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## Synchronous variation of dissolved organic carbon and color in lakes

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### *Abstract*

Temporal variation in dissolved organic carbon (DOC) and water color (light absorption at 440 nm) was measured in 20 lakes in northern Michigan that varied in DOC, pH, morphometry, and relative productivity as indicated by chlorophyll and total phosphorus (TP). Monthly observations during May–August over 6 yr revealed that DOC and color varied by 6- and 28-fold among lakes and varied substantially through time within lakes. The pattern of temporal variation differed among years but was synchronous among lakes. Of the 190 possible correlations among lake time series, most were positive for DOC (158) and color (160), and 50% of the positive correlations were significant ( $P < 0.05$ ). Other variables, such as total phosphorus, chlorophyll, and pH, were less synchronous and had fewer significant positive correlations (13–25%). Temporal dynamics in DOC and color were related to ice-out date as well as spring and summer precipitation. Years of late ice-out and high spring rain were associated with high DOC and color in spring. A summer drought in one year led to declines in color (up to 40%) and DOC (up to 38%) in nearly all of the lakes. The common temporal dynamics of DOC and color were most likely the result of climatic conditions that affected loading of allochthonous carbon as well as losses due to photodegradation. The variations in DOC were sufficient to cause large changes in light penetration, standing stocks of carbon, and ecosystem metabolism.