Rapid Detection of Deforestation and Fire and Carbon Sequestration Monitoring

A Mesoamerican Case Study

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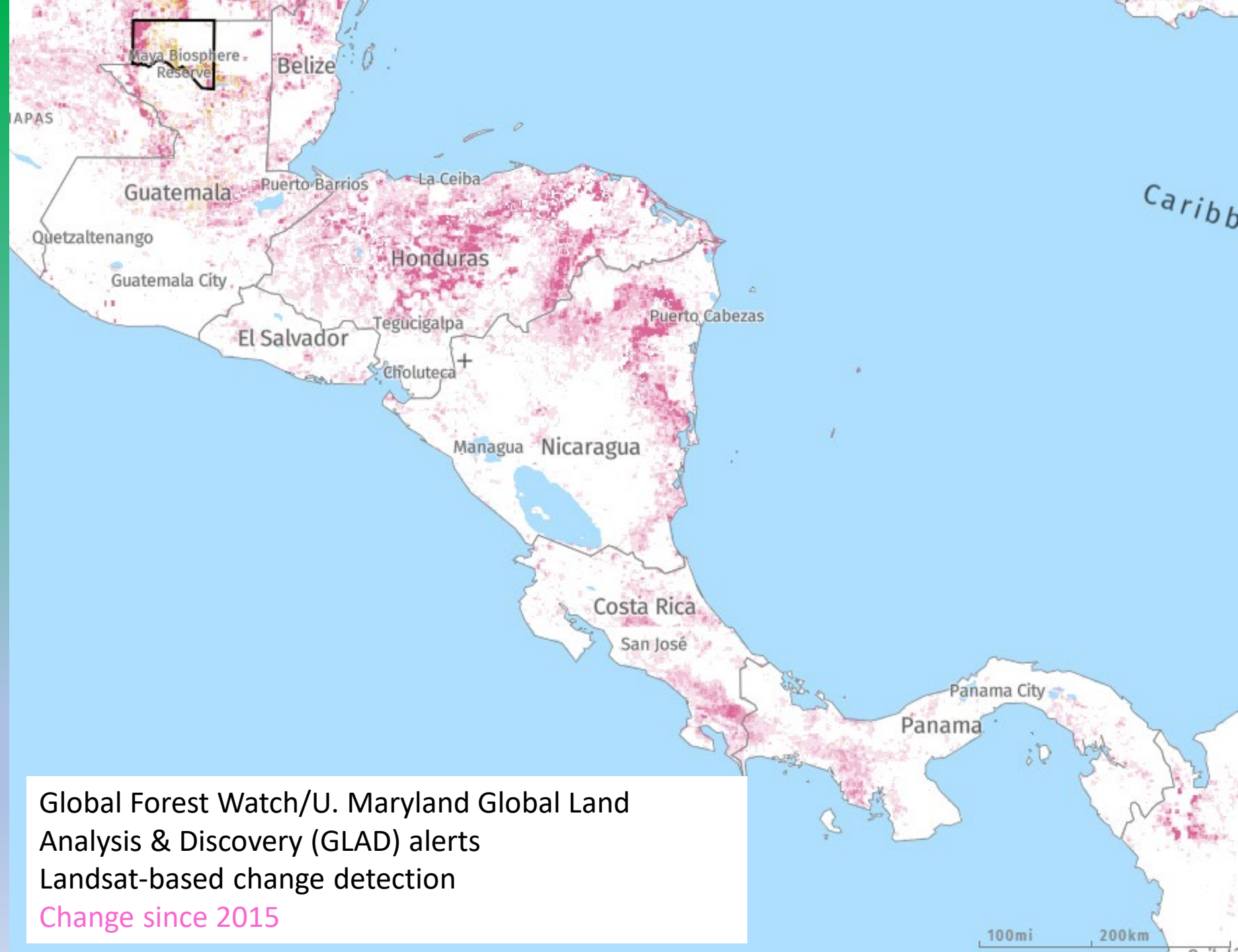**Craig Wayson** - USFS International Programs, SilvaCarbon

BACKGROUND

The 1990's dream of "Paseo Pantera" – corridor linking protected areas

Now, saving the remaining protected areas is the critical task

Threats are often from narco cattle ranching and associated land invasion and pasture establishment

Purplish areas denote change, some outline protected areas (indigenous reserves, national parks, etc.)

Not all is deforestation & degradation (d/d) - e.g., bark beetle outbreak in Honduras

Global Forest Watch/U. Maryland Global Land Analysis & Discovery (GLAD) alerts
Landsat-based change detection
Change since 2015

DETECTION – OPERATIONAL SCALE

In wetter ecosystems where fire may not be the method of first entry, change detection is useful

But there are problems:
1. Latency can be long when using Landsat
2. Global products don't incorporate local knowledge about what change means (e.g., bark beetles vs d/d)

Solutions?
1. Combine active remote sensing (e.g., SAR, microwave) with passive (optical)
2. Deliver ready-to-use data and analysis tools that support use locally and nationally

Global Forest Watch/U. Maryland Global Land Analysis & Discovery (GLAD) alerts
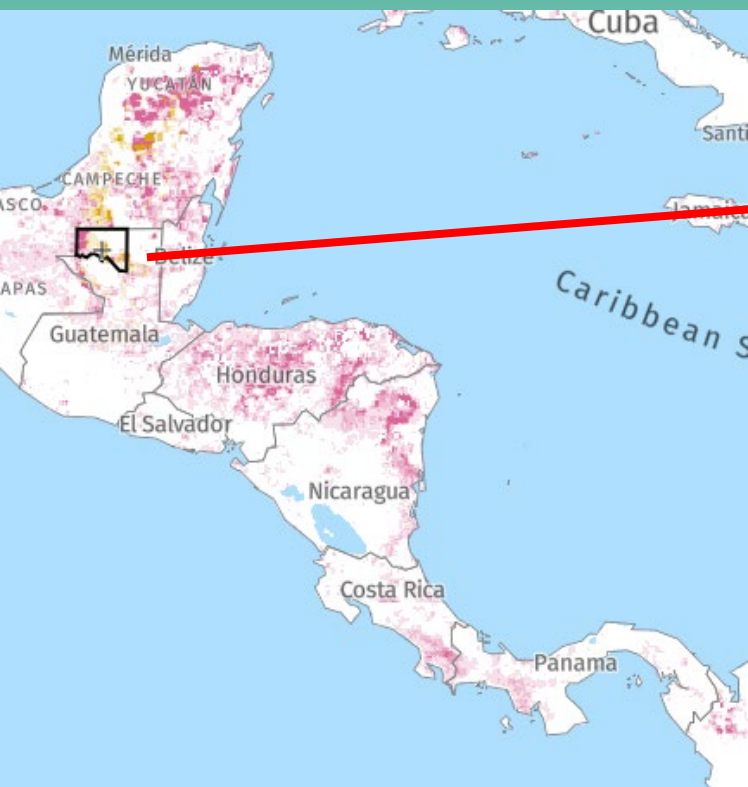Landsat-based change detection
Change since 2015
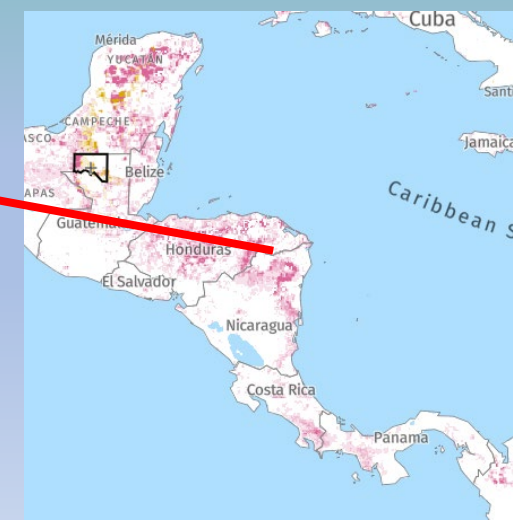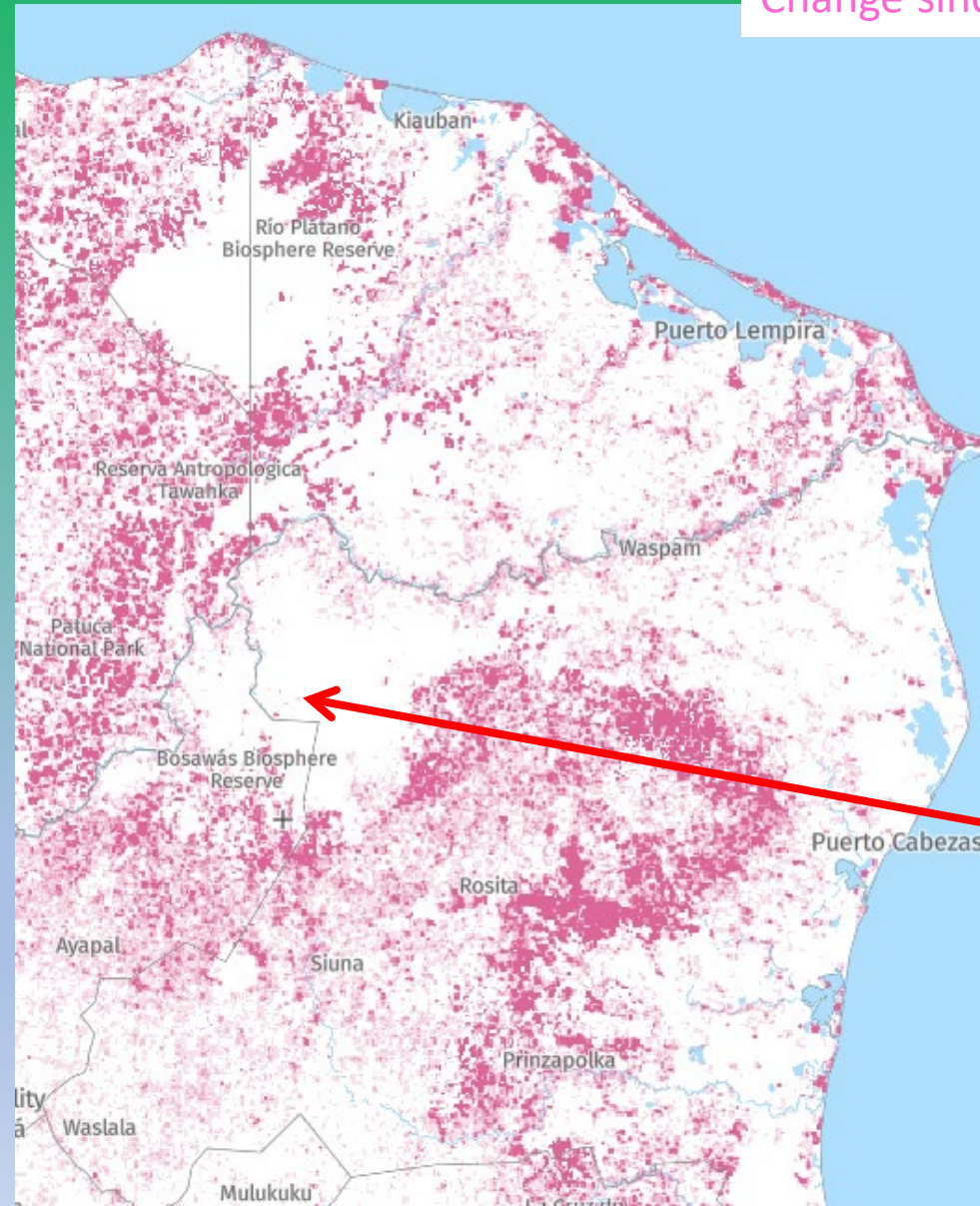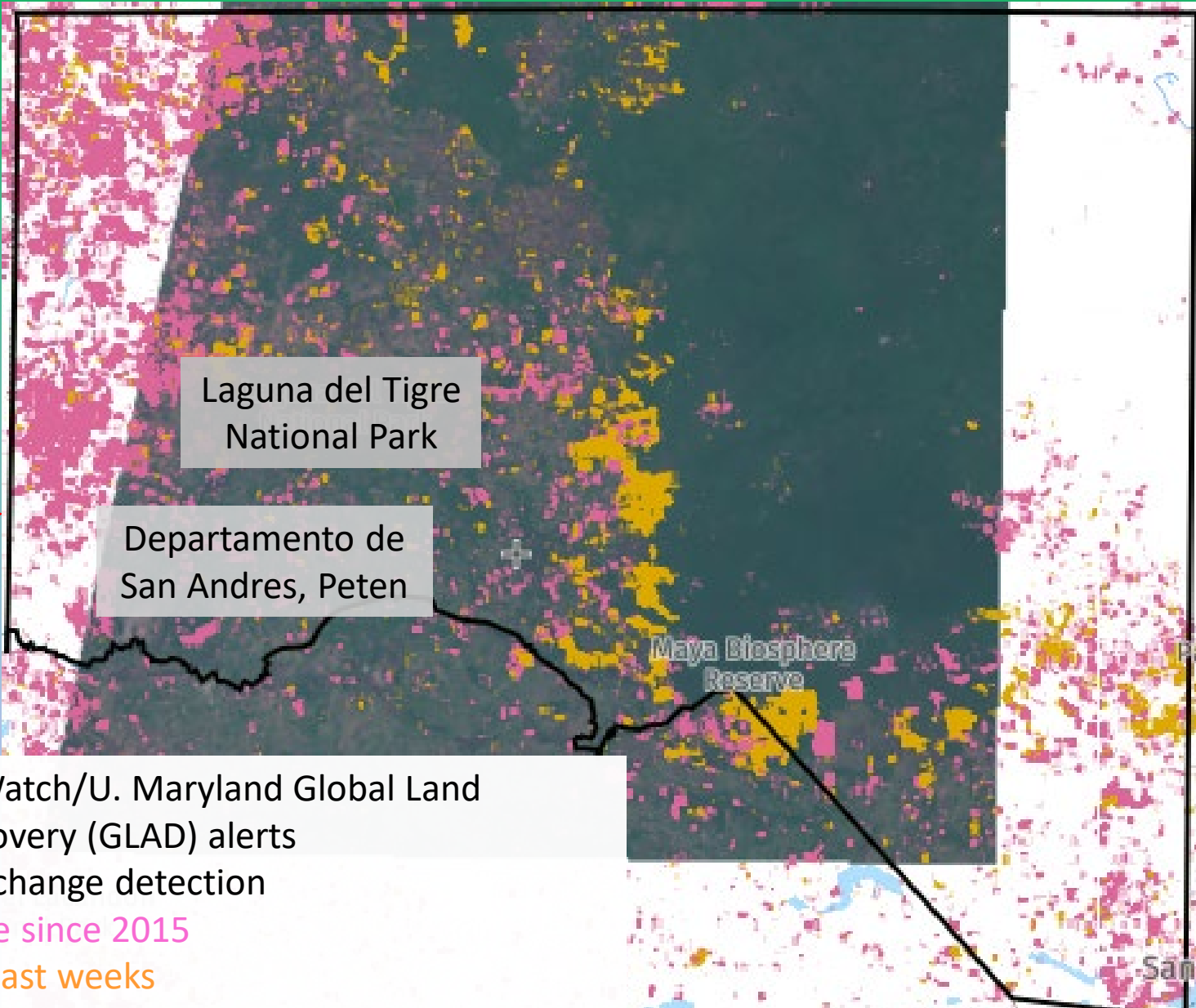
DETECTION - OPERATIONAL SCALE

Where there's a strong dry season (e.g, NW Guatemala/Petén), fire may be the means of starting the deforestation process

Yellow is fire disturbance within the last weeks in the Maya Biosphere Reserve

Guatemalan government and NGOs are trying to hold the line as cattle ranching expands

~50 miles

Laguna del Tigre
National Park

Departamento de
San Andres, Peten

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Purple is change since 2015
Fire within the last weeks

DETECTION - OPERATIONAL SCALE

In practice, MODIS & VIIRS fire detection products are used in the Petén to support operations

Still problems:
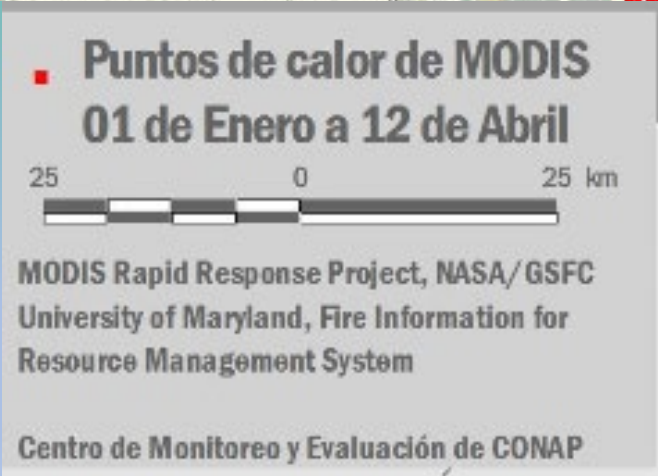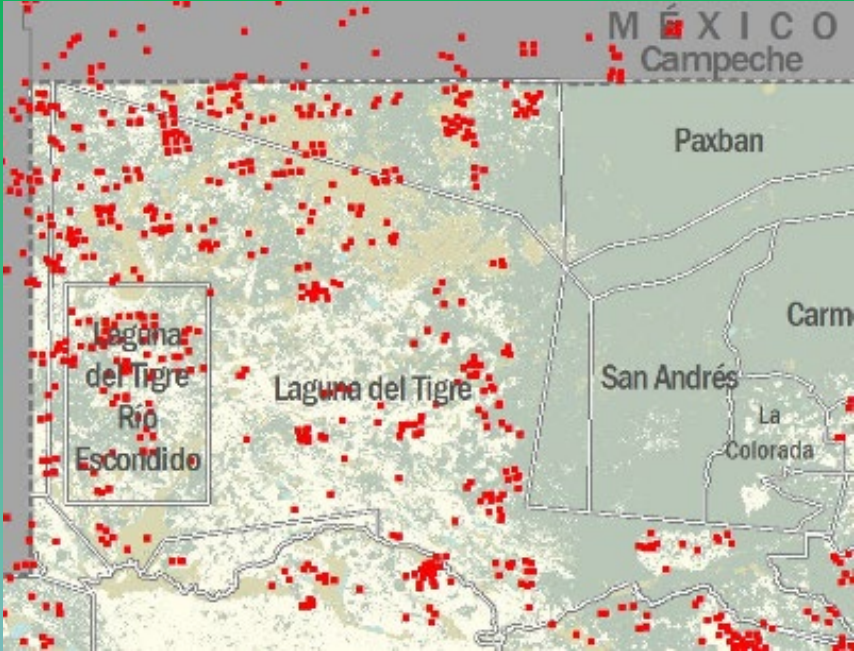1. Omission/commission errors
2. Latency is often too long

Solutions?
1. Develop/deliver more sources of fire detection data to reduce latency and increase confidence in detections
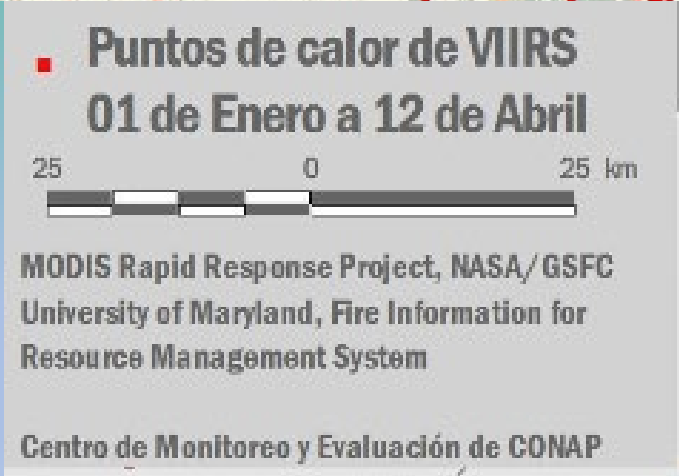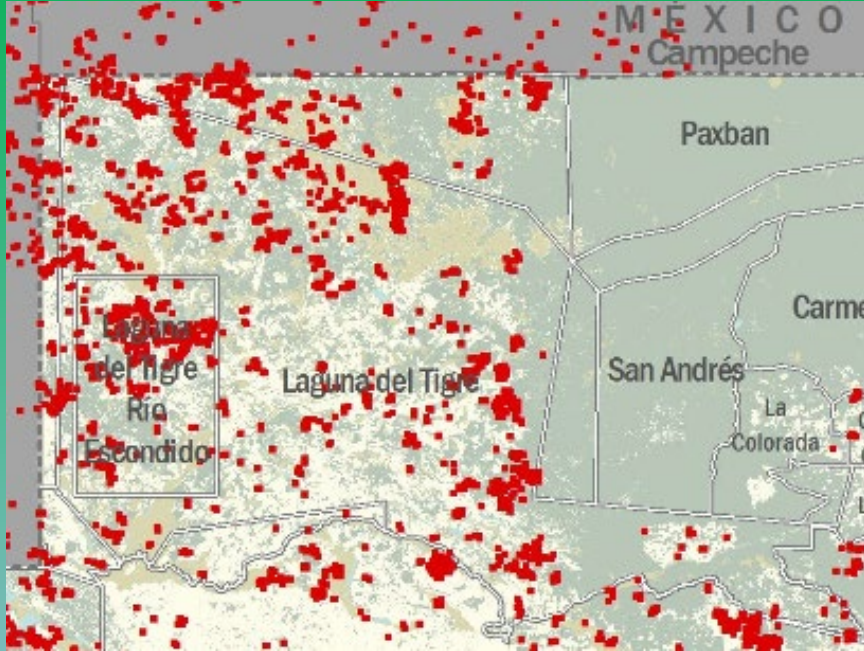2. Develop tools to make efficient use of data at project and national scales

What other data sources?
1. Geostationary: Firehawk, GOES
2. Orbital: Sentinel 3, WorldView-3, other??

MODIS

Puntos de calor de MODIS
01 de Enero a 12 de Abril
25   0   25 km

MODIS Rapid Response Project, NASA/GSFC
University of Maryland, Fire Information for
Resource Management System

Centro de Monitoreo y Evaluación de CONAP

VIIRS

Puntos de calor de VIIRS
01 de Enero a 12 de Abril
25   0   25 km

MODIS Rapid Response Project, NASA/GSFC
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ECOSYTEM RECOVERY

Carbon markets could provide a way to protect forests and fund reforestation (rewilding)
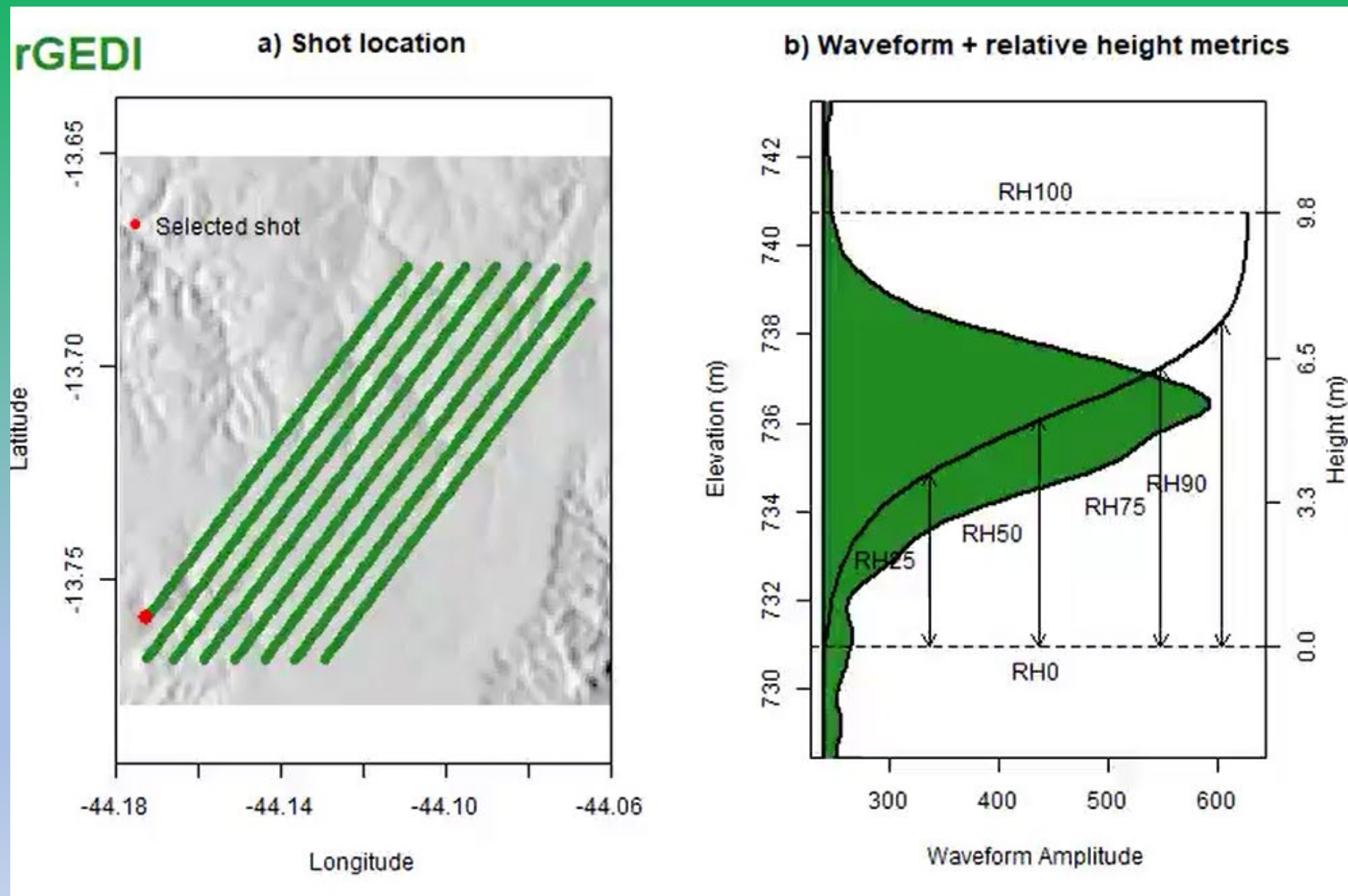
Programs:
1. UN – Reducing Emissions from Deforestation and Forest Degradation (REDD)
2. Carbon offset funding.

Require accurate carbon mapping. Can't currently be done from space...

But, GEDI LiDAR on the Space Station, combined with other information (e.g., ground data, other RS), could be a game changer?
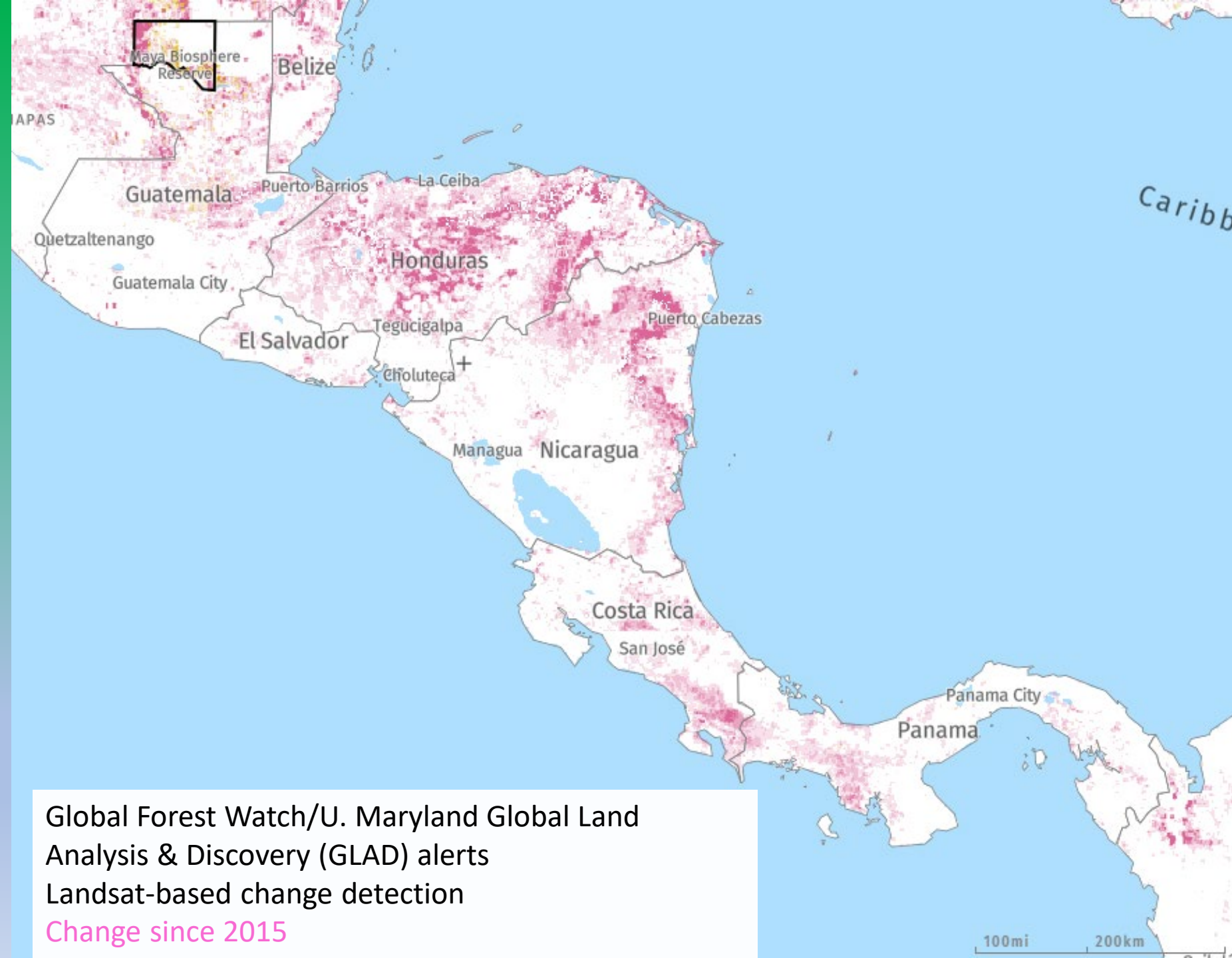
From: GEDI Science Team

ECOSYTEM RECOVERY

REDD and carbon offset projects are done at project to national scales. Local capacity must be developed so that local knowledge and data can be incorporated

Global products won't suffice

Solutions:
1. Use a pilot approach to mapping carbon at project/national scales (GEDI, ground data, other data)
2. Develop and deliver analysis tools for use at local/national scales so that carbon funding can flow

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CONCLUSION

Global is good, but not adequate for all problems

Deforestation/degradation and fire detection in support of operations requires:

1. More data sources to reduce latency and errors
2. Analysis tools that support use at local/national scales

Carbon markets could reduce deforestation and support reforestation/rewilding but:

1. Biomass maps have to be accurate
2. Data delivery and analysis tools must support use at local/national scales

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