

3. Satellite Data Master Trainer Session



#### **Science Background**

- 1. Introduction to GO MHM
- 2. Mosquito Vectors of Disease
- 3. Satellite Data and NASA Connections
- 4. Prior Knowledge Quiz
- 5. Describing your mosquito habitat site using the GO MHM App
- 6. Using the app for the first time
- Lunch and Fieldwork
- Hands-on session and Tour of GO MHM
- 7. Using the macrolens
- 8. Identifying specimens
- 9. Breakouts- Small Group Work
- 10. Education and Training Resources/ Bingo and digital games

# **Seeing Mosquitoes from Space?**

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observer.globe.gov

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# Why is NASA interested in mosquitoes?

NASA studies many aspects of the Earth system, and we assist scientists around the world- Citizen Scientists too- in using NASA data in their research.

What types of data do you think NASA missions are able to collect that would be useful to people studying mosquitoes?



# NASA data that is useful includes:

- Precipitation
- Soil moisture
- Vegetation and landcover
- Surface temperature



### **Mosquitoes, Environment & Weather**

#### Hurricanes? Floods? Droughts?

Unusually high rainfall: creates new breeding sites where none existed before.

Unusually low rainfall can change habitats can concentrate water into small pools where there was previously flowing water.

Increase in proportion of breeding sites in containers.

Hurricanes or drought: Both provide new and unique places for mosquitoes to breed.



Citizen Scientists! You play an important role in finding and mitigating breeding sites

### You Can't See Mosquitoes from Space!

"I don't see mosquitoes from satellites, unfortunately, but I see the environment where mosquitoes are," says Felix Kogan of the NOAA Satellite and Information Service in this video about his work.

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#### "Mosquitoes like warm and moist environments and this is what I see from the operational satellites."

Seasonal patterns of temperature and precipitation may be altered by climate change where you live. Changes in land use is also an important factor in creating new mosquito breeding sites.



Can't quite see mosquitoes from here. Terra from space. Image: NASA.

### On-the-ground monitoring of mosquito breeding habitats is important for NASA Science!



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# Remote sensing data products used to create predictive models of disease transmission





#### **Data Analysis Model**



#### (Anyamba and Soebiyanto 2017)

# Where to find NASA Satellite Data



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#### https://www.strategies.org/ed ucation/educators-toolkit/

#### http://bit.ly/2yaSwEj

Potential topics for investigating factors that contribute to mosquito breeding habitats -

- climate (factors contributing to global and regional climate),
- land cover classification (land cover changes),
- land surface (water and land use changes, ecosystems),

- land surface temperature (global warming, urban heat islands, weather/seasons),
- precipitation (breeding grounds),
- vegetation (seasonal changes)
- soil moisture (breeding grounds)

### NASA Earth Science Data: Yours to Use, Fully and Without Restrictions

NASA's data policy ensures that all NASA data are available fully, openly, and without restrictions. This full and open data policy also ensures that there is no period of exclusive use of these data or access to these data, and that they are made available as soon as practical following the launch of a satellite or the start of a mission.

A key component of this effort is NASA's <u>Earth Observing System Data and</u> <u>Information System (EOSDIS)</u>, which is responsible for processing, archiving, and disseminating NASA's vast collection of data from Earth observing missions. EOSDIS currently provides access to more than 17.5 petabytes of archived data and more than 11,000 unique data products along with the metadata, algorithms, source code, and imagery associated with these products.

### NASA Science Visualization Studio https://svs.gsfc.nasa.gov/

The Scientific Visualization Studio wants you to learn about NASA programs through visualization. The SVS works closely with scientists in the creation of visualizations, animations, and images in order to promote a greater understanding of Earth and Space Science research activities at NASA and within the academic research community supported by NASA.

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# NASA Earth Observations - NEO https://neo.sci.gsfc.nasa.gov

#### What it displays:

Over 50 different
global datasets with
daily, weekly, and
monthly snapshots.

 Images are available in a variety of formats including JPEG, PNG, Google Earth, and GeoTIFF.



#### https://neo.sci.gsfc.nasa.gov

### NASA Precipitation Measurement Mission

#### What it displays:

Datasets are presented in near-real time (from as recent as the past 30 minutes, previous 24 hours and past 7 days

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Why this tool is relevant to a student investigation of hurricanes?

It is a valuable resource for students seeking answers to general hurricane-related questions as well as sources of evidence to support their claims about hurricanes;

- Where the clouds come from? or
- Where did all of that water come from?

**Global Precipitation Measurement Mission data** 

 – GPM IMERG data is available through the NASA Worldview website.



https://go.nasa.gov/2zgFwZl

# NASA Worldview https://worldview.earthdata.nasa.gov

#### What it displays:

 NASA Worldview displays fullresolution satellite images that essentially show the entire Earth as it looks "right now."

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# Why this tool is relevant to a student investigation of hurricanes:

 Data is available in near-real time. Students will be able to analyze, look for patterns and make predictions using data and tools that support unique science investigations.



# Why Collect Mosquito Data?

Globally, there is a major effort to use data from satellites to predict the onset, decline, and spread of vector-borne diseases. Reliable ground-based data are helpful for the development of realistic computer models based on satellite data.

In most parts of the world, ground verification data are simply not available- so GLOBE observations are critically important to tracking and controlling disease.

And- these satellites can't distinguish between the sites in your community- we need the "eyes in the sky" but also the "boots on the ground"!







# Where to find GLOBE Data

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mapper

GLOBE provides the ability to view and interact with data measured across the world. Use our <u>visualization tool</u> to map, graph, filter and export data that have been measured across GLOBE protocols since 1995. The Mosquito Protocol is new- so we look forward to seeing your data! <u>Link</u> to step-by-step tutorial on using the GLOBE Data Visualization Tool.



### Where to find GO Mosquito Habitat Mapper Data

Choose your sphere: **Hydrosphere** Check to select protocols: **Mosquito Habitat Mapper and data type** 

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Click on "data counts" to obtain data from a specific interval.



Link to step-by-step tutorial on using the GLOBE Data Visualization Tool



Select the date for which you need data, add layer and you can see where data is available. Click on a point to access details.





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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/)

#### GLOBE Observer mosquito habitat mapper

### Where to find NASA Data Tools and Visualizations

**Educator Toolkit: Resources to develop student investigations** https://www.strategies.org/products/earth-and-human-activity/ **NASA Earth Observatory** http://earthobservatory.nasa.gov **Science Visualization Studio** https://svs.gsfc.nasa.gov NASA NEO https://neo.sci.gsfc.nasa.gov **NASA Precipitation Mission** https://pmm.nasa.gov/data-access/global-viewer **NASA Worldview** https://worldview.earthdata.nasa.gov

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The Mosquito Challenge Community Campaign (MCCC) is focused on demonstrating the usefulness of citizen science data collected using the GO Mosquito Habitat Mapper for combating Zika in Brazil and Peru. MCCC is led by IGES in partnership with the University Corporation for Atmospheric Research (UCAR), and leverages the NASA App, and the GLOBE Program networks of scientists, teachers, students, and citizen scientists. The MCCC project is made possible through the generous support of the *Combating Zika and Future Threats Grand Challenge* through the United States Agency for International Development (USAID).

This presentation was prepared by the Institute for Global Environmental Strategies (IGES) and does not necessarily reflect the views of the NASA or USAID. For more information, contact the Dr. Russanne Low, IGES at: <u>Rusty\_low@strategies.org</u>

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