



Using spot gauging data to estimate the annual minimum monthly flow with a return period of 5 years

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The annual minimum monthly flow with a return period of 5 years $QMNA5$ at a poorly gauged site is commonly used for water quality and quantity management in France. A method using spot gauging data to estimate this low flow statistic at poorly gauged sites is presented. The estimate for $QMNA5$ at the partial record site is derived from the value of $QMNA5$ at one nearby-gauged site with long-term and high quality records. The relationship between the logarithm of these values is supposed to be well approximated by a linear regression fitted to the logarithm of concurrent flows observed at the two sites. A delete-one cross-validation analysis was performed (i) to assess sensitivity of the data collection strategy, allowing useful recommendations for operational service in charge of river flow monitoring and (ii) to derive bias and standard error models as function of the correlation coefficient between synchronous flows, the total number and the frequency of spot gauging data. The results show that increasing the number of spot gauging data leads to a significant increase in the model performance until approximately 20 gauging data; the gain becomes limited afterwards. Moreover, gauging several times the same year does not significantly improve estimates, probably because of the intra-annual dependence of low-flow data. Three measurements per year seem to be a good trade-off. The method may adjust to non-stationary strategies for data collection, be applied to other low flow statistics and may yield more accurate predictions of $QMNA5$ than advanced interpolation methods.