ASPRS Scholarship Winners — PSW Region

This year’s ASPRS PSW Region scholarship winners are Jie Dai and Vincent Lazar. Jie Dai is a PhD candidate in the Joint Doctoral Program of Geography between San Diego State University (SDSU) and University of California, Santa Barbara (UCSB). His goal to pursue a career in the geospatial field has been a part of his plans since he was young. As early as seventh grade, he won the first place in his high school’s geographic knowledge contest. Jie obtained a Bachelor of Engineering degree in spatial informatics, and a Master of Science degree at the School of Natural Resources and Environment, in the University of Michigan. Jie is currently working with and advised by Drs. Li An and Doug Stow at SDSU, and Dr. Dar Roberts at UCSB. He plans to examine the invasion of an exotic vine, *Mikania micrantha*, in the Chitwan community forests (CFs) in Nepal (an area home to Bengal tigers and one-horned rhinos), and investigate how the invasion interacts with the coupled human and natural systems in the Chitwan Valley.

Vincent Lazar is a senior Geomatics Engineering student at California State University, Fresno, pursuing interests with ArcGIS, photogrammetry, LiDAR, and land surveying. His interest in this field began with the Boy Scouts of America when he earned the Surveying Merit Badge. During the merit badge, he conducted a field survey to create a map and learned about the possible careers in the geospatial field. After Vincent’s first year in the geomatics program, he interned with Towill, Inc. in Concord, CA, where he learned to work with MicroStation and LiDAR to plot parcels and mark points of specific landmark locations for electric poles. During the Fall 2018 semester, Vincent worked on a research project monitoring bridge structures using photogrammetry to see how much bridges deflect with the loads that are applied to them (conducted by the Fresno State Transportation Institution, and benefiting the California Department of Transportation’s (Caltrans)). After graduating and obtaining a Land Surveyor in Training (LSIT) license, Vincent would like to obtain employment with a company that works primarily with the areas of land surveying, ArcGIS, and photogrammetry.

Announcing the Newest ASPRS Student Chapter

The Pacific Southwest Region of ASPRS is proud to announce the official chartering of the Student Chapter at the University of Hawaii at Manoa. The Chapter provides a focus for ASPRS activities on the UH Manoa campus for students, faculty, and ASPRS members in Hawaii. If you’re interested in learning more about upcoming student chapter activities, please contact Chapter President Katie Taladay at taladay@hawaii.edu or Faculty Advisor Dr. Qi Chen at qichen@hawaii.edu, for further information.
Richard McCreight and Gus Calderone began the SDSU technical meeting by discussing their "FireWatch" system for wildfire risk mitigation. California wildfire risks are increasing, with warmer and drier climates causing more frequent and larger firestorms. Mr. McCreight discussed an analysis performed with image data from the Witch Creek fire that destroyed 77 homes (among others) in the Rancho Bernardo Trails community north of San Diego. Pre-fire (2005) imagery indicated a pattern of non-compliance with state law requiring a 100 ft clearance of brush and large trees around houses. Analysis of pre-fire vegetation patterns with homes burned suggest that vegetation management is the single most important wildfire defense available to homeowners, and Mr. McCreight indicated that this finding is supported by recent studies. He also noted that insurance companies are losing a lot of money during wildfire events, and could go bankrupt given the significant costs of wildfire destruction. The best solution is for communities and fire departments to work together to reduce vegetation fuel risks to lives and property, and obtain better leverage when negotiating liability insurance rates. Collection, analysis, and documenting of pre-fire imagery empowers communities and fire departments to manage wildfire risk. Further, firefighters often must abandon certain homes with risky vegetation conditions that are too dangerous to protect during wildfires, and pre-fire imagery/GIS data may be used to defend their decisions.

Mr. Calderone also discussed the potential and limitations of unmanned aerial systems (UAS), or drones. On the "potential" side, drones provide low-cost acquisition and relatively simple operation. However, on the "limitations" side, there are several factors that people should be aware of when planning to use drones for commercial operations. Limited quality control goes into manufacturing of many drones, and failure of electronic components can result in failure of the UAS to remain airworthy. Regulations imposed by the Federal Aviation Administration (FAA) also limit commercial operations that may be performed with UAS. UAS are generally not allowed to fly beyond visual line of site (BVLOS), over people or moving vehicles, in controlled airspace near airports, or in prohibited or restricted areas defined by the FAA. Further, there are practical limits to the use of UAS. For example, collecting imagery over a 10 square mile area requires 20-25 more flight time compared to a manned aircraft. Another interesting point made by Mr. Calderone is that anti-drone technology exists that may be used to bring down a UAS, and this technology is readily available on the internet for anyone to employ.
UAV Mobile Mapping Systems: Expectations and Potentials

By: Pete Coulter, PSW Director

Shahram Moafipoor with Geodetics reviewed the use and issues associated with UAV mobile mapping systems. Geodetics is a defense contractor specializing in advanced sensing and navigation, including global navigation satellite systems (GNSS), inertial measurement units (IMU), indoor navigation, outdoor vehicle navigation, and light detection and ranging (LIDAR) systems. Geodetics found that accurate georeferencing with low-cost LIDAR systems on unmanned aerial systems (UAS) is not so easy, compared to high cost aerial laser scanners (ALS) and high cost terrestrial laser scanners (TLS). The reasons relate to use of low-end sensors (necessary due to power, space, and weight restrictions), limited on-board processing, highly variable flight dynamics, limited flight duration, and the presence of strong vibrations with UAS. These variables result in random and systematic errors associated with each part of the system (e.g., camera instrument errors, LIDAR instrument errors, GNSS/IMU errors, LIDAR/camera/navigation interrelated errors, and processing errors). In order to get a few cm accuracy in final products, careful selection of higher-end, higher-cost GNSS/IMU sensors is necessary.

Mr. Moafipoor also spoke about integration of LIDAR (point) and camera (pixel) data. LIDAR and images from cameras are two unique data types, however they can complement each other and provide added value when used together. For example, LIDAR is a fast/real-time solution that provides high vertical accuracy and good representation of building edges. Photogrammetry, on the other hand, is traditionally post-processed due to the need to measure ground control points (GCP) in the images, has reduced vertical accuracy compared to LIDAR, and may not model the edges of buildings well (due to small imaging sensors on cameras). Further, LIDAR interpretation may be complicated due to the point cloud appearing fuzzy, whereas aerial photos provide clear, wall-to-wall images. The integration of LIDAR and aerial photographs may include the use of LIDAR for GCPs, the use of the LIDAR-derived DEM for orthorectifying imagery, and the use of images to color the LIDAR points in the point cloud. Mr. Moafipoor also described how LIDAR has clear advantages over photogrammetry when mapping below tree canopies, mine site conveyors, and other obstructions, whereas UAS-based photogrammetry is most appropriate for small mapping projects with bare earth and few trees, buildings, equipment, etc.

### UAV MAPPING (MLS): TRADE-OFF (ALS – TLS)

- Many compare the mobile laser systems (MLS) to either the ALS (Aerial Laser Scanner) or TLS (Terrestrial Laser Scanner)

**ALS Systems**
- High altitude and low vibration
- High flight duration
- No limitations on sensors' weight
- Install high-grade sensors
- High-end processor onboard
- Unlimited data logging capability
- No power issue
  - High accurate
  - High cost

**TLS Systems**
- Stationary (no motion)
- High-end sensor
- No weight issues
- High-end processor
- No power issue
- Repeatable
- Long range coverage
  - High accurate
  - High cost

**MLS Systems**
- Low cost
- Multicopter vs. fixed wing
- Highly variable flight dynamics
- Subject to strong vibrations
- Satellite visibility may be restricted
- Limit flight duration
- Limited sensory payload space
- Limited sensory payload weight
- Limited onboard processor
  - How can we improve the accuracy using low-end sensors on a high-dynamic platform?
From the Sky to the Dirt: Using GPR to Understand Landscape and Climate Changes in SE Queensland, AU

By: Pete Coulter, PSW Director

Dr. Allen Gontz discussed the use of ground-penetrating radar (GPR) to look below the ground, on the SE coast of Queensland, Australia. This area has the world's largest sand islands, which grow up to 240 m tall. The sand that builds these islands comes from over 1100 miles away (via a longshore drift current), and sand dune development is related to sea level. Using the GPR, Dr. Gontz and his research team mapped more than 250 km of length with 12 cm vertical resolution at depths of 28-30 m (in ideal conditions). The horizontal horizons apparent in the GPR-derived images provide information about what is going on below the sand dunes, including indications of high/low tide and changes in wind direction over time (related to El Nino, La Nina, and other climate events). In some instances, the local topography actually controls the wind and how the sand is being deposited. Further, the GPR transects provide context to core samples that collected within the areas of interest. Using the range of information collected on past sand dune movements, Dr. Gontz's team is able to predict the timing and direction of future sand dune movements, and can warn residents and/or businesses of relatively near-term threats posed by local sand dunes.
Mapping and Monitoring Critical Habitats Using Unmanned Aerial Systems

By: Pete Coulter, PSW Director

Dr. Tommy Jordan gave the Plenary Talk and provided a wide range of information on the collection, analysis, and applications of image data from unmanned aerial systems (UAS). Dr. Jordan said that UAS, or drones, changed his career and that he loves close range photogrammetry. Drones extend his reach to places that are difficult to get to or inaccessible, and drones allow him to cover areas of interest when he wants and however often he wants. Using a single battery for 20 minutes, Dr. Jordan is able to collect imagery for 80 acres with 2-inch spatial resolution, or 20 acres with 1-inch spatial resolution imagery. The high-resolution imagery may be used for a number of applications, including documenting marsh, forest, geomorphology/geology, and archaeological sites for historic preservation. In addition, drone images may aid accuracy assessment of land cover and/or land cover change maps.

Dr. Jordan discussed the use of Structure from Motion (SfM), and the evolution of SfM to include photogrammetry. SfM utilizes multiple images from a moving sensor in a simultaneous, highly redundant and iterative bundle adjustment procedure. The result is a 3-dimensional (3-D) point cloud that may or may not be tied to real-world coordinates. SfM images may be captured from the ground (e.g. hand-held) or from an airborne platform. Photogrammetry is defined by the ASPRS as "the art, science, and technology of obtaining reliable information about physical objects and the environment through processes of recording, measuring and interpreting photographic images and patterns of recorded radiant electromagnetic energy and other phenomena." SfM has moved from generic, non-controlled 3-D point cloud generation to photogrammetric solutions, where models are aligned to real-world coordinates through the use of ground control and/or geotagged photo positions. Photogrammetric SfM software packages include open source solutions (e.g., Visual SfM, CMVS, Meshlab) and commercial products (Agisoft Photoscan/Metashape, Pix4D, University of Stuttgart - SURE, Eco Systems PhotoModeler, ArcGIS, ERDAS IMAGINE, and others). Flight planning and cloud processing software include Map Pilot (MapsMadeEasy), Pix4D, and Drone Deploy. Dr. Jordan discussed the rise of capability and popularity of multirotor/multicopter aircraft (including hobby and commercial versions), and also noted that fixed-wing UAS can provide more range of coverage compared to multirotors.
Event Funding Support Request
ASPRS Pacific Southwest Region

Funding requests to the ASPRS Pacific Southwest Region (PSW), may be made for financial support of events hosted by other organizations in the region with similar missions and goals. The request for funding should be made by a member of ASPRS PSW on behalf of the requesting organization or event one calendar quarter prior to the event date.

Examples of support include: Funding of venue charges, refreshments (no alcohol) and other similar expenses incurred in hosting educational events, workshops, speakers, GIS Day events, and other similar activities. Typically support of up to $100 will be considered reasonable, with larger amounts possible pending the specific nature and impact of the specific event.

In recognition of ASPRS PSW sponsorship, promotional materials should mention ASPRS PSW (e.g. include region logo and acknowledge region support) and/or ASPRS PSW should be mentioned during opening comments at the event. ASPRS PSW may also request that information regarding ASPRS PSW and membership in the organization be provided to attendees.

Date of request: __________________________ (please submit at least one calendar quarter prior to your event date)

Organization/sponsor of the event: __________________________________________________________

Individual requesting funding: _____________________________________________________________

Requestor’s position/role with the sponsoring organization: ______________________________________

Requestor e-mail address: _________________________________________________________________

Requestor phone number: _________________________________________________________________

Event for which you are requesting funding: _________________________________________________

Event date: __________________________

Event location: _______________________________________________________________________

Anticipated attendance: __________

Please briefly describe the nature of the event or program for which you are requesting funding. (Event type? e.g. speaker, workshop, outreach event; who is the audience? e.g. professionals, students, public; how will the requested funds be used to support the event?)

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The above form is available at https://goo.gl/tHah91
Student Chapter Benefits from the ASPRS Pacific Southwest Region

Participating in an ASPRS Student Chapter helps you develop technical knowledge, leadership experience and lasting relationships with peers and mentors. To help you achieve success with your student chapter activities and events, the Pacific Southwest Region of ASPRS offers student chapters in our region a variety of benefits, as described below.

Visit the ASPRS website to learn if there is a chapter at your school. If there isn't one there, please contact us: pswasprs@gmail.com about the process for getting one started at your university.

Grants and programs to support chapter activities

- Receive an annual Student Chapter Support Stipend (currently $150) to assist your chapter operations and activities.
- Apply for a Special Event Grant (up to $500) to support a high-impact event (e.g. GIS Day, Geospatial Symposium or Speaker Events, support to help students to attend State or National Conferences).
- Assistance in identifying and scheduling ASPRS Professional members in our region to speak at a campus event hosted by your chapter.

[The above may be useful in leveraging additional campus club and activities resources]

Networking and scholarship opportunities

- Participate in the ASPRS annual meeting and get involved with the Student Advisory Council
- Enter your chapter team in the annual Geoleague Challenge and win prizes!
- Opportunities to apply for National Awards and Scholarships
- Access to PSW Region Student Scholarships
- Assistance in identifying APRS Professional members as mentors or for other professional opportunities (internships, summer jobs, etc.).

Materials and Resources

- Access to outreach materials from ASPRS
- Discounts on a variety of resources and materials available through the ASPRS Bookstore.
- Use of the PSW region banner and/or table cover at your events and post a custom ASPRS PSW Region logo on your materials.
Your Pacific Southwest Region Council

The officers for the Pacific Southwest Region are working hard to provide you with quality technical presentations near to home. In the last few years we’ve offered technical sessions in San Diego, Fresno, Reno, and Davis. We are currently planning upcoming sessions. If you have suggestions for locations and topics for a session near where you live, please contact one of our officers or the region email at pacificsouthwestregion@asprs.org.

Immediate Past President: Ms. Lorraine B. Amenda, PLS, CP
President: Dr. Riadh Munjy
Vice President: Dr. Omar E. Mora
Secretary/Treasurer: Ms. Melissa Christie
National Director: Mr. Alan Mikuni, CP, PE
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                R. Radoslav (Rad) Gaidadjiev, CP
                Dr. Yushin Ahn
                Ms. Becky Morton, CP, CMS
                Dr. Kristine Taniguchi-Quan
                Ms. Katie Taladay

Join The Regional Council’s Monthly Teleconference

Are you interested in joining the regional council’s teleconference, in order to share ideas or learn more about ASPRS activities? If so, please RSVP by sending an email to pswasprs@gmail.com.

Upcoming Events of Interest:

Aug. 13-15, 2019
Denver, CO
2019 ENVI Analytics Symposium (EAS)

Sep. 4-6, 2019
Las Vegas, NV
InterDrone 2019

Sep. 17-18, 2019
Denver, CO
GIS in the Rockies Conference

Sep. 28-Oct. 2, 2019
New Orleans, LA
GIS-Pro 2019

Oct. 1-4, 2019
Prescott, AZ
2019 AGIC Education & Training Symposium

Oct. 2-3, 2019
Denver, CO
Pix4D User Conference 2019

Oct. 3, 2019
Sacramento, CA
ASPRS Technical Meeting
(Caltrans office at 1727 30th Street)

Oct. 6-11, 2019
Baltimore, MD
Pecora 21 / ISRSE 38

Nov. 5-7, 2019
Redlands, CA
Esri Ocean and Atmospheric GIS Forum