

MUSSO Didier

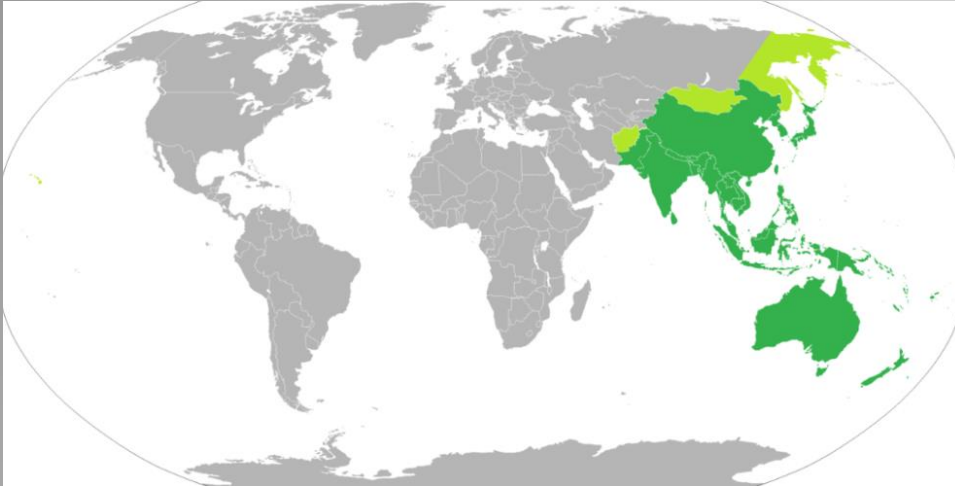
Institut Louis Malardé, Tahiti, French Polynesia

« Spread of Zika virus in the Asia Pacific region »

# **Conflict of interest**

No conflict of interest

# ASIA PACIFIC REGION



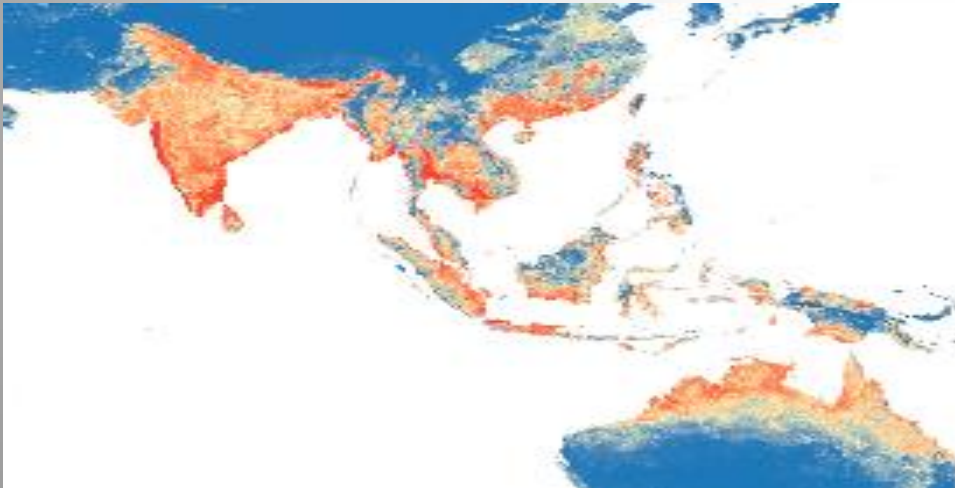
## Main arboviruses in Asia Pacific

### *Flavivirus* genus

- Dengue +++ (Asia Pacific)
- Zika +++ (Asia Pacific)
- Japanese encephalitis (Southeast Asia, PNG Guam) (*Culex*)

### *Alphavirus* genus

- Chikungunya +++ (Asia Pacific)
- Ross River (Australia) (*Aedes* but neither *aegypti* nor *albopictus*)



## Arboviruses not reported in Asia Pacific

### *Flavivirus*

- Yellow fever (why ?)
- WNV (Lineage 1b Australia, 1c Central Asia, by *Culex*)

*Aedes aegypti* and *albopictus* (vectors for ZIKV, DENV, CHIKV) in Asia Pacific

# ZIKV Pacific: 2007 Yap Island



2007: Yap, Federated States of Micronesia, 7.500 inhabitants

- First detection of ZIKV out of Asia and Africa
- Where did ZIKV come from? (Southeast Asia but how was it introduced?)
- Vector: *Aedes henselii* +++ , very limited distribution
- Adaptation of ZIKV to new mosquitoes and hosts
- About 75 % of the population reported symptoms of infection
- No complication

# ZIKV Pacific: 2007 – 2013



**Nothing to declare?**

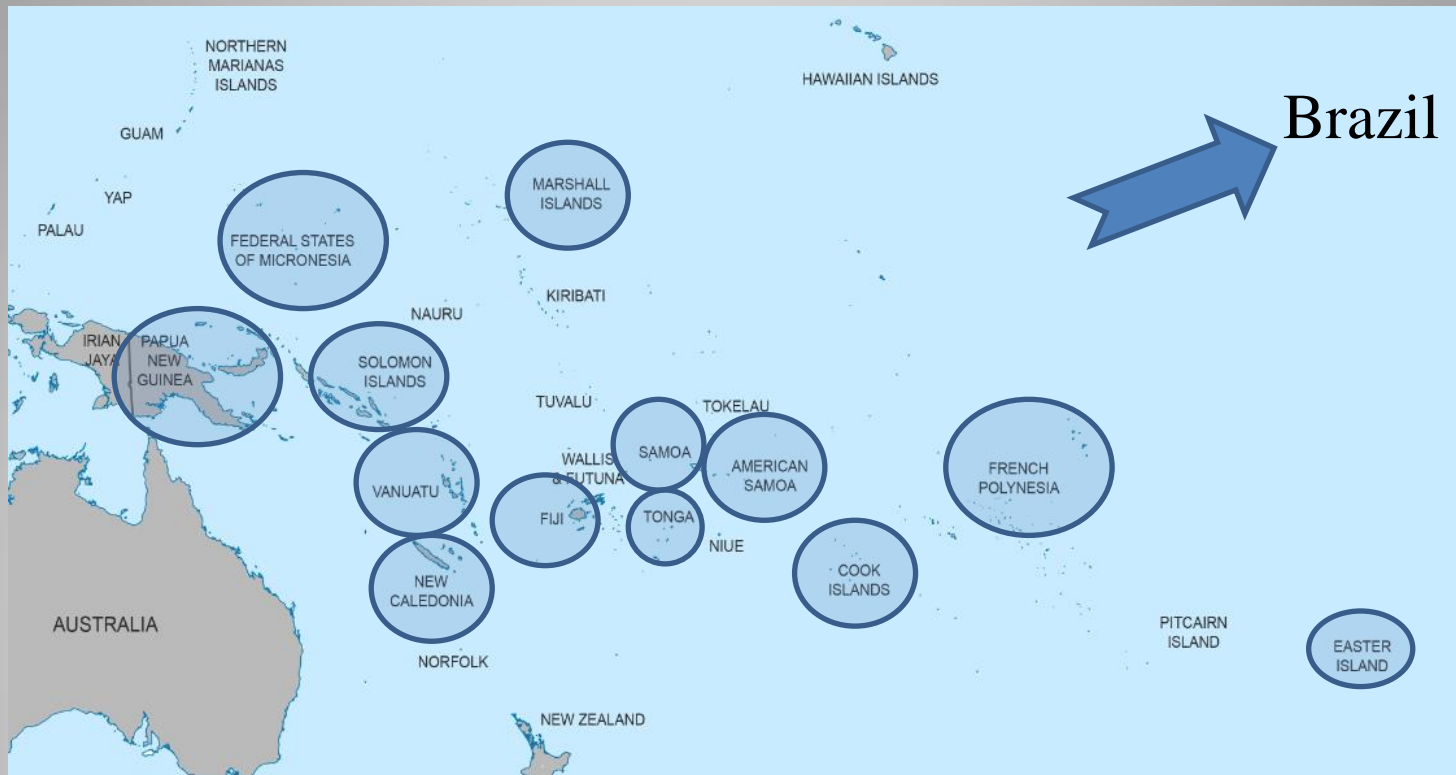
# ZIKV Pacific 2013-2014: French Polynesia



2013-2014: French Polynesia

- Where did ZIKV come from?
- Strain close but different to the strain isolated in Yap, closest to the Cambodia 2010 strain
- Vector: *Aedes aegypti*
- Clinical symptoms: 11%, seroprevalence over 50%
- **Fourth unexpected event:**
  - First severe complications: GBS +++
  - Microcephaly was reported retrospectively
- **Fifth unexpected event:**
  - Non vector borne transmission: materno-fetal, transfusion, sexual

# ZIKV Pacific 2014-2017



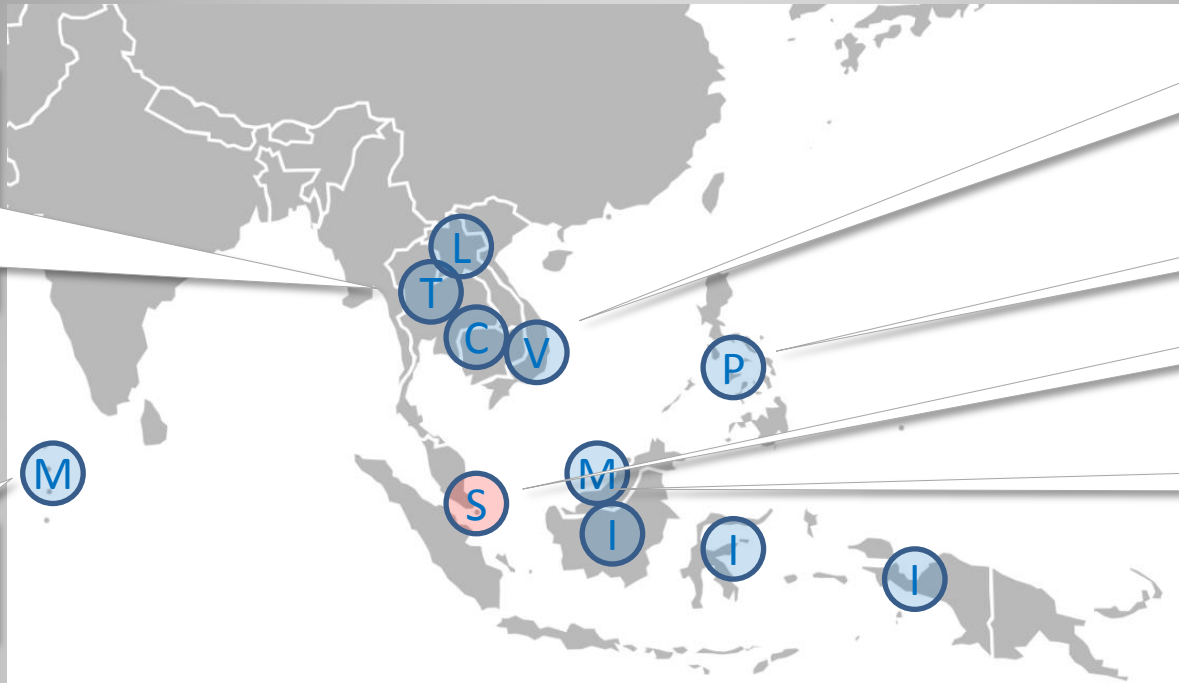
- Spread throughout the Pacific
- Number of countries and territories impacted?
- Number of cases?
- Complications out of French Polynesia (?)
  - 1 microcephaly in a newborn in New Zealand from a mother returning from the American Samoa
- Circulation still ongoing +++ but not always reported
  - Do not focus only on the Americas

# ZIKV Asia: 2014-2017

## Serosurvey : circulation for the past 50 years

**Thailand :**  
Imported cases  
in Israel and  
Australia before  
detection of  
autochthonous  
cases

**Maldives :**  
Imported cases  
in Finland



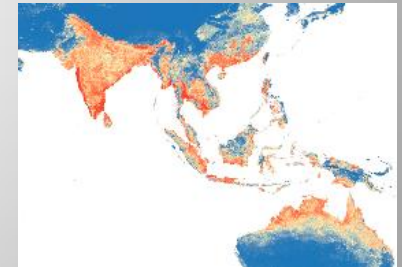
**Vietnam :**  
232 cases since 2016  
2016: 110,000 DENV +++

**Philippines :** 57 cases

**Singapore :** 1 outbreak

**Malaysia :** 8 cases

- Circulation demonstrated by returning travelers
- Circulation underreported +++
- Number of cases? Complications?
- Circulation still ongoing
- First reported outbreak in Southeast Asia : Singapore
  - About 260 cases
  - Strain close to a strain that circulated in Asia before 2007
- Why only 1 outbreak?





# ZIKV in Asia Pacific region: gap in knowledge

## Hypotheses

### Pacific : large spread

Origin of first outbreak in Yap 2007

Origin of second outbreak in French Polynesia 2013-2014?

Mutations in ZIKV associated with increased epidemicity and virulence that occurred in French Polynesia ?

Geographic distribution of ZIKV in the Pacific?

Pre-existing immunity against other flaviviruses in the population, not protective?  
(> 80% DENV seroprevalence in French Polynesia)

No outbreak in Hawaii, why? (*Aedes albopictus* competence in the lab. vs. real life) (≠ CHIKV Réunion Island, France)

### Asia : limited spread

Favorable conditions for the emergence of ZIKV (like for DENV but also for YFV, which is not emerging)

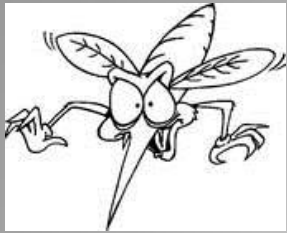
Why only 1 outbreak reported (Singapore)?

Other small/silent outbreaks, misdiagnosed for DENV, but no large outbreak?

Why « old » ZIKV strain emerged in Singapore?

What is the impact of pre-existing immunity against ZIKV that was detected in the region since the 60's (seroprevalence)  
No recent data on ZIKV seroprevalence

Is there a cross protection against ZIKV induced by vaccination against other *Flavivirus*? especially against JEV in Asia ?  
(however vaccination against YFV in Brazil does not seem to be protective)



**WELCOME TO FRENCH POLYNESIA**  
**WE HAVE MORE THAN ZIKV**

