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THE PRESIDENT'S MESSAGE

Greetings! Summer is upon us after another busy GSM year. I applaud all the volunteers and participants that have made possible this past year's successful events. The GSM 2015 fall meeting, organized by Henry Berry and themed "Using Emerging Technology on a Submerging Coast," was well attended by our business, government, and academic communities. The GSM 2016 spring meeting was held at the University of Maine, with 18 student poster presentations and three oral talks.

Last summer's field trip to Isle au Haut led by Bob Gerber and Marshall Chapman was exceptional. We were treated to coastal outcrops of volcaniclastic rocks and complicated, mixed magma intrusives. We were also guided to surficial raised beaches, diamictons, and glaciomarine sediments on the island. The boat rides from Old Quarry in Stonington to Isle au Haut, a caravan tour around the island that included Marshall Chapman's vintage Model A truck, and spectacular weather combined to make it a very memorable field trip.

I hope all of you will be able to participate in this year's summer field trip on Saturday and Sunday, July 16 and 17 in the Brooks/Monroe area. Dave West (Middlebury College) and Steve Pollock (USM, retired) will lead the bedrock portion of the trip. They will showcase the results of their recent geologic field mapping. Roger Hooke (UM) and Woody Thompson (MGS retired) will lead the surficial geology portion integrating field mapping and new insights from LiDAR images of the area that have been made available in the last few years. If you would like to stay in rooms at Unity College on Friday or Saturday, July 15 or 16, please make reservations by July 1.

GSM now has a Facebook page < facebook.com/GSMMaine >. Amber Whittaker has established the site and is serving as the administrator. We hope this will be a useful means of communication and discussion for the Society, and we welcome your input. Visit the Facebook site and search for "Geological Society of Maine." If you "Like" the page, Amber will give you permissions to post to the group.

Looking forward, GSM will have a fall meeting in November, highlighting geographic information systems and their application to geology. On October 14, 15, and 16, our vice-president Henry Berry and Dave West from Middlebury College are organizing the New England Intercollegiate Geological Conference (NEIGC). Fieldtrips will take place along the Maine coast from Maquoit Bay to Muscungus Bay. For more information, see their website http://w3.salemstate.edu/~lhanson/NEIGC/Conference.html.

I would also like to thank the GSM officers for their continuing effort in maintaining the GSM. In particular, I would like to thank Dan Belknap for agreeing to be our new newsletter editor and Amber Whittaker for serving as assistant newsletter editor and our Facebook administrator.

We hope you will join us for our upcoming activities. Have a great summer.

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GSM Summer Field Trip

The 2016 GSM Summer Field Trip will be on bedrock and glacial geology in the greater Belfast-Brooks area, south-central Maine and will be led by Woody Thompson, Dave West, Roger Hooke, and Steve Pollock. It will be held on the weekend of July 16 and 17.

This field trip will highlight prominent bedrock and surficial features in the general area between

Belfast and Brooks, Maine. Many of the individual stops will allow for observations of features related to both the bedrock geologic history (hundreds of millions of years old), and the much more recent glacial history (tens of thousands of years old).

The bedrock portion of the trip will provide opportunities to observe representative units within the four major tectonic terranes (St. Croix, Fredericton, Passagassawakeag, and Casco Bay belts) that are juxtaposed in this region. Additionally, aspects of the deformation, metamorphic, and plutonic history of these rocks will be examined. Finally, a spectacular traverse across the high strain portion of the regionally extensive Norumbega fault system will reveal a wide variety of fault rocks (e.g., mylonite, cataclasite, pseudotachylyte), and demonstrate a complex history of superimposed fault activity.

The glacial portion of the trip will include localities showing impressive glacial grooves revealing ice flow directions, erratic boulders eroded from till, a new glaciomarine delta exposure, and an esker pit. Additionally there will be stops that "ground-truth" the new stunning Lidar imagery in the area that has provided evidence of widespread removal of upland till by subglacial meltwater streams, which, near the glacier margin, are associated with esker nets.

Logistics:

Rooms are available at Unity College, 90 Quaker Hill Rd, Unity, Maine, Friday and Saturday nights. We will be having a social with cash bar at the College Saturday after returning from the field, followed by a sit down dinner. For those wishing to stay at Unity College, rooms will be $25 per night per person and will include breakfast. I expect most will only be staying Saturday night, but if you wish to stay Friday night also that is an option.

1 night including breakfast buffet = $25.00

2 nights including breakfast buffet = $50.00

We will be having a sit-down dinner prepared by the Unity College Catering Service on Saturday night. It will include an entrée with salads and vegetables on the side. The choice in entrees will be chicken, beef or vegetarian. The dinner will cost $10. We will have more information on this later.

There is no cost for the field trip and it is not required that you stay at Unity College. You can join the trip at the college on Saturday or Sunday mornings or both. Field Trip details will be provided later.

For now I need to know how many people will be staying at Unity College and for which nights. I also need to know who will be coming to the dinner and what entrée you want. Please send me an email by Friday, July 1 and follow that with a check for room and food. We must inform the Unity College Catering Service two weeks before the event, hence the July 1 deadline.

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THE EDITOR'S MESSAGE

We are attempting to return to a more regular schedule of publication of the GSM Newsletter. Because of changes in the way we all communicate, and to save mailing costs, the Newsletter will be distributed through e-mail in PDF format. Anyone with special needs please contact the Editor. Please send items of interest for the News from the Campuses and Member News columns, or other things you'd like to share.

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NEWS FROM THE STATE GEOLOGIST

Geological Surveys in the Cross Hairs

"Arizona Geological Survey is on life support," the June 15th headline blared, as a process begun many months ago neared completion. In an unanticipated and shocking move in January, Arizona Governor Doug Ducey proposed in his Fiscal Year 2017 budget to transfer the Arizona Geological Survey (AZGS) duties and responsibilities to the University of Arizona, beginning July 1, 2016 – and with no state funding.

The proposal was developed without consultation with AZGS State Geologist Lee Allison or any interaction with the Arizona geological community. The Governor's policy adviser for natural resources said the AZGS was moved to the University of Arizona because its functions are research-oriented and have "a lot of crossover and synergy" with the university. "One of the things we said from the outset in our discussion with the UA is that we recognize the Geological Survey has a lot of talent. They get a lot of work done, and that is valued by the customers. We held several meetings to make sure we did not see a talent drain or a detriment to the level of service."

The consequences of the transfer, however, have been just the opposite. Twenty-five percent of AZGS positions are threatened by the consolidation and another 20% have been vacated as staff, faced with an uncertain future, sought other opportunities. Furthermore, the survey must consolidate to office space one-quarter its current size, with the loss of many valuable collections and research capabilities.

We all know that this political move has little to do with "synergy" and everything to do with a very short-sighted goal to reduce the state budget. According to an AZGS report, over the past five years, the state has provided $5.37 million in support, which attracted over $35.8 million in external research grants. (The AZGS proposed and managed a hugely successful multi-year program funded through the Department of Energy to collect and standardize state geothermal data – we were a subrecipient of this grant.) All this is now in jeopardy as UA has agreed to fund only one year at the state's former level before cutting the survey loose to fend for itself (and, oh yes, provide those exorbitant indirect funds to UA from future grants!). Has the AZGS been a victim of its own success?

While the geological community would like to dismiss this event as a fluke, it has happened before and likely will happen again as chief executives and legislatures are seduced by the notion that budgets can be trimmed with no loss of services. In the early 2000s, the Georgia Geological Survey was reduced to skeleton status as responsibilities were transferred to other agencies. The Michigan GS was gutted, with responsibilities and no funds transferred to Western Michigan University. In 2013 Colorado Governor John Hickenlooper (himself a former exploration geologist), facing a budget shortfall, "successfully" transferred the Colorado Geological Survey from state government to the Colorado School of Mines, while reducing its budget by half. His spokesman explained that "the university could offset budget reductions by having students, graduate students and faculty members assist in research and apply for grants." Right. The CGS is still struggling to recover. Perhaps the truly successful recent transfer was of the Illinois State Geological Survey from their Department of Natural Resources to the University of Illinois. But in that case the ISGS was already co-located with UI, and ISGS staff already enjoyed the salary and retirement structures of UI faculty. This move actually released the ISGS from some burdensome state bureaucracy.

Nearly every state is dealing with budget issues, but in times when society is placing ever-increasing demands on geological resources, it is incredibly short-sighted to reduce or eliminate the few dollars directed toward state geological surveys. However, if it can happen to Arizona, it can happen to anyone. Who's next?

Robert G. Marvinney, Maine State Geologist:
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NEIGC 2016 Comes to Coastal Maine

The New England Intercollegiate Geological Conference (NEIGC), the longest-running geologic field conference in the country, will be coming to the Brunswick-Waldoboro area October 14-16. It will feature three days of field trips on a range of topics including bedrock, glacial, coastal, and environmental geology. Hosted jointly by the Maine Geological Survey and Middlebury College, this year's meeting will be dedicated to GSM charter member Art Hussey, the undisputed expert on the geology of this stretch of Maine coast. Arthur, who organized an NEIGC meeting here more than half a century ago (1965) will be co-leading a field trip, as will several other GSM members. For more information, search NEIGC 2016 to find the conference web site.

Henry N. Berry, Maine Geological Survey
Henry.N.Berry@maine.gov

GSM Spring Meeting: Student Posters and Oral Presentations University of Maine, Orono, April 1, 2016

**(G) = Graduate Student*

POSTERS:

THE ROLE OF MAGMATIC PROCESSES IN CONCENT-RATING REE ACCESSORY PHASES; EVIDENCE FROM THE MT. WALDO PLUTON, COASTAL MAINE

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The 371±2 Ma Mt. Waldo pluton (MWP) is a coarse grained, porphyritic, bt + hb + sp granite, which displays definite evidence that magma mixing played an important role in the evolution of this magma chamber. Plagioclase mantled k-feldspars (rapakivi textures), abundant magmatic enclaves of intermediate composition, and linear trends on whole-rock Harker diagrams all point to the contemporaneous invasion of this crystallizing felsic magma chamber by mafic magma. This resulted in the formation of a dynamic magma chamber in which the conditions were conducive for convective flow and the formation of mineral layering or schlieren, which are common in the MWP.

The schlieren observed within the MWP are mineral-ogically similar to the granite itself but greatly enriched in accessory minerals, up to 10% modally. Sphene, zircon, apatite and opaques are common, but the REE accessory phase allanite is distinctly abundant. The schlieren are observed in a variety of dispositions (rings, trough structures and fragmented layers), which mimic "sedimentary structures" and are similar to those observed in alkaline plutons in SW Greenland (Harry and Emeleus, 1960) and the Tavares pluton in Brazil (Weinberg et al., 2001). Pitcher (1997) suggests that schlieren may provide evidence for the flow of magma, resulting in the deposition and concentration of the accessory phases.

Geochemical data from the MWP show that the schlieren have very high concentrations of the REEs La, Ce, Sm, Nd and Gd (+ Y) and other HFSEs, such as Zr, Nb and Th. The schlieren are not only enriched relative to the composition of the average MWP granite but also average crustal abundances, sometimes by factors of ~ 10. This strongly suggests that magmatic processes were responsible for the enrichment in REE in the schlieren during the crystallization of this dynamic magma chamber.

COMPOSITIONAL, TEXTURAL, AND CHRONOLO-GICAL EVALUATION OF PLASTER AND MORTAR AT THE NADIN ARCHAEOLOGICAL SITE, CROATIA

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The Nadin Archaeological site in Croatia has an occupational history spanning from the Iron Age to the late Middle Ages (400 BC – 16th Century). This relatively continuous record provides insight into human interactions within the landscape for thousands of years. Significant stylistic and technological variations are present within site's structures, and appear to be linked to changes in building styles and materials through time. This study investigates potential changes in the composition and texture of mortar and plaster, in order to construct a chronological system showing how building technology changed through time. Samples acquired from excavations were analyzed using an optical scanning electron microscope and energy dispersive x-ray analysis. Textural properties of the material were analyzed using sedimentological grain size measurements of the aggregate present in the plaster and mortar samples. The variation in the composition and texture of the samples will ideally provide the basis for establishing a chronological system of site's building materials, with interpretations incorporating the use of local resources and regional economic factors.

SEDIMENTATION PATTERNS IN THE DAMARISCOTTA RIVER ESTUARY (G)

CHANDLER, Emily A., KELLEY Joseph T. and BELKNAP, Daniel F., School of Earth and Climate Sciences, University of Maine 04469

The tidally dominated Damariscotta River estuary is located on the south-central Maine coast. The elongate, north-south orientation of the estuary is characteristic of the indented shoreline in this region and a consequence of the bedrock structural framework, comprising Paleozoic high-grade metasedimentary rocks. The river system relief is ~95 m overall and a series of pegmatite sills separate the estuary into seven distinct basins. The basins were sequentially isolated during fall from the high-stand of sea level associated with retreat of the Laurentide ice sheet, and then gradually reincorporated into the marine environment with the post-glacial sea-level trans-gression. Holocene sediment within the estuary is found in three distinct zones: 1) a stable inner zone with accumulation of sediments on tidal flats and in marshes, 2) a transitional middle zone with tidal ravinement reworking of estuarine sediments including oyster bioherms, and 3) a high-energy, deeply scoured outer zone in which sediment is preserved only below wave base. Previous studies employing seismic reflection profiles, side-scan sonar, and sediment cores have led to a well-understood model of estuarine evolution and stratigraphy. The present study uses multibeam bathymetry, sediment cores and grab samples, resulting in high-resolution bathymetric and surficial sediment maps of the estuarine system and an improved understanding of sedimentary processes within the estuary. Bathymetry and backscatter maps reveal plumose structures bordering the thalweg of the middle zone of the estuary, as well as fan-like drainage networks in the intertidal to subtidal transitional zone in multiple coves. Analyses of sediment cores from each estuarine zone, including using ^{210}Pb and ^{137}Cs dating, reveal modern sediment accumulation rates, which are particularly relevant in the context of disturbances to the system, such as deforestation associated with colonization, and the introduction of aquaculture to the system.

THE ANALYSIS OF TWO MOUNDS IN WEST FARMINGTON, MAINE.

GUNTHER, Thaddeus and MILLETTE, Patricia, Science Department, Mount Blue High School, Farmington, Maine 04938

The purpose of this study was to determine the origin of two mounds located in West Farmington, Maine near Temple Stream. Sediment samples were collected, a standard grain size

analysis was performed, and those findings were compared to the composition of other similar local geological features. Rock samples were collected and analyzed. The findings were then compared to the composition of the regional bedrock. The overall orientation of the mounds was determined with a hand-held GPS, and strike and dip was measured with a Brunton compass. The data provided by the rock samples and strike and dip suggest that the outcroppings on the mounds were phyllite that had been folded during the Acadian Orogeny. The data from the sediment samples and the orientation of the mounds indicate that they are likely small crag and tail features.

SEASONAL EFFECTS ON THE BIOLOGICAL CONTROLS OF ACID ROCK DRAINAGE PRODUCTION IN MAINE (G)

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Acid rock drainage (ARD) occurs when sulfide minerals oxidize thorough interaction with water, creating acidity, often in response to mining. Microorganisms can increase the production of ARD by doubling the rate of sulfide oxidation. Previous work in California has shown that microbial community composition in mine waste environments is directly affected by seasonal shifts in water chemistry and climate conditions such as temperature and precipitation. Maine currently has no active sulfide mines; however, recent legislation has sought to reduce limitation on mining. Little work has addressed the geochemistry and microbiology of ARD in northern New England and similar ecosystems. We hypothesize that microbial communities sampled at steadily decreasing temperatures would result in less microbial influence on pH and sulfate concentrations. In order to test this hypothesis, we conducted a series of batch reactor experiments. Water, and thus microorganisms, sampled from a naturally acidic surface water stream, Blood Brook near Katahdin Iron Works, at different points in time was incubated with pyrite over 5 weeks. Water chemistry was tracked throughout the experiments, and the microbial community was also sampled at the beginning and end of each experiment. We have also been collecting monthly chemical and biological data at Blood Brook throughout the year to correlate chemical and weather changes with shifts in Blood Brook's microbial community. Early pH and sulfate results indicate a temperature effect on ARD production. Ongoing metagenomics work and ICP sample analyses will help to further connect experimental results.

CREVASSE EXTENT AND LATERAL SHEARING OF THE MCMURDO SHEAR ZONE, ANTARCTICA, USING GPR AND GPS OBSERVATIONS (G)

KALUZIENSKI, Lynn, HAMILTON, Gordon, and KOONS, Peter O., School of Earth and Climate Sciences, University of Maine, Bryand Global Sciences, Orono, Maine; ARCONE, Steven, Cold Regions Research and Engineering Laboratory (CRREL), 72 Lyme Rd, Hanover, NH 03755; RAY, Laura E., WALKER, Benjamin Dartmouth University, Hanover, Hew Hampshire 03755; and LEVER, James, CREEL and Dartmouth University

Sub-ice-shelf circulation plays a fundamental role in ice shelf mass budget. The shape of the underside of an ice shelf is important, such that the presence of basal crevasses can significantly modulate the transfer of heat at the ice-ocean interface. In situ observations of basal crevasses are challenging to obtain, but surface-based ground penetrating radar (GPR) surveys can be used to determine crevasse location and orientation. Here, we use GPR methods to map the internal structures in the McMurdo Shear Zone (SZ) which marks the boundary between the Ross Ice Shelf and the slower-moving McMurdo Ice Shelf. Radar observations reveal the presence of crevasses within a zone of accreted marine ice at a depth of approximately 170 meters. A spatial correspondence between surface and basal crevasses suggests that both are formed locally by lateral shearing. We use the Ice Sheet System Model (ISSM) to test this hypothesis. The model estimates the detailed velocity field of the SZ and is constrained by GPS-derived observations of surface motion. The distribution and orientations of surface and basal crevasses are consistent with the gradients in velocity field predicted by the model. This work suggests that high-resolution modeling can be used to predict the locations of basal crevassing which will lead to an improved understanding of ice shelf mass balance processes.

THE TIMING OF THE LAST GLACIAL MAXIMUM AND SUBSEQUENT RECESSION ALONGSIDE HATHERTON GLACIER, ANTARCTICA. (G)

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During the last glacial maximum (LGM), the Antarctic Ice Sheet (AIS) expanded across what today is the Ross Sea. This grounded Ross Sea Ice Sheet (RSIS) caused inflowing outlet glaciers from East Antarctica to thicken and expand into formerly ice-free valleys of the Transantarctic Mountains (Anderson et al., 2013; Bockheim et al., 1989; Bromley et al., 2012, 2010; Conway et al., 1999; Denton et al., 1989a, 1989b; Hall et al., 2000; Todd et al., 2010). The Transantarctic Mountains (TAM), located between the East Antarctic plateau and the Ross Embayment, provide an ideal setting to study the fluctuation history of the former RSIS, affording insight into the history of past expanded ice, as well as bear on potential future behavior of AIS.

Previous work from ice-free areas adjacent to Hatherton Glacier affords conflicting interpretations for the behavior of East Antarctic outlet glacier systems in the region. Based on soil data and rock weathering, Bockheim et al. (1989) proposed the Britannia drift recorded the LGM position adjacent to Darwin and Hatherton Glaciers. Recently Joy et al. (2014) demonstrated with cosmogenic isotopes that Britannia II likely dates to marine isotope stage 6. They also presented a spread of ages (8.0-4.7 ka) from eight glacial erratics dating the Britannia I drift. At Lake Wellman alongside lower Hatherton Glacier, a limited number of radiocarbon dates of fossil algae led Bockheim et al. (1989) to propose that the ice remained at the LGM position, ~300 m above present-day ice, until 9.9-10.5 ka. In contrast, from a spread of cosmogenic exposure-ages (~2340 ka), Storey et al. (2010) proposed a mean age of ~36 ka for the Britannia maximum and only minimal expansion of ice during

the global LGM. These interpretations have significantly different implications for size, timing, and behavior of grounded Ross Sea ice during the LGM.

To test these hypotheses, we produced detailed glacial geomorphologic maps of the ice-free regions alongside the Hatherton-Darwin outlet glacier system and dated samples of ancient algae from glacial deposits and relict ice-dammed ponds from the Britannia limit to present-day glacier. Nine radiocarbon ages from glaciolacustrine deposits at Lake Wellman indicate that ice was at the Britannia limit (likely formed during Britannia I) at ~9.0 - 10.5 ka, a result more consistent with those of Bockheim et al. (1989) than Storey et al. (2010). Another 35 radiocarbon ages from former ice-dammed ponds, requiring an expanded Hatherton Glacier, demonstrate fairly steady retreat from ~10.0-3.0 ka. Over this time, Hatherton Glacier dropped more than 200 m, to within ~50 m of present-day ice levels. Up glacier at Magnis Valley, 5 radiocarbon ages distal to the Britannia I maximum cluster tightly at 8.0 ± 0.1 ka. Even farther up glacier, 25 radiocarbon ages demonstrate Hatherton ice recession from ~10.0-5.0 ka, dropping ~200 m to approximately 40 m above present-day ice. These data are in accord with other evidence suggesting Holocene thinning of EAIS outlet glaciers in response to retreat of grounded ice in the Ross Embayment.

STRATIGRAPHIC CONTEXTUALIZATION OF VOLCANIC ASH DEPOSITED NEAR THE PERMIAN-TRIASSIC BOUNDARY IN THE KAROO BASIN, SOUTH AFRICA

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With its wealth of vertebrate fossils and well-exposed stratigraphy, the Karoo Basin is a primary location for terrestrial evidence of the Permian-Triassic Mass Extinction (PTME). Few volcanic ash deposits have been identified in upper Permian strata in South Africa. However, a porcellanite-bearing interval recently was discovered at Old Lootsberg Pass (Eastern Cape Province, S.A.) 72 m below the vertebrate-defined Permian-Triassic boundary. These silicified ash deposits mark an important geochronometric data point, and their characterization will provide insight into the continental depositional regime prior to the reported PTME.

Porcellanite was examined within a 26 m interval containing five fining-up sequences, each of which begins with cross-bedded wacke and ends in olive-grey (5Y 4/1) siltstone. Fining-up intervals are interpreted to represent cycles of point bar or lateral accretion deposits, characteristic of a meandering river system. The porcellanite beds are at the top of a fining-up cycle, in 1.6 m of laminated and rippled siltstone and claystone. Thin sections of the siltstones exhibit primary structures, including micrometer-scale cross beds, ripples, mud balls, and mm-scale burrows. Anisotropy of magnetic susceptibility (AMS) data reveals a primary, depositional fabric. A thin section from the uppermost porcellanite bed shows structureless texture containing euhedral zircon grains, which have been analyzed by ID-TIMS dating techniques.

The grain size, lithology, and primary structures present in the high-resolution, 1.6 m porcellanite section are indicative of deposition in a low-velocity fluvial regime, with little evidence for sediment reworking. The olive color dominating the section also supports the interpretation of a wet environment.

[HONORABLE MENTION STUDENT POSTER]

INCREASING THE RESOLUTION OF THE LAST GLACIAL MAXIMUM RECORD IN THE TROPICAL ANDES USING ^{10}Be COSMOGENIC SURFACE EXPOSURE DATING IN THE CORDILLERA CARABAYA, PERU

MASON, Zachary, School of Earth and Climate Sciences, University of Maine, Bryand Global Science Center, Orono, Maine 04469

Owing to the abundance of heat and moisture, the tropics are a fundamental component of the global climate system. Yet the role of the tropics in climate remains poorly understood. The Andes are home to ~95% of all tropical glaciers, making this the ideal region for studying relationships between tropical glaciers and climate. conducted a Beryllium-10 surface exposure dating experiment using ten quartz-bearing rock samples from a series of last glacial maximum (LGM) moraines, in a glaciofluvial valley system of Minas Tira within the Cordillera Carabaya of Peru. The AMS measured sample dates (excluding outliers) range from 18.4 ± 0.9 ka to 24.3 ± 0.4 ka, and give an average of 22.2 ± 0.2 ka. On a first order basis, this average fits within the global LGM timescale of 23–19 ka, supporting the view of contemporaneous glaciation between the hemispheres and a globally uniform ice age. My data also align broadly with the global CO2 record, supporting – though not confirming – the hypothesis that atmospheric CO_2 levels are closely linked to temperature changes during deglaciation.

[HONORABLE MENTION STUDENT POSTER]

DOCUMENTING THE ROCKS, SOILS, AND BIOTA OF SERPENTINITE OUTCROPS IN WESTERN MASSACHUSETTS

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Due to a low Ca:Mg ratio, high Ni, and other edaphic qualities, serpentinite-derived soils are often a stressful habitat for plants and other organisms. The serpentinite outcrops in western Massachusetts have previously received geological study, but there have been no comparative assessments of their soil chemistry and biology relative to neighboring lithologies, and no biological assessments, which took a comprehensive look at bedrock geology, soils, vascular plants, bryophytes, and lichens. Although the serpentinite outcrops of western Massachusetts are not "typical" in that they have a closed canopy and well-developed forest soils, they do have some biological distinctions, and their deviation from the commonly understood serpentine syndrome is in itself interesting. We systematically documented several of these outcrops by (1) producing new, fine-scale bedrock geologic maps for the serpentinite lenses and their immediate surroundings, (2) conducting soil sampling guided by those maps, (3) collecting and identifying the vascular plant, bryophyte, and lichen

sepecies occurring on serpentinite and neighboring schist and amphibolite, and (4) collecting vascular plant tissue samples for foliar chemistry analysis. Soil chemistry analyses (particularly Ni content and Ca:Mg ratios) indicate that the soils above serpentine rock are indeed derived from the underlying bedrock, and not from glacial till. Tsuga canadensis and Fagus grandifolia have higher levels of tissue Ni on serpentine than on schist. Although the vascular plants of distant serpentinite outcrops are less similar than the flora of neighboring amphibolite, serpentinite, and schist, the opposite is true for bryophytes. This may be because of mosses' close relationships with substrate and sensitivity to Ca levels. We hypothesize that a lack of water stress is the primary reason why the serpentinite outcrops of western Massachusetts support a closed-canopy forest with the same dominant species as adjacent lithologies, despite their characteristic serpentine soils.

SEDIMENT DEPOSITS ON CHESTERVILLE HILL, CHESTERVILLE, MAINE

MILLETTE, Patricia, ANDREWS, Grace, COULOMBE, Brandon, DORMAN, Cole, FINNEGAN, Aidan, GUNTHER, Thaddeus, HASZCO, Andrew, HICKEY, Maggie, LOWELL, Julia, MARSHALL, Thomas, REID, Isaiah, STINSON, Emma, SWEARINGEN, Lily, THOMPSON, Makao, WINTERS, Brooklynn, WITHEY, Courtney, and ZUNDEL Sawyer, Science Department, Mount Blue High School, Farmington, Maine 04938

The basis of this investigation was a number of peculiar mounds on the side of Chesterville Hill. The purpose of this experiment was to determine the origin and identity of these mounds. Methods that were used to accomplish this were: collecting sediment samples from several depths and locations on the study site, outlining the mounds with waypoints from a Garmin 76CSX GPS, acquiring profiles with a simple transit and stadia rod setup, conducting a standard grain size analysis, and observing the sediment samples under a microscope. It was discovered that the mounds are most likely longitudinal dunes made of postglacial marine sediments, which were deposited on the northeast side of Chesterville Hill by a strong prevailing wind from the northeast and another possible wind direction provided by the wind eddying in the swamp to the west.

AEOLIAN SEDIMENT DEPOSIT AT ZION'S HILL, CHESTERVILLE, MAINE

MILLETTE, Patricia, ANDREWS, Benjamin, BOLDUC, Joseph, CRANDALL, Joseph, ENG, Thomas, FOSS, Cameron, HUISH, Zoe, HUTCHINSON, Caleb, LESKO, Jonathan, LISIUS, River, MINNS, Hannah, ROBINSON, Ezekiel, RYAN, Jack, SALISBURY, Aidan, SALISBURY, William, THOMPSON-VOUGHT, Alden, UNDERWOOD, Aidan, and WEELS, Reed, Science Dept., Mount Blue High School, Farmington, Maine 04938

The purpose of this study was to identify the sediment deposit at the northeast flank of Zion's Hill in Chesterville, Maine, and determine its origin. The perimeter of the mound was mapped with GPS and waypoints were imported into Google Earth. Profiles were determined using transit and stadia rods, and their locations were also documented using GPS. The profile data and perimeter waypoints were imported into AutoCAD for a 3 dimensional view of the feature. Finally, sediment samples were collected and analyzed for grain-size distribution. Findings suggest that the mound is an aeolian dune created by the reworking of glacial-marine sediments. These were deposited post-glacially while sea-level was in the local river valleys. Following the drop in sea-level, glacial marine sediments exposed to prevailing northwest winds coming from both the Sandy River and Wilson Stream valleys and re-deposited on elevated areas in the region.

[CO-WINNERS BEST STUDENT POSTER]

HOW DO FRACTURE NETWORKS CONTRIBUTE TO THE MORPHOLOGY OF LAND-FORMS IN ACADIA NATIONAL PARK

RODRIGUEZ PADILLA, Alba Mar, and VENUTI, Gemma, College of the Atlantic, Bar Harbor, ME 04609

Thousands of visitors flock to Acadia National Park every year to admire the breathtaking landscape reflecting a rich geologic history spanning over 500 million years of tectonic, volcanic, climatic, and glacial processes. This is part of a broad study exploring how bedrock lithology, pre-glacial fracture networks, faults, Pleistocene glaciers, and modern surface processes collaborate to produce the landscape of Mt. Desert Island (MDI). There is a clear correlation between the orientation of valleys, bedrock fracture sets, and streamlined landscape features of MDI. Glaciers are often credited for the production of this iconic landscape, while the role fractures and faults has received less attention. Previous workers have suggested that glaciers took advantage of already existing landscape lows, often following the dominant ~N-S regional fracture set. Indeed, U-shaped valleys and elongate lakes generally follow the orientation of this fracture set. Where glacial striations are preserved on the bedrock or in the orientation of streamlined landscape features, we see ice flow was generally oriented at ~340, sub-parallel to the N-S fracture set (~350) and sub-perpendicular to a second ~E-W fracture set (~270-280). Based on visual inspection of hillshade images generated from a regional lidar dataset, we note that the occurrence of glacial landforms is intimately related to both of these fracture sets. Here we quantify fracture orientation from different field sites in MDI, with a more in depth analysis of the location of distinct fracture sets across the island's highest peak, Cadillac Mountain (1529' a.m.s.l.).

We performed a remote analysis of the region using hillshade images and topographic profiles to identify different glacial erosional landforms throughout the region of high topography. The results obtained from using both techniques suggest that the dominant ~N-S fracture set, oriented at ~340-350, likely hosted pre-glacial valleys in regions of high fracture density. The E-W fracture set, oriented at ~270-280, sub-perpendicular to ice flow, tends to delimit roche mountonnŽes and other glacial erosional landforms at all scales across the island. In both the remote and field measured data we find fractures and lineations of MDI oriented similar to regional faults of eastern Maine (e.g. the Norumbega Fault) at ~060. Recent work by Roy et al., 2015 suggests that inactive faults continue to strongly influence modern landscape evolution as they provide zones of weakness that focus surface processes and result in strong topographic gradients. Through an analysis of the surface hydrology and topography of the island, coupled with regional fracture and fault networks, we have identified potential areas of weakened (fractured) bedrock on Mount

Desert Island that may pinpoint the location of unmapped faults of coastal Maine.

DRONES, PHOTOMOSAICS, AND 3D MODELING: ADOPTING NEW AND TRADITIONAL METHODS TO ASSESS THE KATBERG FORMATION AT OLD WAPADSBERG PASS IN THE KAROO BASIN, SOUTH AFRICA

SASAJIMA, Takuto, GASTALDO, Robert A., Department of Geology, Colby College, 5807 Mayflower Hill Drive, Waterville, ME 04901; and NEVELING, Johann, Council for Geosciences, Private Bag x112, Pretoria, 0001, South Africa

The Karoo Basin in South Africa is known for terrestrial stratigraphic records that encompass the vertebrate-defined Permian–Triassic Mass Extinction. A change in fluvial style, from meandering to anabranching channel architectures, is reported to be associated with the post-extinction fluvial architectures of the Katberg Formation. Due to its inaccessible terrains, however, only a few studies document the lithologies, facies relationships, and architectural elements of this sandstone unit.

To understand the relationship of Katberg sandstones in a broader perspective, we measured stratigraphic sections and digitized a thick sandstone ledge exposed at one of the critical Permian–Triassic boundary sites. At Old Wapadsberg Pass, Eastern Cape Province, an aerial quadcopter was deployed to obtain high-resolution images and videos of the Katberg Sandstone. The raw digital footage was merged as a single photomosaic, which shows that the sandstone body, here, has a thickness of > 20 m, indicating that barforms are thick. To visualize the relationships between architectural elements, we applied photogrammetry to the video frames and rendered a 3-dimensional model of the mountainside, which we recognize a multistoried sandstone with internal features that are different than what is reported in other parts of the basin.

Combining our stratigraphic columns, hand samples analyses, and digital 3D models, our data do not support the current interpretation of the so-called post-extinction Katberg Sandstone as having braid plain features. Architectural elements preserved in the lowest sandstone bodies at Old Wapadsberg Pass appear to support an interpretation that these post-extinction river systems were no different than those prior to the vertebrate-defined boundary.

IMPACTS OF POPULATION RESETTLEMENT DUE TO SEA-LEVEL RISE ON ARCHAEOLOGICAL RESOURCES: A CASE STUDY

ST. AMAND, Ani, School of Earth and Climate Sciences, University of Maine, Bryand Global Science Center, Orono, Maine 04469; SANDWEISS, Dan, Department of Anthropology University of Maine, 5773 S. Stevens Hall Orono, Maine 04469-5773; and KELLEY, Alice, School of Earth and Climate Sciences, University of Maine, Bryand Global Science Center, Orono, Maine 04469

Coastal communities in the United States, as well as other portions of the world, are facing challenges posed by sea-level rise. As coastal areas are inundated and subjected to coastal processes, action is generally limited to mitigation of sites with great local significance experiencing immediate threat, while the destruction of archaeological sites by the resettlement of affected communities has been given little attention. This secondary impact of climate change threatens cultural resources outside of the immediate zone of flooding and erosion. It is imperative for archaeologists to work with climate scientists, urban planners, communities, and government officials alike to identify and protect these sites and to increase stewardship of our archaeological heritage. Here, we report a pilot study in Casco Bay, Maine, using archaeological survey data, accurate digital elevation models, local sea level rise projections, current settlement patterns, and settlement logistics data to predict potential impact to archaeological resources above the immediate impact zone through landward relocation of infrastructure. This project lays the groundwork for communities to mitigate secondary threats by identifying where populations are likely to expand based on existing infrastructure and resettlement patterns, and by articulating which archaeological sites will likely be negatively impacted.

A BI-HEMISPHERIC PERSPECTIVE ON THE LAST GLACIAL TERMINATION FROM THE SOUTHERN ALPS OF NEW ZEALAND AND THE ALTAI MOUNTAINS OF WESTERN MONGOLIA (G)

STRAND, Peter D.[1], PUTNAM, Aaron E.[1], SCHAEFER , Joerg M.[2], DENTON, George H.[1], PUTNAM, David E.[3], KOFFMAN, Tobias N.B.[2], BARRELL, David E.[4], SCHWARTZ, Roseanne[2], WARD, Caleb W. [3], DORJ, Ariunsanaa[5], AMARSAIKHAN, Pagamsuren[5], BAVUU, Tsetsenbileg[5], and SAMBUU, Oyungerel[5],

1 - School of Earth and Climate Sciences & Climate Change Institute, University of Maine, Bryand Global Sciences Center, Orono, ME 04469

2 - Lamont-Doherty Earth Observatory, Columbia University, 61 Route 9W, Palisades, NY 10964

3 - Environmental Science and Sustainability, University of Maine at Presque Isle, Presque Isle, ME 04769

4 - GNS Science, Private Bag 1930, Dunedin, 9054, New Zealand

5 - School of Geology and Mining Engineering, Mongolian University of Science and Technology, Ulaanbaatar, Mongolia

The last glacial termination ~18,000 – 11,000 yrs ago represents the last great global warming and the last time CO_2 rose by a substantial amount before the industrial period. An understanding of this remarkable climate event will help hone our understanding of the processes that drove warming to completion and of the climate system sensitivity to natural and human forcing factors, such as atmospheric CO_2. Here, we test possible drivers of the last glacial termination by comparing chronologies of mountain glacier recession in the middle latitudes of both polar hemispheres. Extra-polar mountain glaciers are highly sensitive to atmospheric temperature, and glacier landforms afford insight into past climate conditions. We present ^{10}Be surface-exposure chronologies and glacial geomorphologic maps of mountain glacier recession since the Last Glacial Maximum in the Southern Alps of New Zealand (44°S, 170°E) and in the Altai Mountains of western Mongolia (49°N, 88°E). On the basis of these chronologies, we will evaluate the relative roles of rising atmospheric CO_2, local insolation forcing, and ocean-atmosphere reorganizations in driving the warming that ended the last ice age.

GLACIER FLOW PATTERNS IN KHOTON NUUR VALLEY, BAYAN OLGII, MONGOLIA (G)

WARD, Caleb W. [1], STRAND, Peter D.[2], PUTNAM, Aaron E.[2], PUTNAM, David E.[1], AMARSAIKHAN, Pagamsuren[3], BAVUU, Tsetsenbileg[3], and SAMBUU, Oyungerel[3]

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3 - School of Geology and Mining Engineering, Mongolian University of Science and Technology, Ulaanbaatar, Mongolia 14191

The Khoton Nuur valley, located near the highest part of the Altai Mountains of far-western Mongolia, features an exceptional record of mountain glacier activity during and since the last glacial period. Here we present a reconstruction of glacial flow patterns recorded from glacial striae in the Tsagaan-gol valley, a tributary of Khoton Nuur lake, at the headwaters of the Khovd River watershed. We identified and mapped orientations of glacial striae etched into molded ice-bedrock of the Tsagaan-gol valley. These features record patterns of ice-flow at the base of the former ice-age Khoton Nuur glacier. We plotted striae orientations on a glacial geomorphological map. Ice flow directions were inferred from associated erosional landforms, such as chatter-marks and crag-and-tail features. Altogether, striae and other directional indicators from this area illustrate the broader pattern of ice-flow at the base of the former Khoton Nuur glacier, and record the relative influence of various tributary glaciers converging from different ice catchments. Data reported here provide morphological context for a coordinated effort to develop a 10Be surface-exposure chronology of glacial landforms of the Khoton Nuur system. In addition, our geologically based ice-flow reconstruction will help to evaluate and improve numerical glaciological models of this ice-age glacier system and aid refinement of inferred paleoclimatic conditions.

ANCIENT ASHES: NEW METHODOLOGY TO EFFECTIVELY CAPTURE AND ANALYZE CRYPTOTEPHRA IN ICE CORES (G)

WHEATLEY, Sarah[1], KURBATOV, Andrei[1,2], and YATES, Martin[2]

1 - Climate Change Institute, University of Maine.

2 - School of Earth and Climate Sciences, University of Maine

By improving ice core sampling methodology, novel analysis of super fine volcanic ash (cryptotephra) from large, tropical volcanic eruptions became possible. Cryptotephra has been elusive in ice core records for several decades; probably due to both physical and instrumental limitations. Previous methods for mounting tephra particles include liquid adhesive, carbon planchets, filters, carbon adhesive, double-sided tape, and epoxy. While these materials are effective for capturing large (visible) tephra particles, few have managed to both capture and successfully analyze glass shards smaller than 10 µm. Because the majority of tephra deposited from tropical volcanic events is smaller than 10 µm, our new method allows for effective capture of over 99% of tephra smaller than 5 µm from ice core samples, as well as the ability to view and analyze the particles under the SEM. This in turn will help further refine timescales across multiple ice cores.

ORAL PRESENTATIONS:

[WINNER BEST STUDENT ORAL PRESENTATION]

IRON, CLIMATE, AND MASS EXTINCTION: GEOCHEMISTRY OF GREENISH-AND REDDISH GRAY SILTSTONES STRADDLING THE PERMIAN–TRIASSIC MASS EXTINCTION IN SOUTH AFRICA

LI, Jiawen, Department of Geology, Colby College, 5807 Mayflower Hill Drive, Waterville, ME 04901

The Permian–Triassic Mass Extinction (PTME) is considered the largest in Earth's history, yet the terrestrial response is not well understood. Only a few localities in the world are known to expose the terrestrial PTME sequence. The Karoo Basin, South Africa, hosts abundant exposures of terrestrial deposits that are reported to span the vertebrate-defined Permian–Triassic Boundary (PTB). We collected greenish-gray and reddish-gray siltstones from below, at, and above the vertebrate-defined PTB at Old Lootsberg Pass, Eastern Cape Province, and Bethulie, Free State Province.

The terrestrial PTB has been associated with a transition from greenish-gray to reddish-gray siltstones. The current PTME model states that the color change is due to aridification and eolian deposition, which reflects a rapid climate change directly linked with the terrestrial PTME. This current study tests the geochemistry of these siltstones to determine the mechanism of coloration and its relation with climate. Optical mineralogical, XRF, and XRD analyses show that the two siltstones are not chemically different. Mössbauer spectroscopy reveals that the reddish-gray color is associated, not with a lower Fe^{2+}/Fe^{3+} ratio, but the presence of hematite. SEM imaging results show that hematite primarily occurs as coatings on clay minerals. Weathering indices indicate extremely wet or subaqueous environment for these siltstones. All results indicate that the reddish-gray coloration is secondary to greenish-gray color as a result of diagenetic hematite formation under constantly wet conditions.

INVESTIGATING LIQUID LINES OF DESCENT OF THE NEPHELINE SODALITE SYENITE IN THE RED HILL ALKALINE IGNEOUS COMPLEX, NEW HAMPSHIRE

MARSHALL, Hannah, Bowdoin College, Brunswick, ME

The fractionation of silica-undersaturated and oversaturated rocks from a common parent magma is difficult to explain using traditional models of fractional crystallization. Red Hill, New Hampshire is a well-studied alkaline igneous intrusive complex in the White Mountain Igneous Province that contains such cogenetic nepheline and quartz bearing rocks. Most of the rocks at Red Hill are coarse-grained syenites interpreted largely as cumulates that represent the residua of an evolving system. To more accurately investigate processes of fractional crystallization, new samples representing liquids, such as mafic enclaves and felsic dikes, were collected and analyzed to develop a model that builds upon hypotheses developed by previous research. A change in water pressure could be a major driver causing the shift in silica-saturation, but the fractionating assemblage causing this shift is up for debate. Previous work has

suggested amphiboles or pyroxenes and Fe-Ti oxides as the controlling phases, but biotite abundance in new samples suggests that this mineral may have a more important role than previously suggested.

Fifteen thin sections were analyzed using Energy Dispersive Spectroscopy on the Scanning Electron Microscope and Electron Microprobe, focusing primarily on mafic minerals, to better understand the petrogenesis of these rocks. A preliminary fractional crystallization model using biotite, amphibole and sodium-rich alkali-feldspar suggests a relationship between mafic enclaves representing part of the liquid line of descent from an assumed parent of an alkali basalt to its host in the least evolved Nepheline Sodalite Syenite (NSS-A). Samples from a dike represent the most highly evolved NSS and a potential final residual liquid. These new contributions and ongoing work suggest fractionation pathways more complicated than previously envisioned for this unique assemblage of silica-undersaturated and -oversaturated lithologies.

AN INVESTIGATION INTO THE INTERRELATIONSHIP OF HIGH SCHOOL STUDENT STEM ATTITUDES AND CONTENT PERFORMANCE (G)

ROGERS, Adam, School of Earth and Climate Sciences, Bryand Global Science Center, Orono, Maine 04469; and MILLAY, Laura, Maine Center for Research in STEM Education, University of Maine, 109 Estabrooke Hall, Orono, Maine 04469

As overall student STEM interest continues to decrease after the past few decades, there's a pertinence in understanding factor s affecting it, such as the potential interrelationship between student content performance and attitudes toward STEM. The following study explores the possibility of such an interrelationship using data collected from three ninth grade Earth science classrooms within the Maine PSP (NSF MSP 0962805). The content and attitude data were collected from students using separate surveys administered before and after instruction throughout the school year. The content survey asked mostly multiple-choice questions—some being misconception based—from each of five major modules in the curriculum. The attitude survey was composed of Likert questions covering a variety of attitudinal facets such as student self-efficacy, interest in STEM careers, and perceptions of science inside and outside of the classroom. This study found that students' post-instruction perceptions of the difficulty of science, themselves as science students, and their excitement about taking college STEM courses were significantly correlated with their post-instruction content scores. In general, these attitudes tended to be less favorable compared to pre-instruction. Furthermore, attitude scores were much less significantly correlated with classroom than content scores. An implication of these results could be that students' attitudes are less influenced through in-class factors, highlighting the difficulty of addressing decreases in STEM interest in the classroom. However, continued study is needed to better understand relationships between classroom, student attitudes, and content learning.

Keynote Speaker:

Katherine Allen, School of Earth and Climate Sciences, UMaine

"When Carbon Escaped from the Sea: The End of the Last Ice Age Recorded by Marine Microfossils"

During the late Pleistocene, the amount of CO_2 in Earth's atmosphere fluctuated by about 30% between glacial and interglacial periods (Lüthi et al., 2008). There is a growing consensus that these fluctuations were caused by major transfers of carbon between the atmosphere and the ocean (e.g., Burke and Robinson, 2012; Jaccard et al., 2009; Sikes et al., 2000; Yu et al., 2010). However, the processes that drove these cycles of ocean CO_2 uptake and release are not yet clear. Additional data on past seawater chemistry are needed, and ideas regarding past ocean circulation need to be tested. In this talk I present new geochemical data from sediment cores collected from the Southwest Pacific Ocean. Modern relationships between shell chemistry and seawater conditions can be used to infer past ocean conditions from analysis of fossil calcite accumulated on the sea floor. Fossil evidence from the Pacific supports increased carbon storage in the ocean during the last ice age, confirming the ocean's role in this major decline (and later increase) in atmospheric CO_2. Next, the challenge is to provide a compelling explanation for why this happened – what caused these dramatic changes in Earth's ocean-climate system?

GSM SECRETARY'S REPORT

Geological Society of Maine Spring Meeting,
April 1, 2016,
University of Maine, Orono

Secretary's Report

The GSM Executive Committee met on April 1, 2016, prior to the GSM Spring Meeting. Topics of discussion included the Spring Meeting, the 2016 summer field trip, GSM officers, and planning for the GSM 2016 Fall Meeting.

The GSM Spring Meeting was held in the afternoon of April 1, 2016 at the University of Maine in Orono. The afternoon program included student poster sessions followed by oral presentations.

Student presentations (abstracts presented in this newsletter) were judged by GSM Executive Council members and their designees. The students did excellent work, and awards were presented for best student presentation and posters. Keith Taylor presented awards to:

- Jiawen Li of Colby College for the best oral presentation.
- Alba Mar Rodriguez Padilla and Gemma Venuti of the College of the Atlantic for the best poster presentation.
- Honorable mentions for undergraduate poster presentations were given to:
  - Ian Medeiros and Nishanta Rajakaruna of the College of the Atlantic, and
  - Zachary Mason of The University of Maine.

On behalf of the Executive Council, Bruce Hunter presented an honorarium to Patricia Millette of Mount Blue High School, to acknowledge her work in engaging high school students to participate in GSM meetings, and bringing student presenters every year (including three poster presentations this year).

The award presentation was followed by an excellent Keynote address by Dr. Katherine Allen of the University of Maine.

GSM President Marty Yates convened the business meeting following the afternoon program.

Business Meeting Minutes

Acknowledgements

GSM President Marty Yates thanked the Geology Club at UMO for setting up and hosting this Spring Meeting, and acknowledged and thanked the student presenters for their hard work and preparation of stunning posters and talks, and for providing great discussion for the afternoon.

GSM Officer Updates

Marty is pleased to announce that Dan Belknap has agreed to once again serve as GSM Newsletter Editor. The newsletter is one of the primary ways we communicate with each other, and is delivered primarily by email. Dan noted that input will be expected and appreciated in a timely fashion.

GSM will transition the Webmaster position. Martha Mixon has done a marvelous job keeping the GSM website up to date, and has many ideas of how it can be enhanced. Marty will keep GSM members updated as the conversation advances. There is also a Facebook page under development, for communication with GSM members and interested parties.

2016 Summer Field Trip

The GSM 2016 summer field trip will be held on July 16 and 17 in the Brooks/Monroe area. David West (Middlebury College) and Steve Pollock (USM, retired) will lead the bedrock portion of the trip, and Roger Hook (UM) and Woody Thompson (ME Geological Survey, retired) will lead the surficial geology portion. This will be a great trip – please mark your calendars. If you would like to stay in rooms at Unity College on Friday or Saturday, July 15 or 16, please make reservations by July 1. [See our webpage www.gsmmaine.org or Facebook page facebook.com/GSMMaine for up-to-date details]

GSM 2016 Fall Meeting

The 2016 Fall Meeting will be held Friday, November 4, 2016. The venue will hopefully be the Augusta Civic Center (not yet confirmed). Content is still under consideration, potentially LiDAR and geographic information systems.

Announcements

Doug Reusch (UMF) announced a field trip he is leading through the Eagle Hill Foundation. One space is available for the trip, June 19 - 25, 2016. There is a link with details on the GSM website.

Walter Anderson suggested that GSM consider transitioning the Walter Anderson Fund to an endowment fund. Walter discussed his experience creating such a fund with the International Appalachian Trail. The fund could encourage and accept larger contributions, and provide continued support for educational and research ventures. Marty encouraged Walter to send him information for discussion by the Executive Council.

Walter Anderson also expressed his willingness to give a presentation to GSM on the International Appalachian Trail and its geological implications.

Marty adjourned the business meeting at 5:10pm.

Respectfully submitted by Lisa Jacob, Secretary
ljj@smemaine.com 207-829-5016

GSM TREASURER'S REPORT

Fiscal Year August 1, 2014 to July 31, 2015

(Note: GSM Fiscal Year Starts August 1)

	Actual
Income	
Dues Paid	$3,385.00
Donations for Anderson Fund	$265.00
Other Income	
Sale of Bulletin #4	$12.00
Field Trip 2014 registrations from NH Geological Society	$250.00
Field Trip 2015 registrations	$775.00
Subtotal	**$4,687.00**
Expenses	
Postal Stamps	$19.60
Thank You Cards for Anderson Fund Donors	$8.39
Annual Corporate Report	$35.00
Meeting Expenses	
Fall Meeting 2014	$1,002.80
Spring Meeting 2015	$599.60
Field Trip to Isle Au Haut 2015	$3,778.05
Anderson Fund Awards	
UMF Geology field trip	$750.00
Spring Meeting Awards	$250.00
Engraving plate on Awards	$65.20
Plaque	
Web site expenses	$64.88
Subtotal	**$6573.52**
Net Decrease	**$1,886.52**

End of Year Asset Summary July 31, 2015

Account	Sub-Account	July 31, 2015
General Fund		
	Business Savings	$134.61
	Money Market	$2,528.77
	Checking	$911.88
	Total	3,575.26
Anderson Fund		
	Business Savings	$25.03
	4 Certificates of Deposit	$20,398.37
	Total	$20,423.40
Total Assets	All Funds	$23,998.36
Liabilities		$0.00

Respectfully submitted, June, 16, 2016
Bruce E. Hunter (Treasurer, 2016)
bruce.e.hunter@gmail.com

NEWS FROM THE CAMPUSES

Please send news items from the campuses, events and announcements, or member news, to Dan Belknap, Newsletter Editor for future issues. Interesting Maine-related images are also always welcome.

Marlboro Beach, Frenchman Bay 10/24/15 – D.F. Belknap

Cape Neddick lighthouse 12/18/15 – D.F. Belknap

New Meadows River seismic profiling 08/21/14 – D.F. Belknap. (It's hardly ever this calm when collecting data!)

MEMBERSHIP DUES STATEMENT

The GEOLOGICAL SOCIETY OF MAINE, INC. (often referred to as **GSM**) is a non-profit corporation established as an educational Society to advance the professional improvement of its members; to inform its members and others of current and planned geological programs in Maine; to encourage continuing social contact and dialog among geologists working in Maine; and to further public awareness and understanding of the geology of the State of Maine; and of the modem geological processes which affect the Maine landscape and the human environment.

The Society holds three meetings each year, in the late fall (Annual Meeting), early spring, and mid-summer (usually a field trip). A newsletter, ***The Maine Geologist***, is published for all members three times a year. The Society year runs from Aug. 1 to Jul. 31. Annual dues and gift or fund contributions to the Society are tax deductible. There are four classes of memberships:

FEE SCHEDULE

$ 20.00	REGULAR MEMBER	Graduate geologists, or equivalent, with one year of practice in geology, or with an advanced degree.
$ 20.00	INSTITUTIONAL MEMBER	Libraries, societies, agencies, businesses with interests in or practicing geology and related disciplines.
$ 10.00	ASSOCIATE MEMBER	Any person or organization desirous of association with the Society.
$ 5.00	STUDENT MEMBER	Persons currently enrolled as college or university students.

THE GEOLOGICAL SOCIETY OF MAINE ANNUAL RENEWAL / APPLICATION FOR MEMBERSHIP

Regular Member	$ 20.00	$__________	Name ____________________________________
Institutional Members	$ 20.00	$__________	
Associate Member	$ 10.00	$__________	Address ____________________________________
Student Member	$ 5.00	$__________	
Contributions to GSM		$__________	____________________________________
(please write gift or fund on check)			
TOTAL ENCLOSED		$__________	____________________________________

Make checks payable to:
Geological Society of Maine
Bruce Hunter, GSM Treasurer
44 Old Fairgrounds Rd.
Unity, ME 04355

Email Address ____________________________________

(GSM funds include the Walter Anderson Fund___, and discretionary gifts as noted by contributor)

- -

2015/2016 SOCIETY YEAR BEGAN August 1 - PLEASE SEND DUES TO TREASURER.

THE GEOLOGICAL SOCIETY OF MAINE
c/o Daniel F. Belknap, Newsletter Editor
Department of Earth Sciences

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University of Maine
Orono, ME 04469-5790 <belknap@maine.edu>

PLEASE PAY YOUR DUES

THE MAINE GEOLOGIST is the Newsletter of the Geological Society of Maine, published three times a year, in mid-winter, summer, and early fall, for members and associates.

Correspondence about **membership** in the Society, **publications** and **dues** should be mailed to:
Bruce E. Hunter, bruce.e.hunter@gmail.com, GSM Treasurer, 44 Old Fairgrounds Rd., Readfield, ME 04355
Items for inclusion in the **Newsletter** may be directed to:
Daniel F. Belknap, Dept. Earth Sciences, University of Maine,
Orono, ME 04469-5790 <belknap@maine.edu>

President	Marty Yates	(2016)	University of Maine, yates@maine.edu
Vice President	Henry Berry	(2016)	Maine Geological Survey, henry.n.berry@maine.edu
Secretary	Lisa Jacob	(2016)	Sevee & Maher Engineers Inc., ljj@smemaine.com
Treasurer	Bruce Hunter	(2016)	Maine Dept. Environmental Protection, bruce.e.hunter@gmail.com
Newsletter Editor	Dan Belknap	(2017)	University of Maine, belknap@maine.edu
Directors	Chris Morrell	(2016)	R.W. Gillespie & Associates, Inc., cmorrell@rwg-a.com
	Keith Taylor	(2017)	St. Germain Collins, keitht@stgermaincollins.com
	Steve Kelley	(2018)	Haley & Aldrich, skelley@haleyaldrich.com