



Regional comparisons of watershed determinants of dissolved organic carbon in temperate lakes from the Upper Great Lakes region and selected regions globally

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ABSTRACT: We analyzed how dissolved organic carbon (DOC) concentration in lakes of the North American temperate forest (Upper Great Lakes region) is related to nine catchment characteristics (lake area, lake perimeter, drainage area, ratio of drainage area to lake area, proportion of watershed occupied by wetlands, proportion of lake perimeter in wetlands, shoreline development, elevation, and watershed slope) and compared selected relationships to those from other regions across the globe. For the temperate lakes, the proportion of the lake perimeter and the proportion of the watershed occupied by wetlands were the best predictors of DOC in both univariate ($r^2 = 0.34$ and 0.30 , respectively) and multivariate regression models. Forested wetlands, in particular those with coniferous vegetation, explained the largest proportion of lake DOC variability. Wetlands with scrub-shrubs and emergent vegetation explained very little or no variability. Secondary to wetlands, lake DOC decreased with lake area and watershed slope. When we combined the temperate lake data set with that of 10 other geographical regions of the world (ranging from subtropical to tundra), the only two variables significant in predicting DOC were proportion of wetlands in the watershed ($r^2 = 0.36$) and lake elevation ($r^2 = 0.34$). We conclude that regional or small-scale DOC models likely have limited applicability in predicting DOC in other geographical areas of the world.

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