

# AN ENHANCED ARIMA MODEL FOR SEA LEVEL FORECAST FOR THE NORTH-WESTERN BLACK SEA COAST

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**Abstract.** The assessment of sea-level evolution during several decades and the implementation of accurate prediction models represents an important issue in oceanography to provide an overview of environmental health and extreme events evaluation within their occurrence in a short time period. Within this paper, a solution is proposed for data preparation and shows the implementation for short-term prediction model using the Python language with open-source visualization and algorithms. A data-driven approach to obtain near-term (about 2 years) regional sea-level prediction using historical observations from local tidal monitoring stations, was established. Starting with the historical data, several missing points were identified and a non-linear approximation was performed taking into account 2 value points before and after the missing data point. For such cases, a polynomial regression model was performed for the 4 data points and thus is obtained the analytical function used to interpolate missing data leading to a complete data series for the entire interval allowing it to be analysed within the proposed model. Quantitative comparisons of monthly sea-level forecasts developed from the Seasonal Autoregressive integrated moving average (SARIMA) model while other common statistical techniques such as trend analysis method were applied. It is shown that the model has higher fitting and forecasting accuracy for short-term projections than exponential smoothing, and is more reliable than other common statistical techniques and can compete favourably with existing techniques for the sea-level or tidal prediction. The study is necessary to facilitate environmental engineering applications, navigation, and furthermore for coastal bathymetry representation.

Keywords: sea-level, SARIMA, prediction model, Black Sea