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A neural approach to predict emissions of volatile organic compounds by plants

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A neural approach to predict the emissions of biogenic volatile organic compounds (BVOC) is presented. The generic black-box model allows to infer the applicability of individual parameter combinations serving as emission predictors. The model is tested using field measurements of isoprene and monoterpene emissions from Amazonian tree species. Model results are also compared to the predictions of the standard emission algorithm for isoprene. On the short-term scale, good agreement was obtained between observations and predictions of the standard algorithm as well as the neural approach using the same input parameters. When these predictors were used to predict the long-term emission variability, r^2 was reduced to < 0.5 for both approaches. For the neural technique, more than 50% of the unexplained variance could be explained by temperature history. An even better performance of the neural model was obtained using physiological predictors ($r^2 > 0.9$).