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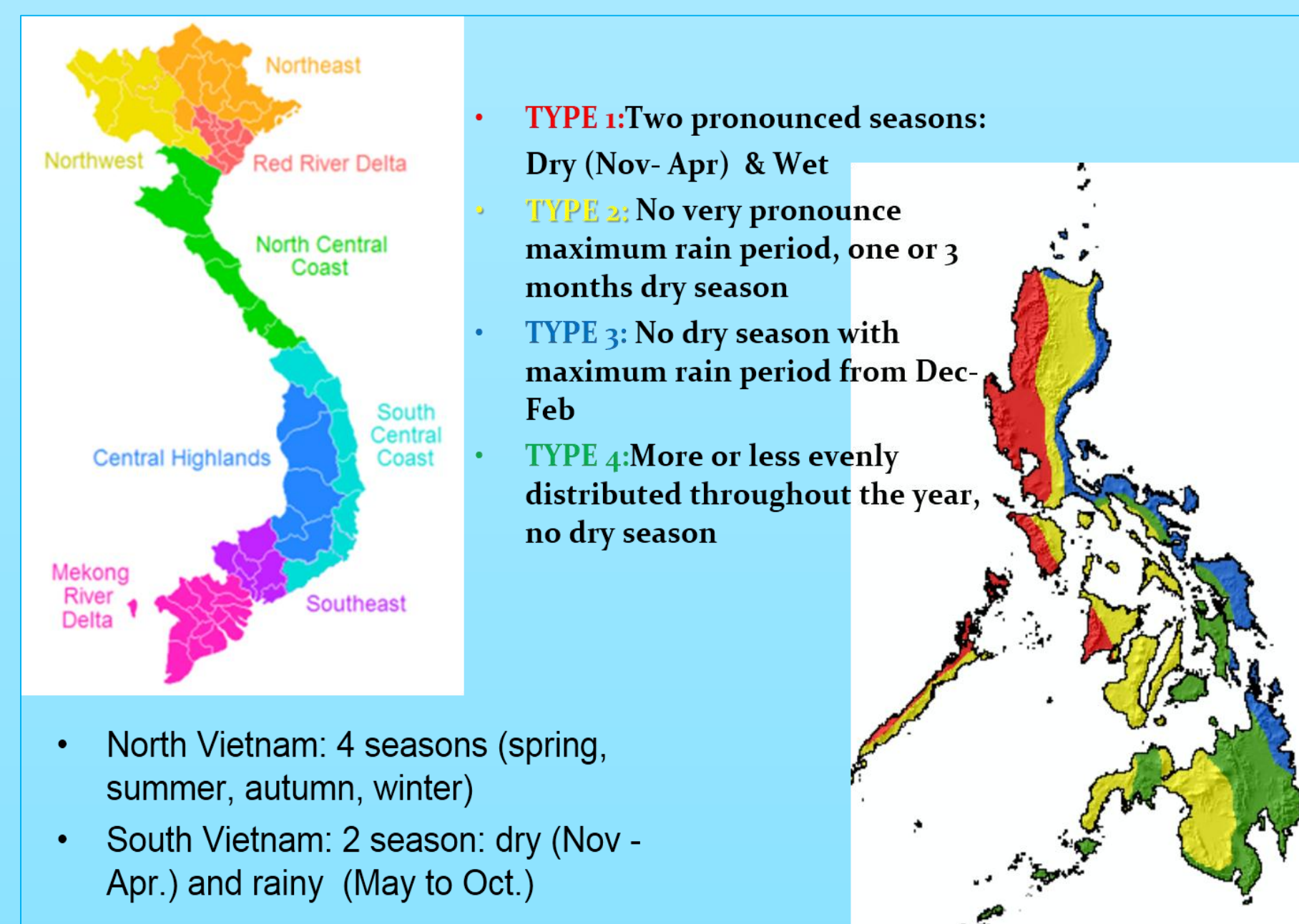
## Introductions

In the South East Asia region, Vietnam and Philippines are recognized as the most vulnerable to climate change, therefore an increased burden of climate change related diseases. Changes in temperature and precipitation are likely to alter the incidence and distribution of vector-borne diseases such as dengue and malaria. This study aims to improve the knowledge of the dengue by investigating the relationship between dengue incidences and climate variables of temperature and precipitation for Vietnam during the period of 1998-2014.

-> **Study focus:** Determine if climatic factors (temperature, rainfall and humidity) are significant in predicting dengue in Vietnam and Philippines?

- Percent of the cases contributed by the climate factors
- Prediction model of dengue cases

## Study site

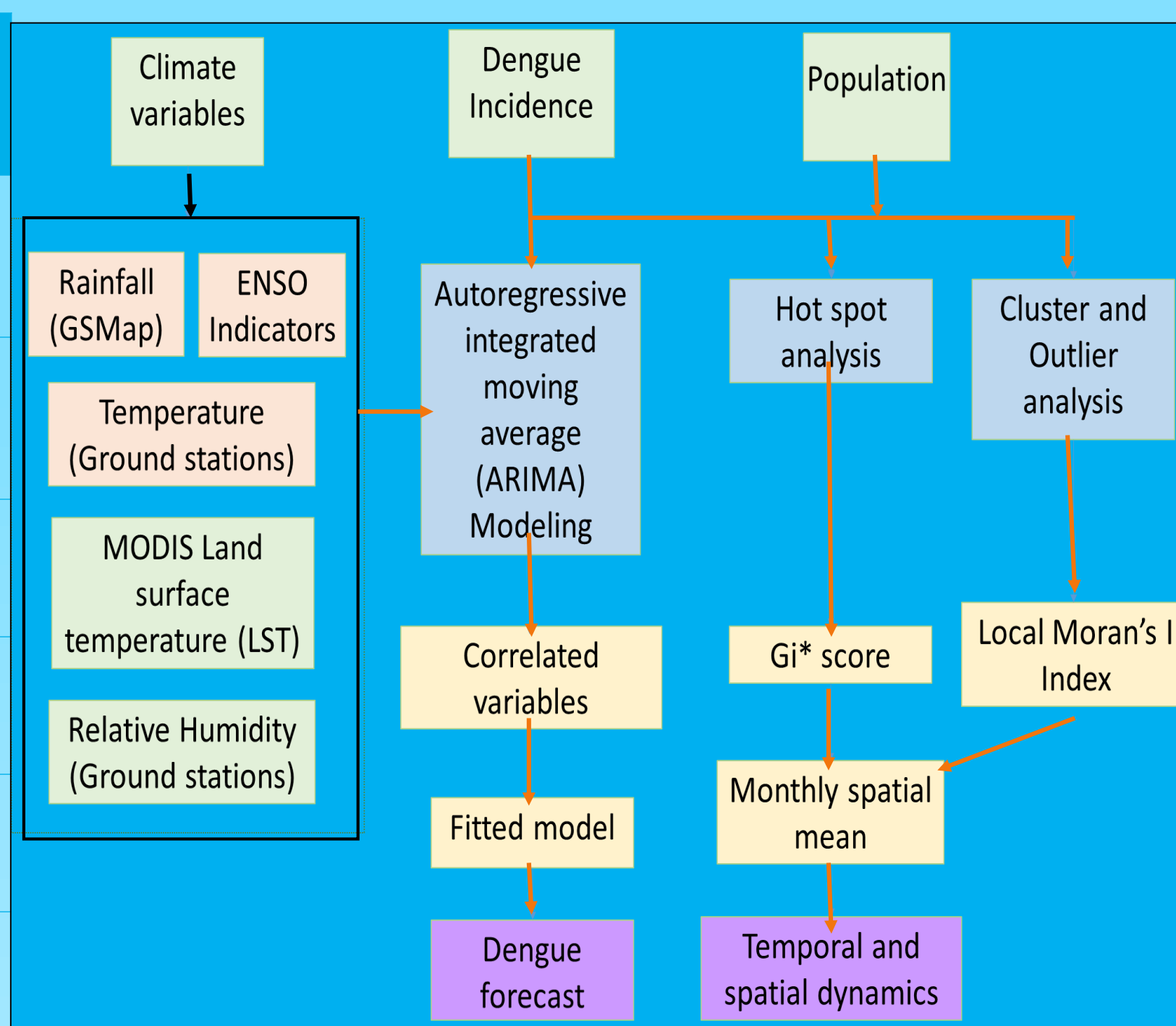


- Modelling of dengue are carried out for 5 provinces at different climate regions of Vietnam and Philippines.
- - Vietnam: Hanoi in the north, Khanhhoa in the Center, and Tiengiang in the south
- Philippines: R03 at type 1 and type 4

## Data / method

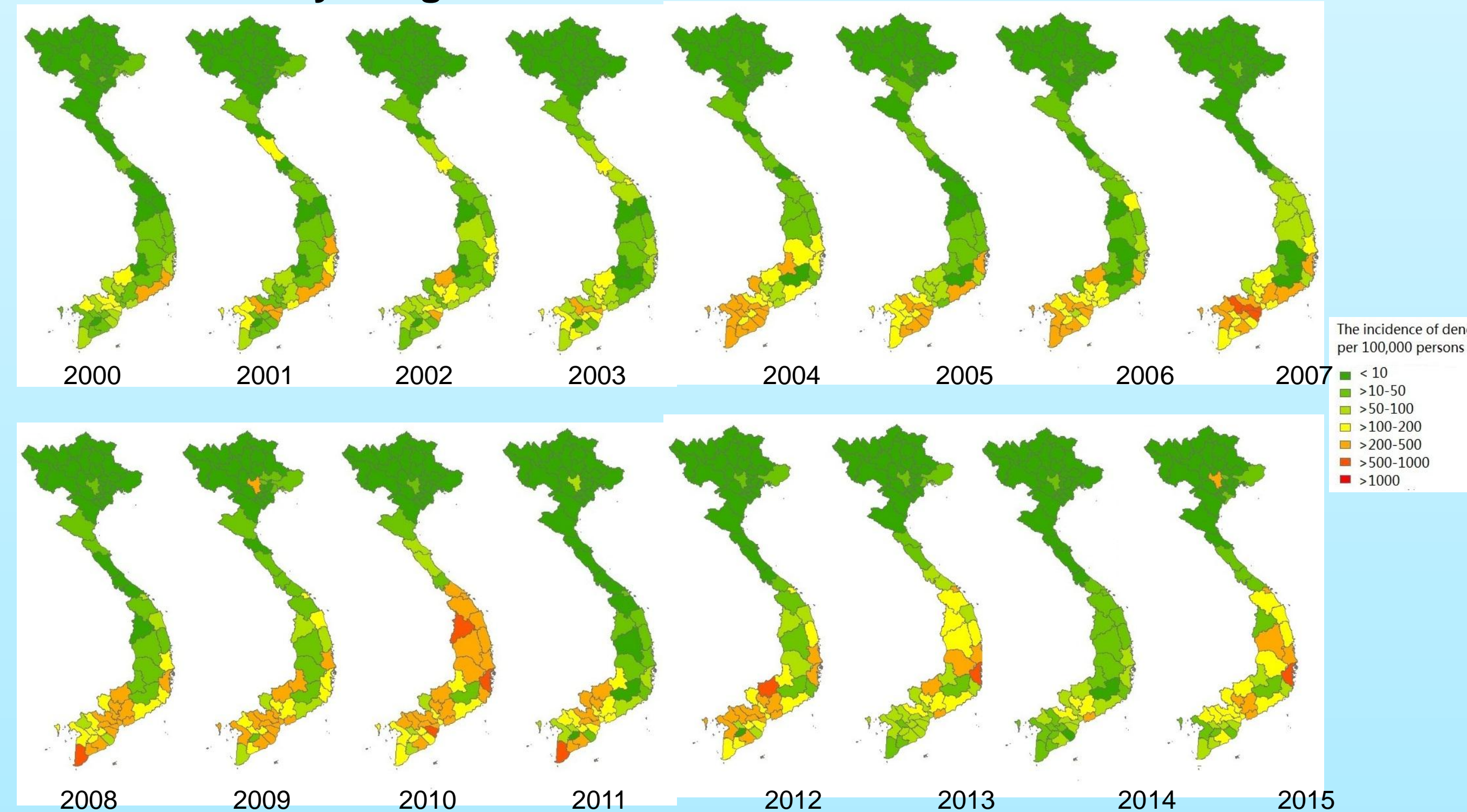
### Data on dengue and Climate variables (2000-2015)

- VietNam: Provincial incidences of dengue
- Philippines: Regional incidences of dengue
- Monthly GSMaP precipitation
- Monthly LST from MODIS
- Monthly NDVI from MODIS
- Relative Humidity Station data/
- ENSO index

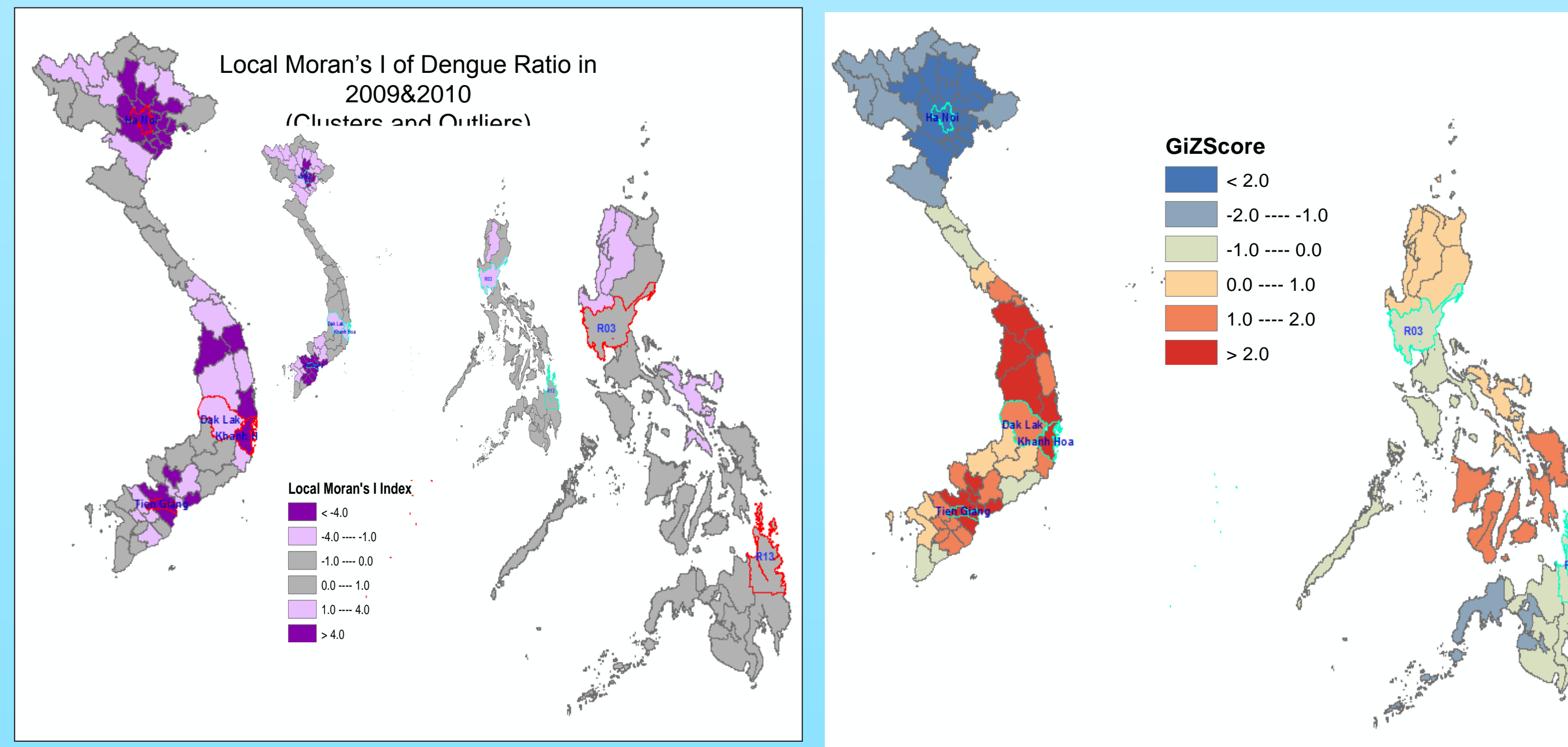


## Materials

### Yearly dengue incidence variation in Vietnam

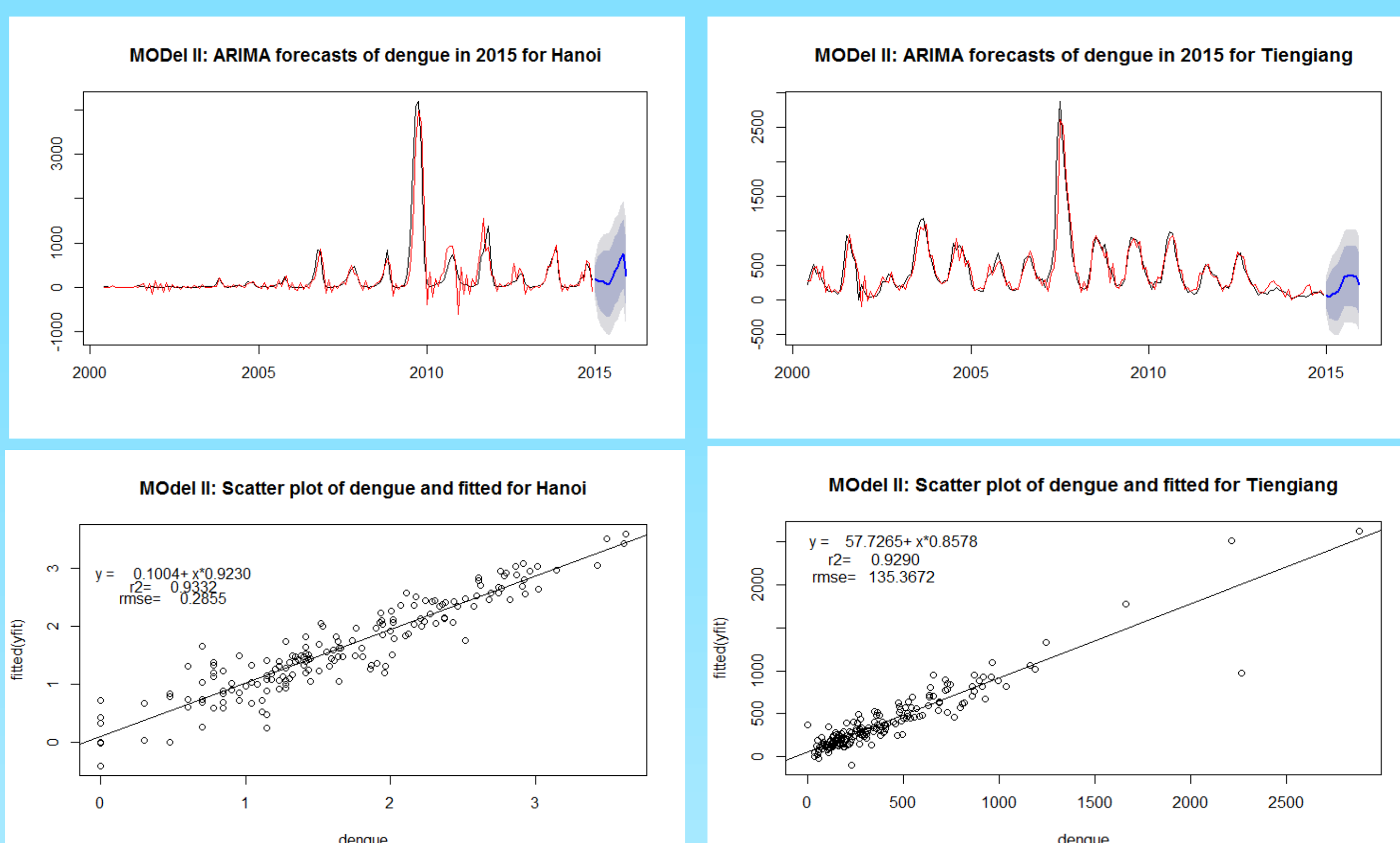


## Spatial Analysis

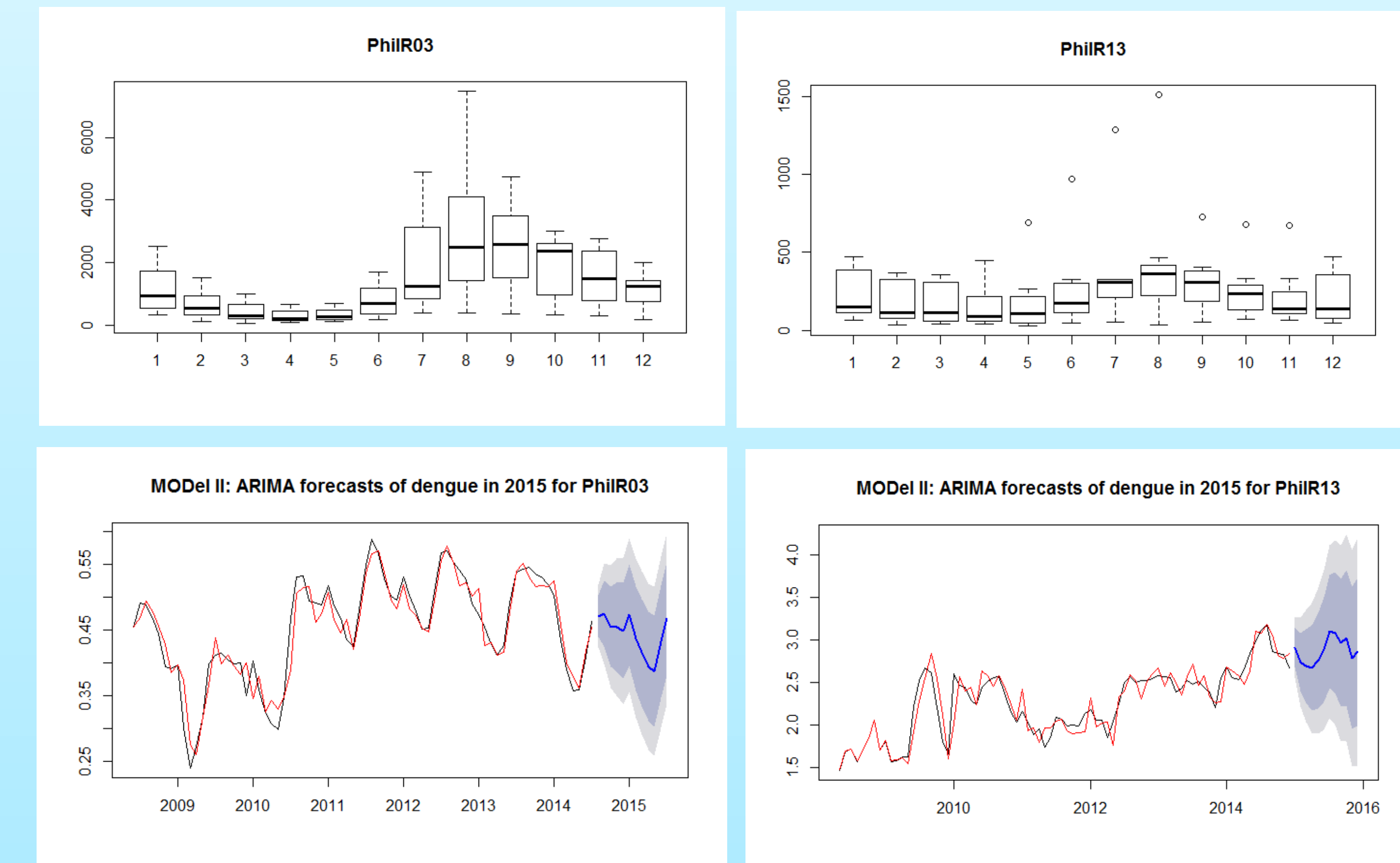


## Dengue Modelling

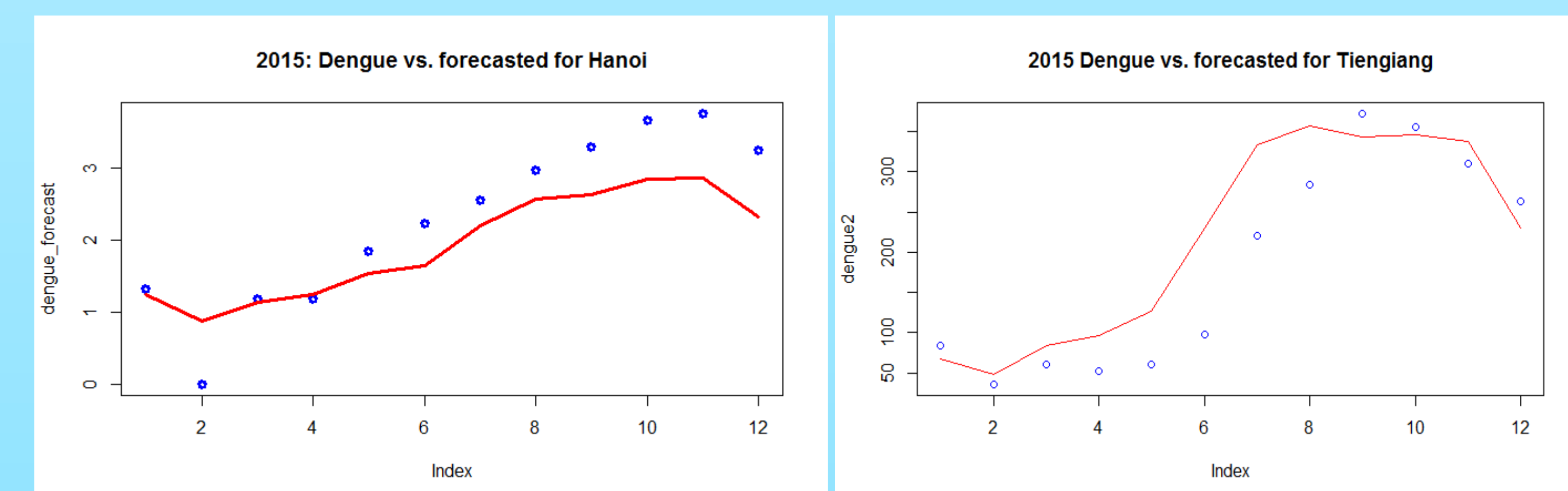
### 1. Dengue prediction for Vietnam



### 2. Dengue prediction for Philippines



### 3. Model verification



## Conclusion

- Spatial analyses helped in defining the host-spot and outlier of dengue distributions for selecting modelling sites
- Remote sensing data were extensively used in dengue modelling (GSMaP, MODIS NDVI and LST)
- Good correlations between dengue cases with climate variables were found in some regions of both countries
- Climatic factors that are significant in predicting the number of dengue cases vary strongly among regions or provinces in both countries
- ARIMA model provides reasonable predicted cases.

## Acknowledgement

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- \* Corresponding author: Vietnam National Satellite Center.