AAGS
"Geodetic Surveying-
Connecting the Geospatial Community"

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AAGS Newsletter

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Editor: Dr. Thomas Meyer

To all members of AAGS,

It is a pleasure to present the August, 2019 AAGS Newsletter, which continues our commitment to staying in touch with our membership. The AAGS Board decided to publish the newsletter biannually, interleaving the newsletter issues with the two yearly issues of our journal, *Surveying and Land Information Science* (SaLIS). Therefore, AAGS is producing four publications annually to keep us all abreast of what's going on in the surveying and geodetic world today. You can follow AAGS on Facebook, and you are always welcome to contact any of the officers in person. (You can find a list of the officers on the AAGS website www.aagsmo.org) In this newsletter, we have a wrap-up of last year from our immediate past-president, Dr. Charles (Chuck) Ghilani, some news about some initiatives AAGS is participating in and the SaLIS table-of-contents for last year. Our *Meet AAGS* column is about the current president, and will be likewise in the Spring issues going forward, so our membership can know more about the current leader.

Send us ideas for the newsletter, or help out by writing articles. Send us newsworthy announcements for Facebook, our LinkedIn group, or the website. If you would like to see an AAGS member spotlighted in the *Meet AAGS* column, drop us a line. AAGS is *your* organization. You can get involved!

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Report on 2019 FIG Working Week – Hanoi, Vietnam

by John Hamilton

The 2019 FIG Working Week was held at the Vietnam National Convention Center in Hanoi, Vietnam, April 22-26 with the theme *Geospatial Information for a Smarter Life and Environmental Resilience*.

Over 90 countries were represented with over 1000 participants in attendance. Over 400 papers and presentations were given during the working week. Several subevents were held during the weekend preceding the working week: the 3rd FIG Young Surveyors Asian Pacific Meeting, Reference Frames in Practice Seminar (RFIP), BELS+ Training (Building European Links toward South East Asia in the field of EGNSS) and BIM for Surveyors (Building Information Modeling).

The FIG Foundation, an independent body under the FIG, awarded grants to four young surveyors to attend and participate in the working week:

Annika Avila (Philippines)
Romina Leiva (Argentina)
Ogochukwu Izuegbu (Nigeria)
Ruth Trujillo (Puerto Rico USA)

A total of 16 Americans attended the working week, including representatives from AAGS, NSPS, NOAA, Esri, and Trimble.

At the first session of the FIG General Assembly held on Monday, April 22nd, AAGS was recognized and welcomed as a FIG Member Association. John Hamilton, AAGS past president, accepted the member association certificate from FIG President Rudolf Staiger.

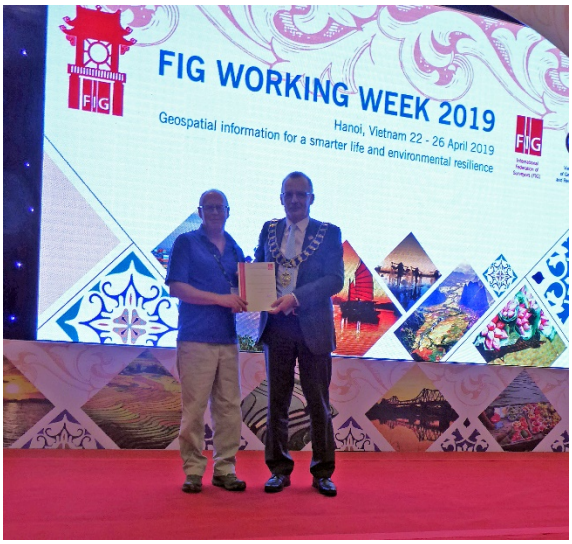
Additionally, at the first GA session the National Society of Professional Surveyors (NSPS) presented their bid to host the 2023 FIG Working Week with the venue being the Hilton Orlando Bonnet Creek/Waldorf Astoria Orlando in Orlando, Florida. The decision will be made during the second GA session on Friday, April 26th.

The Vietnamese Local Organizing Committee (LOC) did an excellent job selecting the conference venue. A total of 31 exhibitors provided a wide variety of the latest technology and also included exhibits for the upcoming FIG working weeks and congress: 2020 FIG Working Week in Amsterdam, The Netherlands; 2021 FIG Working Week in Accra Ghana and 2022 FIG Congress in Cape Town, South Africa. The lunches served during the conference week offered many wonderful food options.

The LOC organized a special musical event for all attendees at the Hanoi Opera House featuring Vietnamese instruments playing classical Vietnamese music and modern tunes. In addition, they also organized a very impressive Gala Dinner at the famous Luc Thuy Vietnamese restaurant which featured Vietnamese cuisine and a number of different musical groups and presentations.

At the second session of the FIG General Assembly it was confirmed that the NSPS bid to host the 2023 FIG Working Week was accepted. It is scheduled to be held May 28 – June 3, 2023.

Hanoi is a vibrant city of 8 million and with it seems like 45 million scooters. Hanoi's traffic was something to behold. Although the spring weather was hot and humid, even by Hanoi's standard, thankfully the rains held off until after the conference finished.



Gravity Research in Louisiana

by J. Anthony Cavell, PLS, CFedS

Almost two decades ago, in 2001, Dr. Roy Dokka founded the Center for GeoInformatics (C4G) at Louisiana State University (LSU). In that same year, the center was named the Louisiana Spatial Reference Center (LSRC). Unwelcome subsidence was a strong motivation for geodetic research in Louisiana at the time. Coincidently in a report to Congress, the National Geodetic Survey explained that vertical control in Louisiana was "obsolete, inaccurate, and unable to ensure public safety." The LSU C4G CORS are referenced in the statutes (RS 50:173.1).

Very quickly, LSU C4G began installing continuously operating Global Positioning System (GPS) stations (CORS) to record the tectonic activity of the area with a particular eye to areas with geologic faults. Most of those stations continue operation to the present and their number has grown to over 120 including several co-located with National Oceanic and Atmospheric Administration (NOAA) tide gauges along the north coast of the Gulf of Mexico.

NGS plans to publish a new, holistic reference frame in 2022. An important component of that effort will be a refinement of an accurate gravimetric geoid model. NGS plans for the model to be accurate to 2 cm. The major effort by NGS to collect airborne precise gravitational

data is their project named GRAV-D. Preliminary analysis suggests that Louisiana will be an outlier to a 2 cm geoid model, perhaps as much as 4–12 cm.

LSU C4G initiated a program to collected terrestrial gravity data at each of its CORS. Initially, Scintrex CG-5 relative gravimeters were acquired, and observations were made radiating from stations with historical absolute data. A potential "shot in the arm" happened when the National Geospatial-Intelligence Agency came to Louisiana to revisit the historical stations. The LSU C4G gravity program took a giant step by acquiring its own FG5x absolute gravimeter. Now the goal of accurate absolute gravity observations at all CORS became realistic!
(See:
https://www.lsu.edu/eng/news/2019/07/louisianaissinking.php)

The current program is to install an absolute gravity mark in close vicinity of each CORS and very precisely locate its position and height as well as several reference stations nearby. The surrounding stations are observed for gravity with the CG-5.

The last piece of the puzzle is scheduled to fall into place in a few weeks when delivery of a precise zenith camera occurs. The combined terrestrial gravity and precise deflections of the vertical will make the data collected attractive and useful enough for NGS to be able to improve the 2022 geoid model in the area of Louisiana.

Richard Rapp

by Thomas Meyer

It happens that I met Dr. Richard Rapp's nephew, Zachery Rapp, at a GPS seminar in White Plains, New York, earlier this summer. Zach put me in contact with his uncle, who shared this brief summary of the landmark work he did in gravity modeling at The Ohio State University, work that laid the foundation of modern geoid models, which are integral to modern surveying practice. The following is an excerpt from an email Dr. Rapp sent me, and is written in his voice.

I was introduced to this topic while working for my dad during the summers as part of a survey crew in the Danbury, Connecticut area. Syd, my brother, continued that surveying activity and now Zach is the next generation providing surveying needs to the community.

I started graduate studies at Ohio State in 1959 because they had the only geodesy program in the nation at that time. I was asked to stay on in 1964, and I started as an assistant professor and became involved with numerous teaching activities and research studies. Most of these studies were sponsored by the Air Force and NASA. My primary interests were trying to get better ways to represent the earth's gravity field and ways to calculate it. The uses were many: from getting better satellite orbits to improving our knowledge at the surface of the earth that could be used for more accurate surveys (both horizontal and vertical). Over the years, many new developments in data availability and analysis techniques, with better computers, played a major role as GPS was being developed. Needs for improved gravity models were also important in oceanography where satellite altimeter measurements in the oceans could be used to study ocean currents on a global stage.

Our department was primarily a graduate department (Department of Geodetic Science) serving students from the US and many other countries. Most of our graduates continued their work with military in the United States (primarily the Air Force and the Army). Others took positions at universities and mapping agencies around the world. Many took positions with the National Geodetic Survey. At one point, Ohio State merged our small department into the Civil Engineering Department with the new name of Department of Civil, Environmental, and Geodetic Engineering (its current name). At this time I am affiliated with the Geodetic Science Division of the School of Earth Sciences, which is in the College of Arts and Sciences.

I took an early retirement in 1992 and continued some teaching, but I mostly continued our research efforts in gravity filed improvement and oceanographic studies. Finally, in 1999 we moved to Hilton Head Island, South Carolina. My interests transitioned to golf, travel, and

enjoying a very nice place to live. But I continue to be interested in the geodetic developments of these past years and the developments have been immense. The accuracy improvements in positioning have been so great on many fronts but especially in the applications for the surveying community.

Joseph F. Dracup Awardee Announced

by Steve Briggs, AAGS Awards Committee Chair

AAGS is pleased to announce that this year's Joseph F. Dracup award is presented to our immediate past-president Dr. Charles Ghilani. Dr. Ghilani earned his baccalaureate degree in dual majors of mathematics and education in 1974 from the University of Wisconsin – Milwaukee. After teaching mathematics and science at the grade school and high school levels for six years, he returned to graduate school at the University of Wisconsin – Madison. He received his Ph.D. in 1989 Ph.D. from the Civil and Environmental Engineering program with emphasis in Surveying Engineering. Following this Dr. Ghilani started his 25-year teaching career at Penn State where, in 1993, he created and oversaw the Penn State Surveying Engineering program. Early on during his professional career he asked his mentor, Dr. Paul R. Wolf, if he could rewrite his book *Adjustment Computations: Spatial Data Analysis*. In 1997, the third edition of this book was published, which, in its sixth edition, has become an industry standard in statistics and least squares adjustments in surveying. Following this, he was asked by Dr. Wolf if he would like to take over *Elementary Surveying: An Introduction to Geomatics*. He worked with Dr. Wolf on the tenth edition, which was published in 2002, and is currently in its 15th edition. Elementary Surveying has become one of Pearson top-ten selling professional books and is currently being published in five different languages.

Even though Dr. Ghilani retired from teaching in 2014, he has continued to be professionally active. He is an honorary member of the Pennsylvania Society of Land Surveying where he serves on their Education Committee, which plans and coordinates their annual and summer conferences along with monthly webinars. He has presented workshops on various geodetic topics at various state societies including Pennsylvania. He was the founding president of the Surveying and Geomatics Educators Society and most recently served as the American Association for Geodetic Surveying president. He is also the current editor of *Surveying and Land Information Science*.

Dr. Ghilani has received numerous awards during his professional life including the Milton S. Eisenhower award from Distinguished Teaching from the Pennsylvania State University, the Earle J. Fennel award from the National Society of Professional Surveyors, the Educator award from the Surveying and Geomatics Educators Society, and is an AAGS Fellow. However, anyone who has heard him talk knows that his biographic introduction is that he is a "farm boy from Wisconsin" where he spent his first 38 years of his life working on his parent's family farm while going to school and teaching. He is the current owner of close to 50 antique tractors, which he restores and shows in his spare time.

Meet AAGS Member – Dr. Herbert W. Stoughton

From the ninth grade Herb has been interested in map and mapping. Although he started college studies in architecture, his first summer employed as a survey technician with the New York Division of Canals in central New York. At the *University of Michigan* (Ann Arbor), he transferred to studies in civil engineering which included an academic program in geodetic engineering (surveying). Although his degree was in civil engineering, his technical elective was geodetic engineering under the professorship of Ralph Moore Berry, one of the original founders of ACSM. It was during his undergraduate era that Stoughton joined ACSM, ASP, and AGU (1962).

Stoughton spent three summers as a trainee in the Topographic Branch of the U.S. Geological Survey executing field surveys for the 1:24,000 mapping program in Colorado, Montana, and Wyoming. After college he worked for consulting engineering/land surveying firms in Michigan and central New York. In the second assignment he was a project surveyor overseeing photogrammetric field surveys for highways and writing

over two hundred legal descriptions for boundary surveys and sewer easement construction.

In December 1966, he moved to Los Angeles where he worked in the engineering surveying office. His assignments were to execute all the least squares adjustments for triangulation, trilateration, and precise leveling; perform planning and data reduction for the control surveys, which had been mandated for the integrity of dams, reservoirs, and aqueducts, and write surveying and engineering computer programs. He designed survey procedures/data reduction/analysis to execute small scale settlement surveys for monitoring structures. He also completed courses in surveying at *UCLA* under Ira Alexander, future ACSM president, and other course in numerical techniques. In March 1969, Stoughton was awarded the ACSM Cubic Electrotape graduate fellowship.

The following fall Herb returned to Ann Arbor to study under Professor Berry and Waldo Tobler (cartography and map projections). One of his first assignments was to help a dental student write his master thesis which required mapping teeth. Employing photogrammetry and a 35 mm camera, Stoughton assisted two graduate dental students complete their theses. Besides graduate course work in geodetic engineering, remote sensing, computer applications, and technical communications, Herb was a teaching assistant in the undergraduate courses. Herb's introduction to professional seminars occurred at Ann Arbor, when Professor Berry requested Herb to co-teach a seminar on the new Michigan state plane coordinate system to members of the Michigan Society of Professional Land Surveyors. After his second year of graduate studies, he went to Cyrene, Lybia, to map an archaeological excavation of a sixth century B.C. Greek temple. Later, he presented his first paper at an ACSM national meeting on the project.

Stoughton was admitted to the doctoral program. He assumed a teaching position at the SUNY Alfred A&T in 1973, where he taught and advised students and worked on his dissertation. Four months after his 34th birthday, the New York state Board of Regents appointed Herb a land surveyor member of the New York State Board of Engineering and Surveying. At the time, Herb was the youngest individual ever appointed to an engineering/land surveying board in the United States.

In 1980, Stoughton joined the DMA Geodetic Survey Squadron at Cheyenne. His assignments included writing technical manuals, provide training, manage geodetic survey projects, write staffing documents to seek funding for large scale surveys, brief DMA senior management and foreign visitors about the GSS geodetic programs, oversaw the first HARN survey executed outside the USA, introduced new computational procedures (multiquadric interpolation, national and regional map projections, field data digital recording, etc.), monitored the absolute gravity initiative and two new astro positioning systems, etc. When the GSS moved to St. Louis, Stoughton chose not to leave Cheyenne, and accepted the lead faculty position of the surveying and mapping program at *Metropolitan State College of Denver*. For the next twelve years he developed twelve academic surveying courses in surveying through televised distance learning.

Herb has been active in professional societal activities. At CSD/AAGS he was the reporter editor from 1975 through 1992, chairman of CSD, chairman for several CCSD technical programs, and a director. At ACSM he was the chairman of the ACSM Bylaws Committee during the reorganization which formed AAGS from the CSD, ACSM director, chairman of various technical committees, and book-review editor. At ASPRS he was a member of the applicants' credentials committee for the Certified Mapping Scientist. Since moving to Wyoming, Stoughton has been active in the Professional Land Surveyors of Wyoming. He has been elected as chapter and state president; chairman of the bylaws committee; state secretary-treasurer for seven years; and advisor to PLSW for the NGS HARN campaign. For the NAD1983 readjustment, Stoughton designed the state plane coordinates systems for Montana (one zone Lambert); Nebraska (one zone Lambert); and Wyoming (four Zone T.M.). For the Montana (except West Yellowstone) and Nebraska systems, the scale factor was less than unity throughout the working area. He also wrote the operations manual for their unique plane coordinate system used in Palau. Stoughton has written over eighty book reviews, nearly one hundred technical and professional papers, and two dozen books, which have been published in Australia, Canada, England, Papua, throughout the U.S., and presented over sixty technical presentations to international, national, state, and regional meetings. Dr. Stoughton is a fellow of AAGS, ACSM, NSPS, and ASPRS; an honorary member of the Colorado Society of Professional Surveyors; received the SAMSOG (Surveying and Mapping Society of Georgia) Public Service Award; ACSM Walter S. Dix Award; ACSM Earle Fennell Teaching Award; and the NSPS National Surveying Excellence Award.

Herb and his wife Catherine reside in Cheyenne. The have one son who is a professional civil engineer, and four grandchildren. In his spare time, Herb is chairman of the Diocese of Cheyenne Building Commission. His

responsibilities are to review new construction project and proposed modifications, and make recommendations to the bishop. Although he has had many interesting assignments, he considers the construction of a cloistered monastery near Meeteetse, Wyoming, his most challenging.