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interpreted to be in a synformal remnant between Grenville age basement nappes deformed in the Alleghanian orogeny. A deep seated Taconic suture and the edge of the Grenville North American basement must be southeast of the NJ Coastal Plain. This implies that any post-Taconic terranes of the mid-Atlantic area must be thin skinned and accreted as rootless thrust slices, at least as far southeast as the NJ Coastal Plain. If the deep seated Taconic suture is along the hinge line of the Baltimore Canyon Trough, which has been proposed as the locus of the Alleghanian suture, then the process of crustal suturing may include the rather faithful reoccupation of a younger suture on an older one. The steeply dipping, through-to-mantle fault zone of 50 km width, which is characteristic of the hinge line suture, may include juxtaposed sutures of several orogenies.

№ 18406

LOWER TO MIDDLE CRETACEOUS SEISMIC STRATIGRAPHY IN NEW JERSEY COASTAL PLAIN INDICATES HIGH RATES OF SEA-LEVEL RISE IN ALBIAN AND TURONIAN

SHERIDAN, Robert E. and OLSSON, Richard K., Department of Geological Sciences, Rutgers University, New Brunswick, NJ, 08903

A seismic stratigraphic analysis of a vibroseis seismic reflection profile southeast of Buena, NJ reveals six lower and middle Cretaceous depositional sequences. The five lower sequences occur within the largely nonmarine Potomac Group. The lowermost sequences onlapping the basement reflector at 1.1 sec contain highstand alluvial deposits. The deepest sequence is correlated with the Valanginian (LZB-2.1, Haq et al., 1987). A strong reflector marking the top of the second sequence is a type 1 unconformity corresponding to an Aptian-Barremian lowstand event (LZB-3.5/4.1). The strong reflector at the top of the third sequence is correlated with the Albian-Aptian type 1 unconformity (LZB-4.2/UZA-1.1). Highstand alluvial deposits in this sequence are indicated by coastal onlap. The reflector at the top of the fourth sequence is correlated with an upper Albian type 1 unconformity (UZA-1.5/2.1). Coastal onlap on the western part of the line indicates highstand alluvial deposits whereas downlap to the east indicates marginal marine deposits. The type 1 unconformity (UZA-2.3/2.4) above the upper Albian inner shelf deposits marks the middle Cenomanian lowstand event. Only transgressive onlap is seen in this sequence. The sixth sequence, upper Cenomanian-Turonian, is separated from the Coniancian(?) by a strong reflector which marks the UZA-2.7/3.1 unconformity and the late Turonian lowstand. Downlap of highstand shelf deposits is evident in the sequence above coastal onlap of sand facies at the base. The two sequences with highstand downlap tracts preserved, Albian and Turonian, document times when global sea-level was rising at a relatively higher rate, as compared to sequences with only coastal onlap preserved. This agrees with the long-term eustatic curve of Haq et al., 1987 and is further verification of the curve's value.

№ 15150

SUBBOTTOM ACCOUSTIC PROFILING OF LAKES: A TOOL FOR DETECTING PALEOSEISMICITY

SHILTS, William W., Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, K1A 0E8

Portable subbottom profiling systems, operating at 7kH$_Z$ frequency, have been deployed on over 150 Canadian lakes in a variety of geological settings. In lakes known to have been damaged by strong (m >6) historic earthquakes and in a limited number of lakes in areas both with and without historic records of seismic activity, distinctive bottom morphologies and sediment associations reflect slope failures on basin sides. A major objective of this research is to differentiate sediment disturbance due to seismic shock from the effects of several other processes that can cause similar appearing features. Shoreline erosion and sedimentation, groundwater sapping, deltaic processes, late-glacial sedimentation and ice-block collapse processes, etc. may create bottom morphologies that are difficult to distinguish from those generated by seismic shocks or by faulting.

Two major morphosedimentological features have been found to be particularly common in lakes known or suspected to have been damaged by seismic shocks: (1) hummocky bottom topography or multiple, hummocky, accoustically non-laminated units are related to subaqueous sediment flows or to subaerial landslides of various types of debris onto a normally smooth or gently undulating lake floor; (2) hummocky topography related to dissection of accoustically laminated sediments, presumably by debris or sediment flows. If one or both of these features are widespread in a lake or in several neighboring lakes, and if they tend to originate from one side of the lake preferentially, regardless of shoreline geology, it is probable that they were created by seismic shock.

№ 10694

ICHNOSTRATIGRAPHY OF THE JACKSONWALD SYNCLINE: THE LAST 7 MILLION YEARS OF THE TRIASSIC

SILVESTRI, ShayMaria, Department of Geological Sciences, Rutgers University, Newark, N.J. 07102; and OLSEN, Paul E., Lamont-Doherty Geological Observatory, Palisades, N. Y. 10964

Reptile footprint-bearing lake-margin facies are especially well developed in the Jacksonwald syncline of the southwestern Newark basin. Footprint-bearing intervals occur in the regressive portions of most Van Houten cycles, which are caused by the 21,000 year cycle of the precession of the equinoxes. Sampling of footprint assemblages from this common ichnofacies through the upper Passaic Formation in the syncline, documents the large-scale ecologically important change in reptile lake-margin communities towards and through the Triassic-Jurassic boundary.

The oldest well-sampled assemblage comes from a prominent black and gray lacustrine sequence in Douglasville, Pa. Most abundant is the quadrupedal dinosaurian ichnite *Atreipus*; other forms present include *Grallator* (*Grallator*) sp., *Brachychirotherium parvum*, *Brachychirotherium* sp., *Rhynchosauroides brunswickii*, and *Gwynnedichnium* sp. This assemblage is almost identical to those from the basal Lockatong Formation, some 16 million years older. However, also present is the oldest occurrence of the crocodilian track *Batrachopus* sp., an ichnotaxon abundant in the Jurassic. Younger Triassic horizons record an apparent increase in the abundance of *Grallator* spp., however, these layers are as yet poorly sampled.

Footprints from between the two pollen-bearing horizons which define the Triassic-Jurassic boundary comprise a *Grallator* -dominated assemblage with abundant *Rhynchosauroides* sp. and *Batrachopus*. This assemblage is identical to several from just below the Orange Mt. Basalt near Montclair and Clifton, N.J. Post-Orange Mt. Basalt assemblages from many localities differ from these by the addition of *Anomoepus* and a great reduction in the abundance of *Rhynchosauroides*.

While as yet insufficiently sampled, the footprint bearing intervals of the Jacksonwald syncline do show the elimination of the Lockatong-lower Passaic *Atreipus*-dominated association and its replacement by a *Grallator*-dominated one, composed of survivors. Further sampling of these new localities should refine our knowledge of the rate and time at which this transition took place.

№ 18281

FABRICS DIAGNOSTIC OF AMPHIBOLITE GRADE DEFORMATION AND RELATIVE STRAIN RATES VS. RECRYSTALLIZATION RATES IN QUARTZ-FELDSPAR MYLONITES

SIMPSON, Carol, & GOWER, Robert J.W., Department of Earth & Planetary Sciences, The Johns Hopkins University, Baltimore, MD 21218.

Mylonite fabrics formed at amphibolite grade in quartz-feldspar protolith rocks vary significantly from those formed at greenschist grade. Although absolute recrystallization rates ($\dot{R}$) and strain rates ($\dot{\varepsilon}$) are not yet tractable in naturally deformed rocks, there are a number of diagnostic criteria that give important information on relative rates. Examples are illustrated from the Port Deposit gneiss (MD), the Maggia gneiss (Alps), the Parry Sound shear zone (Canada), and the Santa Rosa mylonite (CA).

With the onset of dynamic rotational recrystallization in feldspar at temperatures above ca. 450°C, small (<10μm) recrystallized grains are swept away from the mantles of their more rigid host megacrysts to form distinctive feldspar-rich bands in a recrystallized quartz ribbon matrix. At temperatures near 450°C and low bulk strains, these recrystallized feldspar bands are only a few grains wide and grains are commonly irregular but roughly equant in shape. The extremely small grain size of the new strain-free feldspar grains appears to allow a switch to grain boundary sliding in these bands which would in turn permit local strain rate increases. Quartz deformed under these conditions shows well recovered preferred grain shape and lattice fabrics that are always asymmetrical in rotational strain regimes. With slight increase in deformation temperature, or increase in $\dot{R}$ to exceed $\dot{\varepsilon}$, recrystallized feldspar grains, typically <20μm long, may also carry an asymmetrical grain shape fabric as grain boundary migration recrystallization begins to play a more prominent role. Feldspar bands broaden as subgrain and recrystallization grain size increase with higher temperature and lower applied stresses.

K-feldspar megacrysts commonly display strain-related myrmekite formation on sides facing the maximum shortening direction in mylonites formed at ca. 500-550°C (Simpson & Wintsch 1989). These plagioclase and quartz aggregates are useful as kinematic indicators and may also be used to estimate relative $\dot{\varepsilon}$ and $\dot{R}$. Where syntectonic deflection of myrmekitic textures is preserved around clast margins and matrix myrmekite is still present, $\dot{\varepsilon}>\dot{R}$. Where all plagioclase and quartz from strain-related myrmekite is polygonally recrystallized, $\dot{R}>\dot{\varepsilon}$.

In ultramylonites formed at amphibolite grade, $\dot{\varepsilon}>\dot{R}$ is manifest by porphyroclasts with no visible tails or by delta grains. Where $\dot{R}>\dot{\varepsilon}$, polygonal recrystallization and recovery of all feldspar and quartz grains seldom produces grain shape fabrics in either mineral unless grain boundaries are pinned by micas or amphiboles.

№ 14254

A MAGMATIC PERSPECTIVE OF THE ACADIAN OROGENY.

SINHA, A. Krishna, HOGAN, John P., JURINSKI, Joe B., and WAYNE, David, M., Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA. 24061

In multiply deformed and metamorphosed orogens, the separation in time and space of a specific orogeny is a challenging task. We have chosen to apply data on the distribution and ages of igneous rocks (mostly plutonic) to define the spatial and temporal framework of the Acadian Orogeny. On a regional basis (from Alabama to Maine) plutonic rocks of undisputable Siluro-Devonian age define two thermal axes. The western belt is characterized by granitoids of peraluminous affinities, while the easterly belt is represented by a bimodal (gabbro-granite) igneous assemblage. The plutons in the western overthrust belt of the southern Appalachians have been modelled to be the result of delayed decompressional melting (Sinha et. al., 1988) and may be analogous to those in the northern Appalachians (Zen, pers. comm.) as represented by the thermal axis along the Merrimack-Central Maine synclinorium. These plutons of "Acadian" age are related to melts being generated in zones of significant crustal thickening formed by overthrusting during the Taconic Orogeny, and may not be indicators of terrane boundaries associated with suturing of plates during the Acadian Orogeny. In contrast, the igneous rocks associated with the eastern thermal axis [Charlotte Belt in the south, the Coastal Maine Magmatic Province (CMMP) and equivalents in the north] are considered to be the result of strike-slip accretion of Avalon terrane(s). Early plutons (Silurian) in the CMMP are characteristically bimodal and require a transtensional enviroment. In contrast, early-middle Devonian magmatism is dominantly felsic, voluminous, anhydrous and requires an underplating of the crust by mafic magmas during a transpressional event within the Acadian Orogeny.

The recognition of two distinct methods of generating contemporaneous felsic magmatism during "Acadian" times requires a more thorough evaluation of the preceeding orogeny, as well as an assement of igneous rocks as markers of terrane boundaries.