



**17th Annual
Geoscience Student
Research Symposium
March 1st & 2nd, 2012
The Future of
Yesterday's Science... Today!**

17th Annual

Geosciences Student Research Symposium

Thursday March 1st, 2011: 10:00 - 5:15

Friday March 2nd, 2011: 10:00 - 5:15

4069 Derring Hall

Department of Geosciences

Virginia Tech

Welcome to the Geosciences Student Research Symposium! GSRS is produced and organized by the graduate students of the Department of Geosciences at Virginia Tech. The symposium is designed to allow students the opportunity to prepare and present talks in their current research areas for both professional growth and public awareness.

Constructive feedback on student presentations by faculty, students, and visiting guests are highly encouraged. Evaluation forms will be available at the symposium for those interested. Completed forms should be returned to the boxes provided in the presentation room. Each talk is scheduled to last 12 minutes with three minutes for questions.

Both days of the symposium breakfasts and light snacks will be served in the 4th floor west lobby, and lunches will be provided in the Geosciences Museum (2062 Derring). A catered dinner in the Geosciences Museum will conclude this year's symposium, and all are welcome to attend.

We are extremely grateful and wish to extend our appreciation to the corporate, local, and alumni sponsors of this event: BP, Conoco-Phillips, Consol Energy, Schnabel Engineering, PK's, Buffalo Wild Wings, Next Door Bake Shop, Spoke 'n' Beans, Sub Station II, Zeppoli's, and a number of generous alumni! We also thank the Department of Geosciences for their generous support. Finally, to the faculty, volunteers, and student participants, for donating their time and expertise – without you this event would not take place.

Your 2012 GSRS Coordinating Committee:

Committee Chair: Jacalyn Wittmer

Fundraising: Sahale Casebolt

Abstract Book/Scheduling: Mike Meyer, Drew Hawkins, Josh Valentino

Food/Drink: Ken O'Donnell, Lulwah Al Thani, Adam Angel, Jesse Broce, Kyle Mack

Website: Karina Cheung, Dave Mercier

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THURSDAY, MARCH 1st, 2012

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9:00	Breakfast	4 th Floor Lobby, Derring	
		SESSION: Welcome to yesterday's tomorrow!	
10:00	Introduction		
10:05	Matthew Steele-MacInnis	QUARTZ PRECIPITATION AND FLUID INCLUSION CHARACTERISTICS IN SUBMARINE HYDROTHERMAL SYSTEMS	1
10:20	Jacalyn Wittmer	STRATIGRAPHIC PALEOECOLOGY AND DIVERSITY OF MOLLUSK ASSOCIATIONS FROM THE LATE QUATERNARY OF THE PO PLAIN, ITALY	2
10:35	Sarah Mazza	THERMAL STRUCTURE OF THE MAIN CENTRAL THRUST, MOUNT EVEREST REGION, HIMALAYAS	3
10:50	Break		
11:05	Mike Meyer	ANIMAL BURROW SYSTEMS AND MICROBIAL MAT INTERACTION OF THE LATE EDIACARAN SHIBANTAN LIMESTONE OF SOUTH CHINA	4
11:20	Iliya Smithka	MODELING CRUSTAL ASSIMILATION AND CHLORIDE ENRICHMENT IN LAVAS AT OCEANIC SPREADING CENTERS	5
11:35	Denise Levitan	CHARACTERIZATION OF STREAM WATERS IN THE VICINITY OF THE UNDEVELOPED COLES HILL URANIUM DEPOSIT, PITTSYLVANIA COUNTY, VIRGINIA	6
11:50	Lunch	Lunch in the Museum with prospective students (2062 Derring)	
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2:30	Josh Valentino	TRANSIENT LANDSCAPES, TEMPORALLY VARIABLE EROSION RATES, AND THE IMPACT OF GLACIATION AND CLIMATE CHANGE ON LANDSCAPE MORPHODYNAMICS	9
2:45	Drew Hawkins	EVENNESS AND SPECIES ABUNDANCE IN GRAPTOLITE COMMUNITIES DURING LATE ORDOVICIAN CLIMATE CHANGE AND THE END ORDOVICIAN MASS EXTINCTION	10
3:00	Sharmin Shamsalsadati	APPLYING INTERFEROMETRY IN DIFFUSIVE SYSTEMS: ESSENTIAL NOISE SOURCES FOR GREEN'S FUNCTION RECOVERY	11
3:15	Rita Klebesz	MAGMA CHAMBER HETEROGENEITIES RECORDED BY MELT INCLUSIONS FROM MT. SOMMA-VESUVIUS, ITALY	12
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3:45	Matt Francis	PIEZOMETRY AND STRAIN RATE ESTIMATES ON THE GREATER HIMALAYAN SERIES UPPER AND LOWER MARGINS	13
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4:15	Dave Mercier	ICE MELTING ABOVE A CONVECTING, CRYSTALLIZING MAGMATIC SILL ON MARS	15
4:30	Aida Farough	THE ROLE OF SERPENTINIZATION IN LOST CITY HYDROTHERMAL FIELD ON MID ATLANTIC RIDGE	16
4:45	Pilar Madrigal	CRUST-MANTLE BOUNDARY EXPOSED IN THE SANTA ELENA OPHIOLITE, COSTA RICA	17
5:00	Shreya Singh	PRELIMINARY MODELING OF TWO-PHASE FLOW AT THE MAIN ENDEAVOUR VENT FIELD	18
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10:15	Carol Johnson	THE ROLE OF NANO-COMPONENTS IN CONTAMINATED MINE WATER OUTFLOW CROSSING A REDOX BOUNDARY	21
10:30	Kathy Davenport	HIGH-RESOLUTION SEISMIC IMAGING OF AFTERSHOCKS FOLLOWING THE AUGUST 23, 2011 CENTRAL VIRGINIA EARTHQUAKE	22
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11:00	Rachel Corrigan	NEARSHORE SEDIMENTATION AND DEPOSITION OF ORGANIC CARBON IN THE LOWER CHESAPEAKE BAY	23
11:15	Jesse Broce	ANALYSIS OF MARKUELIA-LIKE FOSSIL EMBRYOS OF THE YANJIAHE	24
11:30	Ryan Brandon	MULTI-FACETED FRACTURE CHARACTERIZATION IN A CRYSTALLINE BEDROCK AQUIFER	25
11:45	Kui Liu	ON ITERATIVE INVERSIONS OF GLOBAL CRUSTAL STRUCTURE USING FINITE FREQUENCY SENSITIVITY KERNELS	26
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2:30	Meijing Zhang	A NEW ZONATION ALGORITHM WITH PARAMETER ESTIMATION USING	30
2:45	Ariel Conn	EARTHQUAKE WAVE ATTENUATION FROM GULF COAST TO NORTHERN GREAT PLAINS	31
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4:15	Anthony Giuffre	CONTROLS OF POLYSACCHARIDE CHEMISTRY ON KINETICS AND THERMODYNAMICS OF CALCIUM CARBONATE NUCLEATION	36
4:30	Kyle Ashley	TITANIUM-IN-QUARTZ THERMOBAROMETRY: NANOSCALE INVESTIGATIONS TO OROGENIC APPLICATIONS	37
4:45	William Joyce	DELINEATING SUBSURFACE PATHWAYS FOR WATER LOSS FROM MOUNTAIN LAKE, GILES COUNTY, VA	38
5:00	Pilar Lecumberri Sanchez	CHARACTERIZATION OF THE TRANSITION BETWEEN A DEEP PORPHYRY-COPPER AND A HIGH-SULFIDATION EPITHERMAL SYSTEM: RED MOUNTAIN, AZ	39
5:30	Dinner	In the Museum (2062 Derring)	

QUARTZ PRECIPITATION AND FLUID INCLUSION CHARACTERISTICS IN SUBMARINE HYDROTHERMAL SYSTEMS

STEELE-MACINNIS, Matthew, Dept. of Geosciences, Virginia Tech, Blacksburg, VA 24061

A numerical modeling study of quartz dissolution and precipitation in a sub-seafloor hydrothermal system has been used to predict where quartz could be deposited and potentially trap fluid inclusions. The spatial distribution of zones of quartz dissolution and precipitation is complex, owing to the fact that quartz solubility depends on many inter-related factors, including temperature, fluid salinity and fluid immiscibility, and is further complicated by the fact that quartz exhibits both prograde and retrograde solubility behavior, depending on the fluid temperature and salinity. Using the *PVTX* properties of H₂O-NaCl, the petrographic and microthermometric properties of fluid inclusions trapped at various locations within the hydrothermal system have been predicted. Vapor-rich inclusions are trapped as a result of the retrograde temperature-dependence of quartz solubility as the circulating fluid is heated in the vicinity of the magmatic heat source. Coexisting liquid-rich and vapor-rich inclusions are also trapped in this region when quartz precipitates as a result of fluid immiscibility, which reduces the bulk quartz solubility. Vapor generated as a result of fluid immiscibility migrates upward, entraining variable amounts of brine and/or heated seawater. During ascent, vapor condenses and mixes with seawater entrained in the upwelling plume. Fluid inclusions trapped in the shallow subsurface near the seafloor vents and in the underlying stockwork are liquid-rich and homogenize at 200-400 °C. Salinities of these inclusions are similar (but generally not equal) to that of seawater. Volcanogenic massive sulfide (VMS) deposits represent the uplifted and partially eroded remnants of fossil submarine hydrothermal systems. Because the spatial variation of fluid-inclusion properties in this portion of the submarine hydrothermal system can be predicted, relationships between fluid-inclusion properties and location within the hydrothermal system can be inferred. Fluid inclusion properties can thus be used as an exploration tool for VMS deposits. Importantly, fluid inclusions can define vectors to infer the direction towards potential massive sulfide ore within fossil submarine hydrothermal systems, and can be used to determine the "up" direction within a deformed or tilted volcanic pile.

Advisor: Dr. R. J. Bodnar