

The **DEVELOPER** Spring 2015

- **2 GEOINFORMATICS** Pushing Program Capacity Through Technology
- **4** Program Highlights
- **4** Node Highlights
- **11** DEVELOPER OF THE TERM
- **12** Upcoming Events

aran



▲ The Geoinformatics Team (Jeff Ely, Amber Brooks, Daniel Jensen, and Lance Watkins) prepping for E380 interview.

Geoinformatics Pushing Program Capacity Through Technology

by Amber Brooks & Daniel Jensen

The Geoinformatics Team strives to increase capacity within the DEVELOP Program, its participants, and society by understanding current participant skill levels, heightening skill levels through tutorials and trainings, assisting in defining project partner/end-user requirements, and advocating for the use of technologies that optimize scientific project workflows. In order to build capacity within a structured manner, the following five Geoinformatics initiatives were formed by the CY15 Geoinformatics Team: Software Release, Code Repository, the DEVELOP National Program Python Package, Online Mapping, and Tutorial Creation. Over the spring term the team focused in on the use of Python coding within the program and researched how best to improve current practices.

The DEVELOP National Program Python Package, or dnppy (pronounced "donepie"), is a library of functional "building blocks" of python code, grouped into modules, created to improve institutional knowledge retention, represent DEVELOP and its toolkit in the public domain, and put more analytic power in the hands of participants the first day they walk into the program. Teams in the DEVELOP program increasingly find themselves using some level of programming to manipulate project data. Most of the



▲ A humorous Lance and Jeff on a break at Dev Summit.

time, data processing is performed in Python. Dnppy is an importable python package, complete with a basic installer, which will aid participants in performing such analysis. The dnppy package is used to functionalize common programming tasks in the geospatial community, specifically for working with NASA data products. It includes a continually expanding library of functions for processing satellite data and assisting in analysis to reduce the startup time for DEVELOP teams that must learn programming, find the necessary tools and libraries, and perform analyses based on NASA Earth observation products for project end-users. For example, instead of a team re-creating a script with a heavy learning curve for Landsat cloud extraction or top-of-atmosphere reflectance each term, they can download dnppy and utilize functions within the Landsat module to complete general pre-processing, allowing more time for project analysis and refinement.

In March, the team attended the 2015 Esri Developer Summit to strengthen and broaden the GIS and programming skills directly related to each of the five initiatives and increase the technical capacity of current technology available within the program. The Developer Summit offered a perfect platform to learn more about the technical field of geographic information based programming and inform the Geoinformatics initiatives, as well as meet industry professionals and raise awareness of the DEVELOP National Program. The majority of the four-day conference was focused on attending a subset of the 215+ technical sessions offered and troubleshooting with Esri developers and product engineers at help islands on the expo floor where the Geoinformatics team gained valuable insight into a variety of subjects. These included topics on general coding best



▲ ArcGIS Program Manager Jim McKinney conducts the opening plenary session for developers.

practices, creating geoprocessing toolsets, storing and serving raster data through image services, working with the ArcGIS API for Javascript for web mapping, working with scientific and statistical data, learning how ArcGIS is building support for the scientific community, and a slew of other informative topics. Specifically, the team looks forward to implementing the use of ArcGIS Desktop 10.3.1 across program locations to enable the use of newly integrated Python libraries, such as Scipy, within dnppy and the ability to run R scripts and display results within the ArcMap for statistical visualization.

By attending sessions and other networking events, the Geoinformatics team provided a professional NASA presence and developed new relationships with experts at Esri and other organizations that have volunteered their technical support to increase DEVELOP's technical capacity. This culminated in the opportunity for the Geoinformatics team to be interviewed on E380, Esri's media service, where they spoke about DEVELOP's use of GIS to leverage NASA Earth observation data. Post-conference, the team visited Esri headquarters in Redlands, CA where a campus tour and historic narrative of the company were facilitated. The team also took part in team-building functions at conference events within the city of Palm Springs and in the adjacent beautiful mountains. In these ways, the Esri Developer summit was an invaluable occasion for the team to gain insight into new tools and develop relationships that will be integrated into the DEVELOP National Program to directly benefit society.



▲ The geoinformatics team with their Earth ball covered in attendee scribed code.

node highlights



▲ A DEVELOP hybrid session and panel (ASPRS 2015) focued on applications of NASA Earth observations.

NASA DEVELOP Program Highlights

This spring, 115 participants conducted 29 projects, the most projects and participants ever in a spring term!

- DEVELOP received *675 applications for the summer term*, the largest number of applications received for any term to date (2015).
- DEVELOPers have participated in *21 different conferences and meetings since*

the beginning of 2015.

- DEVELOP chaired two sessions this spring, one at the *AAG Annual Meeting* in Chicago, IL on April 25th, and the other at the *ASPRS Imaging & Geospatial Technology Forum* in Tampa, FL on May 7th. Both focused on the innovative applications of NASA Earth observations.
- **DEVELOPedia**, an internal DEVELOP wiki for knowledge capture and sharing, was successfully launched in a beta phase to the Langley teams and the Young Professional Class this spring in preparation for a program-wide rollout this summer.



NASA Ames Research Center

- *From December 15th to 19th, 2014, the Ames DEVELOP team presented* one oral presentation, two Ignite Talks, and three posters at the Fall 2014 AGU meeting. Additionally, Ames coordinated recruiting efforts via several AGU outlets, including the DEVELOP booth, young scientists luncheon, and the career workshop.
- On February 4th, the Ames DEVELOP team participated in the annual Earth Science Division Poster Session at the NASA Ames Research Center. They presented the Great Basin Climate II and Sierra Nevada DSS Ecological Forecasting projects.
- On February 5th, members of the Fall 2014 Great Basin Climate II team traveled to Sacramento for a successful partner hand-off with Mark Coca of the Bureau of Land Management office in Reno, NV.
- On March 30th, the Ames DEVELOP team collaborated with JPL for a joint virtual closeout session. Each team presented their project findings and analysis to colleagues, science advisors, and partners.

ARC



NASA Goddard Space Flight Center

The Idaho Disasters team enjoyed having their Team Lead Jeff May attend final closeout.

- The DEVELOP team at Goddard hosted the IRI team for the final closeout. Over 45 different scientists attended or called in to listen to the presentations.
- The Himalayan Disasters team created a Sudden Landslide Identification Product that has the ability to identify landslide locations based on the lands spectral signature and soil moisture properties. Up until now, a product like this has not been created for the region. This product is significant because current landslide event datasets are incomplete, and this product will help add additional landslide event data to regional landslide datasets.
- The team had the opportunity to go on a spectacular and informative tour of Building 29, which is home to NASA's spacecraft systems. The team had the chance to see one of the world's largest clean rooms and pieces of equipment that are used to test the soundness of space instruments.



International Research Institute for Climate and Society

- Jerrod Lessel and Andrew Kruczkiewicz attended the American Geophysical Union Fall 2014 Meeting and presented their research on Uruguay Agriculture (Jerrod) and East Africa Floods (Andrew) from previous DEVELOP terms.
- Through his research with IRI, Andrew Kruczkiewicz had the opportunity to go to Malawi in January of 2015 and observe the floods he later studied in his spring research with DEVELOP.
- The IRI team attended a close-out with the NASA Goddard Space Flight Center node in Greenbelt, Maryland. During the close-out, the teams presented their research and went on a tour of the NASA Earth Observation System Control Center.
- During the trip to GSFC, the IRI team took part in team building with a short hike through Pine Barrens Forest in New Jersey, shared meals, sightseeing in D.C.

GSFC IRI



NASA Jet Propulsion Laboratory

- *The two members from the LA Rivers Water Resources team, Rosemarie Wringley and Gwen Miller,* presented findings of their project at the Water Resources and Policy Initiative at Fresno State University.
- The California Department of Forestry and Fire Protection, a partner for the spring California Disasters project, traveled from Sacramento to visit the two JPL teams working on fire-related DEVELOP projects this term.
- DEVELOPers drove to Vandenberg to watch the (Soil Moisture Active Passive) SMAP launch.
- DEVELOPers went on a tour of the Hi-Bay I and Hi-Bay 2, which are clean rooms located at JPL. These clean rooms are where SMAP was built and where scientists are currently working on the low-density supersonic decelerator (a parachute aimed at slowing aircraft heading to Mars.)



NASA Langley Research Center

- *Dr. Nancy Searby (NASA) and Dr. Angelica Gutierrez (NOAA)* visited the Langley DEVELOP office and met all of the participants. Dr. Gutierrez met with a few of the teams to discuss the projects and offered advice on presenting the results.
- Dr. Ellen Stofan, NASA's Chief Scientist, visited Langley Research Center, which gave DEVELOP the opportunity to present an overview of the program and showcase a few of LaRC's spring 2015 projects.
- The Coastal Mid-Atlantic Water Resources team wrapped up the 3-term project with an in-person handoff to Digital Harvest, demonstrating how to use the METRIC model.
- The Great Lakes Climate project was invited to and presented virtually at the Georgian Bay's Vital Signs meeting. Georgian Bay Forever will also be working with the team and center leadership to provide a second article to be published in the Georgian Bay Forever Newsletter.

JPL LaRC



Mobile County Health Department

At the start of the term, MCHD did several team building activities, including group artwork to hang in the office.

- MCHD visited its buddy node Stennis Space Center (SSC) for a day of tours, science advising, and NASA trivia.
- MCHD, joined by a few SSC participants, went out in the field with their partners, The Nature Conservancy and the Pascagoula River Audubon Center, to visit project watersheds and gather GPS points.
- MCHD presented at a joint closeout at SSC to an audience including project partners, family, and former DEVELOP participants.



NSSTC at NASA Marshall Space Flight Center

The team took a tour to the Marshall Space Flight Center on Redstone Arsenal. During the tour, they visited a wind tunnel, the Test Stands, and the Space Environmental Effects lab, and attended a NASA Pathways presentation. After the Marshall tour, the participants visited the US Space and Rocket Center where they learned about the Saturn V rocket and Huntsville's contributions to the space race.

- During the first part of February, the Southwest Health and Climate Team and the Assistant Center Lead attended a seminar lead by SPoRT about remote sensing and the spread of infectious diseases.
- The Alabama Water Resources team met with their project partners in person when Alabama Water Watch (AWW) and Alabama Department of Environmental Management (ADEM) visited the Marshall node. During this meeting, they were able to present previous projects completed at Marshall as well as discuss their plans for the spring term's water project.



NOAA's National Centers for Environmental Information

A largely successful closeout was held at NOAA's National Centers for Environmental Information (NCEI). There were a total of 20 participants in attendance who represented the nodes at Wise County and City of Norton Clerk of Court's Office (WC), University of Georgia (UGA), NCEI, and Richmond, VA. Lindsay Rogers and Dr. Kenton Ross from the National Program Office were also in attendance.

In a continued effort to increase node visibility and recruitment, contact was made with University of Tennessee - Knoxville, NC State, UNC-Charlotte, as well as Oak Ridge National Laboratory. A virtual visit was conducted with NC State's Center of Geospatial Analytics. Outcomes of this recruiting included 70 applicants interested in the NCEI node for the summer term, 37 of whom identified NCEI as their top choice.

The team worked on Summer 2015 and Fall 2015 project proposals with the NOAA Regional Climate Service Directors (RCSDs). The RCSD support the development and delivery of place-based climate science and information products to help decision making. Initial conversations have also occurred with the USAF 14th Weather Squadron, which is located in the same building as NCEI, to discuss future partnership and engagement.



Patrick Henry Building

DEVELOP participants presented the Virginia Agriculture project to the Virginia Wine Board and Virginia Secretary of Agriculture and Forestry in Charlottesville, VA.

DEVELOP greeted Ambassador O'Sullivan and other representatives of the Delegation of the European Union to the United States of America during their visit to the Virginia Governor's Office.



NASA Stennis Space Center

The Louisiana Ecological Forecasting team traveled to Catahoula Lake to visit their project's study area and take pictures and videos for the VPS.

SSC Assistant Center Lead, Shelby Barrett, gave an oral and poster presentation at the Mississippi Water Resources Conference in Jackson, MS.

- The Mississippi Water Resources II team conducted field work with project partners and end-users from the Pascagoula River Audubon Center, the Audubon Mississippi Coastal Bird Stewardship Program, and The Nature Conservancy.
- SSC DEVELOPers participated in a number of team-building activities including: a site tour and tour of the NOAA National Data Buoy Center, NASA trivia with MCHD node participants, and a joint closeout with the MCHD team.



University of Georgia

- *The Miami-Dade Ecological Forecasting project,* completed in the summer and fall 2014 terms, was selected to be highlighted in the NASA Applied Sciences Annual Report.
- UGA and the Georgia Department of Natural Resources began a new project focused on the Ocmulgee River Corridor. The team used an unmanned aerial system for the first time to gather imagery to complement the Landsat imagery critical to this study.
- The spring Georgia Water Resources team participated in an in-person deliverable hand-off with Georgia Power. The team successfully created a graphical user interface by correlating their field data with Landsat 8 data to develop a detection tool for harmful algal blooms in Georgia's reservoirs.
- UGA participants were selected to participate in the DEVELOP Session at the AAG and ASPRS annual conferences.
- UGA collaborated with the Wise County node this spring to conduct a Costa Rica Water Resources project. Their partners included the Costa Rican Embassy. There has been active communication between DEVELOP and the Costa Rican Embassy since the GEOSS of the Americas event at NASA HQ in August 2014.
- The Colombia Ecological Forecasting team completed the third and final term of their project. They produced both an English and a Spanish video so that the project and results will be accessible to the partners as well as the local community.



USGS at Colorado State University

The Colorado Agriculture team was highlighted at the Bioenergy Alliance Network of the Rockies (project end-user) brown bag lunch webinar series in April. The team gave an introduction to remote sensing and its value in forest management, and highlighted the progress the team made in the spring term with regard to reconstructing forest harvest history in the Colorado State Forest State Park. The session ended with questions from the end-users.

- The Colorado Agriculture team visited their study area in March. This gave the team the opportunity to see many of the disturbances on the ground (fire, beetle kill, timber harvest) that they aimed to map using Landsat imagery in the spring term.
- The Arizona Ecological Forecasting II Team presented their mapping results of invasive tamarisk in a seminar at the USGS Fort Collins Science Center. The USGS scientists provided valuable feedback and a lively discussion on the utility and application of the Landsat 8-based mapping methodology used by the DEVELOP team.

DEVELOPer Steve Chignell gave an oral presentation on the final results of the spring 2013 Colorado Flood Mapping project at the 35th Annual American Geophysical Union Hydrology Days Conference held at Colorado State University in May of 2015. This yielded a potential new end-user, who is exploring additional applications of the flood mapping results and methodology.



Wise County and City of Norton Clerk of Court's Office

Participants at the DEVELOP node at Wise led a two day recruiting trip to major colleges across the western part of Virginia. They first stopped and presented for Radford's Geospatial Science department, then Virginia Tech's Geological and Meteorological Clubs, and lastly, Liberty's Aeronautics and Engineering departments. It was a successful trip with no DEVELOP flyers to spare and 476 miles of driving behind them on their western Virginia recruiting tour.

- The NASA DEVELOP node at Wise likes to engage and support the local community. DEVELOPers at Wise volunteered their efforts to the Wise County and City of Norton Clerk of Circuit Court who was hosting a quadcopter event for Boy Scouts and Girl Scouts that would help endorse STEM education. The participants were fully involved in this community project that attracted and engaged over 150 individuals.
- The Wise county DEVELOP team joined three other nodes for a joint closeout at the NOAA facilities in Asheville, North Carolina. The WC, Richmond, UGA, and NCEI nodes were given the opportunity to present and brainstorm with scientists and guests of NOAA.
- Carrying over into the interim, participants at Wise worked on perfecting tutorials and developing webinars with the assistance of ARSET. They built a series of webinars for each step of constructing the Soil Water Assessment Tool (SWAT) model that they built and presented it live to their partners, Water For People. The webinars are also planned to help other nodes and their partners with water security projects in the future.

Spring 2015 **DEVELOPer of the Term**



USGS at Colorado State University's Brian Woodward

Brian Woodward is a recent graduate of Sonoma State University in California, who plans to begin a Masters of Science program focused on the use of remote sensing in forestry at Colorado State University within the next year. Brian served as Team Lead for the Colorado Agriculture team at the Fort Collins (USGS at Colorado State University) DEVELOP node this Spring. His team took on a unique challenge; employing an algorithm that remains in beta testing (Landsatlinkr: OSU) to augment a Landsat time-series analysis developed in Landtrendr (OSU). Brian kept the team motivated throughout the process, determined to have useful results by the end of the term. A DEVLEOPer sent me an email that highlighted this determination: "From the beginning of the term, Brian has shown a full commitment to the team and the project. Through many weeks of morale-busting model errors, Brian continued to pore over failing scripts well after the rest of the team had called it a day. He provided strong leadership and kept the project moving forward when it appeared that it was destined to fail. Quite simply, we would not have results were it not for his unflagging effort." Brian was also nominated as DEVELOPer of the Term at the Fort Collins Node last term, indicating his consistent dedication to the DEVELOP program. Congratulations to Brian Woodward, the Spring 2015 DEVELOPer of the Term!

DEVELOPer of the Term Runners-up



Vickie Ly NASA AMES RESEARCH CENTER



Jeff May NASA GODDARD SPACE FLIGHT CENTER



Andrew Kruczkiewicz

INTERNATIONAL

RESEARCH INSTITUTE FOR

CLIMATE AND SOCIETY

Rosemarie Wrigley NASA JET PROPULSION LABORATORY



Janice Maldonado Jaime NASA LANGLEY RESEARCH CENTER



Timothy Klug NSSTC AT NASA MARSHALL SPACE FLIGHT CENTER



Heather Nicholson NASA STENNIS SPACE CENTER



holson Jennifer Rackley INIS MOBILE COUNTY TER HEALTH DEPARTMENT



Derek Podowitz NOAA NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION



Benjamin Page UNIVERSITY OF GEORGIA



Kieran Blakemore wise county and city of norton clerk of court's office

Upcoming Events

- May 21 June 9 AMS Summer Policy Colloquium Washington, DC
- May 25 July 3 DEVELOP Fall 2015 Term application window
 - June 1 DEVELOP Summer 2015 Term begins
 - June 17–19 Great Lakes & St. Lawrence Cities Annual Meeting — Sarnia, ONT
 - June 22–24 InterAction Forum Washington, DC
 - July 29 Closeout Event at Royal Thai Embassay Highlighting Summer 2015 Thai Projects
 - July 30 DEVELOP Annual Earth Science Applications Showcase — NASA HQ
 - July 31 Earthzine VPS launch
 - August 7 DEVELOP Summer 2015 Term ends
- September 14 DEVELOP Fall 2015 Term November 20

Dream Discover DEVELOP



▲ NASA Goddard Space Flight Center & International Research Institute for Climate and Society participants at closeout with their Science Advisors.





▲ Mobile County Health Department & NASA Stennis Space Center participants team up with project partners to conduct field work.

▲ DEVELOPers at Wise volunteer to support a quadcopter event for Boy Scouts and Girl Scouts that helps endorse STEM education.



▲ USGS at Colorado State University's Arizona Ecological Forecasting team plan out their project.