TAYLOR GEOSPATIAL INSTITUTE

LOCATION. COLLABORATION. IMPACT.

PLANET FELLOWSHIP

NOTICE OF OPPORTUNITY

APPLICATIONS ARE DUE OCTOBER 1, 2022

To be submitted via OpenWater

Questions or inquiries regarding this RFP can be directed to: TGI@slu.edu

TAYLOR GEOSPATIAL INSTITUTE

BACKGROUND

The Taylor Geospatial Institute (TGI), the nation's leading academic center for geospatial science, is committed to making St Louis a global center of excellence in geospatial science research, education, and innovation. The St. Louis region is well-positioned to become the nation's geospatial 'Silicon Valley' as laid out in the June 2020 "GeoFutures Strategic Roadmap," a plan for strengthening St. Louis's competitive advantage in geospatial research and technology. For more information on the Institute, please visit www.taylorgeospatial.org.

The Taylor Geospatial Institute envisions building a world-class, interdisciplinary geospatial science research collaborative to address scientific and societal grand challenges (e.g. food security, supply chain resilience, health equity, and national security). To achieve this goal, the Taylor Geospatial Institute is announcing a PLANET Fellowship in collaboration with Planet Labs that is designed to support graduate students' dissertation research projects in core geospatial science and applied domains (www.taylorgeospatial.org/research/). The purpose of the Taylor Geospatial Institute PLANET Fellowship program is to help improve the dissertation research work of our students and promote the use of Planet datasets to address grand societal challenges, develop the next generation of scientific leaders, and catalyze regional collaboration to accelerate the St. Louis region's development as a global geospatial center of excellence. Underrepresented groups and women in geospatial sciences are encouraged to apply.

This program is another step to demonstrating our commitment to advancing the geospatial sciences.

RESEARCH PRIORITIES AND SCOPE

The Taylor Geospatial Institute aims to address grand societal challenges in food systems, health systems, and national security using cutting-edge geospatial technologies, data, and analytics and to build upon the broad existing research strengths in the St. Louis region. The goal is to advance core geospatial science and adjacent fields while fostering research that can improve food security, advance health, and social equity, and strengthen supply chains, smart cities, and resilient communities.

Applicants are encouraged to read the research priority areas provided in Appendix A.

Fellowship proposals should have a strong geospatial component that should include:

1) developing new geospatial tools (software, algorithms) that advance geospatial science,
2) designing and developing sensors or robotic platforms to generate new data, or
3) using location-aware datasets to address societal and scientific challenges.

Proposals that aim to conduct applications, projects, or fundamental research that do not require Planet data will be deemed non-compliant and either returned without review or declined after review.

The IP developed with the PLANET fellowship is treated in accordance with their institution's policies.

Details of the Fellowship Program

The successful candidates are expected to use Planet's data sets as their primary source of research and evidence in their dissertation. While other data can be used secondarily, Planet's data should be the primary source.

Ideal candidates will have degrees in geospatial science, or a related field, applied to one of the priority research areas outlined in Appendix A (food systems, health systems, and national security).

The duration of the fellowship is 12 months maximum.

Project Budget

The fellowship is **$10,000** for one year. The funds are received and managed by the Fellow's institution. Up to $6,000 may be used to fund personnel which may be paid to the fellow as a stipend or used to support collaborators in the project (e.g., student workers). The remaining funds may be used for expenses associated with conducting research (e.g., fieldwork, data collection, payment to subjects, survey expenses, software, hardware, data transcription, travel, and expenses incurred at sites away from the home institution) including up

Institutional overhead and tuition reimbursement are not supported.

Application Process

Applications are accepted until October 1, 2022. Applications are submitted by applicants directly with approval signature of their research office identified on the cover page (Appendix B). The Fellowship applications are submitted on SLU's OpenWater portal https://slu.secure-platform.com/a.

The applicant must complete the requested application information and must also include the following:

1) a cover page that includes the proposal title, PI name, and contact information, and approval signature of the applicant's Research Office as shown in Appendix B.

2) a resume/curriculum vitae
3) 6-page research dissertation proposal (title, contact info, project summary, research plan including specific aims, preliminary work, potential outcomes, and potential faculty advisor at Saint Louis University or the affiliated institutions)
   a. Project Summary must not exceed one single-spaced page.
   b. Project Description must not exceed 6 single-spaced pages. (Must include description of how the Planet datasets will be used.)
   c. Principal Investigator: The dissertation advisor or another qualified home-institution faculty member should be listed as the Principal Investigator; the graduate student should be listed as the Co-Principal Investigator.
4) 1 letter of recommendation from the Principal Investigator (faculty mentor) about the proposal, the student's academic potential, and commitment to supervise the student's research.

About The Taylor Geospatial Institute

The Taylor Geospatial Institute is a consortium of eight research institutions centered in St. Louis and the Midwest region, whose vision is to be the nation's leader in geospatial science research and accelerate the St. Louis region's development as a global geospatial center of excellence. The TGI is led by Saint Louis University and includes the Danforth Plant Science Center, Harris-Stowe State University, Missouri University of Science and Technology, University of Illinois Urbana-Champaign, University of Missouri–Columbia, University of Missouri–St. Louis, and Washington University in St. Louis. The TGI is committed to making the St. Louis region a global center of excellence in geospatial science research, education, and innovation. Our people, from students to the most distinguished researchers, are critical ingredients to the success of this research consortium. For more information on the TGI please visit taylorgeospatial.org.

APPENDIX A – RESEARCH FOCUS AREAS

OVERVIEW

Building upon the St. Louis region's competitive strengths, the Geospatial Institute will address grand societal challenges in food systems, health systems, and national security with cutting-edge GeoAI and data analytics techniques. The Institute will generate research to improve food security, health and social equity, and build smart cities and resilient communities, and promote economic development through translation to commercial application and by training the next generation of the workforce (Figure 1).

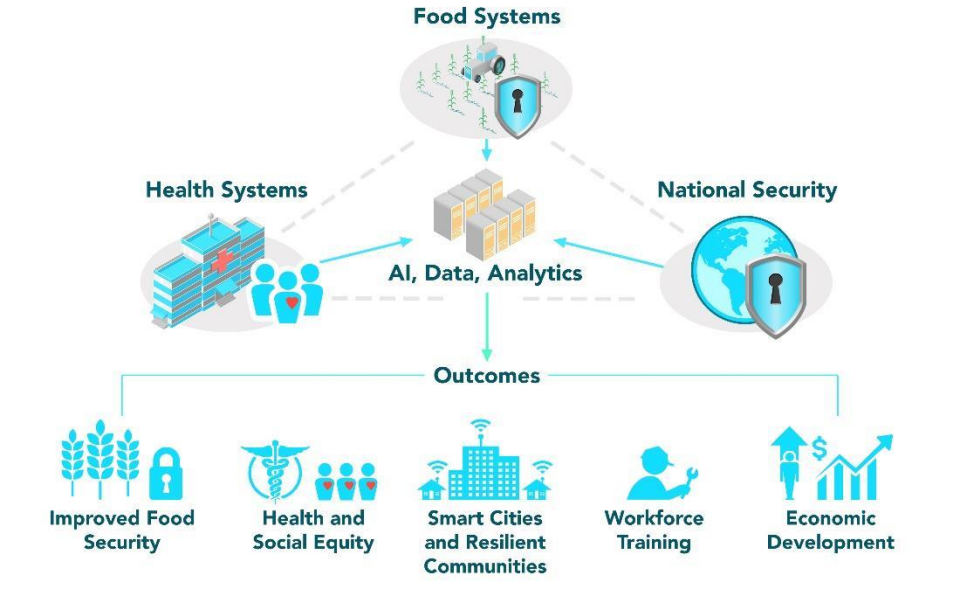

FIGURE 1. ADDRESSING GRAND SOCIETAL CHALLENGES AND OUTCOMES.

FOOD SYSTEMS

Everything comes from plants, not just the food on our dinner table, but everything from medicine, meat, to the strongest rubber used in spaceships.

One of the most challenging global problems today is feeding the growing global population, which will require increasing agricultural output by 70% in the next several decades. Food security is also an important national security issue and a major cause of social instability in many parts of the world. To address this challenge, we need to revolutionize the way we grow crops. We need to: create better crops that can thrive in the future climate with less water; utilize big data, advanced algorithms, and cloud computing at scale so we can monitor crops to improve yield and optimize resource use; and develop geospatial artificial intelligence to teach crops how to adapt to changing environments. To accomplish these goals, we must develop the capability to effectively harness big data and turn that into actionable crop intelligence with precision and speed. This important technology should help address our societal needs and improve our quality of life.

Geospatial science is fueling innovation and adaptation in food security and agriculture ecosystems by enhancing efforts to develop new crops and improve existing ones that meet both economic demands and ecological requirements. Data-driven AI, multi-scale imaging from satellites, drones, and ground robots have pushed the envelope of technological developments. These advances can automate crop monitoring and compute precision farm directives for every farm in the world every week, covering about 1.76 billion hectares, and show farmers when to plant, fertilize, and harvest, as well as what their crop needs to improve yields and reduce input costs. With this technology, farmers can increase yields as much as 35% while lowering costs up to 25% using precision fertilization.

The St. Louis region boasts more than 1,000 plant science Ph.D. researchers, extensive research infrastructure, and a booming agtech sector, and thus is widely recognized as an international epicenter of agriculture research. The Geospatial Institute will build on this strong foundation, expanding on existing partnerships with regional institutions including the Donald Danforth Plant Science Center and regional universities, to address key challenges in food and ecosystem security including crop adaptation to changing climates and enhanced ecosystem functioning of our agricultural systems. Geospatial science is a powerful tool that is required to leverage agriculture as a means to combat climate change, regenerate soils and water systems, and reduce human impacts on biodiversity, while simultaneously producing food.

HEALTH SYSTEMS

Human health is largely determined by where we were born and live. From the air we breathe to the water that we drink, these resources are the building blocks of our health. Geospatial health builds on these very complex, and now easy to measure, air quality and water access and cleanliness concepts, to enhance what we know about where we work, live, and play. Geospatial technology and science have grown our opportunities in measuring location and its influence each day as we travel through our communities. Data from smartphones and watches, activity trackers, social media, and satellite imagery can better inform the drivers of community health throughout the world. Some examples of how we continue to grow the knowledge and application of geospatial tools in health include developing and implementing multi-sensor infectious disease prediction modeling, perception health, and extended e-health tools such as telehealth and app and sensor-based tools.

Through advancements in technology, nontraditional public health and healthcare data from disparate sources can be combined to inform an early sensing system that would provide real-time COVID-19 risk assessments. The data sources include measures of community mobility such as app-based symptom tracking and contact tracing, anonymized smartphone data, geolocated social media mentions, satellite imagery analyses to identify vehicle traffic patterns of health care locations, and geolocated search terms. Synchronizing these data sources and fusing them to develop real-time models provide insights into community-level COVID-19 risks. There is great value in having this type of real-time risk assessment that can be used to identify health-related risks including risks related to the global COVID-19 pandemic, and other, more local examples

like food poisoning from a restaurant. This type of early sensing system can enhance health equity by providing continued real-time data and analytics to devise needed real-time interventions.

> *"St. Louis region has substantial and highly specialized healthcare industry sector with significant activities and opportunities for innovation. Geospatial visualization and analysis is critical for improving healthcare delivery and health outcomes as demonstrated by use of spatial analysis in helping to guide health responses to COVID-19 pandemic, including identifying hotspots down to specific streets." – Geofuture Roadmap*

Geospatial health research informs opportunities for workforce training in disaster preparedness and linking a trained workforce to locations where there is a need for healthcare workers. The tools we are devising will assist in growing, training, and preparing a workforce prior to arrival in locations that are experiencing disasters and other needs. The COVID-19 pandemic highlighted the lack of infection control preparedness. These tools and skills are necessary to have comprehensive response plans for a diverse workforce. For example, advanced supply chain management techniques for diverse health-related needs can also being explored. In addition to training and linking the workforce to locations in need, we are conducting a vaccine optimization study that leverages community mobility as a predictive and prioritized variable in the way vaccination allocation decisions are made. These types of analyses can be applied to many other challenges as well.

National Security and GEOINT

> *Geospatial technologies are the new macroscope to execute on NGA's vission of "Know the Earth…Show the Way…Understand the World".*

In 2017, the U.S. Department of Defense (DoD) decided to locate the new $1.75 billion National Geospatial-Intelligence Agency West (NGA-W) facility in North Saint Louis. When NGA-W opens in 2025, it will directly employ thousands of highly skilled employees. More importantly, a "geospatial ecosystem" of new knowledge-intensive businesses is expected to grow and generate thousands of new high-skill jobs in the surrounding area.

As the home for NGA-W, St. Louis has a strong legacy in mapping, geospatial analysis, and research and development primarily related to national security and defense. With over 350 companies in St. Louis supporting the NGA's mission with technologies involving advanced computing and geospatial analytics, national security is an anchor for regional geospatial research, training, and innovation.

National security and GEOINT encompasses all aspects of a geospatial science core, adjacent fields, and application domains from food security, political unrest, public health, environmental hazards (droughts, earthquakes, wildfires), and climate change. It includes but is not limited to the analysis of literal imagery, geospatial data, and information derived from the processing, exploitation, literal, and non-literal analysis of spectral, spatial, and temporal fused products

utilizing computer vision, AI/ML, cloud computing, cyber-physical systems/IoT, and autonomy, among other critical technologies. These types of data can be collected on stationary and moving targets by electro-optical, synthetic aperture radar (SAR), related sensor programs, social media, mobile devices, and non-technical means (including geospatial information acquired by personnel in the field).

U.S. National Security research aims to maintain a leading edge over adversaries in digital revolution and cutting-edge technologies such as GPS, GPS alternatives, GeoAI, etc. The lack of talent with deep expertise trained through years of research in geospatial core has been recognized as a major national security threat as revealed in a recent article from NGA Director Vice Admiral Sharp[1]. Through the nexus of industry-university-government-community engagement around geospatial science and technology and research in food systems, health systems and application areas such as climate, water, and environment, the Geospatial Institute will make a significant impact on the national security complex through innovation and by creating tomorrow's highly skilled workforce required to keep America safe.

[1] https://www.c4isrnet.com/opinion/2021/08/01/geomatics-is-vital-to-us-national-security-our-advantage-is-at-risk/

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APPENDIX B – SAMPLE COVER PAGE

DD MM YYYY

Dr. Vasit Sagan, Acting Director
Taylor Geospatial Institute
https://taylorgeospatial.org
TGI@slu.edu

SUBJECT: Taylor Geospatial Institute PLANET Fellowship

Title: " Your project title"

Dear Dr. Sagan,
As the Authorized Organizational Representative, I want to officially acknowledge [PI Institution]'s concurrence with the submission of PI [PI Name]'s grant proposal ["Your project title"] and has been approved by this office. Please find attached, the PDF for the full proposal submission.

With best regards,

Project start and end date: 15 October 2022 – 14 October 2023

Signature	Signature of the PI
_____	_____
Name	[PI name], Principal Investigator
Title	Title
Authorized Signatory Official	[PI Institution]
Office of the Vice Chancellor for Research	
[PI Institution]	P:
P:	E:
E:	