GEOHEALTH: A GEOSPATIAL SURVEILLANCE AND RESPONSE SYSTEM RESOURCE FOR VECTOR BORNE DISEASES IN THE AMERICAS

Health and Air Quality Applications Program Review March 29-30, 2023 Asheville, NC

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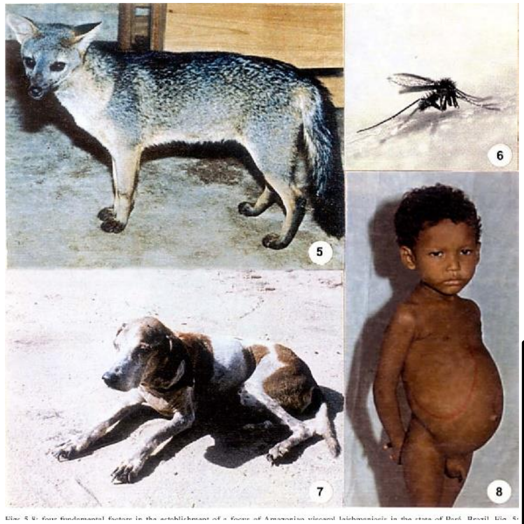
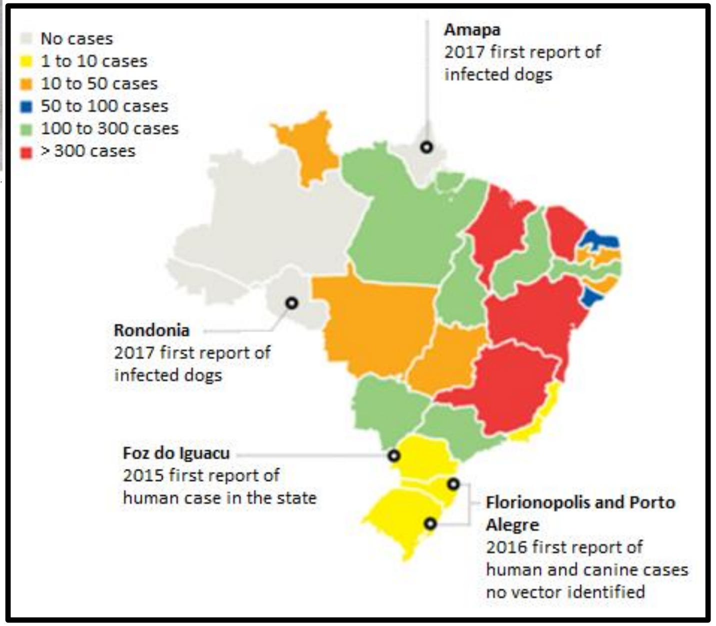
VISCERAL LEISHMANIASIS

Increasing public health problem
Lethality > 90% if not treated
Several mammal reservoirs
Advancing to new geographic areas





ARBOVIRUSES VECTORS

Vectors of Dengue, Zika and Chikungunya in the Americas
Dengue – subsequent infections can lead to severe disease
Zika – same symptoms as dengue (mild) (microcephaly)
Chikungunya – immunity for life after first infection

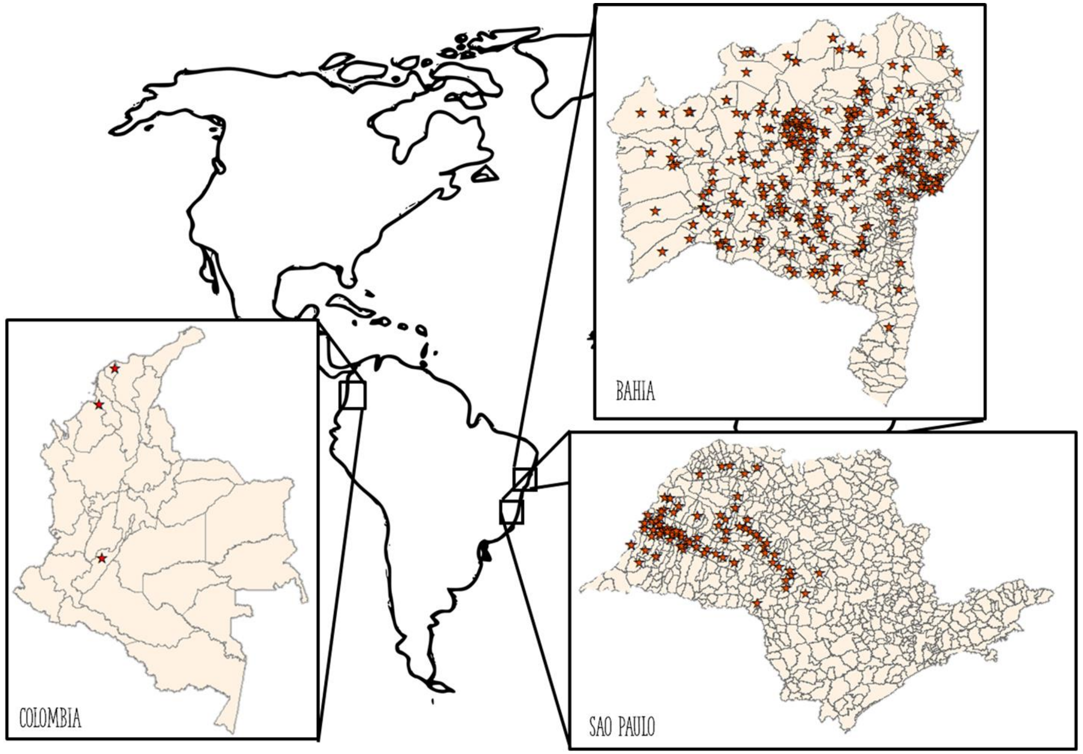
GOALS

To implement a geospatial surveillance and response system resource for vector borne disease in the Americas using NASA EOS data, GIS and ENM to characterize the environmental suitability and the potential for spread of endemic diseases

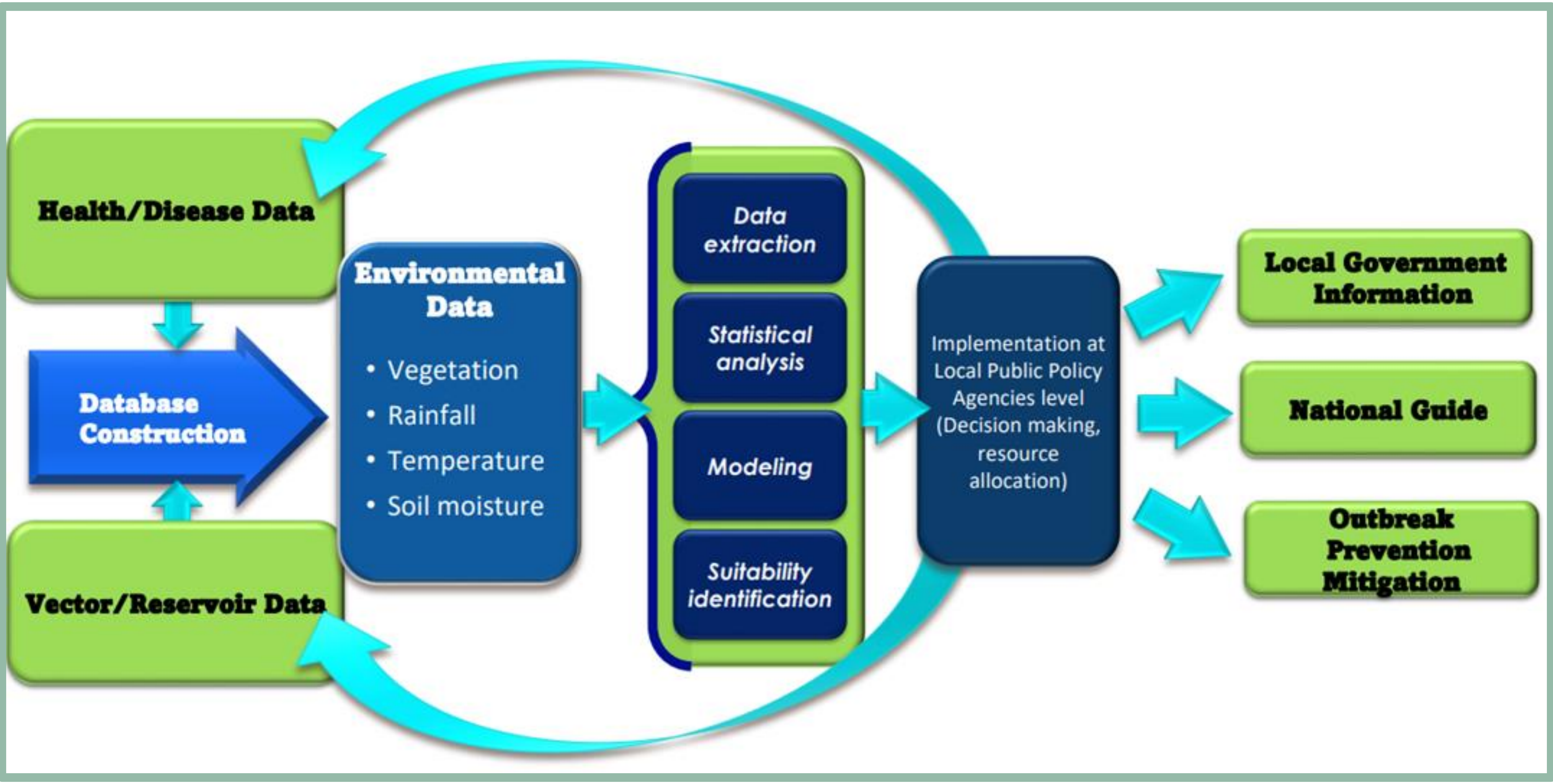
SPECIFIC OBJECTIVES

	Objective	IN PROGRESS	NEEDS REVIEW	DONE
1	Geospatial data portal	✓	✓	
2	Modeling of VL			✓
3	Modeling of arboviruses			✓
4	Big data processing		✓	✓
5	Dissemination and training	✓	✓	

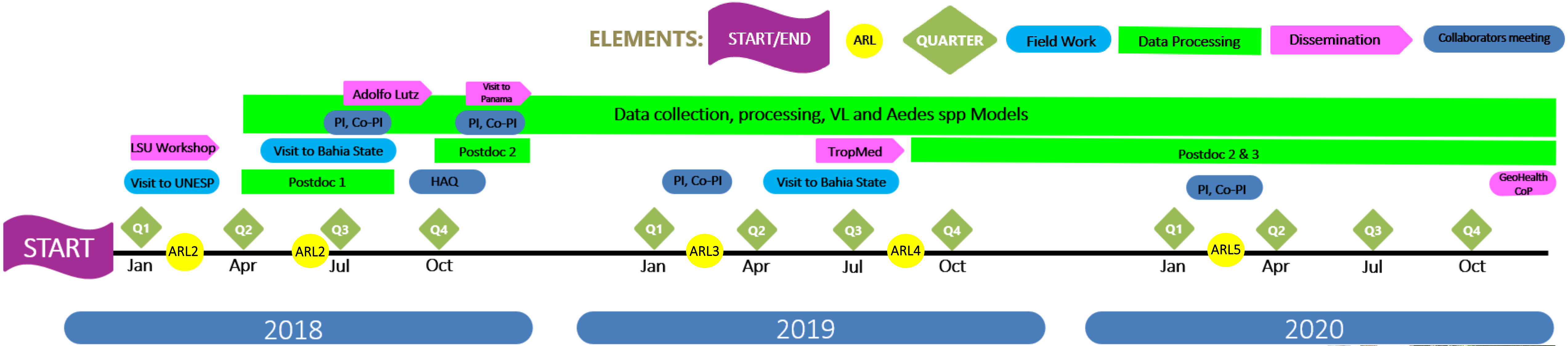
STUDY AREA

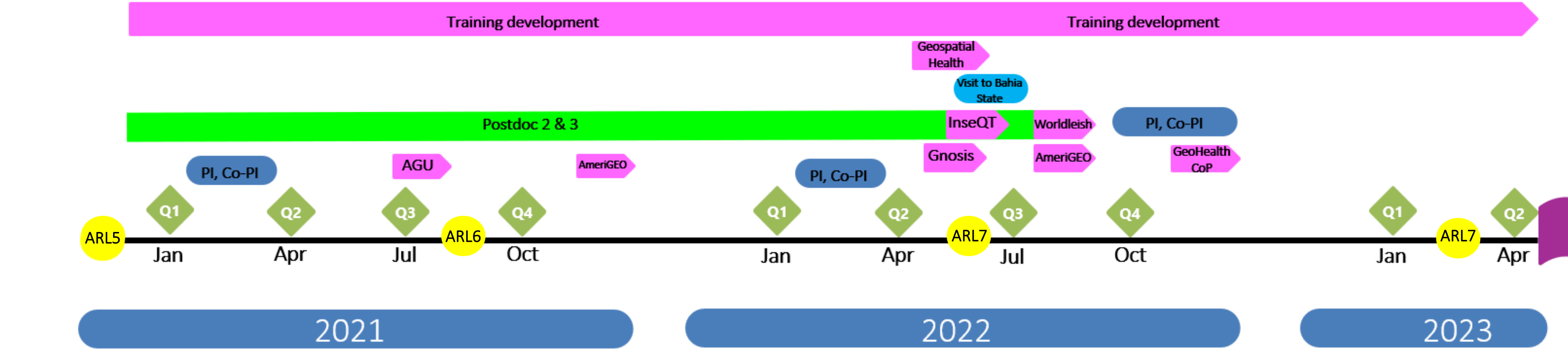


STRUCTURE OF THE STUDY



PROJECT SCHEDULE TIMELINE: MILESTONES AND EXPECTED APPLICATION READINESS LEVEL





Covid 19 – pause on some of the activities → Applied for project extension

ECOLOGICAL NICHE MODEL

2 States in Brazil (Bahia – NE; Sao Paulo – SE)

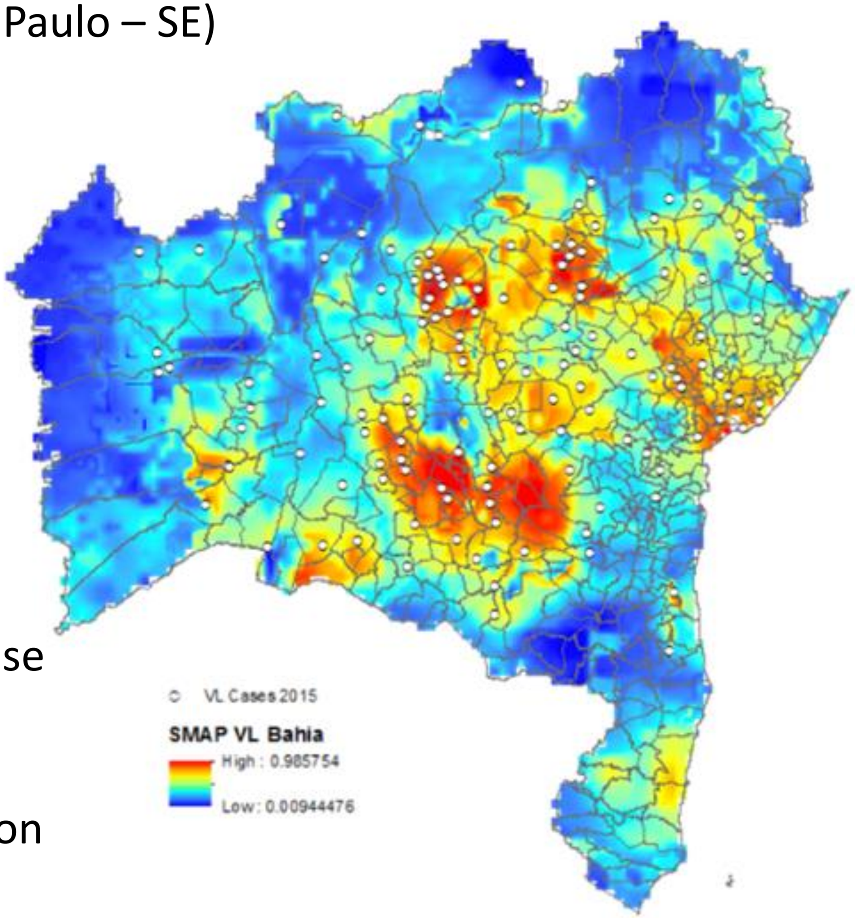
SMAP and WORDCLIM Data

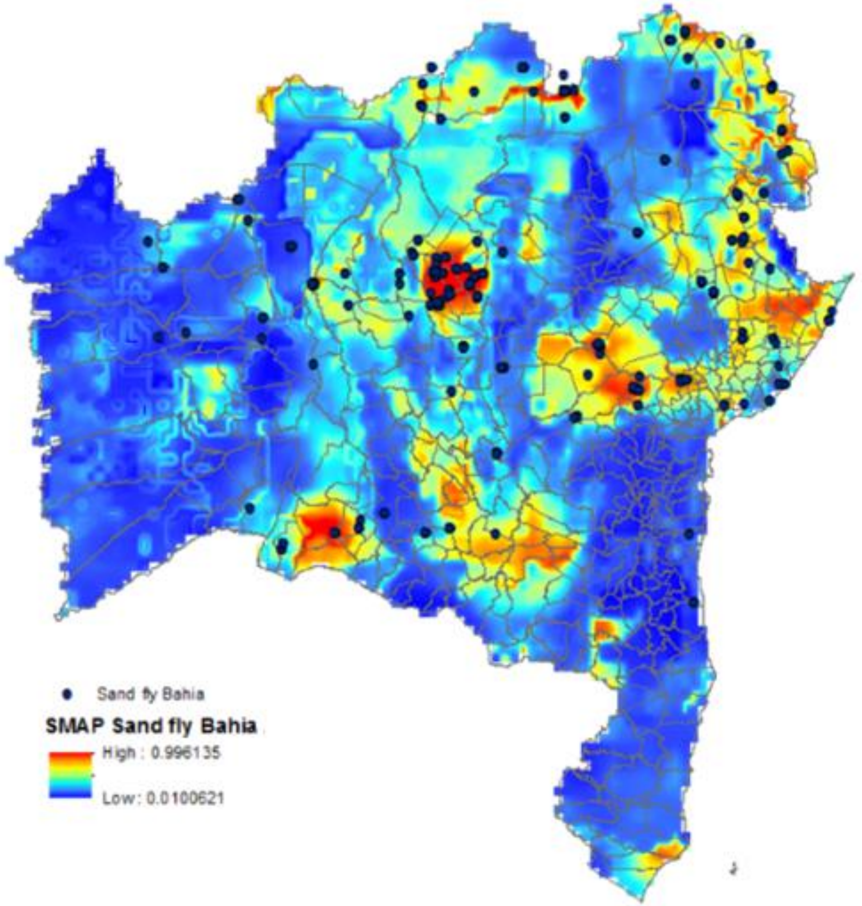
Visceral Leishmaniasis

- Human Cases
- Vector traps (insect data)

RS products (SMAP) provided information on when to expect increase in insect population density and extrapolate for increase in human VL incidence

Target specific areas and months on increased risk





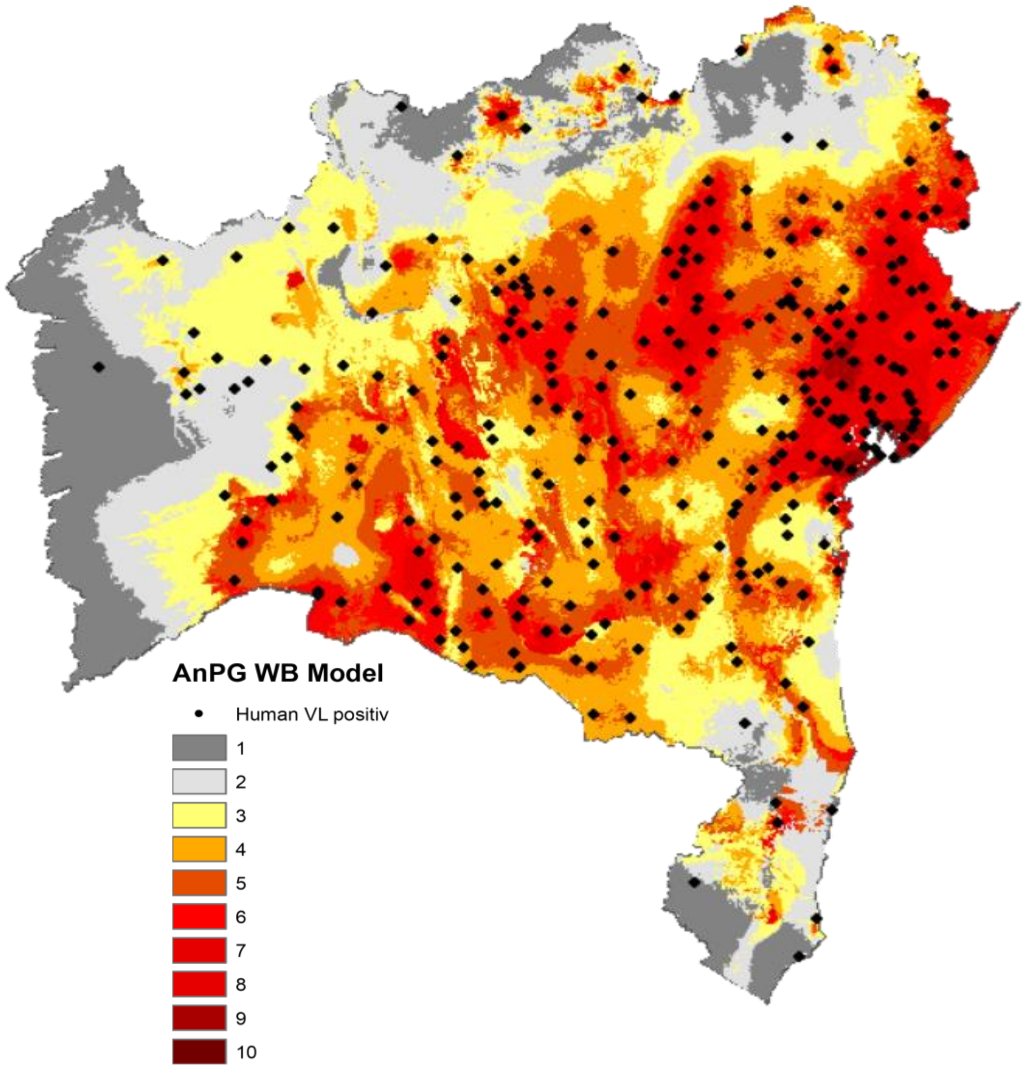
Use of soil moisture active passive satellite data and Wordclim 2.0 data to predict the potential distribution of visceral leishmaniasis and its vector *Lutzomyia longipalpis* in Sao Paulo and Bahia states, Brazil
Rodgers MSM et al. Geospatial Health, May 2022

ANNUAL POTENTIAL GENERATIONS

SMAP data vs Water Budget

Identify how many potential generations of *L. longipalpis* is expected in a year / where

Vector control resources can be allocated acco rding to each area specific needs

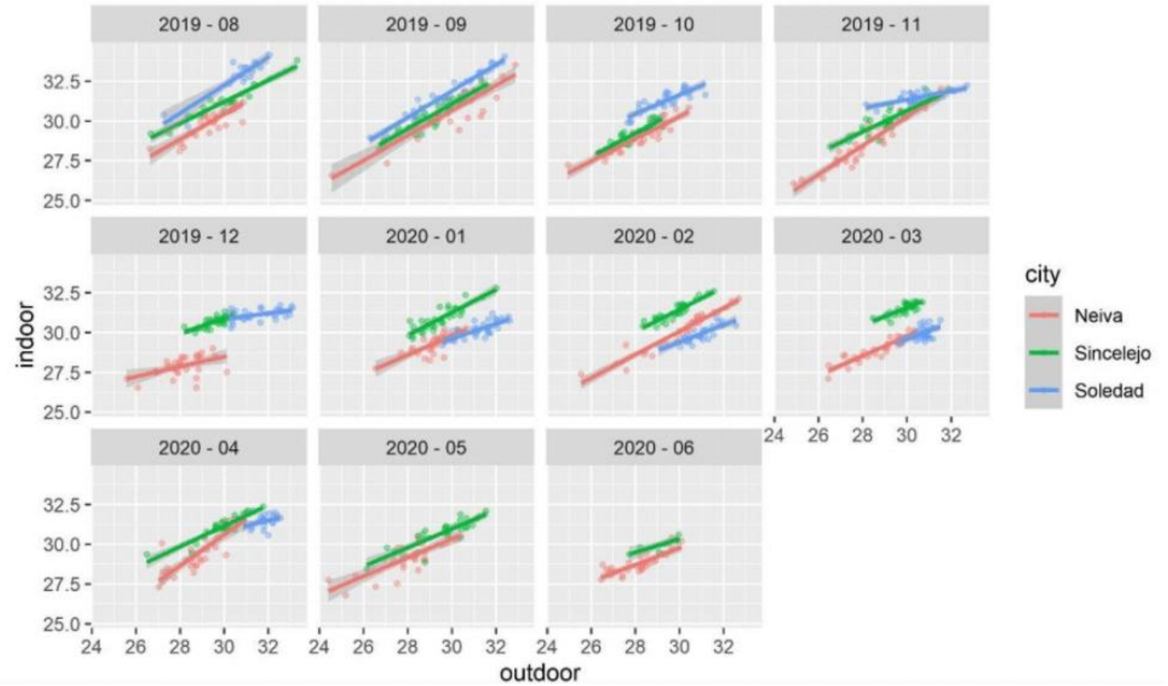


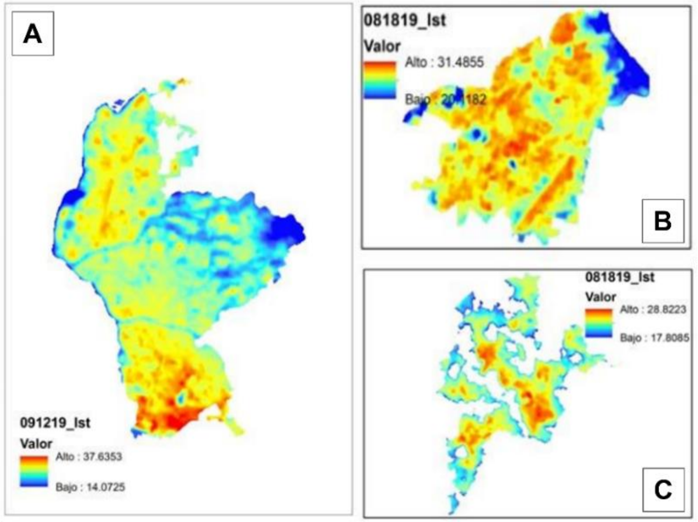
Two predictive models using Maxent and Growing degree day-Water budget analysis to study the distribution and climatic suitability of visceral leishmaniasis and vector *Luztomyia longipalpis* in the state of Bahia, Brazil
Nieto PM et al. Submitted to Geospatial Health, Mar 2023

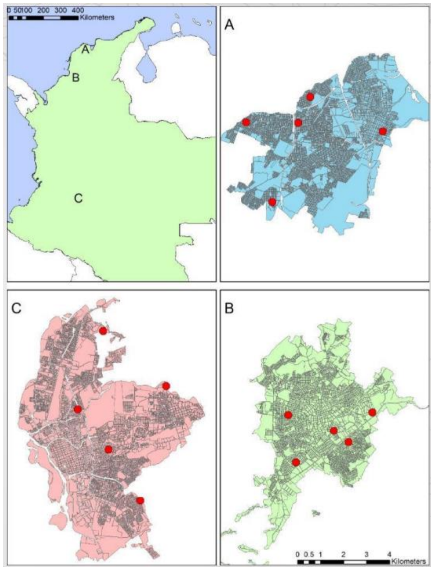
AEDES-BORNE ARBOVIRUSES

Find a functional relationship between indoor temperature and outdoor temperature to better capture the micro-environment of the vectors that live in houses

Investigate how differences in temperature measured inside/ outside/weather stations/satellite translate into altered estimates of transmission of arboviruses







Evaluate the use of RS data in lieu of temperature data loggers

The importance of considering microenvironmental temperature measures for the estimation of reproduction number (R*t*) for arbo virus in Colombian municipalities.
Peña-Garcia VH et al. Submitted to American Journal of Tropical Medicine and Hygiene, Feb 2023

TAKE HOME

NASA EOS data can provide additional information on environmental component of disease transmission

CHALLENGE

Implement the use of NASA EOS into surveillance routine activities

FUTURE

Dissemination of geotechnologies use in health studies, capacity building of health agents

FUTURE DIRECTIONS

AWARENESS

Construction of a Data Portal to host data and support material

CONSIDERATION

Specific training to attend specific needs and resource availability of different communities

DECISION

Continued research and usage of proposed methods and tools into routine work

APPLICATION

Community engagement and implementation into local surveillance/control programs

Thank you

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