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Statistical and trend analysis of water quality and quantity data for the Strymon River in Greece

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Abstract. Strymon is a transboundary river of Greece, Bulgaria and Former Yugoslav Republic of Macedonia (FYROM) in southeastern Europe. Water quality parameters and the discharge have been monitored each month just 10 km downstream of the river's entry into Greece. The data of nine water quality variables (T, ECw, DO, SO_4^{2-} , Na^+K^+ , Mg^{2+} , Ca^{2+} , NO_3^- , TP) and the discharge for the period 1980-1997 were selected for this analysis. In this paper a) the time series of monthly values of water quality parameters and the discharge were analysed using statistical methods, b) the existence of trends and the evaluation of the best fitted models were performed and c) the relationships between concentration and loads of constituents both with the discharge were also examined. Boxplots for summarising the distribution of a data set were used. The χ^2 -test and the Kolmogorov-Smirnov test were used to select the theoretical distribution which best fitted the data. Simple regression was used to examine the concentration-discharge and the load-discharge relationships. According to the correlation coefficient (r) values the relation between concentrations and discharge is weak ($r < 0.592$) while the relation between loads and discharge is very strong ($r > 0.902$). Trends were detected using the nonparametric Spearman's criterion upon the data for the variables: Q, ECw, DO, SO_4^{2-} , Na^+K^+ and NO_3^- on which temporal trend analysis was performed.

Keywords: Strymon river, water quality, discharge, concentration, load, statistics, trends

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