WORKSHOP INITIAL REPORT: EXPANDING THE GEOSCIENCE PIPELINE BY CONNECTING EDUCATORS WITH EARLY CAREER IODP SCIENTISTS

GSA Annual Meeting - Seattle
October 24, 2017

Sharon Cooper, Columbia Univ./IODP
Jon Lewis, Indiana Univ. of PA
R. Mark Leckie, UMass Amherst
Steve Hovan, Indiana Univ. of PA
Lisa White, University of California, Berkeley
School of Rock video
Evolution of an Idea

“...the United States is at risk of losing its competitive edge as fewer students pursue advanced degrees and careers in STEM disciplines and insufficient progress is made in engaging the full diversity of the Nation’s potential talent pool in those fields.” - NSF
School of Rock 2017
July 10-17
Transiting from Subic to Townsville

Co-funded by USSSP/IODP and a workshop funding award made to Indiana University of Pennsylvania (IUP) through NSF under Improving Undergraduate STEM Education

Goals
• encourage early career scientists and secondary-level educators from communities that remain poorly represented in STEM fields, and particularly geosciences, to participate.
• showcase and educate about JR/IODP capabilities.
• increase the diversity of the talent pool that will apply to sail on IODP and related expeditions in the future.
• build a diverse mentoring pool for undergraduate STEM/geoscience students.
• create local partnerships to bolster the STEM/geoscience pipeline.
Instructor Team

- Mark Leckie, UMass, Amherst
- Jon Lewis, IUP
- Steve Hovan, IUP
- Lisa White, UCMP
- Sharon Cooper, USSSP/IODP
Participant teams

- Rachel Bernard, UT Austin Phd student/ Colleen Henegan, KIPP Austin Collegiate High School
- Chloe Branciforte, Ventura College Asst. professor/Julia Domenech, Buena High School
- Thomas Cawthern, Salisbury University Asst. professor/David Hansen, Salisbury Middle School
- Kim Hatch, Long Beach City College/working with Lisa White
- Kerrita Mayfield, Holyoke High School/working with Mark Leckie
- Stephanie Milam-Edwards, Tempe High School/Marilyn Raming, Tempe Union High School
- Dori Read, Gates Middle School/Diane Thompson, Boston University Asst. professor
- Suzy Urbaniak, Kent Street Senior High School, Perth Australia/ Matthew Campbell, University of Queensland Phd student
Curriculum covered

- Sedimentology
- Biostratigraphy
- Core flow
- Paleomagnetism
- Oxygen and carbon isotopes
- Earth structure and tectonics
- K/Pg Boundary
- PETM
- EO Boundary
- Diversity and inclusion strategies
- JR technology/engineering
- Oceanography 101
- Mentoring
- Project planning time
Work in labs

Team exercises

Demonstrating tectonic movements

Equator crossing certificates on the bridge
School of Rock 2017 - Outcomes

• Workshop initial report – draft completed
• 10 action plans for implementing IODP content and enhancing diversity in the geosciences in 10 different communities
• At least four proposals in the works for upcoming NSF solicitations for addressing geosciences (one submitted last week!) diversity at the undergraduate, graduate and high school levels
• Most of the group intends to apply to sail in the near future – either as scientists or EO officers
• Ideas for articles for scientific journals (instructors)
• Lots of new energy, ideas and connections!
Results

Initial survey results indicate that SOR 2017 was successful in helping participants:

A. Understand current obstacles in promoting diversity in STEAM fields and how to facilitate changes.

B. Develop deeper knowledge in geosciences (specifically oceanography, climatology, sedimentology, micropaleontology, structural geology, meteorology and plate tectonics).

C. Increase overall knowledge of the nature and process of science.
Action Plan examples

**Austin, TX:** *Due to the inaccessibility of rock thin sections to most K-12 teachers, we plan to construct five classroom kits that can be loaned out to be used in conjunction with the lesson plan. These kits will be advertised to other middle and high school teachers (science and physics) at KIPP Collegiate, and beyond. At KIPP Collegiate, 97% of the students are Hispanic/Latino.*

**Tempe, Arizona:** The level of instruction and subsequent knowledge obtained from this experience help us to better connect the process of science with these diverse groups of students. We hope to connect students to geoscience through STEAM driven lessons. We believe that by showing that science is accessible to these students, they will seriously consider the geosciences as a possible major.

**Mt. Holyoke, MA:** *Mt. Holyoke High School after school science club.*

HHS is: 70% Latinx, 40% of the HoH are women, 96% FRL, 30% are ELL students
Latinx – ungendered designation of Spanish heritage persons in the American dispora; HoH – Head of Household; FRL – a marker denoting family income below the Federal poverty line; ELL – English Language Learner who may be fluent/literate in a language other than English
Survey Results

**Pre-SOR Use of IODP science in teaching**

- STRONGLY DISAGREE: 2
- DISAGREE: 7
- NEITHER: 0
- AGREE: 7
- STRONGLY AGREE: 0

**Post-SOR Use of IODP science in teaching**

- STRONGLY DISAGREE: 3
- DISAGREE: 0
- NEITHER: 0
- AGREE: 3
- STRONGLY AGREE: 13
Survey Results

Pre-SOR working on proposals for funding aimed at diversity in the geosciences

- Strongly Agree: 19%
- Agree: 19%
- Neither: 37%
- Disagree: 19%
- Strongly disagree: 0%

Post-SOR working on proposals for funding aimed at diversity in the geosciences

- Strongly Agree: 56%
- Agree: 44%
- Neither: 0%
- Disagree: 0%
- Strongly disagree: 0%
Survey Results

Pre-SOR collaborating with colleague to broaden STEM participation among UR...

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Post-SOR collaborating with colleague to broaden STEM participation...

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Conclusions

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