

Trend analysis of sea levels along Turkish coasts

Burkay Şeşeoğulları, Ebru Eriş, and Ercan Kahya¹

Hydraulic Division, Civil Engineering Department, Istanbul Technical University, 34469
Maslak Istanbul, Turkey

Abstract. Sea level changes can be considered as an indicator of environmental and climate change. Sea level becomes a factor of anxiety to those who fear the possible consequences of the earth warmed as a result of the buildup of greenhouse gases. Despite the cities along coastal lines cover less than five percent of the total surface area of Turkey; their total population is over 30 million with a rapid growing rate. A significant change in sea levels is extremely important to the coastal communities in Turkey. In literature, linear secular trends in annual mean sea level data are calculated as the least squares linear regression to a bivariate distribution of the data value versus year. The length of the time series is recommended to be 60 years or longer which sometimes is permitted to be as low as 25 years. In this study, we use a nonparametric approach to determine trends in sea levels as the available data comprises of rather short record length. At the same time, the nonparametric methods are more tolerable for the short records, computationally simpler and distribution-free. Therefore we investigated trend behaviors in sea level data measured along the Mediterranean, Aegean and Black Sea coasts of Turkey using nonparametric Mann-Kendall test. Annual sea level records, observed for eight typical stations, were used for the purpose of trend detection. As a result, five out of eight stations showed an upward trend as one of them showed a downward trend. No trend was found for the remaining stations. We also fitted a least squared line to quantify rate of change in sea level. Among the stations showing positive trends, the highest rate of change was computed in Trabzon (the Black Sea station) whereas the lowest was computed in Karşıyaka (the Aegean Sea station). The results confirmed a strong signal of sea level rise at global scale.

¹ Assoc. Prof., Hydraulic Division
Civil Engineering Department
Istanbul Technical University
34469 Maslak Istanbul, Turkey
Tel: + 90 (212) 285-3002
e-mail: kahya@itu.edu.tr