HAPPY NEW YEAR 2019

All the best to you and yours

GIC ● AIT

GeoInformatics Center - Asian Institute of Technology

GIC GeoInformatics Center
January 2019 Newsletter

Welcome

The GeoInformatics Center would like to wish you a happy and prosperous new year. Please have a read through our latest newsletter to find out about the latest projects and training courses at GIC.

FAO Agriculture Statistics Training Course

Participants conducting tablet-based enumeration field exercise during Agricultural Statistics Training Course

The Food and Agriculture Organization of the United Nations collaborated with the GeoInformatics Center to host a week-long learning opportunity titled Regional Training Workshop on the Use of GIS for Agricultural Statistics. Seventeen statisticians from 13 countries across Asia came to AIT near the end of December 2018 for the five-day event. FAO and GIC staff led sessions introducing participants to QGIS and how to best implement the system into their enumeration workflow. In addition to classroom GIS exercises, participants worked in groups to complete a simulated census enumeration field exercise using the skills acquired at the workshop.

2018 Shunji Murai Annual Lecture at AIT

Few names are as synonymous with the field of remote sensing as Shunji Murai. In the early 1970's Professor Murai was on the ground floor of remote sensing while in the United States. There he was present for the dawn of the highly successful Landsat earth observation program. Over time his works and research efforts left many acknowledging him as the father of remote sensing in Asia. Shunji Murai has a long history at the Asian Institute of Technology, serving as a professor as well as founding it's GeoInformatics Center. As such, the Asian Institute of Technology was proud to host the Shunji Murai Annual Lecture. This year's installment took place on October 12, 2018 at the AIT Conference Center.

Professor Murai's lecture focused on his latest research involving the investigation of ionospheric anomalies as pre-signals for forecasting impending earthquakes. Seismic activity continues to be a major source of disaster for Japan. Professor Murai established an entity called Japan Earthquake Science Exploration Agency (JESEA:http://www.jesea. co.jp) after the catastrophic earthquake and tsunami in Japan's Tohoku area in 2011. JESEA analyzes the pre-signals for predicting earthquakes and publishes them in a weekly bulletin. The bulletin is distributed among registered individuals and organizations in Japan. On September 5, 2018, a pre-signal for an impending earthquake was picked-up in the northern Hokkaido region and a prediction was made. Subsequently, an earthquake measuring 6.6 magnitude struck the southern Hokkaido on September 6, 2018.

Other guests were on hand to deliver relevant works, including Professor Pennung Warnitchai and his presentation on Earthquake Risk Assessment and Reduction in Asia, Dr. Sukit Viseshsin from ESRI Thailand with a presentation on Geo-Smart Cities, and Dr. Aya Yamamoto presenting the latest research activities at the Remote Sensing Technology Center of Japan. A poster session was also available for the 94 guests in attendance exhibiting recent geospatial projects completed by the GeoInformatics Center.

Professor Shunji Murai presenting his latest research at the 2018 Annual Lecture, AITCC

Professor Shunji Murai and Dr. Manzul Hazarika, Director of GIC, at poster session, AITCC

GIC Research Poster Session at 2018 Shunji Murai Annual Lecture, AITCC

Attendees for the 2018 Shunji Murai Annual Lecture, AIT

IoT for Agriculture & Drone Training Course

Instructors leading a lecture session during IoT for Agriculture Training, GIC

In November 2018 GIC hosted a training course for the application of Internet of Things (IoT) and Unmanned Aerial Vehicles (UAV) to the agriculture industry. For those unacquainted, IoT refers to the connectedness of electronic devices to each other and the cloud, as well as utilizing the data obtained by these devices to improve work practices.

Participants experienced hands-on sessions in which they assembled their own IoT devices for sensing temperature and humidity, two essential factors for agriculture. During these sessions participants configured the IoT devices by writing programs in C language, then once the devices were operational, wrote a program in Java Script to display real-time data from the sensors to a web page.

The UAV portion of the training course introduced participants to UAV technology and maneuvering exercises. Fundamentals of the underlying processes related to UAV image acquisition and processing like photogrammetry and computer vision were also addressed during lecture sessions. In addition, participants learned how to create autonomous UAV missions with flight planning software, produce deliverables from UAV data, and implement in-field GNSS measurements to improve the geometric accuracy of those deliverables.

The training course also featured field visits to some of Thailand's most prominent precision agriculture and smart farming facilities including the DTAC Smart Farm, the Coco Melon Farm, and the Kubota Agriculture Machinery Facility.

Participants and Instructors for IoT for Agriculture Training, GIC

Workshop for National Spatial Data Infrastructure in Sri Lanka

Participants for the Spatial Data Accuracy Standards Workshop, University of Peradeniya, Sri Lanka

Staff from the GeoInformatics Center contributed to the success of a training course for Sri Lanka's National Spatial Data Infrastructure (NSDI) program. The training course, titled 3-Day Residential Training Program for NSDI Working Group, lasted from October 31 – November 02, 2018. The event was hosted at the GIS & RS Laboratory of the scenic University of Peradeniya, located just outside of Kandy, Sri Lanka.

A focus of the training course was spatial data accuracy standards. Topics covered by GIC staff included best data collection practices for UAV, accuracy standards for UAV imagery, smart phone application for field data collection, and remote sensing data accuracy standards. A special thanks goes to Dr. Jagath Gunatilake and the Information and Communication Technology Agency of Sri Lanka for organizing the event.

Monitoring Rice Health and Yield with MS Imagery

GIC recently concluded a study on monitoring rice health and yield with remote sensing technology. The study was conducted at a rice farm in central Thailand's Ang Thong Province. GIC staff monitored the rice field with an unmanned aerial vehicle equipped with a lightweight multispectral sensor. The multispectral sensor provided data in red edge and near infrared wavelengths, as well as two visible bands, allowing for in depth analysis of the rice field.

Additionally, GNSS technology was used to perform a ground survey of the area, which resulted in a geometric accuracy within one pixel of the 8cm spatial resolution for UAV reflectance maps. Derived normalized difference vegetation index (NDVI) imagery was in line with expected rice cycle phenology.

Phototarget located at perimeter of study area

Rice yield was estimated with satellite imagery from the moderate resolution imaging spectroradiometer (MODIS) combined with 9-year historical rice yield for AngTong province. The resulting regression depicted a positive relationship (R^2=0.611) between maximum ndvi value and provincial rice yield, indicating that our model is can be used to estimate rice yield reasonably well.

Comparison of actual rice yield for 9 year period (2008 - 2016) and predicted rice yield based on remote sensing analysis

Preparing UAV for multispectral data collection

While ground-level visual inspection uncovered a mild case of rice leaf streak disease present in the rice field, the multispectral imagery did not indicate as such. This leads us to believe that sensors with finer spectral resolution, such as hyperspectral sensors, perhaps could be better suited to detect rice diseases. Otherwise, yield from this crop was a similar quantity to previous harvests, indicating that the crop was unaffected by the mild disease presence.
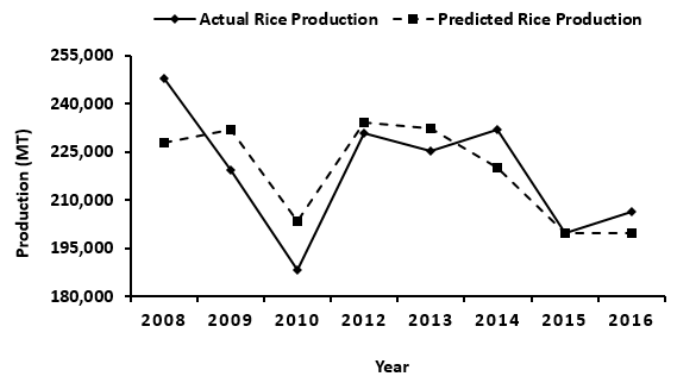

Rice leaf streak disease present at project site

Special thanks goes to Mr. Kritkamol Paothong, Acting Director of the Ayuthaya Rice Research Center, and Mrs. Sumana Maneepitak, Planning and Policy Analyst for the Ayuthaya Rice Research Center, for generously donating their valuable time and expertise to making this project a success. A big thanks also goes to Mr. Samruay Pungdee for allowing access to his rice farm for the duration of the project.

Mr. Kritkamol Paothong, Mr. Samruay Pungdee, Mr. Frank Yrle (from left to right)

GIC & ITC Join for Tajikistan Disaster Preparedness

Project team gathered in Tajikistan for disaster preparedness project inception

The Asian Institue of Technology's GeoInformatics Center has partnered with ITC - University of Twente (Enschede, Netherlands) to undertake a **UNDP** project for improving Tajikistan's disaster preparedness capacity. The project commenced with an inception workshop at Dushanbe Plaza, Tajikistan on December 3, 2018. Over the following four days the project team developed methods for hazard and risk assessment, and demonstrated exercises on hazard mapping for local government officials. Later, the team met with representatives from World Bank, UNDP, the Tajikistan Hydrometeorology Agency, and the Tajikistan Center for Glacier Research to discuss project goals and collaboration opportunities. The project will culminate with implementation of a Spatial Decision Support System (SDSS) to bolster preparation for six types of major hazards in Tajikistan.

2018 Asian Conference on Remote Sensing

GIS Staff participating in ACRS 2018, Kuala Lumpur, Malaysia

The 39th annual Asian Conference on Remote Sensing (ACRS) was held in Kuala Lumpur, Malaysia at the Renaissance Kuala Lumpur Hotel from October 15 – 19, 2018. Mrs. Yeo Bee Yin, Malaysian Minister of Energy, Science, Technology, Environment, and Climate Change, gave an energizing opening address to kick off the conference.

The theme for 2018 was Remote Sensing Enabling Prosperity. There were a number of plenary sessions available in support of the theme including remote sensing and good governance, wealth creation and prosperity, humanizing technology and data, and challenges in wealth creation and prosperity. Technical sessions are also an important part of the conference in which researchers can share their latest research with the remote sensing community. Topics ranged from UAV system development to turbidity monitoring with remote sensing technology.

GIC was well represented at the conference, presenting research from four technical papers, one research poster, as well as a number of impromptu presentations on GIC's latest regional projects.

The Asian Conference on Remote Sensing has a long history dating back to its very first meeting in Bangkok, Thailand in 1980. Professor Shunji Murai, organizer and catalyst for the first ACRS conference, continues to be an integral part for its success to this day. In 2019 ACRS will be celebrating its 40th meeting in Daejeon, South Korea.