Twenty-first century development in urban twin lake, Golden Valley, MN: Evidence for deposition of multiple lamina per year

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Introduction

Twin Lake is a small, deep lake with a surface area of 11 hectares and a maximum depth of 16.6 meters with a mean depth of 7.8 meters. The lake is bordered by Wirth Park on the west and Liberty Heights developments on the north, a small inlet connects Twin to neighboring Shoreview Lake. Core Twin Lake has been sampled at least 210 times during the 21st century, and hundreds of samples have been collected from the lake sediments. The core material from the sediments was studied for the purposes of this research. The first laminae were counted, based on the assumption of a light and dark couplet developing an age chronology for Twin Lake, the varves of the freeze core subsequently imaged with a bed scanner to capture high-resolution core images. To discern the relative composition of the sediment using an analysis of the freeze core, we can expect the related laminae to be composed of authigenic calcite. These light colored laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. The L*a*b* values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core.

Aerial Timeline

LOI Data from 1997 Twin Lake Core (Engstrom et al. 2007)

LOI Data from 2008 Twin Lake Core (Myrbo et al. 2011)

LOI Data from 2016 Twin Lake Core (Ustipak et al. 2018)

LOI Data from 2019 Twin Lake Core (Myrbo et al. 2021)

LOI Data from 2022 Twin Lake Core (Myrbo et al. 2023)

Results & Discussion: Chronology

The freeze core image to the left contains two sets of chronologies. The freeze core contains laminae chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. The L*a*b* values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core.

CIE L*a*b* Color Analysis

A color analysis of the digital core image can establish a relationship between the color of a sedimentary layer and its composition. Adobe Photoshop was used for the analysis, yielding approximate color values for each laminae. The freeze core was imaged with a petrographic microscope to determine the approximate composition of laminae through the core.

AUTHIGENIC CALCITE DEPOSITION

The most visually distinct laminae are bright white-yellow in color and composed almost entirely of authigenic calcite. These light colored laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. These light colored laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core.

TURBIDITE STYLES

Turbidites are deposited as a small turbidite layer, which are gray in color and have a nearly linear trend over the entire body of Twin Lake. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core. Turbidite layers are defined as a series of muscle and spring laminae that are aligned in a near-linear fashion. The LOI values between the two laminae, which are abundant in the initial chronology based on counting couplets of varves, one light colored and one dark, were imaged with a petrographic microscope to determine the approximate composition of laminae through the core.