What factors promote interest in geology? Results from surveys of GSA members

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RQ: What factors contribute to geoscientists’ pursuit of geology?

Study 1: Interviews of 37 field geologists (LaDue & Pacheco, 2013)

Study 2A: Survey at 2011 GSA Annual Meeting in Minneapolis, MN

Study 2B: Revised Survey at 2013 GSA Annual Meeting in Denver, CO
RQ: What factors contribute to geoscientists’ pursuit of geology?

Study 1: Interviews of 37 field geologists (LaDue & Pacheco, 2013)

Study 2A: Survey at 2011 GSA Annual Meeting in Minneapolis, MN

Study 2B: Revised Survey at 2013 GSA Annual Meeting in Denver, CO
Study 1: How did you get interested in Geology? (LaDue & Pacheco, 2013)

**Study Population:**
- 37 field geologists
- 17 female
- Mean Age: 37.6 years
- Highest Education:
  - 10 PhD
  - 11 MA/MS
  - 8 BA/BS
  - 8 undergrads

![Figure 1. LaDue & Pacheco, 2013](image)
<table>
<thead>
<tr>
<th>Influences</th>
<th>Levine et al., 2007</th>
<th>Houlton, 2010</th>
<th>Hoisch &amp; Bowie, 2010</th>
<th>LaDue &amp; Pacheco, 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Coursework</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Awareness of Geosciences</td>
<td>X</td>
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<td></td>
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<tr>
<td>Interest in Science</td>
<td></td>
<td></td>
<td>X</td>
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</tr>
<tr>
<td>Geoscience Careers</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Field Trips</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Family</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Outdoor Experiences</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Travel</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rocks, Fossils</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Local Geology</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Table 4. LaDue & Pacheco, 2013
Study 2: GSA Survey

Open-ended Question:

▪ 2011 How did you get interested in geology?
  ▪ “In your answer consider how childhood, family, school, non-school, outdoor experiences and/or people have influenced your academic or career path. Please include details like your age at the time, the people involved and the setting in your response.”

▪ 2013 Three separate prompts
  ▪ “Did you have any notable childhood experiences that substantially contributed to your choice of the geological sciences for your academic or career path?”
  ▪ “Did you have any notable experiences in middle school, high school, or college…”
  ▪ “Did you have any notable experiences in or with nature or geological field experiences…”
Close-ended Questions: **People**

9. Did you have any teachers, professors, or academic mentors who **positively** influenced your academic or career path?

- No, not particularly
- Yes

*If yes, check all that apply:*

- Pre-college peer
- College peer
- Pre-college teacher
- Intro geology professor
- Non-intro geology professor
- College academic advisor
- Other *(please explain)*
11. Did you participate in any of the following activities growing up?

- Hiking
- Orienteering
- Science Museums
- Rock Climbing
- Rock/Fossil Collecting
- Reading about Science Topics
- Video Games
  - First Person Shooter
  - Multi-player online games
- Sports
- Boy/Girl Scouts
- Camping
- Science TV Programs
- Science Clubs (4-H, FFA, environmental science club, etc.)
- Other: please explain...
Limitations

This is not a validated *scale* of interest in geosciences.

This is not *generalizable* to all geologists since the sample population was attendees at GSA.
Sample Population

2011 GSA Survey
- 81 participants
- 39 female
- 67 white
- Mean age: 31.8 years
- Highest Degree:
  - 16 PhD
  - 8 MA/MS
  - 56 N/A – currently pursuing, or undergrad, or N/A

2013 GSA Survey
- 101 participants
- 46 female
- 83 white
- Mean age: 33.2 years
- Highest Degree
  - 30 PhD
  - 13 MA/MS
  - 30 BA/BS
  - 28 N/A – currently pursuing or N/A
## Method – Analysis

<table>
<thead>
<tr>
<th>Open-ended Responses</th>
<th>Close-ended Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Two rounds of inter-rater coding with rubric generated in LaDue &amp; Pacheco, 2013</td>
<td>• Total counts</td>
</tr>
<tr>
<td>• Total Counts</td>
<td>• Spearman correlation</td>
</tr>
<tr>
<td>• Word Cloud</td>
<td>• Chi square</td>
</tr>
</tbody>
</table>
Method ➔ Results

<table>
<thead>
<tr>
<th>Open-ended Responses</th>
<th>Theme</th>
<th>Close-ended Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>Middle/High School</td>
<td>126</td>
</tr>
<tr>
<td>26</td>
<td>College Professor</td>
<td>84</td>
</tr>
<tr>
<td>18</td>
<td>Hiking</td>
<td>152</td>
</tr>
<tr>
<td>55</td>
<td>Rocks &amp; Fossils</td>
<td>100</td>
</tr>
<tr>
<td>55</td>
<td>Family</td>
<td>109</td>
</tr>
</tbody>
</table>
Open-ended Responses
“There was a really good science program at my high school. They took us on field trips to Michigan's Upper Peninsula and out west to national parks. It really sparked my interest.”
Open-ended Responses *People*
“My family has a lot of scientists, which helped my interest. My parents always took me on trips including to many National Parks out west with a lot of geological influences.”
“One of the professors helped me and was very enthusiastic about geology.”
Open-ended Responses Earth
“I was always attracted by outdoor activities (trekking) and always appreciated landscapes and maps.”
Close-ended Survey (out of 182 participants)

Pre-College
- 125 took Earth Science in Middle or High School

High School Courses

- Earth Science: 58
- Environmental Science: 23
- Dual Credit: 12

People:
- Peer: 18
- Teacher: 44
Close-ended Survey (out of 182 participants)

College
- 47 entered college as a Geology Major / 133 did not...
- 39 switched from other STEM Major
- 151 influenced by someone in college environment

![Bar chart showing the influence of different sources on college choice](chart.png)
Close-ended Survey (out of 182 participants)

Hobbies

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hiking</td>
<td>160</td>
</tr>
<tr>
<td>Camping</td>
<td>130</td>
</tr>
<tr>
<td>Museums</td>
<td>120</td>
</tr>
<tr>
<td>Sports</td>
<td>110</td>
</tr>
<tr>
<td>Rock/Fossil...</td>
<td>100</td>
</tr>
<tr>
<td>Reading...</td>
<td>90</td>
</tr>
<tr>
<td>Boy/Girl...</td>
<td>80</td>
</tr>
<tr>
<td>Science TV</td>
<td>70</td>
</tr>
<tr>
<td>Video Games</td>
<td>60</td>
</tr>
<tr>
<td>Rock Climbing</td>
<td>50</td>
</tr>
<tr>
<td>Science Clubs</td>
<td>40</td>
</tr>
</tbody>
</table>

0 20 40 60 80 100 120 140 160 180
Number of Participants
Close-ended Survey (out of 182 participants)

Do any family members have careers in STEM?

<table>
<thead>
<tr>
<th>STEM</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td></td>
<td>95</td>
</tr>
<tr>
<td>ARTS</td>
<td>130</td>
<td>52</td>
</tr>
</tbody>
</table>

Do any family members have careers in art, music, creative writing?

<table>
<thead>
<tr>
<th>Parent with STEM Career</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>31</td>
<td>54</td>
</tr>
<tr>
<td>Male</td>
<td>51</td>
<td>36</td>
</tr>
</tbody>
</table>

\[ X^2 (2, N=172) = 21.099 \]

\[ p < .01 \]

\[ X^2 (2, N=172) = 8.456 \]

\[ p < .01 \]
Interesting non-significant results

No significant gender differences (chi square):
- Hobbies (ex. camping, scouts, hiking, watching TV, etc.)
- Entering college as a geology major

No significant difference in taking middle/high school earth science:
- Entering college as a geology major
- Entering college as a STEM major
Conclusions

**Academic, People, Earth themes emerge** (van der Hoeven Kraft et al., 2011)

**Pre-College**
- Students take High School Earth science (32%) (AGI Status of Geoscience Workforce, 2014)

**College**
- Advisors & Introductory Course Professors
- Only 26% came to college as a geology major

**Family**
- Significantly higher number of parents in STEM than in humanities/arts careers
- Significantly more for Female participants
Future work

1. Approach this question using existing *Interest* theoretical framework (Hedi & Renninger, 2006)

2. Scale Development

3. Data collection with other samples (ex. non-science, other science, other geoscientists)

4. Evaluate questions with diverse comparison groups (ex. culture/ethnicity, geography, etc.)
Open-ended Responses *Emotion*
Acknowledgements

Stacy Terlep, Undergraduate Research Assistant
Northern Illinois University

Julie Libarkin & Geocognition Research Lab
Michigan State University
## Close-ended Survey

### Significant Correlations

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter as Geology major * Enter as STEM</td>
<td>-.247**</td>
</tr>
<tr>
<td>Enter as Geology major * PhD</td>
<td>.177*</td>
</tr>
<tr>
<td>Enter as Geology major * Rock and Fossil Collection</td>
<td>.232**</td>
</tr>
<tr>
<td>Enter as STEM major * Boy/Girl Scouts</td>
<td>.173*</td>
</tr>
<tr>
<td>No Degree * Non-School Influence</td>
<td>.223**</td>
</tr>
<tr>
<td>Family Influence * Parent with STEM career</td>
<td>.249**</td>
</tr>
<tr>
<td>Family Influence * Museums</td>
<td>.213**</td>
</tr>
<tr>
<td>Parent with STEM career * Parent with ARTs career</td>
<td>.191**</td>
</tr>
<tr>
<td>Parent with STEM career * Male</td>
<td>-.207**</td>
</tr>
<tr>
<td>Parent with STEM career * Female</td>
<td>.212**</td>
</tr>
</tbody>
</table>

*Spearman Correlations * p<.05  **p<.01*