Academic writing (03)

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Ref: An integrated first principle and deep learning approach for modeling nitrous oxide emission from wastewater treatment plants

1. Equally important, the hybrid model is more applicable than the pure learning model due to the lower requirement of data and the pure mechanistic model due to the less calibration requirement.
2. The different contributions from various pathways and potentially neglected production mechanisms contribute to the uncertainties of the first principal models.
3. Despite its versatility, applying deep learning in WWTPs and other environmental systems is often challenging due to limited data availability in such systems.
4. Along with the plant operating data including air and wastewater flow rates, the data produced from calibrated mechanistic component were fed into the teacher-forcing LSTM component for model training and testing.
5. Interpretability is the cornerstone of the model applications in assessing mitigation strategies.
6. The good performance under the unstable period indicates that the hybrid model may be resistant to potential process disturbances or shocks.
7. Going beyond N_2O modeling in WWTPs, the novel hybridization concept can be applied to other environmental systems where part of the processes can be easily derived from the first principles and the semi-empirical processes can be replaced by deep learning.
8. The application of new technologies like deep learning should absorb the quintessence of prior scientific knowledge.