

# Evaluation of baseflow processes in the Yellow River Basin, China

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## Background

### The Yellow River Basin (YRB)

- YRB is the mother river of Chinese
- High-quality development of YRB has been included in National Strategy
- More frequent drought due to changing climate and anthropogenic activities

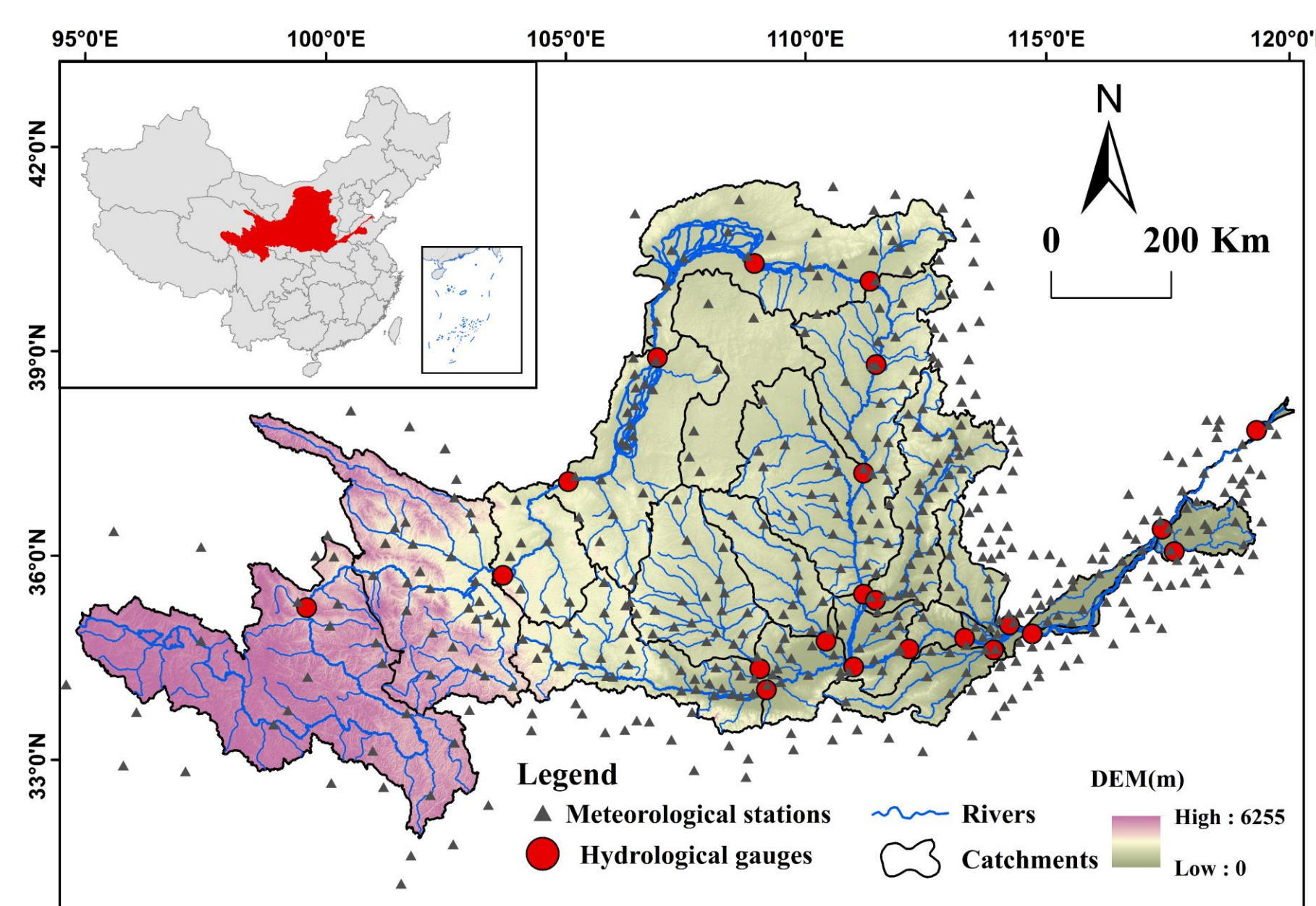


Fig.1 Location of the Yellow River Basin

### Importance of Baseflow

- Provide water resources during the drought season
- Significant for maintaining the ecological health of the YRB

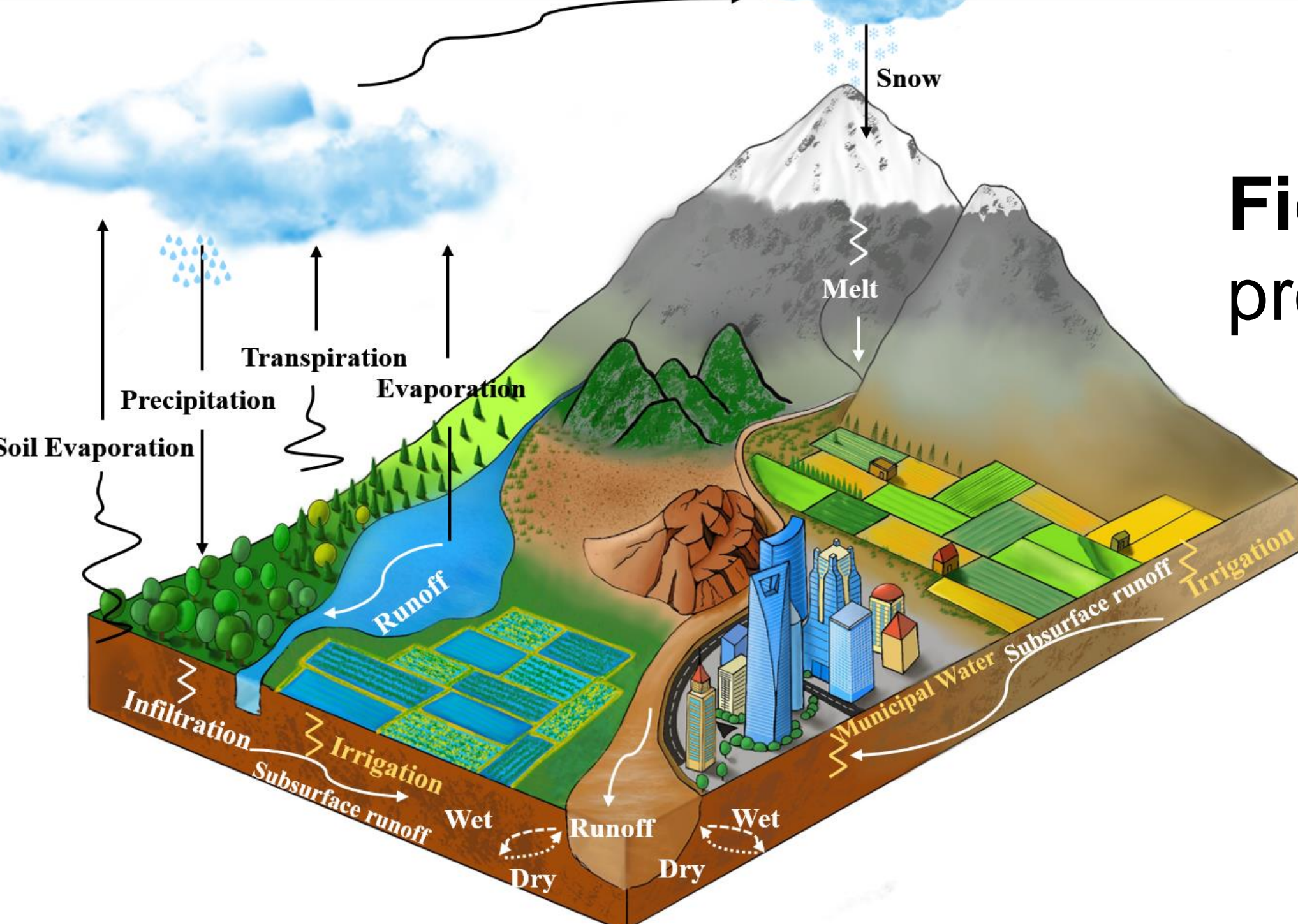


Fig.2 Hydrological processes in YRB

## Methodology

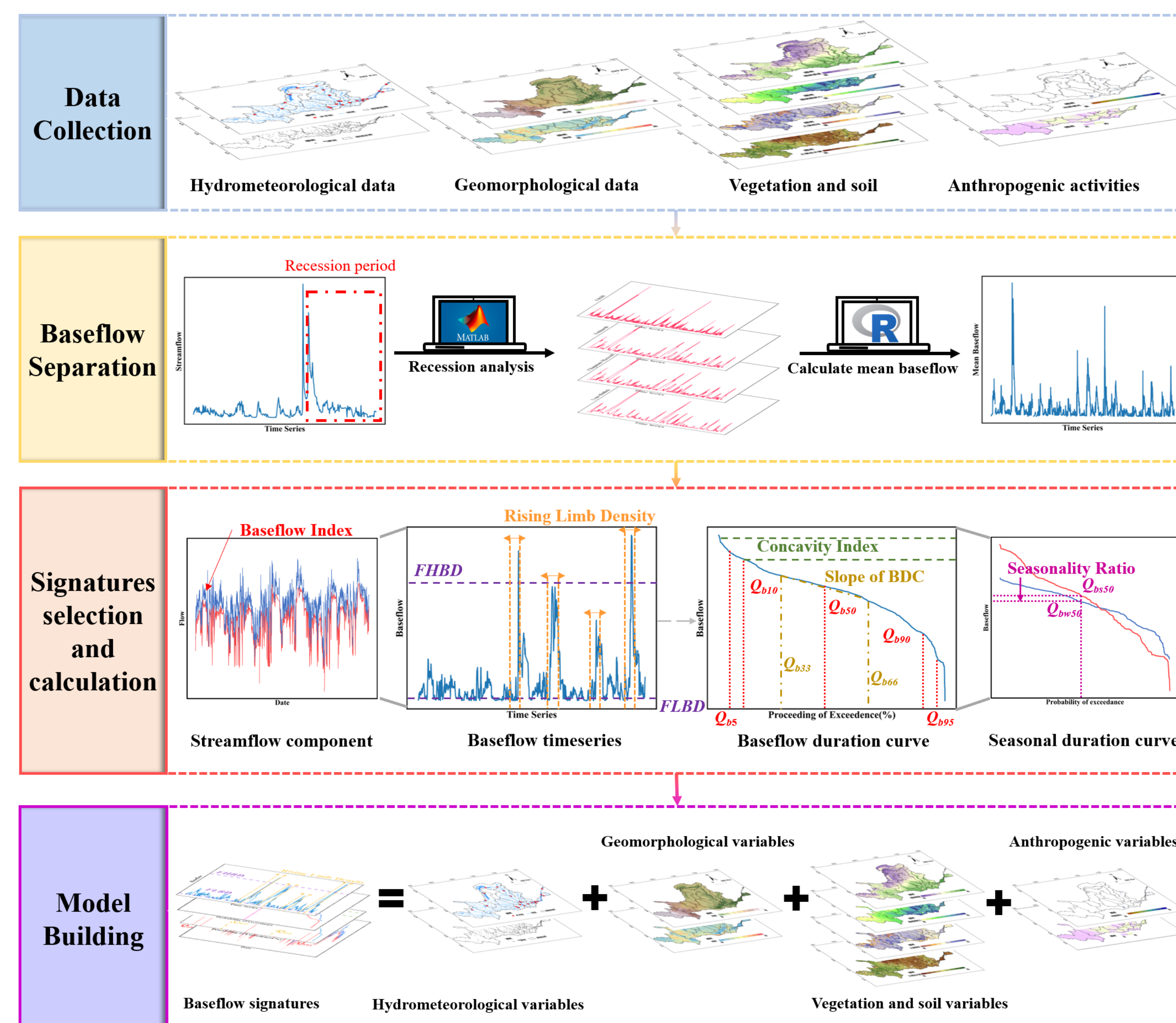


Fig. 3 The flow chart of this study

### Baseflow separation algorithms<sup>3</sup>

- United Kingdom Institute of Hydrology
- Lyne-Hollick; Chapman-Maxwell; Eckhardt

### Baseflow signatures<sup>1,2</sup>

- Magnitude:  $Q_{b5}$ ,  $Q_{b10}$ ,  $Q_{b50}$ ,  $Q_{b90}$ ,  $Q_{b95}$ , Baseflow Index
- Timing: Seasonality Ratio
- Frequency: Frequency of High/Low-Baseflow Days
- Duration: Concavity Index
- Rate of Change: Baseflow Variation Coefficient, Slope of Baseflow Duration Curve, Rising Limb Density

## Results

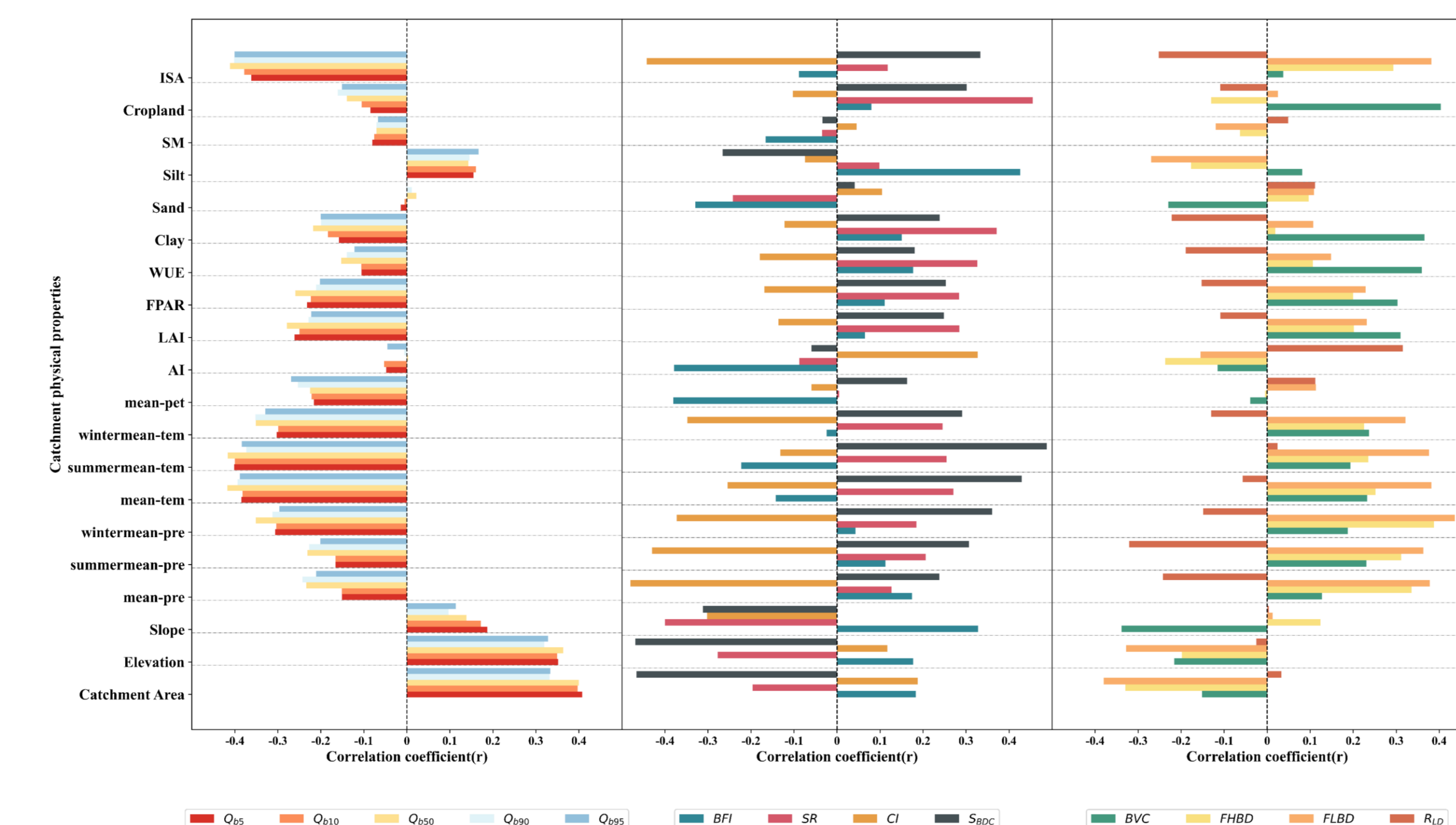


Fig. 4 Relationship between single catchment attributes and baseflow signatures

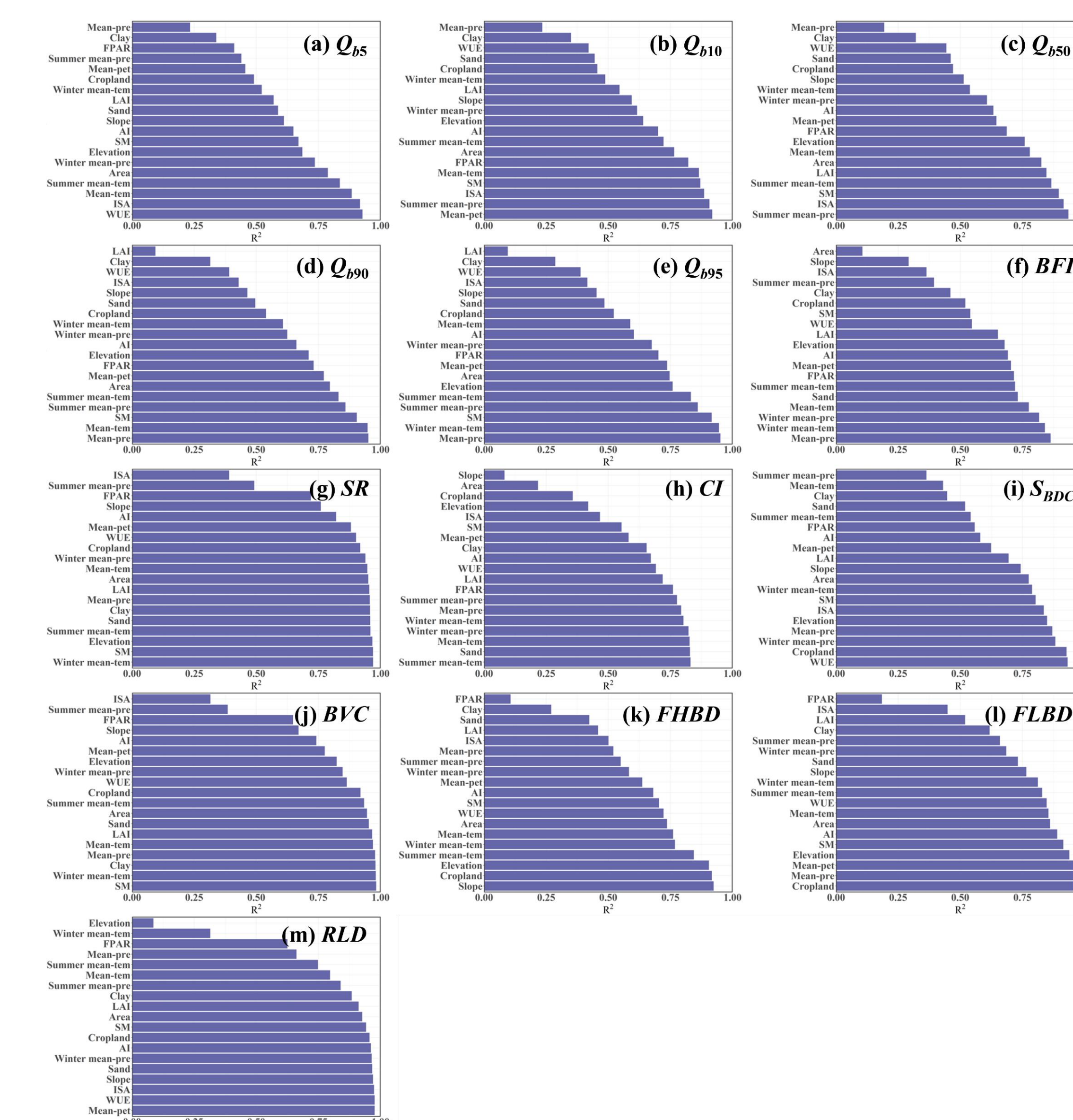


Fig. 5 Importance of attributes affect baseflow signatures

## Summary

- The temporal variation of baseflow was most strongly correlated with catchment terrain, vegetation growth and cropland coverage;
- There was a strong synergistic effect of multiple factors on baseflow signature values, soil textures, precipitation and vegetation conditions are three main drivers.
- This is the first study to show baseflow characteristics in the whole YRB.

## References

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- <sup>2</sup>McMillan, H.K., Gnann, S.J., Araki, R., 2022. Large Scale Evaluation of Relationships Between Hydrologic Signatures and Processes. Water Resources Research, 58(6): e2021WR031751.
- <sup>3</sup>Zhang, J., Zhang, Y., Song, J., et al. 2017. Evaluating relative merits of four baseflow separation methods in Eastern Australia. Journal of Hydrology, 549: 252-263.

## Acknowledge

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