Human Resources in the Atmospheric and Geologic Sciences

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Executive Director
Commission on Professionals in Science and Technology
Plan of the talk

• Overview: CPST – our resources.
• Degrees in geosciences.
• U.S. population projections and pre-college course taking.
• Representation of different groups in geosciences and other STEM fields.
What is CPST?

- Founded in 1953
- Membership Research Organization
  - Societies – all major scientific societies
  - Corporations
  - Academic Institutions
  - Foundations
  - Individuals
- Participating organization of AAAS
- Staff of four people.
- Mission:
  - To collect, analyze, and disseminate reliable information about the human resources in the U.S.
  - To promote the best possible programs of education and training of potential S&Es
  - To develop policies of utilization of S&Es
Online HR Database
### Products and Data Sources:

**STEM Workforce Data Project**  
(funded by the Alfred P. Sloan Foundation)

<table>
<thead>
<tr>
<th>Report</th>
<th>Release Date</th>
<th>Title and (Lead author)</th>
<th>Data Sources</th>
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<tbody>
<tr>
<td>#1</td>
<td>6/2004</td>
<td>Twenty Years of Scientific and Technical Employment (R. Ellis)</td>
<td>BLS, CPS</td>
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<td>#2</td>
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<td>Women in Science and Technology: The Sisyphean Challenge of Change (R. Ellis)</td>
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<td>#3</td>
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<td>Sisypheus Revisited: Participation by Minorities in STEM Occupations, 1994-2004 (R. Ellis)</td>
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<td>The Foreign Born in Science and Technology (L. Lowell)</td>
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<td>#6</td>
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<td>Four Decades of STEM Degrees, 1966-2004: &quot;The Devil is in the Details&quot; (E. Babcock)</td>
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<td>White Paper #2</td>
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<td>Improving Statistics on the STEM Workforce (R. Ellis)</td>
<td>NSF, SESTAT; CPS; BLS industry-occupation matrix</td>
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<td>Is U.S. Science and Technology Adrift? (R. Ellis)</td>
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<td>Employed Persons by Detailed Occupation and Sex, 1983 to 2002</td>
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<td>The Foreign Born in STEM Occupations, 1994 to 2002</td>
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<td>Source Data for Science and Technology Salaries: Trends and Details, 1995-2005</td>
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<td>STEM Employment by Occupation, 2004 and Projected 2014</td>
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<td>14.</td>
<td>Source data for “Is U.S. Science and Technology Adrift?”</td>
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Degrees in STEM

Focus on Geosciences
Number of Degrees Awarded in Broad Science and Engineering Fields by Level of Degree, 2006

Geosciences Bachelor's Degrees, 2006

- Earth Sciences, 3,231, 80%
- Atmospheric Sciences, 662, 17%
- Oceanography, 105, 3%
Within the geosciences, geology/earth science accounts for the lion’s share of bachelor’s degrees

Bachelor’s in Geosciences Fine Fields, 2005-06
(Geology/earth science, general: 2,823 degrees, not shown)

- Atmospheric physics and dynamics: 483
- Geological and earth sci./geosciences, other: 284
- Meteorology: 146
- Oceanography, chemical and physical: 105
- Geophysics and seismology: 65
- Hydrology and water resources science: 36
- Atmospheric sciences and meteorology, other: 13
- Atmospheric sci. and meteorology, general: 9
- Geochemistry: 7
- Paleontology: 2

After geology/earth sciences, atmospheric physics and dynamics was the top graduate degree field at the master’s and doctoral levels.

Graduate Degrees in Geosciences Fine Fields, 2005-06

- Atmospheric physics and dynamics: 183 (84 Master's, 109 Ph.D.s)
- Oceanography, chemical and physical: 128 (75 Master's, 53 Ph.D.s)
- Geological and earth sci./geosciences, other: 109 (51 Master's, 58 Ph.D.s)
- Geophysics and seismology: 79 (50 Master's, 29 Ph.D.s)
- Meteorology: 23 (11 Master's, 12 Ph.D.s)
- Hydrology and water resources science: 17 (5 Master's, 12 Ph.D.s)
- Geochemistry: 12 (3 Master's, 9 Ph.D.s)

Not shown: 1,130 master's and 321 Ph.D.s in geology/earth science, general and 1 master's degree in paleontology.

Schools Awarding Atmospheric Sciences Bachelor’s Degrees

• The top 10 schools award 20-64 degrees each – 310 total, 46.8% of all.
• The next 14 awarded 11-19 degrees each – 192 total, 29.0% of all.
• Remaining 28 schools awarded 1-10 degrees each – 160 total, 24.2% of all.
### Top Ten Schools Awarding Atmospheric Sciences Bachelor’s Degrees, 2006

<table>
<thead>
<tr>
<th>School</th>
<th>Degrees</th>
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<tr>
<td>Pennsylvania State U, Main Campus</td>
<td>64</td>
</tr>
<tr>
<td>University of Oklahoma, Norman Campus</td>
<td>51</td>
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<tr>
<td>Texas A&amp;M University Main Campus</td>
<td>32</td>
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<tr>
<td>Florida State University</td>
<td>28</td>
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<tr>
<td>University of Wisconsin-Madison</td>
<td>27</td>
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<tr>
<td>Valparaiso University</td>
<td>23</td>
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<tr>
<td>North Carolina State University at Raleigh</td>
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<td>SUNY at Albany</td>
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<tr>
<td>Iowa State University</td>
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<tr>
<td>Embry-Riddle Aeronautical University</td>
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<td>University Name</td>
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<tr>
<td>Mississippi State University</td>
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<td>University of Texas at Austin</td>
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<td>University of Washington - Seattle</td>
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<td>University of Pittsburgh Main Campus</td>
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<td>Montana State University - Bozeman</td>
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<tr>
<td>Pennsylvania State U, Main Campus</td>
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<td>University of California-Santa Cruz</td>
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<td>Stanford University</td>
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<td>University of Wyoming</td>
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<td>Central Michigan University</td>
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Top Ten Schools Awarding Ocean Sciences Bachelor’s Degrees, 2006

United States Naval Academy 23
United States Coast Guard Academy 21
University of Washington - Seattle 13
Texas A&M University at Galveston 12
Hawaii Pacific University 7
Humboldt State University 6
Rider University 5
Florida Institute of Technology 4
University of Miami 4
418 Schools awarded 3,998 bachelor’s degrees in geosciences in 2006

**Bachelor's Degrees Summary**

<table>
<thead>
<tr>
<th></th>
<th>Atmospheric</th>
<th>Earth</th>
<th>Ocean</th>
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<tr>
<td>Number of Degrees</td>
<td>662</td>
<td>3,231</td>
<td>105</td>
<td>3,998</td>
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<td>Number of Schools</td>
<td>52</td>
<td>398</td>
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<tr>
<td>Top 10 Schools (#)</td>
<td>310</td>
<td>390</td>
<td>98</td>
<td>572</td>
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<td>Top 10 Schools (%)</td>
<td>46.8%</td>
<td>12.1%</td>
<td>93.3%</td>
<td>14.3%</td>
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U.S. Population
Figure 1-1. U.S. Population by Race/Ethnicity, 1980, 1990, 2000 (Actual) and 2010, 2020, 2050 (Projected)

Note: For 2000, and the projections for 2010, 2020 and 2050, only includes those who reported one race.
Source: CPST, data derived from U.S. Census Bureau.
Figure 1-7. High School Graduates' Science and Mathematics Course Taking, Selected Courses, 2005 by Gender and Race/Ethnicity

Women’s enrollments have steadily increased since 1965. Although men had higher enrollment than women until 1975, they now have a lower college enrollment rate than women.

Figure 2-1. College Enrollment Rates of 16-24 Year Old High School Completers by Gender, 1965-2005

College enrollment rates have increased since 1972 for the three major U.S. racial/ethnic groups but non-Hispanic whites’ rate continues to greatly surpass that of African Americans and Hispanics.

U.S. women’s participation in many professional fields has increased greatly since 1987.

Figure 3-11. Trend in Selected Professional Degrees Awarded to Women, 1987-2006

Who earns geosciences degrees?

Current status and trends
Figure 4-1. Women's Representation Among Science and Engineering Degree Recipients by Level of Degree, 2006

Percent of Bachelor's in Geosciences Fine Fields Awarded to Women, 2005-06

Oceanography, chemical and physical: 65.7%
Geochemistry: 57.1%
Atmospheric sciences and meteorology, other: 53.8%
Paleontology: 50.0%
Geological and earth sci./geosciences, other: 48.9%
Atmospheric sci. and meteorology, general: 44.9%
Geology/earth science, general: 41.5%
Meteorology: 36.3%
Geophysics and seismology: 33.8%
Atmospheric physics and dynamics: 32.1%
Hydrology and water resources science: 30.6%

Women's Representation Among Recipients of Graduate Degrees in Geosciences Fine Fields, 2005-06

Since 1982, women’s representation in all three geosciences at the Ph.D. level has increased.

Figure 4-2. Trend in Women's Doctoral Awards in Earth, Atmospheric and Ocean Science Fields, 1982-2006

Women’s representation among Ph.D. recipients in the geosciences exceeds that of astronomy and physics.

Figure 4-1. Trend in Women's Doctoral Awards in Physical Science Fields, 1982-2006

Women’s participation added to degree production in geosciences.

Earth, Atmospheric and Ocean Sciences Bachelor's Degrees by Gender, Selected Years

- Men
- Women


Degrees: Atmospheric, Earth, Ocean
Women as a Percent of Bachelor's Degrees in Geosciences, by Field, Selected Years

- Atmospheric Sciences
- Earth Sciences
- Ocean Sciences

Figure 4-6. Under-Represented Minorities Among Science and Engineering Degree Recipients by Level of Degree, 2006

Note: Under-represented minorities includes African Americans, Hispanics and American Indians/Alaska Natives.
Figure 4-8. Asian/Pacific Islanders Among Science and Engineering Degree Recipients by Level of Degree, 2006

Figure 4-8. Temporary Residents Among Science and Engineering Degree Recipients by Level of Degree, 2006

Thank you!

Special thanks to AMS for supporting my travel to participate in this meeting.

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