LSP Association
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Glacial Geology of Southern New England

Course Outline

The course will include a 15 minute break mid-way through. Throughout the course, the instructor will connect glacial geology topics with their implications for the waste site cleanup process in southern New England, with an emphasis on Massachusetts.

Module 1

1. Glacial Geologic History
    a. Louis Agassiz
    b. Time frame for glacial advances and retreats
    c. Erosion and Depositional History
2. Theory of Glaciation
3. Ice: The Water Mineral
    a. How a glacier forms
    b. Forming a glacier
    c. Glaciers

Module 2

4. Glaciers
    a. Mountain Glaciers
        i. Cirque Glaciers
        ii. Valley Glaciers
        iii. Mountain Ice Caps
        iv. Piedmont Glaciers
    b. Continental Glaciers
        i. Greenland
        ii. Antarctica
    c. Glacial Movement
        i. Basal Sliding
        ii. Plastic Deformation
        iii. Brittle Zone
        iv. Plastic Zone
        v. Pull of Gravity
        vi. Mountain Glacier vs. Continental Glacier
        vii. Rate of flow
        viii. Zone of Accumulation
        ix. Zone of Ablation
        x. Equilibrium Line
    d. Glacial Advance and Retreat
        i. Toe
        ii. Advance/Equilibrium/Retreat
    e. Ice in the Sea

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Module 3

5. Carving and Carrying by Ice
    a. Erosion
        i. Glacial Abrasion
        ii. Cirques
        iii. Tarns
        iv. Aretes
        v. Horns
        vi. U-Shaped Valleys
        vii. Hanging Valleys
        viii. Fjords
        ix. Glacial Plucking-Roche Moutonee/Monadnock
    b. Deposition
        i. Conveyor Belt
        ii. Moraines
            1. Lateral
            2. Medial
            3. Recessional
            4. Terminal
            5. Ground
    c. Glacial Sedimentary Deposits
        i. Glacial Drift
            1. Glacial Till
            2. Erratics
            3. Glacial Marine Sediments
            4. Glacial Outwash
            5. Loess
            6. Glacial Lake-Bed Sediment
            7. Stratified Drift is Water Sorted
            8. Unstratified Drift is Not Sorted
    d. Glacial Depositional Landforms
        i. End Moraines and Terminal Moraines
        ii. Recessional Moraines
        iii. Ground Moraine
        iv. Drumlins
        v. Kettle Lakes
        vi. Eskers
6. Consequences of Continental Glaciation
    a. Ice Loading and Glacial Rebound
    b. Sea Level Changes
7. Timing of Pleistocene Ice Age
    a. Wisconsinan
    b. Illinoian
    c. Pre-Illinoian

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   d. Interglacials
8. Causes of Glaciation
   a. Plate Tectonics
   b. Atmospheric Chemistry
   c. Milankovich Hypothesis

Module 4

9. Real World Examples
   a. Maps and Aerial Photos and Google Earth
   b. Geologic Cross Sections
   c. How Understanding Glacial Geology Will Assist in the Waste Site Cleanup Process

Questions & Answers

Closing Remarks