

# Citizen science in hydrology:

## A case study of Kathmandu Valley, Nepal

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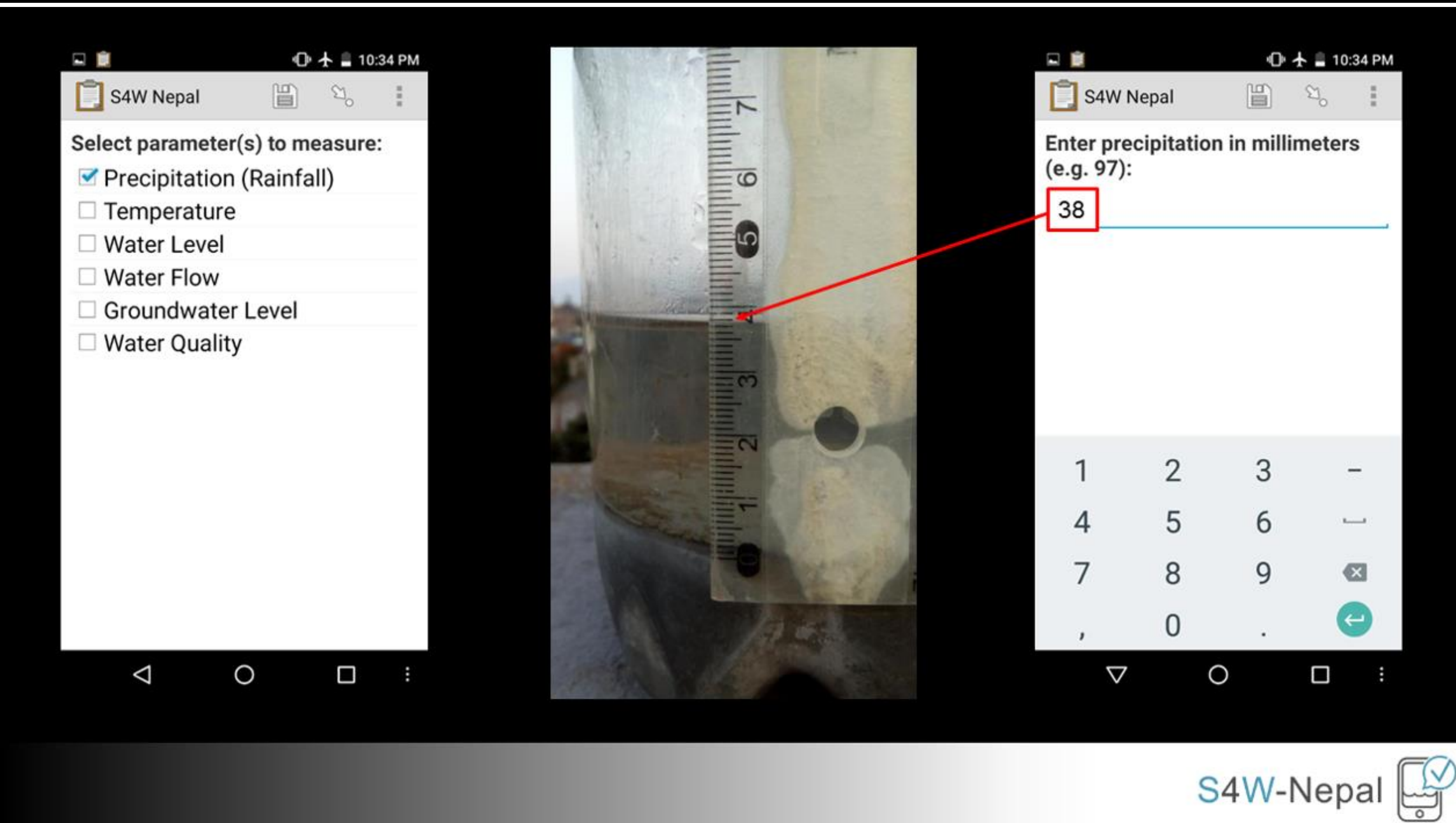
### INTRODUCTION

- Involvement of the general public (i.e. non-scientists) in the research design, data collection, interpretation and various scientific tasks with collaboration from professional scientists is generally referred to as citizen science (CS) (Buytaert et al. 2014).
- In the social and political development context, public participation has been embedded into the mainstream for decades. CS emerged from and across many disciplines, is not a new concept but is becoming increasingly popular even in scientific research (Silvertown, 2009).
- **Hydrology remains a highly data-scarce; in many regions, if data exists, the lengths of the time series are not sufficient.** The increased availability of Information and Communication Technology (ICT) - in particular, mobile phone opens up new ways of data acquisition and dissemination.
- Smartphones for water (S4W)-Nepal has started CS utilizing mobile technology for hydrological data measurement (precipitation, streamflow, groundwater level/quality, stone spout flow/quality, land use, ecological stream health assessment). This paper has attempted to analyse S4W-Nepal CS based precipitation data of Kathmandu valley for the year 2017.

### OBJECTIVES

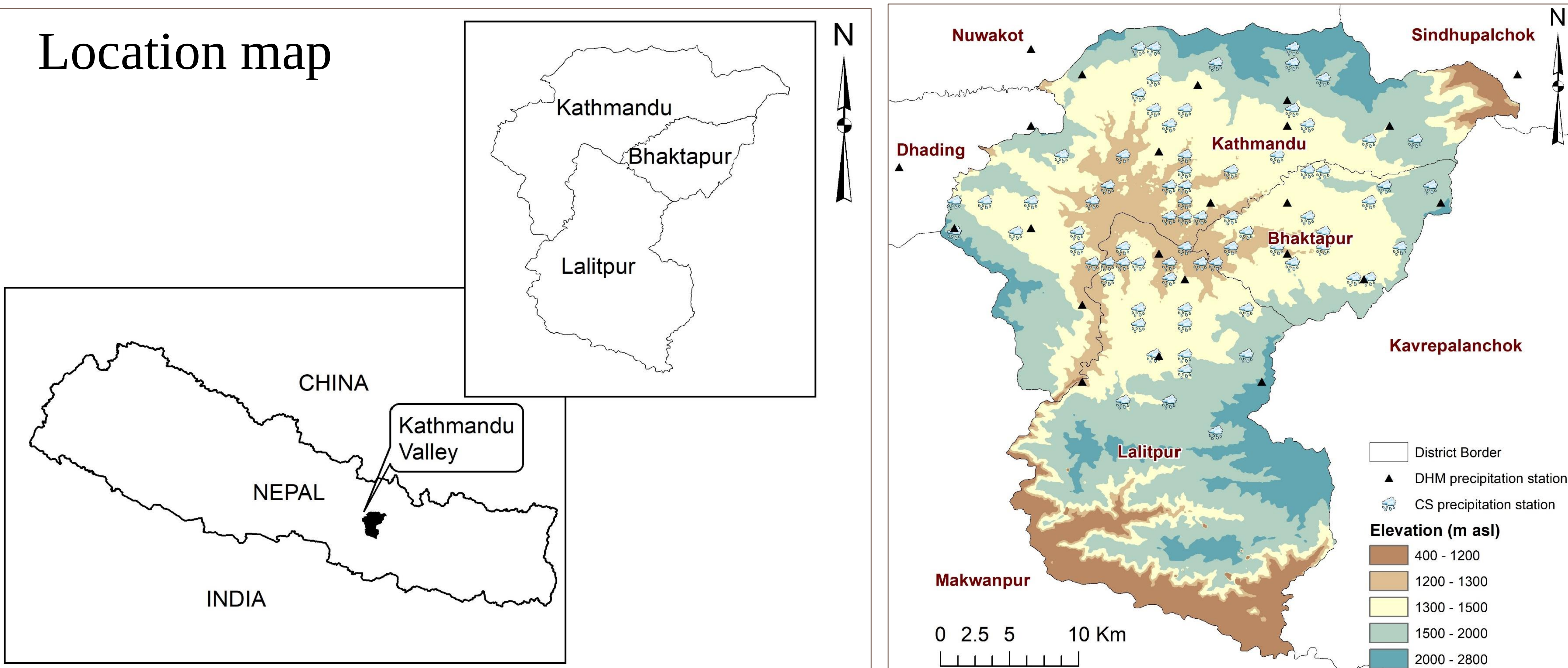
- The purpose of this study is to assess the performance of CS based precipitation data.
- This study compares with the precipitation data maintained by the Department of Hydrology and Meteorology (DHM).

### DATA AND METHODS

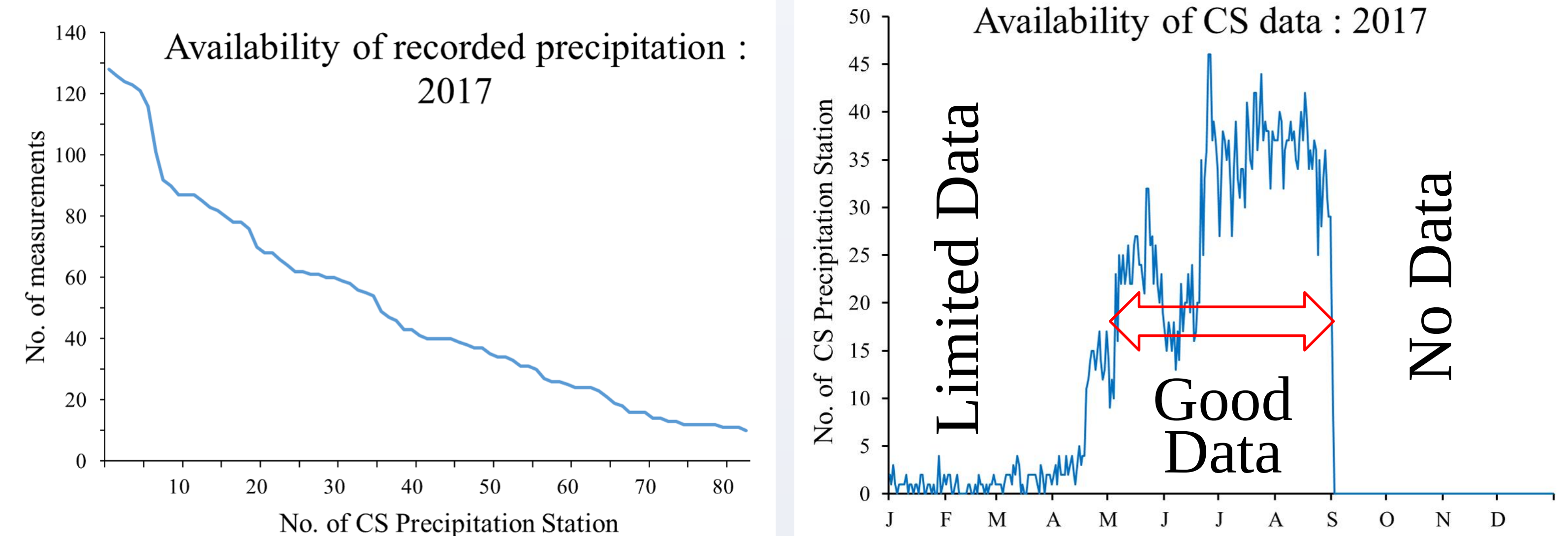


- The stations with the precipitation recorded days <10 days are not utilized.
- 83 stations placed at different locations of the valley are used. The average no. of days with recorded precipitation is 49.

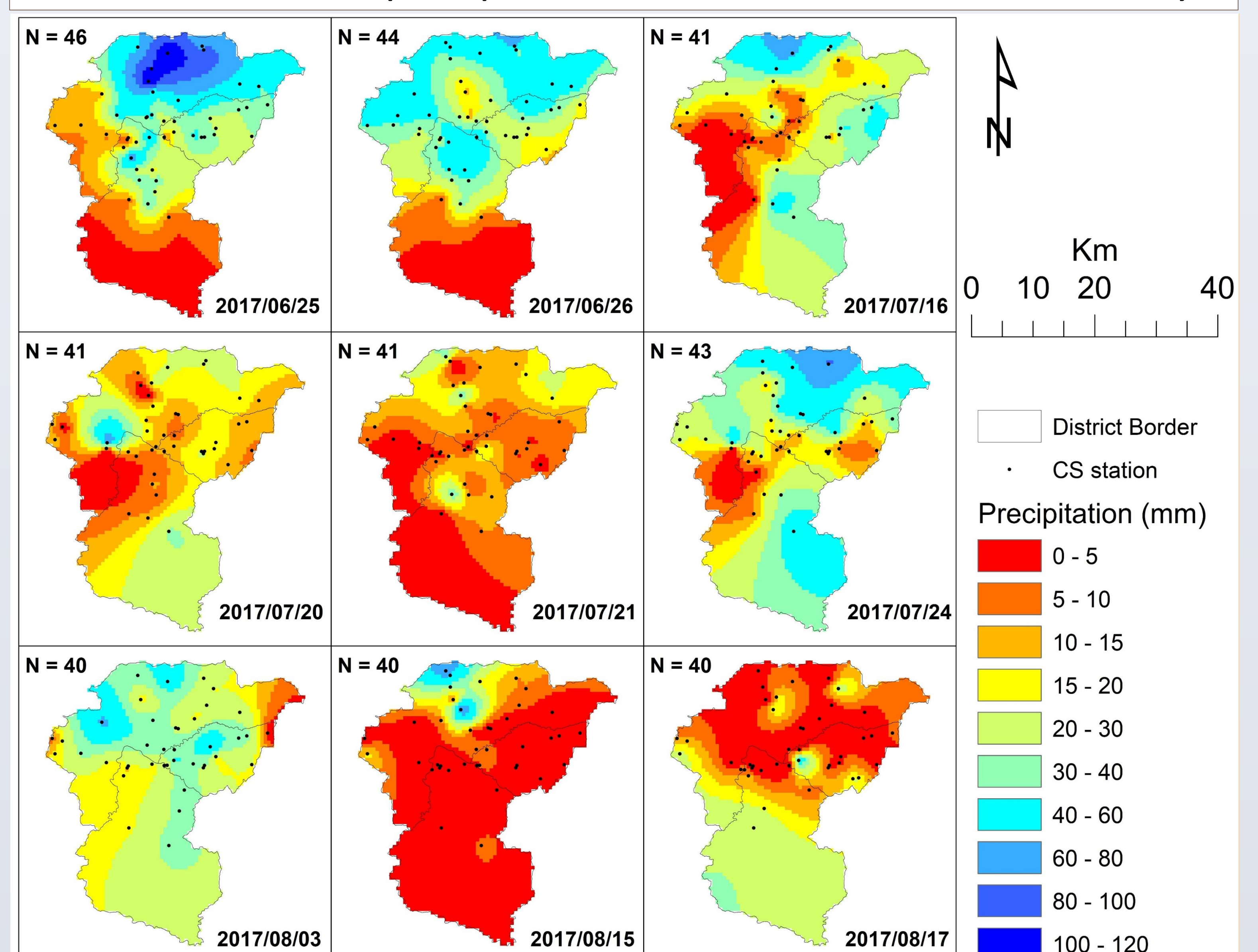
#### Location map



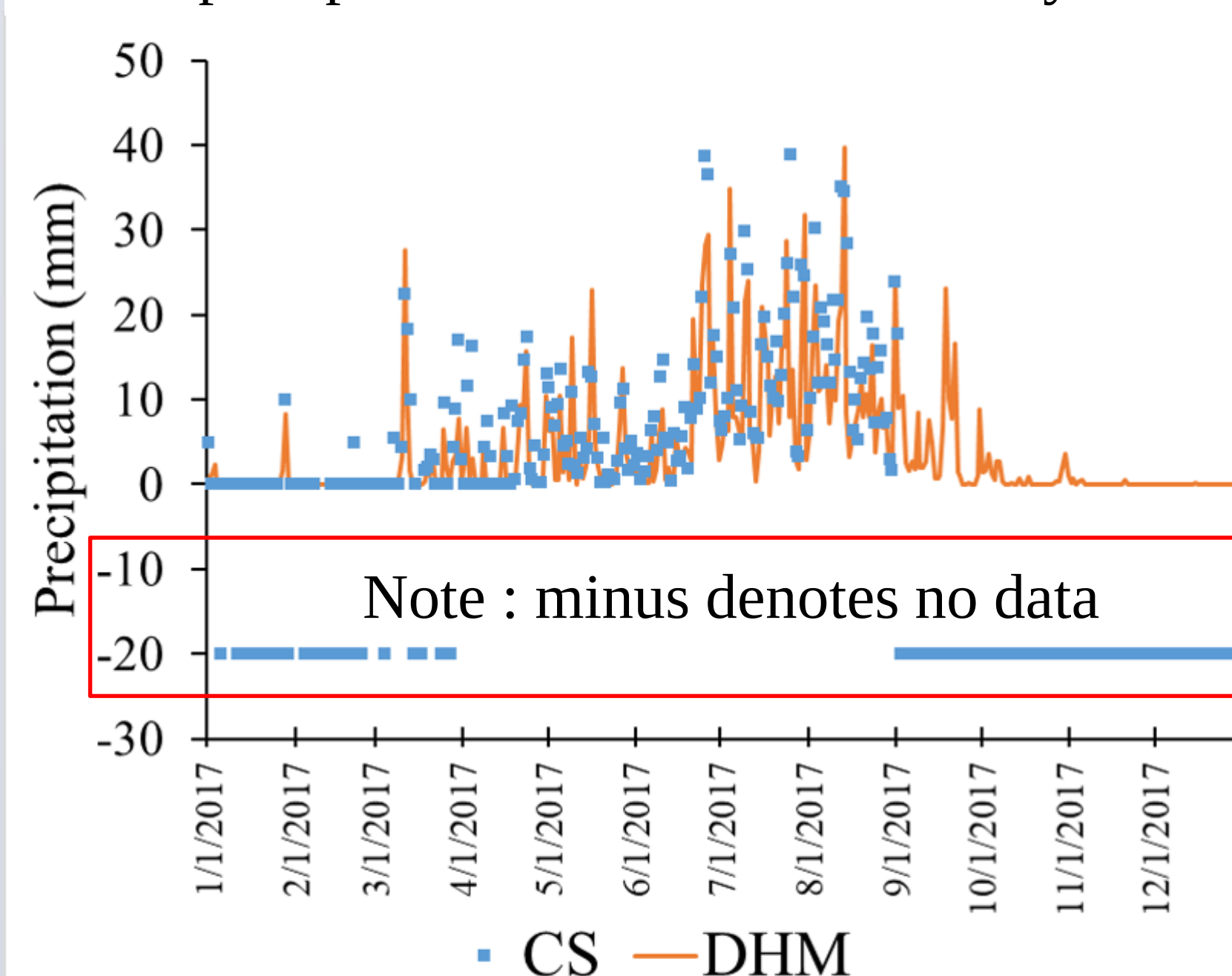
### RESULTS AND DISCUSSIONS



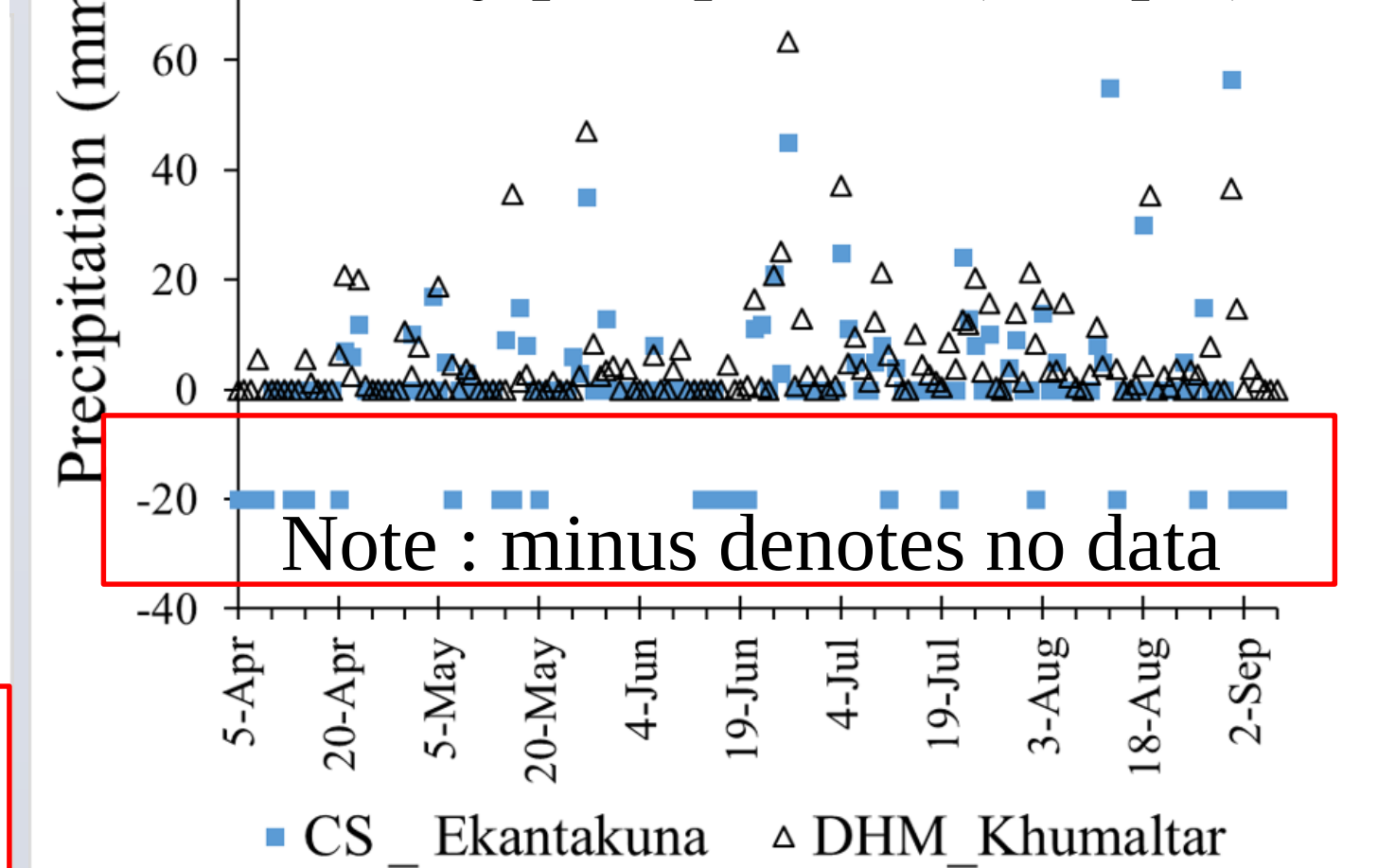
Spatial distribution of 1-day precipitation in Kathmandu Valley.  
[ N = number of CS precipitation stations recorded on that day ]



Inter comparison of spatially averaged daily precipitation of Kathmandu Valley



Inter comparison of station wise daily precipitation (Sample)



The aerial distance between CS\_Ekantakuna and DHM\_khumaltar is around 2.5 km. In this case, CS data has negatively deviated most of the time compared to DHM data.

### CONCLUSIONS AND RECOMMENDATIONS

- The availability of CS data is very poor except few stations. There are huge data gaps in time series data. The station wise data comparison is quite challenging.
- In any case, huge spatial gaps for local variability are fulfilled by these data. The performance of spatially interpolated data is in good agreement. The spatially averaged CS precipitation shows a slightly positive deviation compared to spatially averaged DHM precipitation in Kathmandu Valley. The stations wise comparisons have mixed deviations.
- Comparison with satellite based products will be our future works.

#### References:

- Buytaert et al. 2014. Citizen science in hydrology and water resources: opportunities for knowledge generation, ecosystem service management, and sustainable development. *Frontiers in Earth Science* 2(October): 1–21.
- Silvertown J. 2009. A new dawn for citizen science. *Trends in ecology & evolution* 24(9): 467–71.

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