

# How Global Science has yet to Bridge Global Differences

## A Status Report of the IUGS Taskforce on Global Geoscience Workforce

C. M. Keane (keane@agiweb.org) and L. M. Gonzales (lmg@agiweb.org), American Geological Institute, Alexandria, VA 22302 USA



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### About the Taskforce

The establishment of the IUGS Task Group on Global Geoscience Workforce was inspired by a workshop on global geoscience workforce issues held during the 33rd International Geological Congress in Oslo, Norway in 2008. The workshop explored the sustainability of the global geoscience workforce. The results of the workshop indicated that the answers will remain elusive until key baseline information and metrics of comparability are established. In addition, the issue of the "Global Geoscientist" will need to be examined.

The IUGS Task Group on Global Geoscience Workforce is facilitating the development of national and international measurement and understanding of geoscience workforce issues. In addition, the Task Group represents a key organ in building an understanding of the varied educational and employment environments across the world, so that baselines that allow for comparability of metrics and capabilities may be established and shared with member countries.

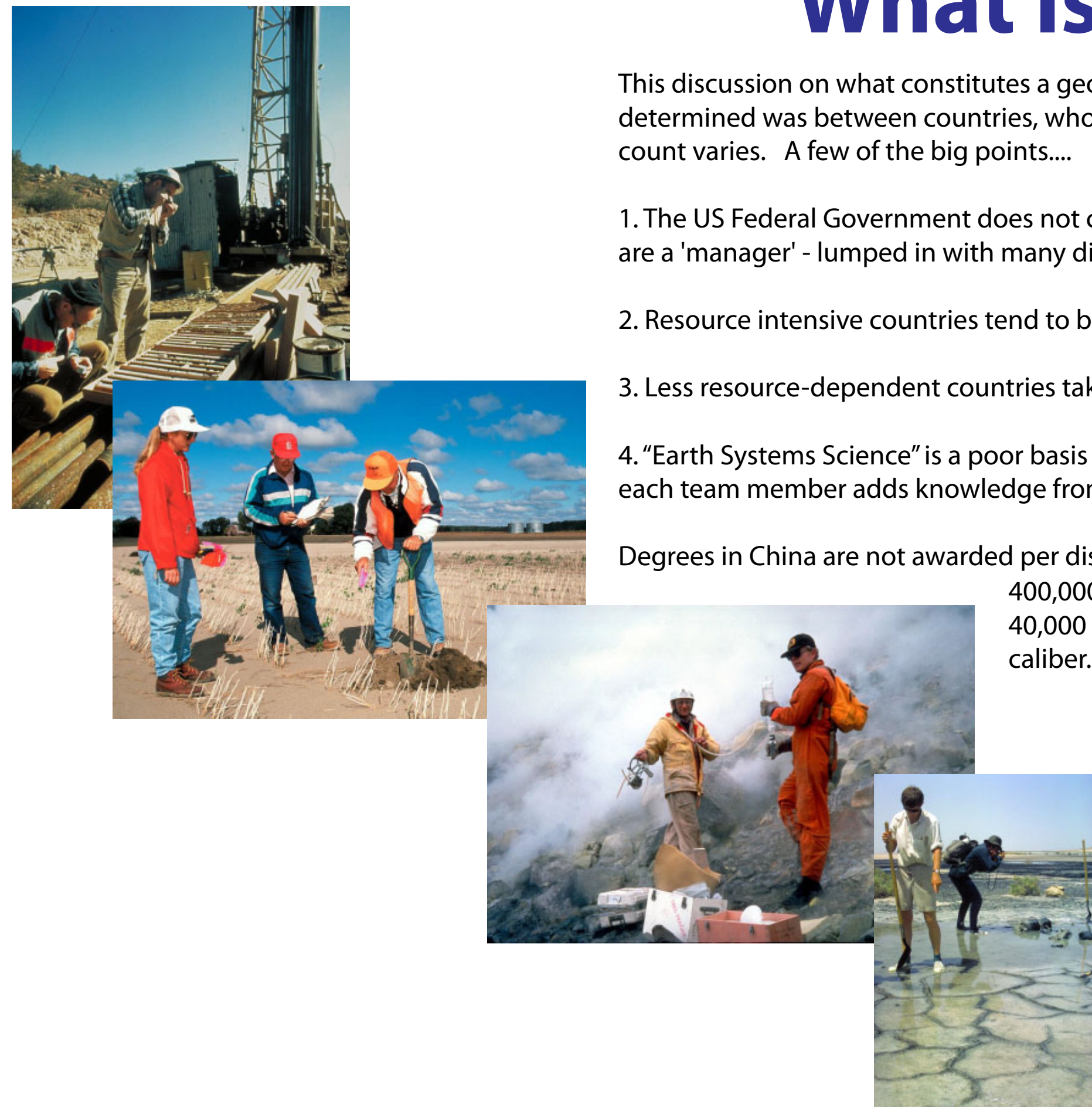
- In the end, the Task Group is focused on three primary tasks:
- Establish descriptions and definitions of geoscientists to enable global comparability of the workforce.
  - Report on the global baseline of knowledge regarding the geoscience workforce, including:
    - The major fields of endeavour in the Earth sciences
    - Educational and training requirements
    - Professional workforce levels and adequacy
    - Cross-boundary issues
  - Regional roles in the geoscience marketplace
  - Develop strategies for capacity building that ensure durable global competency in Earth sciences for a global society.

### What is a Geoscientist?

This discussion on what constitutes a geoscientist was expected to be one of nuance and finesse. Yet, what was determined was between countries, who is "covered" under the term geoscientist varies, and how they are counted varies. A few of the big points...

1. The US Federal Government does not count a geoscientist if they have any supervisory responsibilities - they are a "manager" - lumped in with many disciplines.
2. Resource intensive countries tend to be very "hard rock" and often exclude soils, geography, etc.
3. Less resource-dependent countries take a broader view, especially for surface process areas.
4. "Earth Systems Science" is a poor basis for defining people. "Earth System Science" occurs in teams where each team member adds knowledge from their specialty to the whole of a team or project.

Degrees in China are not awarded per discipline, so titles can be ambiguous. Many external estimates of about 400,000 Chinese geoscientists are incorrect. The real number is between 40,000 and 60,000 geoscientists, but many of those are not on trans-border caliber.



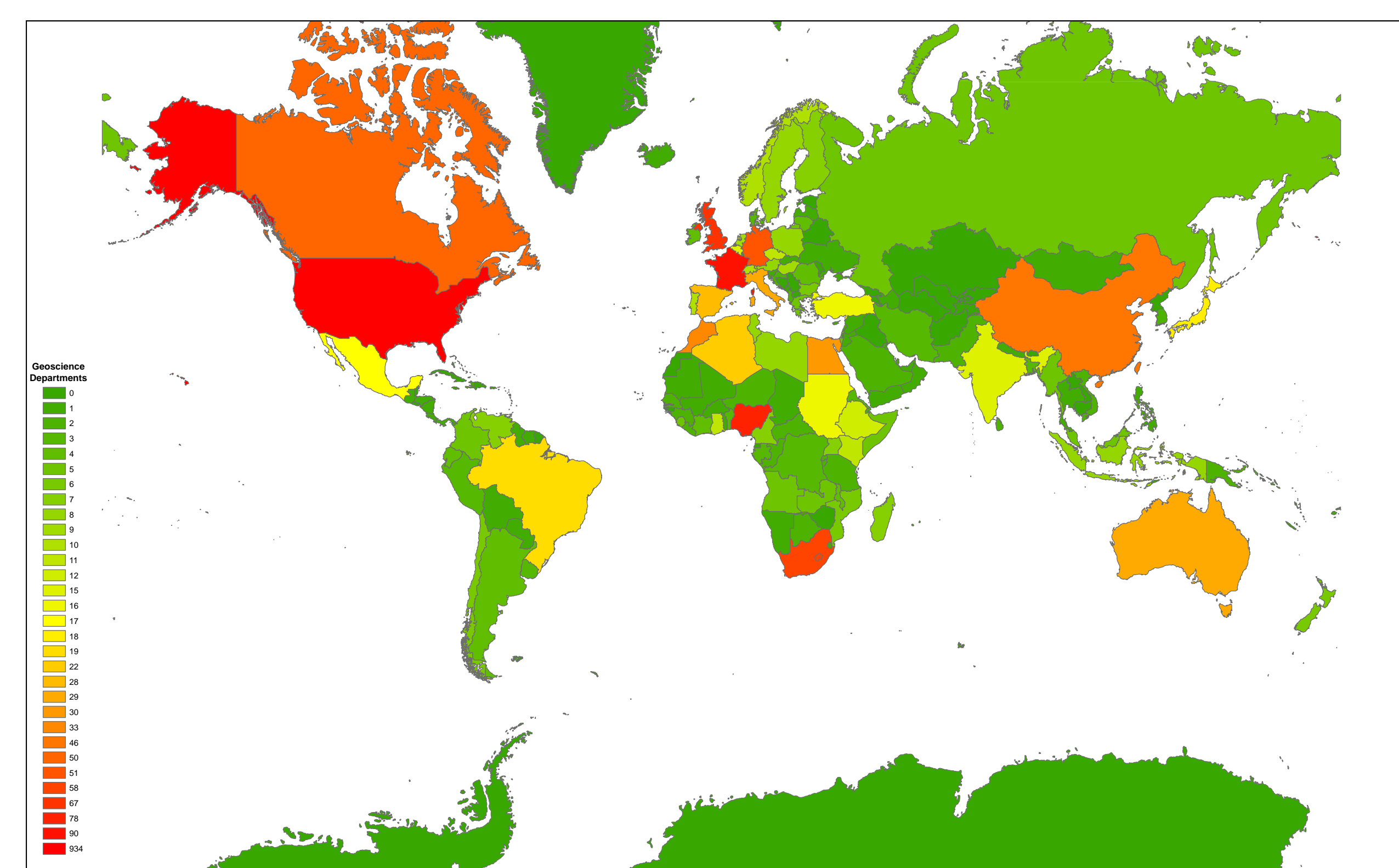
### Where are Geoscientists Being Educated?

Traditionally, the United States has been the major producer of new geoscience talent. The legacy of this is seen today with both the large number of geoscience academic units (over 900) and the approximately 250,000 geoscientists working in the United States. However, talent production is shifting east. Europe and Russia graduates more geoscientists per year now than the United States, and countries in Asia, such as Indonesia and China are also graduating several thousand new geoscientists annually.

Though the US remains the premiere destination for graduate

work, according to GeoRef data, the nearly as many dissertations are completed outside of the United States annually as within.

The map below shows the number of geoscience academic units in each country, as reported in AGI's Directory of Geoscience Departments. Countries in white have no data on programs, and the warmer colors have more programs than the cooler colors. As expected, countries with strong resource dependency and/or large higher education systems tend to have more programs.



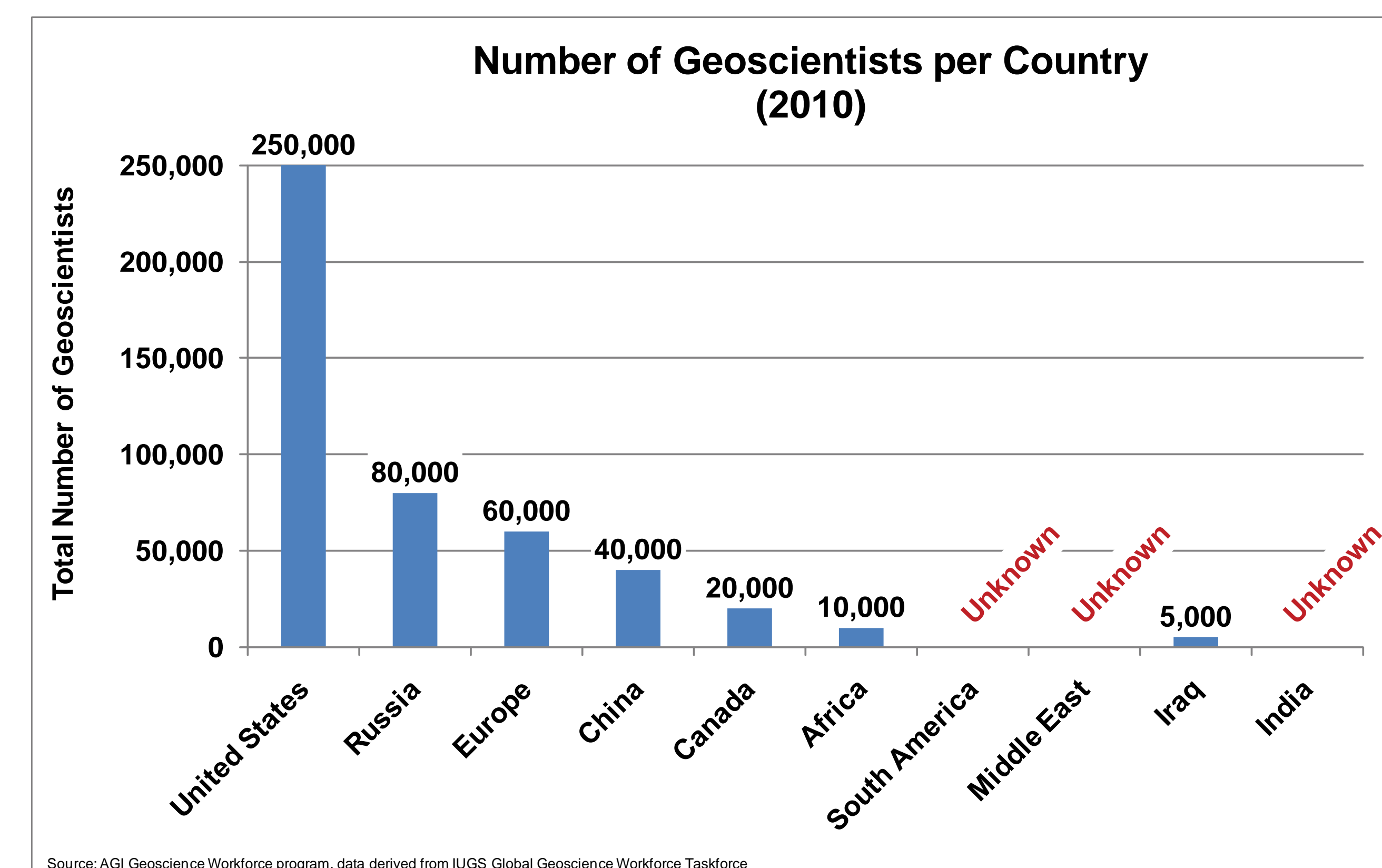
### Abstract

The International Union of Geological Sciences, with endorsement by UNESCO, has established a taskforce on global geosciences workforce and has tasked the American Geological Institute to take a lead. Springing from a session on global geosciences at the IGC33 in Oslo, Norway, the taskforce is to address three issues on a global scale: define the geosciences, determine the producers and consumers of geoscientists, and frame the understandings to propose pathways towards improved global capacity building in the geosciences.

With the combination of rapid retirements in the developed world, and rapid economic expansion and impact of resource and hazard issues in the developing world, the next 25 years will be a dynamic time for the geosciences. However, to date there has been little more than a cursory sense of who and what the geosciences are globally and whether we will be able to address the varied needs and issues in the developed and the developing worlds. Based on prior IUGS estimates, about 50% of all working geoscientists reside in the United States, and the US was also producing about 50% of all new geosciences graduate degrees globally. Work from the first year of the taskforce has elucidated the immense complexity of the issue of defining the geosciences, as it brings in enormous cultural and political frameworks, but also shed light on the status of the geosciences in each country. Likewise, this leads to issues of who is actually producing and consuming geoscience talent, and whether countries are meeting domestic demand, and if not, is external talent available to import. Many US-based assumptions about the role of various countries in the geosciences' global community of people, namely China and India, appear to have been misplaced. In addition, the migration of geoscientists between countries raised enormous questions about what is nationality and if there is an ideal 'global geoscientist'.

But more than anything, the taskforce is revealing clear global trends in geosciences education, both at the pre-college and university level and frame the state of health of geosciences education in the United States in a totally new light. But indicators are present that the developing world will likely overtake the developed world in the near future in the production of geoscientists, but a key question is will that fundamentally change the nature of the science given the social, cultural, and educational frameworks that the next global generation brings with them.

### Where are Geoscientists Today?



### What about Global Migration?

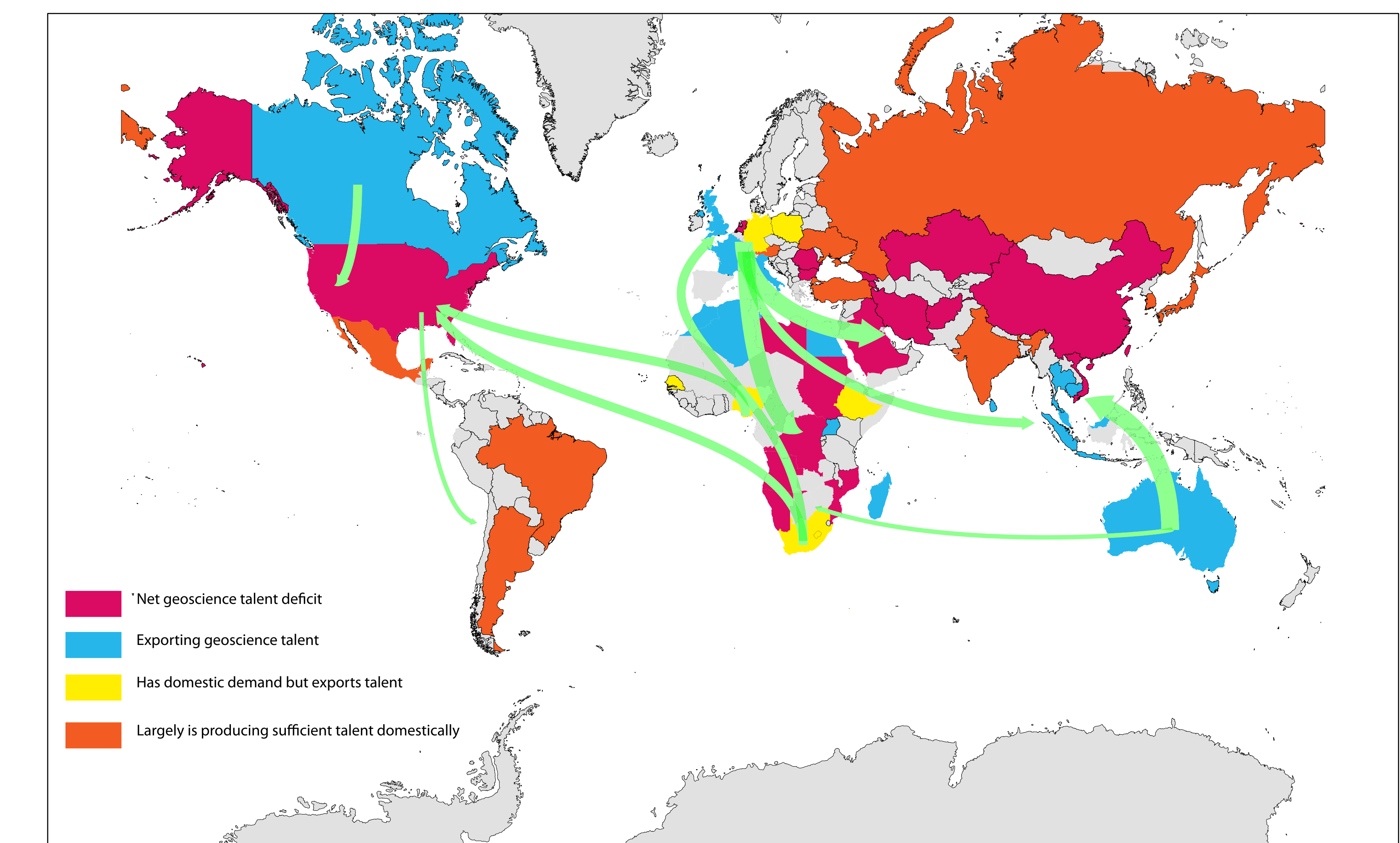
Global migration is an important component in today's economy, and is a major issue for the future of the geosciences. Ironically, the three regions that produce the most geoscience graduates each year (U.S., Europe (including Russia), and China) are not meeting their own domestic needs.

Some countries/regions that have real domestic needs (South Africa, Nigeria, Ethiopia, Central and Eastern Europe) continue to export their new graduates, usually in search of higher wages and additional education, to North America or western Europe. In resource-based developing economies, invariably demand is outstripping supply of qualified geoscientists.

A common challenge is that students often need to leave to develop the skills needed locally. However, the looming question that remains is whether or not these students will return if they find better pay elsewhere.

Some countries, like South Africa, are seeing such a large exodus of their best geoscience talent that sustainability of university-level geoscience education beyond the next 10 years is doubtful. In Australia, the graduate degree recipients are dominantly foreign students who then return home to work.

The key to career success is mobility. The Task Group's work has been discovering that in the future, nationality will be a minor issue and the "Global Geoscientist" will become the new norm.



### What is a Nationality for a Geoscientist?

The 'countable' nationality of a geoscientist is a bigger challenge than expected. In a global economy, geoscientists are a leader in being global workers. For geoscientists educated in countries which tend to export their talent, regardless of local demand, this question is especially daunting.

What nationality is a:

- Foreign-national who is both educated and then employed locally?
- Foreign national who is educated and then employed by a local company to work in their home/third country?
- Geoscientist who works as a journeyman across projects around the world - as often seen in major resource/consulting companies?



*Want to discuss more?  
Want to join the taskgroup?  
Stop by the  
AGI booth (#632)*

### Current Task Group Members

- Moutaz Al-Dabbas, Geological Society of Iraq (Iraq)
- Tanvi Arora, NGRI (India)
- Jay Barton, Consultant (South Africa)
- Peter Pangman, Society of Exploration Geophysicists (USA)
- Sarah Gaines, UNESCO (France)
- Ochir Gerel, Mongolian University of Science & Technology (Mongolia)
- Aliреза Gharagolou, NGDIR (Iran)
- Lella M. Gonzales, American Geological Institute (USA)
- Christopher M. Keane, American Geological Institute (USA)
- Michael G. Loudin, ExxonMobil (USA)
- Michael Leggo, (Australia)
- Edmund Nickless, The Geological Society of London (UK)
- Eikichi Tsukuda, Geological Survey of Japan, AIST (Japan)
- Jacques Varet, BRGM (France)
- Andrew Walther, Rio Tinto (Australia)
- Xiaoping Yang, Chinese Academy of Sciences (China)

and  
The YES Network (Global)