

## Study Areas

The Büyük Menderes basin is located in the Aegean region of Turkey, which is one of the seven regions. Basin included settlements, river, forests and agricultural areas. Also, the Büyük Menderes River is the one of the largest river of Turkey.

The Büyük Menderes River is 615 km long in the east-west direction with an average flow rate of 44 m<sup>3</sup>/s.

Three meandering structures in the BMR basin were determined by visual analysis and reconnaissance survey. In addition, the study areas have been determined by considering their curve. Therefore, the synsite index values of the study areas were examined. The synsite index values of the study areas are 1.52, 2.25 and 2.15, respectively.

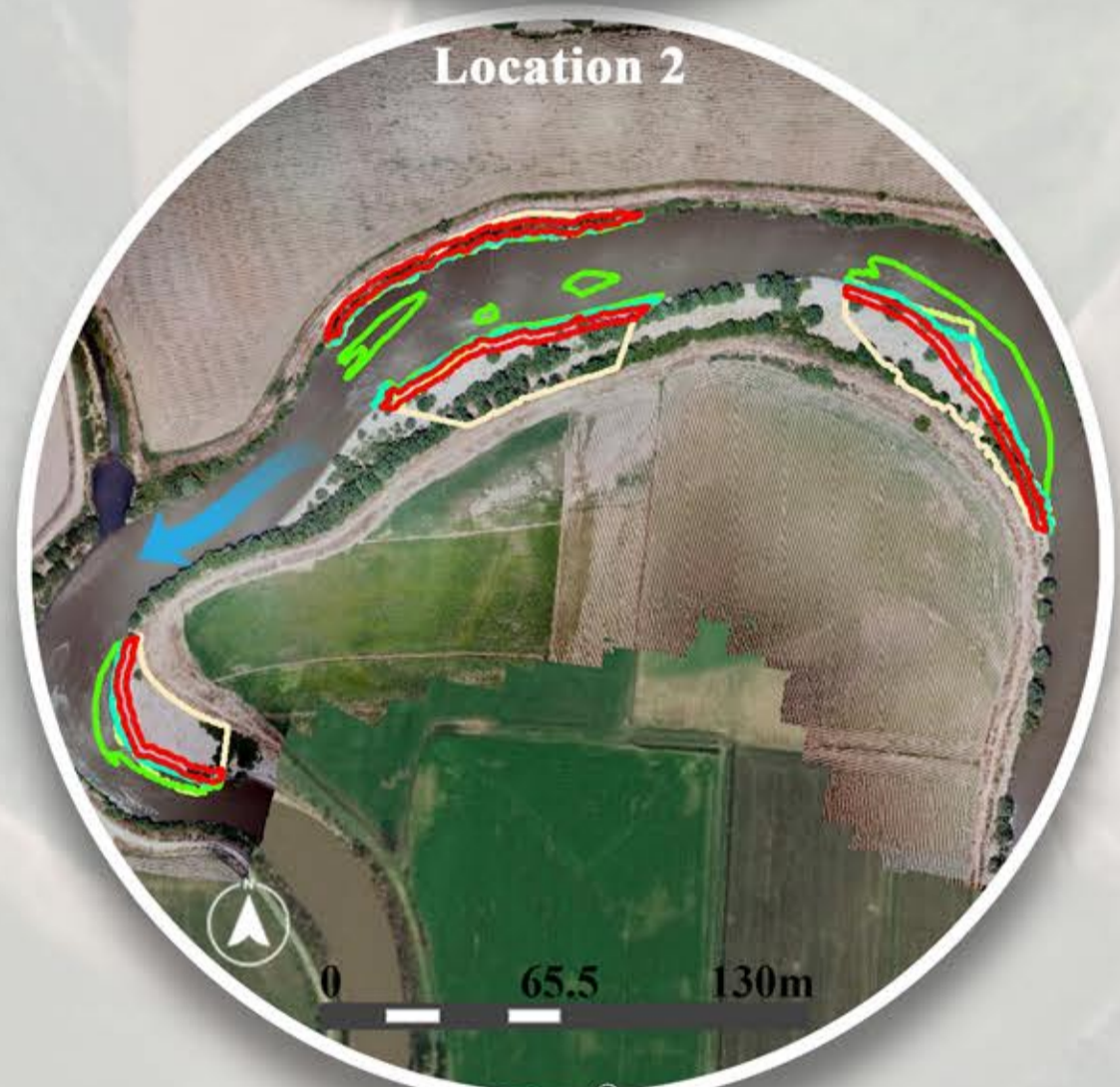
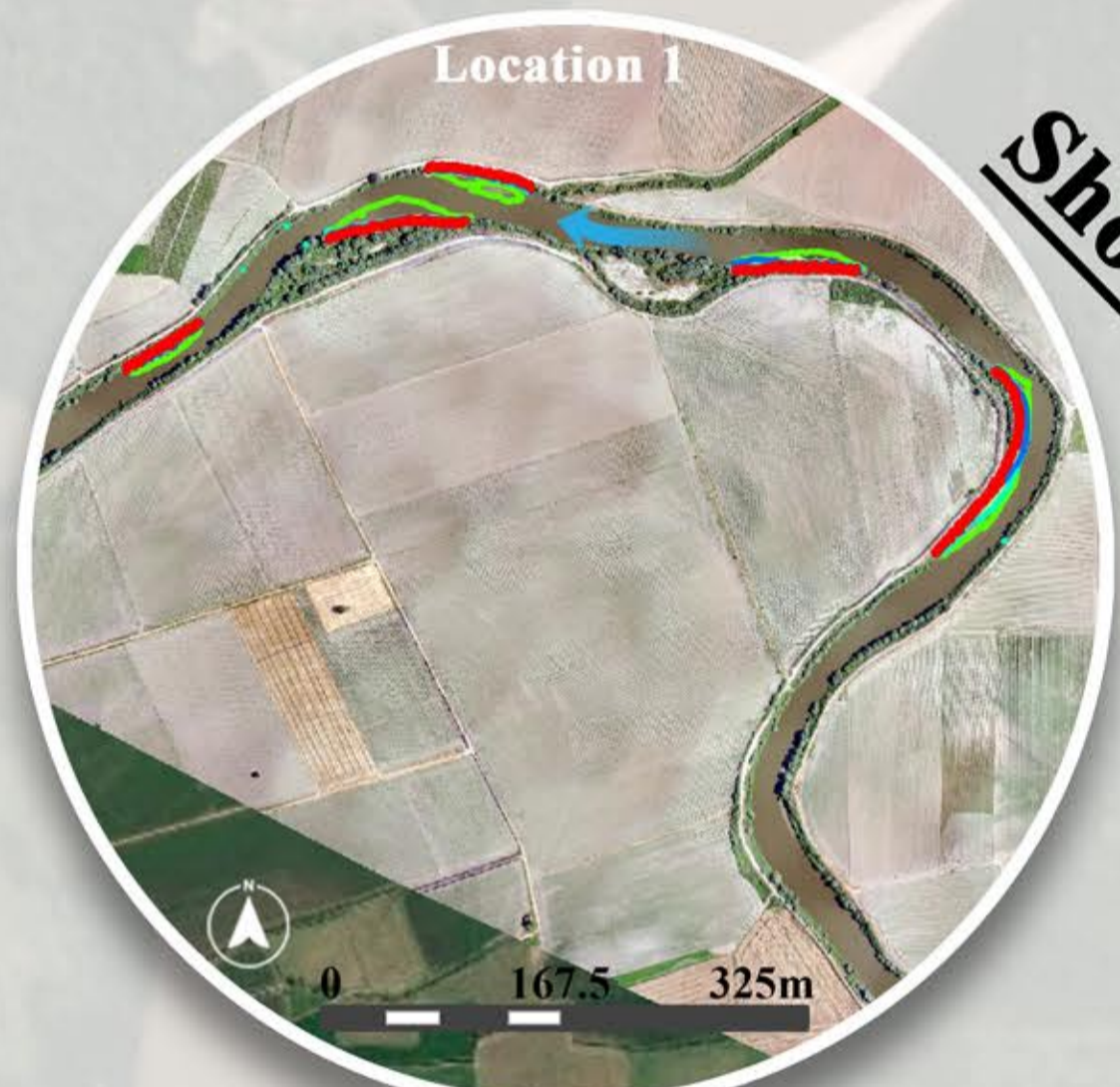
Hence the study areas are defined as folded structure.

## Büyük Menderes Basin



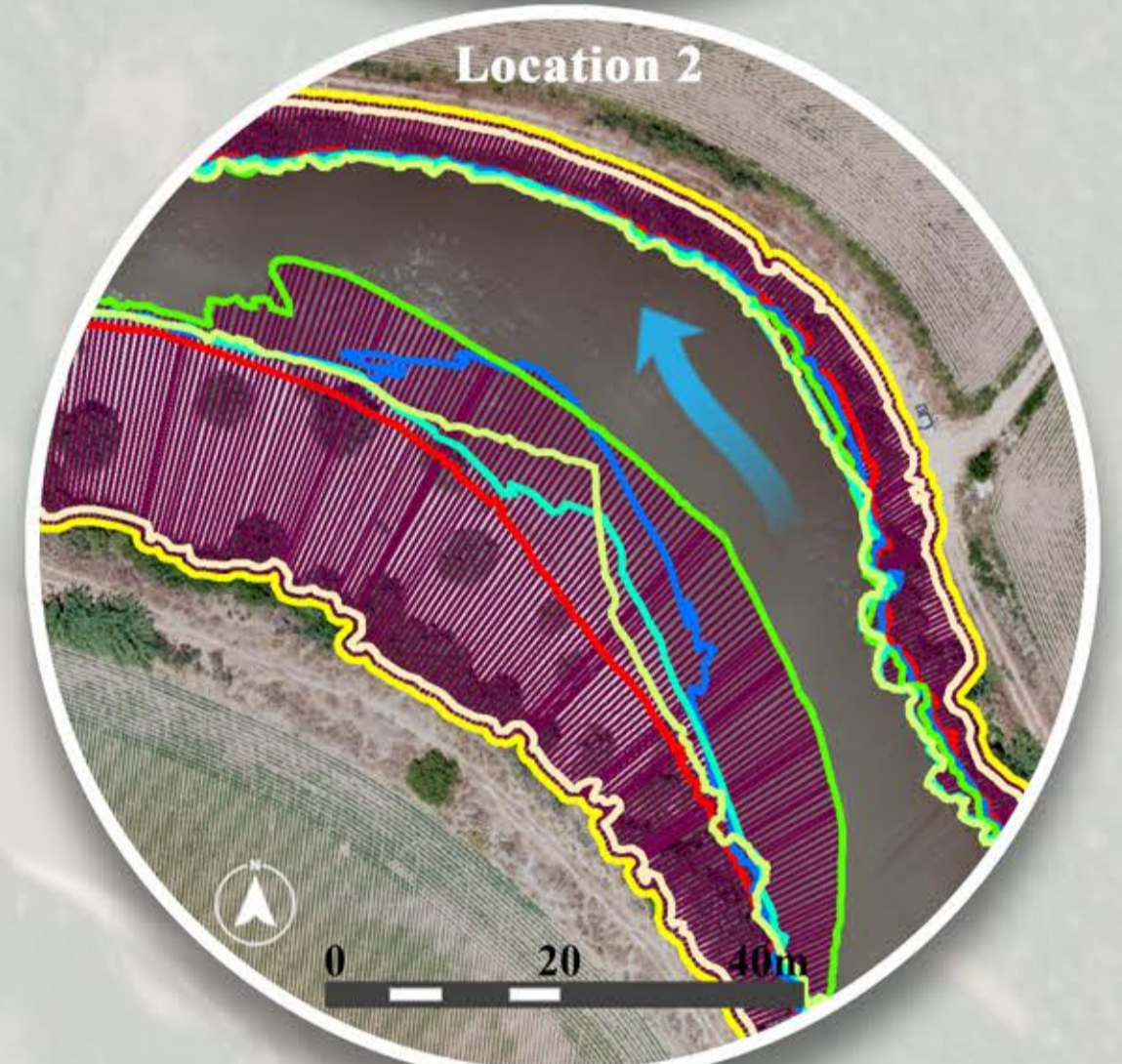
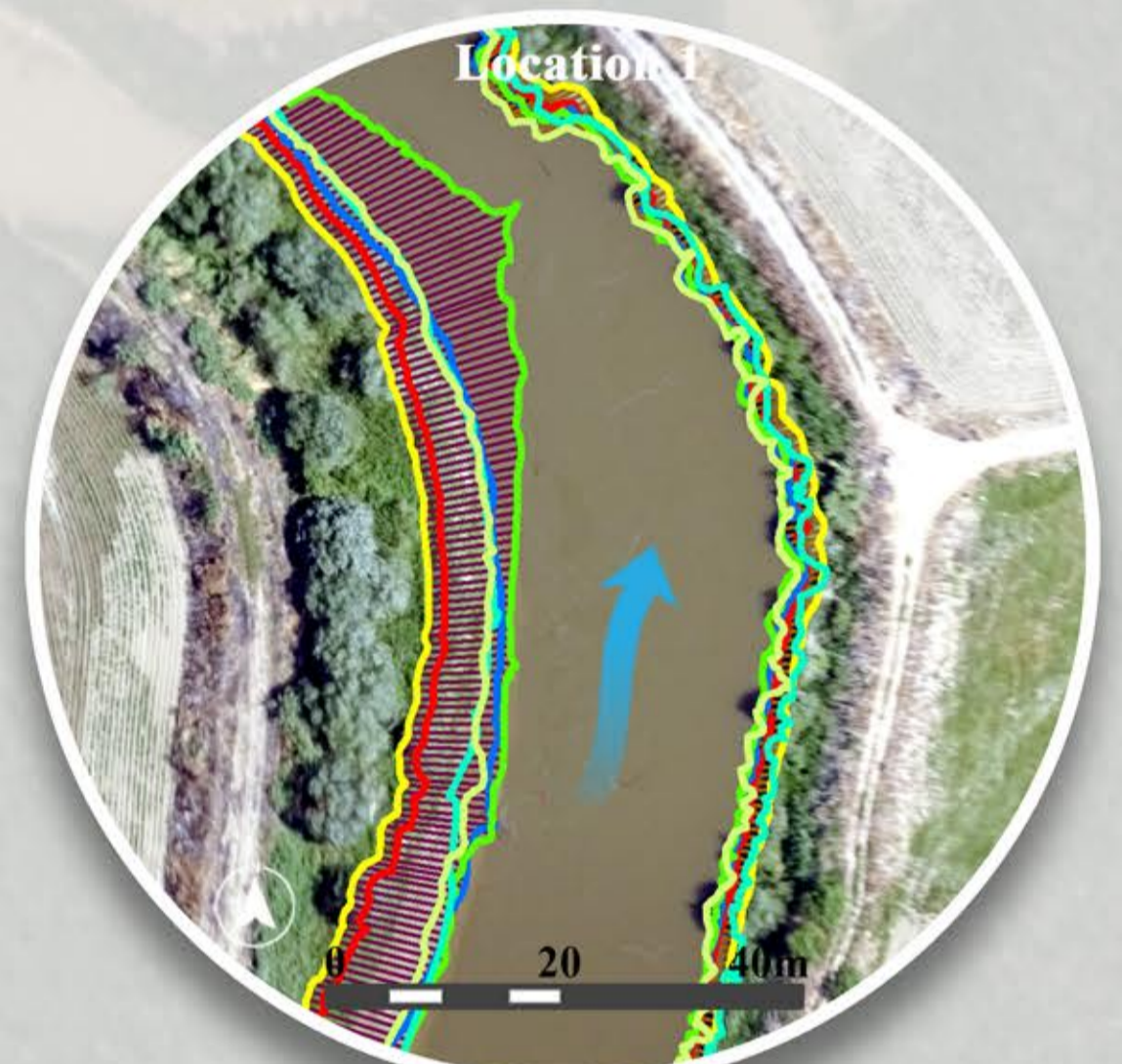
## Datasets and Methods

Multicopter and fixed wing UAVs with an integrated camera and GPS and Glonass system were used to provide images to be used for the production of orthomosaics and digital surface models (DSMs). Accordingly, UAVs' flights have been made at a height of 100 meters with 90% overlapping rate. Moreover, the ground control were set to be distributed homogeneously in the study areas to produce high accuracy data. Precise GCPs were obtained with the RTK-GPS method simultaneously with the UAVs' flights along the meandering river areas. Therefore, SfM algorithm, which is a photogrammetric technique was used to create multi-temporal and high resolution data to model the morphodynamic processes. Calculations of volumetric changes with DoD, and shoreline changes were calculated with DSAS.

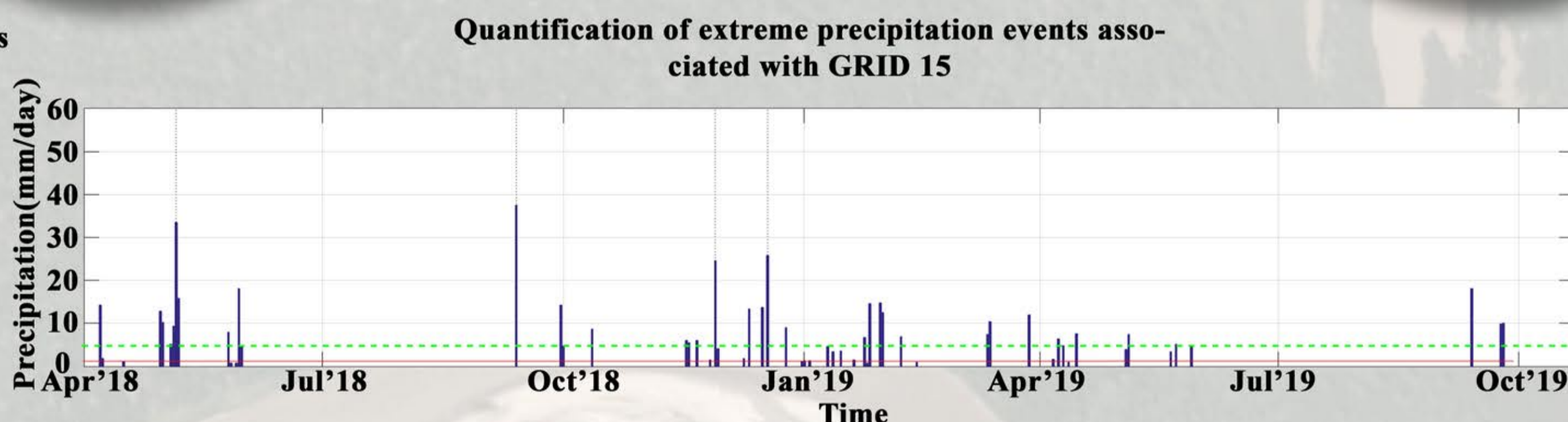
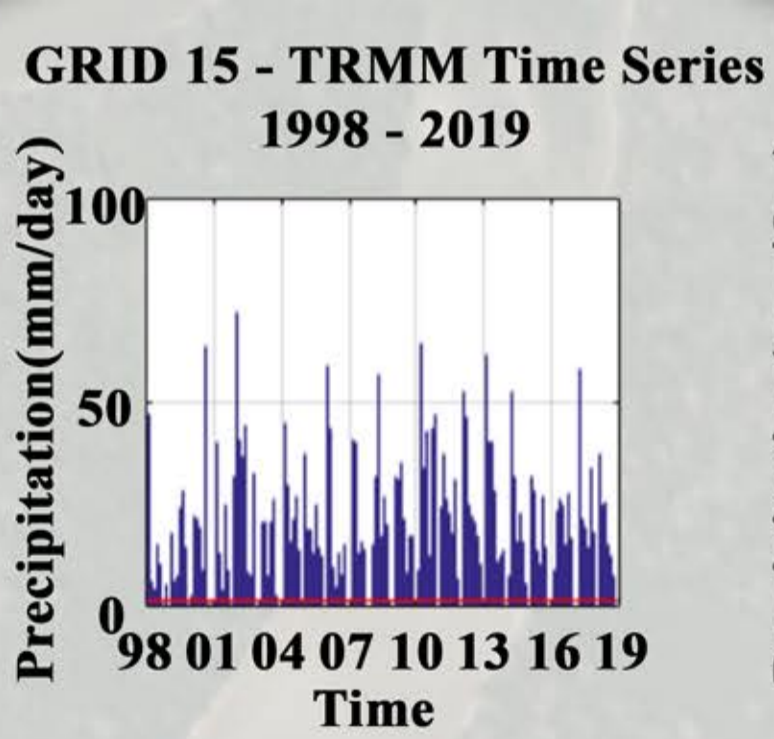
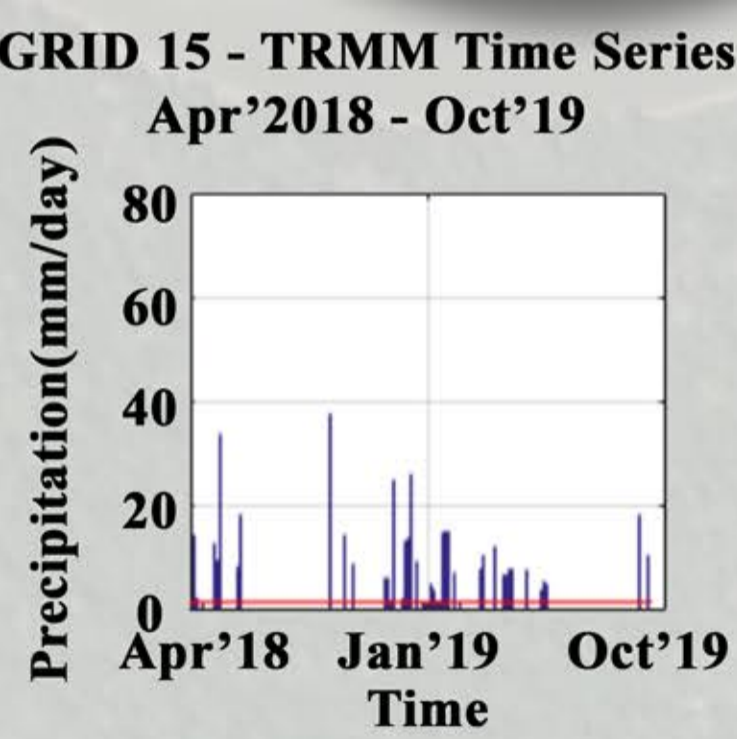


Shorelines Extracted by DoDs

DSAS Analysis



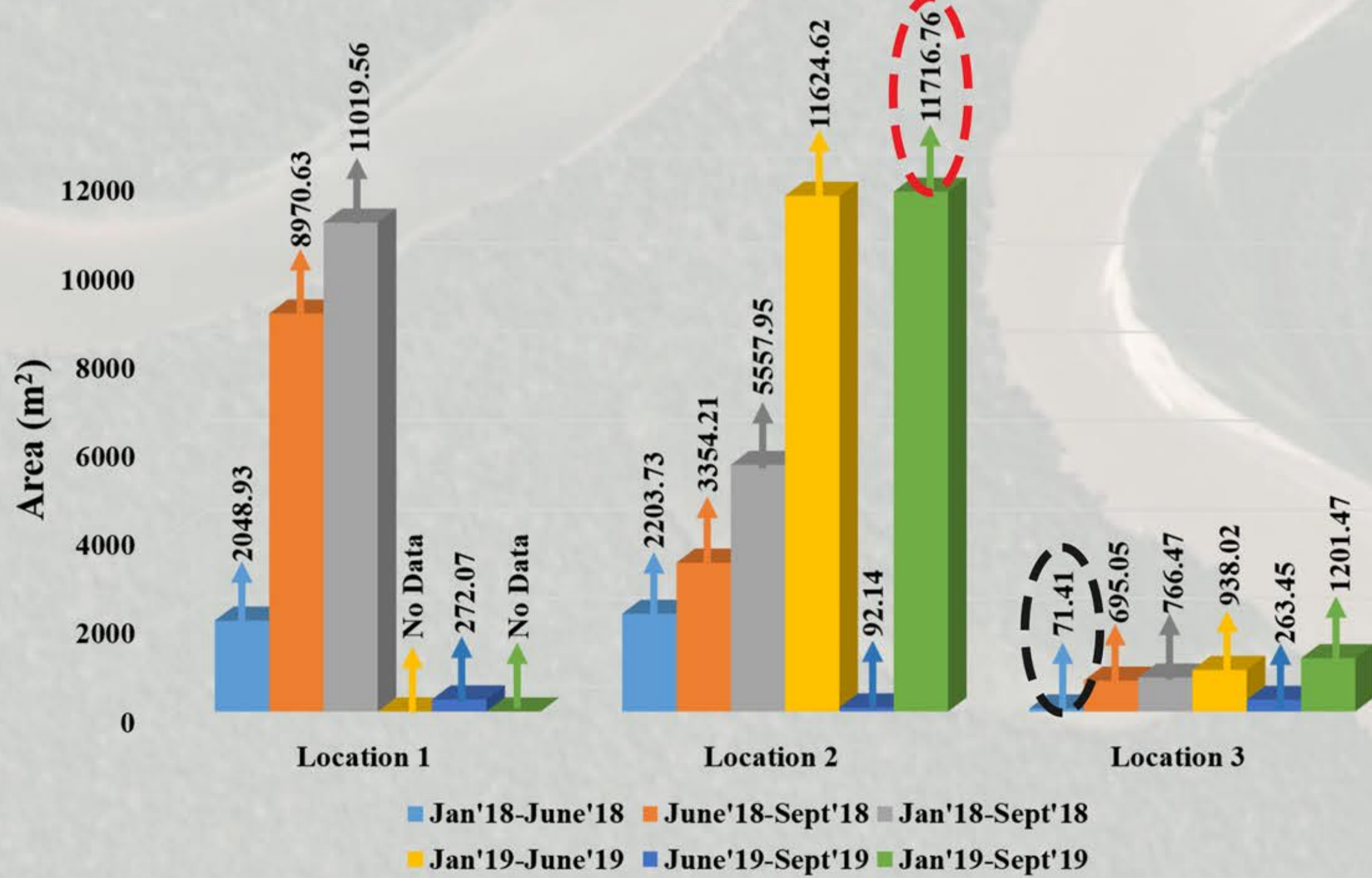
- Shoreline- January'18
- Shoreline- January'19
- Shoreline- June'18
- Shoreline- June'19
- Shoreline- September'18
- Shoreline- September'19
- Transects
- Baseline



- Trend
- P50 (4.77 mm/day) > 99<sup>th</sup> Percentile No Events
- P90 (420.25 mm/day) > 90<sup>th</sup> Percentile 4 Events
- P99 (46.85 mm/day)

## Results and Discussions

### Areal Changes of Sediment



### Maximum Values

\*SCE: 26.52 m  
 \*NSM: 26.52 m  
 \*Area: 11716.76 m<sup>2</sup>  
 (Loc.2 Jan'19-Sept'19)  
 \*Volume: 39379.87 m<sup>3</sup>  
 (Loc.2 Jan'19-Sept'19)

2018  
 \*Area: 11019.56 m<sup>2</sup>  
 (Loc.1 Jan'18-Sept'18)  
 \*Volume: 30410.24 m<sup>3</sup>  
 (Loc.1 Jan'18-Sept'18)

2019  
 \*Area: 11716.76 m<sup>2</sup>  
 (Loc.2 Jan'19-Sept'19)  
 \*Volume: 39379.87 m<sup>3</sup>  
 (Loc.2 Jan'19-Sept'19)

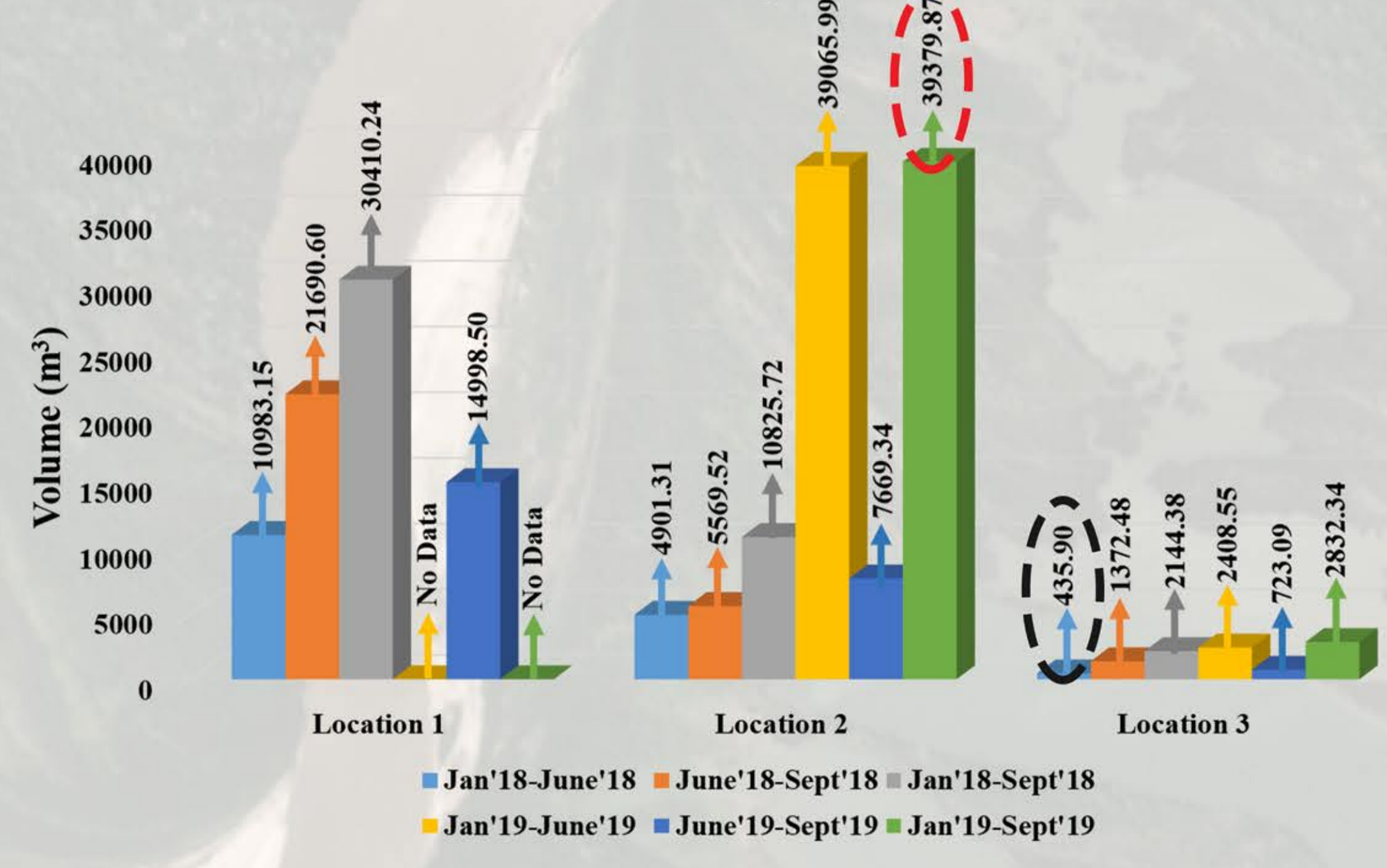
### Minimum Values

\*SCE: 0.06 m  
 \*NSM: 0.11 m  
 \*Area: 71.41 m<sup>2</sup>  
 (Loc.3 Jan'18-June'18)  
 \*Volume: 435.90 m<sup>3</sup>  
 (Loc.3 Jan'18-June'18)

2018  
 \*Area: 71.41 m<sup>2</sup>  
 (Loc.3 Jan'18-June'18)  
 \*Volume: 435.90 m<sup>3</sup>  
 (Loc.3 Jan'18-June'18)

2019  
 \*Area: 92.14 m<sup>2</sup>  
 (Loc.2 June'19-Sept'19)  
 \*Volume: 723.09 m<sup>3</sup>  
 (Loc.3 June'19-Sept'19)

### Volumetric Changes of Sediment



## Conclusions

\*A multi-temporal model was generated to calculate the sediment transport information with areal and volumetric sediment quantities in the meandering structures.

\*The areal and volume of the deposited/eroded sediment amount were compared in between January, June, and September for two years.

\*When the model were evaluated, it was seen that there was an increase in the sediment amounts from January to September.

\*It was observed that there were 4 extreme precipitation events (>90<sup>th</sup> Percentile) in the study locations with the generation of extreme precipitation analysis.

\*Extreme precipitation occurred in January 2019 was observed to cause flooding in meander structures. Therefore, there was a decrease in sediment amount in meander structures.

\*After the flood that occurred in January 2019, the shorelines were restored for each study locations in June and September 2019.