



# Forging Industry/Academia Partnerships

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South Dakota School of Mines & Technology



# Personal Background

- ▶ Professional geologist and groundwater hydrologist with the South Dakota Geological Survey for 23 years
- ▶ Associate Professor  
Department of Geology & Geological Engineering  
South Dakota School of Mines & Technology
- ▶ 2015 National President  
American Institute of Professional Geologists

# American Institute of Professional Geologists (AIPG)



- Advance the geological sciences and the profession of geology
- Establish qualifications for professional geologists
- Certify the qualifications of specific individual Member geologists to the public
- Promote high standards of ethical conduct among its Members and Adjuncts, and within the profession of geology
- Represent, and advocate for, the geological profession before government and the general public



# Department of Geology & Geological Engineering

## South Dakota School of Mines & Technology

- Approximately 235 students in the Department
  - About 190 undergraduate students
  - About 45 graduate students
  - 10-12 Full time faculty members
  - Undergraduate program has grown 75% in five years
  - Museum of Geology and Paleontological Research Laboratory
  - Largest field camp program in the nation



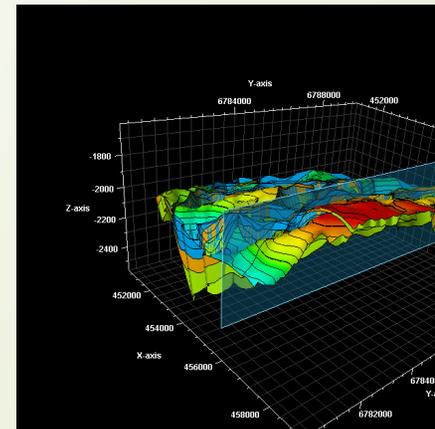
Dr. Laurie Anderson, Department Head

# Personal Activities to Engage Industry

- \$49 million software donation from Schlumberger, Ltd.
  - Petrel, Eclipse, PIPESIM, Techlog, Ocean
- Digital data donation from TGS Inc.
- Organize and co-chair annual oil and gas conference
- Two STEM education programs with Tribal colleges
  - Oglala Lakota College
  - Sinte Gleska University



Petrel Image





# Department Activities to Engage Industry

- ▶ Corporate donations : scholarships, research, software, data, travel
- ▶ Industrial advisory board
- ▶ Professional conferences
- ▶ Student chapters of professional societies
  - ▶ SEG, AAPG, SPE, AEG, TGA, Paleo Club
- ▶ AAPG Imperial Barrel Competition and other contests
- ▶ Rocky Mountain Rendezvous and other student travel
- ▶ Formal liaisons with mining companies for co-ops and internships
- ▶ Presentations from industry representatives
- ▶ New petroleum field camp



# University Activities to Engage Industry at SDSM&T

- Career Fair: 153 companies and organizations on campus this fall
- Research Centers partner with industry and government agencies
- Business Incubator on campus
- Entrepreneurial seminars and activities for students
- Industrial speakers and webinars (Shell last spring)



# Why Forge Partnerships with Industry?

- To benefit students: career placement, scholarships, experience...
- To support research: benefits students, faculty, the university, and society
- To benefit industry: future employees, research & development, recognition/visibility
- To train and employ the future geoscience work force

# status of the Geoscience Workforce

2014



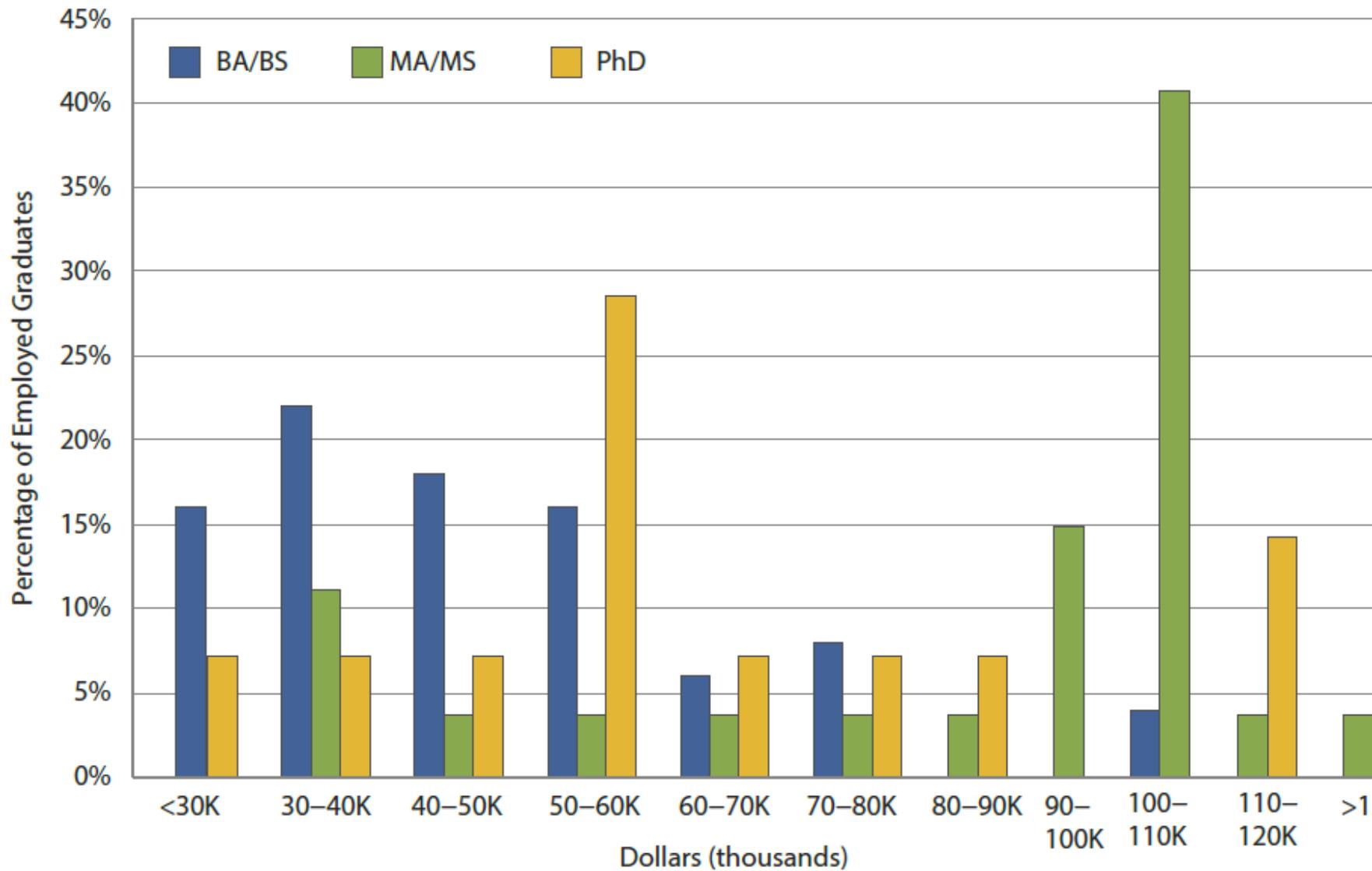
**Polyn Wilson**  
american  
**AGI** geosciences  
institute  
g earth, science, and people

## Career Placement

- ❖ Over the next decade:
  - ❖ 48% of geoscientists at or near retirement
  - ❖ 51,000 geoscience graduates
  - ❖ 14% increase in geoscience jobs
  - ❖ Predicted shortage of 143,000 geoscientists

Figure 4.4: Starting Salaries for Employed Geoscience Graduates

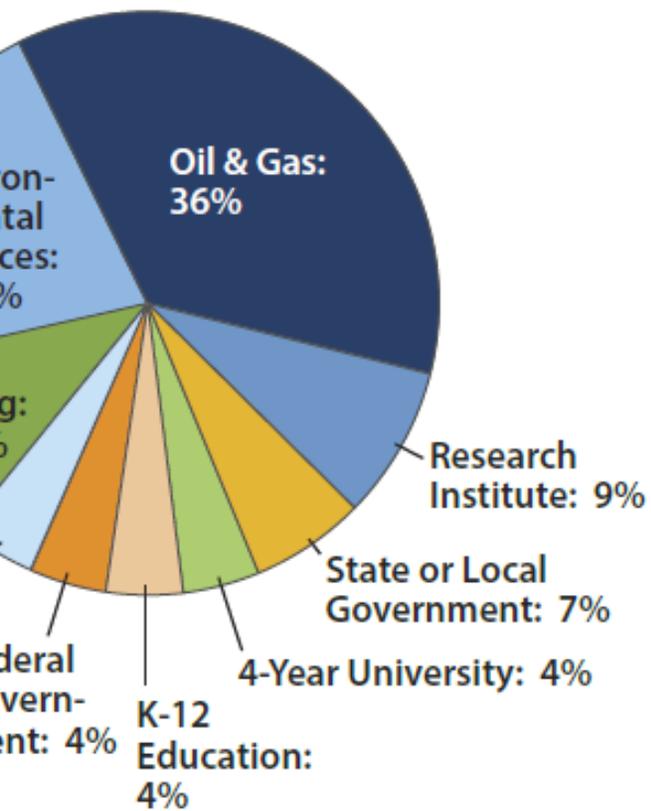
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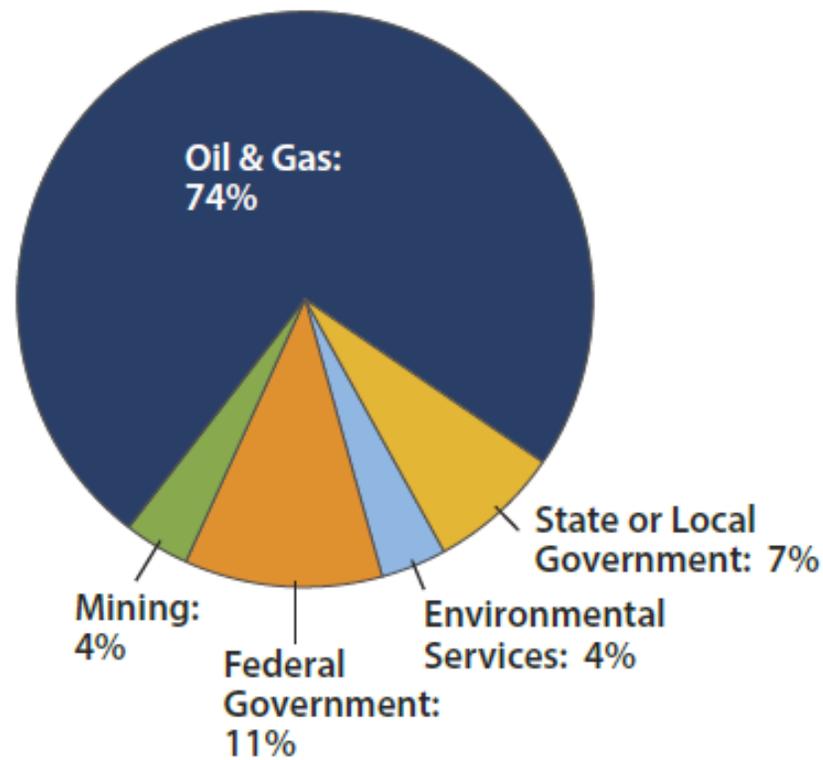
AGI Geoscience Workforce Program; Data derived from AGI's Geoscience Student Exit Survey; Figure created by Kathleen Cantner

## 4.2: Industries Hiring Geoscience Graduates

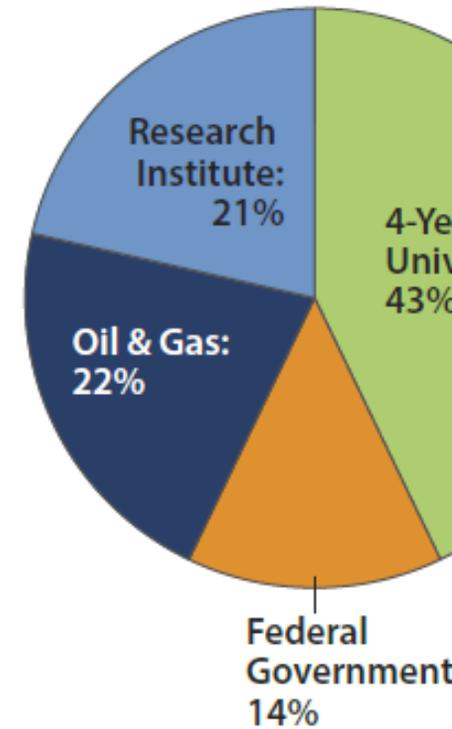
Bachelor's Graduates



Master's Graduates



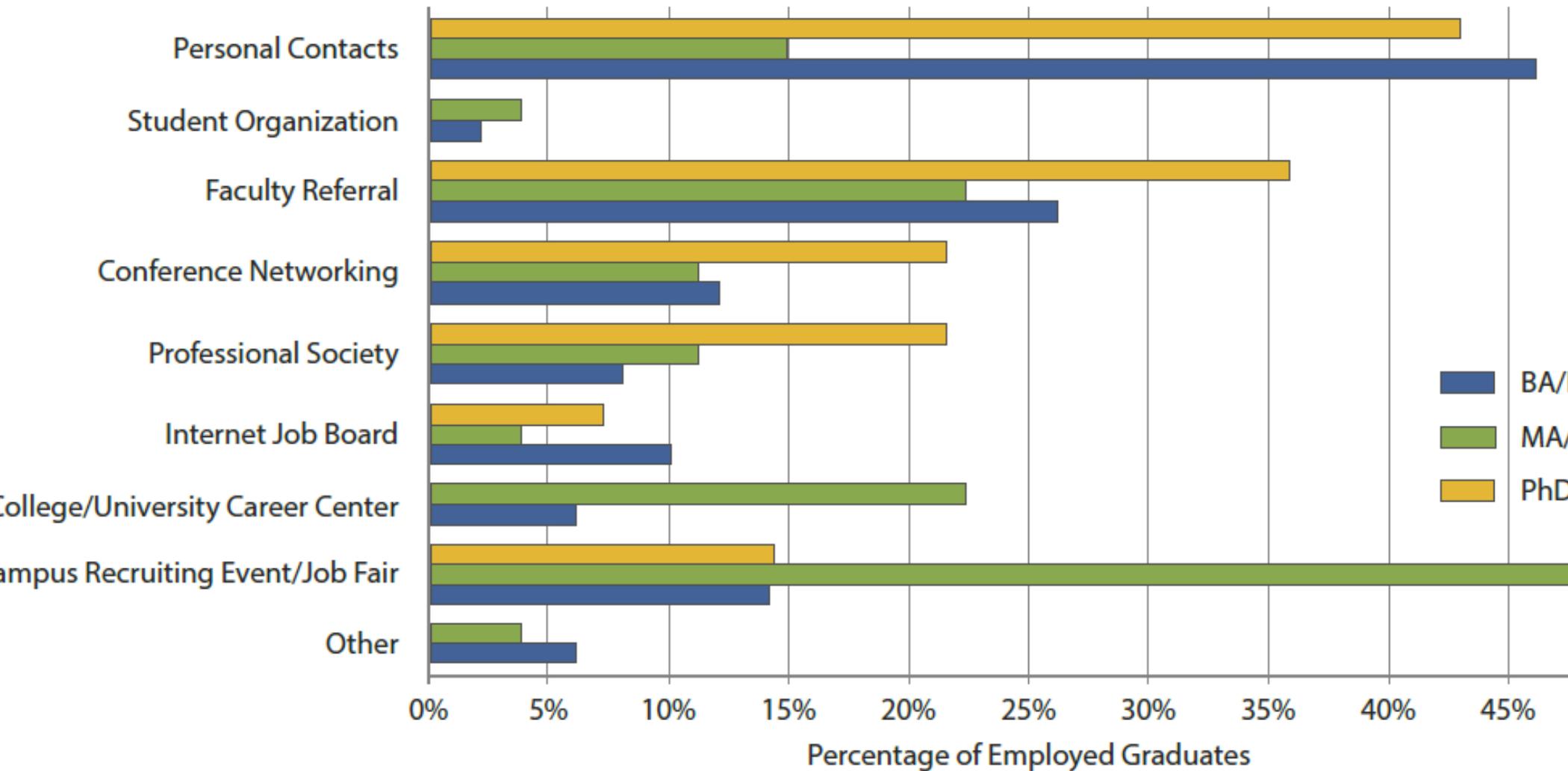
Doctoral Graduates



Geoscience Workforce Program; Data derived from AGI's Geoscience Student Exit Survey; Figure created by Kathleen Cantner

Wilson (2014)

Figure 4.7: Useful Resources Used by Geoscience Students to Find a Job



Geoscience Workforce Program; Data derived from AGI's Geoscience Student Exit Survey; Figure created by Kathleen Cantner

Wilson (2014)



# Career Placement

- ▶ Student co-ops, internships provide critical job experience (sometimes mandatory)
- ▶ Career fairs and career placement centers
- ▶ Networking: professional and personal
- ▶ Resume building, interviewing skills, mentoring
- ▶ Marketable job skills in a technologically evolving world
  - ▶ Geological engineering, geology, paleontology



# Curricular Requirements

- Philosophical questions regarding the purpose of obtaining a college education, e.g., teaching students how to learn, evaluate and grow intellectually vs. training students for a profession
- Debate between moving to more integrated Earth systems approach vs. more traditional geological curricula
- Need to consider requirements and preparation for professional licensure and certification after graduation
- Licensing and certifying entities sometimes have difficulties evaluating non-traditional curricula
- AIPG requires: 36 semester/54 quarter hours of geological coursework, B.S. or higher degree, 8 years professional geological work experience, three sponsors (two must be CPGs) for geological competence and ethical screening



# NSF Summit on Future of Undergraduate Geoscience Education

- ▶ Outcomes: focus on skills, competencies, concepts, learning outcomes, not disciplinary content or curriculum
  - ▶ Critical thinking/problem solving
  - ▶ Communicate effectively to scientists and non-scientists
  - ▶ Understand and use scientific research methods
  - ▶ Have strong quantitative skills and ability to apply
  - ▶ Work in interdisciplinary teams and across cultures
  - ▶ Ability to access and integrate information from different sources and continue to learn

# University Activities to Engage Industry

- Collaborative research
- Contributions: funds, software, data, expertise
- Seminars, webinars, field trips, workshops
- Professional conferences
- Career fairs

Amy Freye, SDSM&T graduate student, and Dr. Bill Roggenthen work on a cooperative shale research project with the U.S. Dept. of Energy



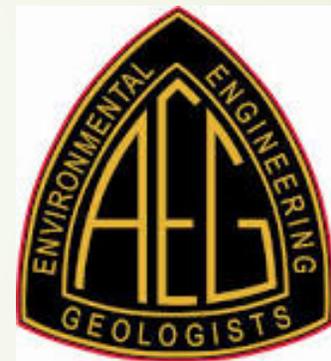
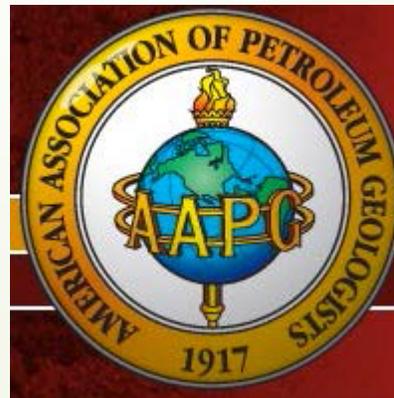


# Corporate contributions

- Funds
  - Faculty and student research and travel
  - Scholarships
  - Endowed chairs
  - Facilities and equipment
- Software and data
  - Mining, oil & gas, mapping
- Research collaborations
- Industrial advisory board members
- Presentations, webinars, workshops

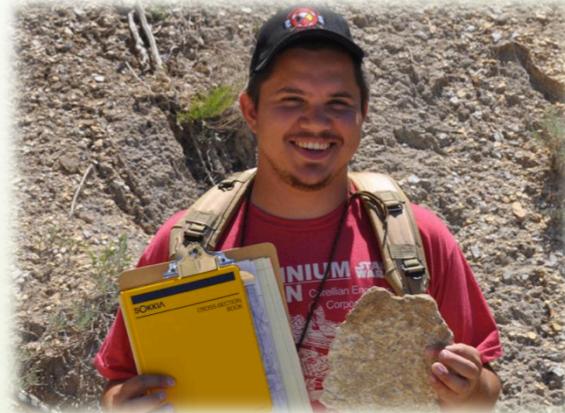
# Professional Societies

- Professional meetings
- Networking
- Student chapters
- Mentoring
- Resume building
- Field trips
- Student contests



# Diversity

- Recognition of the importance of a diverse, multi-cultural work force
- Geoscience industries are global fields and they require greater diversity to flourish
- STEM education programs focused on underrepresented and minority groups
  - NSF Pre-Engineering Educational Collaborative (PEEC)
  - U.S. Dept. of Energy – American Indian Science & Engineering Society (AISES)
  - GEARUP (high school Native American program)





# Compatibility Issues

- Industrial needs can be different from university needs
- Universities may have quotas for degree programs, e.g. five doctoral graduates within a five year period (small programs are more expensive)
- However, M.S. graduates tend to earn higher starting salaries than doctoral graduates, and there has been a decrease in hiring of new doctoral recipients within academia
- Large paleontology programs may have more difficulty with job placement

What an exciting time to be a geoscientist!



Student field trip to Continental Resources drill site in northwestern South Dakota