Summit on Improving Geoscience Graduate Student Preparedness for the Future Workforce

Welcome!

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Sponsored by

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 Acton 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***

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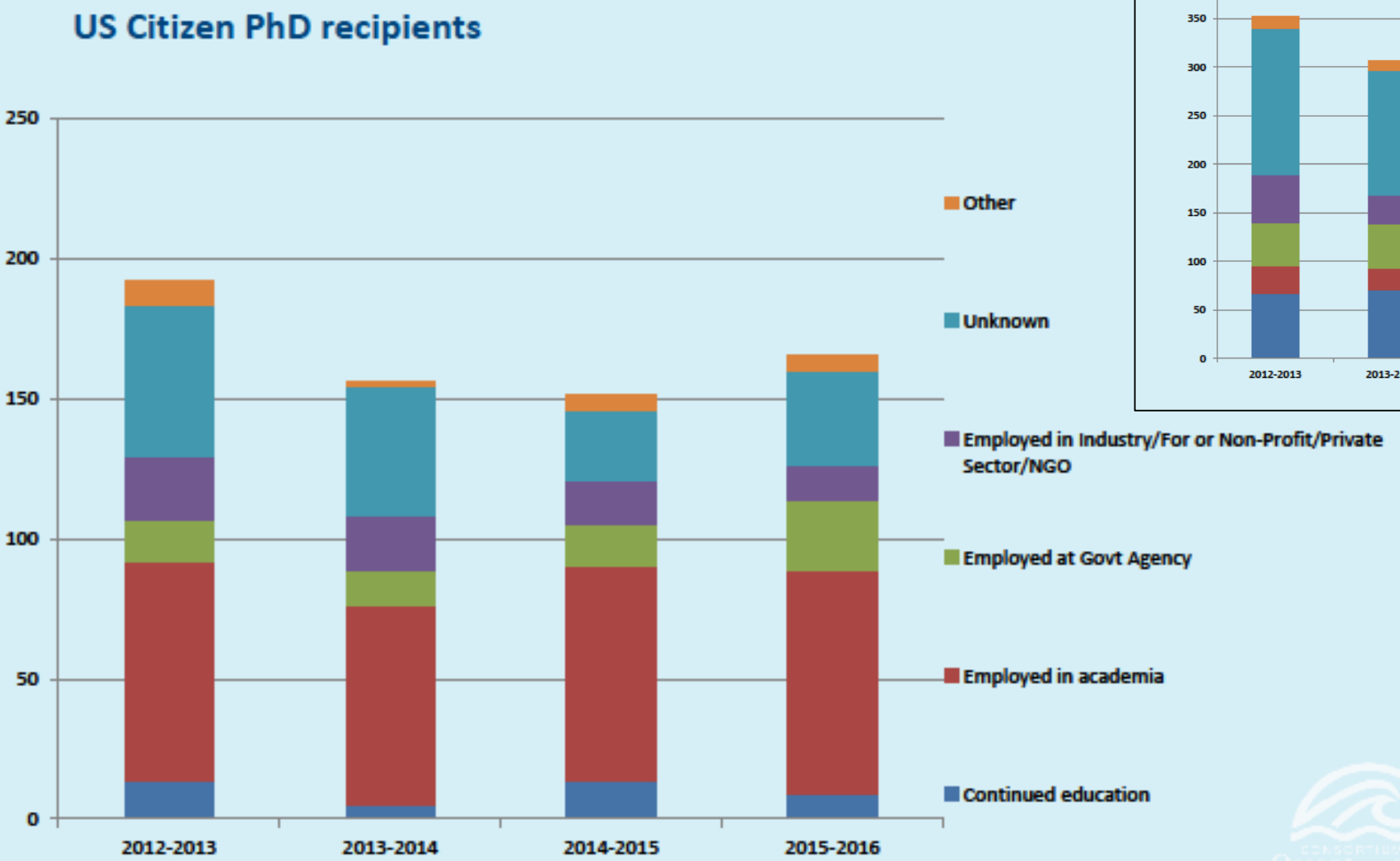
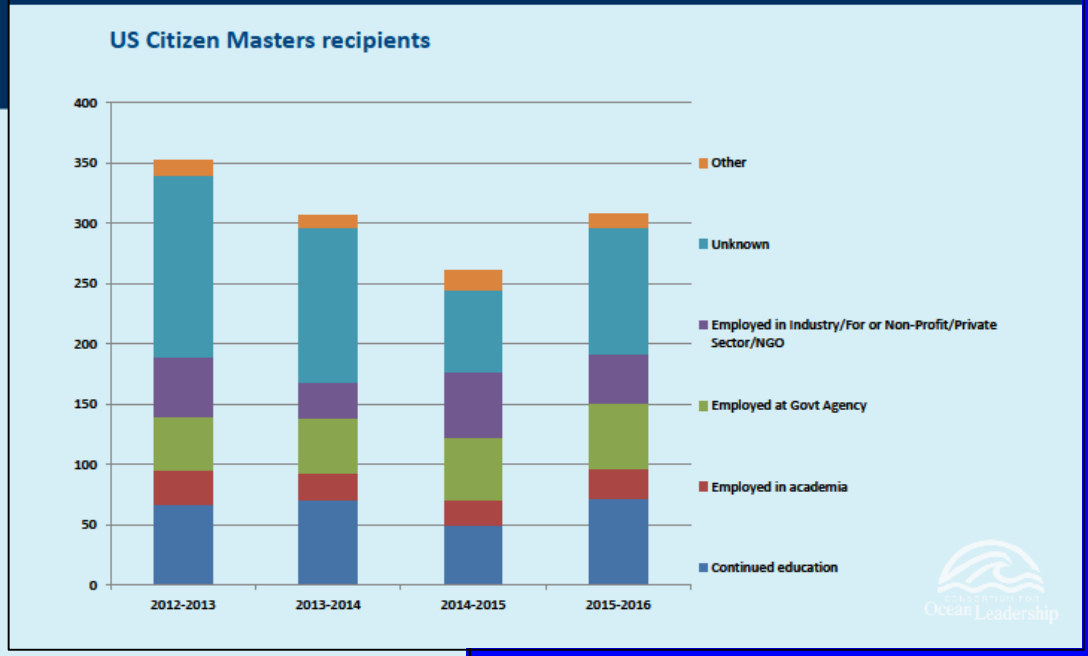
Motivation: Career Statistics

- **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**

Graduate Data – Employment



Graduate Data – Employment



Consortium for Ocean Leadership

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**

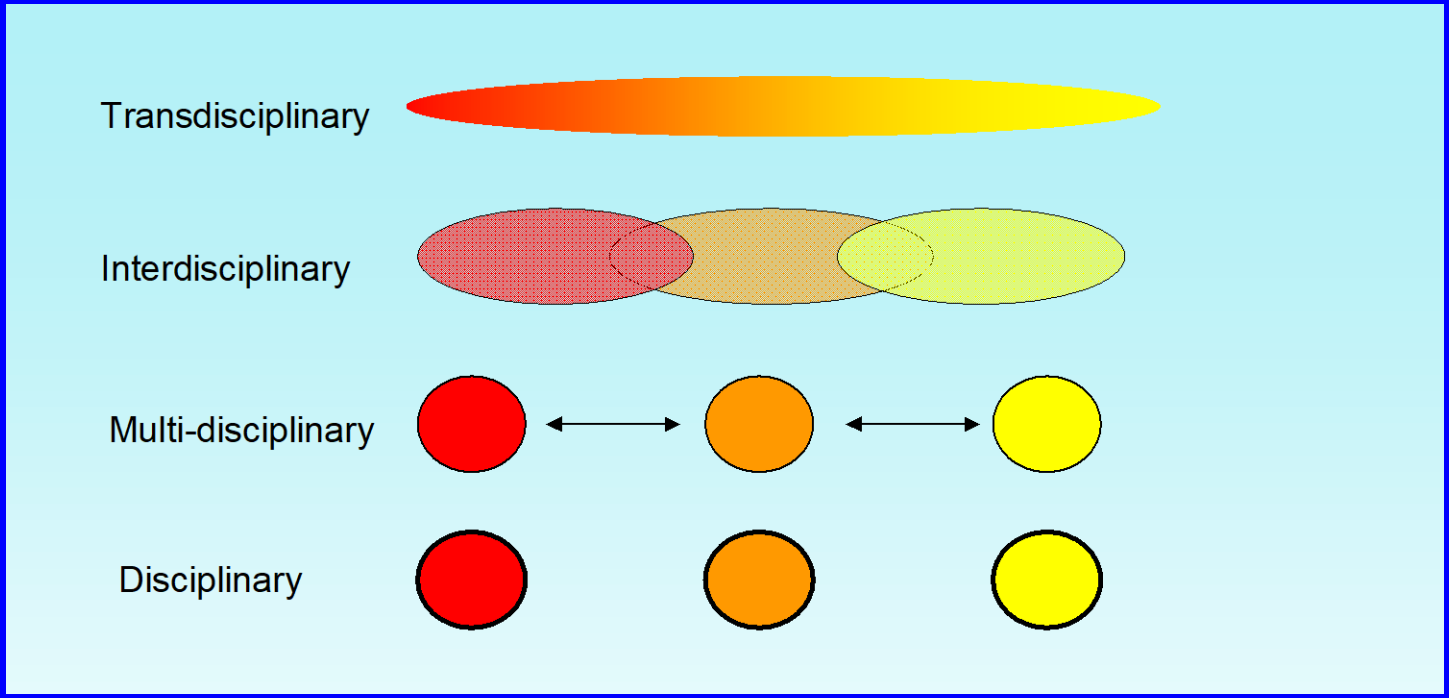
Call from graduate students, professional societies, employers

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

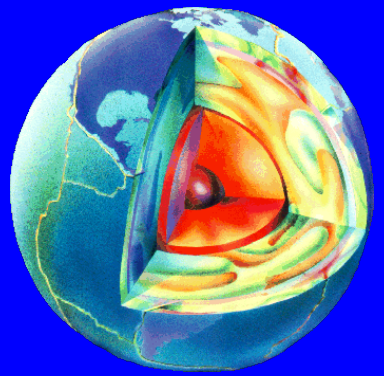


Working at the interfaces between disciplines

….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