

Simulating influent water quality parameters using a nearest-neighbor technique

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Abstract. A nearest neighbor bootstrapping technique was developed to simulate monthly influent water quality ensembles for drinking water treatment plants. This technique generates ensembles of influent water quality scenarios that can be used in water treatment plant models for assessing the probability of compliance with drinking water regulations. For simulating the scenarios at a given water treatment plant, K-nearest neighbors are calculated in terms of a feature vector that includes latitude, longitude, and average annual water quality values. One of the neighbors is resampled with a weight metric that gives large weights to the nearest neighbor and least to the farthest; this is repeated to obtain the ensembles. The components of the feature vector can also be weighted, offering flexibility in how neighbors are picked when modeling compliance for a particular regulation. The ensembles generated provide a good representation of the input uncertainty that is useful in management and planning. Results for simulating total organic carbon for a water treatment plant in Colorado show that monthly means can be reproduced, most importantly in the maximum month. However, some monthly total organic carbon values are overestimated.

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