ORAL PRESENTATION

DIATOM RESPONSE TO GROUNDWATER FLUCTUATIONS IN A CLOSED-BASIN LAKE OVER THE LAST 8500 YRS.

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Sediment records from closed-basin lakes in the climatically sensitive Northern Great Plains (NGP) have contributed significantly to our understanding of paleoclimatology in this region. It is becoming clearer that short-term climatic shifts can be asynchronous amongst lakes within the NGP, possibly as a result of local hydrologic variability. Here we investigate the response of diatom communities to changes in groundwater flow in the closed-basin Kettle Lake, North Dakota. A high-resolution (decadal) sediment record capturing the last 8500 years is analyzed for fossil diatom assemblages and aragonite concentration. Based on prior studies of the contemporary hydrogeologic setting, we use aragonite concentration as an independent proxy of groundwater flux to the lake (and thus lake water level) and identify diatom assemblages associated with high and low groundwater flow (humid and dry climate, respectively). The lacustrine communities associated with this gradient of groundwater flow are characterized by *Stephanodiscus* spp. (*S. hantzschii, S. parvus, S. minutulus*, and *S. niagare*) during times of high flow and *Nitzschia palaeacea*, *Nitzschia linearis*, *Synedra acus*, and *Chaetoceros* cysts at low flow. A semi-quantitative model of lake-level change along this gradient, based on basin morphology and diatom-inferred salinity reconstruction, shows a range of approximately 9 m during the last ~8000 years. Climatically, the diatom record reveals broad humid/wet periods from 8444 – 8139, 4435 – 1430 and 1050 – 574 cal yrsBP, punctuated with short multi-decadal droughts and extended dry periods offsetting the wet periods. The last 574 years (cal BP) of the record is characterized by higher than average diatom assemblage instability (as defined by rate-of-change) and high climatic variability. Our findings are coherent with other lake records in the region, in particular the rapid diatom regime shifts at 4435 and 1430 cal yrsBP, which suggest regional climatic forcing. We show that an independent proxy of hydrologic forcing on the diatom community can be an effective means of interpreting community shifts, which may be related to changes in habitat or physical limnology rather than water quality.