Covid 19 impact on Ocean economy and Ocean health

Introduction:

COVID 19 has an impact on the global economy as well as heath. Particularly, the ocean is vital to the world's economy, with more than 90% of trade using sea routes and as a source of jobs for millions of people [1]. The ocean based industries include **oil and gas, fishing, aquaculture, shipping, tourism, energy, mining, and marine biotechnology**. Ocean health includes marine life, sea level rise, sea surface parameters such as temperature, wind pressure, etc. Finding the changes involved with any one of these parameters can show the Covid 19 impacts. Based on the open source availability of the data, the sea surface temperature (geospatial data) is used to interpret ocean health, the vessel traffic (ground data) and market changes in the energy industry are used to interpret ocean economy.

Hypothesis:

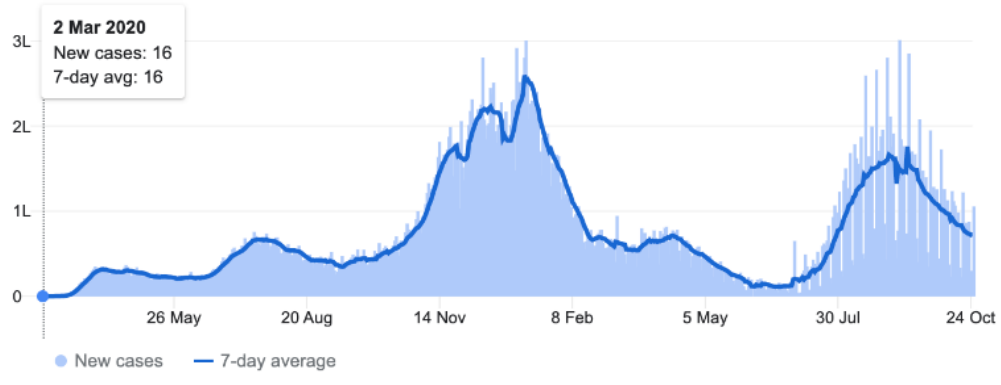
1. Since there was less ocean traffic during Covid 19 period, the ocean health improvement should be seen.
2. Since there was less ocean traffic during Covid 19 period, the ocean economy must have been affected.

Data search and Data collection:

With extensive search of the data availability, the sea surface temperature(SST) data was found here. Ocean traffic and other shipping information are collected via Automatic Identification System (AIS) . As per the hypothesis, the vessel traffic data is collected from here. For a clear analysis, time period and region for the comparison has been concentrated as follows

1. Time period of 2 months before and after covid 19 - jan-feb of 2020 and 2021
2. A small region in West coast of United States of America

It is found that in USA, the covid cases graph as follows



The covid cases started at Mar 2020 and so before covid impact is taken during jan and feb of 2020. Also, the peak covid cases are found to be in Jan and Feb of 2021 which is considered to be after covid impact period for the analysis.

Similarly, the impact of ocean economy, particularly the energy industry i.e., Exxon Mobil Corporation(an American multinational oil and gas corporation) is also analysed in the period of before covid (jan and feb of 2020) and after covid (jan and feb of 2021).

Data Preparation:

For choosing a small region from the West coast of the USA, the polygon of the region is extracted from geojson.io as below

The SST is taken for the resolution of 0.05° x 0.05° but the Vessel count is taken at much closer resolution and hence the data is prepared based on the SST resolution. For every Vessel location, it's closest SST location is taken together as a data. All of these data are available everyday on the taken time period. And the final prepared time series data contains the following

'BaseDateTime', 'LAT', 'LON', 'VesselName', 'LAT_CL', 'LON_CL','SST', 'lat_lon'

where

BaseDate Time - Date and Time

LAT- Latitude of the Vessel

LON- Longitude of the Vessel

VesselName-Name of the vessel at (LAT,LON)

LAT_CL - Closest Latitude of the SST

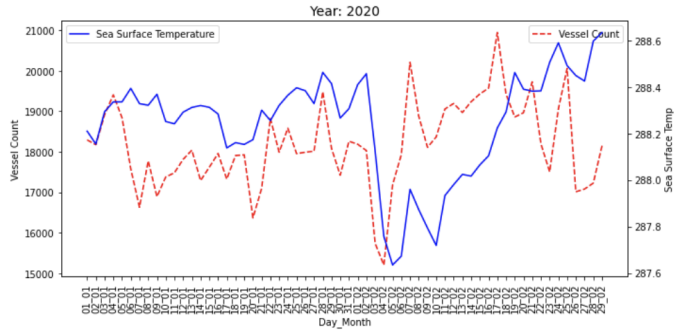
LON_CL - Closest Longitude of the SST

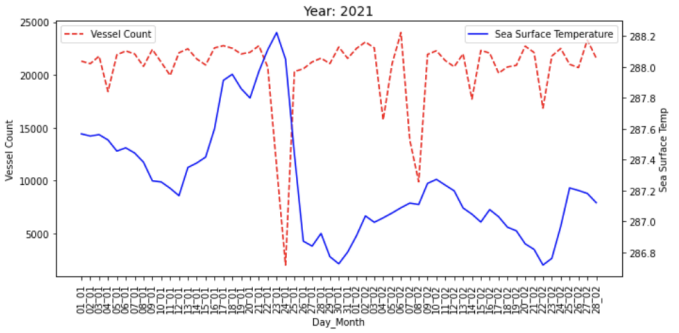
SST - Sea Surface Temperature at (LAT_CL,LON_CL)

Analysis:

To meet Hypothesis 1: Ocean traffic Vs the ocean health

The change in SST as well as vessel count throughout the before and after covid impact period is plotted.



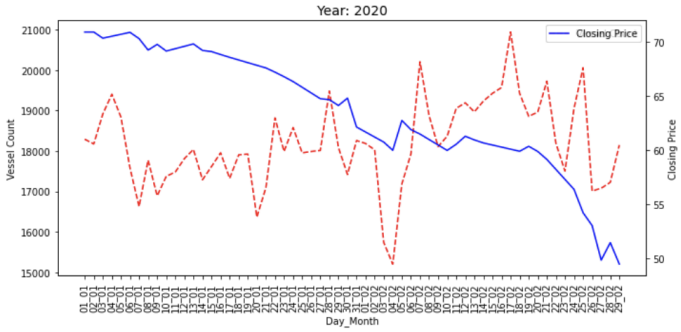


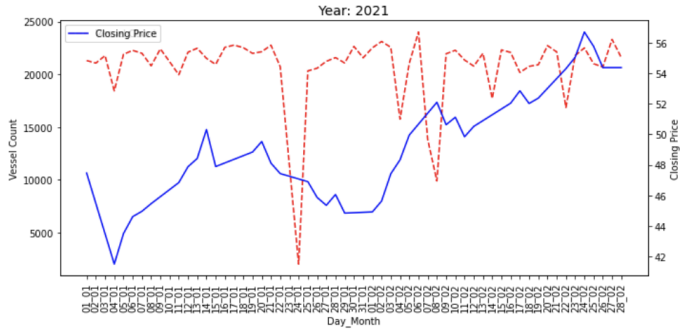
Inference:
The rapid increase of the SST is found before covid impact as there were vessel count fluctuations. While during peak covid period, the vessel traffic is not fluctuating much and this prevents the major increase in SST.

Vessel count fluctuations Vs SST is established with direct relationship.

To meet Hypothesis 2: ocean traffic vs the ocean economy

Instead of SST, the closing price of an energy industry is analysed. And the graph is as below





Here, the relationship between vessel traffic and closing price of the stock is not much established. But due to the impact of covid 19, the drop of the stock price is seen at the early months of 2020. As the economy of the stock does not depend only on the vessel traffic at US ports, but also other regions or other finance factors, the relationship cannot be precisely defined.

But the economic impact based on covid 19 can be clearly seen i.e., major price drop in 2020 and price growth in 2021.

Conclusion and Take away:

For the hypothesis made in the beginning, the analysis is performed to meet the expectations. Though the relation between ocean heath and ocean economy in terms of vessel traffic is defined, other factors that affect ocean health and ocean economy should be considered for better analysis. Comparing ocean economy based on stock price and ocean economy based on vessel traffic is not very efficient as change in stock price does not depend only on vessel traffic. Another way of analysing should be taking the trend change of stock price across all the industries depending on vessel movement.

References:

1. https://www.oecd.org/ocean/topics/ocean-economy/
2. https://cds.climate.copernicus.eu/cdsapp#!/dataset/satellite-sea-surface-temperature?tab=form
3. https://marinecadastre.gov/ais/