

Forecasting Ocean Acidification

DS 4002 Case Study

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Marine life is a delicate balance between different puzzle pieces of the ocean. But in the contemporary era, these pieces have become more and more out of balance.

One piece of the puzzle is water pH. Recently, an increasing acidity of the ocean has caused concern for the well-being of sea life. Ocean acidification occurs when ocean water absorbs excess carbon dioxide from the atmosphere, decreasing the pH. The rapid change in chemistry is a threat to marine organisms: many chemical reactions necessary for life only occur healthily within a small pH range.

The organisms shown above are zooplankton, floating animals extremely critical to marine food webs. Higher acidity dissolves their shells, with certain species risking extinction by the end of the century, upending the structure of marine life. Plankton aren't the only organisms directly affected. Coral, which creates essential ecosystems, might not be able to survive increased acidity. Mollusks and clams can't form new shells. And these have cascading effects that we have no way of fully knowing.

Given the widespread and dire consequences, it's important to understand the causes and effects of ocean acidification. With increasing carbon dioxide emissions from burning fossil fuels, the ocean absorbs even more excess from the atmosphere. Temperature and volcanic eruptions are also seen to affect acidification.

Your task as a data scientist highlighting the patterns of ocean acidification and its causes and effects in order to better understand this complex and dire situation. With this case study, you will be able to explore the changes in ocean pH, project future pH based on exogenous variables, and predict future plankton populations based on pH. Your goal is to explore time series analysis methods that can be used by scientists and analysts to study ocean acidification and make informed policy decisions.

References:

<https://ocean.si.edu/ocean-life/invertebrates/ocean-acidification>