

GLOBE Observer Mosquito Habitat Mapper

April 24, 2018

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Institute for Global Environmental Strategies, Arlington VA
GLOBE Observer: Mosquito Habitat Mapper Team Science Lead

**The Mosquito Challenge
Community Campaign**

COMBATING ZIKA
AND FUTURE THREATS
A GRAND CHALLENGE FOR DEVELOPMENT

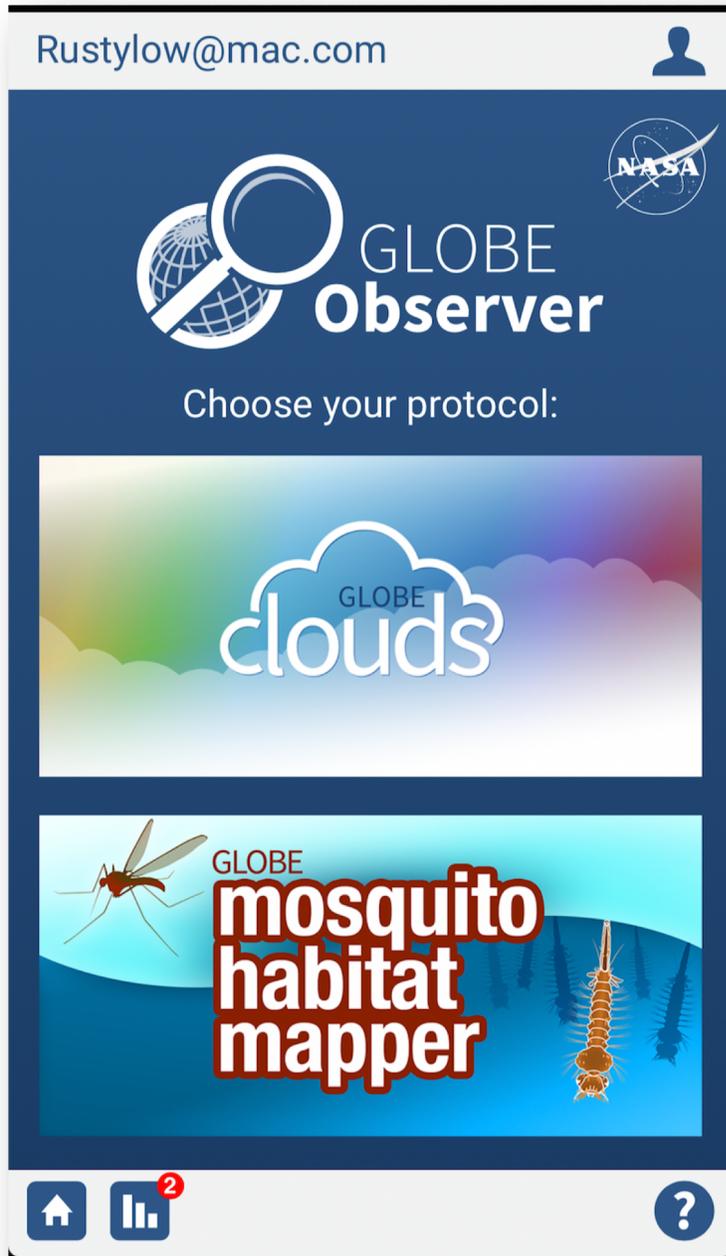


**INSTITUTE
for
GLOBAL
ENVIRONMENTAL
STRATEGIES**



Developing a Citizen Science Project

- Simple, easy to use
- Motivations and rewards
- Accuracy and data quality
- Usefulness of data
- Societal benefits of participation

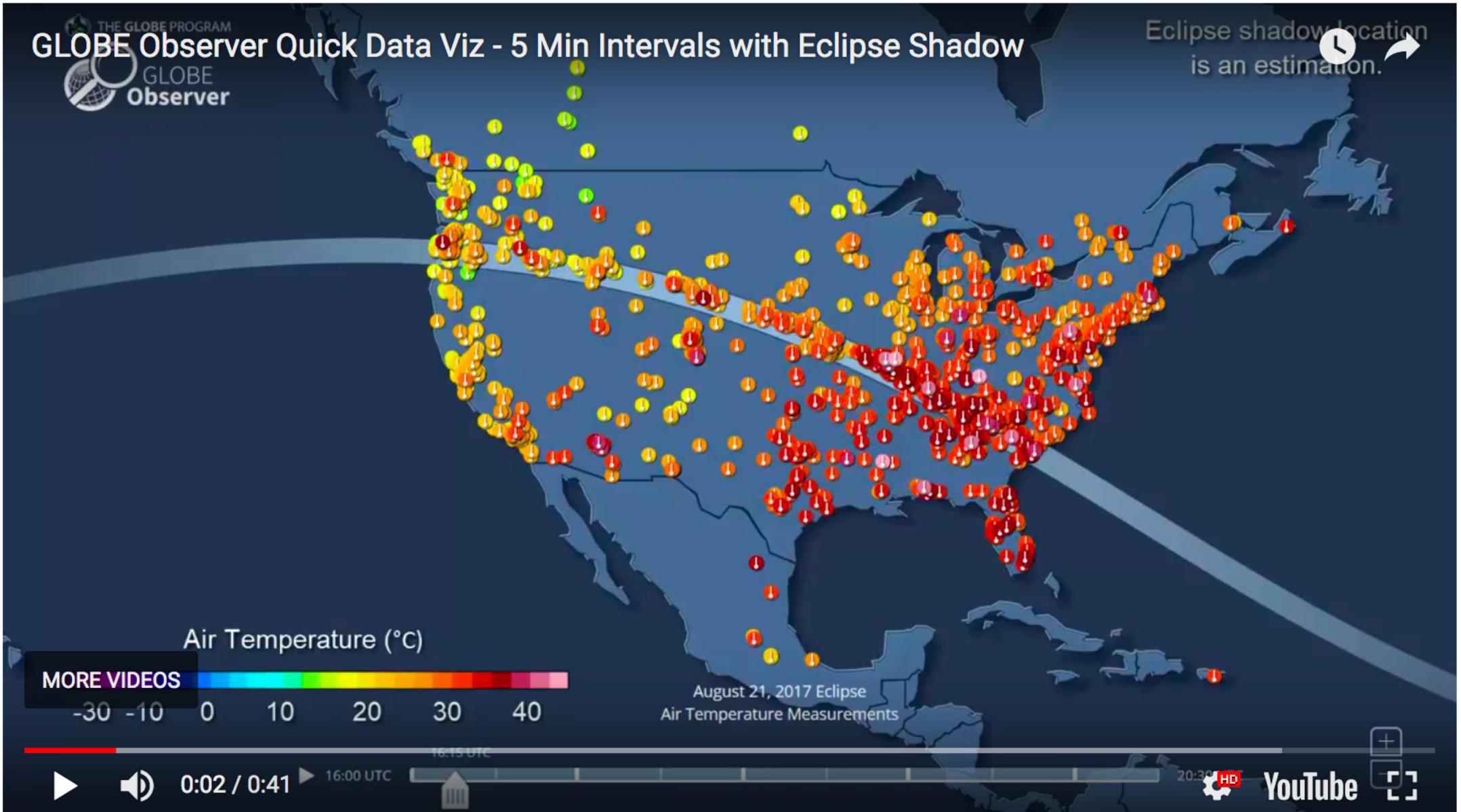


Simple, easy to use

GLOBE Observer is an international network of citizen scientists, of all ages and scientists working together to learn more about our shared environment, changing climate and its impacts.

GLOBE Observer Quick Data Viz - 5 Min Intervals with Eclipse Shadow

Eclipse shadow location is an estimation.



MORE VIDEOS

Air Temperature (°C)

-30 -10 0 10 20 30 40

August 21, 2017 Eclipse
Air Temperature Measurements



0:02 / 0:41

16:00 UTC

16:15 UTC



HD

YouTube



doveroye@gmail.com 

 **GLOBE Observer**

Choose your protocol:

 **GLOBE clouds**

 **GLOBE mosquito habitat mapper**

 **GLOBE Land Cover**
Adopt a Pixel

Visit the Website

GLOBE Land Cover
Adopt a Pixel

Observations: **189**

New Land Cover Observation

Review / Send My Land Cover Observations

Where to Observe?

Set/Check Satellite Flyover

See My Data

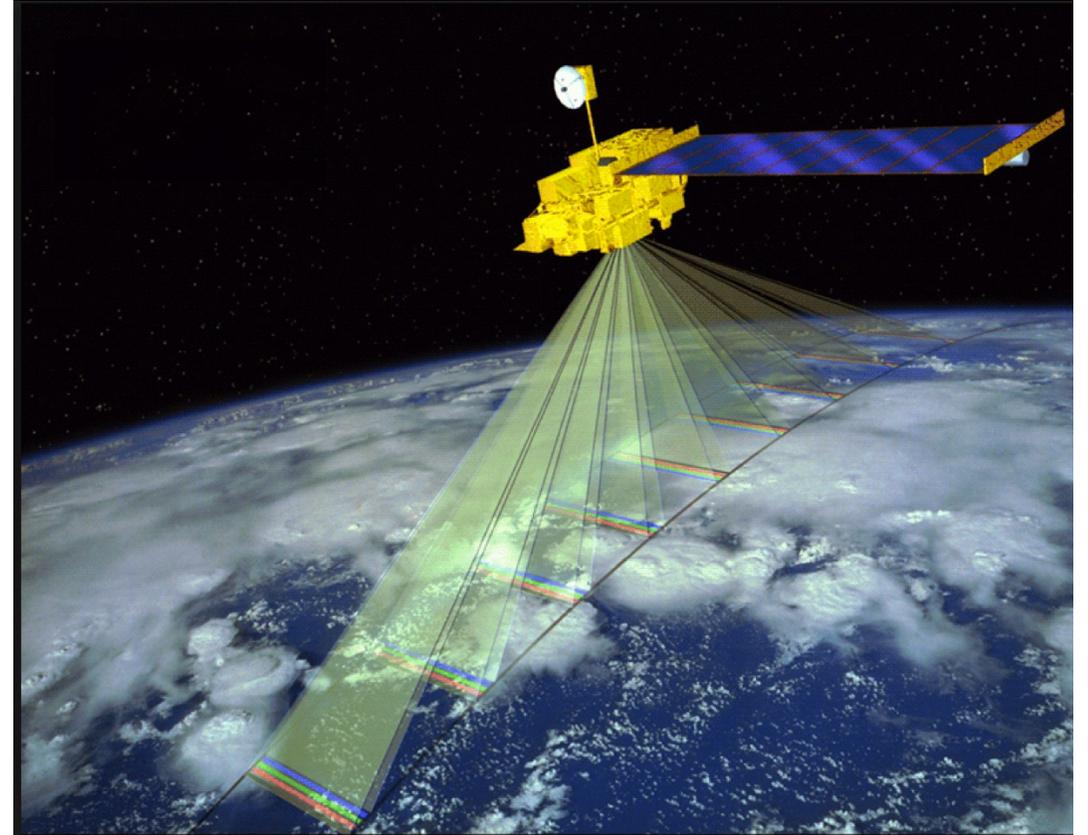
   

You can't quite see mosquitoes from here....

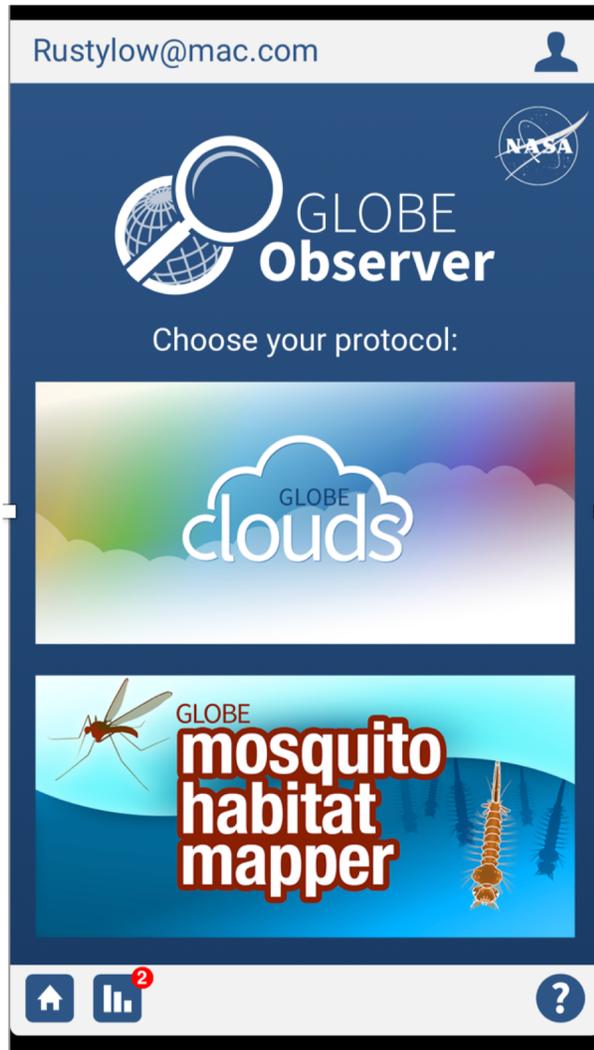
Why is NASA and AEB sponsoring this work?

Through ground-based observations, GLOBE Observer citizen scientists will be able to augment broad scale satellite-based research with highly targeted ground-based observations at a high level of granularity.

Why high interest? Insufficient surveillance worldwide, heightened interest in using satellite data to predict outbreaks of vector borne disease.



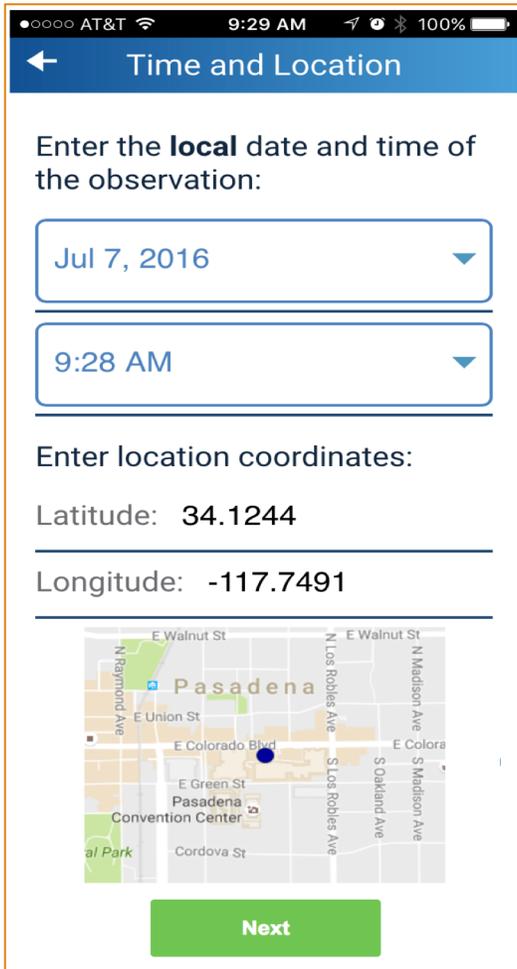
Terra (NASA)



The mosquito is the world's most dangerous animal.

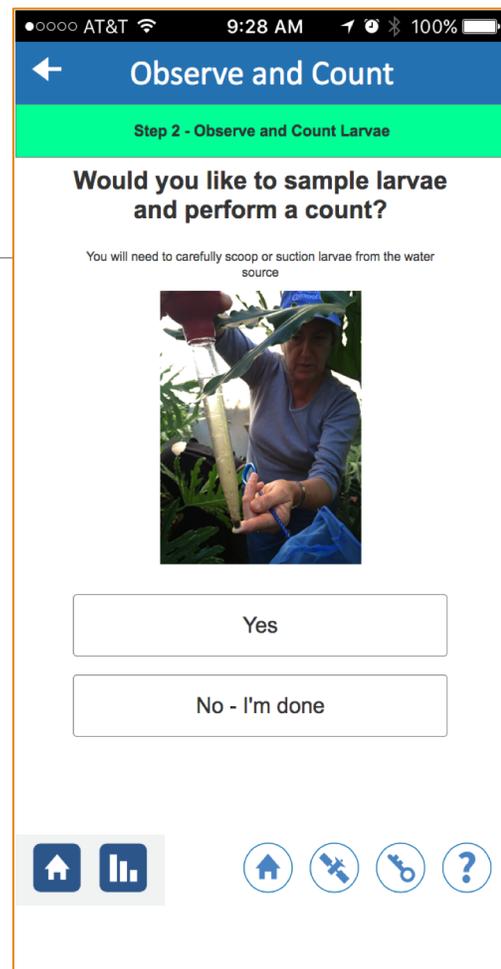
Project observes and reports larvae, an immature developmental stage of the mosquito that lives in water, doesn't bite and doesn't pose a health hazard to humans





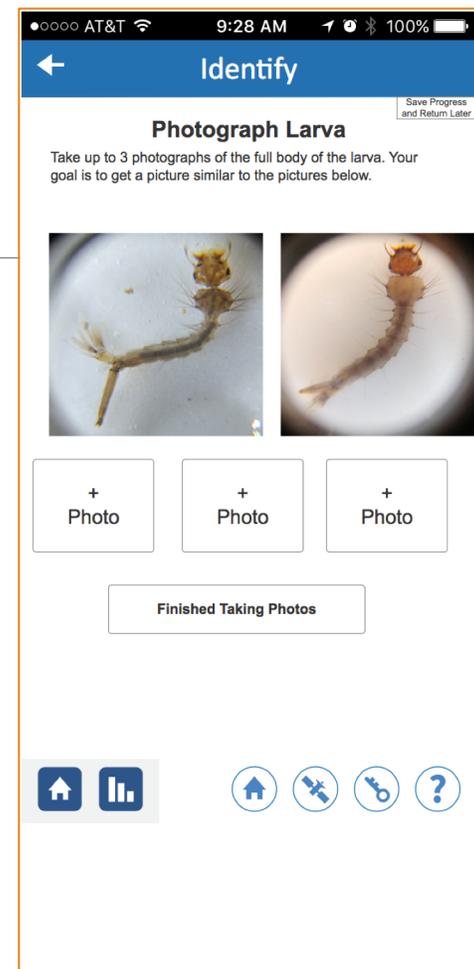
Locate breeding site

1



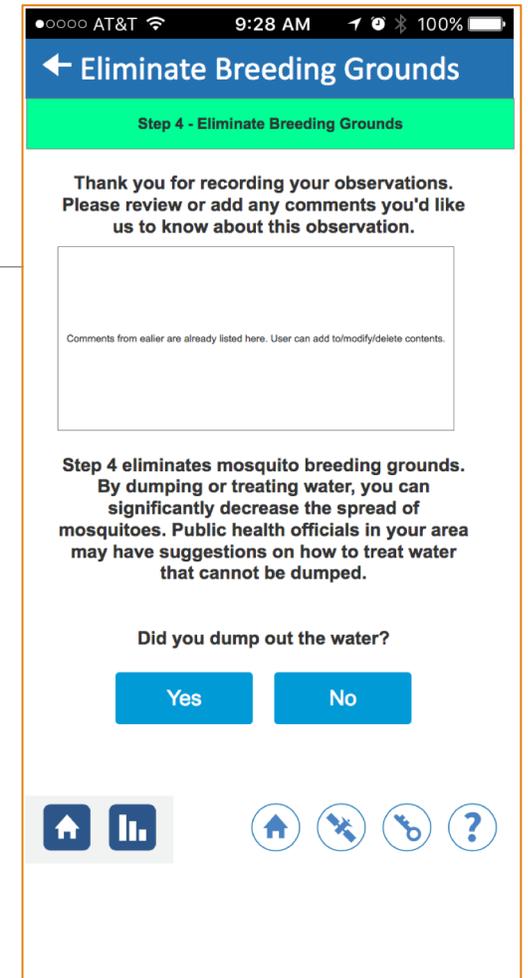
sample & count

2



identify

3



decommission

4

< Identify Larvae Save

Take up to three photographs of the full body of the larva. Your goal is to get a picture similar to the pictures below.



< >



< Identify Larvae Save

Take up to three photographs of the full body of the larva. Your goal is to get a picture similar to the pictures below.



< >

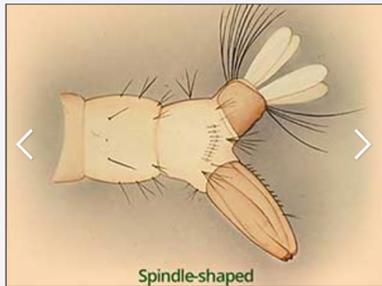


< >

< Identify Larvae Save

Siphon Shape

The mosquito larvae siphon can take different shapes. Some are modified for piercing (pointed), others are cylindrical or spindle-shaped. Examine the shape of the siphon in your photographs and determine if the siphon is pointed, or if it is cylindrical or spindle-shaped.



Spindle-shaped

Use your existing photos, or take new photos focused on the larvae siphon.

< Eliminate Breeding Habitat Save

Not one of our key 3 genera

Based on your analysis of the larva, this is probably not one of the three key disease carrying genera we are investigating - *Aedes*, *Anopheles* or *Culex*. Thank you for your analysis. Please proceed to eliminate this mosquito breeding habitat.

Continue >

Usually there is only one type of larva at a given site, but you can choose to try again, or redo your analysis at a later time.

< Go back and try another larva

Save the sample for later analysis >

Eliminate Breeding Habitat Save

Thank you, your data has been stored successfully on your device and is ready to send to GLOBE.

Your work has:

- Eliminated 2 breeding habitats
- Identified 0 larvae
- Photographed 1 breeding habitats
- You have completed 3 observations



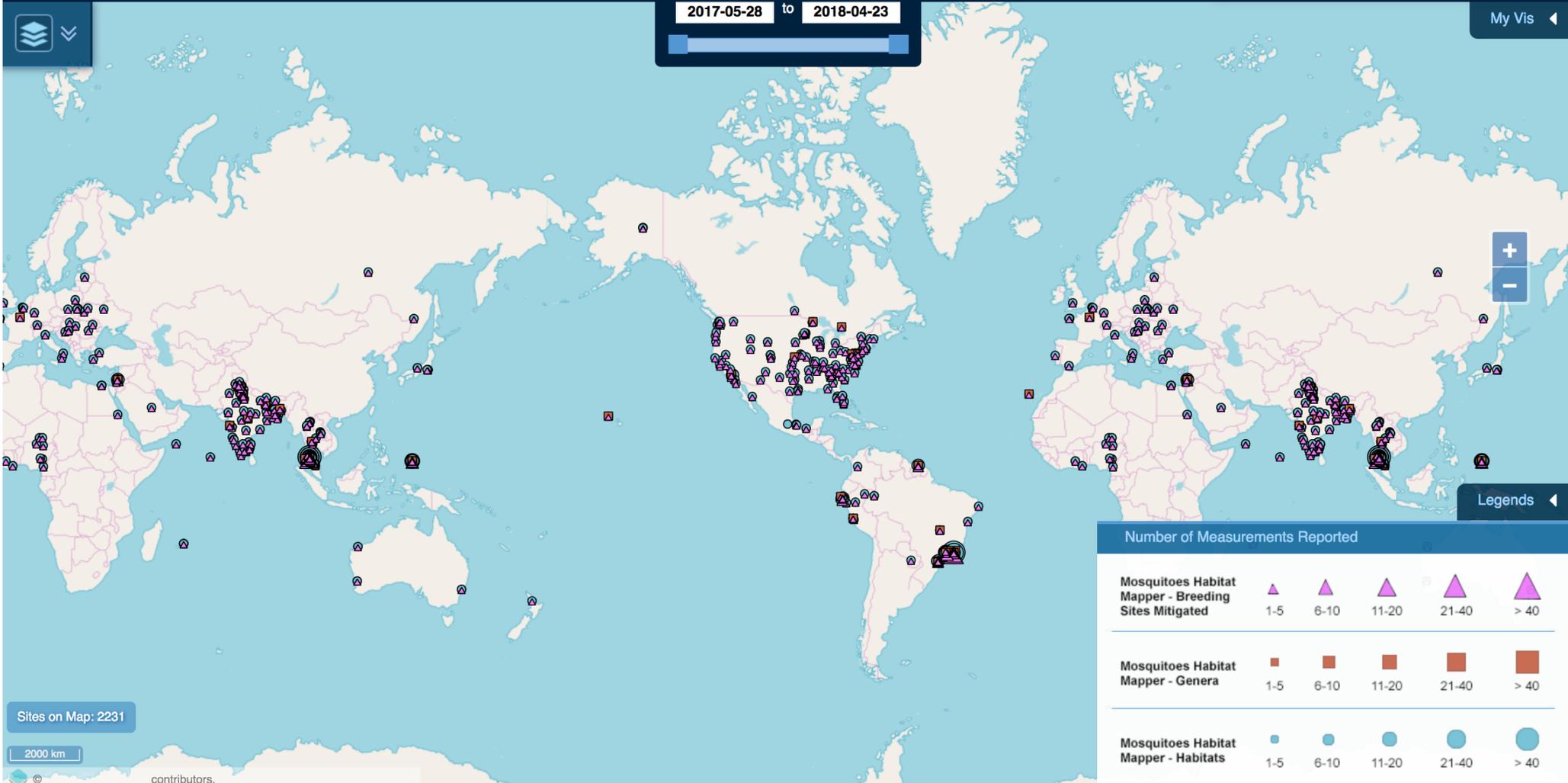
Your Rank: Frog Egg





2017-05-28 to 2018-04-23

My Vis



Legends

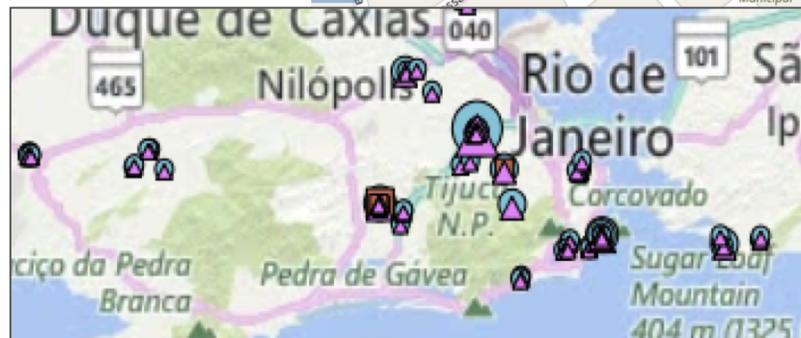
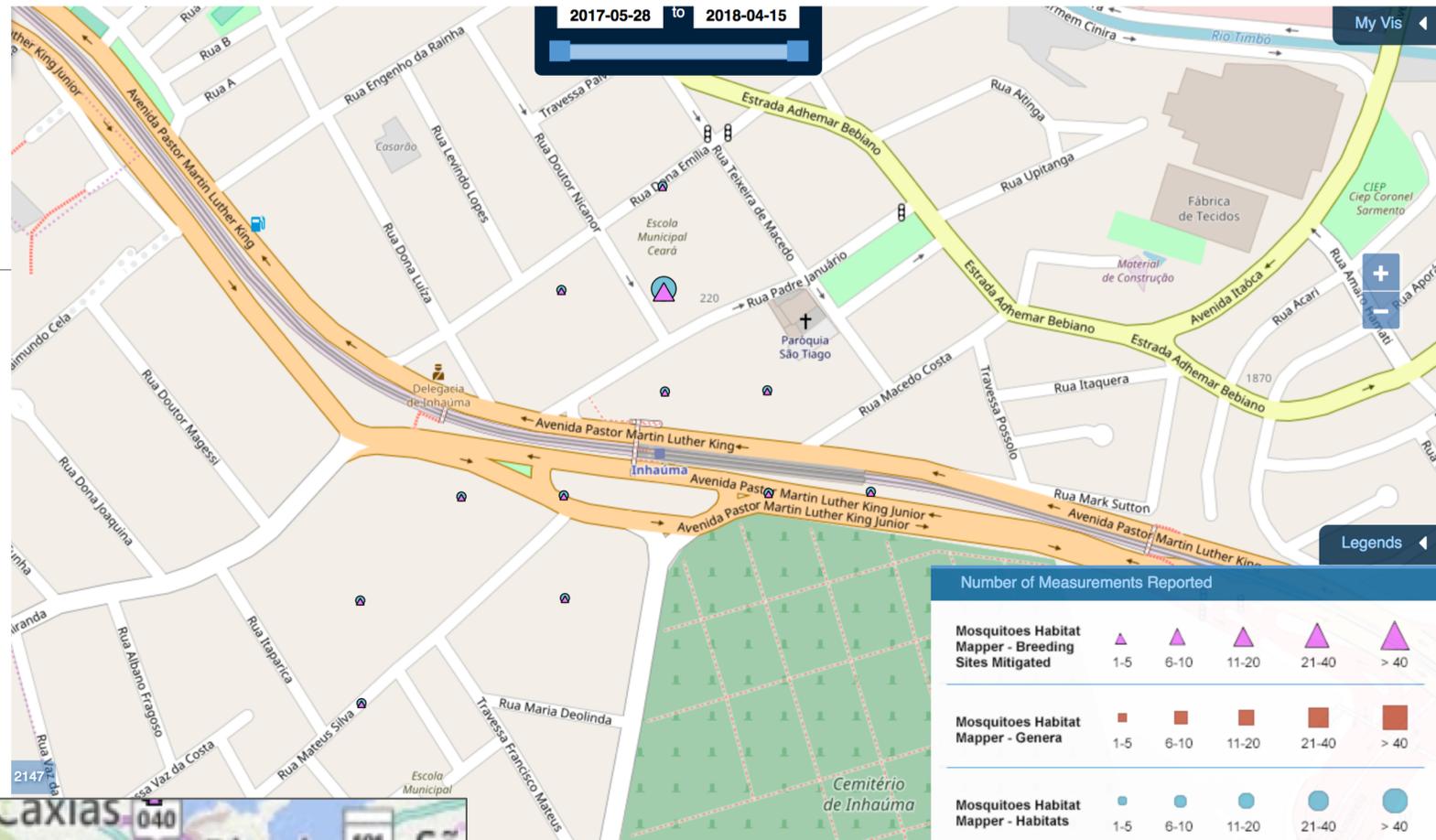
Number of Measurements Reported

Mosquitoes Habitat Mapper - Breeding Sites Mitigated	▲	▲	▲	▲	▲
	1-5	6-10	11-20	21-40	> 40
Mosquitoes Habitat Mapper - Genera	■	■	■	■	■
	1-5	6-10	11-20	21-40	> 40
Mosquitoes Habitat Mapper - Habitats	●	●	●	●	●
	1-5	6-10	11-20	21-40	> 40

Sites on Map: 2231

2000 km

© contributors.



Above: Data reported by citizen scientists since inception, using the GO MHM app, June-December 2017. See inset image, Rio de Janeiro, Brazil data hub, where intensive training pilot took place in May-June 2017. N=1523.

[\(https://vis.globe.gov/GLOBE/\)](https://vis.globe.gov/GLOBE/)

Accuracy and data quality

1 Measurements | Data Counts   Welcome Russanne Lov

2017-05-28 to 2018-04-23

School: Escola Municipal Governador Carlos Lacerda 
Site: 23KPQ669630

Next Site 
◀ 3/4 ▶

Measurements | Data Counts | School Info | Site Info | **Photos**

Select Photos: Mosquito Habitat Mapper | Select Date: 2017-08-10



Body (1/1)



Abdomen Closeup (1/1)

The image shows a screenshot of a web application interface for mosquito data collection. The top navigation bar includes 'Measurements' and 'Data Counts' tabs, a user profile icon, and a 'Welcome' message. A date range filter is set to '2017-05-28 to 2018-04-23'. The main content area displays a map of South America with several red location markers. A modal window is open, showing details for a specific site: 'Escola Municipal Governador Carlos Lacerda' with site ID '23KPQ669630'. The modal has tabs for 'Measurements', 'Data Counts', 'School Info', 'Site Info', and 'Photos', with 'Photos' selected. It features a 'Select Photos' dropdown menu set to 'Mosquito Habitat Mapper' and a 'Select Date' dropdown set to '2017-08-10'. Below these are two photo thumbnails: 'Body (1/1)' and 'Abdomen Closeup (1/1)'. Navigation arrows are visible on the left and right sides of the photo gallery.

2018-04-07

My Vis



Protocol Layers

Mosquito Genera ✓

Mosquito Breeding Sites Mitigated ✓

Mosquito Habitats ✓

Mosquito Habitat Update

Mosquito Genera Update

- All Genera
- Unknown
- Anopheles
- Culex
- Aedes
- Aedes aegypti
- Aedes albopictus
- Aedes albopictus or aegypti indeterminate

Choose sphere to explore protocols

● Atmosphere >

● Biosphere >

● Hydrosphere >

<https://assets.globe.gov/photos/2018/04/08/660437/original.jpg>

Brazil Citizen Science

Site: 23LJC915535

Measurements

Data Counts

Site Info

Photos

Select Photos: Mosquito Habitat Mapper

Select Date: 2018-04-08



Water Source (2/2)



Larva Full Body (1/2)



Larva Full Body (2/2)



Legends

PHOTO REVIEW

GLOBE.gov

View: Unapproved ▾

App: Mosquitoes ▾

Sort by: Oldest ▾

Display: 5 ▾

◀ Prev Next ▶



2 submissions with 9 unapproved mosquitoes photos are pending approval



Clear Approvals



Submit Approvals

Citizen Scientist

sand_811@hotmail.com

Peru

-3.7474°, -73.2531°

Mosquitoes

2018-04-23

23:31:00

Mark All
In Row:



Water
Source
(1/2)



Water
Source
(2/2)



Larva
Full Body
(1/3)



Larva
Full Body
(2/3)



Larva
Full Body
(3/3)



Mark All as
Approved



Submit
Approvals

The Mosquito Challenge Community Campaign

COMBATING ZIKA AND FUTURE THREATS A GRAND CHALLENGE FOR DEVELOPMENT

Empowering Kids as Agents of Change
GO Mosquito Challenge

THESE MONSTERS ARE VIRTUAL
You've seen kids chasing and capturing virtual reality monsters on their mobile phones.

BUT THESE MONSTERS ARE REAL
What if kids were as excited about getting rid of real monsters—the mosquito vectors that cause illness and kill millions of people every year?

THE PROBLEM
Aedes aegypti breeds in cryptic places (storm drains, roof gutters, etc.). Locations change quickly, and are time consuming to find and eliminate.

Teachers and Students to the Rescue
Leverage the international GLOBE Program network of partners, teachers, students, and scientists to train and support a student citizen science corps needed to zero in on breeding sites of mosquitoes, and demonstrate the value of this pilot citizen science project to reducing the threat of Zika.

GLOBE Observer Mosquito Habitat Mapper
Easy-to-use mobile platform to:
• Identify and report potential and active mosquito breeding sites; and
• Sample and count larvae.

In-app key to:
• Determine whether the larvae found could potentially mature into vectors of mosquito borne disease;
• Eliminate the breeding site; and
• Upload data

FOR TEACHERS
• Training workshops
• Educational materials & Curriculum
• Classroom equipment
• Ongoing support

FOR STUDENTS
• Leaderboards to inspire data collection
• Digital games to build skills
• Virtual scientist mentoring
• International Science Fair and prizes

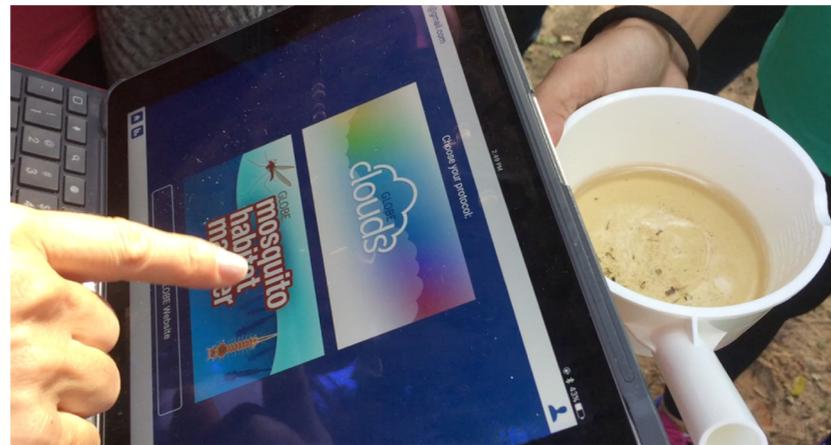
Connecting to Public Health
Open-source data accessed via a map interface by public health professionals and scientists. The data also serves as ground verification for scientists who model mosquito population dynamics and predict disease outbreaks.

South America Map. Artist's rendition of probability heat map showing predicted prevalence/absence of Aedes aegypti.
RED = greatest probability
BLUE = least probability

40 Mosquito project pilot locations

mosquito.strategies.org • rusty_low@strategies.org

Piloting in Brazil and Peru, this game-changing solution is using the power of kid citizen science to combat Zika.



Motivations and rewards



La ciencia te necesita como participante de GO Mosquito

Como Escuelas Activas del Desafío GO MOSQUITO, tú y tus compañeros de clase pueden usar la aplicación Cartógrafo de Hábitats de Mosquito de GLOBE Observer, una plataforma móvil de fácil uso, para ayudar a identificar dónde se encuentran las larvas de mosquito que portan enfermedades en sus escuelas, hogares, vecindarios y comunidades.

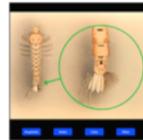
Esta Aplicación Cartógrafo de Hábitats de Mosquito, te puede ayudar a determinar si las larvas que tú encuentras podrían potencialmente madurar en vectores letales de enfermedades transmitidas por el mosquito. Junto con tu ayuda, podemos enfocarnos mejor en los mosquitos que trasmiten enfermedades mortales tales como el virus Zika.



Maestros en Río de Janeiro, Brasil, tomando muestras de larvas de mosquito después de una tormenta. Foto: Dr. Rusty Low.

NOTICIAS de GO MOSQUITO

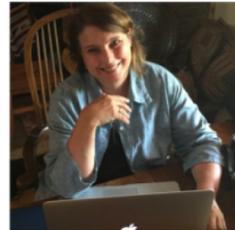
Identificación interactiva de larvas



Prueba tus conocimientos



CONOCE A LOS CIENTIFICOS



Dra. Rusty Low

Envie seu Projeto de Feira de Ciências

Entradas da Feira de Ciências



CONTRIBUIÇÕES DO PROJETO DE M...



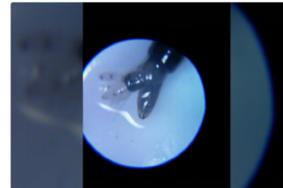
ZIKA ZERO, XÔ MOSQUITO!



A INFLUÊNCIA DE FERTILIZANTES E ...



A BIOLOGIA DO AEDES AEGYPTI E D...



CONHECENDO PARA EDUCAR - GLO...



ZILAH COM CIÊNCIA: TODOS CONTR...



ARBOVIROSES - IDENTIFICANDO O ...



ESQUENTOU, CHOVEU, EMPOÇOU?!



Will people Participate?

 Smithsonian
Science Education Center

 iap SCIENCE RESEARCH HEALTH
the interacademy partnership

Zika!



CURRICULUM MODULE PLANNING DOCUMENT

Developing and Disseminating an Online Inquiry-based Science Education Curriculum Module to Help International 8-14 Year Old Youth Learn about Mosquito-borne Diseases

"At the heart of this work is the idea that all youth -- regardless of gender, geography, or socio-economic status -- should understand mosquito-borne illnesses like Zika, Dengue and Chikungunya, and that we must all play a more active role in sparking interest in STEM through gateway experiences that raise scientific understanding across the globe."

Dr. Carol O'Donnell, Director
Smithsonian Science Education Center

PLANNING DOCUMENT CONTACT
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E: radloff@si.edu



 Smithsonian
Science Education Center

 iap SCIENCE RESEARCH HEALTH
the interacademy partnership

M O S Q U I T O



COMMUNITY RESEARCH GUIDE

HOW CAN WE ENSURE HEALTH FOR ALL FROM MOSQUITOES?

SCIENCE FOR SUSTAINABLE ACTION

Public interest and excitement



f /wmpbrasil

O PROJETO

NOTÍCIAS

IMPRENSA

O PROJETO NA MÍDIA

O PROGRAMA NO MUNDO

PUBLICAÇÕES CIENTÍFICAS

PERGUNTAS FREQUENTES

EQUIPE

CONTATO

IMPRENSA

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U.S. Department of State

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U.S. Department of State
March 29 at 6:00pm · 🌐

Russanne (Rusty) Low's keen interest in investigating habitats has taken her from archeology and paleoclimate research to where she is today: following the spread of mosquito-borne illnesses such as Zika through the use of mobile technology.

Learn how Rusty's work on Zika will create new data sets that do not exist today; help students better understand their environment and mitigate risk; deliver the new data sources to health officials and their communities; and enable the efforts to be replicated throughout the world. <https://go.usa.gov/xQrPH>



BLOGS.STATE.GOV

Arming Citizen Scientists With an App to Identify Zika Carriers
Part four in USAID's series on Grand Challenge female innovators...

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BLOGS

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« Citizen Science Recruitment, Retention, Research & Evaluation Workshop at Citizen Science Association Conference
Book Review: Citizen Science, How Ordinary People are Changing the Face of Discovery »

Global Mosquito Alert: UN Backed Citizen Science Platform to Fight Mosquito-Borne Diseases

By Guest | May 16, 2017 10:24 am

t f t + 47

With the summer approaching, so are the mosquitoes. Now a UN-backed global platform will align citizen scientists from around the world to track and control these disease-carrying species.

By Yujia He

Mosquitoes are an annoying and unavoidable part of the warmer season. Their constant buzzing follows you whenever you step outside of [your house](#), and the females feast on your blood to produce their offspring.

Discover
Editing What We

o Challenge, desenvolvido pelo Instituto de

Designing a citizen science project

- Simple, easy to use
- Motivations and rewards
- Accuracy and data quality
- Societal benefits of participation
- Usefulness of data



<https://www.citizenscience.gov/toolkit/>



Data Partners

- **FIOCRUZ, Rio de Janeiro**
- **Ministries of Health, Brazil and Peru**
- **Ministry of the Environment, Peru**
- **CARE**
- **WCS: Citizen Science of the Amazon**
- **Pan American Health Organization**
- **World Mosquito Project**

NASA DEVELOP: Taking a Bite Out of Mosquito-borne Illness

The Wilson Center, partnered with NASA Earth Science Education Consortium (NESEC) and members of the Global Mosquito Alert Consortium to propose and support the DEVELOP project, *Taking a Bite Out of Mosquito-borne Illness: Mapping and Monitoring Vector-borne Diseases in Western Europe*. This research is one of the first projects that attempts to describe mosquito risk using both remotely sensed environmental data from satellites in conjunction with citizen science observations. The project also serves as an early exploration of the value of citizen science data collected by the GLOBE **Observer** Mosquito Habitat Mapper when analyzed in conjunction with satellite data. The Fall 2017 project results were presented at a Nov. 8 hand off meeting that was webcast, and participants included scientists and citizen science programs from US, Germany, and Netherlands.

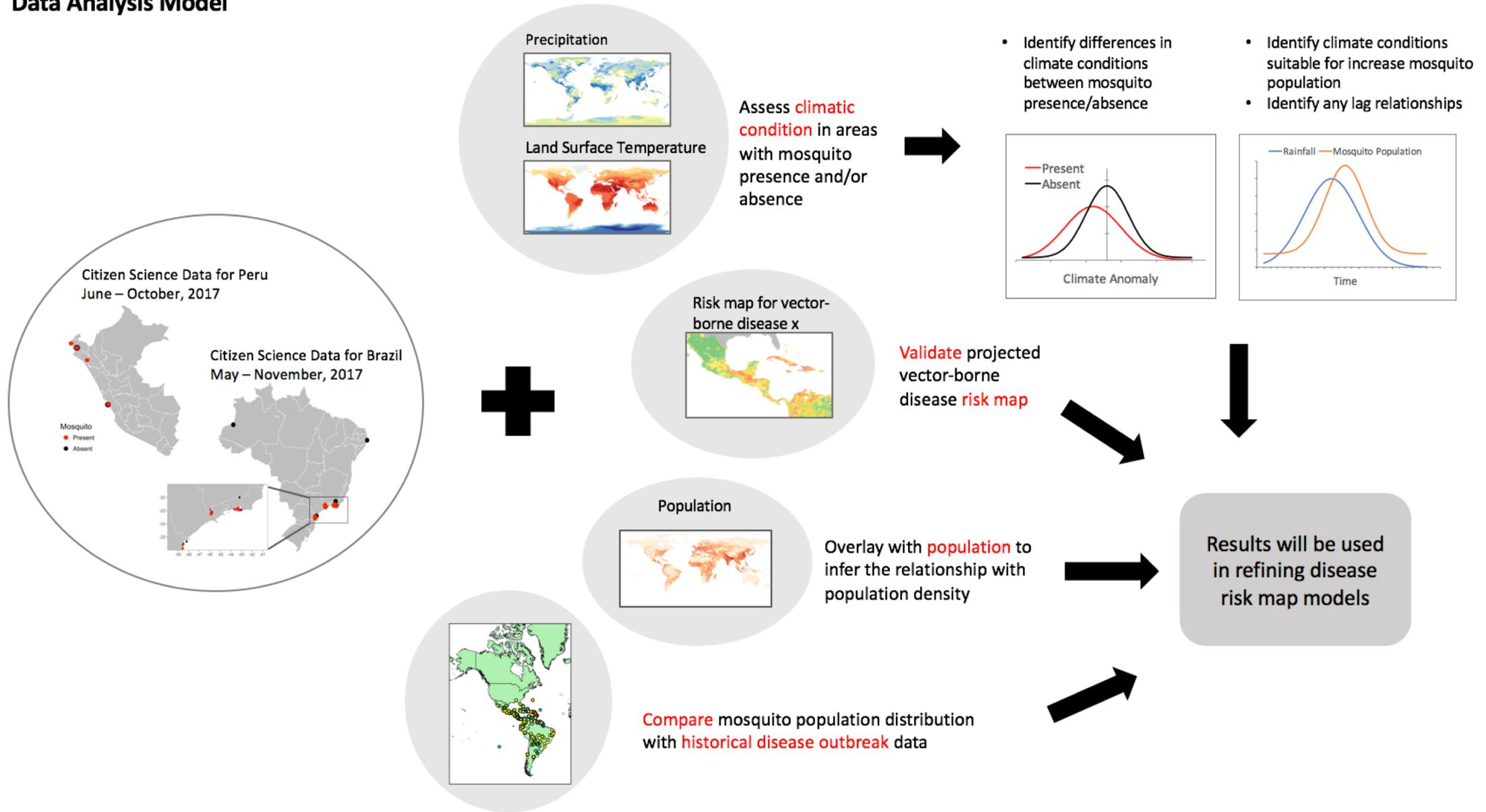
For more information: <https://www.wilsoncenter.org/event/global-mosquito-alert-nasa-develop-project-partners-handoff>

Photos to right DEVELOP team presentation, Wilson Center, DC.



11/16/17

Data Analysis Model





Usefulness of Data: public health, modelers, municipalities

PRESS RELEASE

Pioneering UN Backed, Citizen Led Alliance against Mosquito Borne Diseases Joins Global Fight to Save 2.7 Million Lives Every Year

Initiative Empowers National Networks, Stakeholders and Governments to Generate and Access Real-time Data and Tools through UN Electronic Platform ‘Environment Live’

Geneva, 8 May, 2017 – A new alliance of citizen-science organizations and UN Environment will be launched, Monday, in an effort to escalate the global fight against mosquito-borne diseases, responsible for killing close to 2.7 million people annually, mostly in Africa and Latin America. Overall mosquito borne cases are estimated at 500 million every year.

The new initiative, launched under the name **‘Global Mosquito Alert’**, brings together thousands of scientists and volunteers from around the world to track and control mosquito borne viruses, including Zia, yellow fever, chikungunya, dengue, malaria and the West Nile virus. It is the first global platform dedicated to citizen science techniques to tackle the monitoring of mosquito populations.

- **Global health security**
- **Increased surveillance**
- **Local empowerment of communities**
- **Take action reducing vector-borne disease**

Acknowledgements

Mosquito Habitat Mapper Team

Russanne Low, IGES
Holli Riebeek Kohl, GSFC
Kristen Weaver, GSFC
Dorian Janney, GSFC
Theresa Schwerin, IGES
David Overoye, SSAI
Rebecca Boger, Brooklyn College
Pablo Munoz, INTEL

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Dr. Nadia Sacenco, Deputy Coordinator
Dr. Aline Venoso, AEB, Brasilia
Prof. Ines Mauad, Rio de Janeiro
Prof. Renee Codosi, Salvador

Project Leads- GLOBE Peru

Jose Martin Cardinas Silva, Country Coordinator
Marissa Valdez, Peace Corps

NASA Mosquito Mapper Project Scientists

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**GLOBE Observer Citizen Scientists
&
GLOBE Program Participants**

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