

## **Diatom assemblages as indicators of geomorphological and hydrological evolution in former kettle hole lakes from Skeiðarársandur, south eastern Iceland.**

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This study is the first to document the preservation of diatoms in the basal sediments of former kettle hole lakes. The kettle hole lakes studied formed in the depressions created by the grounding of large quantities of ice released from the glacier margin during the November 1996 jökulhlaup at Skeiðarársandur, SE Iceland. We combine these diatom records with observations on the sedimentological, morphological and hydrological characteristics of these features to infer their evolution from the time of their creation, until the lakes dried out  $\sim$ 15 years later. Diatom assemblages from the three kettle holes investigated in this study are dominated by small benthic species (e.g., *Achnanthes*, *Navicula*, *Nitzschia* and *Fragilaria* spp.), although one kettle hole also shows the presence of planktonic species (*Cyclostephanos* one *Stephanodiscus* spp.). The diatom assemblages are characterised by high relative abundances of benthic diatoms with high nutrient and alkalinity optima. The differences observed in the diatom assemblages between the different sedimentary units in the kettle holes are interpreted to reflect changes in the proportion of available habitat type (e.g. benthic, planktonic and littoral), as a result of the rise and fall of water levels. In addition, small-scale changes in the abundance of different species in different units are interpreted to be linked to changes in water chemistry (e.g., alkalinity), as a result of variation in sediment input (e.g., aeolian accumulation, slumping and re-working) and source of water (e.g., precipitation, ground water, snow melt). Diatom records from lakes in former glaciated regions typically investigate lake evolution over millennia. In contrast, the diatom records from these kettle hole lakes allow the study of short-term processes over a  $\sim$ 15 year evolutionary cycle. The kettle hole lakes formed by the 1996 jökulhlaup represent short-lived, hydrologically dynamic 'hotspots' of biological diversity in an otherwise relatively barren proglacial environment and highlight the potential importance of these environments for nutrient cycling and colonisation within proglacial environments, as well as the potential for relict and modern day kettle lakes to reconstruct environmental change in proglacial areas.