National Aeronautics and Space Administration



## FALL 2016 DEVEL@Per NEWSLETTER

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# **PROGRAM** HIGHLIGHTS





21 Projects







Congratulations to Dr. Sara Lubkin and Allison Daniel for receiving grand prize awards in the 2016 AGU Data Visualization Storytelling Competition! As a partnership between AGU and NASA, this competition encourages students to focus on innovation and storytelling for NASA research and applied science outcomes. Dr. Sara Lubkin and Allison Daniel, DEVELOP participants at the DEVELOP Goddard and DEVELOP Marshall nodes, respectively, used the research and results of their projects to create compelling data visualizations.

 The DEVELOP Puerto Rico Agriculture project at Goddard Space Flight Center was highlighted in the Earth Observatory. Read the article, here.

DEVELOP's Lauren Childs-Gleason & Georgina Crepps participated in the "Power, vulnerability and agency in disaster risk reduction: A knowledge exchange for sustainable development" workshop which focused on linking GIS and gender in disaster risk reduction. Lauren spoke in an opening key note panel. Lauren and Georgina helped to facilitate sessions and presented DEVELOP projects in a "marketplace" of helpful resources for attendees.





# A DAY AT DEVELOP

From its start at Langley Research Center to its expansion into the dynamic national program it is today, NASA DEVELOP is an ever-evolving force. The program's plentiful opportunities for pushing the bounds of scientific research and strengthening participants' personal and professional toolkit continue to expand.

Insights from current and past participants, as well as Fellows and Science Advisors, highlight the truly unique opportunity DEVELOP presents and its wide-reaching impact. Wise County Science Advisor and UVA-Wise professor, Bob VanGundy, shares his most favorable memory with the program. "Seeing [participants] interact with each other and [myself] gives me [...] a better sense of what they hope to accomplish with their lives [...] it is enjoyable for me to get to see them DEVELOP."

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"I am proud to be a part of DEVELOP because of the confidence that the program has given me as a professional [...] I have never worked in an environment where I was encouraged to think outside of the box to find solutions. DEVELOP encourages unconventional thinking and promotes innovation and discovery in everything we do."

Dashiell Cruz, FY17 Impact Analysis Fellow

"In my time with DEVELOP, the program has grown in size, sophistication, and impact [...] projects deliver more elaborate solutions [...] all of the teams now have a direct interchange with partners."

Dr. Kenton Ross, National Science Advisor





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"DEVELOP has been a chance to grow and explore in the field I love [...] I'm part of a continuum of individuals who have grown and will grow through the Program."

Molly Spater, fall 2016 participant at JPL, Alumni Ambassador at UCLA

## WHERE ARE OUR DEVELOPS GOING AFTER DEVELOP?









Jenna Williams FY17 Communications Fellow at Ames Research Center

"We are entrusted with the creation and leadership of research projects, building teams, and incorporating technology in surprising ways. There is an amazing cultivation of 'family' [...] the adage coined that 'once a DEVELOPer, always a DEVELOPer' is true."



#### Hannah Rosenblum 2016 Summer Participant at Langley Research Center

"One thing that makes DEVELOP unique is the background of the participants. The people I worked with came from a variety of geographic and educational backgrounds [...] there was so much we could learn from each other."





### NASA Langley Research Center (LaRC)

Center Lead: Emily Gotschalk; Assistant Center Lead: Tyler Rhodes; Project Coordination & Geoinformatics Fellow: Ryan Avery; Project Coordination Fellow: Amanda Clayton

Fall 2016 participants: Adama Ba, Aubry Eaton, Joe Harris, Donnie Kirk, Jordan Lubbers, Andrea Martinez, McKenzie Nyquist, Suzannah Richards, Christine Sadlik, Taryn Smith, Zachary Wardle, Amy Wolf, Dr. Sunita Yadav-Pauletti

Participants at LaRC had a successful closeout on Wednesday, November 16th. Those in attendance included Dr. Hans-Peter Plag, partner to the Everglades Ecological Forecasting II team, as well as Superintendent Terry Brown from the National Park Service. Multiple participants and members of NPO also supported the Near Real-Time Data Event that hosted many scientists and other data users and attended FedGeoDay. NPO's Lauren Childs-Gleason and Georgina Crepps traveled to present DEVELOP in Thailand this term!

The Everglades Ecological Forecasting II team produced a video for Applied Sciences Program Manager Lawrence Friedl, to take to the GEO Plenary meeting in St. Petersburg, Russia. Participants attended a career and graduate school seminar with Dr. Bruce Doddridge, head of the Chemistry and Dynamics Branch at LaRC. Langley DEVELOP participants also had the opportunity to visit with Langley leadership, including LaRC Center Director Dave Bowles at an Open Door event with the Office of the Director, as well as through a Breakfast with the Office of the Director featuring Clayton Turner (LaRC Deputy Director) and Cathy Mangum (LaRC Associate Deputy Director).

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The DEVELOPer Fall 2016 Newsletter



## University of Georgia (UGA)

Center Lead: Caren Remillard; Assistant Center Lead & Project Coordination Fellow: Sean Cameron

Fall 2016 participants: Amanda Aragon, Ike Astuti, Natalia Bhattacharjee, Alys Hannum, Doori Oh, Kamalakanta Sahoo, Abhishek Kumar, Roger Bledsoe, Maria Jose Rivera, Jessica Staley, Patricia Stupp

The Atlanta Water Resources project was highlighted in the American Geophysical Union's Thriving Earth Exchange and is also being recognized in the 2016 Annual Report for NASA Earth Science's Applied Sciences Program. Additionally, two UGA projects were selected as the Image of the Day in the NASA Earth Observatory.

The Team Lead and Science Advisor of the Eastern India Ecological Forecasting team will be conducting field work in Odisha, India this December in preparation for the second term of the project. The Eastern India Ecological Forecasting and the Atlanta Water Resources posters were both featured at UGA's first annual GIS Day.

The Atlanta Water Resources team was invited to present at the Green Infrastructure Center, the Georgia Geospatial Conference, the UGA College of Environment & Design, and a Lunch & Learn at The Nature Conservancy. Finally, UGA is looking forward to attending the ASPRS and AAG annual conferences where two projects were accepted for oral presentations!

LaRC	UGA	JPL	NCEI	GSFC	FC	ARC	MCHD	ID	MSFC	WC	A



## NASA Jet Propulsion Laboratory (JPL)

Center Lead: Nick Rousseau; Assistant Center Lead & Geoinformatics Fellow: Erika Higa; Geoinformatics Fellow: Sol Kim

Fall 2016 participants: Kate Cavanaugh, Samuel Comer, Ian Heming, Natalie Queally, Molly Spater

The Southern Arizona Ecological Forecasting team took a trip to Tucson, Arizona to meet with one of their partners, Dr. Cynthia Wallace from the USGS Southwest Biological Science Center. Cynthia guided the team to various locations to investigate and gather footage of the invasive buffelgrass species, *Pennisetum ciliare*. The team also visited the USGS at the University of Arizona and met with other scientists.

Nick Rousseau attended Climate Day, an educational event held by JPL at the Pasadena Convention Center on September 16th for high school and middle school students. Nick gave two presentations on the topics of wildfires and drought and presented DEVELOP VPS videos on behalf of the summer 2015 U.S. Disasters project. The node participated in Los Angeles County GIS Day held at Grand Park in downtown Los Angeles on November 16th. DEVELOP participants spoke about DEVELOP's use of ArcGIS while providing information about the NASA DEVELOP Program to both students and county officials.

JPL participants spent a weekend in Trona, CA, where they camped at the Trona Pinnacles and took part in an excursion in mining Pink Halite (salt) crystals from the nearby dry lake bed. There, they networked with various students and professors from UC Riverside and other schools and were successful in finding impressive halite specimens.



### NOAA National Centers for Environmental Information (NCEI)

Center Lead: Alec Courtright; Assistant Center Lead & Geoinformatics Fellow: Kelly Meehan

Fall 2016 participants: Lauren Cater, Evan Henry, Patrick Pierce

The Levant & Central America Climate II project worked closely with their partners, the US Air Force 14th Weather Squadron, to utilize a novel method for monitoring drought. The team built upon the previous term's analyses and incorporated vegetation, land surface temperature, evapotranspiration, and precipitation datasets from NOAA and NASA into a machine learning drought model. The team's ambitious methodology and project results provided their partners with tools to create an enhanced and more robust drought monitoring. This fall's project spurred interest around NCEI, the Collider Climate Innovation Center, and the National Geospatial-Intelligence Agency (NGA). Project results were presented at the University of Virginia's College at Wise at the first ever joint closeout with the Wise County node!

Early in the term, the NCEI team traveled to Grayson Highlands National Park, Virginia to summit Mount Rogers with participants from Wise County and Langley. The node has started to build connections throughout North and South Carolina, presenting at several colleges in both states to highlight DEVELOP and NCEI projects. NCEI has also started working closely with the local school district to connect students with opportunities in the applied sciences. Two previous NCEI projects, Pacific Water Resources I & II, will be represented in the American Meteorological Society (AMS) with a publication in their December 2016 Bulletin, as well as with a project presentation at the AMS annual meeting in January 2017.

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## NASA Goddard Space Flight Center (GSFC)

Center Lead: Sean McCartney; Assistant Center Lead & Geoinformatics Fellow: Alison Thieme

Fall 2016 participants: Elisa Ahern, Tehmina Ashraf, Jessica Fayne, John Fitz, Erin Glennie, Dr. Sara Lubkin, Heather Mitchell, Perry Oddo, Madeline Ruid

The Goddard node had another rewarding term filled with scientific and professional development. The node completed four Python trainings led by Goddard scientists and held a relief mapping potluck for Haiti following Hurricane Matthew. The Puerto Rico Agriculture project was featured on NASA Earth Observatory as image of the day, highlighting work completed in summer 2016. DEVELOPers had the chance to tour Goddard Space Flight Center and learn about the James Webb Space Telescope, High Bay Clean Room, Acoustic Test Chamber, High-Capacity Centrifuge, Space Environment Simulator, and mission control for the Earth Observing System (EOS)!

Participants also attended numerous meetings and conferences, such as: OCO-2 Science Data Applications meeting, Young Scientists Forum at GSFC, Sharing Science with any Audience at AGU Headquarters, and the AGU Fall Meeting. DEVELOP participant Dr. Sara Lubkin was one of five grand prize winners in the 2016 AGU Data Visualization Storytelling competition! She presented at the Hyperwall meeting. Lastly, participants had the privilege of attending a Town Hall with NASA Administrator Charles Bolden on his last trip to GSFC.

The Kenya Ecological Forecasting team used Google Earth Engine and Land Change Modeler in TerrSet to analyze 12 protected areas (PAs) for the Global Environment Facility – Independent Evaluation Office (GEF-IEO). The team quantified the amount of carbon sequestered in the PAs, demonstrating the co-benefits of their conservation efforts to GEF-IEO. The team developed a strong rapport with their partners through in-person and virtual meetings, and in January, the entire team will travel to Kenya to validate the results of their project.



## USGS at Colorado State University (FC)

Center Lead: Brian Woodward; Impact Analysis Fellow: Sarah Carroll

Fall 2016 participants: Bethlehem Astella, Emily Campbell, Rebecca Girma, Benjamin Ignac, Muthukamaran Sampath, Cara Steger, Amy Stuyvesant, Amandeep Vashisht

What a great term in Fort Collins! The Rocky Mountain Climate team visited Rocky Mountain National Park in September with researchers from the United States Geological Survey (USGS). The team assisted the USGS with a field study relating algal productivity to invertebrate populations. This included setting nets in Loch Vale and Sky Pond that researchers would revisit 24 hours later and take chlorophyll measurements from the center of each lake. Using these and other historically-collected datasets, the team developed a model that allows users to predict algal biomass in Colorado's alpine lakes where researchers have not yet been able to study. This model produces information on whether algal biomass is high or low and can be used for increasing the understanding of chlorophyll's spatio-temporal trends in the northern Front Range. The team's conclusion will provide guidance for future DEVELOP projects that will use Landsat imagery for water-based analysis.

The Ethiopia Disasters team utilized 10 years of MODIS and TRMM data to develop a scaled drought index over northcentral Ethiopia. The drought index was compared to soil moisture from SMAP to perform an initial evaluation. The index time series was analyzed to characterize the drought severity, extent, and duration. The team's drought index maps will allow project partners to understand drought variations in context of food security and aid allocation. The team also created a tutorial to describe the step-wise methodology utilized in the project. This tutorial will be shared with one of the project partners to enhance their capacity and train students for future drought monitoring.

LaRC UGA JPL NCEI GSFC FC ARC MCHD ID MSFC WC AZ



## NASA Ames Research Center (ARC)

Center Lead: Brittany Zajic; Assistant Center Lead & Communications Fellow: Jenna Williams

#### Fall 2016 participants: Madison Davis, Lauryn Gutowski, Stephanie Ly, Christina Zapata

After two terms creating the Drought Severity Assessment Tool 2.0, the Navajo Nation Climate III team validated and implemented the DSAT 2.0 model into the decision-making process of the Navajo Nation Department of Water Resources. The team examined significant temporal and spatial trends of standardized precipitation index (SPI) from DSAT 2.0, in addition to other drought indicators such as snow water equivalent, land surface temperature, and root zone soil moisture. Each variable was analyzed for statistical anomalies, as well as spatial and temporal trends, to enable enhanced decision-making capacity regarding imminent economic and agricultural impacts from water resources in the Navajo Nation.

After a successful first term, the Elkhorn Slough Ecological Forecasting II team continued their collaboration with the Elkhorn Slough National Estuarine Research Reserve (ESNERR) in Monterey Bay, CA. The team investigated Elkhorn Slough's dynamics with a historical time series spanning 1997-2016, a vegetation analysis focusing on the 2016 year with high spatial resolution imagery, and a future analysis of the Elkhorn Slough using the Marsh Equilibrium Model (MEM) forecasting the next 100 years.

Brittany Zaijc and Jenna Williams, the Ames Research Center DEVELOP management team, presented at Stanford's GIS Day. They are also attending AGU alongside two Ames DEVELOP projects: Elkhorn Slough Ecological Forecasting I and San Francisco Bay Area Health & Air Quality.



## Mobile County Health Department (MCHD)

Center Lead: Tyler Lynn; Assistant Center Lead & Impact Analysis Fellow: Elaina Gonsoroski

#### Fall 2016 participants: Farnaz Bayat, Saranee Dutta, Katie Harville

This fall at the Mobile County Health Department, the Southeastern Arizona Water Resources team partnered with the National Park Service Intermountain Region and National Park Service Saguaro National Park to analyze the impact of snowpack on water resources in Saguaro National Park and the surrounding Sky Islands.

During the term, the team participated in a "Communicating Your Science" workshop held at the Dauphin Island Sea Lab. While at the workshop, members of the team interacted with local researchers to learn new methods and skills for communicating scientific research! The team also heard from Doug Phillips, a speaker at the workshop and host of "Discovering Alabama", who shared lessons and personal experiences of communicating science to public audiences.

The team had multiple visits from and interactions with their science advisor, including a potluck at the beginning of the term. The team also participated in a number of team-bonding activities such as showing off their pumpkin carving skills and visiting the local Bamahenge landmark with its dinosaur inhabitants. The term concluded with a closeout presentation at the Mobile County Public Library, which family, friends, professors, and the team's science advisor attended to learn more about the NASA DEVELOP program and the Southeastern Arizona Water Resources project.

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## BLM at Idaho State University GIS TReC (ID)

Center Lead: Courtney Ohr; Assistant Center Lead & Communications Fellow: Caitlin Toner

Fall 2016 participants: Cody O'Dale, Traci Olson, Dylan Thomas

The Southeastern Idaho Water Resources team produced a surface water identification tool within two separate platforms that will allow project partners to identify water resources in semi-arid environments. These tools will give project partners the ability to choose between ease of use and adaptable methods. This is essential for accommodating a wide range of users, from people well-versed in scripting to users requiring more accessible methods. The team was able to visit field sites to collect *in situ* data for project validation.

At the beginning of the term, the team attended a personal time management seminar given by Keith Weber at the GIS TReC center. The tips and practices learned in this seminar were initiated throughout the term to increase productivity.

Jenna Williams (now at ARC) attended AGU in San Francisco, CA on December 12-16th to present a flash talk on a previous DEVELOP ID project, Juniper Encroachment and Management in the Western U.S Relative to Catastrophic Wildfires.



## NASA Marshall Space Flight Center at NSSTC (MSFC)

Center Lead: Maggi Klug; Assistant Center Lead & Impact Analysis Fellow: Dash Cruz

Fall 2016 participants: : Kristen Barnard, Mercedes Bartkovich, Olivia Callaway, Nicholas McVey, Tony Ngabo, Chris Ploetz, Ankur Shah, Daryl Ann Winstead

The teams at Marshall showcased the work for their projects at a ZP-11 presentation to the Earth Science civil servant researchers at Marshall Space Flight Center including Dan Irwin, the Program Manager of NASA SERVIR. Additionally, 2 current participants and 2 alumni from Marshall presented their DEVELOP projects at the 2016 Annual Wernher von Braun Memorial Symposium Student Poster Competition in October! Kelsey Herndon (alumna) and Daryl Ann Winstead represented Marshall and placed 1st and 2nd respectively in their categories. In attendance at the winner's reception were Charles Bolden, Dava Newman, and Nancy Searby.

In October Dash Cruz, Assistant Center Lead and Impact Analysis Fellow, went to the HyspIRI conference in Pasadena, CA. There he participated in workshops and attended presentations of leading Earth Science research. He also had the opportunity to showcase one of Marshall's summer 2016 projects, Chaco Canyon Cross-Cutting, in a poster presentation. While he was in California, he took the opportunity to visit the DEVELOP node at JPL and tour their facilities.

LaRC	UGA	JPL	NCEI	GSFC	FC	ARC	MCHD	ID	MSFC	WC	AZ







## Wise County and City of Norton Clerk of Court's Office (WC)

Center Lead: Michael Brooke; Assistant Center Lead: Kimberly Berry; Project Coordination Fellow: Aubrey Hilte; Communications Fellow: Christine Stevens

#### Fall 2016 participants: Alexander Black, Brooke Colley, Austin Counts, Andrew Phillips, Sydney Young

At the beginning of the fall 2016 term, the Wise County node welcomed two Fellows to the node for their year-long stay in beautiful Wise, VA! Christine Stevens, formerly at the NCEI node, joined the node as a Communications Fellow and Aubrey Hilte, formerly at the Fort Collins node, joined the node a Project Coordination Fellow. The team is looking forward to integrating their diverse backgrounds in wildlife biology, geography, and conservation into future WC projects and the node leadership mission.

The Grand Canyon Water Resources team had a very successful term identifying changes in water level and associated changes in land cover in the lower Grand Canyon and upper end of Lake Mead in Nevada. Sustained drought in the Western U.S. and increased water use has lowered Lake Mead to the point that sediment that has been submerged for decades is now exposed. The team used Landsat 5 TM and Landsat 8 OLI to provide updated land cover maps to their partners at Grand Canyon National Park. The Northern Great Plains Water Resources II team expanded the study area from the first term to include Glacier, Grand Teton, and Yellowstone National Parks in their search to track changes in Persistent Ice and Snow Cover (PISC). Using Landsat imagery and GRIDMET meteorological data, the team assessed each park individually to document receding PISC and relate this recession to climate.



### Maricopa County Department of Public Health and Arizona State University (AZ)

Center Lead: Lance Watkins; Assistant Center Lead: Tamara Dunbarr

### Fall 2016 participants: Michael Pechacek, Jayanth Serla, Parul Singh

The Maricopa County Health & Air Quality team met with partners from Maricopa County Department of Public Health (MCDPH) and Maricopa County Air Quality Department (MCDAQ) at the 43rd street air quality monitoring site where they got first-hand experience with the equipment used to measure particulate matter in Maricopa County. The 43rd street monitor consistently remains the site with the highest levels of PM<sub>10</sub> in the county. The team was also able to visit the nearby data center where MCQAD processes and analyzes air quality data!

The Arizona node closeout was presented in coordination with the Arizona State University School of Sustainability on ASU's Tempe Campus. The closeout event was open to faculty and students, project partners from MCDPH and MCDAQ, and the general public. The event consisted of an introduction about NASA DEVELOP, focusing on the individual experiences of the participants, as well as a session covering the Maricopa County Health & Air Quality II project.

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## **DEVELOPer OF THE TERM**

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#### Jessica Fayne NASA Goddard Space Flight Center Fall 2014 - Fall 2016

Jessica was an incredible volunteer, contributing time and effort well beyond what was expected of her. She demonstrated passion for scientific research, and dexterous collaboration with peers and science advisors alike. Jessica's can-do attitude was appreciated by everyone on the team and her initiative for processing satellite data through scripting helped move the project forward. She contributed markedly towards data analysis, and advised members of the team less familiar with GIS and remote sensing. She embodied the core values of DEVELOP through her innovation and collaboration while instilling passion through her infectious pursuit of the geosciences.

Jessica joined the DEVELOP program in fall 2014 after finishing her MS in Geographic and Cartographic Sciences from George Mason University. Jessica is a geographer and physical remote sensing scientist. Her current research involves optical and thermal remote sensing of natural disasters and remote sensing algorithm development. She programs primarily in R, but also uses MatLab and Python for image processing, signal processing, and machine learning tasks. Her cool demeanor under pressure and resolve in persevering when challenges arose set an example for others to emulate. In fall 2017, Jessica is leaving to pursue a PhD where she is certain to contribute significantly to academia.

**DEVELOP ALUMNI** 41GHL1GHT **Jessia** Price Sutton



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Jessica began her DEVELOP story at NASA Ames Research Center (ARC) in summer 2014 before making her way across the country to the NOAA node at National Centers for Environmental Information (NCEI) in summer 2015. There, Sutton returned to the program in the challenging roles of both Team Lead and Center Lead.

Jessica's academic achievements speak to her passion and enthusiasm for Earth science topics and professional and technical growth. After obtaining her BA in Biology from Berea College, she continued her studies and received a Master of Environmental Science Degree from Yale University. During her terms as Center Lead in Asheville, NC, Sutton simultaneously pursued her PhD in Geological Science from the University of South Carolina and obtained her certificate of graduate study in Applied Analytics. Jessica's impressive background and thirst for knowledge certainly qualifies her as an exceptional and memorable alum.

Reflecting upon her experiences at ARC and NCEI, Jessica says "My time with DEVELOP not only helped me develop as a researcher, teacher, and leader, but also grow as a person. I use all of the skills that I developed and strengthened during my time with DEVELOP on a daily basis...the most important skill that I developed was the ability to communicate to a wide range of audiences and people." Her experience working on a diverse range of projects from American Samoa Oceans to Missouri River Climate, and Cascades & Sierra Water Resources as well as the opportunities to work with and learn from a wide range of people have strengthened her communication, research, and technical skills. Sutton has had the chance to network with many people in diverse fields.

"Together, the skills, achievements, and connections that I gained while with the DEVELOP program helped me earn the position that I currently have at the University of South Carolina."

Jessica is optimistic about the role the program has had in gaining confidence and shaping her as a desirable and competitive applicant in her future career endeavors. After finishing her time with DEVELOP, she graduated with her PhD and became a mother the following month, May 2016. Currently, Sutton teaches BIOL 301: Ecology and Evolution at the University of South Carolina, coordinates labs, and supervises graduate teaching assistants. She hasn't strayed too far from NASA, though. She is also working on a NASA SERVIR Project!

## Get your **DEVEL** gear online!

The DEVELOP gear webstore is now available online. Order individually or as a node @ http://tinyurl.com/gs6oq8h anytime from anywhere. Orders will be processed during Week 2 of each term.

Good News! The **DEVELOP Ambassador Corps** has expanded to include current students, as well as alumni and active duty service members! Our Ambassadors work hard to create innovative methods for expanding DEVELOP's reach to a diverse audience. Ambassadors are renewable, semester-long volunteer positions for enthusiastic, creative former participants who want to play an integral role in recruitment.

**Have a job opening?** Contact DEVELOP.Communications@gmail.com to get the word out! Or, post the opporunity to DEVELOP's LinkedIn group.

## **UPCOMING** E V E N T S

January 9 - February 17	Summer 2017 Term Application Window
January 23 - March 31	Spring 2017 Term
March 23 - March 25	ASPRS-IGTF Annual Conference
April 2 - April 7	19th George Wright Society Conference
April 5 - April 7	AAG Annual Meeting
June 5 - August 11	Summer 2017 Term
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VPS and Promotional Videos

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