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405 Concord Avenue #352, Belmont, MA 02478 | 617-977-4304 | info@ lspa.org | www.lspa.org

LSPA Continuing Education Course
Glacial Geology of the Northeast United States

COURSE DESCRIPTION

The surface of the earth in the Northeast United states has been primarily shaped by the advance and subsequent melting of continental ice sheets over the last several hundred thousand years. Soil properties and overburden aquifer (and aquitard) characteristics are intrinsically linked to the glacial processes that formed them. Therefore, a detailed understanding of glacial geomorphology and glacial geology can improve site characterization, investigations design, and data interpretation.

This course will provide LSPs and other environmental practitioners with a framework to interpret the glacial geology of a site in the context of how its history impacts its stratigraphy and groundwater flow, and thereby site investigation. Attendees will progress through background material covering glaciation, glacial melting, and the sediments and associated landforms associated with these processes, and will then review how to access and interpret surficial geologic maps and how to work with the most updated three-dimensional datasets across the state and region.

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Course Agenda:

The course will begin with an overview of glaciology and progress rapidly into glacial ablation (melting), which is the process responsible for most of the overburden in the Northeast United States. Attendees will cover different geomorphic settings and the resultant landforms and associated materials and their hydraulic properties. After covering these basics, attendees will review applications, including reviewing case studies and practicing accessing and interpreting surficial geologic maps.

9:00 **Part 1: Glaciology**

- Glacier formation and equilibrium
- Ice sheets vs. alpine glaciers
- How glacial ice moves
- Landforms and overburden materials associated with advancing ice

9:30 **Part 2: Deglaciation and Glacial Landforms**

- Ice retreat and timing in the Northeast United States
- Proglacial landforms and basins
- Stratified drift and hydraulic properties
    - Proglacial deltas (simple and complex)
    - Ice-contact features including kames, kame terraces, eskers, ice-channel fill
    - Morphosequences and predictable spatial patterns of landform and aquifer properties

10:30 **15-minute break**

10:45 **Surficial Geologic Maps**

- Interpreting glacial landforms from topographic maps
- Sequencing deglacial events to infer subsurface hydrology
- Interpreting surficial geologic maps
- Finding and using surficial geologic maps

11:45 **Practice Using Glacial Geologic Knowledge**

- Designing site investigation considering glacial geology
- Case studies
    - Aquifer glacial stratigraphy and properties
    - Emerging knowledge and controversies
    - Large scale hydrogeologic modeling with surficial geologic domains
    - Interpreting well logs

12:00 **Q & A**

12:15 **Course Adjournment**

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INSTRUCTOR BIOGRAPHY

Brian Yellen, PhD
Brian Yellen is the State Geologist for Massachusetts and Director of the Massachusetts Geological Survey. He has taught hydrogeology and glacial geology at the University of Massachusetts Amherst, and in environmental consulting 2011-2012. Since then, Dr. Yellen has offered nine different LSP continuing education workshops, mostly focused on surficial geology, geomorphology, and hydrogeology. Dr. Yellen has published widely in the fields of geomorphology, sediment transport, coastal processes, and hydrology.