QUANTIFYING YEARLY HIGH-LATITUDE LAKE CDOM FROM ICE SHEET TO COAST IN SOUTHWESTERN GREENLAND

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Following retreat of the Greenland Ice Sheet, plant communities colonized exposed landscapes in western Greenland. Community succession and greening in response to climate change should increase contributions of organic matter (OM) to terrestrial hydrologic systems. These increases may be evaluated over large regions and through time using remote sensing of wavelengths of light that estimate 1) chromophoric dissolved OM (CDOM), a fraction of total OM, in Arctic lakes, and 2) changes in plant communities and health based on the normalized difference vegetation index (NDVI). We use satellite imagery from a high-resolution sensor to evaluate changes in lake CDOM concentrations and vegetation along a 175 km transect from ice to coast in southwestern Greenland. The transect includes a gradient from negative water balance, cooler temperatures, and younger moraine ages near the ice, to positive water balance, warmer temperatures, and older moraine ages at the coast. NDVI and lake CDOM across the transect were evaluated using Sentinel-2 imagery from 2017 to 2023. CDOM concentration variations were derived using a red/green band ratio (506-595 nm, 632-698 nm) to assess biological optical properties of inland waters. The NDVI data indicate a progressively longer growing season throughout the transect, where values increase yearly at peak growth, with the exception of 2022 and 2023, where mean NDVI values were lower than previous years. Estimates of CDOM concentrations display similarities across the transect between the years of 2017, 2019, 2020, and 2021 but, similar to NDVI, CDOM concentrations were lower in 2022 and 2023 than earlier years. The lower CDOM concentrations may be responding to less productive vegetation during 2022 and 2023, possibly due to greater cloud cover. Changes observed across the southwestern Greenland landscape suggest that CDOM concentrations of lakes is linked to alteration in vegetation patterns and are likely to change with continued Arctic warming.

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