Hydro-meteorological Impact on Malaria Diseases at Regional Scale in India

Co-authors: Krushna Chandra Gouda1, Ujjwal Singh2, Petr Maca2, Kantha Rao Bimla1, Himesh s.1, Nikhila Suma1, Mahendra Vishnu Benke1, Srinivas Rao3, and Murty Usn4

1CSIR Fourth Paradigm Institute, Bangalore, India, CMMACS, India

2Faculty of Environmental Sciences, Czech University of Life Sciences Prague, Kamycka 129, Praha-Suchdol, 165 00 Czech Republica

3CSIR Indian Institute of Chemical Technology, Hyderabad

4National Institute of Pharmaceutical Education Research Guwahati

Presenting Author,

Reshama Kumari,

Senior Research Fellow (SRF)

CSIR, 4rth paradigm Institute,

National Aerospace Laboratory,
Bangalore,

Email: reshmakumari08@gmail.com

Objective

- Finding a significant correlation between malaria diseases and hydrometeorological parameters.

Why This Study Important

- Afterward, 1990 the reported malaria death has been estimated by world health origination (WHO) is nearly 19500 to 20000 per annum.
- According to world malaria report 2017, in the year 2016, more than half of world's population (698 million) was at risk of malaria.
- World malaria report predicted that malaria likely to persist in Orissa, west Bengal and southern part of Assam but may shift from the central Indian region to the south western coastal states of Maharashtra, Karnataka and Kerala.
- Also predicted that north east part of India like Arunachal Pradesh, Nagaland Manipur and Mizoram my become malaria prone zone
- The above study motivated me to study of malaria incidence at regional scale in India
- Identify the important hydrological parameter at the regional level, which is potential indicator for malaria diseases with the better health management system

Introduction

- Human health conditions and diseases are strongly influenced by climatic and meteorological factors
- Variability in climate and meteorological factors, including changes in extreme weather events can affect the environment including the human health.
- There is huge research gap in this field which is needed to investigate the connection between meteorological and climatic factors with respect to the human health and epidemics related to infectious diseases like malaria, dengue over the India.

Data and study area

Data: precipitation gridded 0.25x0.25 data from Indian Meteorological (IMD) and GRUN5 global surface runoff during the period of 1995 to 2012

Malaria Data: Plasmodium vivax (PV), Plasmodium falciparum (PF)

Study Area: Tirap (26.9943N, 95.540E) district of Arunachal Pardesh

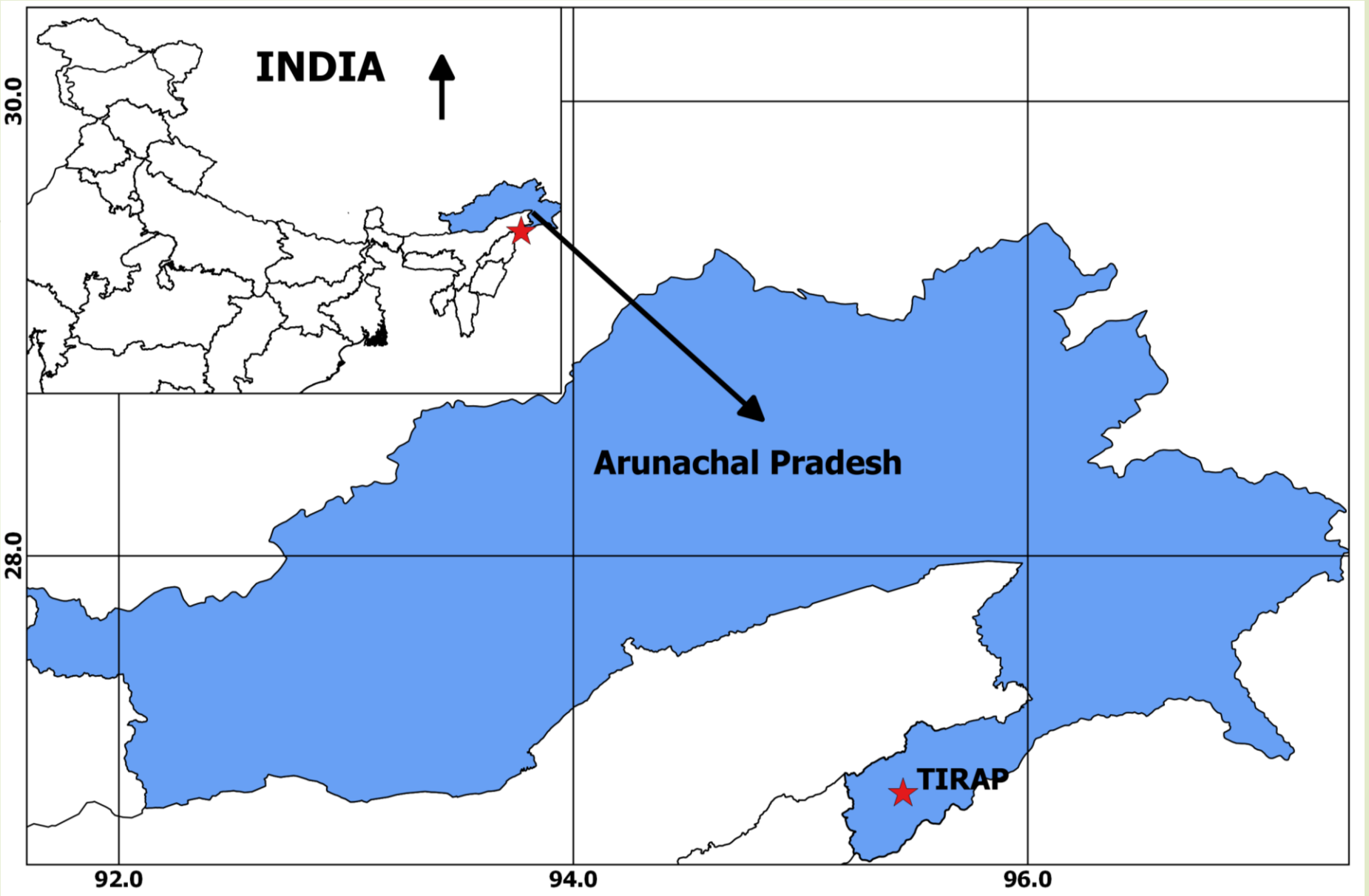

Fig.1 Map of Study Area

Methodology

- The Indian Meteorological (IMD) precipitation (P) and global surface runoff GRUN data has been extracted over the Tirap district boundary of Arunachal Pradesh during the period of 1995 to 2012
- Estimation of actual evaporation (AET) as difference e between Precipitation (P) and runoff time series.
- Data of total number of infected people from parasites, Plasmodium vivax (PV), Plasmodium falciparum (PF) is a indicator of Malaria.
- Creation of correlation matrix among meteorological parameters (P, AET, surface runoff, and AET/P) and malaria data (PV and PF).

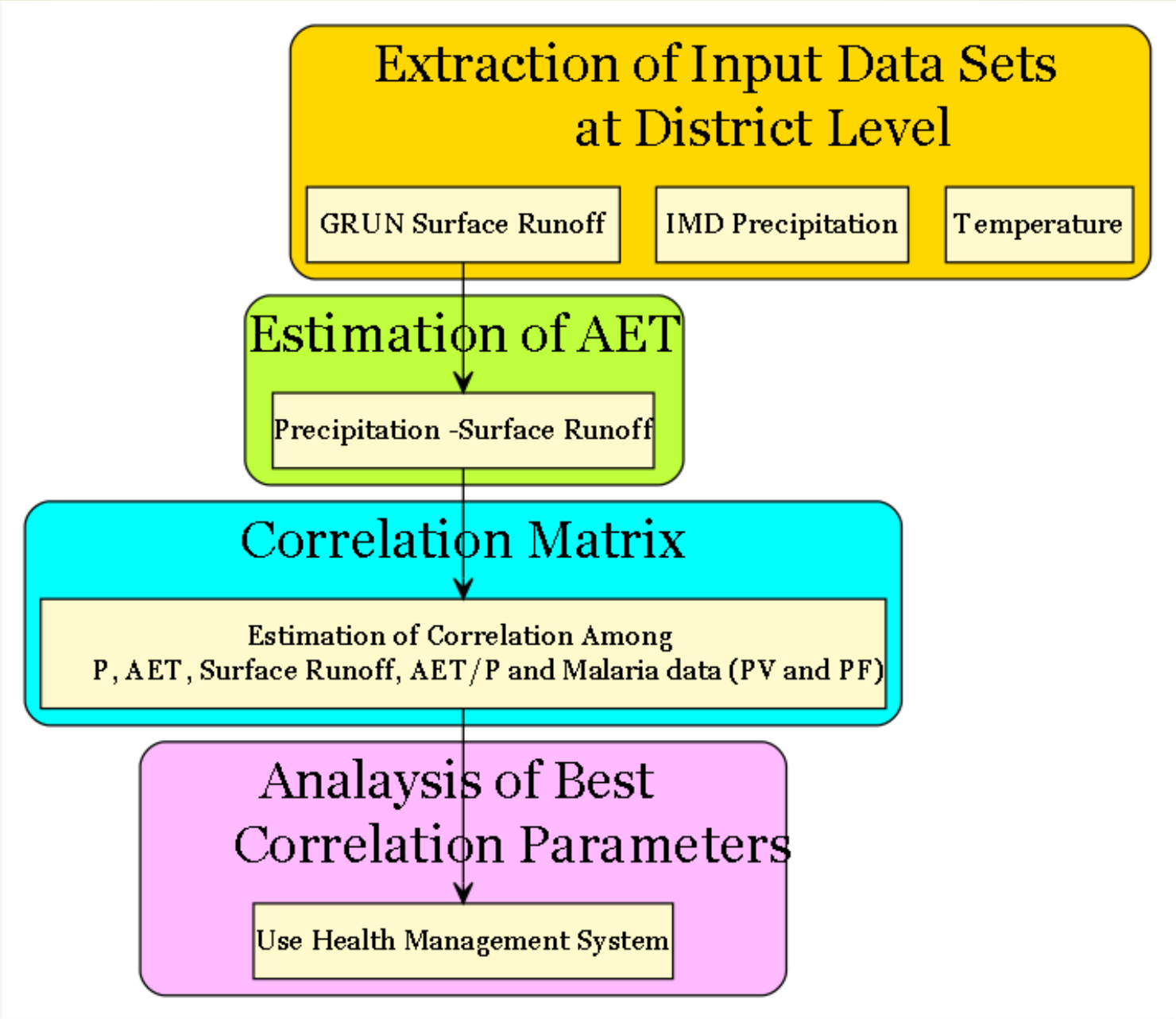

Fig. 2 Methodology flow chart

Result

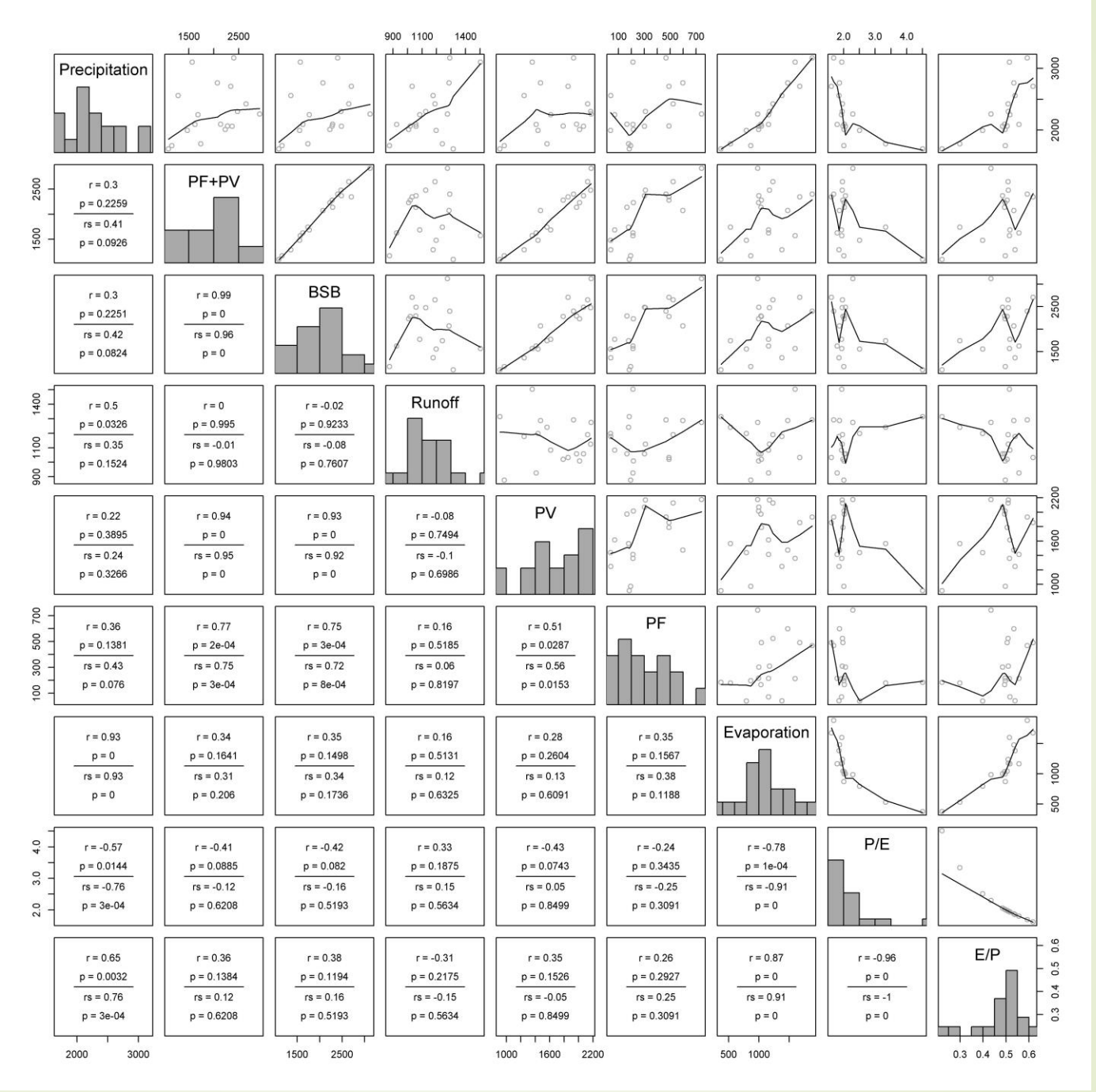

Fig.3 correlation Matrix Plot

Conclusion

- The AET and P relationship with Plasmodium vivax (PV), Plasmodium falciparum (PF) is analysed.
- BSB is the sum of PV and PF.
- BSB is a indicator of malaria affected people.
- The study has revealed that fraction P/AET is negatively correlated with PV, PB and BSB
- In comparison to hydrological and meteorological variables like P, surface runoff, AET and AET/P which are mostly positively correlated with BSB, PV and PF
- Whereas P/AET is negatively correlated with Pv and PB.

Potential Application of This Study

- Forecasting of Malaria diseases at regional scale using hydrometeorological parameters.
- Development of health information system for the better health management

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THANK YOU