Summit on Improving Geoscience Graduate Student Preparedness for the Future Workforce

Welcome!

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WHERE DISCOVERIES BEGIN
Improving Geoscience Graduate Student Preparedness for the Future Workforce

Project Goals:

• Identify the skills and competencies that should be part of graduate geoscience education for PhD & MS students in Earth, Ocean, & Atmospheric Sciences

• Investigate best means of developing these in graduate geoscience programs nationally

• Work with Heads/Chairs and Graduate Program Directors on implementation strategies to develop the skills and competencies identified by the geoscience employers workshop & other studies
Expected Workshop Outcomes

• Informed discussion of skills/competencies needed by Ph.D. & M.S. students in Earth, Ocean, & Atmospheric Sciences for the future careers
  – Identification of skills/competencies that
    • should be part of graduate geoscience education
    • your department does or does not address
• Explore how to develop these skills/competencies in graduate geoscience programs
  – Balance & relationship between skill development & conducting research
  – Employer & professional society roles
• Develop individual Action Plans for own institution
Logistics

- Information Desk: Holland Family Student Center; JGB 2.102
  - JSG staff on hand to answer questions
- Parking Validation: Information Desk
- Meals: Holland Family Student Center
- Coffee, water, soft drinks (afternoon): outside Boyd auditorium & Holland Family Student Center
- Workgroup Rooms: Jackson Geoscience Building (JGB) – roster gives room number
- Nametag has WG#
- WiFi: utguest; no password needed
- Airport Shuttle Monday, 1:30 to 1:45 pm: sign up at information desk
Logistics

• **Overall Schedule:**
  – Presentations and/or Panels
  – Individual workgroup breakout sessions
    • 7 predetermined working groups (10-12)
    • 1 organizing committee (or other) member to facilitate/moderate
    • 1 volunteer to take notes
    • 1 additional volunteer to help with PowerPoint slides
    • Charge – discuss provided questions & related ones
    • Product: 1-2 PowerPoint slides summarizing thoughts on the issues, consensus, and ideas; present in 3-5 minutes (as instructed)
  – Working Group presentations & group discussion
  – Individual Action Plan
  – Final Discussion: Summary of Progress, Next Steps and Roadmap for Future

• **Packet Material** – handouts – Summit Agenda participant list, workgroup list, campus & building maps, Newsletter lite
Current Landscape & Drivers for Change

Graduate education

• Propels societal advancement, innovation and economic growth, strengthens national security, protects environment
**Motivation: Career Statistics**

- **STEM PhD students:** 45% business; 46% academia [NSF NCSES, 2013].
- **Geosciences:** 51% PhD & ~4% Masters students in academia [Wilson, 2015]
- **B.S. geoscience graduates plans** [Wilson, 2015, 2016; OOH, 2016]
  - 8-9% Ph.D. and academic career
  - 20-27% Master’s degree
    - 16% M.S. continue for PhD
Motivations:

Mismatch between Graduate Education & Future Careers

• Graduate programs: too narrowly focused on academic research
  – Students need to develop professional and personal skills valued by both academic and non-academic employers
  – Teamwork, project management, leadership, communication

• Students need information to identify career options & needed skills/competencies and mentoring
  – Need preparation in skills/competencies needed outside academia

• Transferable skills – for changing world & occupations

Call from graduate students, professional societies, employers
Council of Graduate Schools, National Academies of Science, etc.
Geoscience Research today & in the future...

Transformative Research:

Sciences in Transition:
Sustaining disciplines while blurring their boundaries

Working at the interfaces between disciplines
....has most potential for future major breakthroughs
Motivations:

Geoscience Research today & in the future...

• Interdisciplinary, multidisciplinary and transdisciplinary
  – strength in their discipline
  – ability to work across disciplinary boundaries

• Complex interactions between different parts of the Earth system
  – Earth’s interior and surface, hydrosphere, atmosphere, cryosphere, and biosphere
  – Coupling of chemical, physical, biological and geological processes
  – Deep time, present day processes, future impacts

• Important in addressing societally important issues (natural hazards, water, energy, climate, sustainability, etc.)
  – ethics, economics, policy and communication

• Dramatic change in research methods & technologies

As research changes – education must change
Motivations: Geoscience Workforce today & in the future...

• Need for multi- & inter-disciplinary approaches to problems
  – More integration of different types of datasets
  – Cross disciplinarily teamwork

• Different paradigms

• Different types of occupations for geoscientists

• Technological advances – changing skill sets
  – More digital & modeling skills

• BIG DATA – manage, use, model; statistical analysis
  – Multi dimensional analytical approaches

• More interaction between business & society
  – Economics/law/business practices/ethics/risk/environment

• Cultural diversity

As the workforce changes – student learning must change
Motivations: Diverse & Informed Future Workforce

• **Shifts in demographics** – need to access all available talent
• **STEM student population more diverse**
  – gender, race, ethnicity, disability, socioeconomic background, and country of origin
• **Broadening Participation and Retention of Underrepresented Groups**
  ➢ Geosciences BS graduates: <12% low-income, first-generation, and underrepresented minorities
  ➢ Lowest of all sciences
Future of Graduate Geoscience Education

• Sustained change in geoscience graduate education - *Culture change*
  – combined efforts of departments and programs
  – administrators, individual faculty
  – future workforce employers
  – geoscience professional societies