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Filling gaps in daily riverflow series with a spatio-temporal state-space model and the EM algorithm

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A spatio-temporal linear dynamic model has been developed for patching short gaps of up to one month in daily river runoff series. The model was cast in a state-space form in which the state variable was estimated using the Kalman smoother (RTS smoother). The EM algorithm was used to concurrently estimate both parameter and missing runoff values.

Application of the model to daily runoff series in the Volta Basin of West Africa showed that the model is capable of predicting missing runoff values at a gauging station using the remaining series at the station and other series at stations in the same sub-basin that are spatially correlated with it.