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Real-time Bayesian estimation of dynamic stage-discharge models

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River discharge time series are established using ‘rating curves’, which are models with discharge as output and stage and possibly other monitored parameters as inputs. Unfortunately, many stage-discharge relations are unstable, i.e. they are subject to sudden or progressive changes due to many possible causes (e.g. change in the geometry of the river after a large flood, vegetation growth, ice processes, etc.). This requires using dynamic stage-discharge models. This PhD aims at developing a Bayesian method to estimate such models in real time. Rating changes due to morphodynamic effects and vegetation cycles are studied in priority since they are the most problematic in France. This requires: defining and validating tools for detecting rating changes and estimating their probabilities and magnitudes; implementing, testing and validating a Bayesian method for estimating dynamic stage-discharge models in real time, using well documented hydrometric stations.