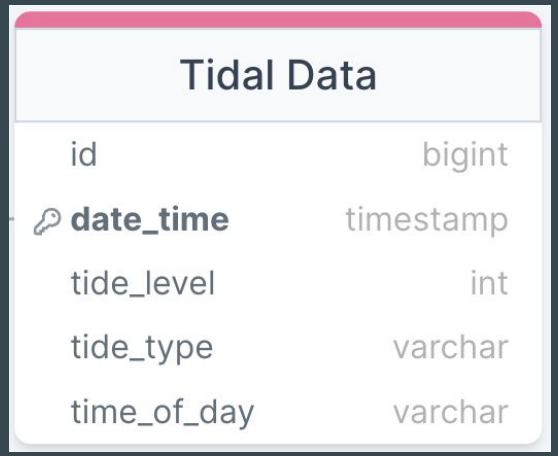
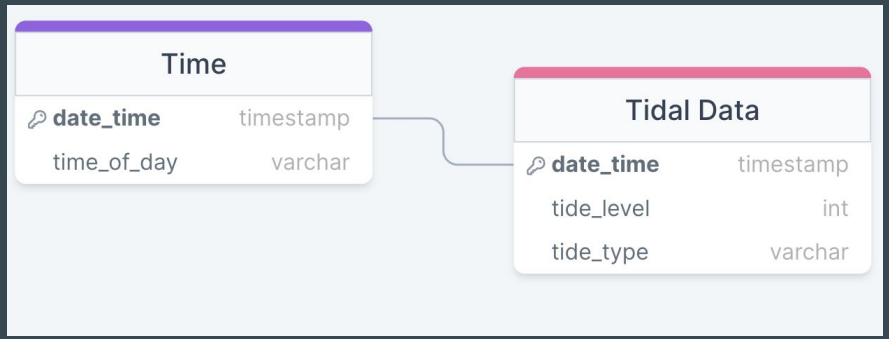
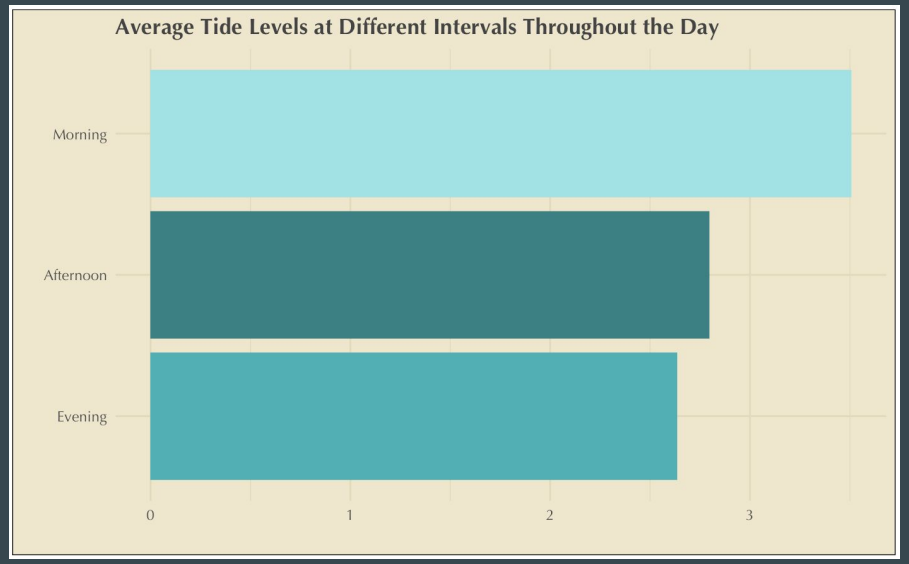
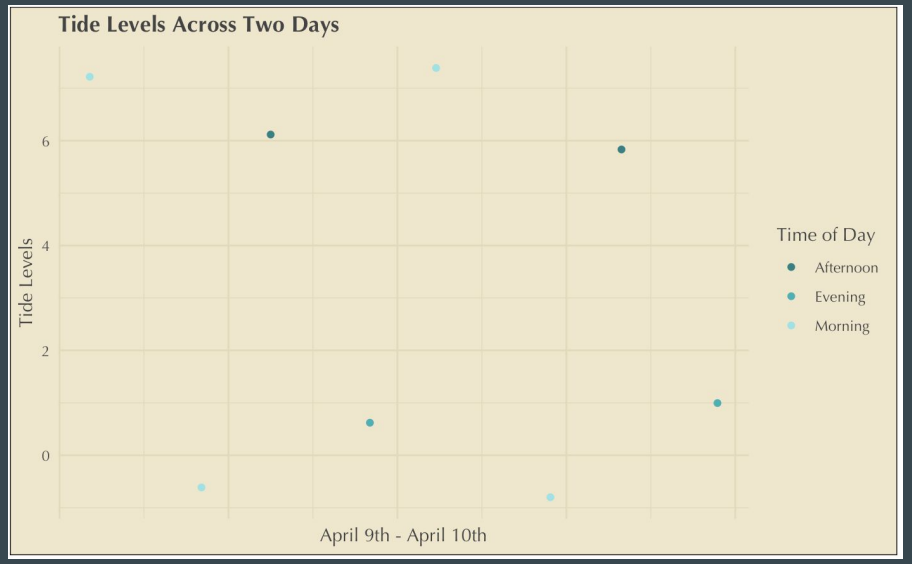
Entity Relationship Diagram - Tide Levels



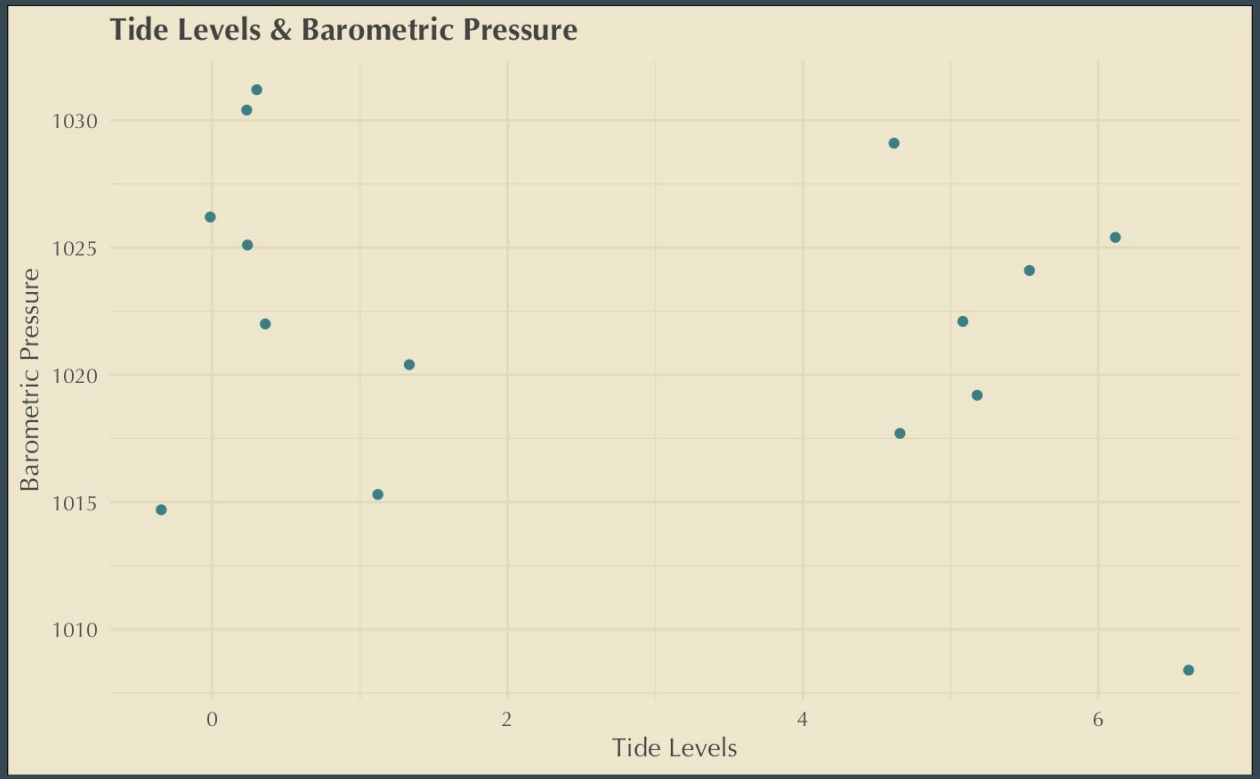


Evaluating Tide Levels

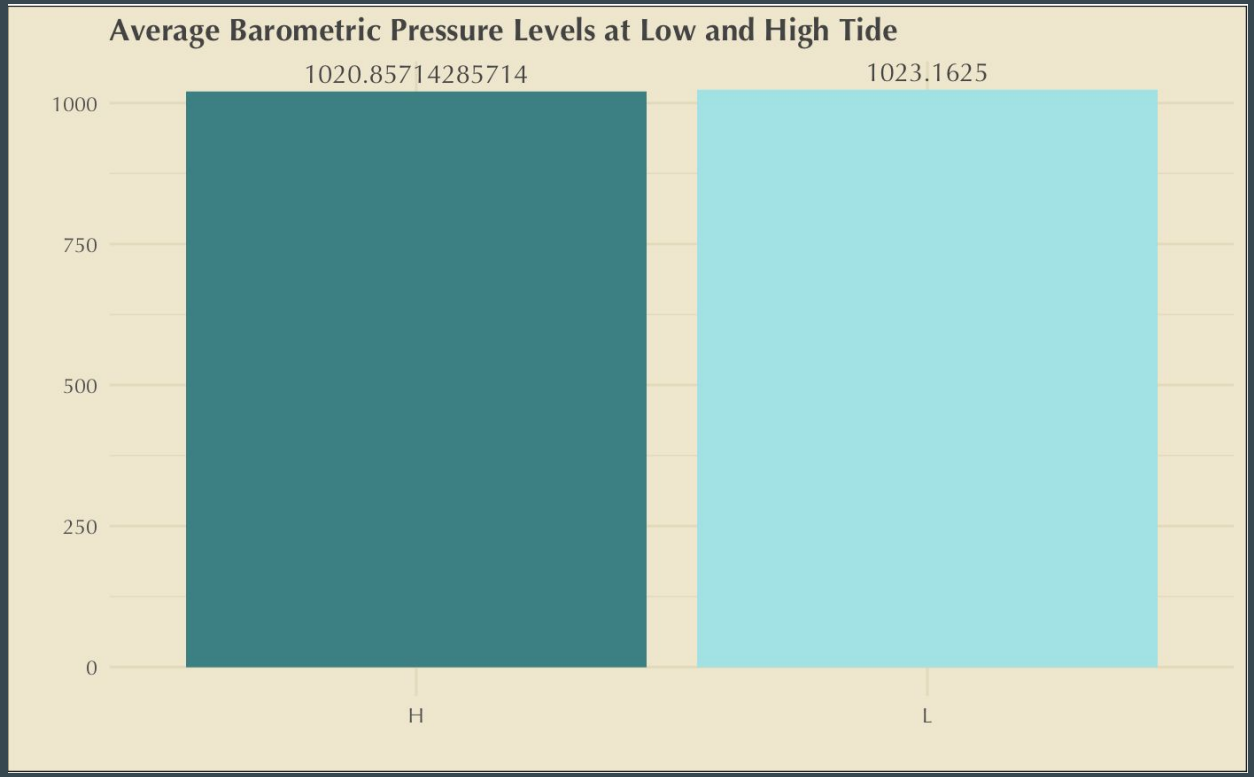




Combined Analysis



Combined Analysis



Statistical Significance

tide_type <chr>	meanPressure <dbl>	sdPressure <dbl>
H	1020.857	6.690007
L	1023.163	6.237888

```
meanDiff=1020.857-1023.163
seDiff=sqrt(6.2378887^2 / 8 + 6.690007^2 / 7)
tScore=meanDiff/(seDiff)

head(tScore)

```

```
 [1] -0.6872828
```

```
```{r}
hightide = tidebarometric[tidebarometric$tide_type=="H","pressure"]
lowtide = tidebarometric[tidebarometric$tide_type=="L","pressure"]

t.test(x=hightide, y=lowtide, alternative="less")
```
```

```
        Welch Two Sample t-test

data:  hightide and lowtide
t = -0.68709, df = 12.434, p-value = 0.2523
alternative hypothesis: true difference in means is less than 0
95 percent confidence interval:
     -Inf 3.657323
sample estimates:
mean of x mean of y
 1020.857  1023.163
```

API Endpoints

https://finalprojectapi-production-8199.up.railway.app/

```
/: SHOW SERVER_VERSION
/tz: SHOW TIMEZONE
/evening: SELECT * FROM tide_barometric WHERE time_of_day = 'Evening'
/morning: SELECT * FROM tide_barometric WHERE time_of_day = 'Morning'
/afternoon: SELECT * FROM tide_barometric WHERE time_of_day = 'Afternoon'
/high: SELECT date_time, time_of_day FROM tidal_data WHERE tide_type = 'H'
/low: SELECT date_time, time_of_day FROM tidal_data WHERE tide_type = 'L'
```

Limitations

- Time frame in which data was mined did not allow for in-depth analysis
  - Lack of variety in seasons, overall weather, etc.
- APIs utilized did not have a lot of variables
- Joining tables reduced data due to limited number of matching date_times

Future Research

- Utilizing additional variables
  - Water temperature, seasonal variation, etc.


Questions?