## REVIEW OF ISPRS GEOSPATIAL WEEK 2019

# Sensors, Satellites and Science: the Power of Geoinformation



Every two years, the photogrammetry and remote sensing community gathers at the ISPRS Geospatial Week. The event comprises a combination of workshops organized by various ISPRS Working Groups and other stakeholders involved in the geospatial profession. The 2019 edition, which was held from 10-14 June in Enschede, situated in the eastern part of the Netherlands, proved to be a true geospatial hub bringing together a wide range of geomatics-related activities and applications.

Creating a better, safer world – that broadly sums up the objective of the ISPRS Geospatial Week participants. With projects covering innovations for land tenure, an efficient method to detect seals in the Arctic and the use of artificial intelligence for mobile robot navigation, the common denominator was a focus on developing solutions to the issues faced by our planet, now and in the future. This year's programme consisted of around 275 oral presentations – spread across five different tracks during the day – and more than 100 poster presentations. The sessions were organized around 13 workshops reflecting the hot topics in photogrammetry and remote sensing at present.

### Inspiring keynotes

The opening keynote was delivered by Edward Anderson of the World Bank. He shared his experience on World Bank projects dealing with various geospatial technologies such as open data for resilience, innovations in spatial planning, community mapping with UAVs, and early warning systems. Anderson pointed out how the Tanzanian Urban Resilience Programme (TURP) in Dar es Salaam, Tanzania, is combining wide-scale in situ geospatial data collection with unmanned aerial vehicles (UAVs or 'drones') and machine learning for disaster risk management. On the subsequent days, a further nine keynote speakers presented the latest technical advances in their fields, varying from UAVs in agriculture and forestry monitoring to urban energy simulation and semantic 3D city models. Some presentations even went beyond the realms of our own planet; Randolph Kirk, Scientist Emeritus at the USGS, demonstrated in his keynote how NASA's Europa Clipper mission will investigate the ice shell and ocean, geology and composition of Jupiter's moon.



Opening ceremony of the ISPRS Geospatial Week 2019.

## UAVs and Artificial Intelligence

Over the course of the week, participants had an opportunity to learn about the latest advancements in the field through a series of talks and poster presentations as well as a total of ten keynote speeches that opened workshops and joint sessions. The use of machine learning and computer vision for the improvement of geospatial data quality and analysis was a recurring theme across various workshops. One prominent example of this was a keynote speech by Margarita Chli from ETH Zurich. She presented the work of Vision for Robotics Lab, focused on building SLAM algorithms that will allow UAVs to better understand and reconstruct their surroundings. Besides

that, participants were able to learn more about the enormous variety of applications of remote sensing and photogrammetry, from the use of UAVs to detect Antarctic seals and penguins to monitoring urban subsidence and ground deformation using InSAR.

## Deep learning

Plenty of attention was paid to the artificial intelligence trend at this year's ISPRS Geospatial Week, including in the papers presented (e.g. in the Semantics3D workshop). Other recurring topics throughout the conference included automatic extraction and object detection. For example, Simon Hensel from Niederrhein University of Applied Sciences in Krefeld, Germany, presented a workflow for generating LoD3 CityGML models – including structured facades – based on textured LoD2 CityGML models by adding window and door objects. Another presentation in the Semantics3D workshop was delivered by Emre Özdemir (Fondazione Bruno Kessler), who updated the audience on the classification of aerial point clouds using deep learning. The research project is focused on 3D building reconstruction based on the classification of aerial point clouds without ancillary data (i.e. data from sources other than remote sensing that is used to assist in analysis and classification or to populate metadata). The project work includes a deep learning approach based on specific geometric features extracted from the point cloud.


Keynote speaker Craig Glennie from the University of Houston, USA, explained the principles of Lidar and the difference between SPL and full-waveform Lidar. (Photo: Jan Böhm / Twitter)

## Single photon Lidar

One of the most popular sessions was the joint session on single photon Lidar (SPL) – which is not entirely surprising, as it is safe to say that SPL is one of the most promising recent advances for mapping applications. Keynote speaker Craig Glennie from the University of Houston, USA, explained the principles of Lidar and the difference between SPL and full-waveform Lidar. He also outlined the stages in the development of these techniques, explaining that large sums of money have been invested in high-altitude Lidar operation for military purposes and the links with Icesat. In the same session Gottfried Mandlburger compared full-waveform Lidar flown at 750m against SPL flown to give a corresponding point density. He concluded that SPL requires fewer flight strips to cover the same area due to the higher flying altitude and the resulting broader swath width, but that the waveform Lidar 3D point clouds provide a sharper and more concise mapping of both topography and buildings.

## Land administration toolbox

The its4land project consortium chose the ISPRS Geospatial Week for the official launch of the its4land Land Administration Toolbox, which contains six tools designed to help land administration communities in developing countries. A workshop was held to present the core ingredients of the toolbox, which include software tools for recording land tenure information based on hand-drawn sketch maps, UAV-driven workflows for land tenure data acquisition, and semiautomatic and interactive delineation of visible cadastral boundaries. All the tools are integrated in a software platform for publishing and sharing land information via geocloud services. Moreover, the toolbox combines consultancy services in the field of needs assessment and governance as well as capacity-building models for innovative technologies.


Mila Koeva, member of the organizing committee, delivering a presentation.

## Business meets science

A particular highlight of the conference was its focus on collaboration between academia and the geospatial industry. During breaks between the workshops, the delegates had the opportunity to meet with a range of industry representatives and attend talks by sponsoring companies presenting cutting-edge technologies that allow for the capture and analysis of geospatial data. The programme included presentations by companies such as Pix4D, RIEGL and Agisoft. The visible synergy between business and science adds a valuable dimension to events such as the ISPRS Geospatial Week. Sander Oude Elberink, member of the organizing committee, comments: "The industry presentations were well attended, with many scientists interacting with the presenters representing the companies. Likewise, many delegates from private companies attended the scientific sessions. On the sensor side, new insights were presented into Lidar sensors such as the single photon Lidar systems. This illustrates that business and science need each other in order to make progress." According to him, vendors are opening up parts of their data processing to gain more insights from scientists.

While this can be said of many industries, it may be even more true for our geomatics profession; it is fair to say that innovation is fundamental for business, and there are huge mutual benefits to be gained from collaboration between business and science. The ISPRS Geospatial Week proved to be a great example of this, and the organizers of the next edition (which will be held in Dubai in 2021) are strongly recommended to keep this in mind.

*The conference had a very wide appeal and covered the topics of primary interest to professionals involved in extracting information from images.*

**Further Reading**

ISPRS Archives: Volume XLII-2/W13, 2019

ISPRS Annals: Volume XLII-2/W13, 2019


The University of Twente proved to be an excellent venue.