EPSCoR Funding Impact in North Dakota

2/15/19

Science and Engineering

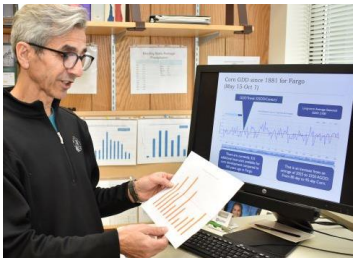
NSF: INSPIRE-ND (**IN**novative and **S**trategic **P**rogram **I**nitiatives for **R**esearch and **E**ducation – **N**orth **D**akota), ND's current Track-1 Award, builds research infrastructure and strengthens research competitiveness (including scientific computing); provides research and STEM education opportunities for students across 11 campuses within ND - 5 Tribal Colleges (TCs), 3 primarily undergraduate institutions (PUIs), 2 research universities (RUs), and 1 master's college/university (MCU); and enhances research collaborations between campuses.

The award is organized around two research themes: 1) Engage regional climate studies to help predict hydrology and impact on agriculture; and 2) Use of agricultural materials to develop sustainable materials.

1. Center for Regional Climate Studies (CRCS): Global climate variations impact regional weather, extreme weather events, and agricultural productivity. Through computational modeling and simulation, CRCS aims to understand how global climate impacts ND agriculture in the areas of field hydrology, general land use, biomass production (which affects chemical feedstocks), and human behavior. The NSF EPSCoR award provides funding for the CRCS to pursue this research. Additionally by obtaining insight from ND stakeholders into the climatological impacts that weather variations have on the ND agricultural economy, the CRCS team is able to seek sustainable solutions that benefit ND. CRCS researchers are located across the state at 3 TCs (Nueta Hidatsa Sahnish College, Turtle Mountain Community College, and United Tribes Community College), 2 PUIs (Dickinson State University and Valley City State University), and 2 RUs [University of North Dakota (UND) and North Dakota State University (NDSU)]. For more information about CRCS, visit: http://und-crcs.org/

2. Center for Sustainable Materials Science (CSMS): ND seeks to advance new discoveries of bio-based, sustainable materials that give more consideration to the environment and contribute to our economy through their sourcing (low cost, renewable), durable lifetimes (long, high durability), and recyclability (efficient, high value). The NSF EPSCoR award provides funding for CSMS to pursue this research. In addition to conducting research on bio-based, sustainable materials (including a recently added expert in lifecycle analysis), CSMS will facilitate education, workforce development, and outreach on the importance of sustainable materials. CSMS researchers are located across the state at 2 TCs (Cankdeska Cikana Community College and Sitting Bull College), 1 PUI (Mayville State University), 2 RUs (NDSU and UND), and 1 MCU (Minot State University). For more information about CSMS, visit: http://csms-ndsu.org/






NASA: In 2018, ND NASA EPSCoR had two UND researchers active in Cooperative Agreement Notice (CAN) Research Awards. These projects are: *Multi-Purpose Research Station in ND in Support of NASA's Future Human Missions to Mars* and *Derive Phytoplankton Size Classes, Detrital Matter, Particulate Organic Matter and Particulate Inorganic Matter from Ocean Color Observation*. In response to the 2018 CAN solicitation, ND submitted a joint proposal with a Principal Investigator from NDSU and a Co-Investigator from UND, titled *Variable Speed Power Turbine for Vertical Lift Tilt Rotor and Hybrid Electric Air Vehicles: Experimental Investigation and Computational Analysis*. North Dakota was notified of its next three-year Research Infrastructure Development (RID) Award to begin in May 2019. In 2018, eleven RID awards were made to researchers from NDSU (7) and UND (4). Additionally, in November, North Dakota was notified of an award to a NDSU researcher under the Rapid Response solicitation, titled *Development of a High Temperature (500C) and High Power Testbed for GaN HEMT/SiC Switching Power Converter for Long-Duration Venus Surface Operations*.

Workforce Development

During this year, ND EPSCoR continued to collect data from 93 previously enrolled rural and frontier youth and 212 new 5th and 8th grade students. Following longitudinal data collection (this next year), researchers will be able to assess changes in STEM interests, self-efficacy, and other relevant variables across time, providing important information for future interventions focused on STEM workforce development.

Additionally, 59 graduate students (31 CRCS and 28 CSMS) and 49 undergraduate students (24 CRCS and 25 CSMS) were trained in STEM research. Additionally, a joint CRCS/CSMS faculty group conducted seven professional development seminars for these same students.

Three PUI, one TC, and one MCU student joined the growing list of students participating in ND EPSCoR's Distributed Research Experience for Undergraduate Students. Many of these students are choosing to continue their education by pursuing STEM graduate degrees.

Commercialization

AkzoNobel, BASF, Interpolymer Corporation, Zymergen, and Composites Innovation Center are among the companies CSMS is working with to commercialize the Center's research. To further these discussions, CSMS will be hosting a two-day summit on the translation of bio-based materials research to industry. The **CSMS Translational Summit**, planned for February 25-26, 2019, will bring together leaders from these and other companies, national labs, and academic institutions to share their expertise with CSMS participants.

Outreach

To strengthen stakeholder connections to the region, CRCS formed a stakeholder group to further engage partners from across ND who might benefit from the research initiatives and data produced by the CRCS group. Initial representation on the CRCS Stakeholder Advisory Board came from agriculture, water management, and regional weather/climate groups. CRCS participants are now working with these stakeholders to determine their research needs. A joint workshop, **CRCS Northern Plains Weather/Climate Product, Service, and User Engagement Workshop,** is planned for March 28, 2019.

Seven new NATURE Sunday Academy lesson plans were created and implemented covering a range of STEM disciplines for Sunday Academy this year: 1) *Adaptation and climate change* (CRCS related), 2) *Digital preservation of natural and cultural resources*, 3) *Hypothesis and product testing*, 4) *Influenza outbreak!*, 5) *Polymer synthesis from common materials* (CSMS related), 6) *Sentiment analysis*, and 7) *Understanding the anatomy of the eye*. Two of the lesson plans were related to the two research clusters accomplishing integration between research and outreach (intellectual merit and broader impact). Over 480 students were exposed to these seven NATURE Sunday Academy lessons throughout all five TC sites.

During this past year, Center for Computationally Assisted Science and Technology graduate students met with faculty and students at the 5 tribal colleges, 3 primarily undergraduate institutions, and 1 master's college/university to describe the benefits of high performance computing (HPC) and offer the services of the research universities' HPCs. Their presentation is available on YouTube: https://www.youtube.com/watch?v=wr8FIH-y2TA&feature=youtu.be

Current Active North Dakota EPSCoR Awards			
Program	**Award**	**Total Amount**	**Type of Award**
NASA	EPSCoR	$1.49 million	Cooperative Agreement Notice (CAN) - 2 awards
NASA	EPSCoR	$0.50 million	Research Infrastructure Development (RID) - 1 award
			New Funding Generated (Does not Include funds from NSF RII awards, State Funds, or pending proposals
Years	**Past NSF RII Track-1 Awards**	**Total Amount**	
2005-2008	EPSCoR	$ 6,783,333	$31,723,102
2008-2014	EPSCoR	$16,500,000	$48,000,016
2014-2019	EPSCoR	$20,000,000	$21,465,053

For more information about North Dakota EPSCoR:
Visit our website: www.ndepscor.ndus.edu or
Call 701.231.8400 (North Dakota EPSCoR State Office)