

Algal blooms in the alpine – investigating the coupled effects of chronic nitrogen deposition and climate change on alpine lakes

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Abstract. Mats of *Zygnema spp.* have been observed in the subalpine Loch and alpine Sky Pond in the Colorado Front Range. These algal mats were not observed prior to 2010. *Zygnema spp.* are common green algae in nutrient-rich waters, and Loch Vale watershed has received chronic nitrogen (N) deposition since mid-20th century. The fact that the algal mats are only recently observed suggests some other forcing factor is facilitating attached algal growth. Summer lake water temperatures have increased steadily by more than 2 degrees Celsius since the 1980s. We hypothesize warming in conjunction with nutrient availability is causing increased algal productivity. Benthic “stations” in the littoral zones of both lakes were sampled weekly in 2015 for chlorophyll and ash free dry mass (n=8 and n=5, respectively). Algal biomass and station-specific daily temperatures were correlated at certain benthic stations, with high degree of spatial heterogeneity in mass accrual. A more global hypothesis is that lakes that were heretofore oligotrophic and characterized by very low nutrient waters may be transitioning to a different trophic state induced by changing climatic drivers.