ABSTRACT FINAL ID: GC44A-07

TITLE: Subsurface images of the northern Newark basin, New York, USA and their implications for carbon sequestration *(Invited)*

SESSION TYPE: Oral

SESSION TITLE: GC44A. Carbon Sequestration: Geophysical Approaches to Characterization of Geologic Carbon Sequestration Reservoirs and Seals IV

AUTHORS (FIRST NAME, LAST NAME): Paul E Olsen[1], Martha Oliver Withjack[2], Roy Walter Schlische[2], David Goldberg[1], Dennis V Kent[2, 1], Kathryn Tamulonis[4], Marcia Couëslan[3], Daniel J Collins[5]

INSTITUTIONS (ALL): 1. Lamont Doherty Earth Obs, Columbia Univ, Palisades, NY, United States.
2. Department of Earth and Planetary Sciences, Rutgers University, Piscataway, NJ, United States.
3. Schlumberger Carbon Services, Calgary, AB, Canada.
4. Schlumberger Carbon Services, Houston, TX, United States.
5. Sandia Technologies, LLC, Houston, TX, United States.

Title of Team:

ABSTRACT BODY: The Triassic-Jurassic Newark rift, a large onshore sedimentary basin close to northeast US metropolitan areas, may have potential for safe geological storage of CO2 in a suitably deep formation overlain by appropriate confining units. Filled with continental synrift sedimentary rocks and CAMP (Central Atlantic Magmatic Province) basaltic intrusions and flows, the basin is bounded on the NW by the NE-striking, SE-dipping Ramapo fault. Funded by the Department of Energy's (DOE) National Energy Technology Laboratory's (NETL) Carbon Sequestration Program's portion of the American Recovery and Reinvestment Act of 2009 (ARRA) and NYSERDA, the TriCarb Consortium for Carbon Sequestration acquired two seismic-reflection profiles in Rockland County, NY that were processed to obtain depth-migrated images of the basin's subsurface geometry. The E-trending dip profile crosses most of the basin, while the shorter N-trending profile provides a strike-view. Five seismic facies are present: (1) shallow continuous, closely spaced, W-dipping reflections suggestive of lacustrine deposits; (2) short, non-coherent reflections suggestive of conglomeritic fluvial strata; (3) high-amplitude parallel reflections, locally exhibiting reverse separation, suggestive of prerift early Paleozoic strata Cambro-Ordovician carbonates; (4) a facies at the bottom of both lines and the western end of the ESE-trending line that lacks reflections, suggestive of prerift metamorphic rocks such as Precambrian gneiss, and/or highly deformed Taconic (Ordovician) phyllites; and (5) a seismically transparent band commonly bounded by high-amplitude reflections that cuts across the stratigraphy of facies 1-3, suggestive of a scoop-shaped intrusive diabase sheet that projects to the surface to outcrops of the CAMP-related Palisade sill.
Basin geometry is well-imaged conforming to a deeply eroded half graben. Reflections of facies 3 are truncated by facies 2 marking the angular pre-rift unconformity. Distinct fanning in facies 1 suggests syndepositional faulting with reflections dipping and thickening toward the poorly imaged Ramapo fault to the NW. Because Jurassic CAMP lavas crop out at the NW edge of the basin, the full thickness of Triassic strata are imaged on the seismic data. Our favored interpretation has the Palisade sheet intruding the pre-rift unconformity in the axis of the basin, climbing up-section into Triassic strata to the NW, NE, and SE. The base of the intrusion and the contact with prerift strata appears to be at a depth of ~ 2 km (6600 ft) in the location of a planned basin-characterization core hole to be drilled in late summer/early fall of 2011. In this location, our favored interpretation has the intrusion underlying Triassic sandstones and conglomerates of the Stockton Formation (best reservoir candidate), in turn overlain by mudstones of the Lockatong Formation (best confining unit candidate), overlain by upwardly coarsening mudstones, sandstones, and conglomerates of the Passaic Formation. These hypotheses should be tested by "ground truth" from the borehole by the time of this presentation.

KEYWORDS: [1600] GLOBAL CHANGE, [8105] TECTONOPHYSICS / Continental margins: divergent, [8169] TECTONOPHYSICS / Sedimentary basin processes, [8434] VOLCANOLOGY / Magma migration and fragmentation.

(No Image Selected)

Previously Presented Material: 0% was presented

Contact Details

CONTACT (NAME ONLY): Paul Olsen

CONTACT (E-MAIL ONLY): polsen@ldeo.columbia.edu
