

Globalizing Graduate Education and Research: Opportunities and Challenges

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NSF and Broadening Participation

NSF is committed to prioritizing investments in...Preparing a diverse, globally engaged science, technology, engineering, and mathematics (STEM) workforce.



Globalizing Graduate Education Is in the US Self-Interest

We believe that our students benefit significantly from education that takes place within a diverse setting. In the course of their university education, our students encounter and learn from others who have backgrounds and characteristics very different from their own. As we seek to prepare students for life in the twenty-first century, the educational value of such encounters will become more important, not less, than in the past.

Council of Graduate Schools, 1996

We Must Globalize the Graduate Curriculum

- ▶ As appropriate, we must infuse global perspectives throughout the S&E graduate curriculum—and NSF must encourage it!
- ▶ Howard University has collaborated with other US universities and with several universities in Europe, Canada, Brazil, Africa and Mexico to transform graduate education in several S&E fields.
- ▶ The topics have involved several interdisciplinary, and often comparative, SBE and other STEM fields, ranging from atmospheric science, scientific ethics, and migration studies, through issues of race, ethnicity and social class.
- ▶ Graduate student exchanges, joint publications, e-courses, and, in one case a quasi-joint certificate program have evolved.
- ▶ Advances have been funded partially by several federal agencies, foreign governments and local governments.
- ▶ **NSF should encourage and support further globalization transformations of the S&E curriculum.**

Study Abroad as a Graduate Education Concept

- Study Abroad is typically thought of as an undergraduate experience. Some institutions, including some S&E focused ones, REQUIRE an undergraduate experience for graduation.
- Since we can't prepare US students to be competitive in some fields without a global perspective, why don't we consider expanding the Study Abroad concept to graduate education?
- To date, there are few models for graduate student Study Abroad programs, particularly in the S&E fields.
- NSF should provide incentives for institutions and departments to consider opportunities for some portion of graduate study to be conducted in an international setting.

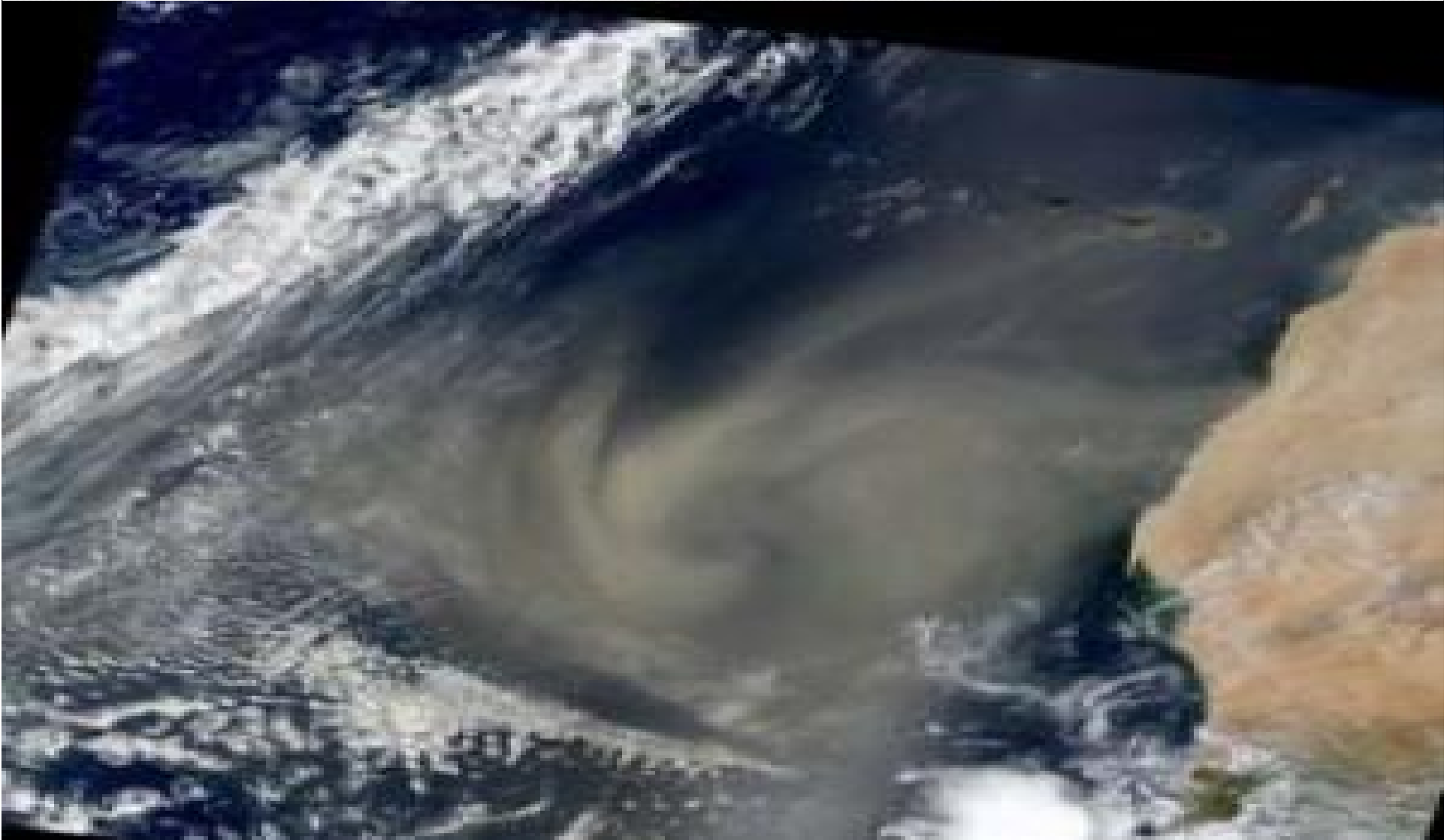
Barriers to Graduate Study Abroad

- ▶ Specialized graduate course work may not be easily accessible away from the home institution.
- ▶ In STEM, lab-based science mentors may not permit graduate students to study abroad
 - According to IIE, only 16% of study abroad undergraduate students in 2006-07 were majoring in the STEM fields, compared to 23% of all U.S. undergraduates who plan to major in S&E fields.
- ▶ Graduate student funding streams may not provide for international study. But NSF could help resolve that!
- ▶ Different systems and styles of graduate education in other countries.

Some Groups of Students Are Low Participants in Study Abroad Programs.

- Students of color are generally less likely to study abroad than white students.
- Low-income students are also much less likely to study abroad.
- African American students are only 4% of the overall study abroad population, and Hispanics are only 6%.
- What is the track record of minority scientists and minority serving institutions in advancing globalization?
- Low URM participation in Study Abroad programs compromises the NSF goal of broadening participation and the nation's goal of producing a globally prepared workforce.

An African Dust Storm



We Have Underdeveloped ATM Expertise in the African Diaspora

- Only 3% of Atmospheric Scientists in the US are African Americans. Tiny numbers in West Africa.
- More scientific capability in African and among African Americans would be helpful to the US and African continent.
- Example: Drought Conditions in Africa lead to considerable issues in water resources, food production, and poverty.
- There are some examples of bilateral and interdisciplinary efforts to increase the number of African and African American scientists in ATM while also addressing national and domestic needs, e.g., African Monsoon Multidisciplinary Analyses (AMMA) campaign and the 2006 Ron Brown research cruise.

The Ron Brown Cruise off the Coast of Cape Verde



Opportunities for Graduate Education (with NSF Support)

- Curriculum enhancements/degree & certificate offerings.
- New pedagogies and technology innovations allowing global simulations and linkages across geographical boundaries.
- Graduate Student exchanges, with continuous funding, especially among diverse groups and institutions, for academic and research purposes.
- Interactive research opportunities involving US/ international graduate students, especially involving underrepresented groups and underserved regions.

The Challenges

- Costs, and funding, in the face of the current economic downturn.
- Complementarity of physical and human resources in some global settings.
- Resistance of institutions and disciplines to change, but there are some hopeful signs, e.g., Engineers without Borders.
- Strategies for determining the right balance in infusing the social sciences and the humanities into S&E graduate education and research.
- Different systems, models and calendars of graduate education.

A Focused Role for NSF

- New initiatives to support the infusion of globalization in curricular offerings, degree configurations or geographical locations for offering graduate education.
- Targeted funding for MSIs to support globalization.
- Require—and provide additional funding—for an international component to all awards that focus on Broadening Participation, e.g., AGEP, LSAMP, HBCU-UP, etc.).
- Revise the evaluation system for all NSF proposals to consider inclusion of an international component (if appropriate) for participating graduate students , especially if it involves underdeveloped parts of the world or URMs.