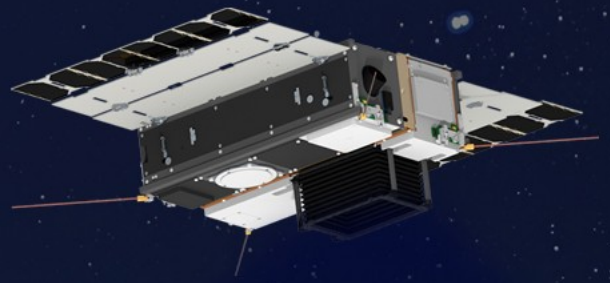
VISIONA
Tecnologia Espacial



DIPTERON

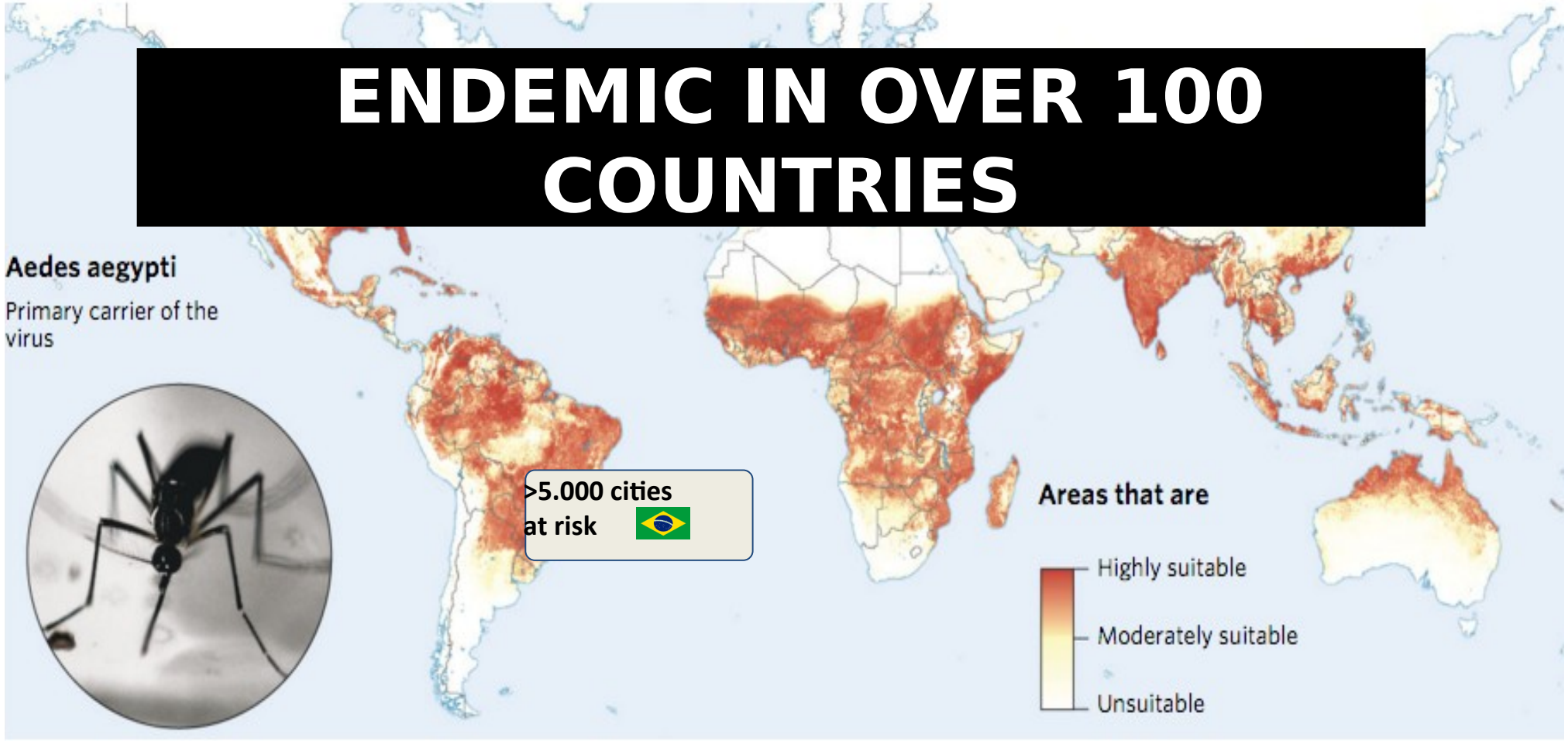
Revolutionizing Dengue Outbreak Management

AI - Driven Space Application in a Smart City Platform The Brazilian Case

Ana Cristina Galhego Rosa
DIPTERON Founder

COPUOS Scientific and Technical Subcommittee
Vienna
1 February 2024

Dengue Fever Overview



source: sciencedirect.com

Impact of Dengue Outbreaks

source: Selangor Journal

source: AsiaNews

Health Burden

Dengue outbreaks strain healthcare systems and lead to economic burdens due to treatment costs and productivity losses.

US$ 39.3 billion (annual global cost)

Community Impact

Outbreaks disrupt daily life, causing fear and anxiety among affected populations.

Challenges in Management

Rapid spread and varying severity of dengue outbreaks pose significant challenges for effective management and control.

Dengue Outbreak Challenges

Understanding the complexity of Dengue Outbreaks and need for efficient and real-time solutions

Limitations of traditional disease management approaches

Geographic Information System (GIS)

Satellite-Based Forecasting Systems

source: appier.com

Predictive Modeling

Space technology supports the development of forecasting models to predict dengue outbreaks based on environmental and climatic variables.

source: Daily Express

Early Warning Alerts

Satellite-based systems generate alerts for potential dengue outbreaks, enabling timely response and resource mobilization.

source: Istock

Community Engagement

Forecasting systems empower local communities to take proactive measures in dengue prevention and control.

DIPTERON

- Earth Observation Data
- **Geographic Information System (GIS)**
- **Artificial Intelligence (AI)**
- **Smart City Platform**

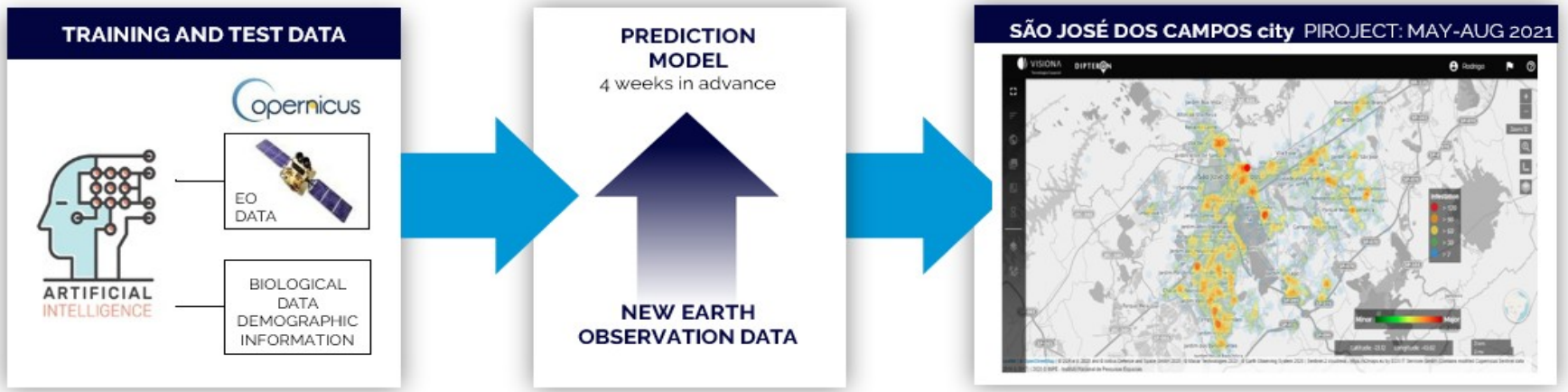
DIPTERON Application

SOLUTION

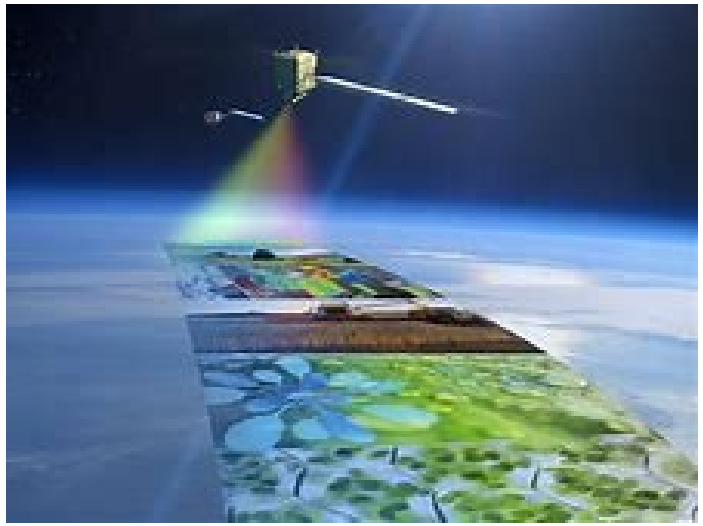
3 GOOD HEALTH AND WELL-BEING

13 CLIMATE ACTION

EARLY-WARNING SYSTEM FOR DENGUE OUTBREAKS



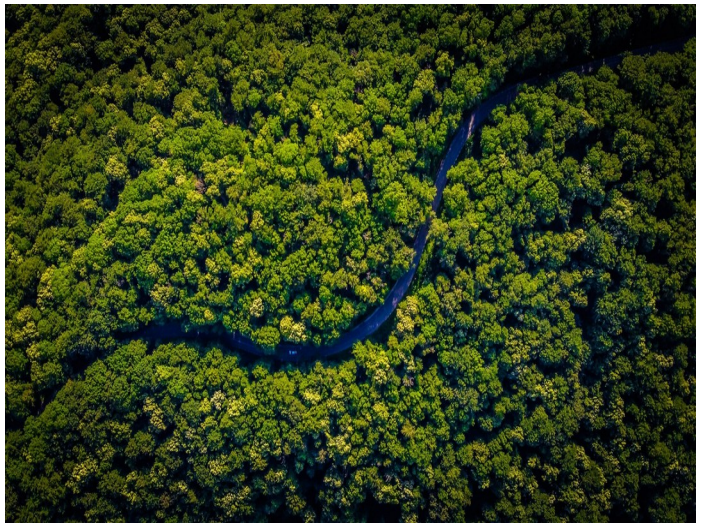
Earth Observation for Dengue Management



source: Earth Imaging Journal

Satellite Imagery

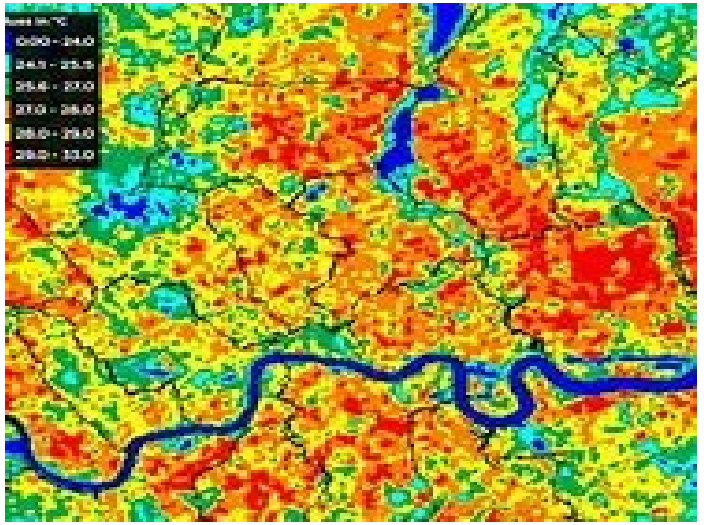
Remote sensing satellites capture data on environmental conditions, water bodies, and land use, aiding in dengue risk mapping.



source: setgo.co

Vegetation Indices

Analysis of vegetation health and density helps identify potential mosquito breeding sites and dengue-prone areas.

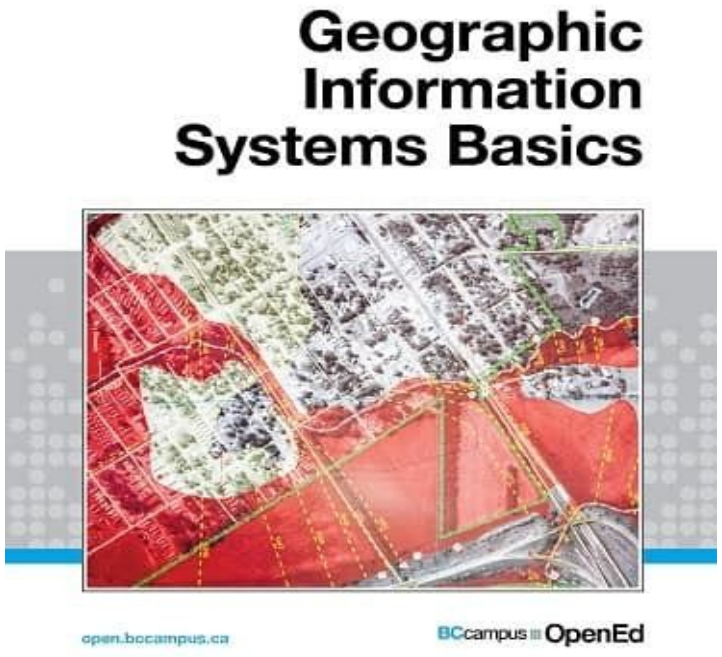


Source: geospatial.insight.com

Urban Heat Mapping

Space technology provides insights into urban heat islands, influencing mosquito habitat suitability and dengue transmission dynamics.

Geographic Information Systems (GIS)



Spatial Analysis

GIS tools integrate satellite data to map dengue hotspots, analyze population vulnerability, and plan targeted interventions.

Risk Assessment

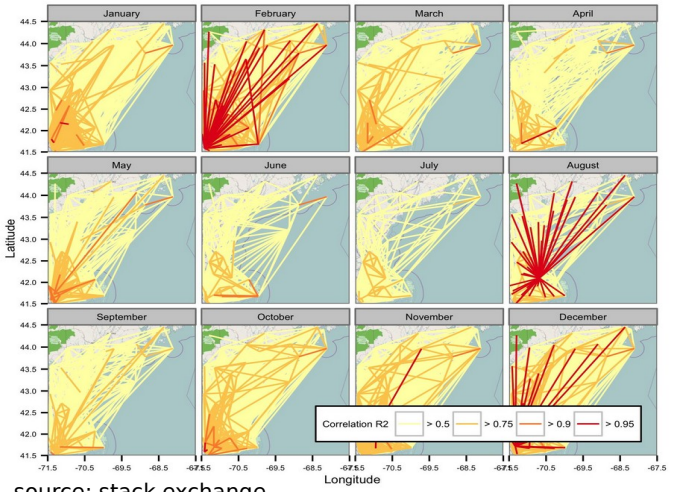
GIS-based risk assessment models aid in identifying high-risk areas for dengue outbreaks, guiding preventive measures.

Data Visualization

GIS platforms enable the visualization of dengue-related data, facilitating informed decision-making for public health authorities.

Artificial Intelligence (AI)

source: artiba.org



source: stack exchange

source; relecura.com

Machine Learning Algorithms

AI models analyze historical dengue data and environmental parameters to forecast potential outbreaks in 4 weeks advanced

Spatial-Temporal Analysis

Spatiotemporal AI models identify geographical and seasonal patterns of dengue transmission for targeted interventions.

Explainable AI

AI models provide interpretable insights into the factors contributing to dengue outbreaks, aiding in decision-making.

Smart City Infrastructure

Integrated Surveillance

Smart city platforms enable real-time monitoring of environmental and health data to detect potential dengue outbreaks

Data Analytics

AI algorithms process diverse data sources to identify patterns and predict potential dengue hotspots.

Early Warning Systems

Space applications provide satellite data for environmental monitoring, aiding in early detection of dengue risk factors

DIPTERON AT SMART CITY WebVis PLATFORM

VISIONA
Space Technology

SATELLITES AVALIABLE

SPOT-6-7	PLÉIADES 1A/1B	WORLDVIEW-1	WORLDVIEW-2	WORLDVIEW-3	WORLDVIEW-4	GEOEYE-1	SENTINEL-1A/1B	SENTINEL-2A/2B	LANDSAT 4/5	LANDSAT 7	LANDSAT 8	CBERS-4
1,5 m	0,5 m	0,5 m	0,46 m	0,31 m	0,30 m	0,41 m	10, 20 e 100 m	10 m	30 e 60 m	30 m	15 e 30 m	5, 10, 20 e 64 m

FULLY PROCESSED IMAGES
(accurated, mosaized, balance color, etc.)
media, high & very high spatial resolution imagens

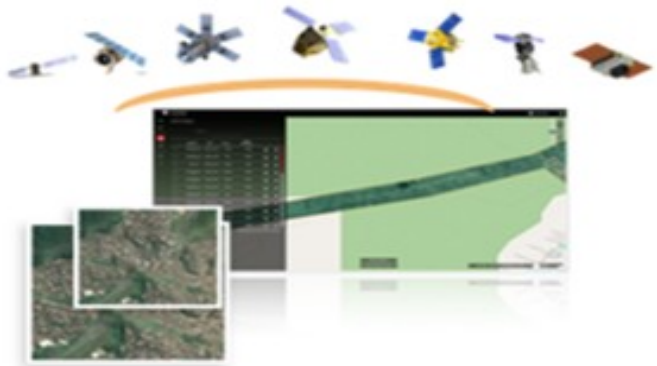
OPEN GEOSPATIAL CONSORTIUM (OGC)
FORMAT THROUGH CLOUD SERVICES

100% CLOUD
INFRASTRUCTURE

AIRBUS MAXAR esa USGS science for a changing world INPE

PRODUCT

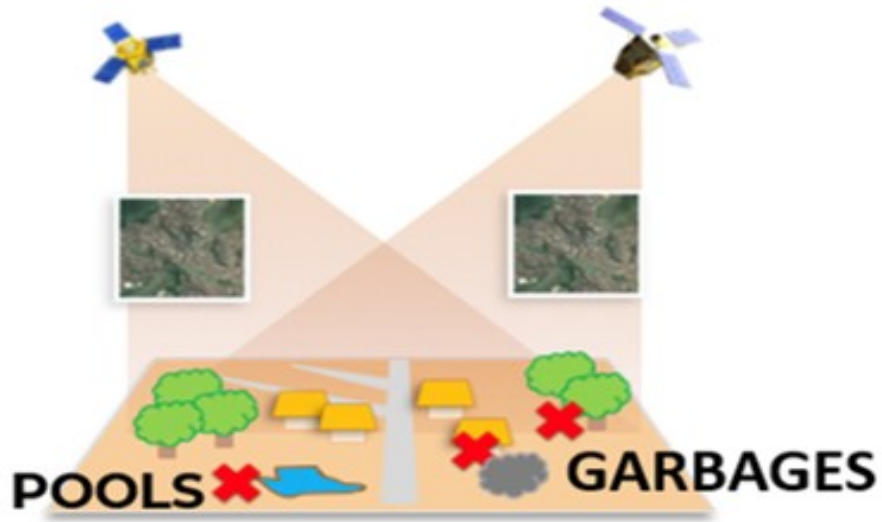
INPUTS



PARAMETERS:

- Precipitation
- Temperature
- Humidity
- NDVI
- EVI
- Altitude
- Wind

MODEL



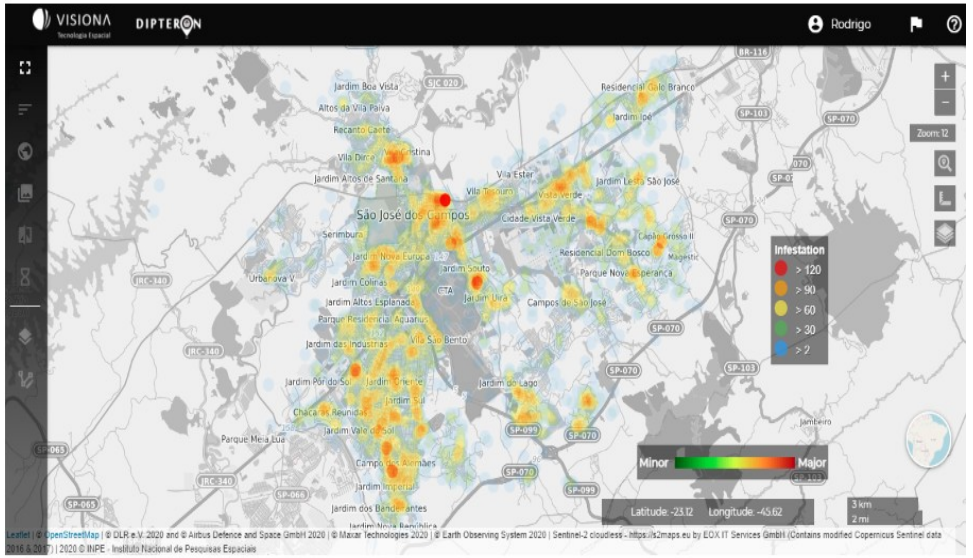
DIPTERON MODEL USES:

- Dengue cases, Infestation Data from Health Municipality
- Socio Economic data from Statistical Institute
- Scalable and Robust Cloud Infrastructure
- Parameters from Satellite

Services

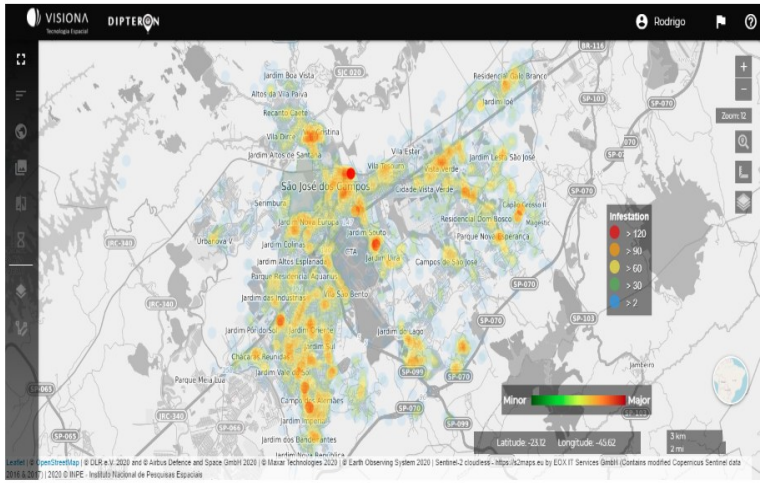
Smart City WebVIS Platform

Pilot: São José dos Campos, Brazil



- Advance localization of outbreaks
- Visualization of potential breeding sites
- Access number of cases and deaths in areas

Benefits



4 weeks in advance for risk areas

source: dataversity.net

Potential breeding sites spatial analysis

Source: diariosp.com.br

Help to plan and support logistical emergency management

source: vox.com

Fumigation action decrease

Team time optimization

Saves money by reducing the costs of campaigns and remediation actions

Saves lives by minimizing the risk of Aedes viral diseases

Conclusion

Space technology enables the development of early warning systems to predict and monitor dengue outbreaks.

Satellite-derived insights enable evidence-based decision-making in local health authorities' response to dengue outbreaks

DIPTERON innovation has contributed to a quick, precise and economical way in combating Dengue Outbreaks

THANK YOU!

Do you have any questions?

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