2014 Great Midwestern Regional Space Grant Consortia Meeting
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9/25/14

GMWRSG Mtg, Iowa Space Grant
Dr. Charisse Buising, Drake Univ.
Welcome

Dr. Charisse Buising, Director of ISGC
Associate Professor, Biology
Associate Director Biochemistry, Cell and Molecular Biology
Drake University

• Associate Director of Research, 2009-13
• Campus Coordinator, 10 years
• Base Program Manager, 6 years
ISGC Management Team

- Jay Staker, Associate Director for Education
- Carmen Fuchs, Office Manager
- Lead Institution, University of Northern Iowa

Jay Staker, Director
Extension, Science, Engineering and Technology
ISGC Organization

Executive Committee

Dr. Charisse Buising
Director

Mr. Jay Staker
Assoc. Director for Education

Mrs. Carmen Fuchs
Office Manager

Dr. Sarah Nusser
ISU Presidential Rep.

Dr. Christine Twait
UNI Presidential Rep.

Dr. Daniel. Reed
UI Presidential Rep.

Dr. Deneese Jones
Drake Presidential Rep.

Dr. Amy Kaleita
ISU Campus Coordinator

Dr. Joel Haack
UNI Campus Coordinator

Dr. P. Barry Butler
UI Campus Coordinator

Dr. Keith Summerville
Drake Campus Coordinator

Voting members designated by green box.

Industrial Affiliates

Mike Tully
Aerial Services, Inc.

Jennifer Nelson
AeroDyne Laboratories

Tim Etherington
Rockwell Collins, Inc.

Robert Sternowski
Softronics, Ltd.

Government Affiliates

Thomas Lograsso
Ames Lab., U.S. DoE

Jerry Hatfield - USDA Nat’l Lab for Agriculture & Env

Yvette McCulley
Iowa Dept. of Education

Robert Libra
Iowa DNR/Geological Survey

Michelle McEnany
IDoT - Office of Aviation

Outreach Affiliates

Monica Challenger
Cedar Rapids Science Center

Jason Dornbush
Grout Museum District

Craig Johnson
Iowa Academy of Science

Chuck McDonald
Iowa Aviation Promotion Group

Jerry Enzler
Nat’l MS River Museum & Aquarium

Kim Findlay
Putnam Museum

Charles Miller
Rediscover Science®

Curt Simmons
Science Center of Iowa

University of Northern Iowa
Lead Institution

9/25/14
PY25 (2014-15)

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21 Iowa Affiliates

- 4 Academic
- 3 Jurisdiction Agencies
- 2 Other Federal Agencies
- 4 Industry
- 8 Outreach

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NASA Education Outcomes

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA’s strategic goals. (Employ and Educate)

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty. (Educate and Engage)

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA’s mission. (Engage and Inspire)
Space Grant Program Activities

1. Fellowship/Scholarship
2. Higher Education
3. Research Infrastructure
4. Precollege Education
5. Informal Education
6. Administration

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Outcome 1: *Employ and Educate*

- Fellowship and scholarship program aligned with higher education programs at academic affiliates
- Scholarship program for precollege seniors at the State Science and Technology Fair of Iowa
- Higher Education Base Programs, Curriculum Development, and Student Hands-On Experiences
- Early Career Research Infrastructure Projects
Outcome 2: *Educate and Engage*

- Partner Schools program
- National Junior Academy of Science program
- STEM *professional development*, preservice and in-service training for formal and non-formal educators working in K-12
- State Science and Technology Fair of Iowa
- Promote and provide hands-on, NASA-related activities to minority and underserved students and schools for the disabled
Science Literacy

Outcome 3: Engage and Inspire

• Support STEM informal education programs that enhance public awareness of NASA missions and general scientific literacy for Iowa.
Fellowship/Scholarships

Actively participate in base programs or with other ISGC-supported faculty

- 18 Grad/UG $7k, 4 CC transfer $5k, 1 Sci Fair $4k
- Enroll in independent study class

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Higher Education

Base Programs

• Main NASA activity on each academic campus
• Competitively award 3-years funding
• Engage and educate our students in authentic, hands-on research experiences
  – Collaborate
  – Publish
  – Present
  – Grants
Research Infrastructure

Early Career Faculty
- 3 years funding
- Primary focus research
- Eligible to mentor

Iowa NASA EPSCoR Researchers
- 1 year funding
- Primary focus research
- Eligible to mentor
Higher Ed - Base Programs

- **Drake University** - Dr. Marc Busch and Co-I Dr. Heidi Sleister
  “Effects of Low Gravity Environments on Host-Pathogen Interactions”

- **Iowa State University** - Dr. Bong Wie
  “Space Technology Research for Robotic and Human Exploration of Near-Earth Objects”

- **The University of Iowa** - Dr. Bernd Fritzsch
  “Understanding gravity sensing defects through targeted ear manipulations”

- **University of Northern Iowa** - Dr. John Ophus & Dr. Alex Oberle
  “High-altitude ballooning for enhancing STEM learning among undergraduate, preservice teachers in science and geography/social science”
Higher Ed - Base Programs

• Drake University - Dr. Marc Busch and Co-I Dr. Heidi Sleister
  “Effects of Low Gravity Environments on Host-Pathogen Interactions”

**New Base Program** Drake University – Dr. Brian Gentry
  “Infection Mitigation during Space Flight: Combination Pharmacotherapy to Combat Herpes Viral Infections, Curtail Drug Resistance, and Decrease Incidence Rates of Adverse Effects”

• Iowa State University - Dr. Bong Wie
  “Space Technology Research for Robotic and Human Exploration of Near-Earth Objects”

**New Base Program** Iowa State University - Dr. Hui Hu
  “Research and Education Integrated Program on Aircraft Icing and De-/Anti-icing Technology”

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Research Infrastructure

- **ISU** - Dr. Nicola Bowler
  “Electromagnetic nondestructive evaluation of degradation and flaws in polymer-matrix composites”

- **UI** - Dr. Sarah Vigmostad
  “Development of realistic computational models of the spaceflight effects on human physiology”

- **ISU** – Dr. Anupum Sharma
  “Biomimetic Designs to Silence Next-Gen Aircraft Propulsion Systems”

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Iowa NASA EPSCoR Program

Build core strengths to grow competitive research and technology capabilities of importance to NASA

1. Improve connections between Iowa & NASA researchers

2. Increase the number of researchers in Iowa working on NASA technical issues

3. Build partnerships through intra-state research collaborations in NASA relevant areas

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Research Awards 2013-14

- Dr. Jerry Honts, Drake, “Using Synthetic Biology to Create a Calcium-Activated Contractile Fabric” Ames Research Center
- Dr. Olesya I. Zhupanska, UI, “Sensing and Imaging of Impact Damage in Composites”
- Dr. Paul Componation, ISU, “The Role of Non-Technical Variables in NASA Research and Development Project Success”
- Dr. Abebe Mengesha, Drake, “Impact of Nanotechnology and Design and Development of Triggerable Drug Delivery Systems for Smart Medicine”
- Dr. Philip Kaaret, UI, “A Ground Station for CubeSat Operations”
- Dr. Brian Gentry, Drake, “Pharmacological Enhancement of Anti-Viral Chemotherapy for the Treatment of Herpes Virus Infections”
Fellowships/Scholarships Yr5

Drake University
Mary “Shea” O’Brien, Jr, pharmacy
Hannah Sauer, Sr, pharmacy
Margaret Armstrong, Jr, biology
Diana Schreier, Jr, pharmacy
Alexandra Howland-Lopez, Jr, biochemistry, cell and molecular biology (Community College Scholarship)

Iowa State University
Andrew Bodling, Doctoral, aerospace engineering
Ira Mitchell, Jr, aerospace engineering
Miriam Wilson, So, aerospace engineering
Toby Cruz, Sr, civil engineering
Brian Fuchs, Jr, materials engineering
Ashley Johnson, So, materials engineering (Community College Scholarship)

University of Iowa
Sanam Zarei, Jr, biomedical engineering
Hannah Maher, Jr, biology
Charles Holliday, So, human physiology
Kasra Zarei, Fr, biomedical engineering
Zach Behrendt, So, chemical engineering
Nora Petran, So, mechanical engineering (Community College Scholarship)
Breanna Kramer, Science Fair winner

University of Northern Iowa
Michael Madsen, Jr, geographic information sciences and environmental science and policy
Bawa Sadjifo, Sr, technology management and manufacturing technology
Angela Schmitt, Sr, science education
Elizabeth Turcotte, So, biology and biochemistry
Kyle Spurgeon, Jr, physics (Community College Scholarship)
NASA Education Lines of Business
Evidence of Success

• Institutional Engagement
• STEM Engagement
• NASA Internships, Fellowships and Scholarships
• Educator Professional Development
Areas of Study

• 10 Engineering
• 8 Life Sciences
• 2 Physical Sciences
• 1 Science Education
Fellowship/Scholarships

Goal: Recruit and train a diverse workforce

- Year 2010 - 10.8% underrepresented & 50% female
- Year 2013 - 19.3% underrepresented & 40% female
- Year 2014 - 22.7% underrepresented & 40% female

Fellowship/Scholarship Awards

Year 2013
- 21.7% (5/23) & 26.1% (6/23) underrepresented students
- 52.2% (12/23) & 56.5% (13/23) female students

Year 2014
- 26.1% (6/23) underrepresented students
- 56.5% (13/23) female students

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Curricular Base, Wider Audience, Develop Skills Sets

- **UNI** - Patricia Higby
  “Energy: Education Capstone Course at UNI”

- **Drake** – Dr. Heidi Sleister
  “Synthetic Biology Project-Based Laboratory Course”

- **Drake** - Dr. David Courard-Hauri
  “STEM Curriculum Development: Sophomore-Level Case”

- **ISU** - Clayton Anderson
  “Space Flight Operations Prototype Workshop”

- **UNI** – Dr. Scott Greenhalgh
  “Redesign of Intro. to Technology and Engineering Education”

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Student Hands-On Experiences 
Internships 

Ames Research Center
- Neil Akolkar, Jr, Aerospace engineering, ISU
- Alexander Christensen, Sr, Aerospace engineering, ISU
- Toby Cruz, Sr, Civil engineering, ISU
- Maxwell Loebig, Jr, Aerospace engineering, ISU
- Jordan Mathews, Sr, Aerospace engineering, ISU
- David Schanot, Jr, Aerospace engineering, ISU

Marshall Space Flight Center
- Jacob Harry, Sr, Aerospace engineering, ISU

Langley Research Center
- Doug Matthews, Sr, Aerospace engineering, ISU
- Brian Senchuk, Jr, Electrical engineering, UI
- Max Wood, Sr, Materials engineering, ISU

Goddard Space Flight Center
- Vincent Lee, Sr, Mechanical engineering, ISU

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NASA Competitions
Lunabotics

- NASA Robotic Mining Competition at Kennedy Space Center - May 14
- PISCES Robotic International Space Mining Competition, Hilo, HI - July 14

L to R: Katie Goebel, John Heinig, Brian Jend, Nathan Beougher, David Peiffer, Phil Molnar, Alex Grant and Jim Heise. Hilo, Hawaii

Mauna Kea volcano simulates Martian terrain

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Student Hands-On Experiences
Rocketry

Cyclone Sounding Rocket
- High altitude
- High Speed
- Scientific Payload

Joel Lynch, Manny Ballestero, Spencer Dewald, not pictured Brendan Cunningham, Justin Edl

Kloudburst 24 high-powered rocket launch, Argonia, KS
April, 2014
Student Hands-On Experiences
Rocketry

Great Midwest Regional Rocket Competition
CySLI Rocket Team 2nd place

L to R; Brandon Bay, Jake Harry, Matt Dickinson, Andrew Jirik, and Christian White and 6 others

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Student Hands-On Projects

Opportunities for Hands-on Experiences

- Collaborate
- Network
- Proposal writing
- Grant writing
- Disseminate – Publications, Presentations
- Report to funding agency
ISGC Year 4

• 34 Researchers
• 61 Higher Ed Students (59U, 1G, 1PD)
• Collaborations
  – 6 NASA Centers
  – 1 Other Federal Agencies
  – 1 Industry
  – 2 Other Academic Institutions
• 12 Peer-reviewed Publications
• 3 Publications submitted
• 14 Other Publications
• 14 Presentations
• 6 Grants funded for a total of $85,700
## Iowa NASA EPSCoR Programs

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Precollege Education

Partnerships
- ISU Extension
- Governor’s STEM Advisory board
  - Reach schools attempting systemic change in STEM learning environments in districts

CySTEMic Summit: Partner school program
- Identify Goals
- Link Teachers to NASA Content
- Evidenced-based pedagogy
- Summit March ’14 included a pre- and post- webinar to prepare and debrief

Professional Development Workshops
- May ’14
- Summer ’14

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Partner School Program

• CySTEMic Summit
  – 10 districts represented
  – 25 STEM teachers and administrators, K-12

• Professional Development Road Map
  – Tool to guide districts to plan PD STEM for learning improvement
  – Completed by district, results compiled, shared with district

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Partner School Program

- May workshop
  - 16 teachers, K-12
  - 5 school districts

- Ongoing work with districts to support PD Plan and link to NASA
Partner School Program

STEM Professional Development workshop
- Focused on science and engineering practices in context of STEM content
- Led in cooperation with teachers
- Featured NASA design challenges as learning experience examples
- Prototype for subsequent workshops to be held around the state in cooperation with STEM Hubs, AEA’s Community Colleges, etc.

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Precollege

Partner School Program

• ISGC
• ISU Extension-Science, Engineering, and Technology Program
• Precollege program for youth and educators

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<th>Participant Type</th>
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Iowa Junior Academy of Science

- Iowa Academy of Science Poster Session
- Increase student ability to conduct and present research
  - 121 Students
  - 5 Middle School
  - 15 High School Teachers
  - 10 Higher Education Faculty
  - 21 Parents or Guardians
  - 13 Other

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Informal Education

National Mississippi River Museum and Aquarium

“Exploring Rivers: The View from Space”

52’ wide Mississippi River watershed

– Erosion and flood tables
– Wetlab
– Educate visitors about the important issues of water quality, flood, drought, and erosion.
Informal Education

Science Center of Iowa

“Investigation: Climate Change”
- Magic Planet digital globe system
- Teacher-workshop on climate science
- Use of climate change programming

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Informal Education

National Mississippi River Museum and Aquarium
“Exploring Rivers: The View from Space”

Science Center of Iowa
“Investigation Climate Change”

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Thank you

Incorporate ideas into State Space Grant Programs

Michigan – Next Prof, SROP, MISNER
Indiana – Comprehensive Program and Outreach
Illinois – Best Practices for Learning
Wisconsin – Low-threshold activities
Ohio – Best Practices Integrated into Space Grant Activities
Minnesota – Context of Activities, Hands-On: Rockets, HASP
Missouri – Bridge to the Stars
Iowa – Diverse activities attract diverse students

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Thank you

Dr. Lenell Allen
Director, Aerospace Research and Career Development
Office of Education
NASA Headquarters
Thank you

• Carmen Fuchs, Office Manager

• Jay Staker, Associate Director for Education

• Joe Buising, Drake University “volunteer”

• Science Center of Iowa