EARLY PALEOZOIC SOUTHERN MARGIN OF NORTH AMERICA

№ 104203

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The Alabama (southern Appalachian) promontory and Ouachita embayment of the late Precambrian-early Paleozoic southern margin of North America reflect a northwest-trending transform offset of a northeast-trending rift. The northwest-trending Southern Oklahoma aulacogen is interpreted as the expression of inboard propagation of the transform fault from the Ouachita embayment (in contrast to earlier interpretations as the failed arm of a triple junction). In Oklahoma, Early and Middle Cambrian gabbros, granites, and rhyolites are unconformably overlain by the transgressive Late Cambrian Reagan Sandstone and younger carbonate rocks. In the southern Appalachians (present Blue Ridge outcrops), late Precambrian sedimentary and volcanic rift-fill rocks (Ocoee, Mt. Rogers, Grandfather Mountain, Mechum River, Catoctin) are overstepped by Early Cambrian sandstones (Chilhowee), defining a post-rift unconformity. The time of transition from rift to passive margin is constrained by the Early Cambrian age of the post-rift unconformity; however, extensional faulting of basement rocks and accumulation of graben-fill clastic sediments continued through Middle Cambrian time along the Rome-Rough Creek-Mississippi Valley graben system and the Birmingham basement fault system inboard from the passive margin. The southern Appalachian rift and inboard basement fault systems, as well as a northwest-trending transform propagating to the Southern Oklahoma aulacogen, are consistent with northwest-southeast extension. Differences in ages suggest a spreading-center shift from the southern Appalachian rift along the transform to the Ouachita rift in the Early Cambrian. Early and Middle Cambrian extension at the Ouachita rift is suggested by the age of igneous activity along the transform. Northeast of the transform, Early and Middle Cambrian extension continued along the Iapetus Ridge outboard from the southern Appalachian passive margin, but minor extension is reflected in the inboard fault systems.

HYDROTHERMAL PRECIPITATES FROM A BLACK SMOKER VENT, TAG AREA, MID-ATLANTIC RIDGE 26°N

№ 104473

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In July of 1985 the first ever recovery of polymetallic sulfides were made from an active black smoker hydrothermal vent site on the Mid-Atlantic Ridge. Precipitates recovered in a dredge haul include polymetallic sulfides, oxides, sulfates, carbonates and chlorides. The predominant chimney fragments are made up of pyrite, chalcopyrite and lesser amounts of sphalerite often showing zonation as replacement textures. Pyrrhotite was not observed. Amorphous iron oxide is abundant in the dredge haul and probably represents much of the talus on the broad basal mound supporting the chimneys and observed in video coverage of the vent field. Other phases recovered include anhydrite, gypsum, quartz, amorphous silica, calcite, atacamite, paratacamite and marcasite. Aragonite is a common phase infilling many of the cavities in the chimney fragments. Chemically Fe, Cu, Zn and S predominate; Mn, Co, Ni, and Pb only occur in amounts less than 0.1% wt. Ag occurs in amounts up to a few hundred ppm particularly with Zn and Cu-rich phases. The bulk of the samples show a paragenesis as primary precipitates in chimney-like structures from hydrothermal solutions in excess of 300°C. Many appear to have reached a mature or dying stage and flow channels are infilled with phases such as aragonite and amorphous silica. Partial oxidation of many samples has occurred.

ADIRONDACKS-GEORGES BANK (TRANSECT E-1): WHERE DO WE GO FROM HERE?

№ 91847

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Geologic and geophysical maps and profiles have been prepared from the Grenville terrane of the North American Craton to the ocean floor off Georges Bank. One of the principal problems offshore is the paucity of data on the pre-Mesozoic geology. The southwestward extension, into this area, of the Meguma terrane of Nova Scotia, is, for example, highly speculative, however plausible. On land there is much disagreement and controversy concerning the nature and significance of specific contacts, a not-unusual problem in metamorphic terranes. More broadly, however, we must emphasize the difficulty of sorting out features of the various Paleozoic orogenic events that now overlap one another spatially. The northwestern limits of Taconian deformation, metamorphism and plutonism are fairly clear, but the corresponding limits for the Acadian and Alleghenian events are not easily located. Even the nature of the sedimentary basins that existed during the Taconian-Acadian interval needs much clarification. Did Iapetus still exist then -- or was it reduced to a series of restricted basins of lesser extent? Much of the extant radiometric geochronology dates the emplacements of plutonic masses. More work of this kind is needed on the volcanic terranes, particularly those in areas of poor biostratigraphic control, and more needs to be done in dating the several metamorphic belts and their P-T-T histories. The reason for the gravity anomaly along the Green Mountain axis could probably be determined by deep drilling.

ADIRONDACKS TO GEORGES BANK: TRANSECT E1 IN A TRANSITION

№ 108682

THOMPSON, James B., Jr., Dept. Geol. Sci., Harvard Univ., Cambridge, MA 02138; BOTHNER, Wallace A., Dept. of Earth Sci., Univ. NH, Durham, NH, 03824; ISACHSEN, Yngvar W., New York Geol. Surv., Albany, NY, 12230; KIDD, William S.F., Dept. Geol. Sci. SUNY, Albany, NY, 12272; KLITGORD, Kim, D., USGS, Woods Hole, MA, 02543; LYONS, John B., Dept. Earth Sci., Dartmouth College, Hanover, NH, 03755; ROBINSON, Peter, Dept. Geol. Geog., U. Mass., Amherst, MA 01003; SCHLEE, John S., USGS, Woods Hole, MA 02543

The rifting and passive-margin histories of The Appalachian System during the Mesozoic and (so far as we know it) earlier during the late Proterozoic and early Paleozoic appear to be much the same from north to south. The active-margin history however, from the mid-Ordovician to the formation of Pangaea in the Permian, shows marked differences between the various segments, although features such as the Blue-Green-Long (BGL) axis, and certain gravity and magnetic anomalies, are through-going. Evidence for an Acadian event is strong in New York, northern New England and Maritime Canada, but is less conspicuous farther south. The Alleghenian deformation of the Valley and Ridge province dies out northward. The last traces of it are possibly found east of the Catskills in the area of this transect. In Canada, by contrast, a flat-lying veneer of Late Devonian and Carboniferous strata overlies earlier Paleozoic deformed rocks of the New Brunswick platform. The BGL axis first became active in the Taconian and coincides in location with a prominent gravity high extending from the Long Range of Newfoundland to the Green Mountains of Vermont. Farther south this gravity high lies progressively farther southeast of the BGL axis so that the separation of the two features is some 60 km in the central and southern Appalachians. Some of us suggest that this separation may be the result of late Paleozoic, low-angle thrusting. The above phenomena are consistent with the consolidation of Laurasia as a single landmass during the Devonian. Northern Iapetus had then closed, but its southern part did not close until the end of the Paleozoic.

ECOLOGICAL REINTERPRETATION OF THE DYSAEROBIC LEIORHYNCHUS FAUNA: GENESEO BLACK SHALE, CENTRAL NEW YORK

№ 89886

THOMPSON, Joel B. and NEWTON, Cathryn R., Dept. of Geology, Syracuse Univ., Syracuse, NY 13244

The anomalous Leiorhynchus fauna of the Upper Devonian Geneseo Shale, formerly considered an epiplanktonic biota, is here reinterpreted as a gregarious and opportunistic epifaunal suspension feeding assemblage that inhabited dysaerobic environments within the Appalachian basin. This reinterpretation is based on detailed petrography, x-radiography, scanning electron microscopy, paleoecologic, and organic analyses of the upper portion of the Geneseo Shale. The majority of the Leiorhynchus are articulated and preserved as primary calcite with only minor distortion due to compaction. Abundant Leiorhynchus occur in aggregates or clumps with a mean density of 13.9 individual/m^2. The Leiorhynchus also strongly appear to be aligned to some sort of weak current within the basin. The mean beak direction of Leiorhynchus is $\bar{a}_{beak} = 42^{o}$, whereas, the mean hinge direction is $\bar{a}_{hinge} = 122^{o}$ or 302^{o}. The presence of a weak current is also supported by small scale cross-laminations and small starved ripples in silty layers. The abundant Leiorhynchus zone also correlates with the highest measured weight percent organics (5.97%) within the section.

These suspension feeding gregarious brachiopods may have obtained some benefit from occupying the fringes of these ancient oxyclines. Water-mass stratification makes probable the development and propagation of internal waves and their interaction with sediments at sites where the waves strike the sea-floor (Woodrow, 1985). Material suspended by these internal waves probably contained abundant organic matter and bacteria that accumulated on the fringes of these boundaries, thereby, creating an ideal situation for gregarious opportunistic suspension feeding taxa that are capable of withstanding lower oxygen levels.

5 **Susan Garbini*:** INCORPORATING EARTH SCIENCE INFORMATION INTO THE PUBLIC POLICY PROCESS [108346] ..... 2:45 P

6 **Julie H. Bichteler*:** END USER DATABASE SEARCHING IN GEOSCIENCE [104435] ..... 3:10 P

7 **Alison M. Lewis*:** GEOSCIENCE INFORMATION: USER NEEDS AND LIBRARY ORGANIZATION [104437] ..... 3:35 P

MSA SYMPOSIUM: CRYSTAL-LIQUID REACTIONS IN GRANITES AND MIGMATITES
Fiesta A/B Room, Convention Center, 1:00 P.M.

R. J. Tracy and J. Alex Speer, Presiding

1 **Robert J. Tracy*:** MODELLING THE RESIDUUM FROM FORMATION AND EXTRACTION OF PARTIAL MELTS IN PELITES [104418] ..... 1:00 P

2 **Sakiko N. Olsen*:** COMPOSITIONAL TREND AND INFERRED REACTIONS IN LEUCOSOMES AND MINOR K-RICH GRANITIC BODIES IN MIGMATITES OF COLORADO FRONT RANGE [104422] ..... 1:20 P

3 **Eileen L. McLellan*:** NATURAL EXAMPLES OF THE ROLE OF BIOTITE DURING ANATEXIS OF AMPHIBOLITES--PRODUCTION OF GRANITIC VS. TONALITIC MELTS [104421] ..... 1:40 P

4 **J. A. Grant*, B. R. Frost:** DECOMPRESSION, METAMORPHISM AND MELTING IN THE AUREOLE OF THE LARAMIE ANORTHOSITE COMPLEX [104419] ..... 2:00 P

5 **William B. Size*:** SHEAR-CONTROLLED INCIPIENT MATRIX MELTING IN MIGMATITE [98144] ..... 2:20 P

6 **Steven B. Shirey*, Gilbert N. Hanson:** HIGH-SILICA DACITE AND RHYODACITE FROM THE RAINY LAKE AREA, ONTARIO: MELTING OF TONALITIC CRUST DURING GRANITE-GREENSTONE BELT FORMATION [104416] ..... 2:40 P

COFFEE BREAK ..... 3:00 P

7 **J. Alexander Speer*:** EVOLUTION OF MAGMATIC AFM MINERAL ASSEMBLAGES IN GRANITOID ROCKS: THE Hbl+Liq=Bt REACTION OF THE LIBERTY HILL PLUTON, SOUTH CAROLINA [86329] ... 3:20 P

8 **Edward D. Young*, Andrew Barth, J. Lawford Anderson:** APPLICATION OF THE GIBBS METHOD TO ANALYSIS OF LIQUID-SOLID PHASE EQUILIBRIA IN IGNEOUS SYSTEMS [102149] ..... 3:40 P

9 **John P. Hogan*, M. P. Dickenson:** APPLICATION OF REACTIONS SPACE TO THE CRYSTALLIZATION OF MUSCOVITE-BIOTITE±GARNET GRANITES [104424] ..... 4:00 P

10 **Calvin F. Miller*, Robert P. Rapp, E. Bruce Watson:** AFM MINERAL-FELSIC LIQUID PHASE RELATIONS: POTENTIAL FOR ELUCIDATION OF THE ORIGIN AND EVOLUTION OF FELSIC MAGMAS [106174] ..... 4:20 P

11 **C. K. Shearer*, J. J. Papike, C. K. Larive, J. C. Laul:** MINERALOGICAL AND CHEMICAL EVOLUTION OF A GRANITE-PEGMATITE SYSTEM: EVIDENCE FROM THE CRYSTAL CHEMICAL BEHAVIOR OF BIOTITE [93398] ..... 4:40 P

SYMPOSIUM: HIGH PORE PRESSURE IN ACTIVE TECTONIC REGIMES
Centro Room, Convention Center, 1:00 P.M.

John D. Bredehoeft and Denis Norton, Presiding

1 **Denis Norton*:** FLUID PRESSURE VARIATIONS IN THE NEAR-FIELD REGION OF MAGMAS [104302] ..... 1:00 P

2 **Spencer R. Titley*:** THE EVOLUTION OF FRACTURE PERMEABILITY IN FOSSIL HYDROTHERMAL SYSTEMS [104313] ..... 1:15 P

3 **John V. Walther*, Bernard J. Wood:** FLUID DYNAMICS DURING PROGRESSIVE METAMORPHISM [86531] ..... 1:30 P

4 **Harold C. Helgeson*:** EFFECTS OF COMPLEX FORMATION ON THE HYDROTHERMAL SOLUBILITIES OF MINERALS AS A FUNCTION OF FLUID PRESSURE AT HIGH TEMPERATURE [108527] ..... 1:45 P

5 **Hugh P. Taylor, Jr.*:** 18 O/16 O EVIDENCE FOR DEEP CIRCULATION OF SURFACE WATERS AND FORMATION OF LOW-18 O MAGMAS IN REGIONAL RIFT-ZONE HYDROTHERMAL ENVIRONMENTS [104309] ..... 2:00 P

6 **Stephen M. Wickham*, Hugh P. Taylor, Jr.:** HYDROTHERMAL SYSTEMS ASSOCIATED WITH LOW-PRESSURE REGIONAL METAMORPHISM AND CRUSTAL ANATEXIS IN THE PYRENEES [104310] ..... 2:15 P

COFFEE BREAK ..... 2:30 P

7 **P. A. Domenico*, V. V. Palciauskas:** ROLE OF MATERIAL PROPERTIES IN ASSESSING FLUID PRESSURE GENERATION AND DISSIPATION IN ACTIVE DEPOSITIONAL BASINS [104307] ..... 2:50 P

8 **Amos Nur*:** TIME DEPENDENT HYDRAULICS OF THE CRUST [109690] ..... 3:05 P

9 **T. J. Shankland*, M. E. Ander:** EVIDENCES FOR DEEP CRUSTAL POROSITY FROM ELECTRICAL CONDUCTIVITY [104314] ..... 3:20 P

10 **Jack E. Oliver*:** COCORP AND FLUIDS IN THE CRUST [104312] ..... 3:35 P

11 **Terry Engelder*, Craig M. Bethke:** REEXAMINATION OF THE GULF COAST MODEL USED BY THE RUBEY-HUBBERT HYPOTHESIS FOR THRUST BELT TECTONICS [87733] ..... 3:50 P

12 **Peter Vrolijk*, Georgiana Myers:** FLUID ESCAPE FROM THE KODIAK ACCRETIONARY COMPLEX, ALASKA [90674] ..... 4:05 P

13 **John D. Bredehoeft*, Steven E. Ingebritsen:** MANTLE DEGASSING AND THE GENERATION OF HIGH PORE PRESSURE [104305] ..... 4:20 P

SYMPOSIUM: NORTH AMERICAN CONTINENT-OCEAN TRANSECTS PROGRAM--ATLANTIC, ARCTIC, AND GULF TRANSECTS
South Banquet Room, Convention Center, 1:00 P.M.

R. C. Speed and D. W. Rankin, Presiding

1 **R. C. Speed*, D.W. Rankin:** NORTH AMERICAN CONTINENT-OCEAN TRANSECT PROGRAM: ATLANTIC, GULF, AND ARCTIC TRANSITIONS: INTRODUCTION [92534] ..... 1:00 P

2 **J. F. Sweeney*:** THE ARCTIC CONTINENT-OCEAN TRANSITION: TRANSECT G [104188] ..... 1:10 P

3 **Harold Williams*, Charlotte Keen:** CONTINENT-OCEANS TRANSECTS D1-4: DEEP STRUCTURE OF THE NORTHEAST EXTREMITY OF THE APPALACHIAN OROGEN [104275] ..... 1:30 P

4 **D. B. Stewart*, J. D. Unger, J. D. Phillips, J. H. Luetgert, D. R. Hutchinson, A. M. Trehu, K. D. Klitgord, C. P. Spencer, A. G. Green, W. A. Bothner:** CONTINENT-OCEAN TRANSECT FROM QUEBEC CITY, QUEBEC, TO SOUTH OF GEORGE'S BANK [104185] ..... 1:50 P

5 **James B. Thompson, Jr.*, Wallace A. Bothner, Yngvar W. Isachsen, William S.F. Kidd, Kim D. Klitgord, John B. Lyons, Peter Robinson, John S. Schlee:** ADIRONDACKS TO GEORGES BANK: TRANSECT E1 IN A TRANSITION [108682] .... 2:10 P

6 **A. A. Drake, Jr.*, J. A. Grow, N. M. Ratcliffe, R. T. Faill, W. Manspeizer, D. R. Hutchinson, K. D. Klitgord, W. E. Bonini:** PHANEROZOIC GEOLOGIC HISTORY OF CONTINENT-OCEAN TRANSECT E-2: N.Y. APPALACHIAN BASIN TO BALTIMORE CANYON TROUGH [104189] ..... 2:30 P

COFFEE BREAK ..... 2:50 P

7 **Lynn Glover III*, Kim Klitgord, J. K. Costain, C. Coruh, S. S. Farrar, N. Evans, L. Pavlides, R. B. Mixon, M. J. Bartholomew:** GEODYNAMICS TRANSECT E-3: PITTSBURG, PA - WASHINGTON, D.C. - BALTIMORE CANYON TROUGH [107810] ..... 3:10 P

8 **D. W. Rankin*, K. C. Bayer, D. F. Black, S. E. Boyer, J. R. Butler, D. L. Daniels, W. P. Dillon, D. W. Elliott, R. Goldsmith, J. A. Grow, J. W. Horton, Jr., D. R. Hutchinson, K. D. Klitgord, R. C. McDowell, R. C. Milici, D. J. Milton, J. P. Owens, J. D. Phillips:** INTERPRETATION OF THE CONTINENT-OCEAN TRANSITION AS SEEN IN GEODYNAMICS TRANSECT E-4 [107378] ..... 3:30 P

9 **Robert D. Hatcher, Jr.*, D. T. Secor:** TECTONIC ELEMENTS AND CRUSTAL STRUCTURE IN THE VICINITY OF THE DNAG E-5 TRANSECT, TENNESSEE, CAROLINAS, GEORGIA AND CONTINENTAL MARGIN [108021] ..... 3:50 P

ABSTRACTS WITH PROGRAMS, VOL. 18, NO. 6, 1986 ANNUAL MEETING

ABSTRACTS with PROGRAMS 1986

99th ANNUAL MEETING AND EXPOSITION

GEOLOGICAL SOCIETY OF AMERICA

Meeting with the Associated Societies

The Paleontological Society (78th)
The Mineralogical Society of America (67th)
The Society of Economic Geologists (65th)
Cushman Foundation (36th)
Geochemical Society (31st)
National Society of Geology Teachers (27th)
Geoscience Information Society (21st)

San Antonio℠

November 10–13, 1986
San Antonio Convention Center
San Antonio, Texas

ISSN 0016-7592