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Using LiDAR to Map Ancient Maya Urban and Agricultural Patterns in San Bartolo Guatemala

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RCEU Summer 2020 Project Proposal

Proposal Identifier: RCEU20-AES-RG-01

Title: Using LiDAR to Map Ancient Maya Urban and Agricultural Patterns in San Bartolo, Guatemala

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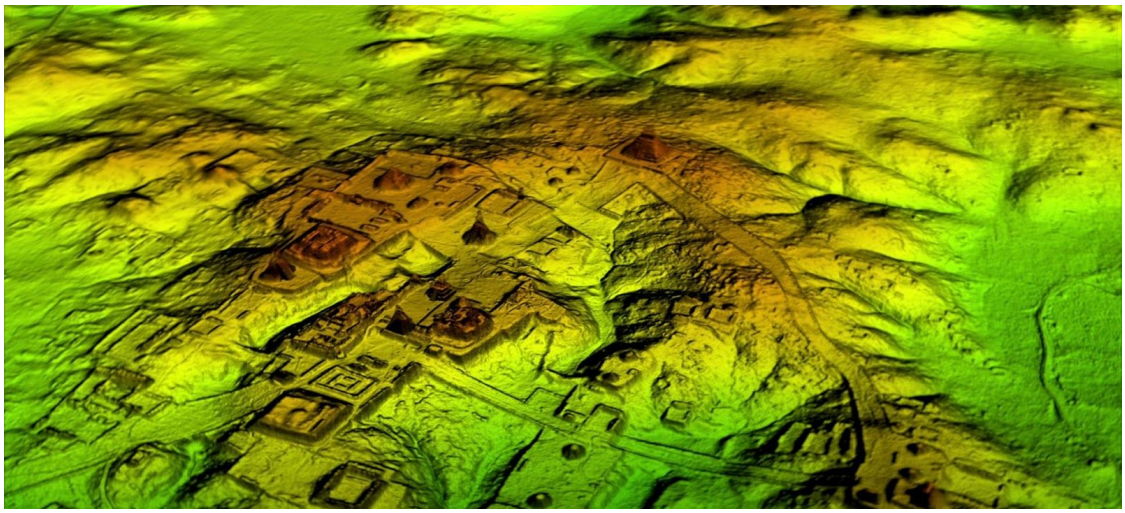
Project Summary:



LiDAR view of Ancient Maya site under tropical rainforest cover in Tikal, Guatemala. COURTESY WILD BLUE MEDIA/NATIONAL GEOGRAPHIC Retrieved from https://www.nationalgeographic.com/news/2018/02/maya-laser-lidar-guatemala-pacunam/

The ancient Maya were an advanced society that adapted to their tropical environment through a variety of strategies, including complex agricultural systems and rapid urban development. Recently, the application of remote sensing and Geospatial Information System (GIS) technologies to archaeological research has expedited efforts to map the distribution and density of these important archaeological features. This project will involve processing LiDAR data collected around San Bartolo in Guatemala to create an inventory of ancient Maya house mounds, agricultural fields, and other features that elucidate urbanization patterns and adaptation strategies. San Bartolo is an ancient Maya site that contains some of the oldest Mesoamerican murals and tombs on record, and is situated in the heavily forested northeastern region of the country. LiDAR's ability to penetrate forest canopy cover makes it possible to identify sites and individual structures that are normally obstructed by dense vegetation, making it a powerful complement to boots-on-the-ground surveys. The participating student will have the opportunity to learn novel, in-demand remote sensing technology and contribute to cutting-edge research on the ancient Maya.

Student Prerequisites: All majors are welcome to apply, and preference will be given to students with an interest in applying remote sensing and geographic information systems (GIS) to archaeology, ecology, and earth system science. The minimum GPA requirement is 3.0 but GPA is only one of the criteria used to evaluate applicants. There are no citizen status restrictions for the proposed project.

Student Duties: The selected student will (1) conduct a literature review on the ecology of San Bartolo, Guatemala, as well as the history of the ancient Maya that populated the area, (2) analyze the PACUNAM LiDAR data using geospatial software to identify key archaeological features, such as house mounds, plazas, and agricultural terraces, and (3) create public-facing deliverables, including a poster presentation and technical report, that will detail the methods and the findings of the investigation.

Benefits to the student: The student researcher will learn how to process and interpret the PACUNAM LiDAR data with software such as ArcGIS and LAStools. LiDAR data have a diverse array of potential applications, making it a valuable skill set across disciplines. The student will also explore the application of remote sensing and GIS to answer archaeological and anthropological questions, and they will hone their technical writing skills along the way. Finally, past students who have worked on these projects with Dr. Griffin have gone on to get GRAs through UAH, NASA, and other universities as well as follow-on internships at NASA.

Mentor Supervisor and Interaction: The student will be supervised throughout the duration of the project by Dr. Robert Griffin. Dr. Griffin has a PhD in environmental anthropology and has worked in the field of applied GIS and remote sensing in the Earth sciences for over a decade. The student will be assigned a fully-equipped computer in Dr. Griffin's geospatial analysis lab with which to conduct his/her research. Supervision by Dr. Griffin will take place at the National Space Science and Technology Center (NSSTC) facility where he and the student will establish best methodologies and review progress in weekly team meetings. The student will be expected to develop and complete tasks according to a specific timetable developed from the general outline described above. Finally, Dr. Griffin's graduate assistants located in the NSSTC's

Human Dimensions, Discovery, and Decision-Making Lab (HD3) will be present throughout the summer and will be available to assist the student as he/she moves through the phases of the proposed analysis.