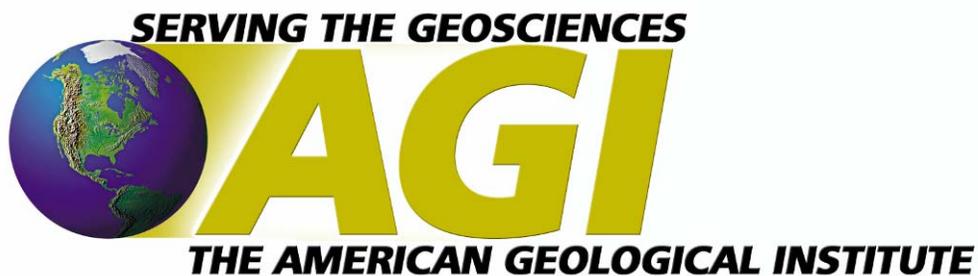


# Student and Faculty Employment Attitudes in the Geosciences 2006



Report by the American Geological Institute, Geoscience Workforce  
<http://www.agiweb.org>

Report by Margaret Anne Baker  
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A growing portion of decision makers in academia, private industry, and government are concerned about shortages in the science, engineering, and technology (SET) workforce. This heightened awareness is in part to several reports released in the last year looking at that nation's competitiveness in the global market. For years, the geosciences have been aware of the need to increase the number of students entering the pipeline, but the recent upswing in the world's commodities market and impending retirement of a generation of geoscientists has increased this pressure. There are serious questions about who will fill these positions.

Representatives from the petroleum industry have indicated that they will need to replace over 50% of their geoscience technical workforce within the next ten years, a level that represents close to 40,000 jobs. There are similar reports for all sectors of the geoscience workforce, with more jobs currently available for geoscience graduates at all levels than applicants to fill them. Despite this wealth of geoscience jobs, few students are applying and taking these positions. The current production of geoscientists from US colleges and universities that are considered part of the potential employment pool, namely graduates with master's and doctorates, is about 1,200 per year. In hopes of better understanding the careers decisions being made by current geoscience students, the American Geological Institute conducted a survey from March to April 2006 to document the attitudes of students and academic advisors of the professional pathways for geoscientists.

A total of 1358 students and 558 advisors responded to the survey from at least 262 schools. Based on the domain name of the emails provided, the students and faculty represent a wide range of schools and geographic locations. Both students and advisors were asked to select employment sectors in which they would seek employment or in which they would recommend that a student actively consider:

- a. State/Local Government
- b. Federal Government
- c. Environmental Industry
- d. Mining Industry
- e. Petroleum Industry
- f. Academia
- g. K-12 Education
- h. High-Technology/Communications
- i. Finance
- j. General Business
- k. Continue Education/PostDoc
- l. Other
- m. Look outside of geosciences

Students were also asked what degree they were currently pursuing and what year they expect to graduate. Advisors were also asked to provide the highest degree offered by their department. Copies of the survey instruments are available in Appendix B.

## Faculty

The 558 responding faculty represent a wide range of schools. There does not appear to be any significant difference in the opinions of advisors based on highest degree awarded or geographic location. Table 1 shows the responses of faculty based on the highest degree awarded by their department and the overall attitude of advisors towards the 13 career pathways.

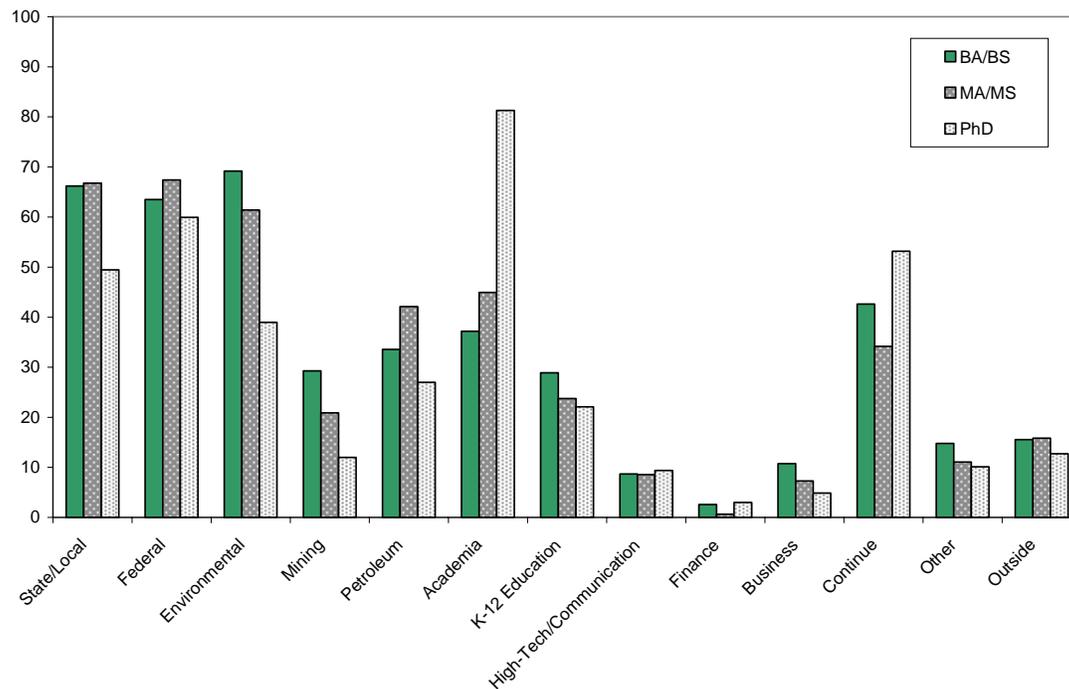
**Table 1 Attitudes of Faculty Respondents by Highest Degree Awarded**

	BA/BS	MA/MS	Ph.D.	All Advisors
State/Local Government	79%	75%	67%	72%
Federal Government	70%	64%	66%	67%
Environmental Industry	96%	95%	84%	89%
Mining Industry	41%	40%	36%	38%
Petroleum Industry	65%	68%	69%	67%
Academia	64%	54%	77%	68%
K-12 Education	82%	61%	63%	67%
High-Technology/ Communications	15%	23%	23%	18%
Finance	5%	6%	7%	6%
General Business	10%	10%	9%	9%
Continue Education/PostDoc	71%	51%	59%	60%
Other	10%	11%	6%	8%
Look Outside of geosciences	16%	9%	19%	16%

## Students

Of the 1358 students who responded to the survey, more than half (772) are seeking BA/BS degrees. Graduates students are roughly split between MA/MS (316) and Ph.D. (267) seekers. Table 2 and Figure 1 show the percent of students who would consider different career pathways by degree level. The three most preferred career pathways, regardless of education level, are Federal Government (64%), State/Local Government (63%), and the Environmental Industry (61%). Students were significantly less interested in non-environmental private sector careers, with the two next most preferred career pathways being academia (48%) and continuing education (43%).

Despite the marketability of a master's degree, many of these students are more interested in entering the public sector rather than the private sector job market. The top six career pathways for master students include: State/Local Government (67%), Federal Government (67%), Environmental Industry (61%), Academia (45%), Petroleum Industry (42%), and Continuing Education (34%). Ph.D. students show an even stronger pull towards the public sector, with Academia (81%) as the clear preferred career path. Other preferred career pathways for Ph.D. students include employment in the Federal Government (60%), a PostDoc position (53%), and employment in State/Local Government (49%). Undergraduate geoscience students show a similar preference in potential career paths, with the largest percent (69%) considering a career in the Environmental Industry. This preference for undergraduate students may be in part due to the availability of entry-level jobs in this sector.



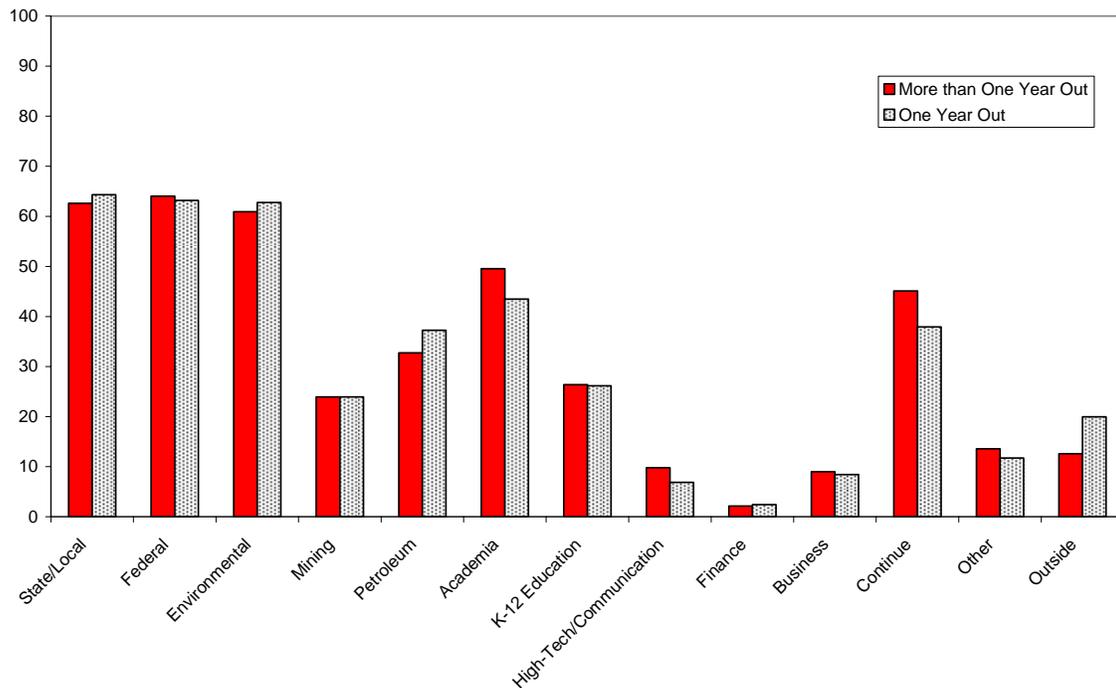
**Figure 1** Comparison of all students based on the degree level

The preference of public sector over private sector jobs does not change significantly between student who will be entering the job market in the coming year and those that are several years from entering the workforce. Figure 2 shows this trend for the entire student population and does not change significantly depending on the student's degree. One exception to this general trend is that students within a year of graduating are slightly more likely to consider a career in the Petroleum Industry than students with several years before receiving their degree.

**Table 2** Attitude of Students Graduating within One Year

	BA/BS		MA/MS		Ph.D.	
	1 yr	>1 yr	1 yr	>1 yr	1 yr	>1 yr
State/Local Government	67%	66%	70%	65%	39%	52%
Federal Government	64%	63%	66%	69%	50%	63%
Environmental Industry	71%	68%	60%	63%	32%	41%
Mining Industry	31%	29%	19%	22%	7%	13%
Petroleum Industry	33%	34%	49%	36%	25%	27%
Academia	36%	38%	42%	48%	82%	81%
K-12 Education	28%	29%	24%	23%	23%	22%
High-Technology/ Communications	7%	9%	7%	10%	4%	11%
Finance	3%	2%	0%	1%	5%	2%
General Business	10%	11%	7%	7%	5%	5%
Continue Education/PostDoc	41%	44%	32%	36%	41%	56%
Other	14%	15%	11%	12%	7%	11%
Look Outside of geosciences	21%	13%	23%	9%	7%	14%

Part of this trend may be related to the career advice that these students receive from faculty advisors, many with limited direct exposure to private industry careers. This limited exposure may reduce the number of students that have had access to non-academic experiences either through internships or collaboration with other sectors during their degrees. A future survey should inquire about the age of master's students in comparison to Ph.D. students. For master's students who came directly out of an undergraduate program, there is a good chance that most of these students have only been exposed to an academic career path and may be part of the reasoning behind the limited number of master's students seeking private sectors careers.



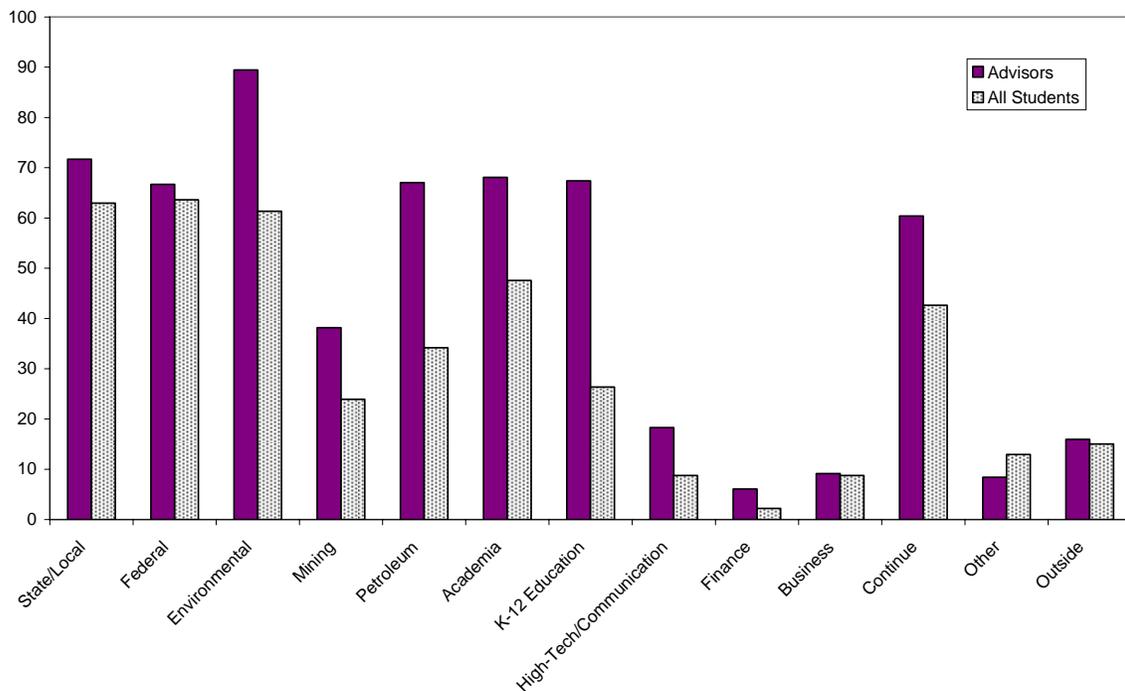
**Figure 2** Comparison of all students within one year of graduation and those students more than one year away from graduating.

This limited interest by students to enter non-environmental private sector careers is problematic. These industries are projected to continue to grow over the next several years as industrializing nations increase their demands for raw materials and energy. An increased global demand for raw materials means that these industries will be hiring geoscientists to replace retiring workers and possibly to expand exploration and development capacity. The other career pathways, such as academia and government agencies, are expected to be focused purely on replacement of retirees. If there are not sufficient geoscientists to fill these position from the U.S. applicant pool, companies and institutions are likely either to fill these positions with foreign-trained geoscientists or to hire more engineers/non-geoscience technical workers.

### Comparison of Students and Advisors

There appears to be a significant difference between the career pathways that advisors suggest and student interest in pursuing these careers. For example, 89% of advisors suggest a career path in the environmental sector and only 61% of all students would consider this career. When the student figure is further broken down based on degree, only 39% of Ph.D. students would consider working in the environmental sector. This low percent may be due to Ph.D. students feeling overqualified for positions that they see geared toward geoscientists at a much earlier stage in their career. Undergraduates show the most interest in the environmental sectors at 69% and 61% of students pursuing a master's degree would consider this career.

Another surprising difference between advisors and students are related to interest in K-12 Education. Two-thirds of advisors say that they would suggest K-12 Education as a career path, but only 26% of all students would pursue a career in K-12 Education. This trend is surprising given few physical science departments have a history of promoting K-12 Education as a career pathway.



**Figure 3** Comparison of the attitude of advisors to suggest given careers paths and students' interests in pursuing these careers.

The 2003 report on Earth and Space Science Ph.D.s includes a section on job search methods and useful sources for information on career planning. In Table 7 of this report, the students were asked about the influence of their advisor on getting their initial employment and advisors were listed as being useful resources if the job was either in academia or a PostDoc. None of the resources listed, with the exception of informal

channels, were useful for the full range of career pathways available to students. These results coupled with the results of this survey suggest that there is a need for improved communications with students at all stages of the pipeline about potential careers. Internships and collaborative projects provide students with connections beyond their department. There are also several electronic sources specific for geoscience-related jobs, but currently these sources are primarily advertising jobs overseas.

## Appendix A

### Responding Departments:

Angelo State University  
Arkansas Tech University  
Auburn University  
Austin Peay State University  
Baylor University  
Beloit College  
Bemidji State University  
Binghamton University  
Bloomsburg University  
Boise State University  
Boston College  
Boston University  
Bowdoin College  
Bowling Green State University  
Brevard College  
Bridgewater State College  
Brigham Young University  
Brigham Young University, Idaho  
Bryn Mawr College  
Bucknell University  
Buffalo State College  
California Institute of Technology  
California State Polytechnic University  
California State University, Bakersfield  
California State University, Chico  
California State University, East Bay  
California State University, Long Beach  
California State University, Northridge  
California State University, Pomona  
California State University, San Bernardino  
California State University, Stanislaus  
California University of Pennsylvania  
Carleton College  
Central Connecticut State University  
Central Michigan University  
Central Missouri State University  
Central Washington University  
Clemson University  
Colby College  
Colgate University  
College of Charleston  
College of William & Mary  
Colorado College  
Colorado School of Mines  
Colorado State University  
Columbia University  
Cornell College  
Cornell University  
Dartmouth College  
DePauw University  
Dickinson College  
East Carolina University  
Eastern Connecticut State University  
Eastern Illinois University  
Eastern Kentucky University  
Edinboro University of Pennsylvania  
Emporia State University  
Florida Atlantic University  
Florida International University  
Fort Hays State College  
Fort Lewis College  
Franklin and Marshall College

Fullerton College  
Georgia Institute of Technology  
Georgia Southern University  
Georgia Southwestern State University  
Grand Valley State University  
Hardin-Simmons University  
Harvard University  
Hobart & William Smith Colleges  
Hofstra University  
Hope College  
Humboldt State University  
Idaho State University  
Indiana State University  
Indiana University / Purdue University, Fort Wayne  
Indiana University / Purdue University, Indianapolis  
Indiana University, Bloomington  
Iowa State University  
James Madison University  
Juniata College  
Kansas State University  
Keene State College  
Kent State University  
La Salle University  
Lake Superior State University  
Lawrence University  
Lehigh University  
Long Island University  
Louisiana State University  
Macalester College  
Mansfield University  
Marshall University  
Massachusetts Institute of Technology  
Miami University  
Michigan Technological University  
Middlebury College  
Millersville University  
Millsaps College  
Minnesota State University, Mankato  
Mississippi State University  
Missouri State University  
Montana State University  
Montana State University  
Montana Tech of the University of Montana  
Montclair State University  
Moravian College  
Murray State University  
New Jersey City University  
New Mexico Institute of Mining and Technology  
New Mexico State University  
North Dakota State University  
Northeastern Illinois University  
Northeastern University  
Northern Arizona University  
Northern Illinois University  
Northland College  
Northwest Missouri State University  
Northwestern University  
Oberlin College  
Occidental College  
Ohio State University  
Ohio University  
Ohio Wesleyan University  
Oklahoma State University  
Old Dominion University

Oregon State University	University of Missouri, Kansas City
Pacific Lutheran University	University of Montana
Pennsylvania State University	University of Nebraska, Lincoln
Princeton University	University of Nebraska, Omaha
Purdue University	University of Nevada, Las Vegas
Radford University	University of Nevada, Reno
Rice University	University of New Hampshire
Rutgers, The State University of New Jersey	University of New Orleans
Saint Cloud State University	University of North Carolina, Chapel Hill
Saint Louis University	University of North Carolina, Charlotte
Salem State College	University of North Carolina, Pembroke
San Diego State University	University of North Carolina, Wilmington
San Francisco State University	University of North Dakota
Smith College	University of Northern Colorado
Sonoma State University	University of Northern Iowa
Southern Illinois University	University of Oklahoma
Southern Nazarene University	University of Oregon
Southern Oregon University	University of Pittsburgh
Stanford University	University of Puerto Rico, Mayaguez
SUNY College at Brockport	University of Rochester
SUNY, Albany	University of Saint Thomas
SUNY, Cortland	University of South Carolina
SUNY, Fredonia	University of South Florida
SUNY, Geneseo	University of Southern California
SUNY, Oneonta	University of Tennessee
SUNY, Stony Brook	University of Texas at Austin
Syracuse University	University of Texas, El Paso
Temple University	University of the Pacific
Tennessee Technological University	University of the South
Texas A&M University	University of Toledo
Texas A&M University, Corpus Christi	University of Tulsa
Texas Christian University	University of Utah
Texas Tech University	University of Vermont
The Richard Stockton College of New Jersey	University of Washington
Trinity University	University of West Georgia
Tufts University	University of Wisconsin, Eau Claire
Union College	University of Wisconsin, Green Bay
University of Akron	University of Wisconsin, Madison
University of Alabama	University of Wisconsin, Milwaukee
University of Alaska, Fairbanks	University of Wisconsin, Oshkosh
University of Arizona	University of Wisconsin, River Falls
University of California, Berkeley	University of Wyoming
University of California, Los Angeles	Utah State University
University of California, Riverside	Vassar College
University of California, Santa Barbara	Virginia Polytechnic Institute and State University
University of California, Santa Cruz	Washington State University
University of Cincinnati	Washington University in St. Louis
University of Colorado	Wayne State University
University of Connecticut	Weber State University
University of Florida	Wellesley College
University of Georgia	Wesleyan University
University of Hawai'i	West Virginia University
University of Idaho	Western Carolina University
University of Illinois at Urbana-Champaign	Western Kentucky University
University of Iowa	Western Michigan University
University of Kansas	Western State College of Colorado
University of Kentucky	Western Washington University
University of Louisiana at Lafayette	Wheaton College
University of Maine	Willamette University
University of Maryland	Williams College
University of Massachusetts	Worcester State College
University of Memphis	Wright State University
University of Michigan	Yale University
University of Minnesota	Youngstown State University
University of Missouri, Columbia	

## Appendix B

### STUDENT SURVEY

The American Geological Institute is conducting a brief survey of the professional employment pathways that geoscientists take through their career. To this end, we are interested in the areas that you expect to look for professional employment following completion of your education.

We would appreciate your considering the following questions. As a thank-you, we are holding two drawings from participant responses, one for a copy of the new 5<sup>th</sup> Edition of the Glossary of Geology, and another for a 1-year subscription to Geotimes magazine.

1. If you were considering professional employment today, what employment sectors would you seek employment opportunities in? Check all that apply
  - a. State/Local Government
  - b. Federal Government
  - c. Environmental Industry
  - d. Mining Industry
  - e. Petroleum Industry
  - f. Academia
  - g. K-12 Education
  - h. High-Technology/Communications
  - i. Finance
  - j. General Business
  - k. Other
  - l. Look outside of geosciences
2. What is the current degree you are pursuing? BA/BS MA/MS Ph.D.
3. What year do you expect to graduate?

If you wish to be entered in the drawing, please provide us your Email address

## ADVISING SURVEY

The American Geological Institute is conducting a brief survey of the professional employment pathways that geoscientists take through their career. To this end, we are interesting in the areas that students would be advised to look for professional employment following completion of their education.

We would appreciate your completing the following questions. As a thank-you, we are holding two drawings from survey responses, one for a copy of the new 5<sup>th</sup> Edition of the Glossary of Geology, and another for a 1-year subscription to Geotimes magazine.

If you are or were to be advising students about professional employment, which employment sectors would you recommend that they actively consider? Please check all that apply.

- a. State/Local Government
  - b. Federal Government
  - c. Environmental Industry
  - d. Mining Industry
  - e. Petroleum Industry
  - f. Academia
  - g. K-12 Education
  - h. High-Technology/Communications
  - i. Finance
  - j. General Business
  - k. Continue Education/PostDoc
  - l. Other
  - m. Look outside of geosciences
2. What is the highest degree offered by your department? BA/BS MA/MS Ph.D.

If you wish to be entered in the drawing, please provide us your Email address