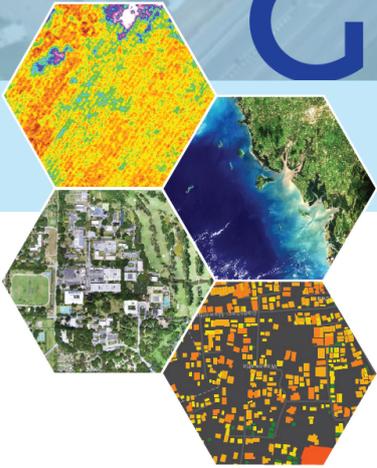




Vehicle-free drone imagery of highway construction zone created for Thailand's Department of Highways  
– See page 2 for more info

# QUARTER 3 NEWSLETTER



## Welcome

Greetings from AIT's Geoinformatics Center! Please have a read through our 3rd Quarter newsletter to learn about GIC's latest projects and related news.

## Launch of Uttarakhand Disaster Risk Database

On September 12, 2018 Dr. Manzul Hazarika, GIC's Director, attended a meeting marking the Launch of the Disaster Risk Database at Uttarakhand, India. The Database is part of a World Bank project called The Disaster Risk Assessment of Uttarakhand. Collaborative efforts of three international entities, including DHI (Singapore), ERM (Mexico), and AIT (Thailand), led to the implementation of the project. Uttarakhand is only the 3rd of twenty-nine Indian states to proactively pursue a state-wide system for probabilistic multi-hazard risk assessment. Implementation of the system will contribute to Uttarakhand's safety regarding disasters including earthquake, landslide, flood, flash flood and industrial disasters.



Dr. Hazarika presenting at the launch event

## SA Project Manager In-house Training

Sentinel Asia is an organization dedicated to the application of geospatial technology to aid in disaster response in the Asia-Pacific Region. The Geoinformatics Center has participated as a Data Analysis Node for the Sentinel Asia program for nearly ten years already. Members of GIC's Disaster Management Team serve the Sentinel Asia Program by creating value added products from available satellite data for disaster response, as well as by acting as project managers during such events. In September 2018 members of GIC's Disaster Management Team led an in-house training for GIC staff to become new project managers for the Sentinel Asia Program. During the 5-day course four new project managers were added to the roster.



Disaster Management Team staff work together to complete an image analysis exercise

# UAV Monitoring of Road Construction Zone for DOH

The Thailand Department of Highways (DOH) is responsible for constructing and maintaining the Kingdom's road infrastructure. Currently the DOH is undertaking a lane widening project along a 12 km stretch of the Rama 2 Highway in Samut Sakhon, a province to the southwest of Bangkok. The DOH recognized the monitoring potential of unmanned aerial vehicles (UAV) and thus entrusted GIC and its partner SensorSoft to carry out monitoring of the construction project.



GIC, Sensorsoft Co. Ltd., and Thailand's Department of Highways collaborate to acquire drone imagery of a highway construction area

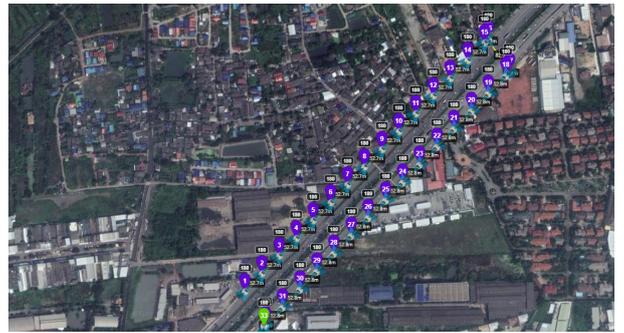


Discussing results of initial aerial survey at Samut Sakhon province, Thailand

An initial survey was conducted in August 2018 to obtain imagery for a high resolution orthomosaic of the entire project area. During this visit the team also marked and/or located thirty-three ground control points in the project area. During a later visit the team performed a real-time kinematic (RTK) survey to obtain the positions of the ground control points. This allowed integration of the ground control points into UAV image processing to reduce positioning error and increase the accuracy of the output products.

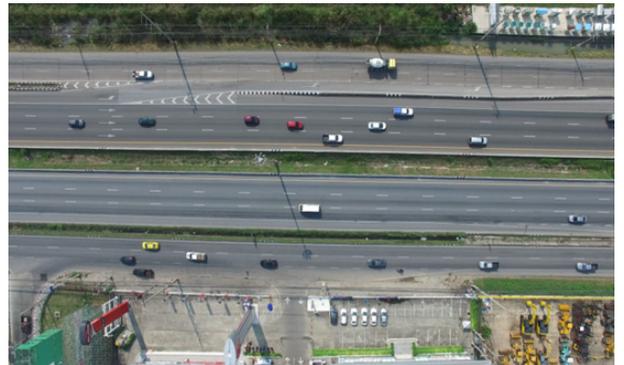


Team performing RTK survey of ground control points



Waypoints for UAV mission at Rama 2 Highway, Samut Sakhon

Bangkok and its surrounding areas are known for having heavy traffic. Despite these conditions, the DOH still requires vehicle-free imagery to monitor construction progress. For this project GIC is enlisting an innovative time-series image analysis technique. By interpreting multiple images of the same area of interest, GIC is able to create high resolution images of the highway for inspection with vehicles removed. GIC and SensorSoft will continue to monitor the Rama 2 Highway at the request of the DOH for the next year.



UAV imagery of highway, vehicles present



UAV imagery of highway, vehicles removed after applying algorithm



# Berunda Fixed Wing Completes First Data Collection Mission

Earlier this year GIC reported its first successful missions with its in-house built fixed wing UAV, dubbed Berunda. Since then the team has implemented a number of modifications to the system to make it safer and more reliable. Some important improvements include tweaks to the deployment of the parachute landing system as well as improvements to the first person view camera.

Recently Berunda surpassed its preliminary test flight period and progressed to data collection. Near the end of September 2018 a 45 minute mission was flown at AIT at an altitude of 120m with end lap & side lap of 80% to capture imagery of the entire campus. The output produced by this system had a horizontal accuracy of 34 cm without ground control points. Horizontal accuracy improved to 7cm after GCP's were included in image processing.

The functionality and high resolution output of GIC's Berunda is comparable to commercially available models. However, this in-house built UAV is significantly cheaper than well-known models from industry giants like Trimble and Sensefly. Further testing will assess the reliability of Berunda, and if all goes well, GIC will implement the system in its future UAV-based monitoring projects.



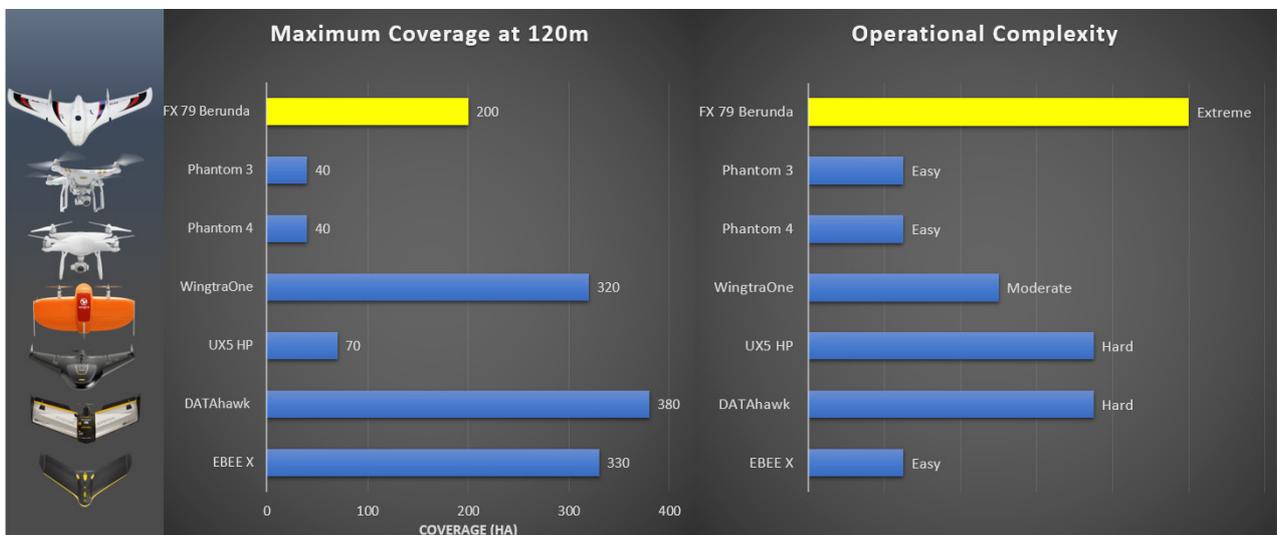
Parachute reduces stress on UAV body during landings



Retrieving Berunda after a successful mission



Berunda orthomosaic output, AIT campus



Comparison of photo coverage and operational complexity for Berunda and commercially available solutions

# Drone Applications Training Course at GIC

An introduction to Unmanned Aerial Vehicles Training course was held in September at the GeoInformatics Center. UAV have a wide scope of applications across many industries as is reflected by our training course participants. The ten attendees came from diverse disciplines including the Maldives Environment Department, Thailand's Ayuthaya Rice Research Institute, and AIT's own Architecture Department. Participants started the five-day course by learning the fundamentals of photogrammetry and remote sensing, manual control of UAV, and autonomous mission design. Advanced topic sessions explored practical applications of UAV deliverables including volume estimation, vegetation classification, and tree canopy extraction.



Operating multirotor UAV during practical session



UAV Training participants in a lecture session at GIC

## GNSS Summer School in Japan

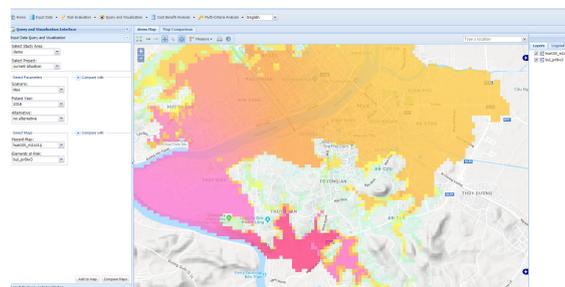


GNSS demonstration at GNSS Summer School 2018

GNSS Summer School is an annual educational event for students and young professionals who are new to GNSS or teach the subject in their home country. Two GIC staff attended the six day course at the beginning of August. The event was organized by Tokyo University of Marine Science and Technology and took place on campus in Tokyo, Japan. Attendees were exposed to lectures and practical sessions on topics including signal security, QZSS satellite constellation, RTK SDR software, system design, and GNSS authentication. Additionally, vendors Ublox and Allystar demonstrated the capabilities of their latest GNSS equipment during the summer school.

## GIC Staff Member Visits ITC Netherlands

In July a staff member from the GeoInformatics Center visited ITC at the University of Twente in Enschede, Netherlands. ITC and GIC are collaborating to create a spatial decision support system. While at ITC, GIC staff worked out some bugs in the decision support system. The trip was a success and the DSS is currently operating bug free. Special thanks goes to Cees Van Westen, PhD for his time spent with GIC staff at ITC. The DSS can be accessed online at: <http://sdss.geoinfo.ait.ac.th/>



Decision support system depicting areas at risk around Hue, Vietnam

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