

Innovations in Global Climate Change Education (IGCCE)

FY 2011 Annual Report (10/1/10 – 9/30/11)

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PROJECT DESCRIPTION

The Innovations in Global Climate Change Education (IGCCE) project was a new start in 2011 and continues the activities awarded under the Congressionally directed Global Climate Change Education (GCCE) project that began in 2008. GCCE had a broad focus of improving research and education in global climate change through competitive awards that improve climate change and Earth system science education at the elementary, secondary, and undergraduate levels. Like the GCCE project, IGCCE is designed to be consistent with the recommendations of the National Research Council's report *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond* and the report by the National Academies, *Rising Above the Gathering Storm*. These reports highlight the need to continually advance our understanding of our Earth system, utilizing Earth observation data when available, and to enhance our science and technology capabilities through research and K-12 science and mathematics education, respectively.

The IGCCE project is designed to strengthen the skills of teachers and provide innovative science research and learning opportunities for K-16 students. IGCCE contributes to NASA's efforts to utilize its unique mission, workforce, facilities, research, and innovations to inspire interest in science, technology, engineering, and mathematics (STEM). All IGCCE projects are required to make use of NASA's unique contributions to climate and Earth system science, including the use of NASA Earth observation data, basic to more complex interactive Earth system models, and/or simulations.

In FY 2011, IGCCE transitioned from the NASA Higher Education Program into the NASA Minority University Research and Education (MUREP) Program. IGCCE focuses on rapidly and significantly increasing the participation of underserved and underrepresented communities in STEM. In 2011, IGCCE solicited proposals from US minority higher education institutions, community colleges, public school districts with high underrepresented/underserved enrollment, and non-profit organizations with a substantial history of working with underrepresented communities. Cooperative agreements valued at \$7.2 million were awarded to 14 organizations. The winning proposals illustrate innovative approaches using NASA content to support elementary, secondary, and undergraduate teaching and learning.

In the later part of FY 2011 IGCCE implemented a name change to NASA Innovations Climate Education (NICE). For the purpose of this report, the project will be referred to as IGCCE. The FY 2012 report will be submitted using the NICE project title.

PROJECT GOALS

The goals of IGCCE are to use NASA's unique contributions to climate and Earth system science, through collaboration with community colleges, minority serving institutions, and school systems to:

- Increase the number of underrepresented/underserved students prepared to teach climate change content within STEM subjects;
- Increase the number of underrepresented/underserved undergraduate students prepared for employment and/or to enter graduate school in technical fields relevant to global climate change; and
- Advance the understanding of how to effectively teach global climate change concepts.

IGCCE seeks to improve the teaching and learning about global climate change in elementary and secondary schools, on college campuses, and throughout lifelong learning.

PROJECT BENEFIT TO OUTCOMES 1 AND 2

The IGCCE project directly supports the NASA Strategic Plan and the Office of Education's Outcomes. Specifically, IGCCE aligns with Outcome 1 to "*contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals through a portfolio of investments*" and to Outcome 2 to "*attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.*"

Through a network of 71 projects (57 funded under GCCE and 14 under IGCCE), significant strides are being made in strengthening the climate change education skills of teachers and providing innovative climate science research and learning opportunities for students. The IGCCE awards were made in July 2011, thus the accomplishments cited below are largely related to the ongoing GCCE projects. In FY11:

- 42 new or revised higher education courses targeted at climate change-related STEM skills were developed. Over 1405 students participated in these courses. *It should be noted that the IGCCE project office is awaiting confirmation from three awardees who planned to teach three classes enrolling nearly 500 students. These numbers are not reflected in the data above.*
- 3953 elementary and secondary educators participated in long duration and short duration IGCCE STEM professional development (PD) opportunities. Specifically, 3031 participated in short duration activities; 922 participated in long duration activities. These educators will have a significant role in increasing the climate literacy of thousands of students. Also important is their sharing with their professional community the knowledge they gained from these educational experiences, as many of the projects' PD workshops are conducted in a train-the-trainer format.
- Over 4000 elementary and secondary students participated in NASA climate-related educational activities.
- From 2008 – 2011, a total of 11 projects have been awarded to institutions in EPSCoR states.

PROJECT ACCOMPLISHMENTS

A key priority of IGCCE is collaborating with Minority Institutions (MI) to improve the quality of the Nation's STEM education. The response rate, and success rate, of MI's to the previous GCCE solicitations was very low, and thus the IGCCE team was challenged with increasing MI awareness of and participation in the solicitation. To meet this challenge, the IGCCE project team and twelve Space Grant Consortia across the US hosted workshops highlighting the release of the NASA solicitation for proposals. Workshops were held in California, Florida, Georgia, Illinois, Minnesota, Mississippi, Montana, New York, North Carolina, Puerto Rico, Texas, and Virginia with a total of 386 participants registered for these events. The events included a live Webcast from Langley Research Center discussing the solicitation, tips on proposal preparation, and presentations from current IGCCE projects; more than 800 participants were reached via the Webcast. NASA received 49 proposals, much higher than the number of proposals that were submitted by MI's for the 2008 – 2010 solicitations, and 14 of those proposals were funded.

The IGCCE project has formed strategic partnerships with the NASA Science Mission Directorate, National Science Foundation (NSF) Climate Change Education Program, and National Oceanic and Atmospheric Administration (NOAA) education programs. The goals of this multi-agency partnership are to leverage existing resources, develop common evaluation metrics, minimize duplicate effort, and facilitate communications among this emergent community of scientists and educators. The 2nd annual NASA, NOAA, NSF Climate Change Education Principal Investigators Meeting was held in February 2011 with over 200 people in attendance representing more than 120 projects. Attendees showcased their projects, participated in a variety of activities and conversations related to effective communication and successful project management, and exchanged ideas and best practices. Plans are ongoing for the 3rd annual NASA, NSF, NOAA PI meeting to be held in April 2012.

Contributing to the synergy of the tri-agency partnership, Langley has taken the lead in developing a web-searchable, cross-agency matrix that contains a wide spectrum of project information. Matrix information includes, but is not limited to, target audience, grade level, tools and products being developed, evaluation techniques being initiated, etc. The searchable, web-based tool will be a comprehensive database of all NASA, NSF, and NOAA-funded climate change education projects.

The tri-agency climate change education partnership is being highlighted at the 2011 American Geophysical Union conference, an event that draws over 20,000 participants. There will be a series of related climate literacy sessions over 2 days highlighting many of the tri-agency projects, as well as an invited presentation from the tri-agency coordinating group.

IGCCE added a project evaluator to the management team through the NASA Postdoctoral Program (NPP). The evaluator's work is key to understanding project effectiveness and ensuring IGCCE meets project objectives. Each IGCCE-funded project has its own unique evaluation component; thus the IGCCE evaluator is conducting a meta-evaluation of IGCCE, as a whole, and working with the individual project evaluators to build a community of practice in the area of climate change education evaluation. Quarterly evaluator webinars are being led by Langley and are open to evaluators across the tri-agency community.

To meet help meet the challenge of building a community of practice and sharing, IGCCE PI webinars are held monthly where PI's highlight their progress, solicit ideas from other projects, and share lessons learned. Guest speakers are also invited on occasion to discuss related activities within or outside NASA that may be of interest to the PI's.

In the area of project management, IGCCE began work on a web-based quarterly reporting system that will become operational in FY 2012. The PI's will use this system to report on milestones, metrics, accomplishments/challenges, and publications; it will facilitate creation of project reports by the project team.

PROJECT CONTRIBUTIONS TO PART MEASURES

PART Measure 1: Achieve 40 percent participation of underserved and underrepresented in NASA higher education projects

As a result of the 2011 proposal solicitation, **14** MI's were awarded cooperative agreements totaling \$7.2M.

PART Measure 3: 75,000 educators participate in NASA education programs

3953 teachers, along with informal educators, participated in IGCCE project-led PD opportunities in FY 2011.

PART Measure 4: 25,000 undergraduate and graduate students participate in NASA education opportunities.

IGCCE-funded projects offered 42 new or revised higher education STEM courses to students. Over **1400** students enrolled in the courses.

PART Measure 5: 600,000 elementary and secondary students participate in NASA instructional and enrichment activities

IGCCE projects provided over **4447** elementary and secondary students with climate change education experiences that included NASA data and/or models.

IMPROVEMENTS MADE IN THE PAST YEAR

The IGCCE project made significant strides in raising awareness of funding opportunities and encouraging participation of MI's. For the 2008-2010 GCCE solicitations, which were open to all higher education, school system, and non-profit institutions, an average of 8% or 16 proposals came from MI's, including organizations categorized as High Hispanic Enrollment. The 49 proposals received from MI's in response to the 2011 IGCCE solicitation is a significant improvement, and the IGCCE project management team will continue its efforts improve the rate of response to the next solicitation.

Other improvements include:

- Strengthening the partnership with NASA Science Mission Directorate, NSF, and NOAA
- Escalating the evaluation component of the IGCCE project

- Increasing awareness and highlighting project opportunities through professional organizations such as the National Science Teachers Association and the Public Broadcasting Service
- Developing a quarterly report system for PI use
- Enhancing the IGCCE website

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

The 14 IGCCE and 57 GCCE awardees are partners in the project. Under their grants and cooperative agreements, they create new courses, provide teacher professional development workshops and research internships, create new curricula and online courses for undergraduates and K-12, and provide research experiences for K-12 and undergraduate students.

Other IGCCE partners include the NASA Science Mission Directorate, NSF, and NOAA climate change education programs. The goals of this multi-agency partnership are to leverage existing resources, develop common evaluation metrics, minimize duplicate effort, and facilitate communications among this emergent community of scientists and educators.

Virginia Space Grant Consortium, in partnership with NASA Langley Research Center, provides educational outreach and support to IGCCE and plays a key role in integrating the NASA, NSF, and NOAA PI's into a community of practice.

References:

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