

ABSTRACTS

NORTHEASTERN SECTION, GEOLOGICAL SOCIETY OF AMERICA

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FAULT PATTERNS AT THE PEAPACK OFFSET OF THE RAMAPO BORDER FAULT, NEW JERSEY TRIASSIC

ADAMS, George F., 466 Hauck Rd., Bridgewater, N. J. 08807

Truncated igneous flow units along the western scarp of the Second Watchung indicate a co-linear extension of the Ramapo fault between Bernardsville and Moggy Hollow. As presently mapped, the Ramapo fault extends westerly from Bernardsville in a broad curve to a diabase pipe in Peapack.

The newly-mapped fault branch cuts across the Watchung syncline and thus post-dates it. Downthrow, interpreted to be in the same sense as the main border fault, diminishes southward toward Moggy Hollow. At present a west-facing obsequent fault-line scarp is developed where Watchung basalts are in fault contact with Brunswick shales.

The Ramapo fault with its newly recognized extension across the Second Watchung is offset and overlapped with respect to its Pottersville - High Bridge segment. Between the overlapped parts of the fault segments, a ramping effect is observed in the Brunswick formation west of the Peapack pipe, where it overlies beveled Paleozoic folds. Generally low dips (5-100) become steeper (45-500) and more westerly as the Pottersville fault is approached. This flexure carries the Brunswick well above the pre-Triassic massif to the north and indicates a horizontal component of movement in the adjoining fault segments, also expressed in sheared basalts near Bernardsville.

The general fault pattern suggests that a sedimentary section, limited to the Brunswick formation and the Watchung basalts formerly extended west of the Ramapo fault segment in this area.

THEORETICAL MODEL OF SHORE DYNAMICS AT SANDY HOOK SPIT, NEW JERSEY

ALLEN, James R., Department of Geography, University of Arkansas
Fayetteville, AR 72701

A computer model is presented which simulates the interaction between shoreline geometry and shoaling waves along Sandy Hook spit, N. J. Thirteen wave conditions defined by height, period and angle of approach, characterizing the local wave climate, are refracted to the shoreline to generate a discrete approximation of the nearshore energy field. The mean breaking wave value for the longshore component of the energy flux factor is calculated for each wave ray and resolved into a volumetric amount of longshore sediment transport. A cellular approximation of the shoreline with floating boundaries mid-way between adjacent rays is then used to solve for shore-perpendicular changes through a continuity of mass approach to the calculated volumes transported into and out of adjacent cells.

An excellent agreement between the qualitative representation of wave energy patterns and observed shoreline mobility is found. Correlation of simulated beach migration with measured changes is only slightly less satisfactory. The segmented shoreline of the spit is shown to represent a series of feeder beach/depositional nodes induced by the refracted wave climate pattern. Intersegmental transfers are associated with pulses of sediment transport that result in rapid oscillations in the downdrift shoreline. The model is successful in identifying the potentially hazardous coastal phenomena and in assessing the geomorphic effects of shore stabilization alternatives with the limitations of the internal working assumptions and empirical coefficients.

TECTONIC SIGNIFICANCE OF CAMERON'S LINE

AMENTA, Roddy, Department of Geology, James Madison University,
Harrisonburg, Virginia 22807

Minor structures, map patterns, and stratigraphic relationships in western Connecticut indicate that Cameron's line is the exposed edge of a tectonic slide which extends eastward beneath the Hartland terrain and resurfaces near mantled gneiss domes. A distinctive s-surface, changing with increasing strain from crenulation cleavage to spaced or penetrative schistosity, occurs near Cameron's line and the domes. Aligned minerals and crenulation axes at both locations, moreover, rake steeply to the northwest on the s-surface at an angle to fold axes and parallel to the direction of finite elongation during thrusting. This fold-thrust fabric formed during the Acadian orogeny after the development of the first mesoscopic schistosity in the Straits Schist and Goshen Formation, units of Silurian or Devonian age. The slide was subsequently deformed by development of northwest-trending folds, mantled gneiss domes and uplift of the Berkshire massifs. The probable northward continuation of the fold-thrust fabric

may warrant reinterpreting the structural histories of some regions along strike in Massachusetts and Vermont. Cameron's line is probably a continuation of the Baie Verte-Brompton line of Canada, an obduction zone formed near the Ordovician continental margin. The strong Acadian tectonic signature along the entire line, therefore, is interpreted to be the result of the collision between the continental margin and land masses further east during the final closing of Iapetus.

THE GEOMORPHIC EFFECTS OF OFF-ROAD VEHICLES ON THE BEACH: FIRE ISLAND NATIONAL SEASHORE

ANDERS, Fred J. and LEATHERMAN, Stephen P., National Park Service
Service Cooperative Research Unit, University of Massachusetts,
Amherst, Massachusetts 01003

The effects of off-road vehicles on Fire Island National Seashore, New York, presently are being investigated. Vehicular traffic is concentrated on the beach face, seaward of the foredune toe. The experimental approach has been adopted to determine the amount of disruption that a vehicle produces. A specially developed microtopography profiler was used to precisely measure the amount of sand displacement after each vehicle pass. In the experimental design the following parameters were important: vehicle size and weight, tire size and pressure, vehicle speed, orientation of the vehicle to the slope, slope angle, initial sand compactness, moisture content, and number of vehicle passes in the same track. Several of these variables were held constant, and the remainder were measured in the field as the number of passes in the test track was increased. Multiple linear regression analysis showed that the volume of sand displaced is related to slope angle, number of passes, and vertical compaction. Initial passes are the most significant in displacing sand, with subsequent impacts displacing progressively less sand per pass. Effects of ORVs on sand compaction and surface roughness in relation to swash processes is also being studied. Dyed sand and suspended sediment sampling experiments are being conducted in adjacent impact and control sites. Initial results indicate an accelerated loss of sand in the impacted areas, but continued testing is necessary to quantify this effect for comparison to natural rates of hydraulic sediment transport. These studies are being conducted to determine the effect of ORV-induced geomorphic disruption on a barrier beach.

THE CRYSTAL STRUCTURE OF SYNTHETIC WEEKSITE

ANDERSON, Christine A.F. and SMITH, Deane K., The Pennsylvania
State University, University Park, Pennsylvania 16802

Weeksite, $K(UO_2)_2(Si_2O_5)_3 \cdot 4H_2O$ occurs in nature as a secondary alteration product of uranium-bearing deposits. The Na, Cs analogue of weeksite was recognized in the complex assemblage of reaction products formed from the hydrothermal alteration of simulated nuclear waste form based upon a borosilicate glass formulation. It has also been identified as an interaction product between simulated nuclear wastes and crystalline silicate rocks. The cell dimensions of the pseudocell ($Z=2$ instead of $Z=16$) for this Na,Cs analogue of weeksite were determined by precession photographs to be $a_0 = 7.22(3)\text{\AA}$, $b_0 = 17.79(3)\text{\AA}$ and $c_0 = 7.10(3)\text{\AA}$. The space group was confirmed to be $Pnna$. The structure of weeksite consists of uranyl silicate chains extending parallel to c_0 cross-linked by silica tetrahedra. The alkali ions occupy the voids between the chains along a_0 , similar to the boltwoodite structure.

THE PAC HYPOTHESIS AND EPISODIC STRATIGRAPHY

ANDERSON, Edwin J., and GOODWIN, Peter W., Department of Geology,
Temple University, Philadelphia, Pennsylvania 19122

Application of the PAC Hypothesis to a stratigraphic analysis of the Helderberg Group demonstrates that the entirety of this sequence accumulated episodically in response to recurrent basin-wide events. Recognition of this non-gradualistic mode of accumulation is dependent upon selecting the appropriate scale of observations. At the scale of formations or members accumulation may appear gradual, but at the scale of PACs (1-5 meter thick upward-shallowing punctuated aggradational cycles) deposition was episodic. Not only is the PAC motif ubiquitous but there is virtually no record of gradual upward deepening within a PAC. Transgressive events occurred rapidly, producing sharp non-depositional surfaces which mark the boundaries of PACs. The basin-wide nature of these episodic events is demonstrated by tracing individual PACs and PAC sequences throughout the Helderberg Basin. The pervasiveness of the PAC motif in the diverse facies of the