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GOBIERNO DEL ESTADO | 2024 • 2030



# IRAP 2025 Technical Visits

February 14<sup>th</sup>, 2025





ESCUELA NACIONAL DI ESTUDIOS SUPERIORES

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### Agenda Welcome 1. YIP and IRAP background 2. IRAP 2024 feedback 3. **IRAP 2025 Technical Visits** 4. 5. Q&A

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# Welcome and Introductions







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SIIDETEY









## The Yucatán Initiative

The **Yucatan Initiative Project** is a collaborative platform for research, academics, and service between the State of Texas in the U.S. and the State of Yucatan in Mexico.

This project is sponsored by the Secretary of Innovation, Research, and Higher Education of the State of Yucatan, Mexico (SIIES) and Texas A&M University (TAMU).







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# Objective

To establish an intellectual footprint **between SIIDETEY and TAMU**, consisting in the joint development of **solutions to regional problems** present in both the State of Texas and the State of Yucatan.























## **Strategic Areas**

### **Research**

- Phase I Engineering (2014-2015)
- Phase II Agriculture and Life Sciences (2015-2016)
- Phase III Geosciences (2017-2019)

### **Academics**

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- Into by Canieti
- ELCIR IRAP
- Foundations of Engineering
- Anthropology Ethics

### **Services**

- EPICS
- CANIETI Executives ESL
- Uxmal Corridor Program in progress







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Research, academic and service projects in Engineering, Agriculture & Life Sciences, and Geosciences between the State of Texas and the State in Yucatan, working jointly on the development of solutions to regional problems.

### **Areas of Collaboration**





Aquifers





Logistics

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**Animal Science** 





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Parque Científico y Tecnológico de Yucatán







**Early Warning Systems** 







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Geology



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The goal is to **expose students to research and global programs** early in their careers.







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## **IRAP Objectives**

- To learn how research can produce positive impacts on society, the economy, and the environment
- To learn how the scientific method can serve as an instrument to conduct research
- To learn how to formulate and present a research proposal through a transdisciplinary team aiming to solve a regional problem common to both Texas and Yucatan
- To develop global competencies: global fluency, adaptability, crosscultural interpersonal skills, and an understanding of global dynamics in solution creation.

























## **IRAP Outcomes**

Sea cucumber - *Isostichopus badionotus* 

- What?
  - Marine animal
  - Up to 45cm in length (1ft 6in)
- Where?
- Warm atlantic
- Shallow waters (<50m)
- Why?
- Export to East Asia
- Wild catch is illigal





- . Understand the **use of the scientific method** to produce research.
- 2. Distinguish the **difference** between scientific and non-scientific information.
- 3. Develop **basic skills to apply** the scientific method.
- 4. Participate in **laboratory research** that applies the scientific method.
- 5. Align the research proposal with the **2030 Agenda SDGs**
- 6. Write a research proposal that follows the scientific method.
- 7. Construct a **research poster** that follows academic and entrepreneurship standards.
- 8. Present a research poster in an academic setting.
- 9. Develop **global competencies**: global fluency, adaptability, interpersonal skills, and problem-solving abilities.















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### **IRAP Components**



### Introduction to Research Abroad Workshop

Technical Visits to SIIDETEY/TAMU labs



### **Cultural Activities**









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Based on the analysis of data collected from this experiment, conclusions will be drawn

responding to a subject to the second state of the second state of

be successful, it is important to stay connected with farmers to promote sustainable farming

If Null Hypothesis 1 is accepted: Look for another bio-alternative that is effective a

If Alternative Hypothesis 1 is accepted: Continue researching and present results to government to make neem oil more available.

If Null Hypothesis 1 and Alternative Hypothesis 2 is accepted: Look for another bio-alternative that will reduce contamination and continue with further research

action hat

Global Issue: Pesticide overuse is common in farming communities not just i

Health & Environment: Weighs the problem of pollution hurting human health

ultures. Pesticide pollution in the Yucatán and Texas regions has heavy implications fo

Pesticide Pollution: Affects sustainable agricultural practices, ecosystem

istainable farming practices, ecosystem safeguarding, and local communities

preservation, and cultural communities in Yucatán and Texas.

If neem oil is effective, the next steps would be to continue researching other bio-alternative

In period is encoded, the next steps would be to commute researching other observations for crops other than corn. Furthermore, with the validity of the research, promoting this specific biopesticide for corn to farmers worldwide would help complete the 4 SDG-related

Neers DI.

If Null Hypothesis 2 is accepted: Neem oil would not serve as an alternative to reduce contamination and other biopesticides would be investigated.



### Effectiveness of Sargassum Biofertilizer in Plants By Eduardo Gallegos, Paul Kavanagh, Jacqueline Matias, Frida Romero, Raquel Susko Universidad Anahuac Mayab, Texas A&M University

We expect surgassum fertilizer to be just as or more efficient than regular fertilizer. Sargassum has

overcrowded the ocean due to over-nutrients and acidification in the ocean from our curren

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### xpected Outcomes



million tons on the Texas Gulf Coast. Acidification of ocean promotes overgrowth sive sargassum influxes cause negative en impacts like beach pollution and erosion, and harm the tourism Restriction in US on extraction far from coast because important for animal life

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Extract close to coast using machines with minimal environmental impact Currently, collected sargassum placed in disposal site Create sargassum fertilizer because it provides

elements such as: Fe, Cu, Zn, Mn, N, P, K, S, Ca and
 Growth regulators: gibberellin and auxin
 Biomolecules: metabolites, carbohydrates and

Literature Review

**Data Collection** 

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Experimental Design

SHES

vitamins.

01

02

03

Main objective: Compare the effectiveness of Sargassum biofertilizer with conventional and/or organic fertilizers for a specific plant variety. Specific objectives:

- Analyze and compare the nutrient composition of Sargassum biofertilizer, traditional fertilizers, and organic fertilizers. Evaluate the impact of each fertilizer type on soil health parameters (e.g., organic
- matter content, microbial activity). Compare plant growth and yield (e.g., height, biomass) when treated with Sargassum biofertilizer, traditional fertilizers, and organic fertilizers
- Assess the environmental impact of each fertilizer type, considering factors like production processes and potential for nutrient leaching.

fertilizers. Therefore, many of the nutrients added into commonly used synthetic fertilizers can be found in sargussum. This makes it nutrient rich, which is important for fertilizer. It also is expected to be a more environmentally friendly option, as it offers a cycle that replenishes the natrients from rops back into the fields, which resolves the open-ended cycle that we currently face that leaves us with an unregulated and growing amount of excess sargassum. To test if this reasoning has standing for a large-scale experiment, we initially tested it using severa Jamacia seeds, one control treatment (regular water) and a second treatment with sanaassan fertilizer. As shown below, the sargassum fertilizer test germinated and grew faster over the first few days than the control. Below are pictures showing the result of this experiment. We expected sargassum fertilizer to allow the plants to continue to grow at a faster rate and hope a larger study will answer questions about the productivity of a plant fueled by sargassum fertilizer.

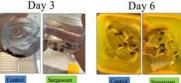
erall, we expect the plants using sargassum fertilizer

to have the same or larger leaf size, stem thickness

regular fertilizer. We also expect them to appear just as

healthy through qualitative characteristic such as stem

mass, and Chile production than the plants using the



and Chile color

This study investigated the notential of Sargassum seaweed, an ecological problem, as a biofertilizer for promoting plant growth and enhancing the health of the soil in Chile Habaners and Chile Pequin crops in the Yucatan and Texas regions. The findings reveal that Sargarsum hiotentilizer holds promise as an effective alternarive to traditional fertilizers, offering an even superior result in terms of plant growth, yield, and soil health parameters. These improvements contribute to long-term plant fertility and sustainability, making Sargassum a viable option for environmentally conscious agriculture and an alternative to reduce Sargassum excess.



Environmental and Economic Benefits: Sarrassam, a growing environmental challenge, can be transformed into a nutrient-rich fertilizer that enhances soil health, boosts crop yields and mitigates coastal pollution.

Sustainable and Renewable: Harvesting sargassum provides a renewable agricultural resource, reducing reliance on chemical fertilizers while supporting local economies and creating jobs in coastal com

Global Applicability: Sargassam fertilizer offers a scalable, eco-friendly alternative with the potential to be adopted worldwide, aligning with global sustainable development goals.

Despite being in different countries, sargassum represents one of the issues that both Texas and Yacatan face. As we all share our resources, it is important to realize the harm overase can cause and find creative ways to use these resources for diverse purposes.



### **Effectiveness of Sargassum Biofertilizer in Plants**

By Eduardo Gallegos, Paul Kavanagh, Jacqueline Matias, Frida Romero, Raquel Susko Universidad Anahuac- Mayab, Texas A&M University, UADY

### stroduction

Every year, human activity contributes to an immense number of pesticides found in local water supplies, which pose health risks such as cancer and Alzheimer's disease [1]. Mexico the world's greatest pesticide consumer, uses 260 different varieties, including 34 restricted ure words's greatest pesticule consumer, uses 200 urient varieties, including 54 restricted and 34 banned, and produces 30 of the 90 chemicals banned in the USA. Pesticides have been found in Yacatán groundwater [2]. Similarly, residential use and landscaping for com (Zea mays) can introduce pesticides into urban groundwater in the United States, with Calcuring y can independent pendent of the second pendent pend Texas use to reduce pesticide pollution in their water while effectively growing corn

### Given this context, the hypotheses are:

Null Hypothesis 1: There is no discernible difference in controlling insect nonulations between synthetic and biopesticides in corn crops, Alternative Hypothesis 1: Biopesticides are more effective at controlling pests and minimizing water pollution compared to synthetic pesticides in corn crop Null Hypothesis 2: There is no discernible difference in environmental

een synthetic and biopesticides Alternative Hypothesis 2: Synthetic pesticides are more effective at controlling pests but use higher er ntal pollution compared to biopesticides.

### Objectives

- · Evaluate Pest Control: Compare the effectiveness of neem oil and chlorpyrifos in controlling pests in corn fields. Assess Environmental Impact: Measure and compare water pollution levels from neer oil and chlorpyrifos.
- Investigate Farmer Perspectives: Examine farmers' usage patterns and attitude towards biopesticides and synthetic pesticides in Texas and Yucatán
- Analyze Cost-Effectiveness: Compare the production and application costs of neem of vs chlomyrifos
- Merge Data: Combine qualitative and quantitative findings to understand pesticide us and environmental impact
- Inform Policy: Use findings to recommend sustainable pest management practices an

### Methods

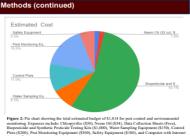
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h to Combat Pesticide Pollution catán and Texas

odriguez, Diana De Leon,

d Autónoma De Yucatán (UADY)

va Martinez, & Ángel Leandro Puch Uribe

Conclusion

in both Texas and Yucatan commun

ontrolling pests.

- Effectiveness: Neem oil, if as effective or more than synthetic pesticides like chlorpyrifos, could be widely adopted in farming corn.
- able Practices: Reduced environmental damage in water and from syntheti Sust
- Economic Impact: More affordable pesticides could affect the market and availability of certain pesticides.
- Improved Strategies: Comparing effectiveness will refine pest management strategie
- Biopesticide Goal: Identify a sustainable and cost-effective biopesticide that can replace
- Environmental Benefits: Decrease pollution and allow more humans and animals to
- Farmer Impact: Cost-effective biopesticides that are available to farmers worldwide

### Sustainable Development Goals related

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### **Establishing Sustainable Path to Combat Pesticide Pollution: Joint** Strategies for Yucatán and Texas.

A

Augusta Martinez, Martin Paz Rodriguez, Diana De Leon, Héctor Alejandro Barrera Carrillo, Ricardo Córdova Martinez, & Ángel Leandro Puch Uribe Texas A&M University & Universidad Autónoma De Yucatán (UADY







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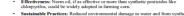
**Parque Científico y** Tecnológico de Yucatán

Parque Científico y



Héctor Aleiandro Barrera

Texas A&M





- and integrate biopesticides into current farming practices
- regular pesticides that helps reduce pollution and improve the environment



practices and promote global awareness of sustainable practices

he research pro

and the enviro Biopesticides: Favorable bio-alternatives to control pests while reducing the toxic effects of traditional pesticides. Local Knowledge: Reducing synthetic pesticides is attainable with education from indigenous communities such as the Maya. Research Impact: The availability of biopesticides could change agricultural

Global Context and Learnings

Texas and Yucatán but worldwide.

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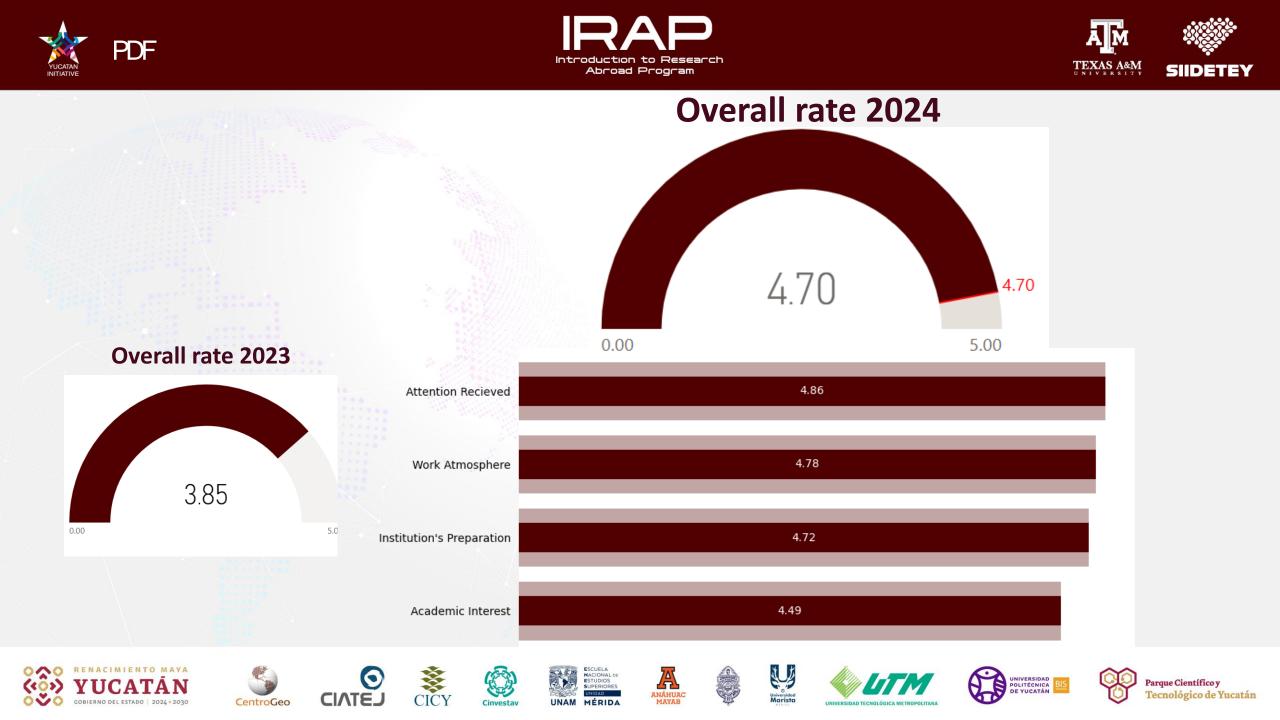


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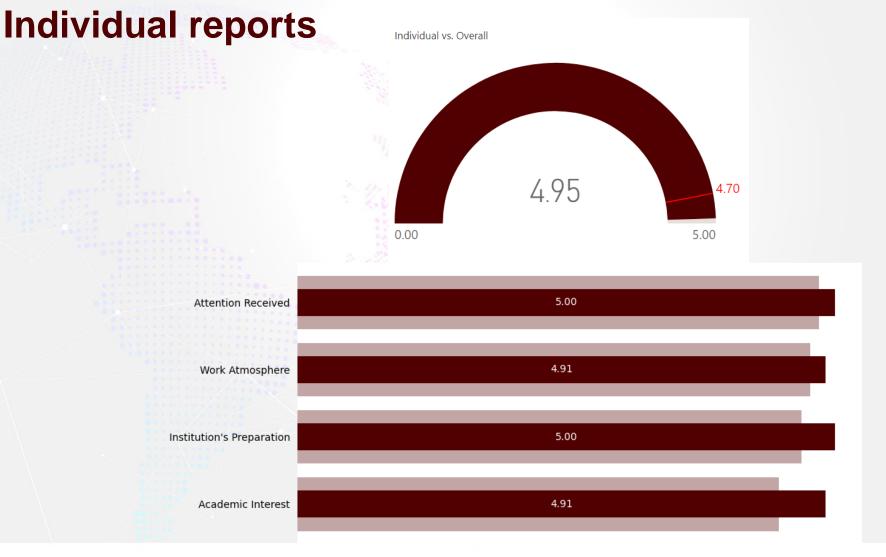
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## The IRAP 2025

- From May 11<sup>th</sup> to August 31<sup>st</sup>
  - Yucatan Phase from May 11<sup>th</sup> to the 24<sup>th</sup>.
  - Virtual collaboration phase from June to August.
  - Closing week at TAMU from August 24<sup>th</sup> to the 31<sup>st</sup>.
- 67 Participants from A&M
  - 60 Students
  - 6 Faculty leaders (4 traveling with the group)
- 34 Participants from SIIDETEY\*

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- 30 students\*
- 4 Faculty leaders









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- College 1st & 2nd year students
- Participant from
- Students from:
  - College of Engineering
  - College of Agriculture & Life Sciences
  - College of Arts & Sciences
  - Mays Business School

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• School of Education and Human Development



Participants profile















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Universidad Marista

















## **Technical Visits**

- Gain a better understanding of how science works "In science even the simplest and 'obvious' things have to be demonstrated to be considered true and objective".
- Gain a better understanding of how collaboration between different fields of science (biology/food science/veterinary/engineering) leads to discovery, innovation, and creative problem-solving
- Hands-on activities.
- Learn about the scientific method implementation.
- Work with researchers.
- Expose the Yucatán research and innovation capabilities























			IRAP May 2025 - Y	/ucatán Day by Day Itinerary						
	Sunday, May 11, 2025	Monday, May 12, 2025	Tuesday, May 13, 2025	Wednesday, May 14, 2025	Thursday, May 15, 2025	Friday, May 16, 2025	Saturday, May 1			
7:30 - 8:00				Pick up at housing						
8:00 - 9:00		Visit to the Yucatán					Pick up at ho			
9:00 - 10:00		Scientific &	Technical Visit 1 UPY: FMAT: UMM: UAM:	Technical Visit 2 UPY: FMAT: UMM: UAM:	Technical Visit 3 FMAT: UPY: UMM: UAM:	Technical Visit 4 FMAT: UPY: UMM: UAM:				
10:00 - 11:00		Technological Park (PCTY)					CULTURAL ACTIN 10:00 am Chichén It 12:30 Visit and sw Cenote Oxman			
11:00 - 12:00										
12:00 - 13:00										
13:00 - 14:00		PCTY Academic Building								
14:00 - 15:00			Transportation to host institutions Introduction to Research Workshop at host institutions							
15:00 - 16:00		Transportation			"Pueblo Magic					
16:00 - 17:00	Depart from Houston Intercontinental Airport			(FMAT - UPY - UN	ransportation to housing					
17:00 - 18:00	5:03 pm CT (UA 1426)	CULTURAL ACTIVITY Mérida City Tour	Team Building activity	Т		Transportation and				
18:00 - 19:00	Host families pick up students at Mérida		Transportation to housing				at housing			
19:00 - 20:00	Airport	Opening Ceremony with								
20:00 - 21:00		host families at UADY								
4:30 - 5:30	Sunday, May 18, 2025	Monday, May 19, 2025	Tuesday, May 20, 2025	Wednesday, May 21, 2025	Thursday, May 22, 2025	Friday, May 23, 2025	Saturday, May Pick up at ho			
4:30 - 5:30							Pick up at ho			
7:30 - 8:00				Depart from Mé Houston 7:00 (UA1427)						
8:00 - 9:00			Pick up at housing							
9:00 - 10:00		<u>Technical Visit 5</u> FMAT: UPY: UMM: UAM:	Technical Visit 6 FMAT: UPY: UMM: UAM:	Workshop: "Transforming knowledge into business" Tecnia Innovation Park (Anahuac-Mayab University)	Final activities (at host Institutions) 09:00 Post-program feedback 10:00 Teamwork 12:00 Final presentations 13:00 Closing activity		(0A1427)			
10:00 - 11:00	-					<b>CULTURAL ACTIVITY</b> Visit to Sotuta de Peón Hacienda				
11:00 - 12:00										
12:00 - 13:00	Family Day									
13:00 - 14:00										
14:00 - 15:00		Transportation to host institutions Introduction to Research Workshop at host		Transportation to Uxmal	Transportation to housing	Transportation to housing				
15:00 - 16:00										
16:00 - 17:00		institutions		Visit to the Cacao Museum						
17:00 - 18:00		Transportation to housing			Pick up at housing					
18:00 - 19:00				Dinner Break	Farewell Reception					
19:00 - 20:00				Visit to the A.Z. Uxmal and	(Universidad Marista)					
20:00 - 21:00	-			"Uxmal Echoes"show	Transportation to housing					
21:00 - 23:00				Transportation and drop off at housing						
			Host Institutions			•	•			
Technical visits			FMAT: Facultad de Matemáticas (UADY)							
Activities at Host Univiersities		UPY: Universidad Politécnica de Yucatán								
Cultural Activities	S	UMM: Universidad Marista Mérida								
Transportation provided by the program		UAM: Universidad Anáhuac - Mayab								











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## **Host Universities**

### Marista University of Mérida (Marista)



Autonomous University of Yucatán (UADY)

**School of Mathematics** 



### Polytechnic University of Yucatán (UPY)



### Anáhuac – Mayab University (UAM)







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## **Technical Visits Calendar**

	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
	13-May	14-May	15-May	16-May	19-May	20-May
	Tuesday	Wednesday	Thursday	Friday	Monday	Tuesday
UADY			e i en			
UPY						
Marista						
náhuac - Mayab						





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## Visit Agenda

09:00 am

-Welcome

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- Institutional presentation
- Practice introduction
  - Activity objective
  - General rules
    - Presentation of activities
- 09:30 am Practice development
- 12:00 pm Lunch break (30 minutes)
- 01:00 pmFinal presentations and visit wrap-up02:00 pmEnd of the technical visit

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Technical Visit Info

Visit Date: Monday, May 22

Institution: Centro Geo

Lab name: National Geointelligence Laboratory - Socio-Ecological Systems

Lab Description: The National GeoIntelligence Laboratory (GeoInt) is a scientific-technological association of the National Council of Science and Technology (CONACCT) formed by the Center for Research in Geospatial Information Sciences (CentroGeo), the Center for Research in Mathematics (CIMAT), and the Potosino Institute of Scientific and Technological Research (IPICYT). Under the operation of CentroGeo, the laboratory was designed to facilitate the application of institutional capacities and their allies to the generation and transfer of knowledge to the public, private, and social sectors, through the development of new projects, products, and services specialized in Geospatial Information Sciences (GIS) and Geointelligence focused on meeting the emerging needs of real-time analysis of large volumes of geospatial data.

Faculty in charge: Dr. Gandhi Samuel Hernández Chan

Visit requirements: Cap or hat, laptop, at least one cell phone with the ability to download an application. Bottle with water, sunscreen, mosquito repellent, clothing with UV and sun protection (long sleeves).



## **Technical Visit Fact Sheet**

- Date of visit
- Institution
- Lab name
- Lab description
- Activity description\*
- Lab responsible
- Visit requirements
- Additional notes\*
- Contact info

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Personnel involved





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## **Economic support**

- 1. **15 USD** will be provided to each lab per student hosted during the visit. \$225\* for an estimated group size of 15 participants\*.
- 2. Economic support will be available through Universidad Marista.
- 3. To receive payment, each institution must submit an official invoice to Universidad Marista following the provided guidelines.

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## **Next steps**

- 1. All 2024 participating institutions are expected to receive their assessment report no later than <u>February 21<sup>st</sup></u>
- 2. Institutional confirmation is required by email no later than March 10<sup>th</sup>.
- 3. <u>In-person meeting</u> on March 20<sup>th</sup> \*(time and location TBC)
- 4. Lab/activity information must be submitted by <u>April 11<sup>th</sup></u> (link to submission form will be provided once the institution confirms their participation)
- 5. Each participating institution will receive the student breakout list by <u>April 28<sup>th</sup>.</u>
- 6. Collaborators involved in the technical visit must be listed by May 4<sup>th</sup>.
- 7. A farewell ceremony will be held on Thursday, <u>May 22<sup>nd</sup> at 7:00 pm</u> in the Universidad Marista, to which all are invited..



















# **Questions?**





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February 14<sup>th</sup>, 2025





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