Triennial Report
2009 - 2011

Geographic Information Science Center of Excellence
South Dakota State University

GIScCE

SDSU

USGS
science for a changing world

Editorial Staff

Purpose

Welcome to the 2009-2011
Geographic Information Science Center of Excellence
Triennial Report

This report introduces the Center and summarizes the last 3 years of activity. The intent of this report is to advertise our achievements to the wider academic community, attract new students and postdoctoral researchers, and to provide a baseline to measure our future progress.

South Dakota is named after the Lakota and Dakota Sioux American Indian tribes. The state was admitted to the Union in 1889, and today has a population of about 820,000. South Dakota is a beautiful rural state with a continental climate and four distinct seasons, ranging from very cold winters to hot summers, with an average of 230 sunny days per year. In 2011 the CNBC ranked South Dakota as the state with the 5th highest quality of life based on several factors, including local attractions, the crime rate, health care, as well as air and water quality. South Dakotans have the nation's 2nd shortest commute-to-work time (U.S. Census Bureau's 2010 American Community Survey) and the 3rd lowest unemployment rate (Department of Labor December 2011 assessment).

A number of people helped me to put this report together but special thanks go to Eric Salas and Marcia Prouty. The satellite images were taken from publicly available NASA resources. The report was generated with Microsoft Publisher using Berlin Sans, Candara, Georgia, and Calibri fonts.

David P. Roy
Triennial Report Editor
Professor, SDSU

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Geographic Information Science Center of Excellence

The **Geographic Information Science Center of Excellence (GIScCE)** was inaugurated as a formal collaboration between South Dakota State University and the United States Geological Survey (USGS) Center for Earth Resources Observation and Science (EROS) in September 2005. The GIScCE mission is to apply geographic information science capabilities, especially remote sensing, to advance the scientific understanding of the Earth System and, in particular, the characteristics and consequences of a changing global landscape.

Through the GIScCE, the interdisciplinary SDSU-EROS research team applies remote sensing, geographic information systems, geospatial analysis, digital mapping, and modeling to document and understand the changing earth. From the perspective of the USGS EROS, the GIScCE provides a unique and powerful opportunity to advance USGS EROS efforts to provide operational observation and monitoring that supports USGS science goals related to climate change, ecosystem dynamics, human health and the environment, natural hazards, and water needs.

The idea and vision for the GIScCE was formed and implemented by scientific and administrative leaders at SDSU, EROS, and the South Dakota State Board of Regents. As this report shows, we have made significant progress in achieving our founders' original vision.

The GIScCE truly represents a unique partnership that strengthens both SDSU and EROS. Since inception in September 2005, the senior scientists from SDSU and EROS have worked together to make the GIScCE a recognized global center for geographic information science research.

Tom Loveland
Research Physical Scientist, USGS EROS Center
Adjunct Professor, SDSU
Co-Director, GIScCE

Senior Scientists & Professors

Eleven senior scientists constitute the GIScCE faculty and are drawn from academia and the United States Geological Survey Earth Resources Observation and Science (EROS) Center staff. By serving the international, national and South Dakota communities through teaching, graduate supervision and research investigations, the faculty have established the GIScCE as an internationally recognized center for research in geographic information science.

Mark A.
Professor
Cochrane

Ph.D. Ecology
Biology Department, Pennsylvania State University, USA, 1998
S.B. Environmental Engineering Science
Massachusetts Institute of Technology, USA, 1993

Faculty SDSU

Professional Positions

Mark relocated to South Dakota State University in 2005 where he is currently a senior scientist and professor in the Geographic Information Science Center of Excellence and the Natural Resource Management Department. He has also been an associate researcher with the non-governmental organization (NGO) Instituto do Homem e Meio Ambiente na Amazônia (IMAZON) since 1995. Prior to working at SDSU, he was a senior research scientist with the Center for Global Change and Earth Observations (CGCEO) and an adjunct professor with the Geography Department at Michigan State University. From 1998-1999, he lived in Brazil and was a postdoctoral scientist with the Woods Hole Research Center and an associate researcher with the NGO Instituto de Pesquisa Ambiental da Amazônia (IPAM).

Research Interests

Dr. Cochrane's research focuses on understanding spatial patterns, interactions and synergisms between multiple physical and biological factors that affect ecosystems. Recent work has emphasized human dimensions of land-cover change and the potential for sustainable development. Ongoing research projects, funded by NASA and the Joint Fire Science Program, aim to understand disturbance regime changes and biodiversity impacts resulting from various forms of forest management and degradation, including fire, fuels treatments, fragmentation and logging. Dr. Cochrane's interdisciplinary work combines ecology, remote sensing and other fields of study to provide a landscape perspective of dynamic processes involved in land-cover change. He has published more than 30 peer reviewed scientific journal papers, 13 book chapters, and edited or authored 3 books. His most recent book, *Tropical Fire Ecology: Climate Change, Land Use and Ecosystem Dynamics* (Springer-Praxis) provides detailed information on the fire situation for roughly half of the planet's fire-affected surface (available, January 2009).

Teaching

Fire and Ecosystems (GSE/GEOG/WL/BIOL-767), Mark Cochrane, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Spring 2006, Spring 2007, Spring 2009, Spring 2011.

Introduction to Global Climate Change (GSE/BIOL 792 & GEOG 790), Mark Cochrane, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Spring 2010, Spring 2012.

Advanced Remote Sensing Applications: Fire and other disturbances (GSE/GEOG-766), Mark Cochrane and David Roy, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Spring 2008.
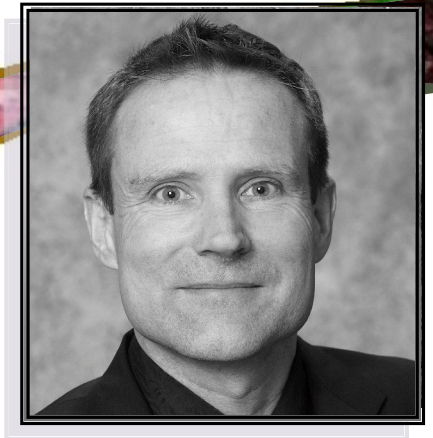
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Niall P. Hanan

Professor

Ph.D. Biology
Biology Department, Queen Mary College, London University UK, 1990
B.Sc. Hons
Liverpool Polytechnic, Liverpool, UK, 1985

Faculty SDSU

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Professional Positions

Niall is senior scientist in the Geographic Information Science Center of Excellence (GIScCE) and professor of Natural Resource Management (NRM) at South Dakota State University. After receiving a PhD in Biology (range ecology and remote sensing) from the University of London (Queen Mary College, 1990) Niall held postdoctoral appointments at the University of Maryland (1991-1995), Wageningen University Research, The Netherlands (1995-1997), UC-Santa Barbara and Carnegie Institution of Washington, Stanford (1998). Niall then joined the Natural Resource Ecology Laboratory (NREL) at Colorado State University where he spent 12 years as an assistant, associate and senior research scientist. Niall moved to SDSU in January 2011.

Research Interests

Niall's research focuses on the ecology and ecosystem dynamics of semi-arid grasslands, savannas and grazing systems in Africa and globally. His on-going research projects are strongly interdisciplinary, including theoretical, empirical and model-based studies of the ecology of savannas and other semi-arid vegetation systems, the role of human management of grazing, fire and other disturbances in ecosystem dynamics, the use of micrometeorological techniques to study vegetation-atmosphere exchanges of carbon and water, and the use of remote sensing and geospatial datasets to measure and model ecosystem dynamics at landscape, regional and continental scales. Niall has published more than 50 peer reviewed scientific papers and has recent funding from NSF, NASA, USAID, and other agencies.

Teaching

Advanced Methods in Geospatial Modeling: Global Ecology and Modeling (GSE/ GEOG-760), Niall Hanan, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Spring 2012.

International Field Experience: The West African Savanna Summer School (GEOG/ BIO 496), Niall Hanan, Undergraduate field experience in West Africa, offered through the SDSU Geography and Biology degree programs, planned for Summer 2012.

Geoffrey M. Henebry

Professor

Ph.D. in Environmental Sciences
The University of Texas at Dallas, USA, 1989
M.Sc. in Environmental Sciences
The University of Texas at Dallas, USA, 1986
B.A. in Liberal Arts
St. John's College, Santa Fe, USA, 1982

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Professional Positions

Geoff was a postdoctoral fellow and then research assistant professor with the Konza Prairie Long Term Ecological Research (LTER) Project at Kansas State University, 1989-1996. During a Fulbright senior research fellowship from 9/1993 to 3/1994, he worked at INPE (the Brazilian National Institute for Space Research) on characterizing flooding dynamics in the Pantanal Matogrossense using Synthetic Aperture Radar. Geoff joined the Department of Biological Sciences at Rutgers-Newark in 1996 as an assistant professor. However, the Great Plains beckoned and Geoff and his family moved to the University of Nebraska-Lincoln in 1999. He worked in the Center of Advanced Land Management Information Technologies as an associate geoscientist in the Conservation and Survey Division and then as a research associate professor in the School of Natural Resource Sciences until moving north to South Dakota State University in 2005. In addition to being a senior scientist in the GIScCE, Geoff is a professor in the Department of Natural Resource Management. He served as the Coordinator of the Ph.D. program in Geospatial Science and Engineering from 2006-2011. Currently, Geoff is serving as the Interim Co-Director of the GIScCE.

Research Interests

Land surface phenology: the spatio-temporal dynamics of the vegetated land surface as observed by remote sensors. The biogeophysical consequences of land use land cover change (LCLUC), particularly land-atmosphere interactions. Effects of climatic variability and change on land surface dynamics. Landscape ecology of grasslands, croplands, and disturbances. Geoff serves on Advisory Committee of the USA National Phenology Network (*http://usanpn.org*). He currently serves on the editorial boards of BioScience and Landscape Ecology, and previously at Ecology/Ecological Monographs, Conservation Ecology, and Applied Vegetation Science. He has contributed to more than 60 scientific papers and reports and six book chapters. Geoff's research is currently funded by NASA, NSF, and NIH. He is active in the American Geophysical Union (AGU) and the US Chapter of the International Association for Landscape Ecology (US-IALE). Since 2001 Geoff has been a Certified Senior Ecologist by the Ecological Society of America.

Teaching

Introduction to Geospatial Science and Engineering (GSE-740), Geoffrey Henebry, Graduate level course required as part of the Geospatial Science and Engineering Ph.D. program, Fall 2009, Fall 2011.

Geospatial Science and Engineering Seminar (GSE-790), Geoffrey Henebry, Graduate level course required as part of the Geospatial Science and Engineering Ph.D. program, Fall 2011.

David P. Roy
Professor

Ph.D. Remote Sensing
Geography Department, University of Cambridge, UK, 1994
M.Sc. Remote Sensing and Image Processing Technology
Meteorology Department, University of Edinburgh, UK, 1988
B.Sc. Geophysics
Environmental Sciences Department, University of Lancaster, UK, 1987

Faculty SDSU

Professional Positions
David was a postdoctoral research fellow with the National Environment Research Council for Thematic Information Systems, University of Reading, U.K., 1993 to 1994 and with the Space Applications Institute of the Joint Research Center of the European Commission, Ispra, Italy, 1994 to 1996. In 1996 he moved to the United States to take a position as an assistant and then as an associate research scientist in the Department of Geography, University of Maryland, and to lead the Moderate Resolution Imaging Spectroradiometer (MODIS) Land Data Operational Product Evaluation group at NASA's Goddard Space Flight Center. David relocated to South Dakota State University in 2005 where he is currently a senior scientist and professor in the Geographic Information Science Center of Excellence and the Geography Department. Currently, David is the Chair of the SDSU Research and Scholarship Committee.

Research Interests
David's research focuses on the development of remote sensing and advanced computing methods to integrate/fuse satellite sensor data and to map and characterize terrestrial change, the causes and consequences of land cover and land use change, and fire-climate-vegetation interactions. He is interested in development of methodologies to facilitate the transfer of remote sensing products into the user domain, particularly in developing countries. David is an associate member of the NASA MODIS land science team, a member of the NASA Land-Cover/Land-Use Change Science Team, and the GOFC-GOLD Fire Implementation team. He is a recipient of three NASA group achievement awards recognizing his contributions to the NASA MODIS Terra and Aqua missions. David has published more than 65 peer reviewed scientific journal papers and 5 book chapters. His largest NASA grant, "Web-enabled Landsat data (WELD) - a consistent seamless near real time MODIS-Landsat data fusion for the terrestrial user community" is for more than three million dollars.

Teaching
Quantitative Remote Sensing for Terrestrial Monitoring (GSE/GEOG-741-S01), David Roy, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Fall 2006, Fall 2007, Spring 2009, Fall 2010.

Remote Sensing (GEOG-484), David Roy (laboratories assisted by Sanath Kumar and Emma White), Undergraduate level course offered as part of the SDSU Geography degree and masters program, Fall 2010, Fall 2011.

Advanced Remote Sensing Applications: Fire and other disturbances (GSE/GEOG-766), Mark Cochrane and David Roy, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Spring 2008.

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Michael C. Wimberly

Professor

Ph.D. Ecology
College of Forestry, Oregon State University, USA, 1999
M.Sc. Quantitative Resource Management
College of Forest Resources, University of Washington, USA, 1995
B.Sc. Environmental Science
Department of Environmental Sciences, University of Virginia, USA, 1990

Faculty SDSU

Professional Positions

Mike was a postdoctoral research scientist with USDA Forest Service Pacific Northwest Research Station from 1999 through 2001 and an assistant professor of Forest Landscape Ecology in the Warnell School of Forest Resources at the University of Georgia from 2001 through 2005. He joined the newly-created Geographic Information Science Center of Excellence (GIScCE) at South Dakota State University as an associate professor in 2005 and was promoted to full professor in 2011. He currently holds the positions of Senior Research Scientist in the GIScCE and professor in the Department of Natural Resource Management.

Research Interests

Mike conducts interdisciplinary research incorporating aspects of landscape ecology, natural resource management, and spatial epidemiology. His current work focuses on integrating ecological concepts with satellite imagery, GIS datasets, and spatial statistics to assess environmental and health hazards at broad spatial scales. Specific interests include the interactions of forest management with fire ecology and wildfire risk; the effects of climatic variability and land cover/land use change outbreaks of malaria and other infectious diseases; the influences of natural and built environments on physical activity and obesity in rural communities, and the environmental impacts of expanded biofuels feedstock cultivation. This work is supported by grants from a variety of external funding sources, including the National Institutes of Health, the US Department of Agriculture, the Sun Grant-DOE Regional Feedstock Partnership, and NASA.

Teaching

Geospatial Analysis (GSE/GEOG-743), Michael Wimberly, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Spring 2010.

GIS Application in Ecology (GSE/GEOG 792), Michael Wimberly, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Fall 2009, Spring 2011.

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Alisa L. Gallant

Adjunct Professor

Ph.D. Remote Sensing and GIS program
Colorado State University, USA, 1997
M.Sc. Biological Science
Oregon State University, USA, 1985
B.A. Biology
Sonoma State University, USA, 1979
B.A. Art
Sonoma State University, USA, 1979

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Professional Positions

Alisa has woven training in ecology and physical science towards conducting integrated landscape research since the early 1980s. She was a regional ecosystems geographer at the U.S. Environmental Protection Agency Research Laboratory in Corvallis, Oregon, from 1983-1990. After returning to school for a doctorate, she took a postdoctoral position from 1996 to 1998 as the remote sensing and geospatial analysis specialist for the Landscape Biodiversity Lab at Montana State University in Bozeman, Montana. In 1998 she accepted a position as a research physical scientist at the U.S. Geological Survey, Earth Resources Observation and Science (EROS) Center in Sioux Falls, South Dakota, where she continues to work. In 2011 she joined Geographic Information Science Center of Excellence and the Geography Department at SDSU as an adjunct faculty member.

Research Interests

Integrated, interdisciplinary, multiscale studies that incorporate remote sensing, GIS/geospatial modeling, landscape/land-change characterization, and ecoregional analyses for biodiversity applications. Alisa is the remote sensing and geospatial analysis lead for the Terrestrial Wetland Global Change Research Network (TWGCRN), an international network formed to study climate change interacting with other stressors along environmental gradients. She particularly is interested in opportunities offered by the TWGCRN to link patterns of acoustic energy and other in-situ information with spatiotemporal patterns of energy measured remotely in the optical, infrared, and microwave portions of the spectrum. Alisa also collaborates on research integrating remote and in-situ environmental data to study relations of land-use dynamics to honey bee declines and to assess benefits of conservation program investments in land-use change in support of biodiversity.

Teaching

Alisa is a new member of the GIScCE faculty and has not yet taught courses at SDSU.

Kevin P. Gallo
Adjunct Professor

Ph.D. Agricultural Meteorology/Remote Sensing
College of Agriculture, Purdue University, USA, 1984
M.Sc. Agricultural Climatology
College of Agriculture, Purdue University, USA, 1981
B.Sc. Geography (Meteorology)
Geography Department, Northern Illinois University, USA, 1978

Faculty EROS

Professional Positions
Kevin has been a physical scientist with the Center for Satellite Applications and Research (STAR), National Environmental Satellite, Data, and Information Service (NESDIS) of the National Oceanic and Atmospheric Administration (NOAA) since 1985. Prior to joining NOAA Kevin was a postdoctoral research associate with the Laboratory for Applications of Remote Sensing, Purdue University (1984) and an assistant professor of Agricultural Meteorology, Cornell University (1984-1985). Kevin has been a visiting scientist at the USGS/EROS (1986-1991 and 1999-present) and NOAA's National Climatic Data Center (1991-1998).

Research Interests
Kevin's current research activities include:

* The use of high-resolution satellite data and in situ data to validate NOAA operational satellite data and products;

* Satellite-based analysis and assessment of the urban heat island effect (warmer air temperatures associated with urban compared to rural environments) on trends in temperature observed at climate stations; and

* Analysis and assessment of land surface properties (e.g., land surface temperature and vegetation indices) at in situ climate stations to provide recommendations on use of the stations for validation of future satellite-derived products

Teaching
Remote Sensing in Meteorology and Climatology (GSE/GEOG-766-S01), Kevin Gallo, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Fall 2007.

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Shuguang Liu

Adjunct Professor

Ph.D. Forest Ecology and Hydrology
University of Florida, USA, 1996
M.Sc. Forest Ecology
Beijing Forestry University, China, 1987
B.Sc. Forest Science
Central-South Forestry University, China, 1984

Faculty EROS

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Professional Positions

Leo was a research scientist at the State Planning Commission, Beijing, China and the Chinese Academy of Sciences, Beijing, China prior to gaining his Ph.D. in 1996. He then moved to the USGS Earth Resources Observation and Science (EROS) Center as a government contractor. Since 2003 he has been an honorable professor at the Chinese Academy of Sciences, China and an advisor to the US National Research Council. In 2008 he became a federal employee of the USGS Earth Resources Observation and Science (EROS) Center.

Research Interests

Leo is leading an interdisciplinary team to develop advanced data assimilation systems to improve the monitoring and forecast of land surfaces conditions including carbon sources and sinks, hydrological cycle, and ecosystem goods and services. He leads a USGS/NASA effort to develop innovative up-scaling approaches to quantifying the spatial and temporal dynamic changes of contemporary carbon stocks and fluxes in the US, and quantify the economic and environmental consequences of biofuel production in the Northern Great Plains. He has played key roles in several interdisciplinary studies on estimation of carbon sequestration supply and prediction of ecological sustainability under various physical, socioeconomic, and environmental conditions at the regional scale in Central and North America, Asia, and Africa.

Leo's work has been funded by various agencies including NASA, NSF, DoD, USAID, USDA, and USGS. He has published more than 50 peer reviewed scientific journal papers. He currently serves on the editorial boards of The Open Forest Science Journal and Tropical and Subtropical Botany.

Teaching

Principles of Land Surface Modeling (GSE/GEOG-760-S02), Shuguang Liu, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Spring 2008.

Thomas R. Loveland

Adjunct Professor

Ph.D. Department of Geography
University of California, Santa Barbara, USA, 1998
M.Sc. Department of Geography
South Dakota State University, USA, 1976
B.Sc. Department of Geography
South Dakota State University, USA, 1974

Faculty EROS

Professional Positions

Tom has held a number of geographic remote sensing positions dealing with land use and land cover issues. He started his career as a Land Use Analyst for the South Dakota State Planning Bureau in 1977. He also served as the Director of the Arizona State Land Department's Resource Analysis Division in Phoenix, AZ. Most of Tom's career has been spent at the USGS Earth Resources Observation and Science Center (EROS) where he has been engaged in many large area land cover characterization studies spanning local to global scales. Tom is currently leading Landsat science activities for the USGS and he provides science input to all USGS remote sensing activities. Tom has been co-director of the GIScCE since 2004.

Research Interests

Tom's interests revolve around understanding the geography of land change. Using remote sensing, he has investigated the characteristics of land use and land cover, the geographic variability in landscape dynamics, and the consequences of change on environmental systems. He has been involved in mapping land cover characteristics throughout the United States and globally. Tom was instrumental in reestablishing a national land cover mapping program in the USGS, and he was among the first to create continental and global-scale land cover data sets derived from remotely sensed imagery. His recent research has focused on documenting the rates, cause, and consequences of contemporary US land cover change. Tom chairs the USGS-NASA Landsat Science Team and was a member of the NASA National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project science team. He is a member of the editorial board for the Journal of Land Use Sciences and has served in leadership roles in a number of national and international science organizations including the American Society of Photogrammetry and Remote Sensing, Climate Change Science Program, and the Global Observation of Forest Cover/Global Observation of Lands Dynamics. Tom has published over one hundred journal articles, book chapters, and other professional papers. He serves on numerous national and international science advisory panels dealing with remote sensing, and has received career achievement awards from the Department of the Interior, U.S. Geological Survey, American Society of Photogrammetry and Remote Sensing, and the Association of American Geographers.

Teaching

Remote Sensing (GEOG 484), Tom Loveland, Undergraduate level course offered in the Geography Department, Fall 2007, Fall 2008.

Ecoregions Concepts and Applications (GEOG-490/590), Tom Loveland, Undergraduate level course offered in the Geography Department, Spring 2006.

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Gabriel B. Senay

Adjunct Professor

Licensed Professional Engineer (P.E.) in Civil Engineering
Water Resources, 2002
Ph.D. Department of Agricultural Engineering
The Ohio State University, USA, 1996
M.Sc. Catchment Hydrology
Wageningen University, The Netherlands, 1991
B.Sc. Agricultural Engineering
Alemaya University, Ethiopia, 1986

Professional Positions

Gabriel joined the U.S. Geological Survey (USGS) Earth Resources Observation Science (EROS) Center as a research physical scientist in 2008. Before that, he worked as a senior and principal scientist under different contractors (Raytheon, SAIC and ARTS) to USGS/EROS since 2000. Since 2005 his USGS/EROS appointment has been shared with the GIScCE at SDSU where he works as an adjunct professor in the Department of Agricultural and Biosystems Engineering and the Geographic Information Science Center of Excellence. He worked for 2 years (1998-2000) as a contactor to US Environmental Agency (EPA) in Cincinnati, Ohio. He moved to the United States in 1992 to pursue his Ph.D. work at the Ohio State University and undertook postdoctoral research at Oklahoma State University, Stillwater, Oklahoma (1996-1998).

Research Interests

Gabriel's research focus is on the integration of satellite-derived data with Agro-hydrologic modeling for water resources and agricultural production assessment and monitoring. His research focuses on developing simplified algorithms for operational early warning applications to monitor droughts and potential food security risks in the developing world. He seeks to maximize the societal benefit of earth observation systems though better resource assessment and planning that have been made possible due to improved access to remotely sensed data.

His research work is funded through grants obtained from various organizations such as NASA, USGS, USDA, NIH and NSF.

Teaching

Remote sensing of water resources (GSE/GEOG-766-S02), Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. program, Fall 2006, Fall 2007, Fall 2009, Fall 2011.

Faculty EROS

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James E. Vogelmann

Adjunct Professor

Ph.D. Plant Biology
Indiana University, USA, 1983
B.A. Botany
University of Vermont, USA, 1978

Faculty EROS

Professional Positions

Jim was a National Research Council postdoctoral researcher and staff member at the Jet Propulsion Laboratory, California from 1984-1987. He then became a research assistant professor at the Complex Systems Research Center, which is part of the Institute for the Study of Earth, Oceans and Space at the University of New Hampshire from 1987-1994. From 1994 to 2008, Jim was a principal scientist for various corporate contracts at the USGS EROS Center. Jim joined the USGS EROS Center as a Research Ecologist in 2008. He has been affiliated with the Geographic Information Science Center of Excellence at South Dakota State University since 2005.

Research Interests

Jim's current research interests include characterizing the Earth's natural resources, conditions, and changes, using remotely-sensed data. His current research efforts include conducting large area monitoring investigations, vegetation classification and land cover research, analysis of multi-temporal remotely-sensed data sets for characterizing multiple landscape properties and changes, vegetation characterization for fire hazard evaluation, and developing operational methodologies for employing remote sensing for assessing gradual vegetation changes related to changing climate patterns and insect damage. Jim was a member of the Landsat Science Team (2006-2011), and was a member of the previous Landsat 7 Science Team (1996-2001).

Teaching

Remote Sensing (GEOG 484), (team-taught with Tom Loveland), Undergraduate level course offered in the Geography Department, Fall 2009.

Remote Sensing for Conservation Applications (GSE/GEOG 766), Jim Vogelmann, Graduate level course offered as part of the Geospatial Science and Engineering Ph.D. Program, Spring 2009.

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Research Professors

The GIScCE faculty are complemented by research faculty hired at assistant, associate and full research professor equivalents. Research professors pursue externally funded research and increase GIScCE opportunities for collaborative research and student and postdoctoral education.

Brett Murphy

Asst. Research Professor
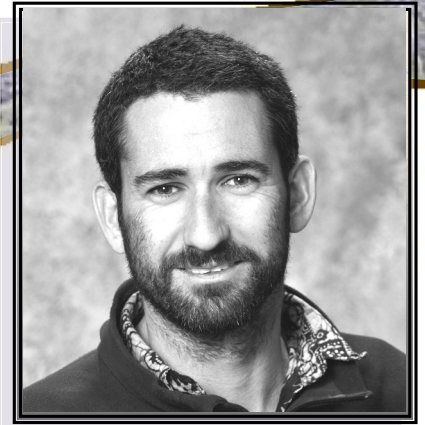
Ph.D. School for Environmental Research
Charles Darwin University, Australia, 2007
B.Sc.(Hons) Botany
University of Western Australia, Australia, 1999

Research

Professional Positions

Following his PhD, Brett worked as a research scientist in Darwin, northern Australia, with Bushfires NT, the Northern Territory Government's bushfire management organisation, from 2006-2008. He then held an Australian Research Council postdoctoral fellowship at the School of Plant Science, University of Tasmania from 2008-2011, before taking up his current position with South Dakota State University. Brett remains based in Darwin, Northern Territory, Australia.

Research Interests

Brett's current research focusses on: (1) the drivers of fire regimes throughout Australia and the likely impacts of global environmental change; and (2) how fire regimes can be actively managed for biodiversity conservation and greenhouse gas abatement. He is also interested in: (3) the demographic and floristic changes taking place in Australia's tropical savanna landscapes in response to changes in fire regimes, climate and atmospheric CO_2 concentration; and (4) the existence of positive and negative feedbacks between vegetation and fire in northern Australia, and whether such feedbacks are responsible for possible alternative stable states in tropical vegetation (i.e. savanna vs. rainforest). Brett is a macroecologist at heart, and loves analyzing continental and global scale datasets relating to just about anything vaguely ecological.

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Lara Prihodko

Asst. Research Professor

Ph.D. in Ecology
Colorado State University at Fort Collins, USA, 2004
M.A. Geography
University of Maryland at College Park, USA, 1992
B.A. Archaeology
Boston University, Boston, USA, 1990

Research

Professional Positions

After completing her masters, Lara worked for Hughes STX providing scientific support in the Biospheric Sciences branch at NASA Goddard Space flight center (1992-1995). From there, she moved overseas to the Netherlands, where she worked as a research assistant at the Winand Staring Center in Wageningen (1995-1997). She then returned to school to complete her Ph.D. in Ecology at Colorado State University (CSU) where she was also a postdoctoral fellow in the Department of Atmospheric Science (2004-2006). Before her move to South Dakota State University in summer 2011, she was a research scientist at the Natural Resource Ecology Laboratory at CSU (2006-2011). Lara is currently an assistant research professor in the Geographic Information Science Center of Excellence.

Research Interests

Lara specializes in modeling biosphere-atmosphere interactions with particular emphasis on regional to continental scale carbon dynamics, biogeochemistry and land surface characterization. Past research has included characterizing the sensitivity and uncertainty of land surface models due to their parameterization with data assimilation techniques and model parameterization of drought tolerance in the seasonally dry Amazõnian rainforest to improve coupled carbon-climate simulations. Most recently her work has focused on coupled human and natural systems in continental Africa. Current projects include the development of a model of vegetation, disturbance (fire and herbivory) and carbon cycle dynamics for continental Africa to assess the role of Africa in the global carbon cycle, measuring and modeling the dispersion and deposition of nitrogen and phosphorous released during savanna fires in Africa and the role it may play in regional biogeochemistry and fertility and understanding the sustainability and resilience of coupled human-ecological-hydrological systems in semi-arid West Africa in the face of global change. Her work is currently supported by NSF, NASA and USAID.

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Postdoctoral Fellows

The GIScCE is a "Research Center of Excellence" and postdoctoral fellows play a vital role in the research conducted at the center. Postdoctoral fellows work in collaboration with GIScCE faculty and are encouraged to seek their own research funding to grow the research portfolio of the Center and to develop their careers. Successful postdoctoral researchers are encouraged to advance to assistant research professor positions at the GIScCE.
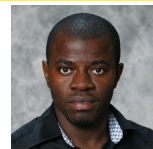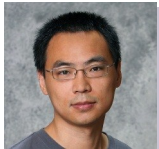
Postdoctoral Fellow

Dr. Ting-Wu Chuang

GIScCE Advisor **Dr. Michael C. Wimberly**

Academic Qualifications

Ph.D. Epidemiology, University of Michigan, Ann Arbor, USA, 2009
M.Sc. Epidemiology, National Taiwan University, Taiwan, 2001
B.Sc. Public Health, Taipei Medical University, Taiwan, 1999

Current Research Interests

Using remote sensing data to analyze West Nile virus (WNV) transmission in the Northern Great Plains and malaria transmission in the highlands of Ethiopia. The project is supported by the NIH and the main goal is to develop computer systems for processing satellite remote sensing data to generate environmental measurements that can provide early warning of disease outbreaks. He is also co-investigator on a NASA Earth Science Applications Feasibility Study in Public Health. The objective of this project is to develop statistical models of WNV risk and mosquito population dynamics using AMSR-E land surface parameters.

Representative Papers

Ting-Wu Chuang, Michael B. Hildreth, Denise L. VanRoekel, and Michael C. Wimberly. 2011. Weather and land cover influences on mosquito populations in Sioux Falls, South Dakota, *Journal of Medical Entomology* 48(3), 669-679

Ting-Wu Chuang, Randall G. Knepper, William Stanuszek, Edward D. Walker, and Mark L. Wilson. 2011. Temporal and spatial patterns of West Nile virus transmission in Saginaw County, Michigan, 2003-2006, *Journal of Medical Entomology* 48(5), 1047-1056.
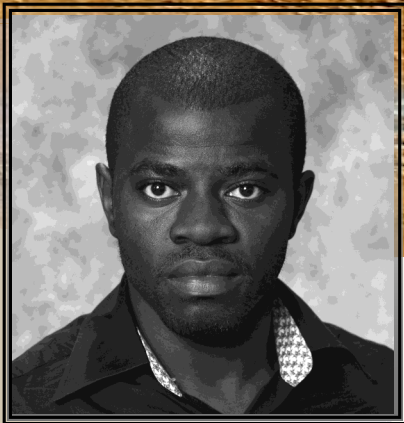
Ting-Wu Chuang, Christine W. Hockett, Lon Kightlinger, and Michael C. Wimberly. Landscape-level spatial patterns of West Nile virus risk in the northern Great Plains. 2012. *American Journal of Tropical Medicine and Hygiene*. (Accepted)

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Ting-Wu.Chuang@sdstate.edu

Postdoctoral Fellow

Dr. Armel Kaptue

GIScCE Advisor **Dr. Niall P. Hanan**

Academic Qualifications

Ph.D. Remote Sensing and Physics of biosphere, Paul Sabatier University of Toulouse, France, 2010
M.Sc. Applied Computer Science and Geomatics, International Institute for Water and Environmental Engineering of Ouagadougou, Burkina Faso, 2007
Secondary and High School Teacher's Diploma, Mathematics, Higher Teacher Training College of Yaounde, Cameroon, 2005
M.Sc. Mathematics option Numerical Analysis, University of Yaounde I, Cameroon, 2005
B.Sc. Mathematics option Applied Mathematics, University of Dschang, Cameroon, 2002

Current Research Interests

Modeling of coupled natural humans systems; Quantitative estimation of land surface variables and modelling of land cover and land use change; Study of land atmosphere interaction processes; Mitigation, adaptation and vulnerability of terrestrial ecosystems.

Representative Papers

Kaptué, A., S. M. De Jong, J.-L Roujean, C. Favier and C. Mering. 2011. Ecosystems mapping at the African continent scale using a hybrid clustering approach based on 1 km resolution multiannual data from SPOT/VEGETATION, *Remote Sensing of Environment*, 115, 452-464.

Kaptué, A., J.-L Roujean and S. M. De Jong. 2011. Comparison and relative quality assessment of the GLC2000, GLOBCOVER, MODIS and ECOCLIMAP land cover data sets at the African continental scale, *International Journal of Applied Earth Observation and Geoinformation*, 13, 207-219.

Kaptué, A., J.-L Roujean, A.Bégué, S. O. Los, A. A. Boone, J.-F. Mahfouf, D. Carrer and D. Badiane. 2011. A new characterization of the land surface heterogeneity for use in land surface models, *Journal of Hydrometeorology*, 12, 1321-1336.

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Armel.Kaptue@sdstate.edu

Postdoctoral Fellow

Dr. Valeriy Kovalskyy

GIScCE Advisor **Dr. David P. Roy**

Academic Qualifications

Ph.D. Geospatial Science & Engineering, GSE, South Dakota State University, 2011
M.Sc. Environmental Sciences, Ohio University, USA, 2004
B.A. Geography, Lviv National University, Ukraine, 2001

Current Research Interests

Empirical modeling of vegetation canopy responses to disturbances during different pheno-phases, including assimilation of *in situ* data and remote sensing observations to model daily dynamics of vegetation properties; Prognostic modeling of phenological timing based on multiple phenology controlling factors; Automation of satellite production procedures for large volume Landsat Data processing; Satellite data fusion.

Representative Papers

Kovalskyy, V., Roy, D.P., Zhang, X., Ju, J. 2011. The suitability of multi-temporal Web-Enabled Landsat Data (WELD) NDVI for phenological monitoring – a comparison with flux tower and MODIS NDVI, *Remote Sensing Letters*, 3(4), 325-334.

Kovalskyy, V., and Henebry, G.M. 2012. A new concept for simulation of vegetated land surface dynamics - Part 1—The event driven phenology model, *Biogeosciences*, v. 9, no. 1, 141-159, available only online at http://dx.doi.org/10.5194/bg-9-141-2012.
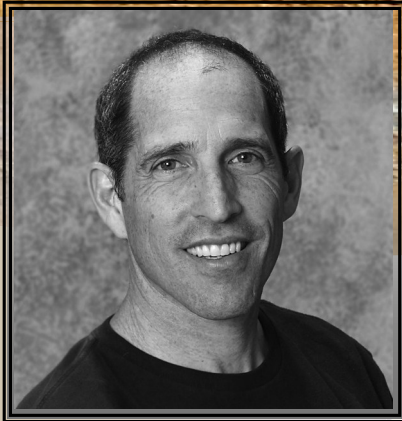
Kovalskyy, V., and Henebry, G.M. 2012. Alternative methods to predict actual evapotranspiration illustrate the importance of accounting for phenology - Part 2—The event driven phenology model, *Biogeosciences*, v. 9, no. 1, 161-177, available only online at http://dx.doi.org/10.5194/bg-9-161-2012.

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Valeriy.Kovalskyy@sdstate.edu

Dr. Jordan Muss

GIScCE Advisor **Dr. Geoffrey M. Henebry**

Academic Qualifications

Ph. D. Forest Ecology, University of Wisconsin, Madison, USA, 2011
M.Sc. Environmental Science, Florida Atlantic University, Florida, USA, 2001
B.Sc. Computer Science, Northwestern University, Illinois, USA, 1987

Current Research Interests

I am using lidar to describe and map three-dimensional canopy structure, and the relationship between canopy architecture and ecosystem function. The initial focus of my research was on the manner in which canopy configuration affects snowpack accumulation and ablation, and the resulting delivery of meltwater to trout streams in northern Wisconsin. Currently, I am examining the relationship between canopy structure and carbon dynamics and biodiversity in Costa Rican tropical rain forests. I have developed a method to create pseudo-waves from discrete lidar data, and use these waveforms as a test bed to explore new metrics that can be used to analyze large-footprint "true" waveforms collected over forested regions. Using this approach, I have developed some new methods to analyze and interpret lidar waveforms that take wave shape into account, and I have demonstrated the advantage of these metrics over more traditional height-based metrics when estimating forest biomass. I am also examining the relationships between pseudo-waveforms and large-footprint "true" waveforms with the goal of establishing a uniform methodology of forest structural analyses using either discrete or waveform lidar data.

Representative Papers

Muss, J.D., Mladenoff, D.J., Townsend, P.A. 2011. A pseudo-waveform technique to asses forest structure using discrete lidar data, *Remote Sensing of Environment*, 115, 824-835.
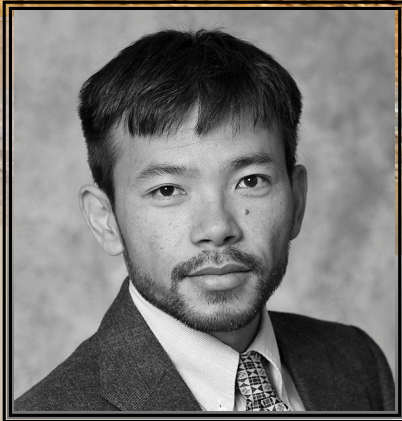
Muss, J.D., Aguiliar-Amuchastegui, N., Mladenoff, D.J., Henebry, G.M. (in review) Analysis of waveform lidar data using shape-based metrics, *IEEE Geoscience and Remote Sensing Letters*.

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Jordan.Muss@sdstate.edu

Postdoctoral Fellow

Dr. Izaya Numata
GIScCE Advisor **Dr. Mark A. Cochrane**

Academic Qualifications

Ph.D. Geography, University of California, Santa Barbara, California, USA, 2006
M.Sc. Remote Sensing, National Institute for Space Research (INPE), Brazil, 1999
B.Sc. Agricultural Engineering, University of Sao Paulo, Brazil, 1996

Previous Postdoctoral Position

University of California, Santa Barbara, Department of Geography, USA, 2006-2007, Assistant Specialist in land cover change study of the Brazilian Amazon.

Current Research Interests

I use remote sensing primarily for monitoring, characterizing and evaluating land-use and land-cover (LULC) dynamics and estimating the impacts on terrestrial ecosystems. My post-doc research has focused on determining spatio-temporal dynamics of forest fragmentation and the implication for forest degradation in the Amazon.

Representative Papers

Numata, I., Cochrane, M.A., Souza, C.M., Sales, M.H. 2011. Carbon emissions from deforestation and forest fragmentation in the Brazilian Amazon, *Environmental Research Letter,* 6, 044003. Doi: 10.1088/1748-9326/6/044003.

Numata, I., Cochrane, M.A., Galvão, L.S. 2011. Analyzing the impacts of frequency and severity of forest fire on the recovery of disturbed forest using Landsat time series and EO-1 Hyperion in the Southern Brazilian Amazon, *Earth Interactions,* 14, 1-17. doi: 10.1175/2010EI372.1.

Numata, I., Cochrane, M.A., Roberts., D.A., Soares., J.V., Souza Jr., C.M., Sales, M.H. 2010. Biomass collapse and carbon emissions from forest fragmentation in the Brazilian Amazon, *Journal of Geophysical Research - Biogeosciences,* 115, G03027, doi: 10.1029/2009JG001198.

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Postdoctoral Fellow

Dr. Yuchu Qin
GIScCE Advisor **Dr. David P. Roy**

Academic Qualifications

Ph.D. Remote Sensing and GIS, Institute of Remote Sensing Applications, CAS, China, 2010
B.Sc. Environment and Urban Planning, Shenyang Jianzhu University, China, 2004

Current Research Interests

Development of continental to global scale remote sensing products for terrestrial studies at Landsat resolution, development of algorithms for land surface characterization, passive and active remote sensing, satellite data fusion.

Representative Papers

Yuchu Qin, Yunchao Wu, Zheng Niu, , Yulin Zhan, Zaiping Xiong. 2008. Reconstruction of sparse forest canopy height model using small footprint LiDAR data, *Journal of Natural Resources,* 23 (3), 507-513.

Yuchu Qin, Bin Li, Wenjiang Huang, ChangYao Wang. 2011. Stepwise decomposition and relative radiometric normalization for small footprint LiDAR waveform, *SCIENCE CHINA Earth Sciences,* DOI: 10.1007/s11430-010-4120-y.
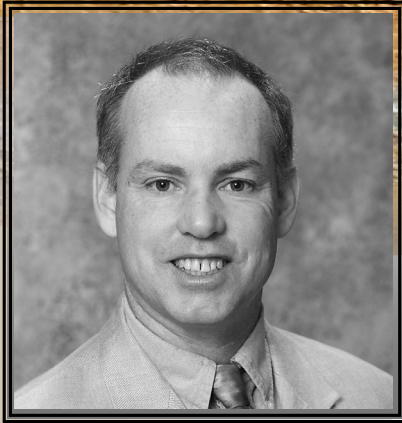
Yuchu Qin, Tuong Thuy Vu, Yifang Ban. 2011. Towards an optimal algorithm for LiDAR waveform decomposition. *IEEE GRSL,*DOI:10.1109/LGRS.2011.2172676.

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Postdoctoral Fellow

Dr. Christopher Wright

GIScCE Advisors **Dr. Geoffrey M. Henebry**
and **Dr. Michael C. Wimberly**

Academic Qualifications

Ph.D. Ecology, Montana State University, USA, 2004
M.Sc. Agronomy, Montana State University, USA, 1993
B.A. Biology, Williams College, USA, 1990

Previous Postdoctoral Position

U.S. Geological Survey Earth Resources Observation and Science Center, USA, 2004-2007, National Research Council Postdoctoral Associate working on ecological applications of wetland remote sensing.

Current Research Interests

Recent NDVI trends in Central Asia and the Midwestern U.S. and climatic and land-use land-cover change drivers of those trends, application of network theory in landscape ecology, remote sensing applications in landscape hydrology, amphibian decline and climate change in Yellowstone National Park, ecological scaling, theoretical community ecology, complex systems.

Representative Papers

Rover, J., <u>Wright, C.K.</u>, Euliss, N.H., Mushet, D.M., Wylie, B.K. 2011. Classifying surface water dynamics in prairie potholes with remote sensing and GIS, *Wetlands*, 31, 319–327.

<u>Wright, C.K.</u> 2010. Spatiotemporal dynamics of prairie wetland networks: Power-law scaling and implications for conservation planning, *Ecology*, 91, 1924–1930.
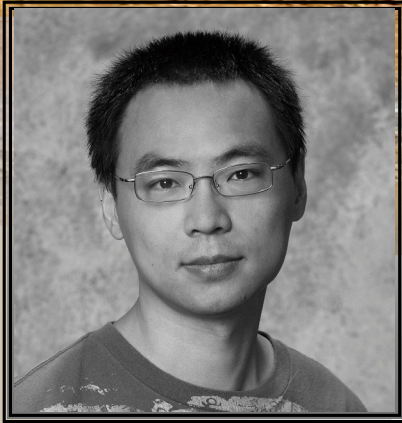
<u>Wright, C.K.</u>, de Beurs, K.M., Akhmadieva, Z.K., Groisman, P.Y., Henebry, G.M. 2009. Reanalysis data underestimate significant changes in growing season weather in Kazakhstan, *Environmental Research Letters*, 4, 045020.

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Christopher.Wright@sdstate.edu

Dr. Lin Yan

GIScCE Advisor **Dr. David P. Roy**

Academic Qualifications

Ph.D. Geodetic Science, The Ohio State University, Ohio, USA, 2011
M.Sc. Photogrammetry and Remote Sensing, Tongji University, China, 2005
B.Sc. Surveying Engineering, Tongji University, China, 2002

Current Research Interests

Automated target extraction from multi-temporal Landsat images, nonlinear dimensionality reduction of hyperspectral remote sensing images, computer vision approaches to remotely sensed image information extraction.

Representative Papers

Li, R., L. Yan, K. Di and B. Wu. 2008. A new ground-based stereo panoramic scanning system, The XXIth ISPRS Congress, Beijing, China, July 3-11, 2008, 6p.

Yan, L., J. Yuan, L. Cheng, R. Li and D.L. Wang. 2010. A biologically and geometrically inspired approach to target extraction from multiple-source remote sensing images. Proceedings of the ASPRS 2010 Annual Conference, San Diego, CA, April, 2010, 10p.

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Lin.Yan@sdstate.edu
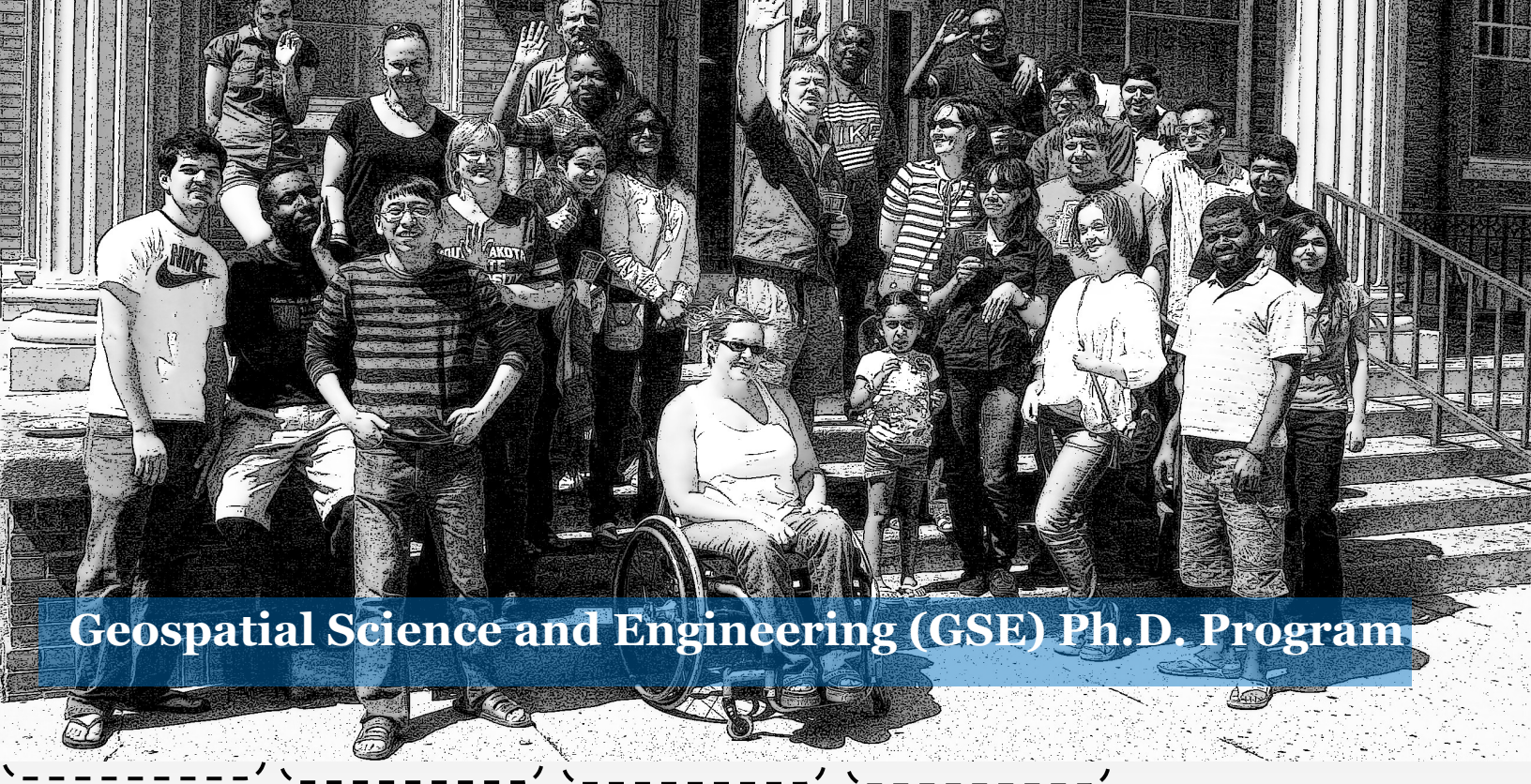
Geospatial Science and Engineering (GSE) Ph.D. Program

The **Geospatial Science and Engineering (GSE) Ph.D.** is an interdisciplinary program that integrates advanced coursework with opportunities for cutting-edge research to advance Geographic Information Science (GISc). The focus of GISc is on understanding geospatial data and transforming these data into relevant information. Core faculty of the GSE doctoral program consists of faculty in the Geographic Information Science Center of Excellence (GIScCE), both from SDSU and EROS, and the Image Processing Laboratory in the department of Electrical Engineering & Computer Science. Other participating departments include Civil & Environmental Engineering, Geography, and Natural Resource Management. GSE students may declare one of three specializations: (1) Remote Sensing Geography, (2) Remote Sensing Engineering, and (3) Interdisciplinary Geospatial Science. This latter option provides flexibility to customize an interdisciplinary course of study.

The GSE program is administered through the GIScCE and is coordinated by Dr. Mike Wimberly. GIScCE faculty members are primarily responsible for teaching GSE courses, including Introduction to GSE (GSE 740), GSE seminar (GSE 790), Quantitative Remote Sensing for Terrestrial Monitoring (GSE 741), Geospatial Analysis (GSE 743), and Fire and Ecosystems (GSE 767). Two umbrella courses—Advanced Methods in Geospatial Modeling (GSE 760) and Advanced Remote Sensing Applications (GSE 766)—cover specific topics in depth, including water resources, conservation applications, biogeochemical modeling, and global ecology. Special topics courses (GSE 792) are offered in several other subjects, including global climate change and GIS applications in ecology.

The first students were accepted in 2005 and there are currently 26 students enrolled in the GSE program, including full-time students support by GIScCE research activities and part-time students associated with USGS EROS. To date, seven students have successfully completed their dissertations and have been awarded Ph.D. degrees. These graduates have gone on to pursue careers teaching GISc at the university level or conducting research in university and government laboratories.

New students are continually recruited into the program. We seek highly motivated applicants with strong backgrounds in the geospatial sciences or a closely-related field. Current faculty research interests range broadly, and include quantitative remote sensing, sensor design and calibration, land cover and land use change, geography, hydrology, landscape ecology, climate change, and fire science as well as applications of geospatial technologies in natural resource management, public health, agriculture, and other fields. Prospective students are encouraged to contact faculty members in their area of specialization to inquire about admission and funding opportunities. The Graduate Studies section of the GIScCE webpage is available at **http://globalmonitoring.sdstate.edu** and has additional information for prospective applicants.

Ph.D. Students

Ph.D. students are integral to the GIScCE and the majority of students are taking a Ph.D. in Geospatial Science and Engineering under the supervision of GIScCE faculty. Student dissertation topics reflect a range of research interests and geographies and the GIScCE multi-disciplinary research environment. Outstanding Ph.D. students are encouraged to advance to postdoctoral positions at the GIScCE.
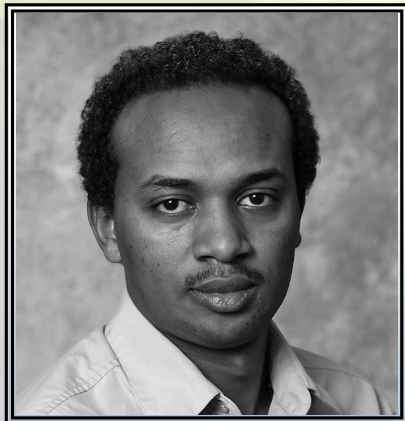
Henok Alemu

GIScCE Advisor **Dr. Gabriel Senay**
Started Spring 2007
henok.alemu@sdstate.edu

Academic Qualifications
M.Sc. Photogrammetry & Geoinformatics, Stuttgart University of Applied Sciences, Germany, 2006

Professional Masters, GIS, ITC, Netherlands, 2004

B.Sc. Applied Geology, Mekelle University Ethiopia, 2001

Ph.D. Dissertation Title
Hydrologic impacts of changing Land Cover Land Use, Rainfall and ET regime dynamics in the Nile Basin during 1980-2010: A multi-sensor remote sensing based approach.

Current Research Interests
Remote sensing hydrology; relationship between land cover dynamics and hydrology.

Representative Paper
Alemu, H., Senay, G.B., Singh, A., Hooda, A. K., et al. 2012. Land cover, Rainfall and Evapotranspiration Regimes in the Nile Basin: 2001-2010. A Satellite Data Based Assessment, A Report of the Division of Early Warning and Assessment (DEWA) United Nations Environment Programme. *In Press.*

Ph.D. Students

Current Research Interests
Land resources (soil, water, vegetation, & their interaction and management); Environmental Science; Remote Sensing and GIS.

Representative Paper
Alemu, W. and Legessa, D. 2011. Flood Hazard & Risk Assessment using GIS and Remote Sensing in Fogera Woreda, Northwest Ethiopia, in (Assefa M. Melesse) Nile River Basin: Hydrology, Climate and Water Use; Springer, New York, pp. 179-206. DOR 10.1007/978-94-007-0689-7_9.
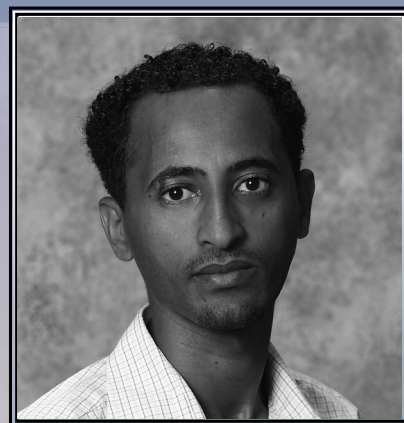
Woubet G. Alemu

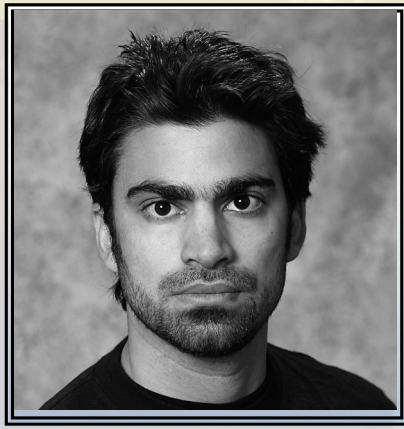*GIScCE Advisor* **Dr. Geoffrey Henebry**
Started Fall 2011
woubet.alemu@sdstate.edu

Academic Qualifications
M.Sc. Land Resources Management, Bahir Dar University, Ethiopia, 2011

M.Sc. Remote Sensing & GIS, Addis Ababa University, Ethiopia, 2007

B.A. Geog. & Environmental Study, Addis Ababa University, Ethiopia, 2004

Rafael Barreto de Andrade

GIScCE Advisor **Dr. Mark Cochrane**
Started Spring 2008
rafael.andrade@sdstate.edu
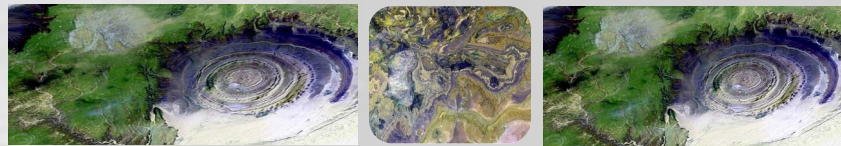
Ph.D. Dissertation Title
Fire disturbance and diversity and composition of Sacarabeinae beetles in the Brazilian Amazon.

Current Research Interests
Diversity and conservation of invertebrates.

Representative Paper
de Andrade, R. B. and Freitas, A.V.L. 2005. Population biology of two species of Heliconius (Nymphalidae: Heliconiinae) in a semi-deciduous forest in Southeastern Brazil. *Journal of the Lepidopterists' Society of London*, 59, 223-227.

Academic Qualifications
M.Sc. Ecology, Universidade Estadual de Campinas, Brazil, 2007

B.Sc. Biological Sciences, Universidade Estadual de Campinas, Brazil, 2003

Ph.D. Students

Ph.D. Dissertation Title
Efficacy of forested protected areas in the Brazilian Amazon.

Current Research Interests
Conservation, fire and disturbance in tropical forests, anthropogenic process and pattern in tropical landscapes.

Representative Paper
Cochrane, M.A. and Barber, C.P. 2009. Climate change, human land use and future fires in the Amazon, *Global Change Biology*, 15(3), 601-612.
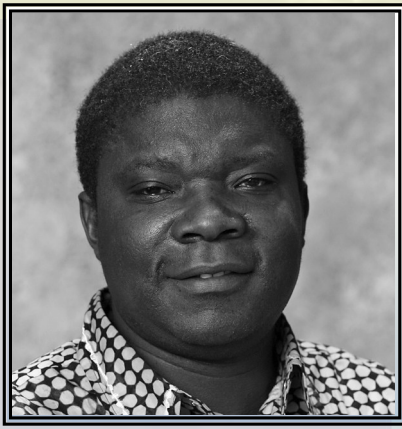
Christopher Barber

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Started Spring 2006
christopher.barber@sdstate.edu

Academic Qualifications
B.Sc. Environmental Studies, Richard Stockton College of New Jersey, USA, 1997

Jean-Robert B. Bwangoy-Bankanza

GIScCE Advisor **Dr. Matthew Hansen**
Started Fall 2005
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Academic Qualifications
M.Sc. Geographic Information Science, University of Redlands, USA, 2003

B.Sc. Forest Engineering, University Laval, Canada, 1989
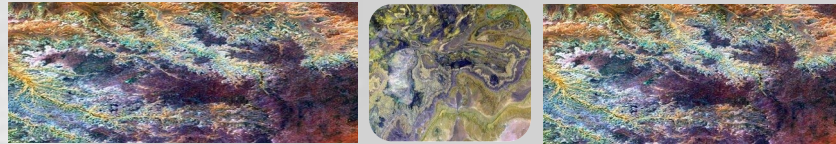
Ph.D. Dissertation Title
Mapping the flooded forest of the Congo Basin using multisource and multiresolution data.

Current Research Interests
Modeling the extent and distribution of wetlands in the tropics using optical and radar data; analysis of phenological variations across latitudes and between wetlands and non-wetlands in the Congo River Basin.

Representative Paper
Bwangoy, J.R., Hansen, M.C., Roy, D.P., De Grandi, G., Justice, C.O., 2010, Wetlands mapping in the Congo Basin using optical and radar remotely sensed data and derived topographical indices, *Remote Sensing of Environment*, 114:73–86.

Ph.D. Students

Ph.D. Dissertation Title
Continental geospatial applications using the ICESat II laser altimeter data

Current Research Interests
Exploitation of passive and active remote sensing data for change detection research, terrain analysis, bare-earth digital elevation model (DEM) processing and hydrological derivative applications.

Representative Paper
Danielson, J.J., and Gesch, D.B. 2008. An enhanced global elevation model generalized from multiple higher resolution source datasets, *Proceedings of The International Archives of the Photogrammetry, Remote Sensing, and Spatial Information Sciences*, Beijing, China, July 3-11, 2008, 1857-1863.

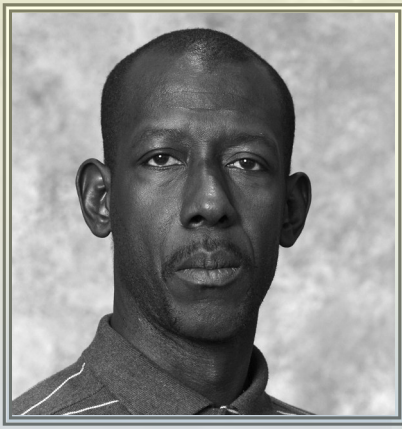# Jeffrey Danielson

GIScCE Advisor **Dr. Thomas R. Loveland**
Started Spring 2005
daniels@usgs.gov

Academic Qualifications
M.Sc. Geography, South Dakota State University, USA, 2000

B.Sc. Geography, South Dakota State University, USA, 1994

Amadou M. Dieye

GIScCE Advisor **Dr. David Roy**
Started Fall 2005
amadou.dieye@sdstate.edu

Academic Qualifications
M.A. Geographic Information Systems &
International Development, Clark University,
USA, 1998

B.Sc. Survey and Engineering, Ecole Nationale
Superieure de Geologie, France, 1988

Ph.D. Dissertation Title
*Land cover land use change and soil
organic carbon under climate variability in
Sahelian West Africa (1975-2055)*

Current Research Interests
The use of remote sensing and Geographic
Information Systems techniques for natural
resources   monitoring, mapping land use and
land cover change, and the relationship
between climate change and land cover land
use in semi-arid to sub-humid West Africa.

Representative Paper
Dieye, A. M., Roy, D.P., Hanan, N.P., Liu, S.,
Toure, A. 2012. Sensitivity analysis of the
GEMS soil organic carbon model to land cover
land use classification uncertainties under
different climate scenarios in Senegal,
Biogeoscience, Special Issue: Earth
observation for land-atmosphere interaction
science, 9, 631-648.
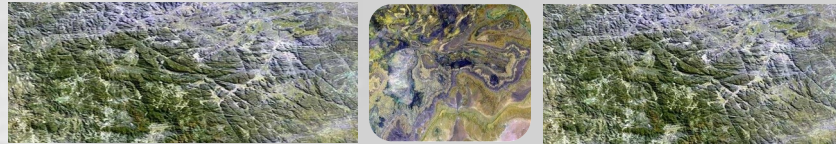
Ph.D. Students

Current Research Interests
GIS and remote sensing-based
monitoring of land cover changes
and forest ecosystem services in
the humid tropics of West Africa.

Representative Paper
Appiah, M., Blay, D., Damnyag, L.,
Dwomoh, F. K., Pappinen, A., and
Luukkanen, O. 2009. Dependence
on forest resources and tropical
deforestation in Ghana.
*Environment, Development and
Sustainability*, 11(3), 471-487.
Springer Netherlands. DOI: http://
dx.doi.org/10.1007/s10668-007-
9125-0
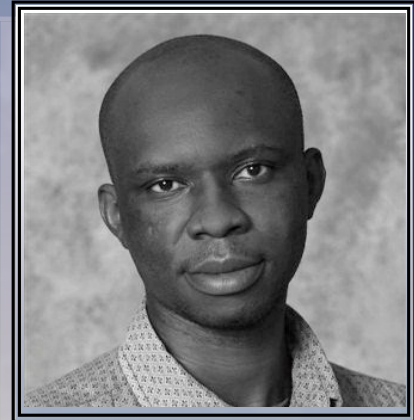
Francis Dwomoh

GIScCE Advisor **Dr. Michael Wimberly**
Started Spring 2012
francis.dwomoh@sdstate.edu

Academic Qualifications
M.Sc. Geo-information Science and Earth Observation for
Natural Resource Management, International Institute for
Geo-information Science and Earth (ITC), Enschede, The
Netherlands & Kwame Nkrumah University of Science and
Technology (KNUST), Kumasi, Ghana, 2009

B.Sc. Natural Resources Management,
Kwame Nkrumah University of Science & Technology,
Ghana, 2002

Collin G. Homer

GIScCE Advisor **Dr. Thomas Loveland**
Started Fall 2001
homer@usgs.gov

Academic Qualifications
M.Sc. Wildlife Management, Utah State University, USA, 1992

B.Sc. Geography, Weber State University, USA, 1986

Ph.D. Dissertation Title
Developing a remote sensing monitoring framework for the Sagebrush Steppe ecosystem in Wyoming

Current Research Interests
Development of a large-area sagebrush steppe monitoring system using multiple scales of calibrated satellite imagery and ground measured plot data. The research will generate validated continuous estimates of percent bare ground, percent herbaceous, percent shrub, and percent litter cover.

Representative Paper
Homer, C.G., Aldridge, C.A., Meyer, D.K. and Schell, S. 2012. Multi-Scale Remote Sensing Sagebrush Characterization with Regression Trees over Wyoming, USA; Laying a Foundation for Monitoring, *International Journal of Applied Earth Observation and Geoinformation.* Vol. I4, 233-244.

Ph.D. Students

Ph.D. Dissertation Title
Monitoring North American land cover change with multi-scale time series data and its effect on carbon dynamics

Current Research Interests
The use of remote sensing to develop a Land Cover Land Use change monitoring system in North America.
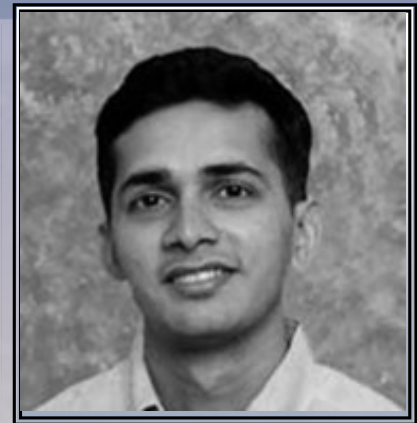
Sheikh Nazmul Hossain

GIScCE Advisor **Dr. Thomas Loveland**
Started Summer 2010
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Academic Qualifications
M.Sc. Spatial Planning, Royal Institute of Technology, Stockholm, Sweden, 2001

B.Sc. Urban and Rural Planning, Khulna University, Bangladesh, 1998

Zhengpeng Li

GIScCE Advisor **Dr. Shuguang (Leo) Liu**
Started Fall 2006
zli@usgs.gov

Academic Qualifications
M.Sc. Computer Science, South Dakota School of Mines & Technology, USA, 2004

M.Sc. Environmental Science, Peking University, China, 2000

B.Sc. Inorganic Chemistry, Peking University, China, 1997

Current Research Interests
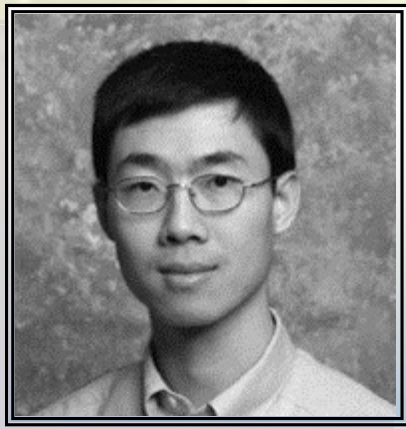Using remotely sensed products in regional carbon cycling modeling, data assimilation and decision support systems, primarily applying the General Ensemble Biogeochemical Modeling System (GEMS) in ecosystems including forest, grassland and agricultural lands.

Representative Paper
Tan, Z., Liu, S., Li, Z., and Loveland, T.R. 2007. Simulated responses of soil organic carbon stock to tillage management scenarios in the Northwest Great Plains, *Carbon Balance and Management,* 2:7, doi:10.1186/1750-0680-2-7.
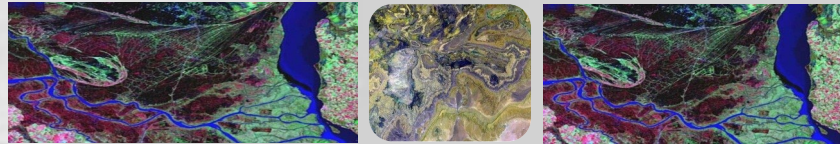
Ph.D. Students

Current Research Interests
Quantifying and monitoring tropical forest cover change using high spatial resolution satellite imagery in Central Africa.

Representative Paper
Lindquist, E., Hansen, H., Roy, D.P., and Justice, C.O. 2008. The suitability of decadal image data sets for mapping tropical forest cover change in the Democratic Republic of Congo: implications for the mid-decadal global land survey, *International Journal of Remote Sensing*, 29, 7269–7275.

Erik Lindquist

GIScCE Advisor **Dr. Matthew Hansen**
Started Fall 2005
erik.lindquist@sdstate.edu

Academic Qualifications
B.A. in Botany, Miami University, Ohio, USA, 1994

Belinda Arunarwati Margono
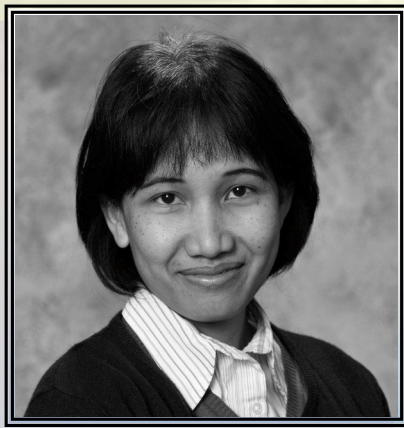
GIScCE Advisor **Dr. Matthew Hansen**
Started Spring 2009
belinda.margono@sdstate.edu

Academic Qualifications
M.Sc. Land Resource & Urban Sciences, Faculty of Geo-Information Science and Earth Observation (ITC), University of Twente, Enschede, The Netherlands, 1999

B.Sc. Forestry, Gadjah Mada University, Yogyakarta, Indonesia, 1994

Ph.D. Dissertation Title
Using Landsat time series data for mapping Indonesian forest cover, type and structure

Current Research Interests
Estimating the tropical forest cover change in term of forest cover loss (deforestation) and forest degradation over years, estimating its corresponding biomass reduces, and predicting the future tropical forests circumstances.

Representative Paper
Arunarwati, B. and Hussin, Y.A. 2001. Detecting tropical deforestation using satellite radar data: In The balance between biodiversity conservation and sustainable use of tropical rain forests. P.J.M. Hillegers and H.H. de Jongh (eds.) 2001. Wageningen: Tropenbos Foundation, 2001. ISBN 9051130503 pp. 245-249.
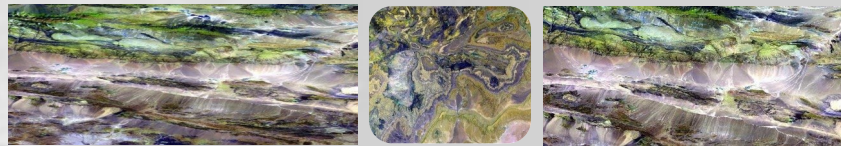
Ph.D. Students

Ph.D. Dissertation Title
Integrating multi-sensor satellite data for malaria early warning in the Amhara region of Ethiopia

Current Research Interests
Monitoring the temporal and spatial associations of malaria risk with climate and environmental data from satellite observations for malaria early warning in the Ethiopian highlands. Characterization and mapping of mosquito breeding habitats using high resolution satellite sensors.

Alemayehu Midekisa

GIScCE Advisor **Dr. Michael Wimberly**
Started Fall 2009
alemayehu.midekisa@sdstate.edu

Academic Qualifications
M.Sc. GIS & Remote Sensing, Addis Ababa University, Ethiopia, 2006

B.Ed. Education, Alemaya University, Ethiopia, 2003

Christopher Moran

GIScCE Advisor **Dr. Mark Cochrane**
Started Fall 2011
christopher.moran@sdstate.edu

Current Research Interests
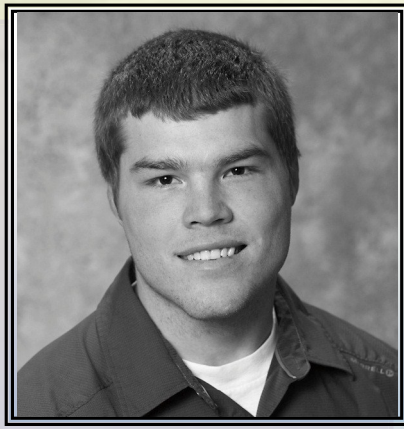The dynamic interaction of vegetation, climate, and disturbance on future disturbance regimes from landscape to global scales.

Representative Paper
Moran, C.J. and Cochrane, M.A. 2012. Do mountain pine beetle outbreaks change the probability of active crown fire in lodgepole pine forests? *Ecology, In press.*

Academic Qualifications
M.Sc. Biological Sciences , South Dakota State University, USA, 2011

B.Sc. Biology/Ecology, South Dakota State University, USA, 2009

Ph.D. Students

Current Research Interests
Large scale hydrological modeling and hydropower assessment of the Congo Basin using remotely sensed and hydrological time series data.

Representative Paper
Munzimi, Y. 2008. Satellite-derived Rainfall Estimates (TRMM products) used for Hydrological Predictions of the Congo River Flow: Overview and Preliminary Results, Report of Global Change   System for Analysis, Research and Training (START) and US National Science Foundation/ US Climate Change Science Program (NSF/USCCSP) visiting fellowship.

Yolande Munzimi

GIScCE Advisor **Dr. Matthew Hansen**
Started Spring 2008
yolande.munzimi@sdstate.edu

Academic Qualifications
Master of Professional Studies, Environmental Science, Water and Wetland Resources, State University of New York College of Environmental Science and Forestry, USA, 2007

B.Sc. Agronomy, University of Kinshasa, Democratic Republic of Congo, 2000

Shahriar Pervez

GIScCE Advisor **Dr. Geoffrey Henebry**
Started Spring 2008
md.pervez@sdstate.edu

Academic Qualifications
M.Sc. Geography, University of North
Dakota, USA, 2005

B.Sc. Urban and Rural Planning, Khulna
University, Bangladesh, 1997

Ph.D. Dissertation Title
*Assessment of the sensitivity of freshwater
availability in the Ganges and
Brahmaputra river basins to climate
variability and land use change scenarios*

Current Research Interests
Development of predictive capabilities
for fresh water availability within large river
basins under regional and global change
scenarios and assessment of impacts
on groundwater recharge within the basins.

Representative Paper
Pervez, M.S. and Brown, J.F. 2010. Mapping
irrigated lands at 250-m scale by merging
MODIS data and national agricultural
statistics, *Remote Sensing*, 2(10), 2388-
2412.

Ph.D. Students

Current Research Interests
Exploring the Semantic Web
paradigm towards building an
ontology-based semantically enabled
geographical information science
knowledge representation, discovery,
and interoperability capabilities.

Representative Paper
Ramachandran, B., Justice, C., and
Abrams, M., (Editors) Land Remote
Sensing and Global Environmental
Change: NASA's Earth Observing
System and the Science of ASTER and
MODIS. Springer, 2011.
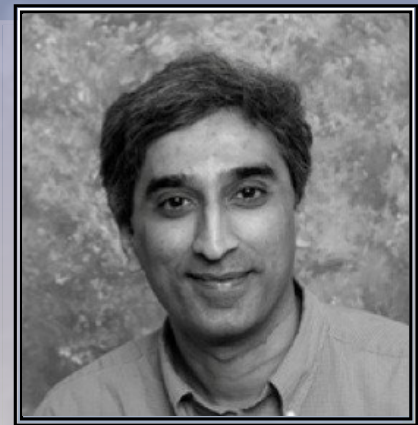
Bhaskar Ramachandran

GIScCE Advisor **Dr. Geoffrey Henebry**
Started Fall 2009
bhaskar@usgs.gov

Academic Qualifications
M.Sc. GIS, University of Edinburgh, UK, 1992

M.Phil. Geography, University of Delhi, 1986

M.A. Geography, University of Delhi, India, 1982

B.A. Geography, University of Delhi, India, 1980

Eric Ariel Salas

GIScCE Advisor **Dr. Geoffrey Henebry**
Started Fall 2006
eric.salas@sdstate.edu

Academic Qualifications
M.Sc. Geo-Information Science, Wageningen University, The Netherlands, 2002

B.Sc. Civil Engineering, University of San Carlos, Philippines, 1996

Ph.D. Dissertation Title
Evaluation and application of a new shape-sensitive metric useful for characterizing both spectral curves and LiDAR waveforms

Current Research Interests
Development and assessment of robust indices for detection of physiological changes of vegetation; Shape characterization of full-waveform LiDAR using LVIS; Investigation of a new hyperspectral metric applicable to airborne and space-borne datasets.

Representative Paper
Salas E.A.L, and Henebry, G.M. 2012. Separability of maize and soybean in the spectral regions of chlorophyll and carotenoids using the Moment Distance Index. *Israel Journal of Plant Science. In Press.*
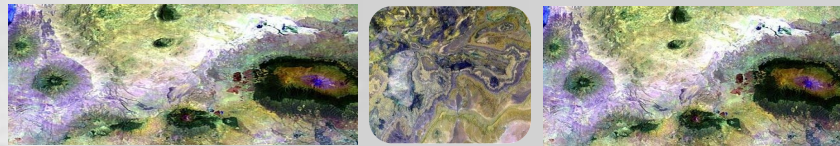

Ph.D. Students

Ph.D. Dissertation Title
Fire type classification in the Brazilian Legal Amazon

Current Research Interests
My research responds to the NASA Carbon Cycle and Ecosystems science focus area by developing methods to classify MODIS active fire detections as deforestation fires, forest fires, disturbed forest fires, or maintenance fires. The spatio-temporal distribution of fire types over a decade will be documented and hypotheses concerning the impact of drought and disturbed forest on annual fire type proportions across the Brazilian Legal Amazon addressed.

Representative Paper
Kumar, S.S., Roy, D.P., Boschetti, L., Kremens, R., 2011, Exploiting the power law distribution properties of satellite fire radiative power retrievals - a method to estimate fire radiative energy and biomass burned from sparse satellite observations, *Journal of Geophysical Research*, 116, D19303, doi:10.1029/2011JD015676.

Sanath Kumar Sathyachandran

GIScCE Advisor **Dr. David Roy**
Started Spring 2008
sanath.kumar@sdstate.edu

Academic Qualifications
M.Sc. Space Studies, University of North Dakota, USA, 2007

M.Sc. Physics and Astrophysics, Delhi University, India, 1997

B.Sc. Physics (Hons), Delhi University, India, 1994

Jason Stoker

GIScCE Advisor **Dr. Mark Cochrane**
Started Fall 2005
jstoker@usgs.gov

Ph.D. Dissertation Title
Evaluating Landsat and spatial aggregation of high-resolution lidar for Improved national-scale vegetative classifications

Current Research Interests
Active lidar remote sensing; fusion of Lidar data with passive optical data and 3-D information representation for ecological applications.

Representative Paper
Stoker, J., Harding, D., and Parrish, J. 2008. The Need for a National Lidar Dataset, *Photogrammetric Engineering and Remote Sensing*, 74, 1066-1068.

Academic Qualifications
M.Sc. Geomatics, Colorado State University, USA, 2002

B.Sc. Natural Resource Management, Colorado State University, USA, 1997
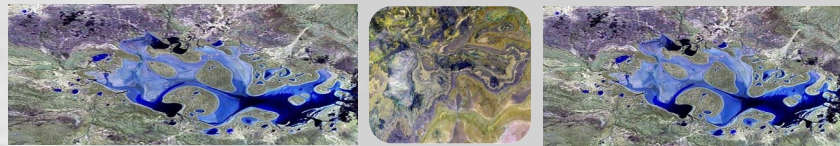
Ph.D. Students

Ph.D. Dissertation Title
Satellite driven hydrologic modeling of ungauged lakes and reservoirs in East Africa

Current Research Interests
Measuring surface water using multi-source satellite data.

Representative Paper
Velpuri N. M., Senay, G.B., and Asante, K.O. 2012. A multi-source satellite data approach for modelling Lake Turkana water level: calibration and validation using satellite altimetry data, *Hydrology and Earth System Sciences*, 16, 1-18.
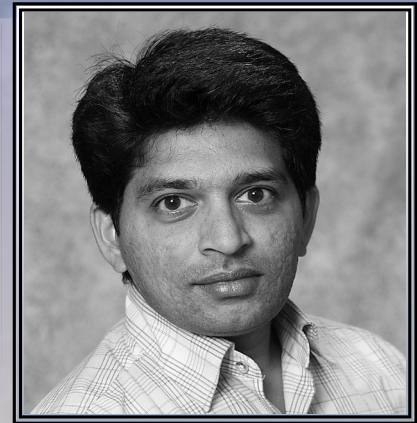
Naga Manohar Velpuri

GIScCE Advisor **Dr. Gabriel Senay**
Started Fall 2007
manohar.velpuri@sdstate.edu

Academic Qualifications
M.Phil. GIS and Remote Sensing, University of Cambridge, UK, 2005

M.Tech. Spatial Information Technology, JNTU, Hyderabad, India, 2002

B.Sc. Agriculture, ANGR Agricultural University, 2000

Stefanie Wacker

*GIScCE Advisor **Dr. Michael Wimberly***
Started Fall 2006
swacker@fs.fed.us

Academic Qualifications

M.Sc. Biological Sciences, South Dakota State University, USA, 2004

B.A. Geography, University of Colorado, USA, 1995

B.A. Environmental Science, University of Colorado, USA, 1995

Ph.D. Dissertation Title

Understory vegetation response to timber harvest in the Black Hills National Forest, South Dakota, USA

Current Research Interests

Disturbance and landscape ecology; plant invasions; biological control of plants; and spatial modeling.

Representative Paper

Wacker, S.D. and Butler, J.L. 2006. Potential impact of two Aphthona spp. on a native, non-target Euphorbia, *Rangeland Ecology and Management,* 59, 468-474.
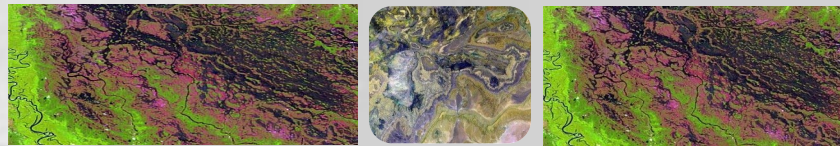
Ph.D. Students

Ph.D. Dissertation Title

Changing Field Sizes of the Conterminous United States, a Decennial Landsat Assessment

Current Research Interests

Agricultural change and land cover mapping using Landsat series remotely sensed data, with particular interest in field size distributions.

Representative Paper

White, E.V. and Roy, D.P. 2011. A contemporary decennial global sample of changing agricultural field sizes, B11E-05. Agricultural Mapping, Monitoring, and Data Visualization for a Changing Global Environment I, *Oral Presentation at Fall Meeting*, AGU, San Francisco, Calif., 5-9 Dec. 2011.

Emma Victoria White

*GIScCE Advisor **Dr. David Roy***
Started Fall 2010
emma.white@sdstate.edu

Academic Qualifications

M.Sc. Remote Sensing and Image Processing, University of Edinburgh, UK, 2008

B.Sc. Geographic Information Science, University of Newcastle, UK, 2006

Ph.D. Fellowships

The following seven students were awarded prestigious NASA Earth and Space Science Ph.D. Fellowship grants. The purpose of the NASA fellowship is to ensure continued training of interdisciplinary scientists to support the study of the Earth as a system. The student applications were evaluated through a two-step process: first through mail review, and then by a panel composed of members of academic institutions and research organizations as well as program managers at NASA Headquarters. NASA selects nationally only approximately 55 students each year for these highly competitive fellowships.

Chris Barnes

(advisor Dr. David Roy) was awarded a NASA Earth and Space Science Ph.D. Fellowship grant from 2006 to 2009 for his proposal titled, "*United States Land Cover Land Use Change, Albedo and Radiative Forcing: Past and Potential Climate Implications*".

Amadou Dieye

(advisor Dr. David Roy) was awarded a NASA Earth and Space Science Ph.D. Fellowship grant from 2007 to 2010 for his proposal titled, "*Land Cover Land Use Change and Soil Organic Carbon Under Climate Variability in Semi-Arid to Sub-Humid West African Sahel (1975-2050)*".

Erik Lindquist

(advisor Dr. Matt Hansen) was awarded a NASA Earth and Space Science Ph.D. Fellowship grant from 2007 to 2010 for his proposal titled, "*Using MODIS and Landsat data to advance regional, high-spatial resolution change monitoring for the humid tropical forests of the Congo Basin*".

Chris Barber

(advisor Dr. Mark Cochrane) was awarded a NASA Earth and Space Science Ph.D. Fellowship grant from 2008 to 2011 for his proposal titled, "*Applied Remote Sensing for Conservation Monitoring*".

Sanath Kumar

(advisor Dr. David Roy) was awarded a NASA Earth Science Systems Fellowship grant from 2010 to 2013 for his proposal titled, "*Fire Type Classification in the Brazilian Legal Amazon*".

Yoland Munzimi

(advisor Dr. Matt Hansen) was awarded a NASA Earth Science Systems Fellowship grant from 2010 to 2013 for her proposal titled, "*Satellite-derived Rainfall Estimates (TRMM products) used for Hydrological Predictions of the Congo River flow*".

Alemayehu Midekisa

(advisor Dr. Mike Wimberly) was awarded a NASA Earth and Space Science Fellowship grant from 2011 to 2014 for his proposal titled, "*Integrating Multi-Sensor Satellite Data for Malaria Early Warning in the Amhara Region of Ethiopia*".

Semi-Arid Region, Senegal

Market garden production, near Lompoul, 150 km North of Dakar, Senegal, May 27th 2007. Land cover and land use (LCLU) in semi-arid regions is strongly dependent on water availability. LCLU derived from satellite data, combined with carbon field measurements, are inputs into a carbon model to assess soil organic carbon stocks.

Source: Dieye's fieldwork

Recent Ph.D. Graduates

In the last three years, the GIScCE has produced five Ph.D. graduates — four finished with a Ph.D. degree in Geospatial Science and Engineering, and one finished with a Ph.D. in Biological Sciences.
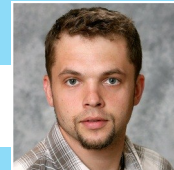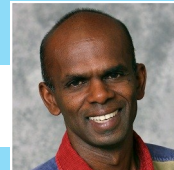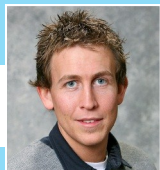
Dr. Christopher Barnes

Ph.D. Geospatial Science & Engineering
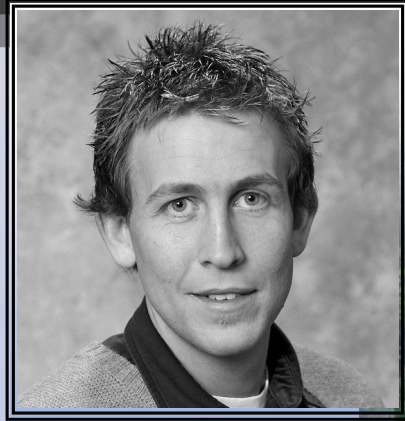
Graduated Fall 2010
Advisor: *Dr. David Roy*

PhD Thesis Title
United States Land Cover Land Use Change, Albedo and Radiative Forcing: Past and Potential Climate Implications

Dr. Barnes graduated with his PhD in November 2010 under the supervision of Dr. David Roy. He is currently employed as a Principal Scientist on the Land Cover Trends project at the USGS Earth Resources Observation and Science (EROS) Center in Sioux Falls, SD. He continues to work on the use of remote sensing and advanced computing methods to study the impact of land cover and land use change on the Earth's radiative energy balance and the continental scale climate implications.

Representative Papers
Barnes, C. A., and Roy, D.P. 2010, Radiative forcing over the conterminous United States due to contemporary land cover land use change and sensitivity to snow and interannual albedo variability, *J. Geophys. Res.*, 115, G04033, doi:10.1029/2010JG001428.

Sohl, T., Loveland, T., Sleeter, B., Sayler, K. and Barnes, C.A. 2009. Addressing foundational elements of regional land-use change forecasting. *Landscape Ecology*, 25:233-247, doi:10.1007/s10980-009-9391-3.

Barnes, C.A. and Roy, D.P. 2008. Radiative forcing over the conterminous United States due to contemporary land cover land use albedo change, Geophysical Research Letters, 35, L09706, doi:10.1029/2008GL033567. *AGU Journal Highlight, EOS*, 89, 24, 10th June 2008, p 221.

Dr. Mark Broich

Ph.D. Geospatial Science & Engineering

Graduated Fall 2010
Advisor: *Dr. Matthew Hansen*

PhD Thesis Title
Advancing the Quantification of Humid Tropical Forest Cover Loss with Multi-Resolution Optical Remote Sensing Data: Sampling and Wall-to-Wall Mapping

Dr. Broich graduated with his PhD in November 2010 under the supervision of Dr. Matthew Hansen. He then moved to Perth, Australia and worked as a post-doctoral researcher developing methods to quantify and analyze patterns of Indonesian forest cover change using multi-resolution optical remote sensing data. He primarily spends his leisure time kiteboarding.

Representative Papers
Broich M., M.C. Hansen, P.V Potapov, B. Adusei, E.J. Lindquist, S.V. Stehman. 2011. Time-series analysis of multi-resolution optical remote sensing imagery for quantifying forest cover loss in Sumatra and Kalimantan, Indonesia, *International Journal of Applied Earth Observation and Geoinformation*, 13, 277–291.

Broich M., M.C. Hansen, F. Stolle, P.V. Potapov, B.A. Margono. 2011. Remotely sensed forest cover loss reveals high spatial and temporal variation across Sumatera and Kalimantan, Indonesia 2000-2008, *Environmental Research Letters*, 6/1, doi: 10.1088/1748-9326/6/1/014010.

Broich, M., S.V. Stehman, M.C. Hansen, P.V. Potapov, Y.E. Shimabukuro. 2009. A comparison of sampling designs for estimating deforestation from Landsat imagery: A case study of the Brazilian Legal Amazon, *Remote Sensing of Environment*, 113, 2448-2454.

Dr. Valeriy Kovalskyy

Ph.D. Geospatial Science & Engineering
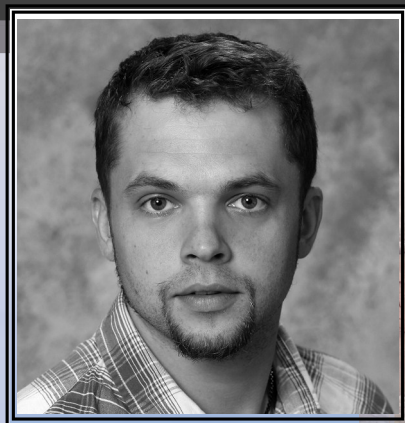
Graduated Summer 2011
Advisor: *Dr. Geoffrey Henebry*

PhD Thesis Title
An Event Driven Phenology Model: Development and Validation

Dr. Kovalskyy completed his Ph.D. in August 2011 under the supervision of Dr. Geoffrey Henebry. He is currently employed as a postdoctoral researcher on the NASA Web Enabled Landsat Data (WELD) project at the GIScCE. He continues to work on the use of remote sensing and advanced computing methods and is focusing on the expansion of the WELD satellite data processing to global scale, working with the Landsat and Landsat Data Continuity Science Teams and with NASA AMES supercomputer researchers. When not doing research he is taking flight lessons toward his private pilot license.

Representative Papers
Kovalskyy V., Roy, D.P., Zhang X., Ju J. 2011. The suitability of multi-temporal Web-Enabled Landsat Data (WELD) NDVI for phenological monitoring – a comparison with flux tower and MODIS NDVI, *Remote Sensing Letters*, 3(4), 325-334.

Kovalskyy, V. and Henebry, G.M. 2012. Alternative methods to predict actual evapotranspiration illustrate the importance of accounting for phenology: The Event Driven Phenology Model Part II, *Biogeosciences*, 9, 161-177, doi:10.5194/bg-9-161-2012.

Kovalskyy, V. and Henebry, G.M. 2012. A new concept for simulation of vegetated land surface dynamics: The Event Driven Phenology Model Part I, *Biogeosciences,* 9, 141-159, doi:10.5194/bg-9-141-2012.

Dr. Luiz Mestre

Ph.D. Biological Sciences
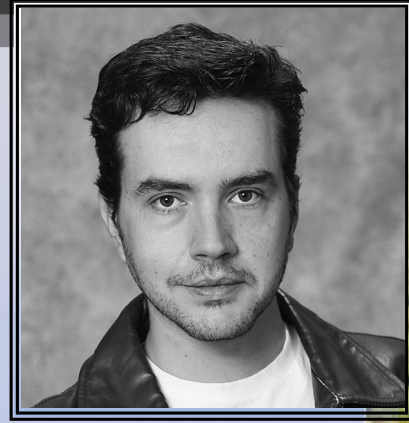
Graduated Summer 2011
Advisor: *Dr. Mark Cochrane*

PhD Thesis Title
Effects of wildfires on Amazonian bird communities

Dr. Luiz Mestre graduated with a PhD in Biology on July 2011 under the supervision of Dr. Mark Cochrane and Dr. Jos Barlow (Lancaster University). He is currently teaching Conservation Biology and Environmental Education at Universidade Federal do Paraná in Palotina (South Brazil). Luiz is supervising two bird projects in South-Brazilian Atlantic Forests, and collaborating to the National Committee of Endangered Amazonian Birds. He is also currently leading a Brazilian government funded project on the impacts of selective logging on Amazonian bird communities in Jamari Reserve, Rondonia – South Amazon.

Representative Papers

Mestre, L.A.M., Rechetelo J., Cochrane M.A. & Barlow J. 2011. Avifaunal inventory of a Southern Amazonian transitional forest site: the São Luiz farm, Mato Grosso, Brazil, *Boletim do Museu Paraense Emílio Goeldi,* 6 (2), 147-161.

Mestre L.A.M., Thom G., Cochrane M.A. & Barlow J. 2010. The birds of Reserva Extractivista Chico Mendes, South Acre, Brazil, *Boletim do Museu Paraense Emílio Goeldi*, 5(3), 311-333.

Mestre, L. A. M., Cohn-Haft, M., Dias, M. 2010. Diet and Prey Availability of Terrestrial Insectivorous Birds Prone to Extinction in Amazonian Forest Fragments, *Brazilian Archives of Biology and Technology,* 53, 1371-1381.

Dr. Narayanaraj Ganapathy

Ph.D. Geospatial Science & Engineering
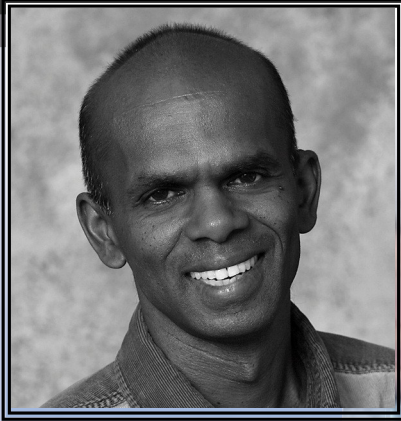
Graduated Fall 2011
Advisor: *Dr. Michael Wimberly*

PhD Thesis Title
Influences of forest roads on the spatial pattern of modern wildfire regimes in the East Cascades of Washington State

Dr. G. Narayanaraj completed his Ph.D. in December 2011 under the supervision of Dr. Michael C. Wimberly. Currently, he is a fulltime lecturer in the Geography Department at the University of Montana where he teaches graduate and undergraduate Geospatial Science courses while he continues his research on the lightning- and human caused wildfire regimes at multiple scales using remote sensing and geographical information systems.

Representative Papers
Narayanaraj G., Wimberly M.C. 2012. Influences of forest roads on the spatial pattern of human-and lightning-caused wildfire ignitions, *Applied Geography*, 32(2), 878-888.

Narayanaraj G., Wimberly M.C. 2011. Influences of forest roads on the spatial pattern of wildfire Boundaries, *International Journal of Wildland Fire*, 20(6), 792-803.

Narayanaraj G., Bolstad P.V, Elliott K.J., Vose J.M. 2010. Terrain and landform influence on eastern hemlock (*Tsuga canadensis L.*) distribution in the southern Appalachian Mountains, *Castenea*, 75(1), 1-18.

Center Scholar Program

The **GIScCE Center Scholars Program** is an undergraduate academic and professional curriculum designed to enable SDSU students to gain educational and research experience and to help them qualify for a career in geographic information science. The Program was initiated in 2006 and is coordinated by Dr. Robert Watrel of the Department of Geography. The GIScCE faculty provides mentored hands-on practicum/internship research experience to students to help develop their spatial, analytical and critical thinking necessary for effective investigation of geographic information science/remote sensing questions.

Student participation in the GIScCE Center of Excellence Scholars Program requires they maintain a 3.0 GPA in major coursework. The program requires each student to complete a supervised individual or team research internship and to present a paper or poster at a professional conference. The student is then required to present a professional portfolio for Center of Excellence review and approval prior to graduation. Since the program's inception, its enrollment continues to increase. In Spring 2009 the following students graduated (major supervisor in parentheses): Christy Wey (Mike Wimberly), Beth Mueller (Robert Watrel), Adam Barker (Matt Hansen), Bret Graves (Robert Watrel); in Fall 2009: Brad Stricherz (Mark Cochrane), Ben Helder (Geoff Henebry); in Spring 2010: Chris Pope (Robert Watrel); in Spring 2011: Aaron Stingley (Mark Cochrane); and in Fall 2011: Riley Forsyth (Matt Hansen).

Masters Students

Hemalatha Akula
Started Fall 2009, M.Sc. Geography
Advisor: Dr. Mark Cochrane

Aaron Friesz
Started Spring 2009, M.Sc. Geography
Advisor: Dr. Mike Wimberly

Benjamin Helder
Started Fall 2009, M.Sc. Geography
Advisor: Dr. Geoffrey Henebry

Confiance Mfuka
Started Spring 2011, M.Sc. Geography
Advisor: Dr. Matthew Hansen

Christopher Moran
Graduated 2011, M.Sc. Biology
Masters Thesis Title: Mountain Pine Beetles, Mitigation Treatments, and Fire Behavior in Ponderosa Pine of the Black Hills, SD

Sarah Arnold
Graduated 2009, M.Sc. Geography
Masters Thesis Title: Changing Fire Return Intervals in Southern California

Stephen Boyte
Graduated Fall 2009, M.Sc. Geography
Masters Thesis Title: Wildfire regimes and landscape dynamics in the Black Hills, USA

Namita Giree
Graduated 2011, M.Sc. Geography
Masters Thesis Title: Quantifying Forest Cover Loss in Malaysia from 1990 to 2005: Comparisons with Contemporaneous Change in Indonesia

Aashis Lamsal
Graduated 2011, M.Sc. Geography
Masters Thesis Title: Evaluating Geospatial Visualization Methods for West Nile Virus Risk Mapping

Note: The GIScCE does not have a separate Masters Program, these Masters students are included because they are advised by GIScCE faculty.

Research Staff

Research associates and geospatial analysts provide key research, technical, and computational support to externally funded GIScCE research projects.
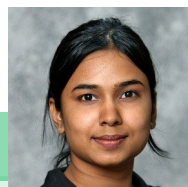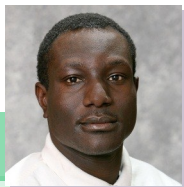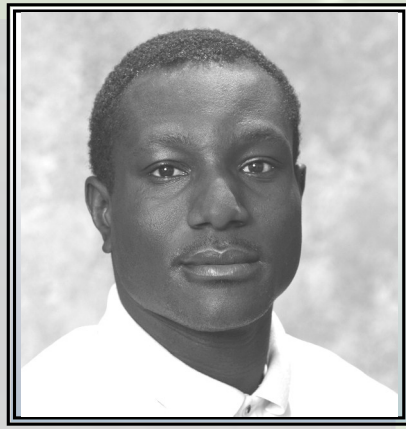
Bernard Adusei

Started January 2007
bernard.adusei@sdstate.edu

Academic Qualifications

M.Sc. Geography, South Dakota State University, USA, 2006

B.A. Geography and Resource Development, University of Ghana, Ghana, 2002

Current Research Interests
Development of automated Wall to Wall Decision tree-based cloud and cloud-shadow mask algorithm for the humid tropical forest biome for Landsat datasets.

Representative Paper
Matthew C. Hansen , David P. Roy, Erik Lindquist, Bernard Adusei, Christopher O. Justice and Alice Altstatt. A method for integrating MODIS and Landsat data for systematic monitoring of forest covers and change in the Congo Basin, *Remote Sensing of Environment*, 112, 2495-2513.

Research Staff

Alexey Egorov

Started May 2009
alexey.egorov@sdstate.edu

Current Research Interests
Alexey is working on a NASA-funded research project entitled "Web-enabled Landsat data (WELD) — a consistent seamless near real time MODIS-Landsat data fusion for the terrestrial user community" with Dr. David Roy and Dr. Matthew Hansen. His duties include developing methods for mass-processing Landsat, Ikonos and QuickBird images for land cover and change characterizations.

Representative Paper
Hansen, M.C., Egorov, A., Roy, D.P., Potapov, P., Ju, J., Turubanova, S., Kommareddy, I., Loveland, T., 2011, Land cover monitoring of the conterminous United States with Landsat: First results from the Web-Enabled Landsat Data (WELD) project, *Remote Sensing Letters*, 2, 4:279-288.

Academic Qualifications

M.Sc. Biology, Yaroslavl State University, Russia, 1995
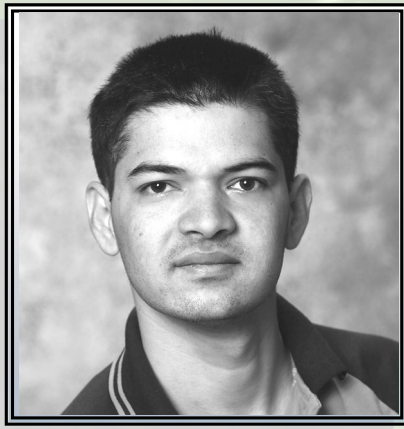
Aashis Lamsal

Started September 2011
aashis.lamsal@sdstate.edu

Academic Qualifications

M.Sc. Geography, South Dakota State University, USA, 2011

B.E. Computer Engineering, Tribhuvan University, Nepal, 2006

Current Research Interests
As a geospatial analyst under Dr. Michael Wimberly, his duties include developing a computer system for forecasting West Nile virus risk using earth observation data and developing a web visualization framework for disseminating geospatial data. Before joining SDSU, he worked as a software engineer in Hitechvalley iNet (ISO 9001:2000 Certified), Nepal and Worldlink Technologies, Nepal.

Representative Paper
Aashis Lamsal, Ting-Wu Chuang, Yi Liu, Michael C. Wimberly. Evaluating Geospatial Visualization Methods for West Nile Virus Risk Mapping. *International Journal of Health Geographics* (submitted).
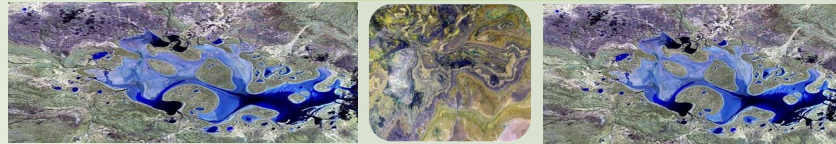
Research Staff

Current Research Interests
Indrani Kommareddy is a computer programmer and systems analyst responsible for putting together a satellite production and distribution system in support of NASA funded Web-enabled Landsat data (WELD) project. The WELD project web distribution system (http://weld.cr.usgs.gov/) currently has more than 500 users from 20 countries.

Representative Paper
Kommareddy, I., Roy, D.P., Ju , J., Web-enabled Landsat data (WELD) Project a NASA Making Earth System data records for Use in Research Environments (MEASURES) funded project, Quick Overview of WELD Project & WELD Product Distribution Metrics, *9th NASA Earth Science Data System Working Group (ESDSWG)*, New Orleans, October 20-22, 2010.

Representative Grant:
Roy, D.P. and Kommareddy, I., Enhanced Web Enabled Landsat Data (WELD) Access, Funded by NASA NNH11ZDA001N-ACCESS *Advancing Collaborative Connections for Earth System Science*, March 2012 – April 2014.

Indrani Kommareddy

Started August 2009
indrani.kommareddy@sdstate.edu

Academic Qualifications

M.Sc. Information Systems, Dakota State University, USA, 2008

B.E. Computer Science and Engineering, Jawaharlal Nehru Technological University, India, 2006

Administrative and Information Technology Staff

Administrative and information technology staff ensure the smooth running of the GIScCE and support all faculty, staff, and student activities.

Marcia Prouty
Administrator
marcia.prouty@sdstate.edu
605-688-6591

Marcia has a BA in Secondary Education (Speech/Debate) from Augustana College in Sioux Falls, South Dakota and graduate education from various other universities. She has a teaching background and has worked in offices in the medical and education fields.

Julie Westberg
Senior Accountant
julie.westberg@sdstate.edu
605-688-6139

Julie is currently pursuing a BS in Consumer Affairs at SDSU; anticipated graduation date is Spring 2013. She has an Associate's degree in General Studies from South Dakota State University and finished Executive Secretarial at Nettleton College, Sioux Falls in 1988.

Anil Kommareddy

Information and Computer Research Scientist
anil.kommareddy@sdstate.edu
605-688-5792

The GIScCE computing resources are architected, built and administered by Anil Kommareddy. Anil has a B.E. degree in Electrical and Electronics Engineering from the University of Madras in India. He has expertise in the design, build and maintenance of high performance computing clusters and software stacks. His coding accomplishments include development of machine-learning code including Classification and Regression Tree algorithms customized to classify large satellite datasets and development of codes to process satellite images using different image processing libraries.

Anil's hardware and software design architectures have provided the GIScCE with cost effective solutions and the proven capability to expand the GIScCE computing systems. When he joined the GIScCE in 2005 there was 1 server with 12TB of RAID storage, 6 Workstations, and 27 desktops. Today, the GIScCE has 27 servers with 795TB of RAID storage with a high speed 4Gbps and 8Gbps SAN network, 106 Workstations and 30 Laptops spanning multiple computer operating systems — Redhat Enterprise Linux, Mac OS, Windows Server 2008R2, Windows 7, and Windows XP. This astounding growth is due to faculty research grant activity, but it is fundamentally reliant on Anil's ability to develop reliable computing solutions at low cost and to maintain a stable GIScCE computing environment.

GIScCE Computer Resources

Computing Facilities

Computing is central to GIScCE research and instruction activities, involving dedicated research computing systems for large volume satellite data processing, storage, and geographic information analysis and modeling, in addition to personal computers for communication and instructional and research material preparation. The GIScCE computing resources are architected, built and administered by Anil Kommareddy.

The GIScCE has nationally competitive computing resources. The GIScCE research systems have 795 TB of online storage, spanning several clusters and dedicated servers, that currently provide one of the nation's leading university departmental online satellite data storage systems. The GIScCE research computing is undertaken on Linux and Windows servers to perform large scale image processing tasks that are CPU and throughput intensive.

All GIScCE systems are supported by a range of Remote Sensing, GIS and statistical software packages including ENVI, PCI Geomatica, ERDAS, ArcGIS, Splus, R and Matlab, and a variety of software libraries including HDF4, HDFEOS, gdal and MODIS tool kits and compilers including C, C++ and Fortran.

Graduate Student Computing

The GIScCE philosophy is to provide advanced computing systems in support of graduate students to facilitate efficient completion of their research work and expose them to a variety of computational environments and solutions. Each graduate student enrolled in the GIScCE has a dedicated workstation to perform their research. Their workstations provide access to the GIScCE's research clusters and dedicated servers used by their research group. The availability of these computing resources enables students to apply and validate multiple computational and statistical approaches using large datasets.

Teaching Labs

The GIScCE teaching laboratories are equipped with Windows computers and the latest versions of Remote Sensing, GIS and statistical software. The labs are computationally among the best on campus. The software are maintained and updated each semester and the computers are frequently upgraded. Students trained on the GIScCE system are well prepared to face today's competitive work environment. The GIScCE graduate labs are used as dual purpose labs with capabilities to support temporary research in addition to being used for graduate courses.
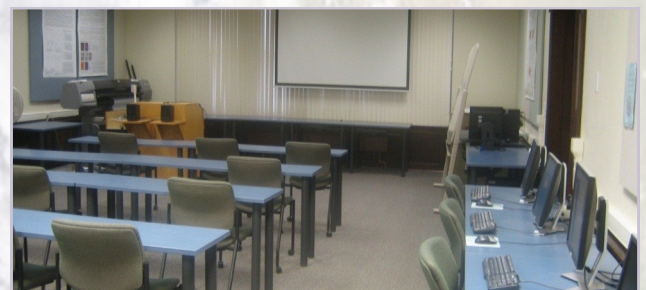
Computer Resources

Research Computing

The GIScCE has one of the nations most advanced computational research capabilities for geospatial analysis and data storage. Currently there are 27 servers connect to a 795TB of online storage connected via 4Gbps and 8Gbps storage area network connectivity. Of the 27 servers and 795TB of online storage, 16 servers and 740TB of online storage space are dedicated to specific federally funded research projects, and the remaining servers and storage are shared with the department research users.

A high performance GIScCE computing architecture with a high throughput backbone was designed to efficiently process large continental and global scale satellite data. The GIScCE research computers have high speed connectivity (1Gbps) at the workstation and 10Gbps network connectivity to research compute servers. The research compute servers are used to transfer large data sets among GIScCE servers and also with other agencies which are connected to Internet2. The campus has 10Gbps Internet2 connectivity with other academic, government and non-commercial organizations making it easier to collaborate with other research agencies such as NASA, EROS Data Center, USDSA and other federal labs. The high speed 10Gbps network connectivity to the servers and 1Gbps network connectivity to workstations are provided by the university Office of Information technology.
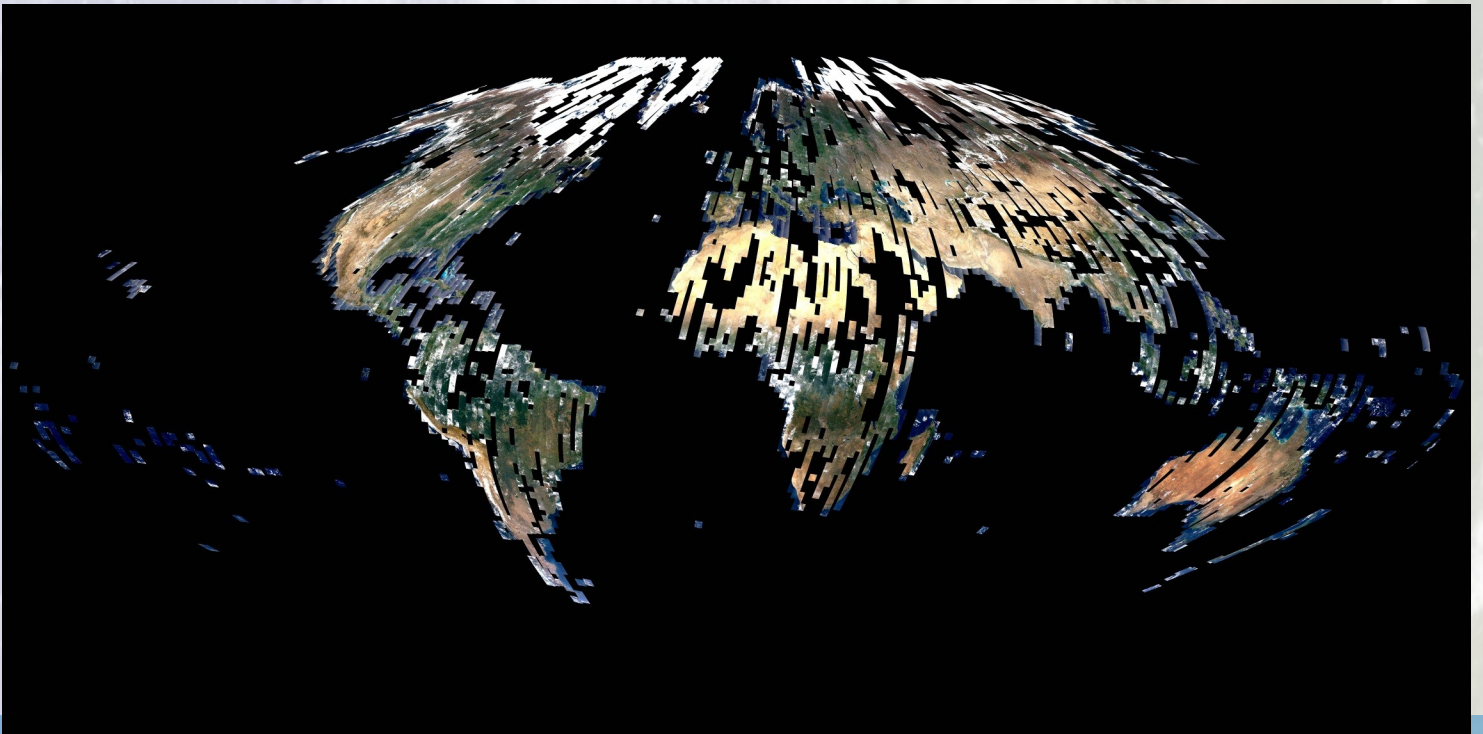
To date the most compute intensive GIScCE project has been the NASA funded Web Enabled Landsat Data (WELD) project. This picture shows all the 30m pixels acquired by the USGS Landsat project in May 2010 reprojected into a sinusoidal global projection and converted to visible reflectance to show approximately what the Earth looks like from space with the human eye. It is composed of more than 260,000,000,000 pixels. It was generated in less than four hours by the WELD team working with NASA AMES California scientists using NASA's fastest supercomputer, the NASA Earth Exchange (NEX). Despite the considerable GIScCE computer resources the same data took more than a week to generate on the GIScCE WELD project computers.

GIScCE
Research Funding

In the current triennium (2009-2011) the GIScCE faculty has continued to be highly successful in garnering externally funded research grants. In this period, $13,336,115 of new funding was awarded and $9,907,388 in previously funded (2006-2008) grants ended. This 34% increase reflects concerted effort that was extraordinarily successful: 57% of the grant proposals submitted by the GIScCE faculty during 2009-2011 were selected for funding, for an average of $4.4M per year.

Funding *Starting* in 2009-2011:
Total $13.3M
[% by agency]

NASA 57.7
NSF 14.4
NIH 10.2
USAID 5.8
other 11.9
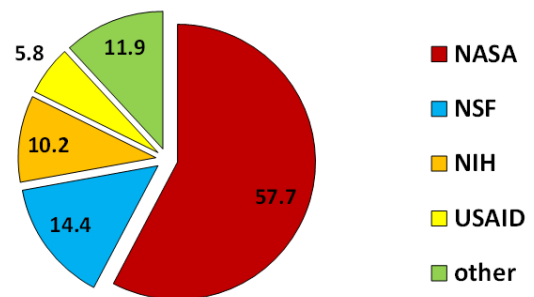
Funding *Ending* in 2009-2011:
Total $9.9M
[% by agency]

NASA 72.0
USGS 14.6
NIH 0.2
USDA 5.9
other 7.3
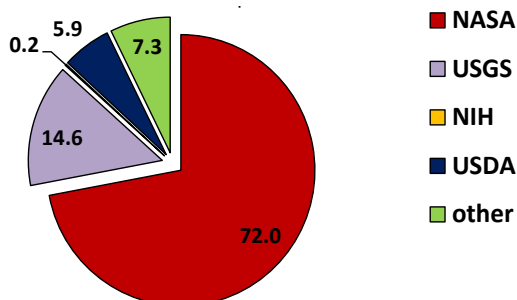
While the majority of the research dollars continued to originate from the National Aeronautics and Space Administration (NASA), more than 40% was from other agencies, including the National Institutes of Health (NIH), the National Science Foundation (NSF), the Joint Fire Science Program (JFSP) passed through the USGS, the US Agency for International Development (USAID), and the Sun Grant Initiative. This diversification of funding sources illustrates the interdisciplinarity that is a hallmark of the GIScCE.

Looking Forward

Now halfway through our seventh year, we can look back and see the rapid growth and development of the GIScCE into an internationally recognized center for basic and applied research in geospatial science, with an emphasis on terrestrial remote sensing. Our research faculty, staff, and students are international, hard-working, and collegial; our research portfolio is large, diversified, and interdisciplinary; and our research activity is vigorous, innovative, and successful. What lies ahead? Let's focus on three areas: research, education, and engagement.

The opening of the USGS Landsat archive in 2008 to free access was a watershed event for terrestrial remote sensing. Free access means the ability to drill back into time with a scope that was unimaginable even at the founding of the GIScCE in 2005. Two principal poles of the remote sensing research at the GIScCE have been the multispectral sensors aboard the Landsat and MODIS series. Together these sensors have provided an unparalleled portrait of land surface dynamics over the past decades. But we are still at the early stages of realizing the riches of the USGS Landsat archive, which includes satellite data from 1972 to present. Moreover, research at the GIScCE is ranging into other parts of the electromagnetic spectrum using other kinds of sensors to detect, model, and map diverse phenomena. Looking forward, key research themes include agriculture, biodiversity, carbon, disease, urban areas, and water.

To date the Geospatial Science and Engineering Ph.D. program has graduated seven students, who are now employed either in government agencies or universities on three continents. While it takes quite a while to spin up a new doctoral degree program, we now expect a steady stream of two to four Ph.D. students to graduate each year during the next triennium (2012-2014). Another key aspect of education at the GIScCE is the mentoring of post-doctoral fellows (PDFs). Currently there are nine PDFs and the GIScCE has provided the opportunity for research and training to 12 former PDFS who are now working research positions in government agencies and universities on three continents. The GIScCE faculty has also been active in the graduate programs in Geography, Biological Sciences, and Natural Resource Management, and we expect this to continue. In 2011, we hosted our first sabbatical visitor, Dr. Nancy McIntyre of Texas Tech University, and we will continue to host visiting students and faculty. We have been reaching out to the broader community by giving and sponsoring public lectures, a recent highlight was the inaugural Virginia and John Holtry Distinguished Lecture in Geographic Information Science, "Feeding the Lions: The Conservation of Biological Diversity on a Changing Planet", given by Dr. Herman "Hank" Shugart, Department of Environmental Sciences, University of Virginia.

Engagement at the GIScCE occurs at multiple levels spanning from collaborations within the University to participation on national and international science teams. The GIScCE faculty has provided expertise to the Federal and State governments through service on review panels and advisory boards, through peer review and public comments on draft publications and policies, and through outreach to local and regional communities. As our national and international reputations continue to grow, we expect to become even more engaged.

The words of founding GIScCE Co-Director Matt Hansen in the last triennial report bear repeating here: "The nature of remote sensing research does not dictate that it need be performed in any specific place. We can be as competitive here in South Dakota as we can be anywhere else. Our success to date is evidence of that."

These achievements have been accomplished through the hard work of our faculty, staff, and students and enabled through the support of the SDSU and USGS/EROS administrations, the State of South Dakota Board of Regents, the people of South Dakota, and our funding sponsors. To each and every one involved with us in the past three years, let me express, on behalf of my colleagues, our gratitude for your past support.

Geoff Henebry, February 2012
Professor, SDSU
Interim GIScCE Co-Director

Appendix I: Alumni Faculty and Staff

Dr. Kwabena Asante: Adjunct Professor, USGS EROS Research Physical Scientist, now an Independent Consultant, Climatus LLC, Mountain View, CA, USA.

Adam Baer: Geospatial Analyst, now a Geospatial Intelligence Officer, Department of Defense, MO, USA.

Dr. Kirsten de Beurs: Postdoctoral Fellow, now an Assistant Professor, University of Oklahoma, OK, USA.

Dr. Jiyul Chang: Postdoctoral Fellow, now a Postdoctoral Researcher, Department of Plant Science, South Dakota State University, SD, USA.

Claudia Cochrane: Research Coordinator, Resigned, USA.

Marcela Doubková: Geospatial Analyst, now a Geospatial Analyst, Technical University of Vienna, Vienna, Austria.

Dr. Ahmed Elaksher: Postdoctoral Fellow, now an instructor, St. Cloud State University, MN, USA.

Dr. Bingxuan Guo: Postdoctoral Fellow, now a Postdoctoral Fellow, George Mason University, VA, USA.

Dr. Matthew Hansen: Senior Scientist and Co-Director, now a Professor, University of Maryland College Park, MD, USA.

JoAnn Jorgensen: Senior Secretary, Retired, USA.

Dr. Junchang Ju: Assistant Research Professor, now a Senior Scientific Programmer, NOAA/NESDIS Camp Springs, VA, USA.

Dr. Zhe Li: Postdoctoral Fellow, now a Visiting Scientist, Agriculture and Agri-food Canada.

Dr. Akihiko Michimi: Postdoctoral Fellow, now an Assistant Professor, Western Kentucky University, KY, USA.

Kyle Pitman: Geospatial Analyst, now a Computer Services Consultant, Durham, NC, USA.

Dr. Peter Potapov: Assistant Research Professor, now a Research Associate Professor, University of Maryland College Park, MD, USA.

Dr. Mirela Tulbure: Postdoctoral Fellow, now an Assistant Professor, University of New South Wales, Sydney, Australia.

Dr. Svetlana Turubanova: Postdoctoral Fellow, now a Research Associate, University of Maryland College Park, MD, USA.

Dr. Xiaolei Wang: Postdoctoral Fellow, now a Postdoctoral Researcher, University of Oklahoma, OK, USA.

Dr. Jong-min Yeom: Postdoctoral Fellow, now a Research Scientist, Korean Aerospace Research Institute (KARI), South Korea.

Dr. Chunsun Zhang: Associate Professor, now a Research Scientist, University of Melbourne, Australia.

Dr. Zhiliang Zhu: Adjunct Professor, USGS EROS Research Physical Scientist, now a USGS federal government employee, USGS, Reston, VA, USA.

Cool Faculty Research & Locations

Coupled Human and Natural Systems in the Grazing Lands of the African Sahel

Drs. Hanan, Prihodko, and Kaptué, are working with collaborators in West Africa to study coupled human-natural systems in the African Sahel. Sahelian grazing lands are a vital grazing resource for the people of Africa, providing seasonal grazing for millions of animals. Many small lakes appear during the wet season but dry out during the dry season. Over millennia, human societies have responded to the seasonal availability of water for cattle by developing complex, socially-negotiated, long-distance herd-migration routes that have organized and formalized access to grazing and surface water resources. Since regional droughts in the 1970s and 1980s, the coupled hydrology, ecology and grazing management in many watersheds appears to be changing, with increasing drainage into pools that in some places now provide year-round water supplies. Using models, satellite data, and ecological and social survey techniques, the interactions and feedbacks between climate, vegetation dynamics, landscape hydrology, and humans are being investigated for a watershed in Northern Mali and then scaled to the Sahel.

Cool Faculty Research & Locations

Fire Ecology Field Work in the Western U.S.

Fuels management has become the cornerstone of efforts to reduce the incidence of large, destructive wildfires in the United States, and Drs. Cochrane and Wimberly have been studying the effects of fuel treatments on fire severity since 2006. This research, funded by the USDA/USDI Joint Fire Science Program, uses satellite remote sensing data to assess treatment effects at a site level and spatial simulation models to explore interactions between treatment patterns and fire behavior at a landscape level. Extensive field validation is a key component of the research, and has taken the project team to numerous ecosystems across the United States. This field work has encompassed the Rocky Mountains of northern Montana, the Blue Mountains of southeastern Washington, the Kaibab Plateau north of the Grand Canyon, the Sierra Nevada of California, and the Boundary Waters Canoe Area Wilderness in Minnesota.

Cool Faculty Research & Locations

Impact of Vegetation Fire Emissions and Nutrient Deposition on African Ecosystems

African savannas burn more frequently than any other biome worldwide. Of the many elements emitted when savannas burn, two of the most interesting are nitrogen and phosphorus because of their important role in ecosystem biogeochemical cycles. However, their fate following fire is poorly understood in Africa. Dr. Prihodko is leading a study that is examining patterns of nutrient emissions from fires, atmospheric transport of these emissions and nutrient deposition across Africa to explore the effects on ecosystem dynamics. The project involves modeling of atmospheric transport and deposition of gaseous and aerosol nitrogen and phosphorus, and field measurements of fire related deposition in West Africa. Field measurements are currently concentrated at a savanna site in the Baoulé Biosphere Reserve outside of Bamako, Mali and will be expanded to dry and wet savannas in the near future. Results from this work are being incorporated into a model of the African carbon cycle, also being developed at GIScCE.

WELD: WEB - ENABLED LANDSAT DATA

USGS Home
Contact USGS
Search USGS
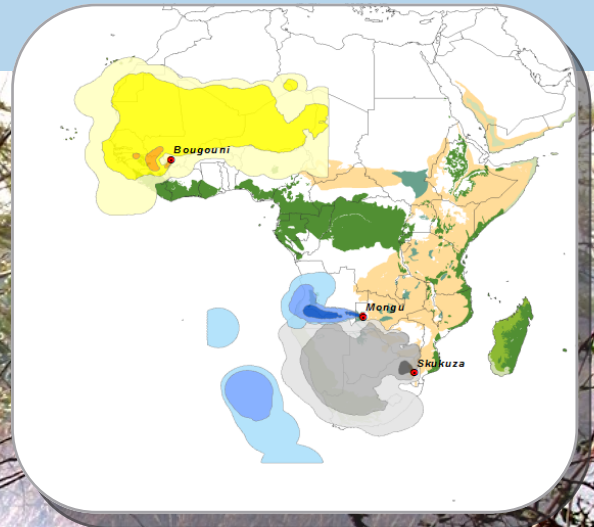
Landsat Information Just A Click Away

The next time you're struggling to fold up a road map, think of the challenge faced by GIScCE researchers. They have developed a system for generating and disseminating the information contained in ten years worth of Landsat images of the conterminous United States and Alaska. The information is readily available at no cost to anyone with an Internet connection. Funded by a $3.3 million NASA grant, the Web-enabled Landsat Data (WELD) project is a collaborative effort of the GIScCE and the U.S. Geological Survey EROS.

Available to the public since October 2010, the WELD project has more than 500 registered users from 20 countries. More than half the users are academics with a significant number of general public and federal government users. The WELD team members are fans of Google Earth, but note that the WELD project provides both images and geophysical data products on a weekly, monthly, seasonal and annual basis. Sharp-eyed visitors to the WELD Web site at **http://weld.cr.usgs.gov** will notice SDSU's logo on the homepage along with logos for NASA and the U.S. Geological Survey.

The WELD team in front of the GIScCE: (top row, L-R) Alexey Egorov, Sefa Adekpui, Dr. David Roy, Sanath Kumar, Dr. Valeriy Kovalskyy; (bottom row) Dr. Lin Yan, Emma White, Indrani Kommareddy, Dr. Yuchu Qin, Anil Kommareddy.

CONUS

2005 2006 2007 2008 2009 2010 2011

Alaska

2005 2006 2007
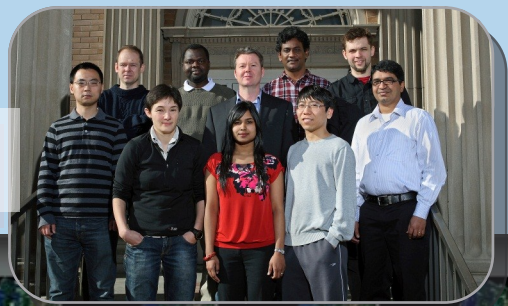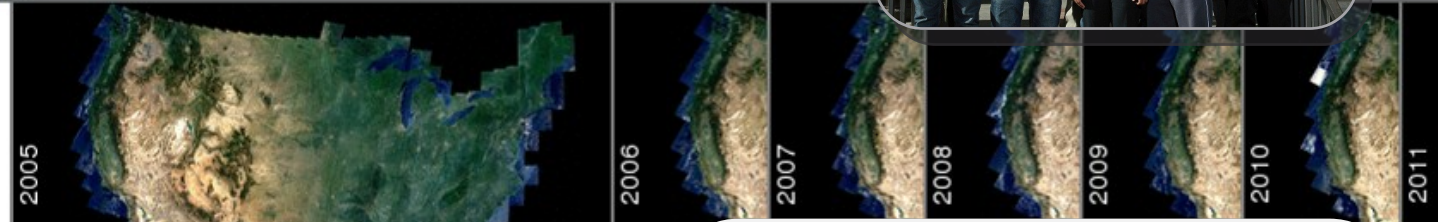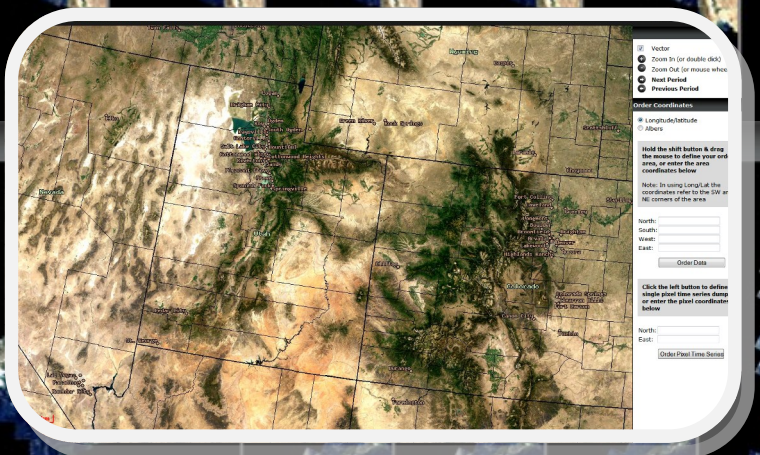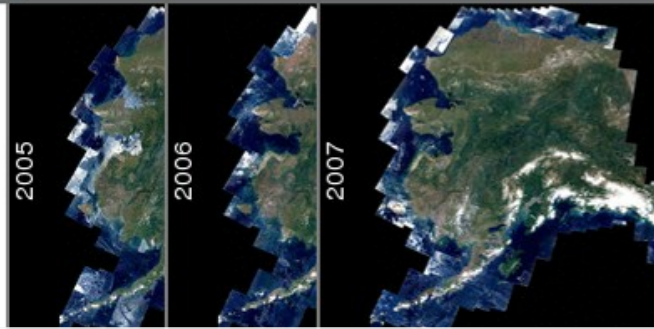
Interface Help   WELD Product Information   Distribution Metrics
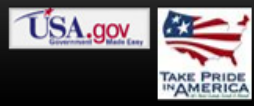
Malaria Early Warning in the Ethiopian Highlands

Drs. Wimberly, Senay, and Henebry are leading an NIH-funded project to study the application of satellite remote sensing for malaria risk mapping and epidemic forecasting in the Amhara region of Ethiopia. This mountainous area is characterized by strong environmental gradients, as illustrated by the topographic overlay of MODIS land surface temperature data acquired in October of 2003. Much of the predominantly rural population has a high exposure to mosquito breeding sites and the consequent risk of malaria transmission during outbreak years. In collaboration with the Anti-Malaria association, an Ethiopian NGO, GIScCE scientists have compiled an extensive historical database of malaria cases, conducted a pilot study on the potential uses of maps to enhance malaria prevention and control, and developed malaria risk models driven by remotely-sensed environmental indices. Postdoc Ting-Wu Chuang and Ph.D. student Alemayehu Midekisa are key members of the research team.

Cool Faculty Research & Locations
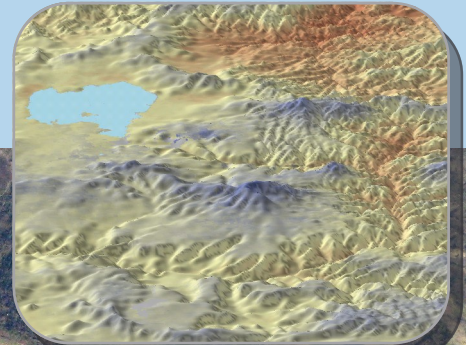
Northern Australian Savannas

Northern Australia is dominated by vast tracts of tropical savanna, embedded with small patches of rainforest, large river systems with extensive freshwater floodplains, and rocky heathland communities. The region is very sparsely populated, and there has been very little clearing of vegetation for agriculture (<1% of the region). These savanna landscapes are highly flammable, with the wetter areas burning once every 2-3 years, and the primary land management issue is fire. Indeed, changes to fire regimes caused by the breakdown of traditional Aboriginal land management in many areas across the region has been strongly implicated in ongoing biodiversity declines. Most notable is the dramatic decline in the abundance of small- to medium-sized mammals in the last few decades, even in large, relatively intensively managed national parks.

Since 2006, Dr. Murphy has been working to understand how fire regimes can be best manipulated by using prescribed burning (the deliberate application of fire), with the aim of reducing the overall frequency and spatial extent of fires. This knowledge will allow land managers to better manage fire for biodiversity conservation and reduction of greenhouse gas emissions. Brett is a GIScCE assistant research professor based at the Northern Territory Government Bushfire Research Group, Darwin, Australia, and is working with Mark Cochrane on a NASA funded fire project.

Cool Faculty Research & Locations

Severe Storm Damage Evaluation

Dr. Gallo and colleagues from the National Severe Storms Laboratory and several National Weather Service Forecast Offices are comparing satellite observations of severe storm damage with radar-derived products and ground observations. One storm event that occurred on 18th August 2011 in Northeast Nebraska was typified by high winds and hail that removed the majority of tree leaves and caused significant crop damage. Because of these effects in the August satellite data much of the natural vegetation resembled that of data sensed in early Spring and the crops resembled that of data sensed much later in Autumn. Ground surveys and comparisons with satellite and radar data are planned for the upcoming severe storm season in the Great Plains region.

Cool Faculty Research & Locations
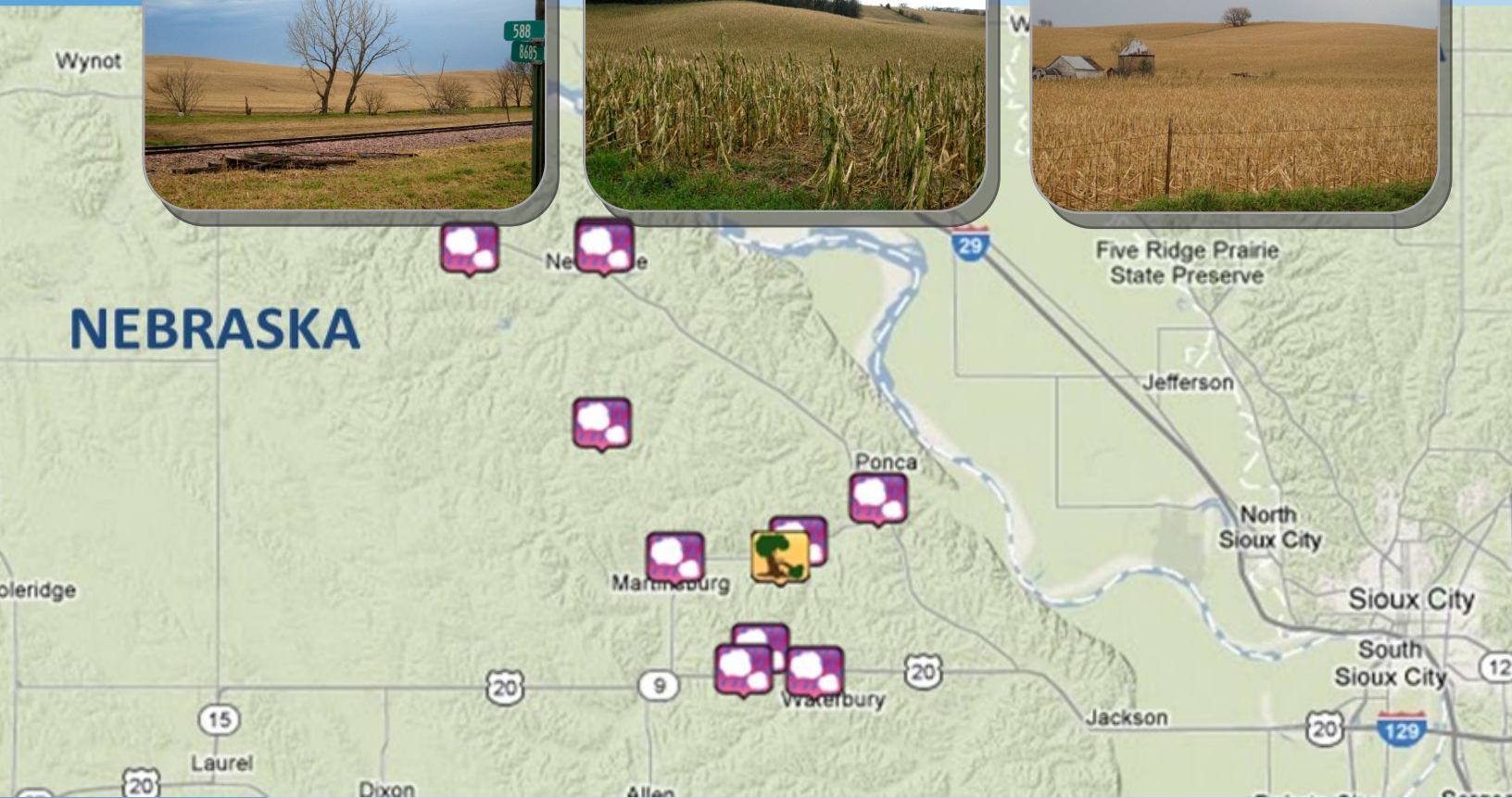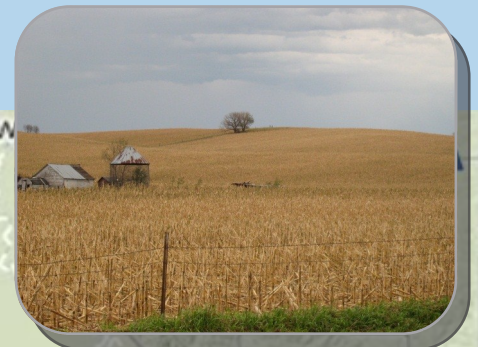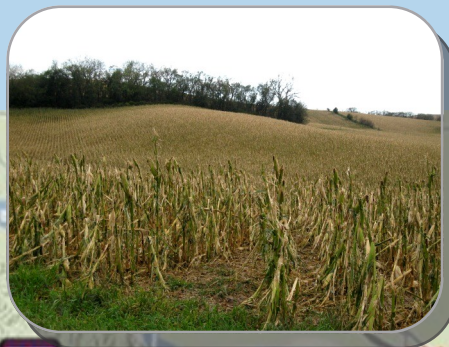
The River Nile Hydrology

Dr. Senay has an abiding interest in the Nile River, its year-to-year variability, and the hydrology of the Nile Basin. In January 2011, he participated in a workshop on "Climate Adaptation for the Nile Basin" in Cairo and made sure to visit Aswan in Southern Eygypt. River stage height measurements have been used since ancient times to estimate Nile flood levels and forecast drought and flood-plain agricultural harvests. The Nilometer (pictured) that Dr. Senay found in Aswan is an ancient gage used to estimate river flow volumes. The annual flooding cycle of the Nile was eliminated in the 20th century by the construction of the Aswan dams. River stage is estimated today using modern analogs to the Nilometer, for example, by flow gaging stations such as those managed by the USGS throughout the US, and using satellite altimetry to measure the time it takes a microwave or laser pulse to travel from the satellite to the river and back to the satellite.

Cool Faculty Research & Locations

Wetlands

Dr. Gallant and colleagues from agencies and academic institutions in the U.S. and Canada have been collaborating in a research network to study how wetland landscapes respond to changes in climate and land use. Water is key to basic functioning of ecosystems and for meeting a host of human needs, but there are concerns about water availability and dependent species under rapid climate change. The research network integrates information from the ground to the skies to study the status of water in the landscape. For example, scientists deploy acoustic sensors on the ground to monitor calling responses of amphibian and bird species that use wetlands. The timing of sounds across years is informative about unusual trends or variance in breeding activity that could affect the persistence of animal populations over time. From the skies scientists use satellite sensors to monitor seasonal snowpack, water, and vegetation response. There is good correspondence between the information gained from the skies and what the animals are telling us on the ground.

The big challenge is that, although open water has a distinct spectral response that can be detected readily by satellite sensors, it remains difficult to map the majority of wetlands in North America because they are hidden under vegetation canopies or are smaller than the satellite sensors can resolve. Dr. Gallant has teamed up with remote sensing scientists in the U.S. Geological Survey and the Canada Centre for Remote Sensing to work on a multi-sensor approach to improve the consistency with which wetlands can be mapped and monitored. Information on wetland response to changes in the environment is needed to support decisions on water and land-cover management and on national policies that influence land use.

photo credit: Mark Roth

Fishing

Whether you want a perch, bass, walleye, or catfish, lakes around the Brookings area offer great locations for fishing.

Snow Sports
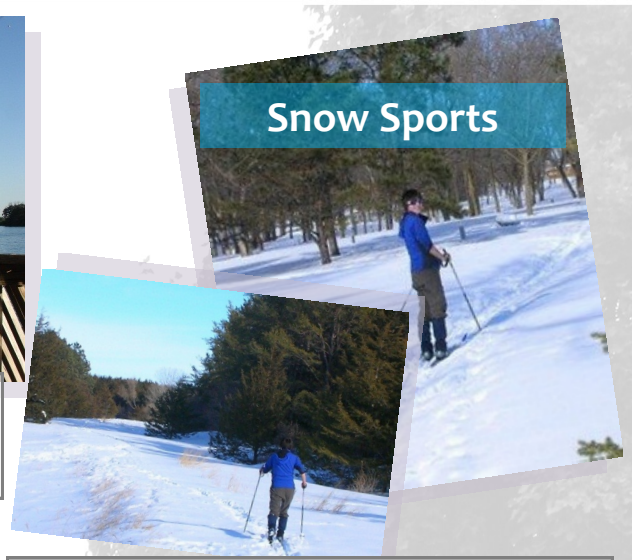
Winter months in Brookings, South Dakota can also mean a great time to go cross-country skiing, downhill skiing, ice skating, snowmobiling, or even ice fishing.

Canoeing & Kayaking

Water-sport enthusiasts can enjoy the many lakes and rivers in the Brookings area.

Kiteboarding

There are many lakes close to Brookings that provide optimal seasonal conditions for kite boarding, wind surfing and sailing.

Non-Academic Fun Things To Do

Learning to Fly

SD is one of the nation's cheapest places to learn to fly, and several GIScCE students are applying for pilot licenses.

Camping and Sports
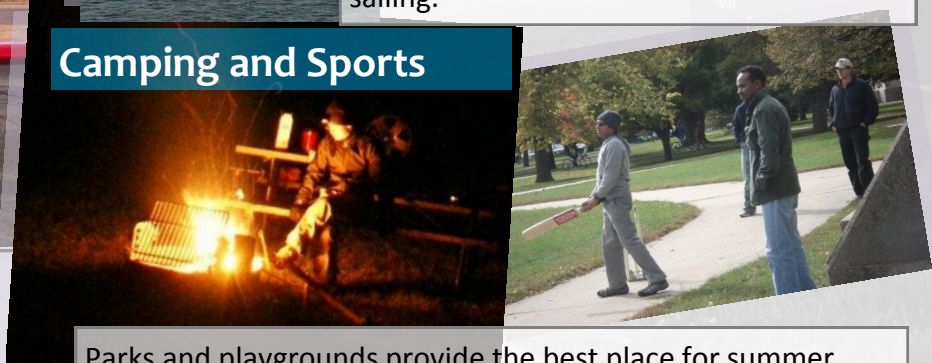
Parks and playgrounds provide the best place for summer festivals, family picnic, camping, and sports.

Refereed Journal Articles: 2009

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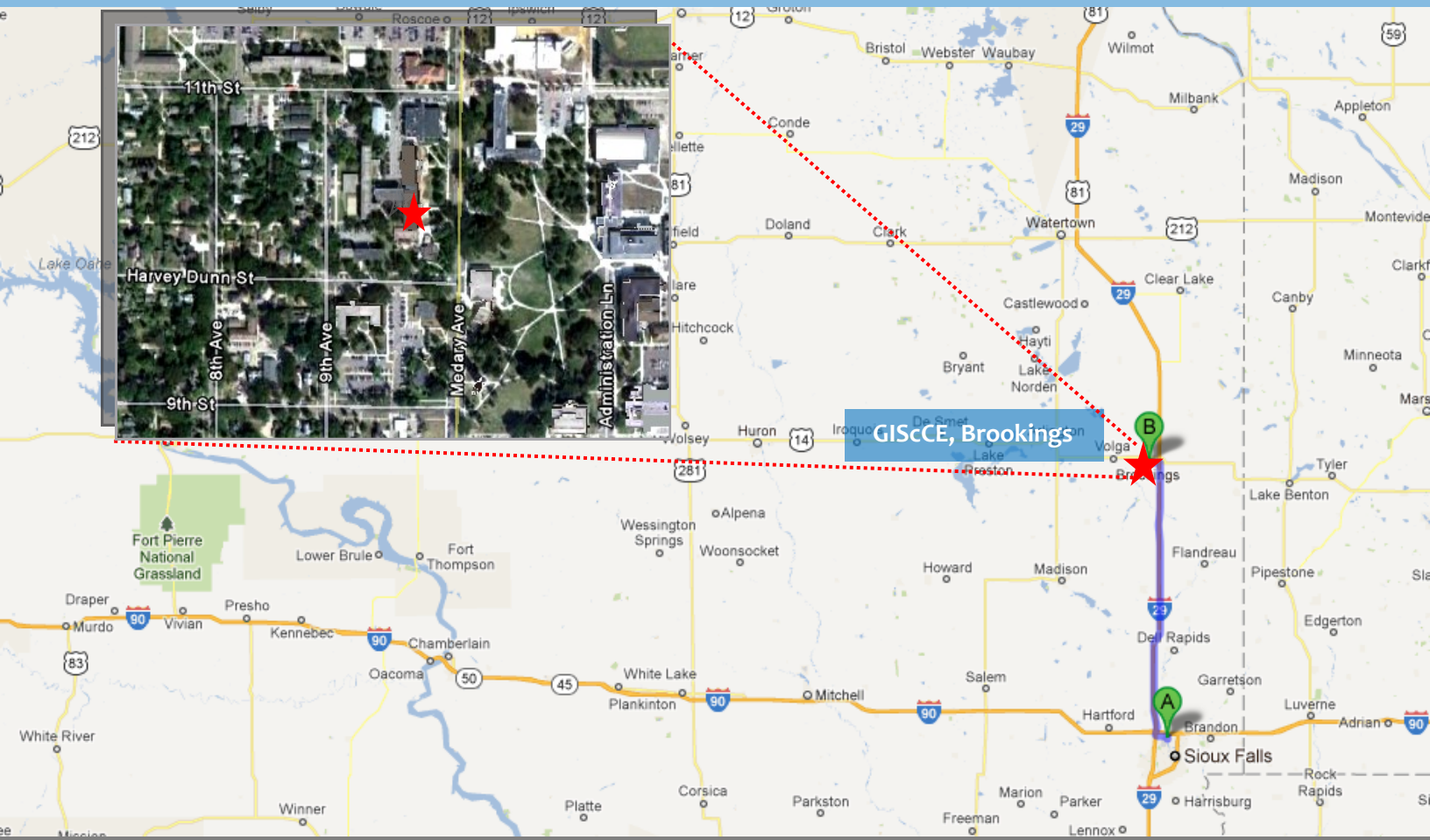| Research & Admin Staff	Telephone	Email
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Appendix VI

How to Get to the GIScCE

Driving from Sioux Falls Regional Airport :

1. Head **southeast** on **N Jaycee Ln** (0.2 mi)
2. Continue straight to stay on **N Jaycee Ln** (0.2 mi)
3. Slight **right** at **N Minnesota Ave** (0.8 mi)
4. Turn **right** at **W Russell St** (2.1 mi)
5. Take the ramp onto **I-29 N** (52.4 mi)
6. Take exit **132** for **US-14/I-29** toward **Huron/Brookings** (0.3 mi)
7. Turn **left** at **6th St/US-14** (1.6 mi)
8. Turn **right** at **Medary Ave** (0.5 mi)

Destination will be on the left between Harvey Dunn St and 11th St.
(58.1 mi—about 55 minutes)

Physical Address: 1021 Medary Avenue, Wecota Hall, Brookings, SD 57007-3510.

Postal Address
1021 Medary Ave.
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