Water color affects the stratification, surface temperature, heat content, and mean epilimnetic irradiance of small lakes

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Abstract: The effects of water color on lake stratification, mean epilimnetic irradiance, and lake temperature dynamics were examined in small, north-temperate lakes that differed widely in water color (1.5–19.8 m^{-1}). Among these lakes, colored lakes differed from clear lakes in the following ways: (*i*) the epilimnia were shallower and colder, and mean epilimnetic irradiance was reduced; (*ii*) the diel temperature cycles were more pronounced; (*iii*) whole-lake heat accumulation during stratification was reduced. The depth of the epilimnion ranged from 2.5 m in the clearest lake to 0.75 m in the most colored lake, and 91% of the variation in epilimnetic depth was explained by water color. Summer mean morning epilimnetic temperature was ~2 °C cooler in the most colored lake compared with the clearest lake. In clear lakes, the diel temperature range (1.4 ± 0.7 °C) was significantly (p = 0.01) less than that in the most colored lake (2.1 ± 1.0 °C). Change in whole-lake heat content was negatively correlated with water color. Increasing water color decreased light penetration more than thermocline depth, leading to reduced mean epilimnetic irradiance in the colored lakes. Thus, in these small lakes, water color significantly affected temperature, thermocline depth, and light climate.