“GeoHealth: A Surveillance and Response System for Vector Borne Diseases in the Americas”.

Monday. September 19/ 2022

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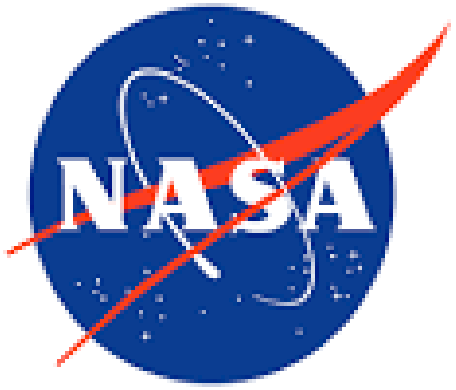

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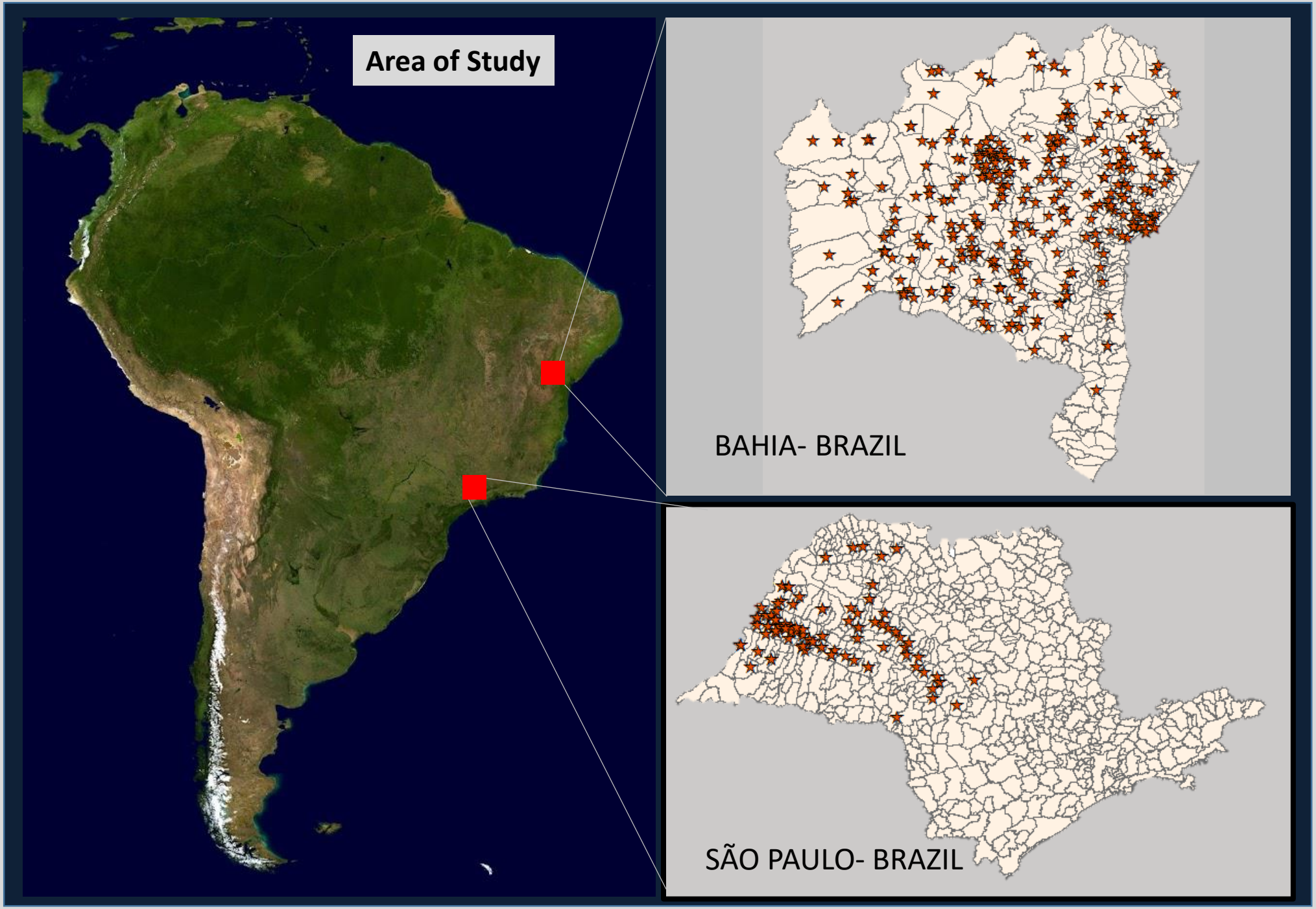

Area of Study
BAHIA- BRAZIL
SÃO PAULO- BRAZIL

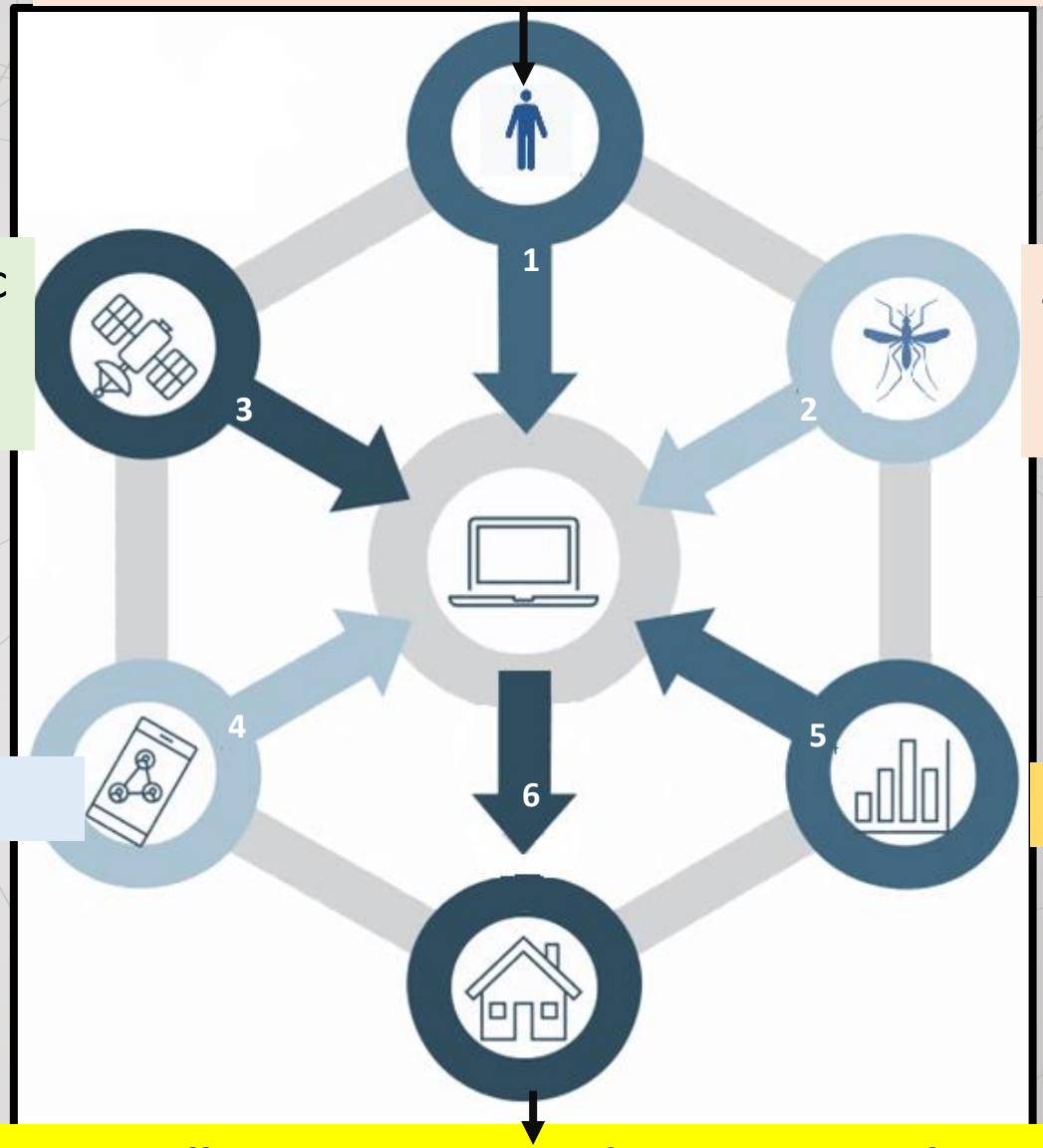
- **Area of Study**: State of Bahia and São Paulo.
- **Parasitological data**: Visceral leishmaniasis annual human cases.

  Bahia **25 years** (10 years data 1990-2000 (FUNASA) and 14 years data 2004-2018) (SINAN)

  São Paulo **19 years** data 1999-2018 (SINAN).
- **Satellite data**: AVHRR, MODIS (1990-2000). Temperature, NDVI. Resolution: 1Km
- **Satellite data**: WorldClime 30 year average. Temperature, precipitation. Resolution: 1km
- **Satellite data:** SMAP, GPM, VIIRS and ECOSTRESS.

Study structure with One Health Perspective

1. Presence data – Human VL cases



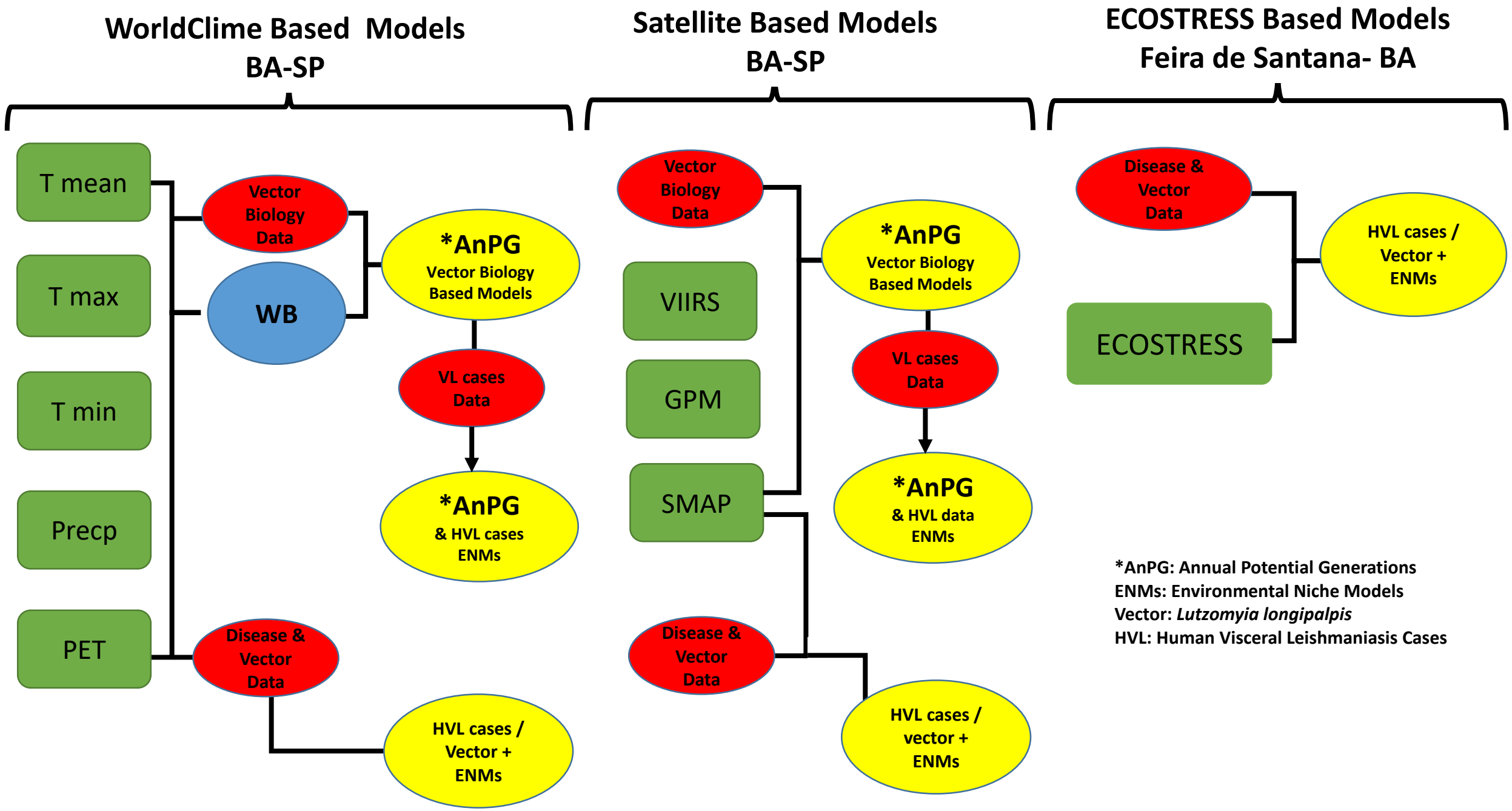
3. Satellite data, Local station, etc
-Environmental
-Climatological

2. Presence data – Sand fly,
- Lutzomyia Spp
-Aedes Spp

4. Socio Economics data

5. Analysis

6. Decision making – surveillance Recommendation – control, prevention, treatment.


WorldClime Based Models
BA-SP
T mean
T max
T min
Precp
PET
Vector Biology Data
WB
*AnPG Vector Biology Based Models
VL cases Data
*AnPG & HVL cases ENMs
Disease & Vector Data
HVL cases / Vector + ENMs
Satellite Based Models
BA-SP
Vector Biology Data
VIIRS
GPM
SMAP
*AnPG Vector Biology Based Models
VL cases Data
*AnPG & HVL data ENMs
Disease & Vector Data
HVL cases / vector + ENMs
ECOSTRESS Based Models
Feira de Santana- BA
Disease & Vector Data
ECOSTRESS
HVL cases / Vector + ENMs
*AnPG: Annual Potential Generations
ENMs: Environmental Niche Models
Vector: Lutzomyia longipalpis
HVL: Human Visceral Leishmaniasis Cases

Worldclim Models

Bahia

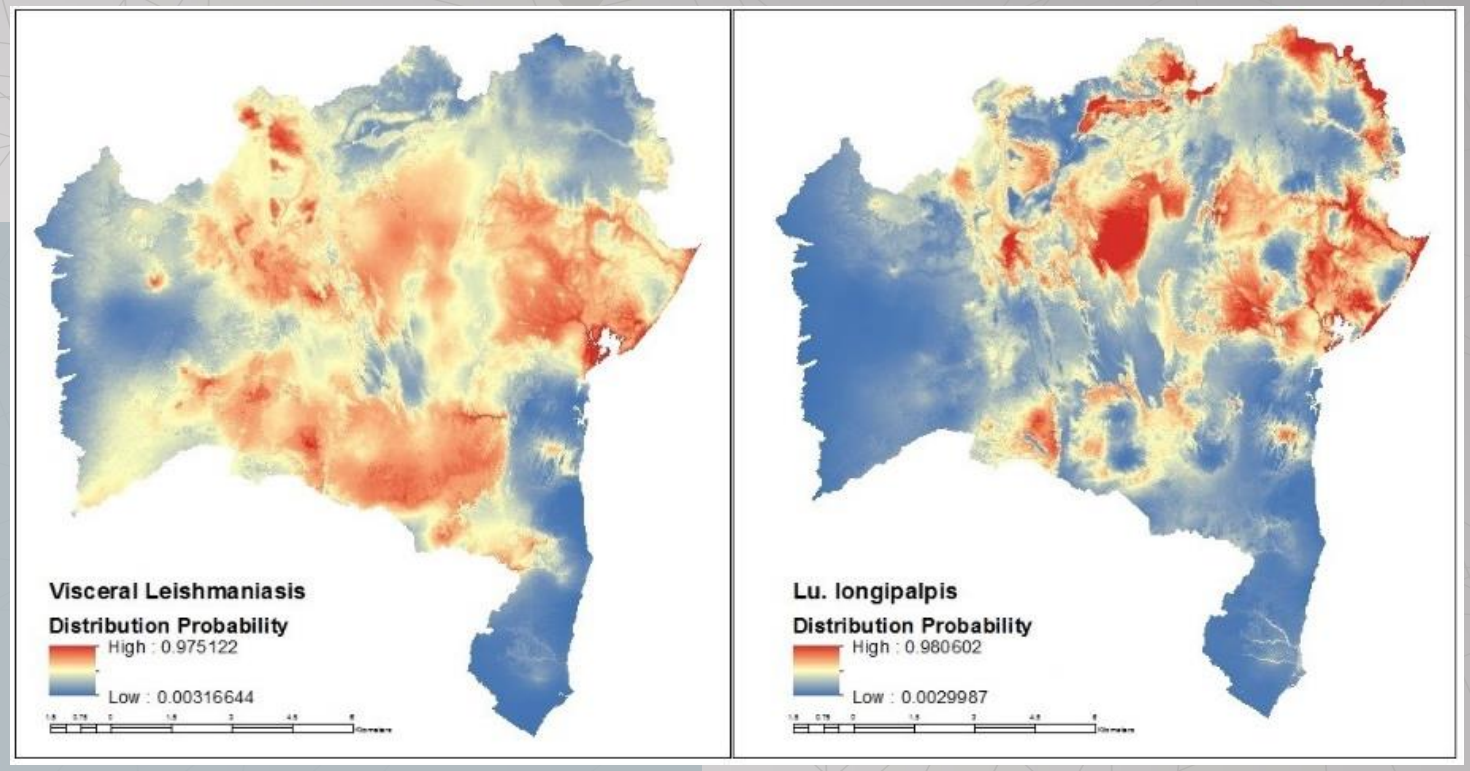
- Precipitation (April, October and November).
- Max temperature (November and December).
- precipitation (October and December).

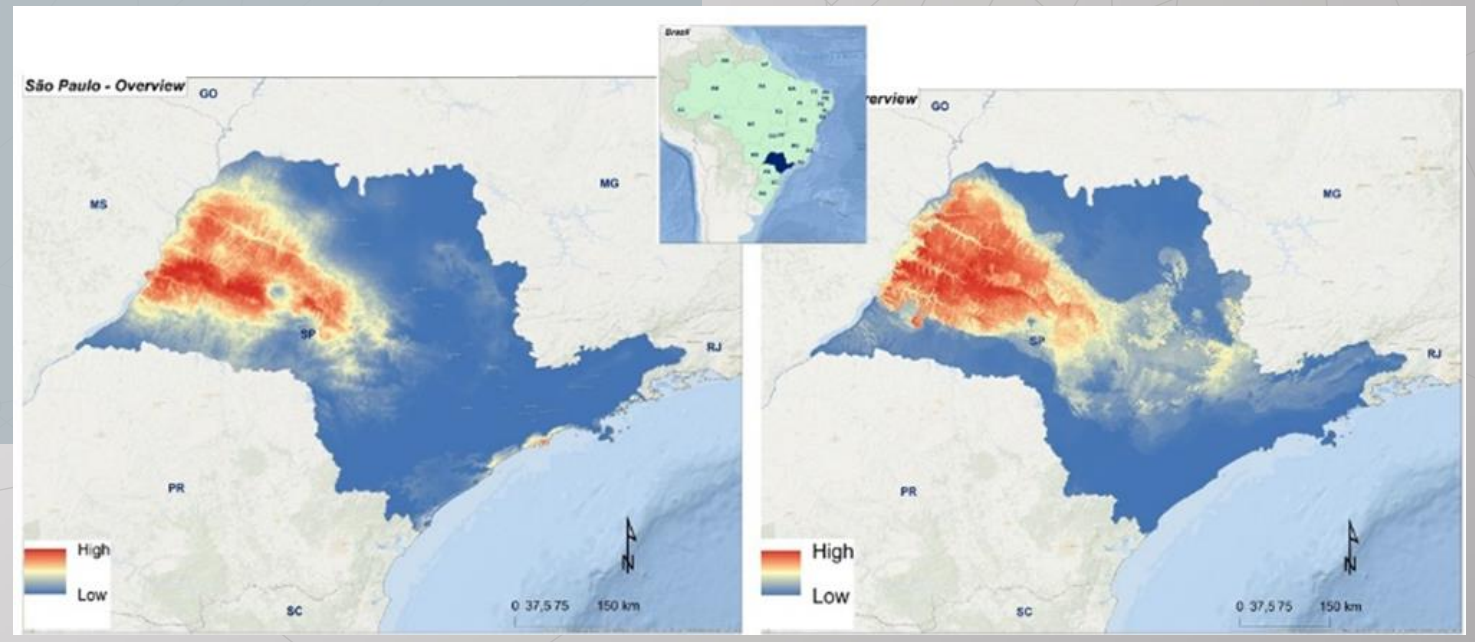
São Paulo

- Max temperature (November and December).

- VL and vector ENMs.

Spatial resolution of 1km





SMAP Models

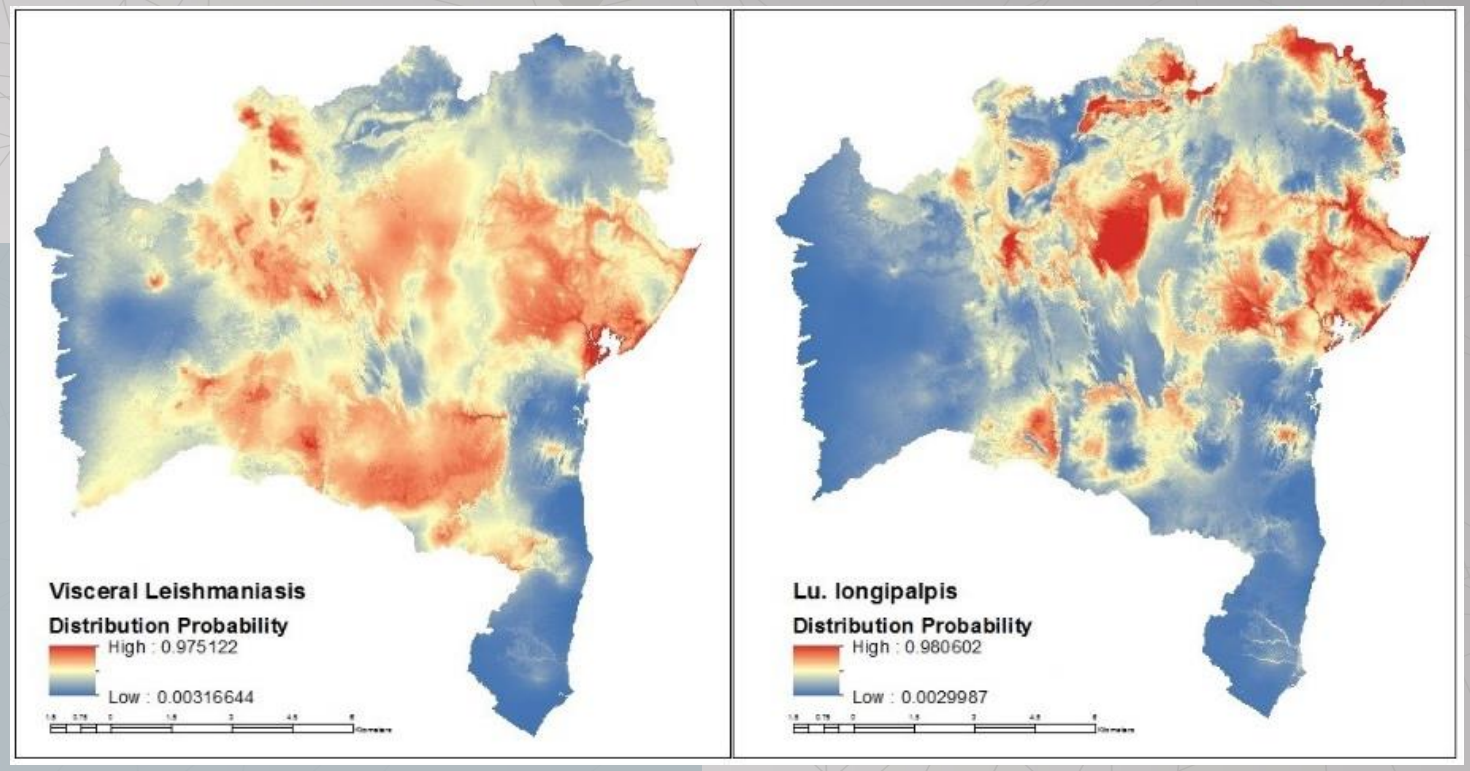
Bahia

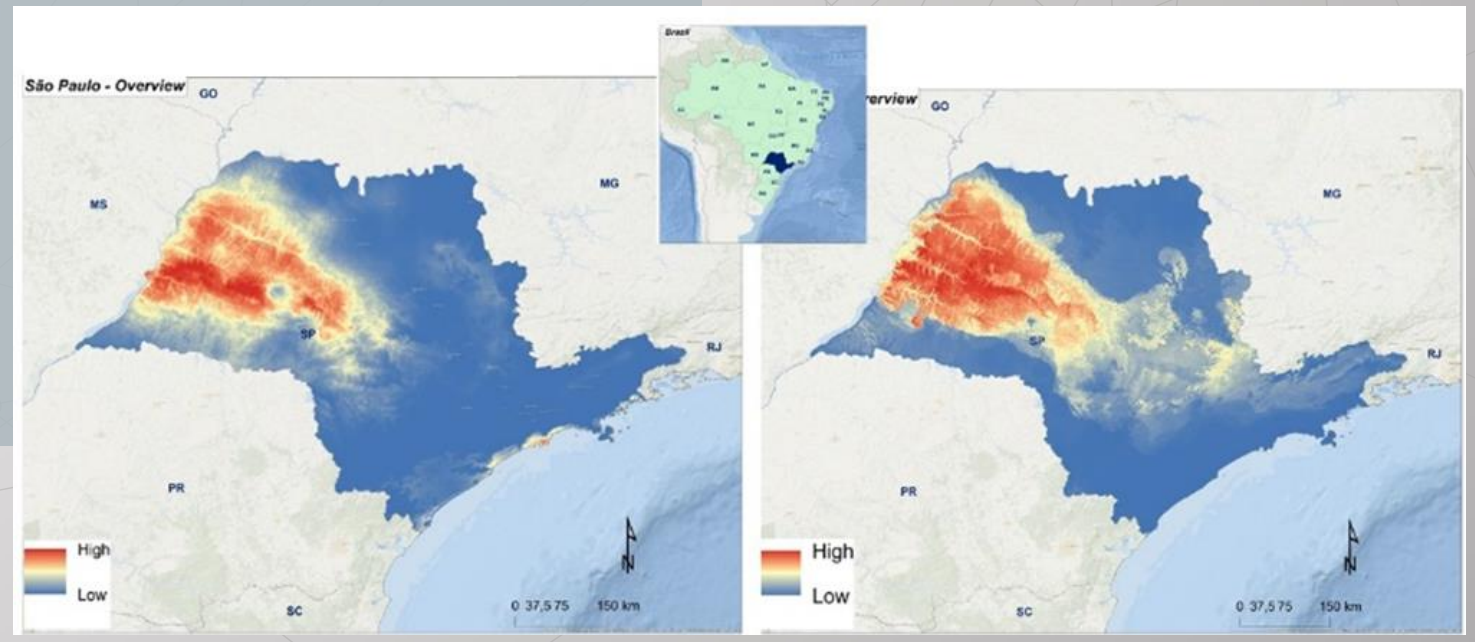
- Seasonal high VL (September, November and January).
- Dry season sandfly (October, November, January and May).

São Paulo

- Soil moisture (June, July and November).
- Disease and vector followed a similar pattern in variable importance for the ENM

Spatial resolution of 36 Km
Resample 1km

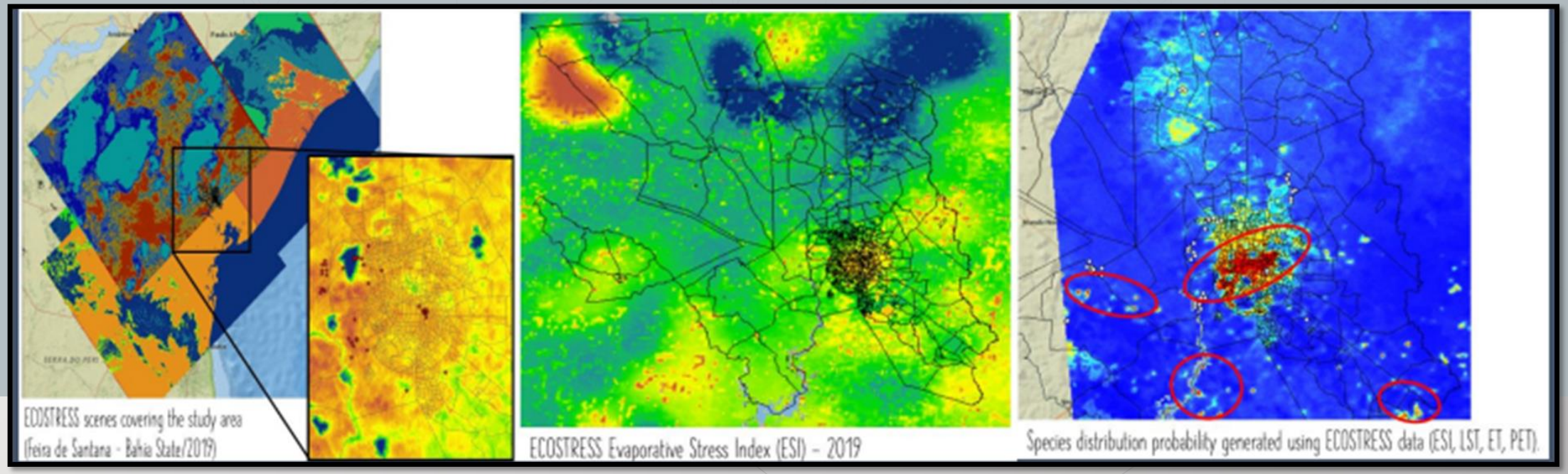


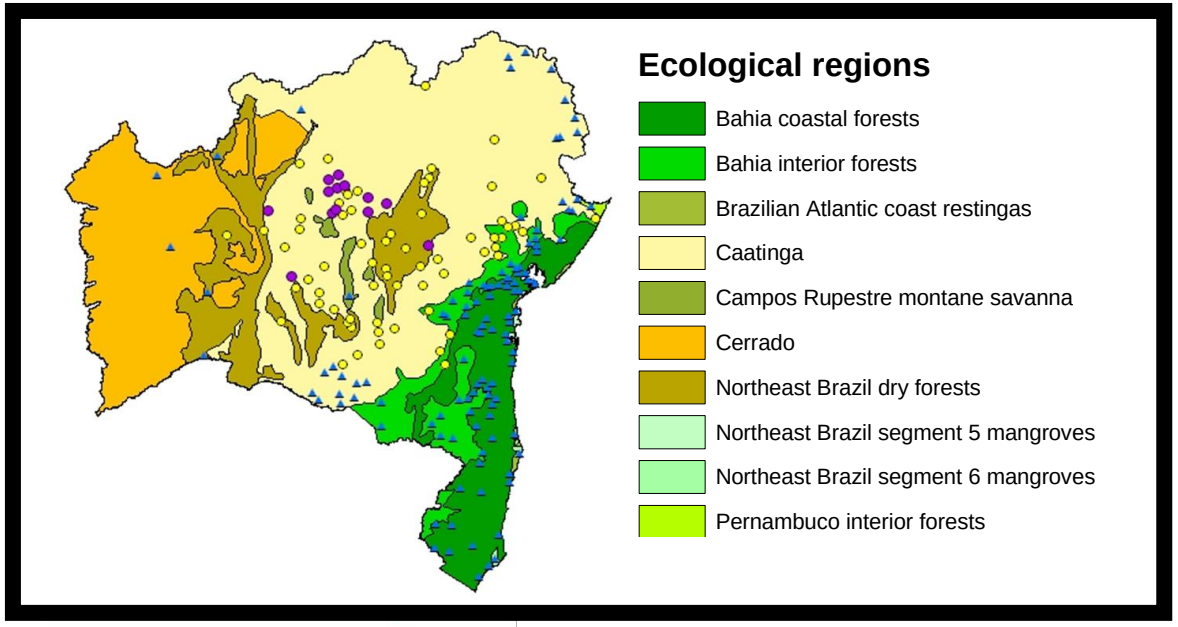


ECOSTRESS Model

Bahia: Feira de Santana

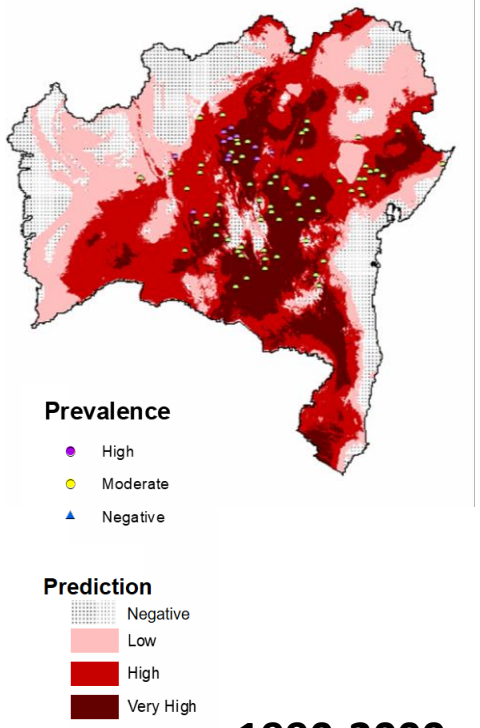
- (ECOSTRESS 2018–2020) in generating ecological niche models (ENMs) for Lutzomyia longipalpis, the vector of visceral leishmaniasis (VL) using Maximum Entropy Species Distribution Modeling software (MaxEnt).



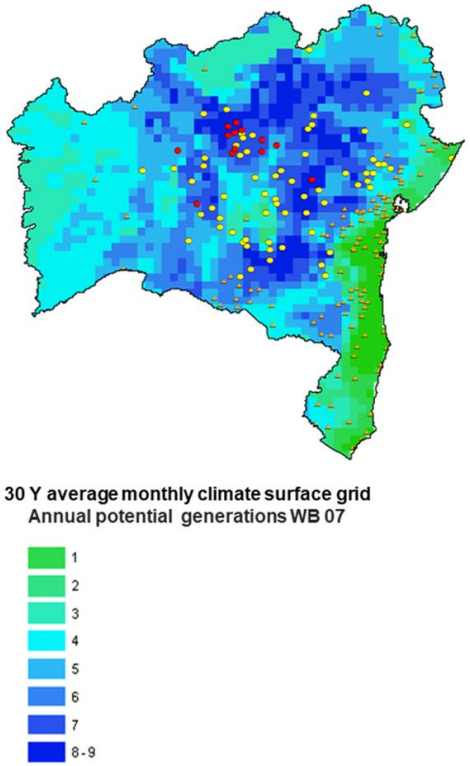


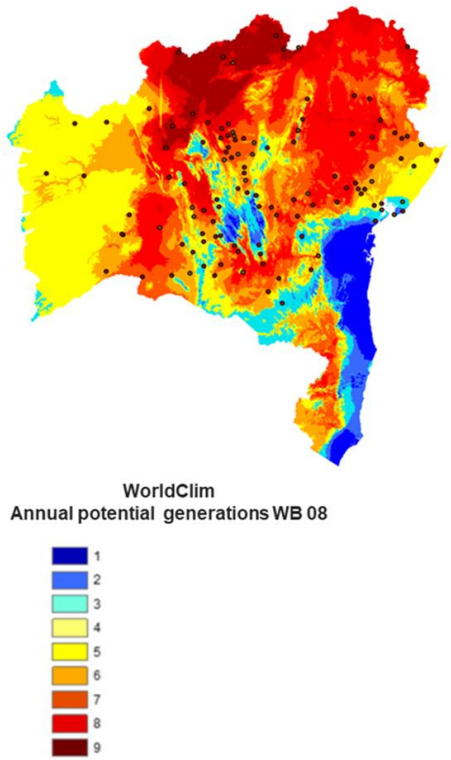
Changes over the years in the potential generations per year of *Lutzomyia longipalpis* State of Bahia- Brazil

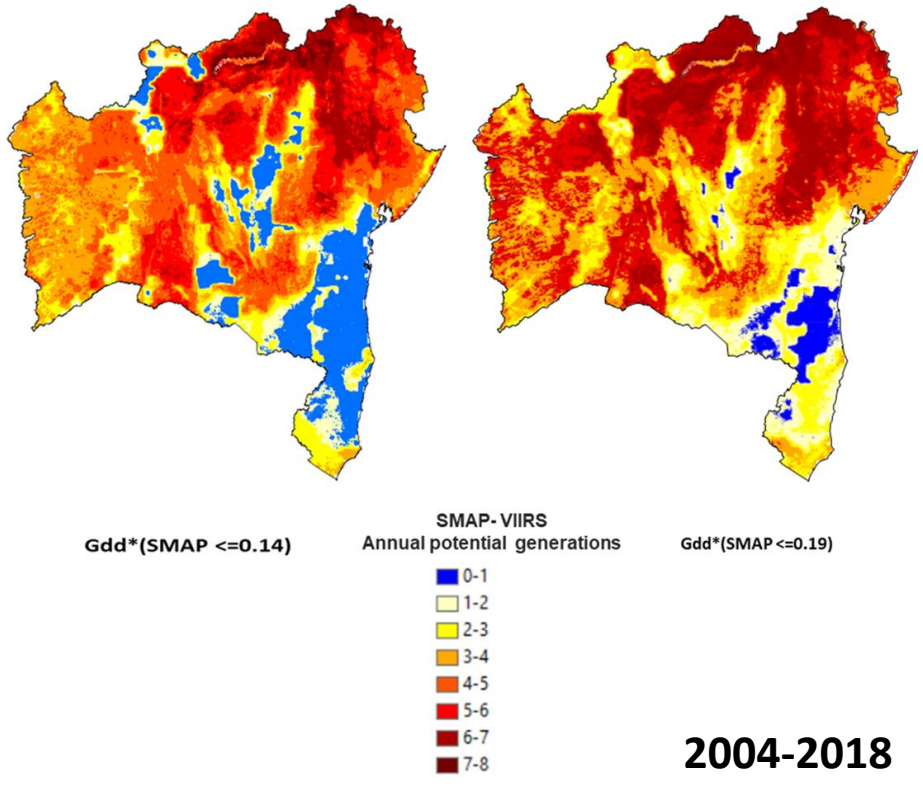
The AnPG ranged from 0-9
-Caatinga have at least 5 generations characterized as hot semiarid region
-Cerrado predicted to have 2-4 generations
-Most of the Bahia costal forest was predicted with 0-3 generations Indicating low development of the vector and consequently low risk.
-The High prevalence distribution of the disease is limited to the central Plateau, where the vegetation in predominantly xerophilous.



1990-2000



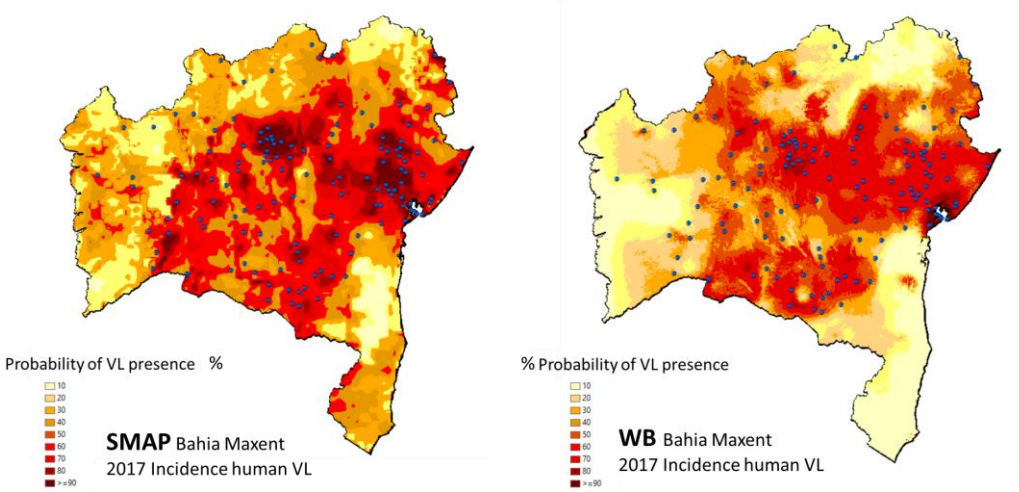




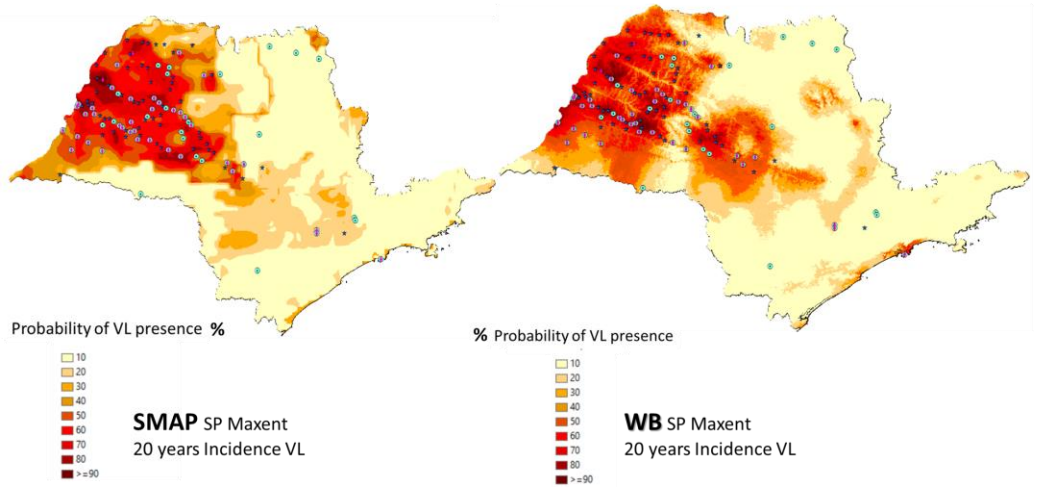
2004-2018

SMAP -Vs – WB WorldClime Models São Paulo and Bahia states

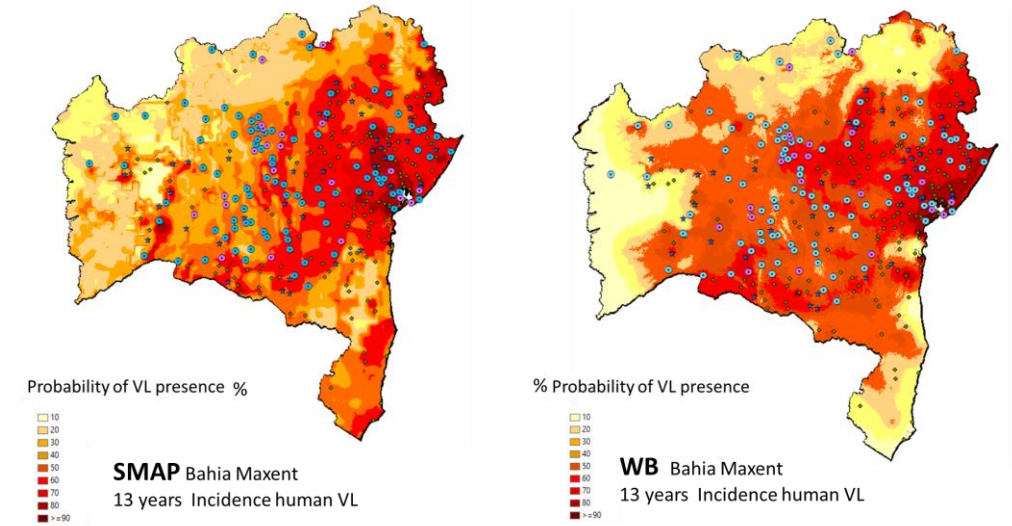
SMAP Vs Water Balance based MaxEnt Models 2017 **Incidence Human VL cases Bahia**



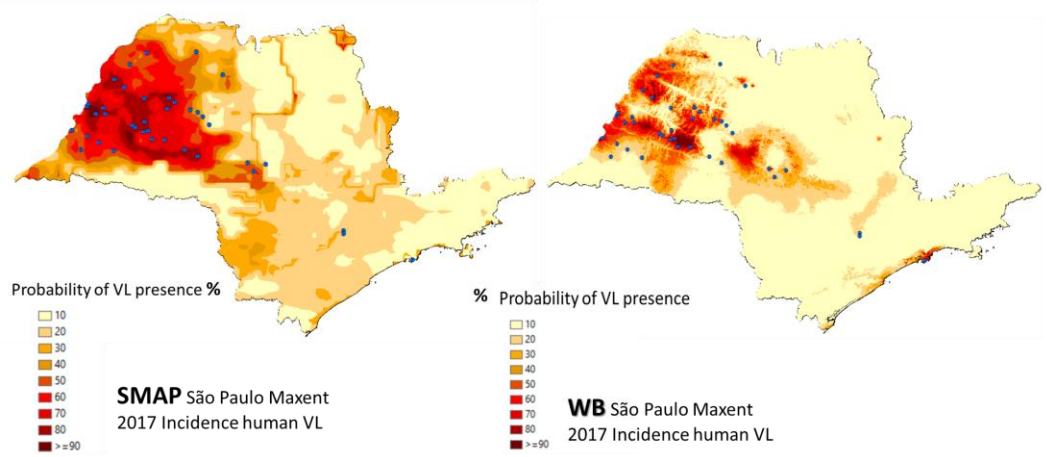
SMAP Vs Water Balance based MaxEnt Models. **20 Years Incidence Human VL cases São Paulo**



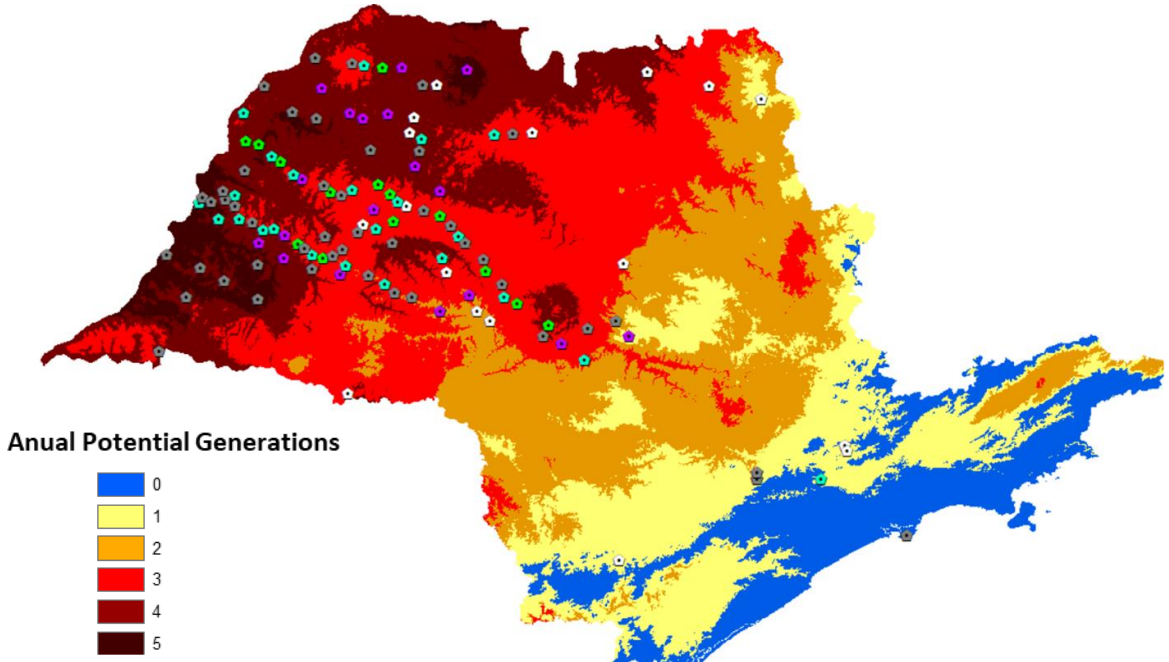
SMAP Vs Water Balance based MaxEnt Models. **13 Years Incidence Human VL cases Bahia**



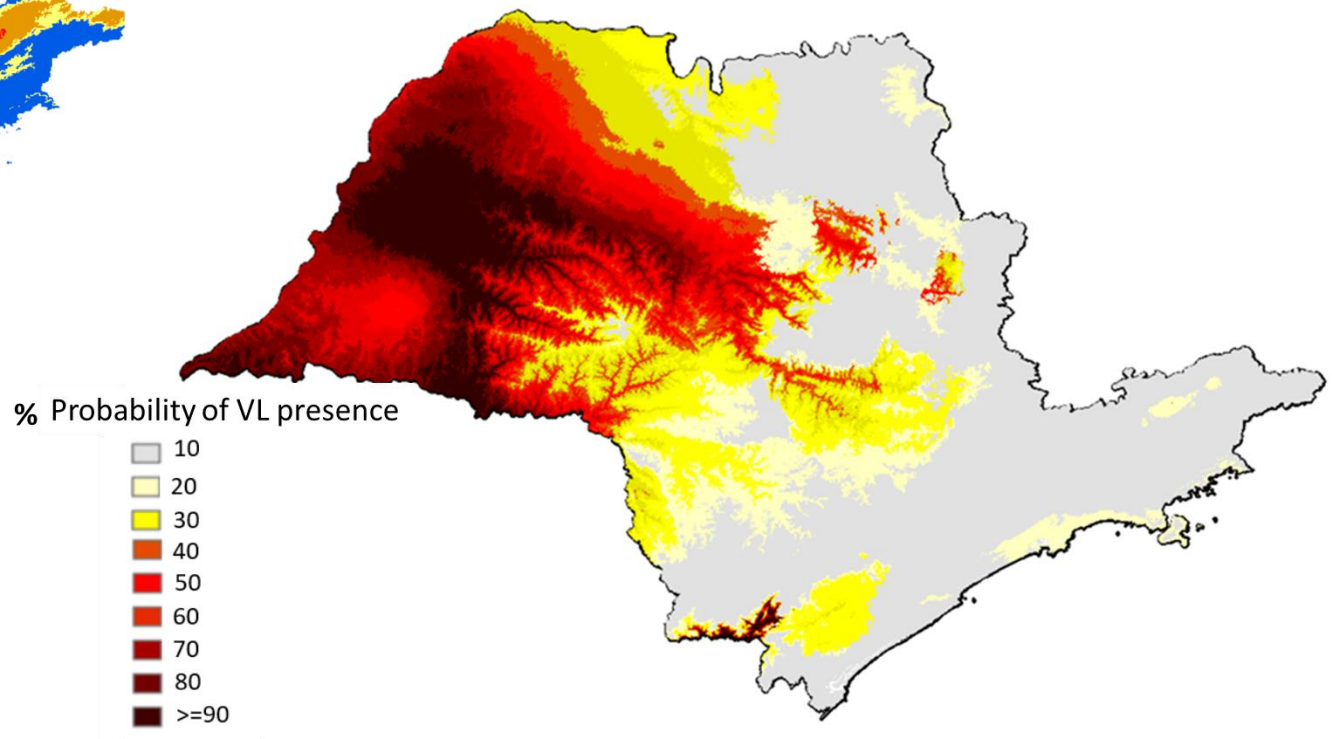
SMAP Vs Water Balance based MaxEnt Models. **2017 Incidence Human VL cases São Paulo**



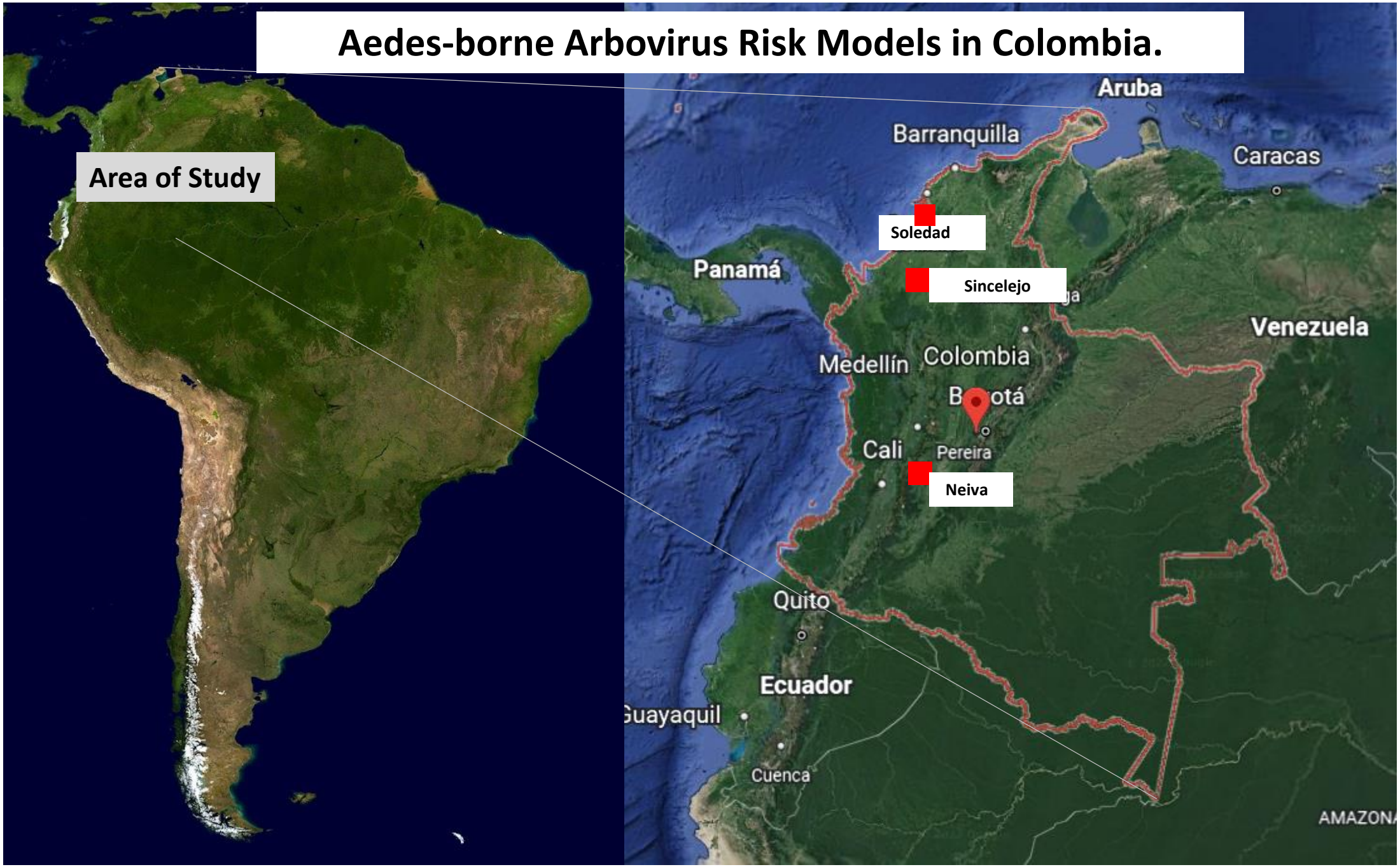
L. longipalpis biology based Models. Anual potential generations São Paulo.



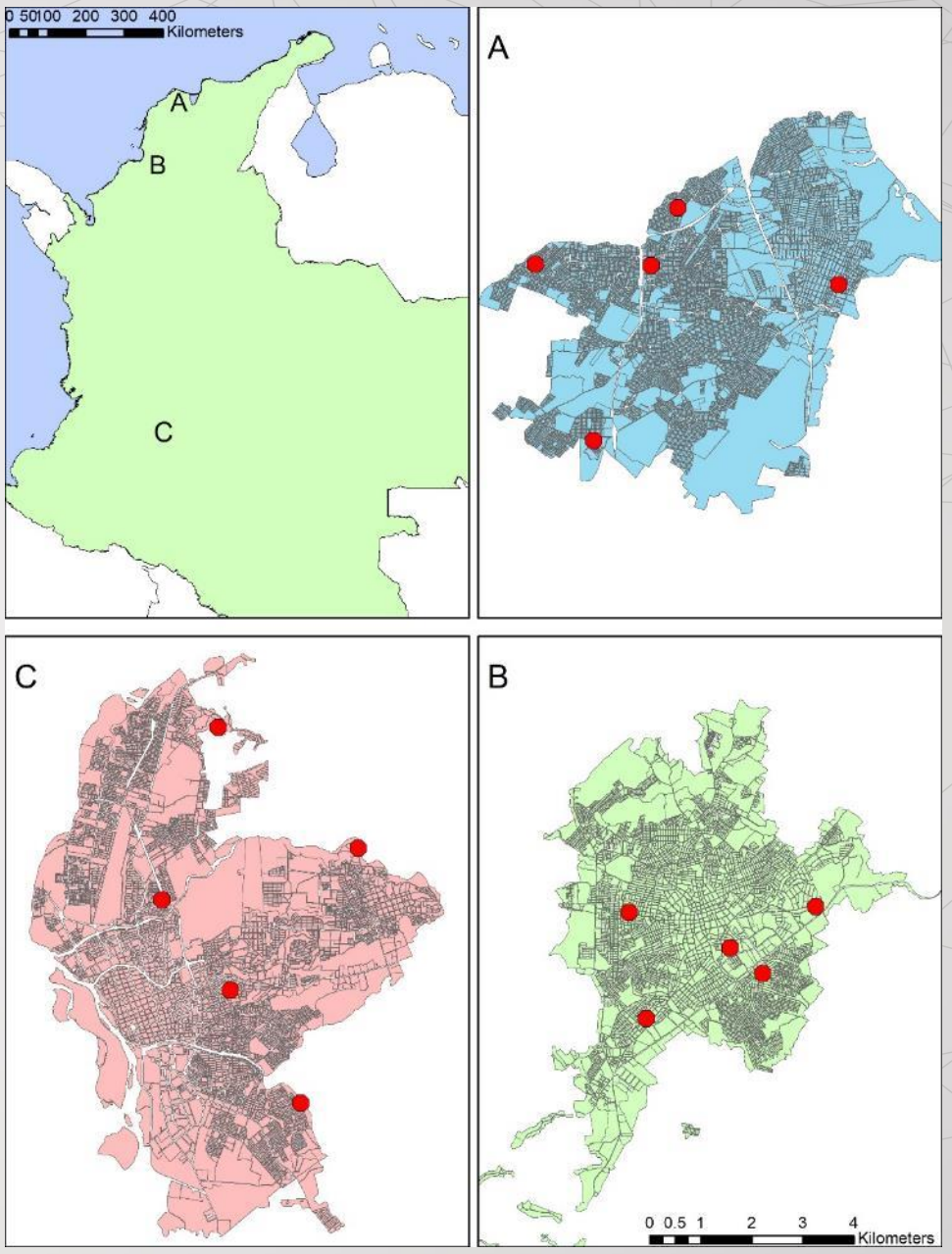
L. longipalpis biology based Environmental niche model. São Paulo.



Aedes-borne Arbovirus Risk Models in Colombia.



Aedes-borne Arbovirus Risk Models in Colombia.



Area Of Study:

Colombia (3 cities: Soledad, Sincelejo and Neiva).

Climatological data:

Local weather stations, Landsat LST. HOBO™ thermometers.

Objective:

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

-To investigate how differences in temperature measured inside/outside/weather stations/satellite translate into altered estimates of transmission of arboviruses.

Five (5) houses were surveyed in 3 different cities in Colombia over the course of a year with installed HOBO™ thermometers. weather station data available for the three cities (or nearest station) were compiled and satellite data is currently compiled to complete the dataset for a final analysis.

Figure 1 Location of Soledad (A), Sincelejo (B) and Neiva (C) in Colombia (Left superior panel) and the distribution of Temperature data logger inside each municipality highlighted as red circles.

Latest Article

Use of soil moisture active passive satellite data (SMAP) and Worldclim data to predict the potential distribution of visceral leishmaniasis and its vector in São Paulo and Bahia states, Brazil.

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[2]NASA Marshall Space Flight Center. USA

[3]Federal University of Bahia. Brazil

[4]São Paulo State University. Brazil

Next Steps:

*2 Articles (1, in the Biology of *Lutzomyia longipalpis* in Brazil and 1, in Aedes-borne Arboviruses in Colombia).

*Eco-epidemiological studies with the one health perspective and citizen scientists approach for the study, control and prevention of Visceral leishmaniasis in Colombia.

Thank you!
¡Gracias!
Obrigada!

Questions?

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