Chaotic Analysis of Acid Rains with Time Series of pH Degree, Nitrate and Sulphate Concentration on Wet Samples

Chaos theory is one of the new paradigms of the science since the last century. After determining chaos in the weather systems by Edward Lorenz the popularity of the theory was increased. Chaos is observed in many natural systems and studies continue to defect chaos to other natural systems. Acid rain is one of the environmental problems that has negative effects on environment and acid rains values are monitored continuously. In this study, we aim that analyze the chaotic behavior of acid rains in Turkey with the chaotic defecting approaches. The data of pH degree of rain waters, concentration of sulfate and nitrate data of wet rain water samples in the rain collecting stations which are located in different regions of Turkey are provided by Turkish State Meteorology Service. Lyapunov exponents, reconstruction of the phase space, power spectrums are used in this study to determine and predict the chaotic behaviors of acid rains. As a result of the analysis it is found that acid rain time series have positive Lyapunov exponents and wide power spectrums and chaotic behavior is observed in the acid rain time series.

Keywords: Acid rains, chaos, chaotic analysis, Lyapunov exponents.