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Impacts of Agricultural Areas on Spatio-Temporal Variability of Daily Minimum Extreme Flows during the Transitional Seasons (Spring and Fall) in Southern Quebec

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Abstract : Several statistical methods were used to analyze the spatio-temporal variability of daily minimum extreme flows (DMEF) in 17 watersheds—divided into three homogenous hydroclimatic regions of southern Quebec—during the transitional seasons (spring and fall), during the 1930–2019 period. Regarding spatial variability, there was a clear difference between the south and north shores of the St. Lawrence River, south of 47° N. DMEF were lower in the more agricultural watersheds on the south shore during transitional seasons compared to those on the north shore. A correlation analysis showed that this difference in flows was mainly due to more agricultural areas ((larger area (>20%) on the south than on the north shore (<5%)). An analysis of the long-term trend of these flows showed that the DMEF of south-shore rivers have increased significantly since the 1960s, during the fall (October to December), due to an increase in rainfall and a reduction in cultivated land, which increased the infiltration in the region. Although there was little difference between the two shores in the spring (April to June), we observed a decrease in minimum extreme flows in half (50%) of the south-shore rivers located north of 47° N.

KEYWORDS :

Minimum extreme ; Fows ; Spring ;F ; Agriculture ; Hydrology ; Watersheds ; Infiltration ; Long-term trend ; Statistical analysis

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