

# PROCEEDINGS OF THE TWENTY-SEVENTH ANNUAL KECK RESEARCH SYMPOSIUM IN GEOLOGY

April 2014  
Mt. Holyoke College, South Hadley, MA

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**KECK GEOLOGY CONSORTIUM  
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Oberlin College, Pomona College, Smith College, Trinity University, Union College,  
Washington & Lee University, Wesleyan University, Whitman College, Williams College**

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**2013-2014 PROJECTS**

**MAGNETIC AND GEOCHEMICAL CHARACTERIZATION OF IN SITU OBSIDIAN, NEW MEXICO:**

Faculty: *ROB STERNBERG*, Franklin & Marshall College, *JOSHUA FEINBERG*, Univ. Minnesota, *STEVEN SHACKLEY*, Univ. California, Berkeley, *ANASTASIA STEFFEN*, Valles Caldera Trust, and Dept. of Anthropology, University of New Mexico

Students: *ALEXANDRA FREEMAN*, Colorado College, *ANDREW GREGOVICH*, Colorado College, *CAROLINE HACKETT*, Smith College, *MICHAEL HARRISON*, California State Univ.-Chico, *MICHAELA KIM*, Mt. Holyoke College, *ZACHARY OSBORNE*, St. Norbert College, *AUDRUANNA POLLEN*, Occidental College, *MARGO REGIER*, Beloit College, *KAREN ROTH*, Washington & Lee University

**TECTONIC EVOLUTION OF THE FLYSCH OF THE CHUGACH TERRANE ON BARANOF ISLAND, ALASKA:**

Faculty: *JOHN GARVER*, Union College, *CAMERON DAVIDSON*, Carleton College

Students: *BRIAN FRETT*, Carleton College, *KATE KAMINSKI*, Union College, *BRIANNA RICK*, Carleton College, *MEGHAN RIEHL*, Union College, *CLAUDIA ROIG*, Univ. of Puerto Rico, Mayagüez Campus, *ADRIAN WACKETT*, Trinity University,

**EVALUATING EXTREME WEATHER RESPONSE IN CONNECTICUT RIVER FLOODPLAIN ENVIRONMENT:**

Faculty: *ROBERT NEWTON*, Smith College, *ANNA MARTINI*, Amherst College, *JON WOODRUFF*, Univ. Massachusetts, Amherst, *BRIAN YELLEN*, University of Massachusetts

Students: *LUCY ANDREWS*, Macalester College, *AMY DELBECQ*, Beloit College, *SAMANTHA DOW*, Univ. Connecticut, *CATHERINE DUNN*, Oberlin College, *WESLEY JOHNSON*, Univ. Massachusetts, *RACHEL JOHNSON*, Carleton College, *SCOTT KUGEL*, The College of Wooster, *AIDA OROZCO*, Amherst College, *JULIA SEIDENSTEIN*, Lafayette College

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**A GEOBIOLOGICAL APPROACH TO UNDERSTANDING DOLOMITE FORMATION AT DEEP SPRINGS LAKE, CA**

Faculty: *DAVID JONES*, Amherst College, *JASON TOR*, Hampshire College,  
Students: *KYRA BRISSON*, Hampshire College, *KYLE METCALFE*, Pomona College, *MICHELLE PARDIS*,  
Williams College, *CECILIA PESSOA*, Amherst College, *HANNAH PLON*, Wesleyan Univ., *KERRY STREIFF*,  
Whitman College

**POTENTIAL EFFECTS OF WATER-LEVEL CHANGES ON ON ISLAND ECOSYSTEMS: A GIS SPATIOTEMPORAL ANALYSIS OF SHORELINE CONFIGURATION**

Faculty: *KIM DIVER*, Wesleyan Univ.  
Students: *RYAN EDGLEY*, California State Polytechnical University-Pomona, *EMILIE SINKLER*, Wesleyan University

**PÃHOEHOE LAVA ON MARS AND THE EARTH: A COMPARATIVE STUDY OF INFLATED AND DISRUPTED FLOWS**

Faculty: *ANDREW DE WET*, Franklin & Marshall College, *CHRIS HAMILTON*, Univ. Maryland, *JACOB BLEACHER*, NASA, GSFC, *BRENT GARRY*, NASA-GSFC  
Students: *SUSAN KONKOL*, Univ. Nevada-Reno, *JESSICA MCHALE*, Mt. Holyoke College, *RYAN SAMUELS*, Franklin & Marshall College, *MEGAN SWITZER*, Colgate University, *HESTER VON MEERSCHIEDT*, Boise State University, *CHARLES WISE*, Vassar College

**THE GEOMORPHIC FOOTPRINT OF MEGATHRUST EARTHQUAKES: A FIELD INVESTIGATION OF CONVERGENT MARGIN MORPHOTECTONICS, NICOYA PENINSULA, COSTA RICA**

Faculty: *JEFF MARSHALL*, Cal Poly Pomona, *TOM GARDNER*, Trinity University, *MARINO PROTTI*, *OVSICORI-UNA*, *SHAWN MORRISH*, Cal Poly Pomona  
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**HOLOCENE AND MODERN CLIMATE CHANGE IN THE HIGH ARCTIC, SVALBARD NORWAY**

Faculty: *AL WERNER*, Mt. Holyoke College, *STEVE ROOF*, Hampshire College, *MIKE RETELLE*, Bates College  
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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions—Obsidian Provenance, New Mexico Project**

**MAGNETIC AND GEOCHEMICAL CHARACTERIZATION OF GEOREFERENCED OBSIDIAN SAMPLES FROM FOUR SOURCE AREAS IN NEW MEXICO**

Faculty: ROB STERNBERG, Franklin & Marshall College

M. STEVEN SHACKLEY, Geomorphological XRF Laboratory, Albuquerque, NM,

JOSHUA M. FEINBERG, Institute for Rock Magnetism, University of Minnesota

ANASTASIA STEFFEN, Valles Caldera Trust, and Dept. of Anthropology, University of New Mexico

**OBSIDIAN ARTIFACT PROVENANCE STUDY OF THE PIEDRAS MARCADAS PUEBLO, ALBUQUERQUE, NEW MEXICO**

ALEXANDRA FREEMAN, The Colorado College

Research Advisor: Christian M. Schrader, The Colorado College

**MAGNETIC PROPERTIES OF CERRO TOLEDO OBSIDIAN**

ANDREW GREGOVICH, Colorado College

Research Advisors: Christian M. Schroder, Colorado College and Joshua M. Feinberg, University of Minnesota

**GEOCHEMICAL CHARACTERIZATION OF THE MULE CREEK OBSIDIAN, NEW MEXICO**

CAROLINE HACKETT, Smith College

Research Advisor: Mark Brandriss

**MAGNETIC CHARACTERISTICS OF OBSIDIANS IN MULE CREEK, NM**

MICHAEL BABATUNDE HARRISON, California State University, Chico

Research Advisor: Todd J. Greene

**BASIC PALEOMAGNETIC PROPERTIES OF OBSIDIAN FROM THE MOUNT TAYLOR REGION OF NEW MEXICO**

MICHAELA KIM, Mount Holyoke College

Research Advisor: Michelle Markley

**HYSTERESIS AND LOW-TEMPERATURE MAGNETIC PROPERTIES OF MOUNT TAYLOR OBSIDIAN**

ZACH OSBORNE, St. Norbert College

Research Advisor: Joshua M. Feinberg, University of Minnesota - IRM

**EFFECTS OF WILDFIRE ON FLOAT OBSIDIAN CLASTS FROM THE VALLES CALDERA, NEW MEXICO**

AUDRIANNA POLLEN, Occidental College

Research Advisor: Dr. Scott Bogue

**INTRA AND INTER-SOURCE MAGNETIC PROVENANCING OF MULE CREEK REGIONAL SOURCE OBSIDIAN**

MARGO REGIER, Beloit College

Research Advisors: James Rougvie, Beloit College and Joshua M. Feinberg, University of Minnesota

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**GEOCHEMICAL VARIABILITY OF OBSIDIAN IN WESTERN NEW MEXICO WITH LABORATORY-  
BASED PXRF**

KAREN ROTH, Washington and Lee University  
Research Advisor: Jeffrey Rahl

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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions— Chugach Terrane, Alaska Project**

**STUDIES IN RESURRECTION BAY AND BARANOF ISLAND AIMED AT UNDERSTANDING THE  
TECTONIC EVOLUTION OF THE CHUGACH-PRINCE WILLIAM TERRANE, ALASKA**

Faculty: JOHN I. GARVER, Union College  
CAMERON DAVIDSON, Carleton College

**DETRITAL ZIRCON U/PB AGES OF THE PALEOCENE ORCA GROUP AND UPPER CRETACEOUS  
VALDEZ GROUP, RESURRECTION BAY, ALASKA**

BRIAN K. FRETT, Carleton College  
Research Advisor: Cameron Davidson

**EXHUMATION OF THE BARANOF SCHIST, ALASKA DETERMINED THROUGH DETRITAL  
ZIRCON FISSION TRACK DATING**

KATE KAMINSKI, Union College  
Research Advisor: John I. Garver

**U/PB DATING OF DETRITAL ZIRCONS, BARANOF ISLAND, SE ALASKA**

BRIANNA J. RICK, Carleton College  
Research Advisor: Cameron Davidson, [John Garver, Union College]

**THERMAL EVOLUTION OF THE SITKA GRAYWACKE, BARANOF ISLAND, ALASKA, REVEALED  
THROUGH ZIRCON FISSION TRACK DATING**

MEGHAN PAIGE RIEHL, Union College  
Research Advisor: John I. Garver

**OXYGEN AND HAFNIUM ISOTOPE GEOCHEMISTRY OF ZIRCON, QUARTZ, AND GARNET FROM  
THE CRAWFISH INLET AND KRESTOF PLUTONS, BARANOF ISLAND, ALASKA**

CLAUDIA I. ROIG, University of Puerto Rico, Mayagüez Campus  
Research Advisor: Dr. Aaron J. Cavosie

**PETROGRAPHY AND GEOCHEMISTRY OF THE CRAWFISH INLET AND KRESTOF ISLAND  
PLUTONS, BARANOF ISLAND, ALASKA**

ADRIAN A. WACKETT, Trinity University  
Research Advisor: Diane R. Smith

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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions— Fluvial Response to Extreme Weather Project**

**EVALUATING EXTREME WEATHER RESPONSE IN THE CONNECTICUT RIVER FLOODPLAIN ENVIRONMENT**

Faculty: ROBERT NEWTON, Smith College  
JON WOODRUFF, University of Massachusetts  
ANNA MARTINI, Amherst College  
BRIAN YELLEN, University of Massachusetts

**EXTREME PRECIPITATION AND EROSION IN UPLAND WATERSHEDS: A CASE STUDY FROM SHERMAN RESERVOIR, MA**

LUCY ANDREWS, Macalester College  
Research Advisors: Kelly MacGregor and Brian Yellen

**IDENTIFYING STORM DEPOSITS IN A DRY FLOOD CONTROL RESERVOIR IN WESTERN MASSACHUSETTS, USA**

AMY DELBECQ, Beloit College  
Research Advisor: Susan Swanson

**SEDIMENTATION BEHIND CONWAY ELECTRIC DAM, SOUTH RIVER, WESTERN MASSACHUSETTS**

SAMANTHA DOW, University of Connecticut  
Research Advisor: William Ouimet

**A CASE STUDY OF STORM DEPOSITION IN LITTLEVILLE LAKE, HUNTINGTON, MA**

CATHERINE DUNN, Oberlin College  
Research Advisor: Amanda Schmidt

**DELTA PROGRADATION IN A FLOOD CONTROL RESERVOIR: A CASE STUDY FROM LITTLEVILLE LAKE, HUNTINGTON, MA**

RACHEL JOHNSON, Carleton College  
Research Advisor: Mary Savina

**IMPACTS OF EXTREME PRECIPITATION ON SEDIMENT YIELDS FOR POST GLACIAL UPLANDS OF THE NORTHEAST**

WESLEY JOHNSON, University of Massachusetts Amherst  
Research Advisor: Jon Woodruff

**DISCERNING EXTREME WEATHER EVENTS IN THE CONNECTICUT RIVER SYSTEM THROUGH THE STUDY OF SEDIMENTS IN UPLAND DAMS AND FLOOD CONTROL RESERVOIRS OF WESTERN MASSACHUSETTS AND SOUTHWESTERN VERMONT**

SCOTT KUGEL, The College Of Wooster  
Research Advisors: Dr. Mark Wilson and Dr. Meagen Pollock

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AIDA OROZCO, Amherst College  
Research Advisor: Anna M. Martini

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**CLAY MINERALOGY FINGERPRINTING OF SEDIMENTS DEPOSITED FROM TROPICAL STORM  
IRENE IN THE CONNECTICUT RIVER WATERSHED**

JULIA SEIDENSTEIN, Lafayette College

Research Advisor: Dru Germanoski

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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions—Geobiology of Dolomite Formation Project**

**A GEOBIOLOGICAL APPROACH TO UNDERSTANDING DOLOMITE FORMATION AT DEEP SPRINGS LAKE, CA**

Faculty: DAVID S. JONES, Amherst College  
JASON M. TOR, Hampshire College

**MICROBIAL COMMUNITY ANALYSIS OF DEEP SPRINGS LAKE, CA: EXPLORING THE ROLE OF AEROBIC BIOFILMS IN BIOGENIC DOLOMITE PRECIPITATION**

KYRA BRISSON, Hampshire College  
Research Advisor: Jason M. Tor

**GEOCHEMICAL EVOLUTION OF BRINES CONSTRAINED BY NAHCOLITE CONCRETIONS OF DEEP SPRINGS LAKE, CA**

K.S. METCALFE, Pomona College  
Research Advisors: David Jones and Robert Gaines

**IMPLICATIONS OF SULFATE REDUCTION ON DOLOMITE FORMATION AT DEEP SPRINGS LAKE, CALIFORNIA**

MICHELLE PARADIS, Williams College  
Research Advisor: Dr. Phoebe A. Cohen

**MAGNESIUM ISOTOPE RECORDS ASSOCIATED WITH DOLOMITE FORMATION IN A MODERN LAKE**

CECILIA PESSOA, Amherst College  
Research Advisor: David S. Jones

**GEOCHEMISTRY OF PORE WATERS, SPRINGS, AND SEDIMENTS AT DEEP SPRINGS LAKE, CA: IMPLICATIONS FOR DOLOMITE FORMATION**

HANNAH PLON, Wesleyan University  
Research Advisor: Timothy Ku

**EXPLORING MEDIATION OF DOLOMITE PRECIPITATION USING STABLE CARBON AND OXYGEN ISOTOPES, DEEP SPRINGS LAKE, CA**

KERRY R. STREIFF, Whitman College  
Research Advisor: Kirsten Nicolaysen

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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions— GIS Approach to Water-Level Change Project**

**POTENTIAL EFFECTS OF WATER-LEVEL CHANGES ON ISLAND ECOSYSTEMS: A GIS SPATIOTEMPORAL ANALYSIS OF SHORELINE CONFIGURATION**

Faculty: KIM DIVER, Wesleyan University

**GIS APPROACH TO WATER-LEVEL CHANGE: POTENTIAL EFFECTS OF WATER-LEVEL CHANGES ON ISLAND ECOSYSTEMS**

RYAN EDGLEY, California State Polytechnic University, Pomona, CA

Research Advisor: Kim Diver

**DECLINING WATER LEVEL IN LAKE MICHIGAN-HURON AND THE EFFECT ON ISLANDS IN THE MASSASAUGA PROVINCIAL PARK, ONTARIO**

EMILIE SINKLER, Wesleyan University

Research Advisor: Kim Diver

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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions—Martian Pāhoehoe Lava Project**

**LAVA ON MARS AND THE EARTH: A COMPARATIVE STUDY OF INFLATED AND DISRUPTED FLOWS**

Faculty: ANDREW DE WET, Franklin & Marshall College  
CHRIS HAMILTON, University of Maryland and NASA-GSFC  
JAKE BLEACHER, NASA-GSFC  
BRENT GARRY, NASA-GSFC

**CHARACTERIZATION OF DEPRESSIONS IN THE MCCARTYS FLOW COMPARED TO DEPRESSIONS IN ELYSIUM REGION ON MARS**

SUSAN KONKOL, University of Nevada, Reno  
Research Advisor: W. Patrick Arnott

**BASALT PLATEAU ESCARPMENT CRACK PATTERNS-FIELD, GIS & ANALOG MODELING OF THE MCCARTYS FLOW AND IMPLICATIONS FOR MARS**

JESSICA MCHALE, Mount Holyoke College  
Research Advisor: Michelle Markley

**CHANNEL BIFURCATION AND SHATTER RING FEATURES ASSOCIATED WITH THE TWIN CRATERS LAVA FLOW, ZUNI-BANDERA VOLCANIC FIELD, NM: INSIGHTS INTO SIMILAR FEATURES ON MARS**

RYAN C. SAMUELS, Franklin & Marshall College  
Research Advisor: Andrew de Wet

**VERTICAL VARIATIONS WITHIN THE MCCARTYS FLOW: A PETROGRAPHIC AND GEOCHEMICAL ANALYSIS**

MEGAN SWITZER, Colgate University  
Research Advisor: Karen Harpp

**THE INFLUENCE OF TOPOGRAPHIC OBSTACLES ON BASALTIC LAVA FLOW MORPHOLOGIES**

HESTER VON MEERSCHIEDT, Boise State University  
Research Advisor: Dr. Brittany D. Brand

**ANALYSIS OF CRACK SYSTEMS WITHIN THE MCCARTYS LAVA FLOW WITH POSSIBLE APPLICATIONS TO MARS**

CHARLES WISE, Vassar College

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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions— Earthquake Geomorphology, Costa Rica Project**

**THE GEOMORPHIC FOOTPRINT OF MEGATHRUST EARTHQUAKES: MORPHOTECTONICS OF THE 2012 MW 7.6 NICOYA EARTHQUAKE, COSTA RICA**

Faculty: JEFF MARSHALL, Cal Poly Pomona  
TOM GARDNER, Trinity University  
MARINO PROTTI, Universidad Nacional de Costa Rica  
SHAWN MORRISH, Cal Poly Pomona

**ACTIVATION OF A SECONDARY OBLIQUE SLIP FAULT FOLLOWING THE MW=7.6 SEPTEMBER 5, 2012, NICOYA,**

**COSTA RICA, EARTHQUAKE**  
RICHARD ALFARO-DIAZ, University of Texas at El Paso  
Research Advisors: Terry Pavlis and Aaron Velasco

**EARTHQUAKE RELOCATION AND FOCAL MECHANISM ANALYSIS IN THE AREA OF RUPTURE FOLLOWING THE MW=7.6 NICOYA EARTHQUAKE, COSTA RICA**

GREGORY BRENN, Union College  
Research Advisor: Dr. Matthew Manon

**MODELING COSEISMIC SLIP OF THE 2012 NICOYA PENINSULA EARTHQUAKE, COSTA RICA: ROLES OF MEGATHRUST GEOMETRY AND SURFACE DISPLACEMENT**

PAULA BURGI, Smith College  
Research Advisor: Jack Loveless

**HOLOCENE BEACHROCK FORMATION ON THE NICOYA PENINSULA, PACIFIC COAST, COSTA RICA**

CLAYTON FREIMUTH, Trinity University  
Research Advisor: Thomas Gardner

**ANALYSIS OF AFTERSHOCKS FOLLOWING THE SEPTEMBER 5, 2012 NICOYA, COSTA RICA MW 7.6 EARTHQUAKE**

SHANNON FASOLA, St. Norbert College  
Research Advisor: Nelson Ham

**COASTAL UPLIFT AND MORTALITY OF INTERTIDAL ORGANISMS FROM A MAGNITUDE 7.6 EARTHQUAKE, NICOYA PENINSULA, COSTA RICA**

CLAIRE MARTINI, Whitman College  
Research Advisors: Kevin Pogue and Bob Carson

**ASSESSMENT OF CURRENT RADIOMETRIC DATING TECHNIQUES OF BEACHROCK ON THE NICOYA PENINSULA, COSTA RICA**

ELIZABETH OLSON, Washington and Lee University  
Research Advisor: David Harbor

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**RELATIONSHIP BETWEEN BEACH MORPHOLOGY AND COSEISMIC COASTAL UPLIFT, NICOYA PENINSULA, COSTA RICA**

CAROLYN PRESCOTT, Macalester College

Research Advisor: Kelly MacGregor

**STRATIGRAPHIC ARCHITECTURE OF AN ANOMALOUS HOLOCENE BEACHROCK OUTCROP, PLAYA GARZA, NICOYA PENINSULA, COSTA RICA**

DUSTIN STEWART, Cal Poly Pomona

Research Advisor: Jeff Marshall

**PREMONITORY SEISMICITY BEFORE THE SEPTEMBER 5, 2012, MW 7.6 NICOYA EARTHQUAKE, COSTA RICA: RELATIONSHIP WITH MAINSHOCK RUPTURE AND AFTERSHOCK ZONE**

ANTHONY MURILLO GUTIÉRREZ, Universidad Nacional de Costa Rica (UNA)

Research Advisor: Marino Protti

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**Keck Geology Consortium: Projects 2013-2014**  
**Short Contributions— Climate Change, Svalbard, Norway Project**

**HOLOCENE AND MODERN CLIMATE CHANGE IN THE HIGH ARCTIC, SVALBARD, NORWAY**

Faculty: AL WERNER, Mount Holyoke College

MIKE RETELLE, Bates College

STEVE ROOF, Hampshire College

**A PALEOCLIMATE RECONSTRUCTION OF LAKE LINNÉ, SVALBARD, NORWAY**

JOHANNA EIDMANN, Williams College

Research Advisor: Mea Cook

**INTERPRETATION OF SEDIMENTATION EVENTS DURING THE 2012/13 SEASON IN A  
PROGLACIAL LAKE, LAKE LINNÉ, SVALBARD**

DANA REUTER, Mount Holyoke College

Research Advisor: Alan Werner

**INVESTIGATIONS INTO ABRUPT AND LARGE SCALE LAKE LEVEL FLUCTUATIONS IN AN  
ARCTIC KARST LAKE, KONGRESSVATNET, KAPP LINNÉ, SVALBARD**

NATASHA D. SIMPSON, Pitzer College

Research Advisor: Robert Gaines

**ANALYSIS OF 2012-2013 SEDIMENT TRAPS IN LINNÉDALEN, SPITSBERGEN: IMPLICATIONS FOR  
VARVE FORMATION AND PALEOCLIMATE INTERPRETATION**

JOSH SOLOMON, Colgate University

Research Advisor: Bruce Selleck

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