Analysis of trend and cycles in the hydrometeorology of hydrometric stations of River Niger.

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Abstract

Variations in temperature and precipitation have a direct influence on the availability of water resources in terms of quality and quantity. The extent of changes in climatic variables can therefore considerably affect the hydrological cycle of river basins, particularly those in areas that are hypersensitive to the effects of climate change. The African continent is no exception, as it is one of the most vulnerable areas to climate change. What's more, the sub-Saharan region is one of the most particularly exposed areas, since agricultural practices are mainly based on the vagaries of rainfall. With this in mind, this study examines long-term changes in precipitation and temperature using the Lokoja and Niamey stations. Historical precipitation and temperature data for the period 1971 to 2016 at Lokoja and 1990 to 2022 at Niamey were analysed as part of this study. Statistical methods, namely the non-parametric Mann-Kendall test and the Sen slope estimator, were used to assess and characterize the problem, while spectral analysis was used to examine rainfall periodicity. The results reveal that the trend in annual precipitation was significantly significant at the Niamey ville station (Z= - 1.01; p= 3.11E-15), Say (Z=2.00; P = 0.04) and lokoja station (Z= 2.13; P=0.032371). In contrast, the Kollo station showed a significant downward trend (S = -73, p < 0.05), while others exhibited non-significant trends. However, the Niamey Airport station has a slight increase in rainfall although it is still positive. With regard to temperature trends, a statistically significant upward trend was observed for minimum temperatures (Niamey Tmin P = 0.001, Tillabéry P=0.002).

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GGS conference 2024.

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