A SHORT GEOLOGICAL HISTORY OF BLOCK ISLAND AND RHODE ISLAND SOUNDS

Ocean Special Area Management Plan

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Generalized Bathymetry – SAMP Area

Battelle, 2004
You are here
MALASPINA GLACIER – Northeast Gulf of Alaska

An Analog “The size of Rhode Island”
End Moraines of Southeastern New England

Schafer and Hartshorn, 1965; Goldsmith, 1982; Sirkin, 1982
End Moraines of Southeastern New England and Long Island

Sirkin, 1982, 1996

- Interlobate zone; D: Delta

TM: Terminal Moraine
RM: Recessional Moraine

Sirkin, 1982, 1996
GEOLOGY OF THE RHODE ISLAND OCEAN SAMP

EXPLANATION

End Moraine

Modified from:
Schafer and Hartshorn, 1965
Stone and Borns, 1986
Stone and Sirkin, 1996

SAMP Boundary
Laurentide Ice Retreat

- 24,000 BP
- 15,500 BP
- 10,000 BP

After Dyke & Prest, 1987
Ice Retreating from Block Island

Warmer

Events in Southern RI Correlated to Greenland GISP-2 Ice Core

Colder

Ice Retreating from Block Island

Block Island Ice Covered
Mohegan Bluffs, BI – Complex Stratigraphy
Mohegan Bluffs, BI – Complex Stratigraphy

Boothroyd and Sirkin, 2002
Mohegan Bluffs, BI – Complex Stratigraphy

- Eolian Mantle
- UD Till
- LD Lake
Tectonic End Moraines
Southern New England

Oldale and O’Hara, 1984
Eastern Shore, BI – Moraine Thrust Slices
Deglacial Configuration – BI and RI Sounds

Stone and Borns, 1986
Deglacial Configuration – BI and RI Sounds

Stone and Borns, 1986
- Glacial Lakefloor
- End Moraine - Blocky
- End Moraine - Boulder
- End Moraine - Boulder, Cobble, Sand
- Manetto Gravel

Sirkin, 1982
- End Moraine

Stone and Sirkin, 1996
- End Moraine

SAMP Boundary

0 10 km
0 10 mi
Glacial Lakes of the Sounds
17,000 BP

Eustatic Sea-Level Rise

Laurentide Lakes

Laurentide Ice Sheet? 2m·100yr⁻¹

Antarctic Ice Sheet? 2-5m·100yr⁻¹

Fairbanks, 1989
RELATIVE CRUSTAL MOTION  Central Long Island Sound

RELATIVE SEA LEVEL

Delayed ISOSTATIC REBOUND

EUSTATIC SEA-LEVEL RISE
Fairbanks 1989

Not 80m at BI

J Radway Stone, 2000
Sea-Level Rise
Block Island Sound

- 40 meters
Sea-Level Rise
Block Island Sound

- 20 meters
Shoreface Sediment Transport

Barrier Island Transition to Shelf Shoal

Penland, Suter and Boyd 1988
Depositional Platform
sand sheet

Cross-Shore Swath
coarse sand w/small dunes

Depositional Pavement
cobble gravel

Glacial Outcrop
boulder gravel concentration

EXPLANATION

Scale

Draft: 30 Sept, 2006
BOTTOM CHARACTERISTICS OF RHODE ISLAND AND BLOCK ISLAND SOUNDS
Maps created using charts and notes from the f/v 'Black Sheep'

Mapped by: Mike Tarasevich

EXPLANATION

Interpreted surface sediment grain size
- Fine sand
- Fine to medium sand
- Medium sand
- Cobble/Boulder

Surface sediment sample (Shepard, 1954 classification)
- Gravel
- Gravely sediment
- Sandy silt
- Sand
- Silt

Collected by:
- McMaster, 1966
- USGS 1982-1997

Scale
0 5 10
0 5 nmi
Map Scale: 1:100,000

Rhode Island

USGS
RIGS
USGS Seismic Profiles
Block Island Sound

Needell and Lewis, 1984
USGS Seismic Profiles Block Island Sound

Needell and Lewis, 1984
Summary

• Complex Glacial Topography – End Moraines
  Deltas and Fans
  Large Lakes

• Topography Reshaped by Waves and Tidal Current Flow during Sea-Level Rise

• Present Processes – Wave Orbital Motion
  Downwelling Flow
  Upwelling Flow
  Combined Flow

Tidal Current Flow
End of Presentation