ships. This is in contrast to tectonic interpretations based on evidence from Maine, which invoke an east-dipping subduction zone beneath a composite Avalon Terrane.

18-4 **BTH 11** Short, Heather

STRAIN PARTITIONING IN A TRANSPRESSIVE OROGEN, CENTRAL COASTAL MAINE

SHORT, Heather and JOHNSON, Scott, Department of Geological Sciences, Univ of Maine, Orono, ME 04469, heather.short@umit.maine.edu

Recent field, microstructural and chronological studies of Silurian and pre-Silurian rocks in the area between Waterville and Belfast, Maine, have identified a region of intense Devonian-age dextral shear strain that was focused in the older Liberty/Orrington (L-O) belt and adjacent younger rocks of the Fredericton Trough. This focused zone of dextral shear coincides with exposures of older gneisses, metavolcanics and metapelites that record a regional metamorphic high. Both the shear strain and metamorphic grade taper off to the northwest in the Central Maine Sequence (CMS) metapelites.

In Waterville, tight, upright, gently- to moderately-plunging folds are spatially associated with a dextral shear fabric. Limbs of these folds are moderately asymmetrically boudinaged, and carbonate veins filling the boudin necks contain curved fibers of calcite and have associated "flanking structures" along their margins that formed during dextral rotation of the veins about a steeply plunging axis. Further east, approaching the Hackmatack Pond Fault (HPF), pelitic slivers contain spiral garnet porphyroblasts. Evidence for the dextral shear deformation is pervasive from the HPF east to the Sennebec Pond Fault and includes strong asymmetric boudinage of competent layers and quartz veins, a strong vertical foliation with gently plunging mineral elongation lineations, and mylonites with strongly asymmetric fabrics. Upright folds seen in the CMS are preserved only locally in relatively competent units.

With the effects of contact metamorphism superficially removed, metamorphic grade jumps from garnet grade in the CMS rocks to sillimanite grade in the L-O rocks across the HPF, possibly indicating some later movement along this fault. Kyanite occurs locally along the east side of this fault, though it is commonly partially replaced by cordierite. This suggests that the kyanite was formed during a pre-Devonian metamorphism, or that metamorphic conditions in these rocks changed markedly during the Devonian. The above observations are consistent with Devonian-age transpression in south-central Maine.

18-5 **BTH 12** Eastler, Thomas E.

WHERE IN MAINE IS THE DOG BAY LINE?

EASTLER, Thomas E., REUSCH, Douglas N., and GIBSON, David, Natural Sciences, Univ of Maine at Farmington, 173 High Street, Farmington, ME 04938, eastler@maine.edu

An Acadian suture has been difficult to pin-point in the Northern Appalachian orogen. Recognized in 1992, the Dog Bay Line is a significant boundary within the Newfoundland Exploits subzone that separates a Silurian sequence linked to Laurentia from a contrasting Silurian sequence to the southeast (Williams et al., 1993). Northwest of the line, Ordovician through Lower Silurian turbidites and marine conglomerates (Badger Group) underlie terrestrial volcanic rocks and sandstones (Botwood Group); to the southeast, shallow marine shales and limestones underlie red sandstones (Indian Islands Group). Structures along the line indicate that the sequences were juxtaposed via dextral transpression prior to ~420 Ma, and the Dog Bay Line may mark the site of final closure of the Iapetan seaway.

In New England, van Staal et al. (1998) suggested that the Dog Bay Line occupies a medial position within the Central Maine basin. The northwesterly Rangeley sequence, which may extend as far southeast as Skowhegan, has been tied to Silurian Laurentia, and volcanic and sedimentary rocks (The Forks Formation) are comparable to the Botwood Group. To the southeast, Silurian strata (Sangerville and Waterville Formations) include ribbon limestones, shales, turbidites, and polymictic conglomerates that at best loosely correlate with the Indian Islands Group. In Farmington, centrally located and close to the proposed trace of the Dog Bay Line, highly disrupted shales contain isolated boulder-sized sandstone blocks; in Athens, on strike to the northeast, an isolated small body of volcanic rocks is also a candidate for a block in Silurian mélange. The ribbon limestone-shale-turbidite-conglomerate-mélange assemblage may record pre-Late Silurian accretion, and all strata in the region display evidence of dextral transpression. 1:24 000 scale mapping, supplemented by comparative volcanic geochemical and sediment provenance studies across and along strike, are planned to test the hypothesis that the Farmington-Athens "line" correlates with the type Dog Bay Line in Newfoundland and represents the Acadian suture in Maine.

18-6 **BTH 13** Schoonmaker, Adam

TECTONIC SETTINGS OF ORDOVICIAN AND DEVONIAN MAFIC ROCKS NEAR CHESUNCOOK LAKE, NORTHERN MAINE

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Field relationships and geochemistry of the Bean Brook Gabbro and equivalents (Boom House Gabbro) indicate a correlation with the Ordovician Dry Way Volcanics at the Ripogenus Dam, northern Maine. The gabbros (K/Ar age 472.5 Ma) intrude the Hurricane Mountain Mélange and related Cambrian sedimentary strata, but are conspicuously absent above the Taconic unconformity at the base of the Siluro-Devonian. This temporal distribution of gabbros is similar to that seen in the Ordovician section of the Exploits Terrane and Dunnage Melange in Newfoundland. Geochemical tectonic discrimination and trace element patterns of Ordovician and Devonian basalts (Dry Way and West Branch), and Ordovician gabbros (Bean Brook and Boom House), indicate that all were geochemically influenced by subduction-related sources. Ordovician basalts and gabbros range from tholeiitic arc to calc-alkaline arc on Th/Ta/Hf/3 and Ta/Yb vs Th/Yb diagrams. Trace element diagrams of the Ordovician lavas and gabbros show low amounts of enrichment of the incompatible trace elements (relative to N-MORB) with a consistent Nb-anomaly suggesting that the Bean Brook and Boom House Gabbros are genetically related to the nearby Dry Way volcanics. REE patterns for the Bean Brook and Boom House gabbros and Ordovician Dry Way volcanics all show similar flat patterns, although at elevated concentrations (relative to chondrite), inconsistent with a direct MORB origin. These magmas could be the result of a ridge subduction event, or early stage arc formation.

The Devonian volcanics were erupted in a rapidly subsiding basin dominated by fine-grained mudrocks and subsequently overlain by the Acadian Seboomook Flysch. This suggests that these basalts may have been erupted on the outer trench slope of a subducting plate. The basalts show a significant Nb-anomaly but are strongly calc-alkaline-to-shoshonitic, consistent with either a volcanic arc or a within-plate origin. REE patterns are highly elevated (relative to chondrite) and show a negative slope also consistent with a volcanic arc or within-plate setting, or with melting of a slab-enriched lithosphere source during an early stage of the Acadian collision.

18-7 **BTH 14** Gerbi, Christopher

THE CHAIN LAKES MASSIF, MAINE AND QUÉBEC: A PRODUCT OF EXTENSION?

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The origin and history of the Chain Lakes massif, which lies within the axial zone of the northern Appalachian orogen, is uncertain, and many models attempt to explain its role in Appalachian orogenesis. Based on our recent work, we suggest that the most likely scenario includes the protolith of the Chain Lakes massif as a sedimentary deposit laid down on extending Grenville(?) crust. Possibly as a consequence of continued extension, the massif partially melted at low pressure (approximately 4 kb) during the Ordovician. Following metamorphism, intrusion of arc-related plutons, and cooling, the massif remained relatively rigid during regionally extensive middle Paleozoic contractional events.

The southern half of the Chain Lakes massif contains relatively abundant exotic clasts and a widespread subhorizontal to shallowly-dipping compositional banding defined predominantly by sillimanite-biotite lenses. Many of these lenses contain isoclinal microfolds defined by sillimanite (fibrolite). The quartzofeldspathic matrix is granofelsic; no penetrative foliation is present. We interpret well-defined leucosomes containing plagioclase, K-feldspar, and quartz as fossil melt. Pseudomorphs of andalusite, garnet, and possibly cordierite are sporadically present, and there is no clear systematic variation in metamorphic grade across the massif. In places along and near the southern border of the massif, subvertical shear zones up to a few meters wide overprint the compositional banding. We attribute these shear zones to Devonian deformation. The northern half of the massif is dominantly massive, with xenoliths set in a granofelsic matrix. We interpret these rocks as anatectic products, possibly related to the partial melting evident in the southern half of the massif.

The above observations are most consistent with petrogenesis in an extensional setting. If it formed during extension, the massif records little evidence related to the collisional history of the Laurentian margin. Thus, although it may have been a microcontinental fragment that accreted to Laurentia in the Ordovician or later, the Chain Lakes massif could equally well represent an extended portion of the Laurentian margin.

18-8 **BTH 15** Lim, Chul

STRAIN HISTORY AND FLUID INCLUSIONS OF VEINS IN THE TACONIC FLYSCH AND MELANGE OF NEW YORK AND VERMONT

LIM, Chul, HOWE, Stephen S., and KIDD, William S.F., Dept of Earth and Atmospheric Sciences, University at Albany, 1400 Washington Ave, Albany, NY 12222-0100, cl0250@csc.albany.edu

Ordovician shales and greywackes (flysch) deposited in the foreland basin of the Taconic thrust system comprise a deformed belt of faulted and folded rocks, or more highly disrupted melange, adjacent to the Champlain Thrust and the Taconic Allochthon. This deformed flysch/melange belt was produced during transport of the Taconic allochthon, caused by the medial Ordovician collision of the Laurentian margin with island arc terranes. Quartz-calcite veins, common in the melange, mostly have slickenside fibers recording either reverse or normal sense of shear, represented by 120/36 and 164/68 in average orientation, respectively. The reverse-motion veins are consistently cross-cut by the normal-motion veins. Microthermometric analysis of aqueous fluid inclusions in 16 samples of these veins distributed from the New York Capital Region to near the US-Canada border yields homogenization temperatures (T_H) of 145-285°C (NY Capital Region), 199-249°C (Battenkill River), 183-221°C (Mettawee River), 152-212°C (West Haven) and 133-140°C (Highgate Springs), showing a systematic decrease of peak T_H from south to north. Fluid inclusions within the flysch/melange have remarkably consistent salinities (typically 1.4-5 wt % NaCl equiv). The salinity and its range increase (4.8-12.3 wt % NaCl equiv) in samples located close to the Beekmantown carbonates of the Cambrian-early Ordovician Laurentian shelf. In the NY Capital Region, no significant difference in T_H and salinity is found between normal- and reverse-displacement veins in the most westerly locality but, about 8 km farther east, adjacent to the boundary fault of the Taconic Allochthon, normal-motion veins show somewhat lower T_H than reverse-motion veins. This, along with the cross-cutting relationship, suggests that the reverse motion was immediately followed by the normal motion in the west, but farther east there was a longer time interval between reverse and normal displacement. We suggest that there was a regional extension of the western margin of the Taconic orogen soon after cessation of the Taconic thrusting, with extension beginning in the foreland and propagating back toward the hinterland.

18-9 **BTH 16** Dietsch, Craig

A GONDWANAN AFFINITY FOR THE GNEISS DOME BELT, SOUTHWESTERN NEW ENGLAND APPALACHIANS

DIETSCH, Craig, Department of Geology, Univ of Cincinnati, Cincinnati, OH 45221-0013, craig.dietsch@uc.edu

Geochronologic and geochemical data from the Hartland Belt (HB) and the Gneiss Dome Belt (GDB) of western Connecticut indicate that these high-grade rocks from southwestern New England are a collage of tectono-stratigraphic units formed in continental margin, backarc, and arc settings. The terrane affinities of key units remain problematic. In Caradoc to Llandovery plutonic rocks that intrude the HB, discordant zircons and Pb isotopic data from some of the pre-Silurian ones show them to have Grenvillian inheritance (Sevigny & Hanson, 1993, 1995). The timing of final assembly and accretion of the HB to Laurentia was early Silurian based on concordant TIMS U-Pb xenotime ages of 435±3 and 438±2 Ma from blastomylonitic granite (Sevigny & Hanson, 1995) that forms part of the ductile shear zone of Cameron's Line.

The whole-rock geochemistry of another set (n=16) of metabasites from the pre-Llanvirn Collinsville Formation (CF) of the GDB is consistent with the hypothesis that they formed in a backarc basin (Chocyk-Jaminski and Dietsch, 2002). The majority of metabasites in this set can be classified as basaltic andesite with subalkaline signatures. They have a range of Ti/V ratios with 10 samples having values between 20 and 50 characteristic of ocean floor basalt. The chemistry of previously analyzed arc-like CF metabasites and their association with evolved metatonalites suggest that this backarc had an ensialic character. Chocyk-Jaminski (1998) and later Dietsch (2002) proposed that it was built on a rifted fragment of Laurentian crust.

The idea that rocks of the GDB have, in fact, affinity to the *Gondwanan* side of Iapetus is supported by re-determined electron microprobe U-Pb monazite ages from migmatitic paragneiss from the Waterbury dome (WD). Rounded, xenoblastic monazites yield consistent sets of preliminary mean ages between 565 and 568 Ma [for example, 566 and a [(std error x 2) of 4] Ma, n=9]. In WD migmatitic schist, a monazite inclusion in garnet has yielded 437 [12] Ma, n=7, consistent with a concordant TIMS U-Pb monazite age of 432±2 Ma from the same rock, and indicating the older ages can be interpreted as relic detrital grains. In addition, conventional ages of abraded zircon fractions from WD bt-ms-grt granitic gneiss whose REE pattern shows it to be derived from shale, yield $^{207}Pb/^{206}Pb$ ages no older than 618 Ma.

Europe. An interdisciplinary team of scientists has been assembled to investigate several harbor sites in Portugal, with an emphasis on locating buried Phoenician shipwrecks. Ships can prove to be veritable treasure chests of cultural and trade information, but the sites under investigation have undergone considerable geomorphic change and any Phoenician vessel must now lie buried within tidal-fluvial sediments.

Geologic coring and geophysics were employed to reconstruct the paleogeographies of three Phoenician sites in Portugal. The Abul site is situated along the Rio Sado estuary margin, the Castro Marim site is separated from the Rio Guadiana by two kilometers of tidal wetlands, and the Santa Olaia site is located on the alluvial plain of the Rio Mondego, over 15 km upstream of the mouth. Excavation has revealed a significant Phoenician presence at all three sites and it is presumed that they were harbors with immediate access to open-water sailing. This implies considerable late Holocene delta-alluvial plain progradation.

Cores, coupled with GPR and electrical resistivity data, reveal that marine to open estuarine conditions existed at the three sites, and that subsequent alluvial progradation has produced a >10 m thick late Holocene sequence of estuarine-delta-floodplain sediments. Radiocarbon dates from cores, coupled with the few published core data from the Rio Guadiana and a regional sea level curve, provide chronological control for paleogeographic reconstructions.

The identification of Phoenician-era shorelines serves as a predictive tool for locating possible harbors or anchorages, increasing the chance of locating buried Phoenician sea-going vessels. In some areas, the preservation potential for buried shipwrecks is high; however, significant burial depths may make recovery difficult and infeasible. On the other hand, deep burial may have preserved ships that otherwise would have been destroyed by modern practices used in the extensive saltpans and rice paddies of the region.

17-6 **BTH 6** LeBlanc, Christopher R.

QUANTIFYING THE AMOUNT OF GAS HYDRATE BENEATH THE CENTRAL SCOTIAN SLOPE FROM THE SEDIMENT VELOCITY STRUCTURE

LEBLANC, Christopher R.[1], LOUDEN, Keith E.[1], MOSHER, David C.[2], and PIPER, David J.W.[2], (1) Department of Oceanography, Dalhousie University, Halifax, NS B3H 4J1, Canada, leblanc@phys.ocean.dal.ca, (2) Geol Survey of Canada (Atlantic), Dartmouth, NS B2Y 4A2, Canada

Pressure-temperature conditions present in sediments on the Scotian slope, for water depths greater than approximately 500 metres, will cause water and dissolved methane in sufficient concentration to form gas hydrate. Increases in bottom water temperature or decreases in relative sea level can cause gas hydrate to dissociate, releasing water and methane. This release may be an important contributor to global warming due to increasing the amount of greenhouse gas, or to slope instability due to increasing the sediment pore pressure. The base of the gas hydrate stability zone is primarily determined by the sediment temperature, and therefore approximates the shape of the seafloor. This boundary is generally indicated by the occurrence of a bottom simulating reflector (BSR) resulting from a sharp acoustic impedance contrast between the high velocity hydrate and low velocity free gas. However, the presence of a BSR does not determine the concentration of hydrate in the sediment, nor does the lack of a BSR indicate the absence of gas hydrate. An additional approach is required to directly measure variations in the velocity structure of the sediment, which can be attributed to changes in the concentration of gas hydrate . In August 2002, an area on the Central Scotian slope was investigated where gas hydrates were expected. The sediment was imaged with single channel reflection seismics and velocity measurements were determined from wide-angle seismic reflection/refraction data recorded on three ocean bottom seismometers (OBS). One of the OBS locations displays a prominent BSR in the single channel reflection seismic record, while the other locations do not appear to. Levels of gas hydrate concentration will be derived from velocity models of the OBS data at each site. These results will help to better quantify the amount of gas hydrate that may be present beneath the Scotian slope.

17-7 **BTH 7** Wang, Guo

SEDIMENTARY ANALYSIS OF A LAKE CORE AT BARROW, ALASKA

WANG, Guo[1], XU, Juan[2], ZHANG, Qingsong[2], and LI, Yuanfang[2], (1) Institute of Geographical Sciences and Natural Resources, Chinese Academy of Sciences, No.3, Datun Road, outside Andingmen, Beijing, 100101, China, wangg@igsnrr.ac.cn, (2) Institute of Geographical Sciences and Nat Rscs, Chinese Academy of Sciences, No.3, Datun Road, outside Andingmen, Beijing, 100101, China

It deals with the systematic multi-variable analysis of sedimentary process on the grain-size data and geochemical data of a lake core at Barrow, Alaska, Arctic. The core with length of 60 cm is from under sea level of 2 metre in Elson Lagoon, and about 2 km away from the coast. The top of the core (0-40cm) was separated into 40 samples (one per a centimetre), the bottom (40-60cm) 10 samples (one per 2 cm). It was treated by multivariable analyses including cluster analysis, factor analysis, major component analysis that the data from these 50 samples were made a granular analysis of 25 indexes (size degrees: 10mm, 5mm, 3mm, 1mm, 0.8mm, 0.5mm, 0.35mm, 0.25mm, 0.2mm, 0.15mm, 0.125mm, 0.1mm, 0.07mm, 0.05mm, 0.035mm, 0.025mm, 0.02mm, 0.016mm, 0.01mm, 0.008mm, 0.005mm, 0.002mm, 0.001mm, 0.0005mm, and < 0.0005mm) and a geochemical analysis of 45 indexes (P, Ba, Sr, V, Ni, Cu, Co, Cr, Mo, Zn, Ga, Nb, Sc, Sn, Ta, Y, Yb, Be, Ce, Pb, Zr, La, Li, W, Rb, C, HCO_3^-, Cl^-, SO_4^{2-}, Ca^{2+}, Mg^{2+}, K^+&Na^+, $CaCO_3$, pH, SiO_2, P_2O_5, Fe_2O_3, Al_2O_3, CaO, MgO, K_2O, Na_2O, MnO, TiO, and crystaled H_2O). R-type cluster tree of the grain-size has two branches, A Branch is greater than 0.1mm, B Branch less than 0.1mm. First Branch of R-type geochemical cluster tree is composed of Nb, Ce, Cr, Rb, HCO_3^-, CaO, P_2O_5, SiO_2, and pH, Second Branch is composed of residual geochemical indexes. Two branches of R-type cluster tree of colligation of the grain-size and geochemical indexes are mix of A Branch and First Branch, mix of B Branch and Second Branch, respectively. It indicate that there is causality between geochemical indexes and grain-size. The crown of Q-type cluster trees show that 32-60 cm section of the core is continental deposits, and this sedimentary environment and process are stable and steady; 20-32cm section is a transition period from continental deposits to marine sediments, and magnetic mineral with Cr decrease sharply the oxides of Si and Ca reduce, one of Ti and Fe increase, organic matter raise;10-20 cm is marine sediments, coase grain is a little, oxide, silt, organic matter and adsorbed composition fluctuate greatly, leached remain composition speed to increase in surface layer, the source of matter is stable, but dynamic environment change greatly. This research was financially supported by funding from National Natural Science Foundation of China (49971078).

SESSION NO. 18, 8:00 AM

Friday, March 28, 2003

Tectonics, Structural Geology, and Geophysics (Posters)

Westin Hotel, Commonwealth A

18-1 **BTH 8** Oakey, Gordon N.

A NEW SERIES OF DETAILED MAGNETIC ANOMALY MAPS FOR ATLANTIC CANADA

OAKEY, Gordon N. and DEHLER, Sonya A., Geological Survey of Canada (Atlantic), Dartmouth, NS B2Y 4A2, Canada, oakey@agc.bio.ns.ca

A new series of detailed magnetic anomaly maps has been produced for the Atlantic onshore and offshore regions of Canada. The maps are based on a new compilation of aeromagnetic and marine survey data collected by government and industry surveyors over the past several decades. Individual surveys and digital grids have been adjusted to a common datum and micro-levelled to minimize textural artifacts. High-elevation regional survey flights were used to define a standard long-wavelength component (200 to 400 km) for levelling. A 500 m grid was produced from the reprocessed data and artificial illumination has been used to enhance subtle anomalies and trends in the maps.

The new series of 4 maps consists of a regional map at 1 : 3 000 000 scale and three local maps at 1 : 1 500 000 scale covering Nova Scotia, Newfoundland & the Gulf of St. Lawrence, and the Grand Banks. Subtle features that are visible in the new maps include major mafic dikes cutting across Nova Scotia, the Avalon peninsula of Newfoundland, and the shelf northeast of Newfoundland. Also visible are details of near-surface basement structures on the Scotian shelf, Grand Banks and Flemish Cap. Micro-levelling has improved the continuity of anomalies crossing shorelines and details of onshore features are easily followed into the offshore domain in many areas.

The maps will be released as GSC Open Files in 2003 and copies may be obtained from the Geological Survey of Canada (Atlantic) office or other GSC product distribution centres.

18-2 **BTH 9** Ténière, Paul J.

STRATIGRAPHY, STRUCTURE, AND $^{40}AR/^{39}AR$ GEOCHRONOLOGY IN THE LOCHABER-MULGRAVE AREA, NOVA SCOTIA

TÉNIÈRE, Paul J.[1], BARR, Sandra M.[1], WHITE, Chris E.[2], and REYNOLDS, Peter H.[3], (1) Geology, Acadia Univ, Wolfville, NS B4P 2R6, Canada, paul.teniere@ns.sympatico.ca, (2) NS Department of Natural Resources, P.O. Box 698, Halifax, NS B3J 2T9, Canada, (3) Earth Sciences, Dalhousie Univ, Halifax, NS B3H 3J5, Canada

The Lochaber-Mulgrave area of northern mainland Nova Scotia is underlain by rocks of the Early Carboniferous Horton Group, in faulted contact with Devonian and Silurian rocks to the south and west and younger Carboniferous rocks to the north and east. On the basis of lithology and sedimentary characteristics, the Horton Group is divided into four formations: Clam Harbour River, Tracadie Road, Caledonia Mills, and Steep Creek. These formations have a total thickness of at least 4000 m, and were deposited in varied braided fluvial and shallow to deep lacustrine environments. Sparse paleontological data from macrofossils and spores indicates an age of Famennian to late Tournaisian. Compared to the Horton Group in other areas of Nova Scotia, the rocks in the Lochaber-Mulgrave area appear to be somewhat older, exhibit higher thermal maturity indicating deeper burial, and are more deformed and metamorphosed, especially in the southern part of the area near the Roman Valley Fault. Detrital muscovite yielded $^{40}Ar/^{39}Ar$ ages of ca. 500 Ma, for which no source is apparent in either of the now-adjacent Avalon or Meguma terranes.

Based on petrographic studies, the rocks have undergone low-grade regional metamorphism with the development of slaty cleavage defined by new muscovite growth with a strongly preferred optical orientation. Whole-rock $^{40}Ar/^{39}Ar$ dating of muscovite-rich slate indicates that new muscovite growth occurred at ca. 350-340 Ma. These data require that the sedimentary rocks underwent extremely rapid burial, deformation, and cooling through the argon retention temperature in muscovite by ca. 350-340 Ma. A possible explanation is overthrusting of the Horton Group from the south by Devonian rocks of the Guysborough block, as a result of transpression at a restraining bend along the Chedabucto-Roman Valley fault system during juxtaposition of the Avalon and Meguma terranes. Further evidence of an overthrusting event is evident to the northeast in Cape Breton Island where equivalent units in the L'Ardoise block display overturned sequences with recumbent folds and near-horizontal cleavage. Uplift and subsequent deformation that also involved younger units in the region were probably the result of on-going movement on the terrane-bounding fault system.

18-3 **BTH 10** Johnson, Susan C.

THE COMPOSITE NEW RIVER BELT, SOUTHWESTERN NEW BRUNSWICK

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The composite New River belt forms a linear, >100 km long northeast-trending belt of Neoproterozoic and Early Paleozoic rocks situated immediately west of the Belleisle Fault in southern New Brunswick. Although the composite nature of the belt was not originally recognized, recent mapping and radiometric studies indicate that Neoproterozoic rocks in the belt can be separated into two major fault-bounded blocks, each containing a distinct Lower Paleozoic cover.

In the central part of the belt, the Robin Hood Lake Fault zone defines the boundary between distinct lithological sequences with contrasting styles of deformation. Southwest of the fault in the Pocologan River area, ductilely deformed and mylonitic, ca. 555 Ma Neoproterozoic granitoid rocks are overlain by Early Paleozoic volcanic and sedimentary rocks that appear to have greater affinity to Ganderian rocks in the St. Croix belt to the west, than to those in the Avalon Terrane in southeastern New Brunswick. In contrast, rocks to the northeast of the fault in the Long Reach area comprise brittlely deformed ca. 620 Ma Neoproterozoic granitoid rocks and relatively undeformed ca. 555 Ma bimodal volcanic rocks overlain by fossiliferous Cambrian strata. Avalonian fauna within the latter, and in a similar sequence exposed in a small fault wedge immediately west of the Belleisle Fault at Beaver Harbour, are directly correlative to those in the Avalon Terrane in the Saint John area.

The composite New River belt is situated between Early Silurian rocks of the Kingston belt and Late Ordovician to Early Devonian rocks of the Mascarene belt. The recent interpretation of the Kingston and Mascarene belts as remnants of a Silurian arc and back-arc sequence, respectively, and the location of the New River belt with respect to these rocks, has led to a model of northwestward subduction beneath a composite Gander Terrane to explain the current spatial relation-

15-3 2:20 PM Mossman, David J.*; Bruening, Ralf; Powell, H. Philip: ANATOMY OF A JURASSIC THEROPOD TRACKWAY FROM ARDLEY, OXFORDSHIRE, U.K [48010]

15-4 2:40 PM Rygel, Michael C.*; Gibling, Martin R.: CENTROCLINAL CROSS STRATA – ORIGIN, MORPHOLOGY, AND IMPLICATIONS FOR UNDERSTANDING ANCIENT TERRESTRIAL ECOSYSTEMS [50846]

15-5 3:00 PM Gibling, Martin R.*; Rygel, Michael C.; Falcon-Lang, Howard J.; Calder, John H.: DRYLAND VEGETATION IN THE PALEOZOIC: THE PENNSYLVANIAN RECORD FROM JOGGINS, NOVA SCOTIA [50970]

SESSION NO. 16

T11. Late Glacial–Early Holocene Climate and High-resolution Records of Climate Change from Lakes

1:40 PM, Westin Hotel, Harbour Suite B

Ian Spooner and R. W. Spear, Presiding

16-1 1:40 PM Kurek, J.*; Cwynar, L.; Spear, R.W.; Schulz, M.: HIGH-RESOLUTION LAKE SEDIMENT RECORDS OF HOLOCENE CLIMATE FROM MAINE, USA [50898]

16-2 2:00 PM Ferland, Kristie A.*; Kelley, Joseph T.; Belknap, Daniel F.; Dickson, Stephen M.; Gontz, Allen M.: AN INVESTIGATION OF GLACIOISOSTATIC LAKE-LEVEL CHANGES IN RANGELEY LAKE, MAINE [51016]

16-3 2:20 PM Spooner, Ian S.*; MacDonald, Ian M.L.; Beierle, Brandon: A MULTI-PROXY LITHOSTRATIGRAPHIC RECORD OF LATE GLACIAL AND HOLOCENE CLIMATE VARIABILITY FROM PIPER LAKE , NOVA SCOTIA [51018]

16-4 2:40 PM Spear, R.W.*; Cwynar, Les C.; Kurek, Joshua; Sillick, Craig D.; Stork, Allison J.; Clayton, Patrick L.: THE VEGETATION RECORD OF EARLY HOLOCENE CLIMATE IN THE WHITE MOUNTAINS OF NEW HAMPSHIRE AND MAINE [51369]

16-5 3:00 PM Rueger, Bruce F.*: LATE HOLOCENE CLIMATIC CYCLICITY PRESERVED IN THE PEATS OF DEVONSHIRE MARSH, BERMUDA [51054]

3:20 PM Break

16-6 3:40 PM McCarthy, Francine M.G.*; Blasco, Steve M.; Keyes, Darren; Harmes, Robert A.; Sherman, Keith: EARLY TO MID HOLOCENE CLIMATE RECORD FROM SEVERN SOUND, SOUTHERN GEORGIAN BAY, LAKE HURON, LAURENTIDE GREAT LAKES [51234]

16-7 4:00 PM Skarke, Adam D.*; McClennen, Charles E.: LATE-GLACIAL AND HOLOCENE EVOLUTION OF LAKE ONTARIO: LAKE-LEVEL, ISOSTATIC REBOUND, AND SEDIMENT DEPOSITION [50595]

16-8 4:20 PM Hyatt, James A.*; Gilbert, Robert: SEDIMENT AND ACOUSTIC RECORDS OF SURFACE WATER- GROUNDWATER EXCHANGE THROUGH SINKHOLE LAKES [50911]

16-9 4:40 PM Wang, Guo*; Xu, Juan; Zhang, Qingsong; Li, Yuanfang; Liu, Kexin; Hang, Baoxi; Wu, Xiaohong: ANALYSIS OF SEDIMENTARY ENVIRONMENT OF A LAKE CORE AT BARROW 6000 YEARS AGO [50903]

FRIDAY, MARCH 28, 2003

SESSION NO. 17

Marine Geology and Sedimentology (Posters)

8:00 AM, Westin Hotel, Commonwealth A

Times when authors will be present at their posters will be indicated at each poster booth

Booth #

17-1 1 Poppe, L.J.*; Eliason, A.H.; Hastings, M.E.: A VISUAL BASIC PROGRAM TO CLASSIFY SEDIMENTS BASED ON GRAVEL-SAND-SILT-CLAY RATIOS [48056]

17-2 2 Duxfield, Anya. K.*; Hughes Clarke, John E.; Parrott, Russell; Wildish, David; Fader, Gordon B.J.: THE RELATIONSHIP BETWEEN LINEAR CHAINS OF POCKMARKS AND SHALLOW SEISMIC STRUCTURE, PASSAMAQUODDY BAY, NEW BRUNSWICK, CANADA [50152]

17-3 3 Oakley, Bryan A.*: RESPONSE OF A MICROTIDAL WAVE-DOMINATED BARRIER TO CLOSELY TIMED EXTRA-TROPICAL CYCLONES [50675]

17-4 4 Scott, David B.*: END MORAINES ON THE UPPER SCOTIAN SLOPE: RELATIONSHIP TO DEEP-SEA CORAL AND FISH HABITATS [51286]

17-5 5 Dunn, Richard K.*; Byrne, Daniel I.: PALEOGEOGRAPHIES IN DELTA-ALLUVIAL PLAIN SETTINGS OF THREE PHOENICIAN HARBORS, PORTUGAL [51442]

17-6 6 LeBlanc, Christopher R.*; Louden, Keith E.; Mosher, David C.; Piper, David J.W.: QUANTIFYING THE AMOUNT OF GAS HYDRATE BENEATH THE CENTRAL SCOTIAN SLOPE FROM THE SEDIMENT VELOCITY STRUCTURE [51327]

17-7 7 Wang, Guo*; Xu, Juan; Zhang, Qingsong; Li, Yuanfang: SEDIMENTARY ANALYSIS OF A LAKE CORE AT BARROW, ALASKA [50488]

SESSION NO. 18

Tectonics, Structural Geology, and Geophysics (Posters)

8:00 AM, Westin Hotel, Commonwealth A

Times when authors will be present at their posters will be indicated at each poster booth

Booth #

18-1 8 Oakey, Gordon N.*; Dehler, Sonya A.: A NEW SERIES OF DETAILED MAGNETIC ANOMALY MAPS FOR ATLANTIC CANADA [51260]

18-2 9 Ténière, Paul J.*; Barr, Sandra M.; White, Chris E.; Reynolds, Peter H.: STRATIGRAPHY, STRUCTURE, AND $^{40}AR/^{39}AR$ GEOCHRONOLOGY IN THE LOCHABER-MULGRAVE AREA, NOVA SCOTIA [49287]

18-3 10 Johnson, Susan C.*: THE COMPOSITE NEW RIVER BELT, SOUTHWESTERN NEW BRUNSWICK [51247]

18-4 11 Short, Heather*; Johnson, Scott: STRAIN PARTITIONING IN A TRANSPRESSIVE OROGEN, CENTRAL COASTAL MAINE [51219]

18-5 12 Eastler, Thomas E.*; Reusch, Douglas N.; Gibson, David: WHERE IN MAINE IS THE DOG BAY LINE? [51372]

18-6 13 Schoonmaker, Adam*; Kidd, W.S.F.: TECTONIC SETTINGS OF ORDOVICIAN AND DEVONIAN MAFIC ROCKS NEAR CHESUNCOOK LAKE, NORTHERN MAINE [51376]

18-7 14 Gerbi, Christopher*; Johnson, Scott: THE CHAIN LAKES MASSIF, MAINE AND QUÉBEC: A PRODUCT OF EXTENSION? [51228]

18-8 15 Lim, Chul*; Howe, Stephen S.; Kidd, William S.F.: STRAIN HISTORY AND FLUID INCLUSIONS OF VEINS IN THE TACONIC FLYSCH AND MELANGE OF NEW YORK AND VERMONT [51437]

18-9 16 Dietsch, Craig*: A GONDWANAN AFFINITY FOR THE GNEISS DOME BELT, SOUTHWESTERN NEW ENGLAND APPALACHIANS [51308]

18-10 17 Blackmer, Gale C.*: THOUGHTS ON THE EARLY PALEOZOIC TECTONIC SETTING OF THE PENNSYLVANIA PIEDMONT [50406]

18-11 18 McDermott, Andrew; Revetta, Frank; Chiarenzelli, Jeffrey*: GRAVITY AND MAGNETIC SIGNATURE OF THE LOON LAKE SYNCLINE, ADIRONDACK HIGHLANDS, NEW YORK [50379]

18-12 19 Ouassaa, Khaled*; Forsyth, Dave: NEW STRUCTURAL CONSTRAINTS ON THE LAURENTIAN MARGIN BENEATH SOUTHERN ONTARIO AND THE ADJACENT USA [51100]

18-13 20 Potter, D. Patrick*; Jauer, Chris D.; Dehler, Sonya A.: A COMPARISON OF POST-STACK MIGRATION PERFORMED USING REFRACTION-DERIVED VELOCITIES VERSUS STACKING VELOCITIES [51320]

18-14 21 Revetta, Frank A.; Hamelin, Ian*; McDermott, Andrew: GRAVITY SURVEY OF THE EPICENTRAL REGION OF THE AU SABLE FORKS, NEW YORK EARTHQUAKE OF APRIL 20, 2002 [49644]

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