

# Evaluating the potential of reach water surface elevation product from SWOT mission using Assimilation and Hydrodynamic modelling.

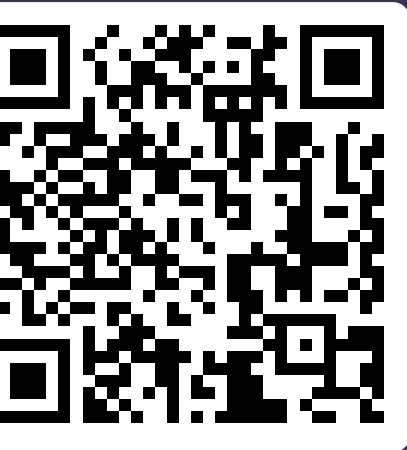
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## 1 Introduction

- Efficient water resource management system demands accurate river discharge characterization.
- Declining trend in availability of in-situ measurements escalates need to consider alternate sources.
- Integration of observations from the Surface Water and Ocean Topography (SWOT) mission with a hydrodynamic model through data assimilation is a promising avenue of research in this context.

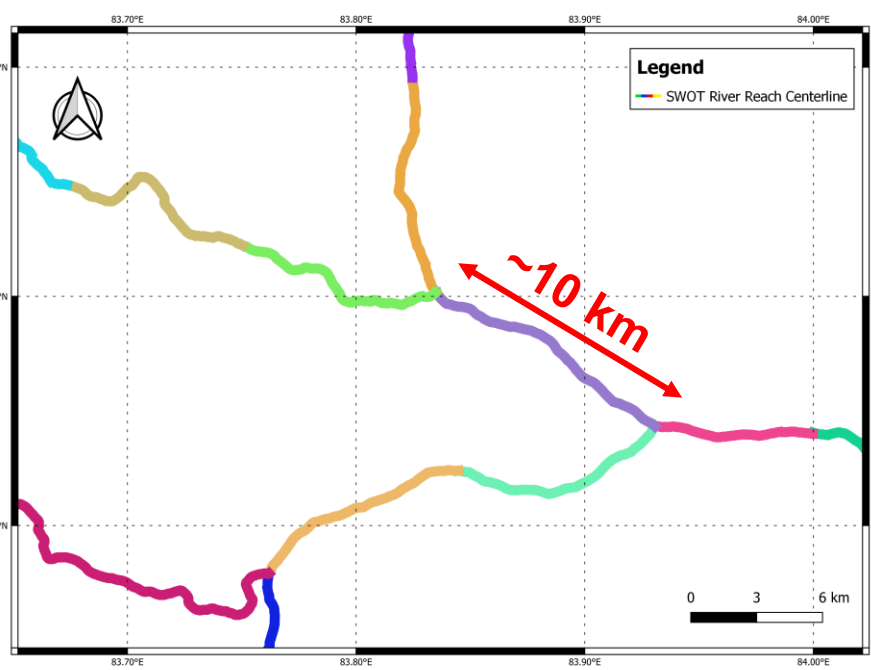


Fig. 1: SWOT Reach Product

## 2 Objectives & Study Area

- To evaluate the impacts of assimilation of SWOT reach product of Water Surface Elevation (WSE) in the CaMa-Flood hydrodynamic model to improve river discharge estimation over the Mahanadi River Basin in India.

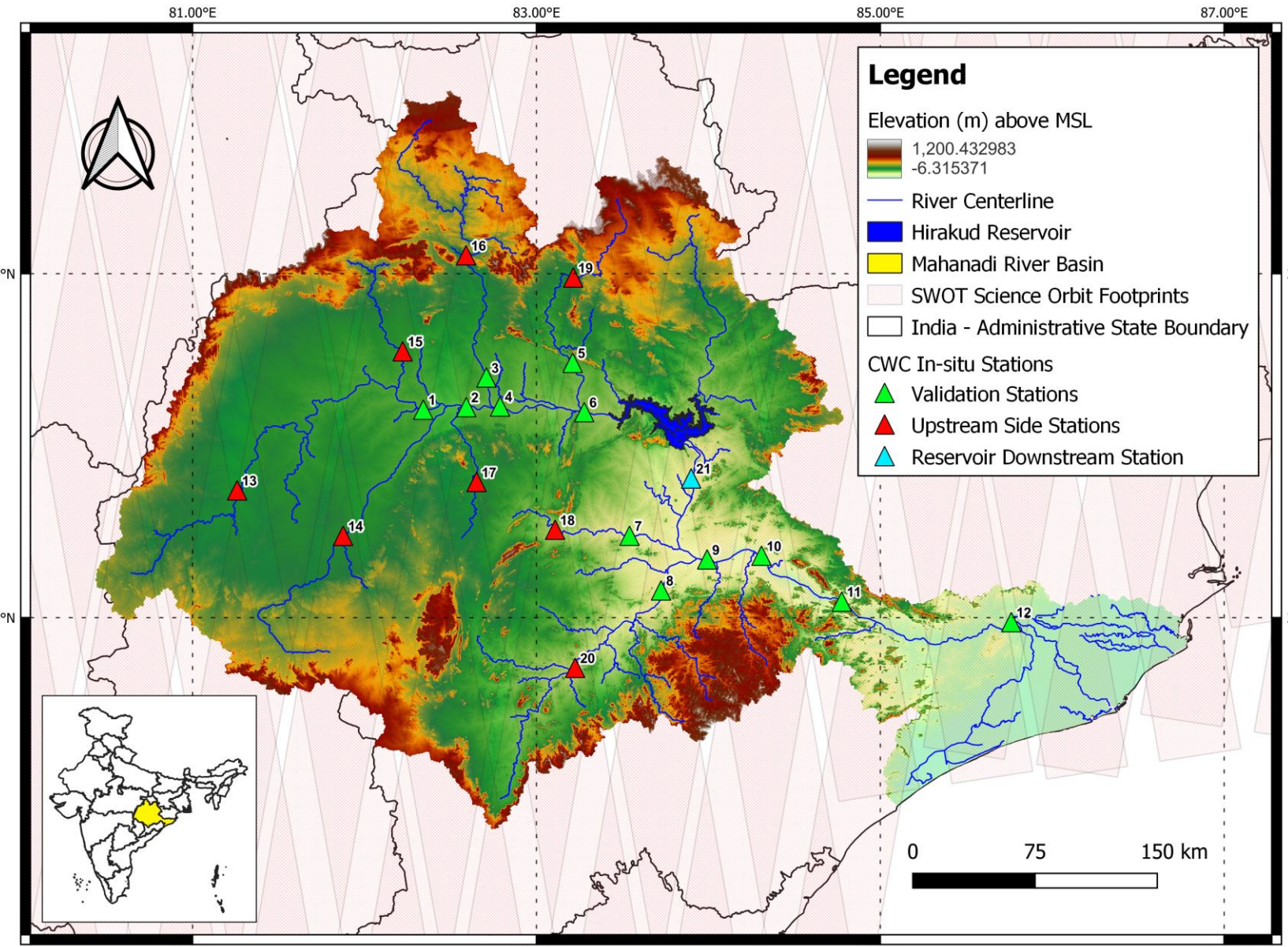


Fig. 2: Mahanadi River Basin, India

## 5 References

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## 3 Methodology

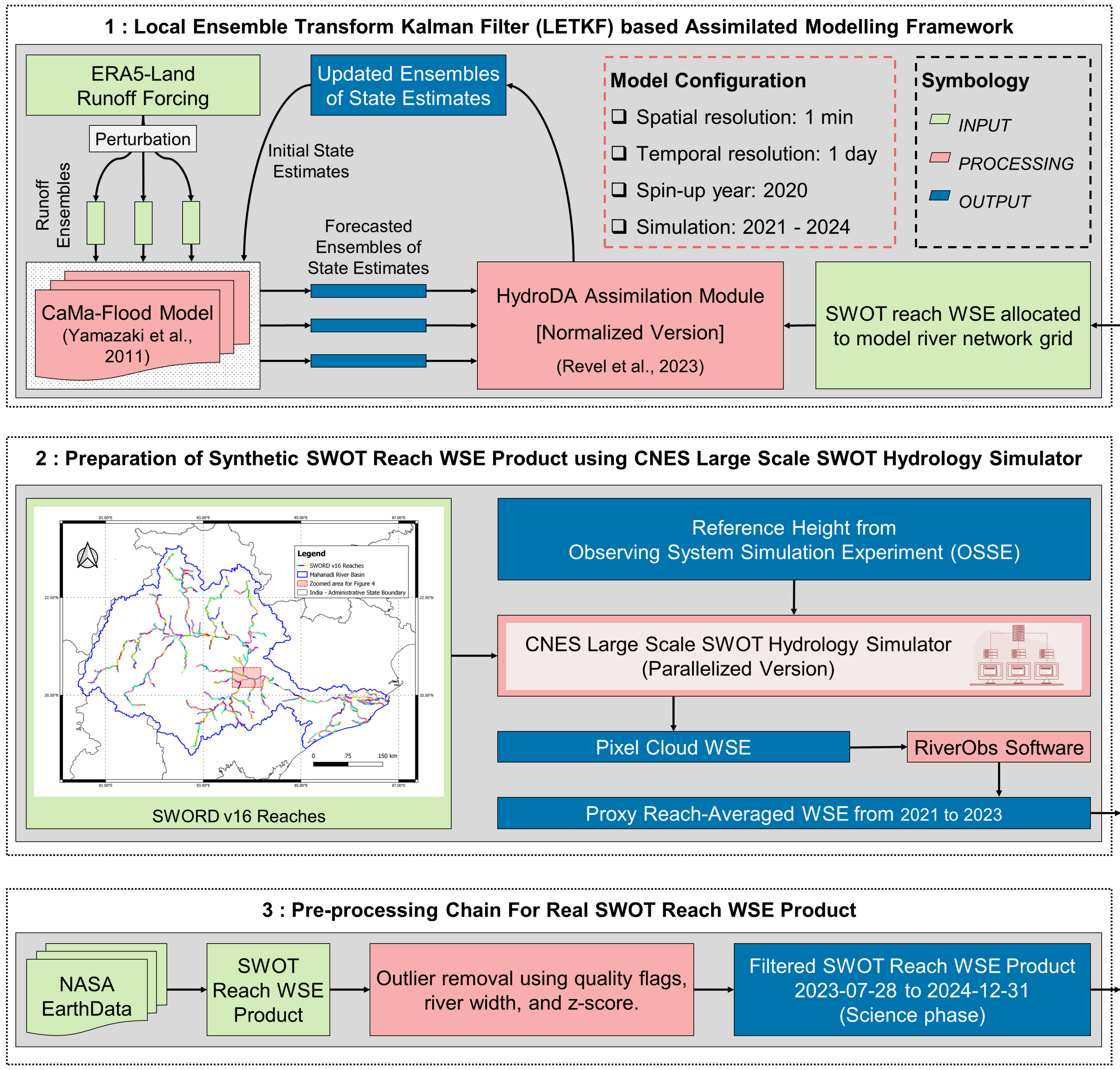


Fig. 3: Methodology Framework

## 4 Results & Conclusion

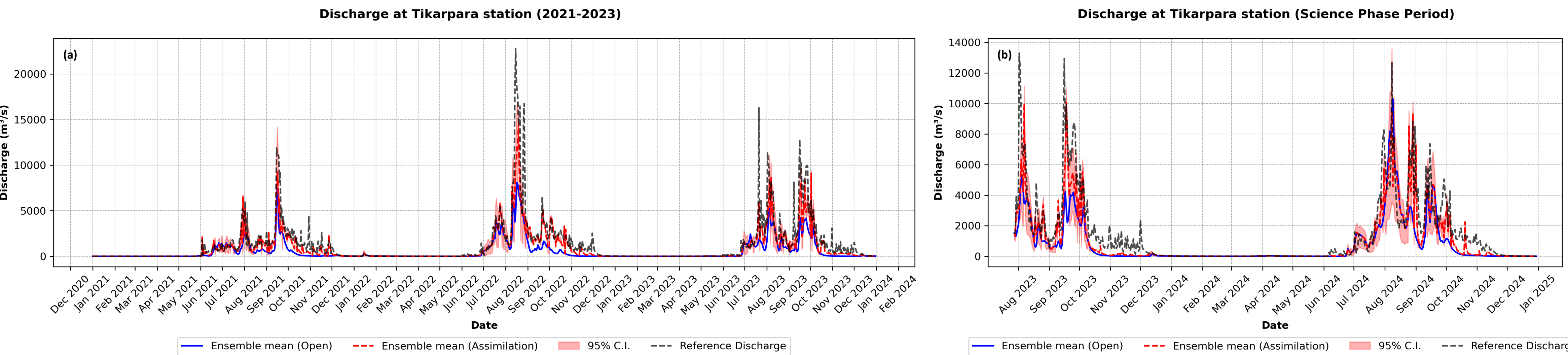


Fig. 4: Temporal variation of discharge at Tikarpara station post assimilation of (a) synthetic and (b) real SWOT WSE

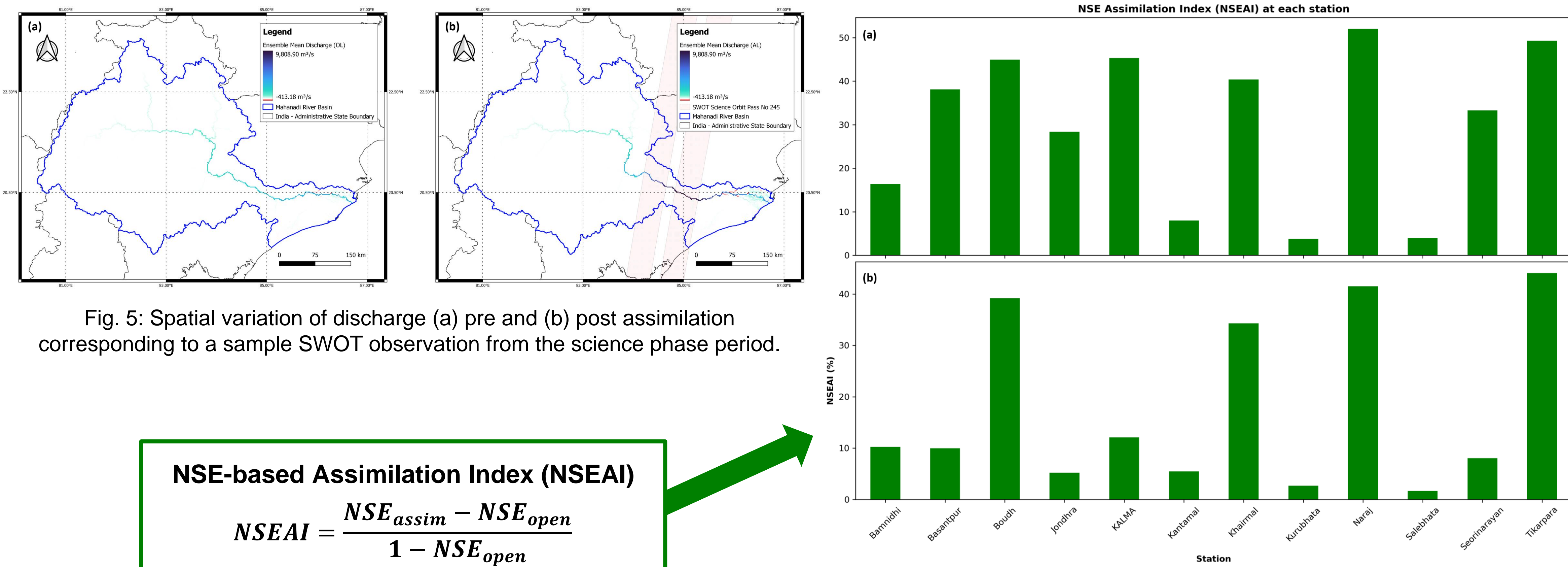


Fig. 5: Spatial variation of discharge (a) pre and (b) post assimilation corresponding to a sample SWOT observation from the science phase period.

Fig. 6: NSEAI at each validation site for the assimilation experiment using (a) synthetic and (b) real SWOT WSE

- Consistent performance: NSEAI achieving up to **50%** and **40%** for assimilation using synthetic and real SWOT data, respectively.
- CNES SWOT Simulator + OSSE framework enabled us to simulate SWOT river products incorporating the effect of **river channel slope**.
- Assimilation of real SWOT measurements showed a comparatively inferior performance owing to the presence of outliers which resulted in much fewer valid SWOT observations than actually measured.
- Improvement in discharge is prominent, particularly towards the downstream river reaches and closer to satellite overpass dates.

## 6 Acknowledgement

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