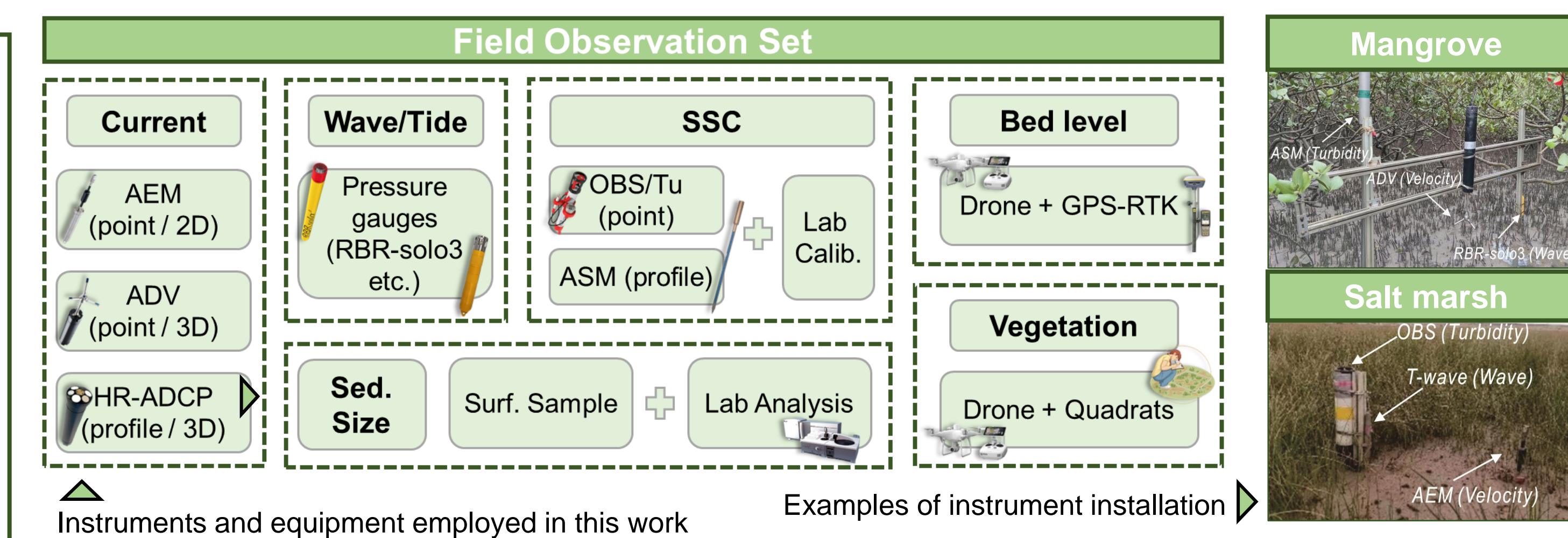
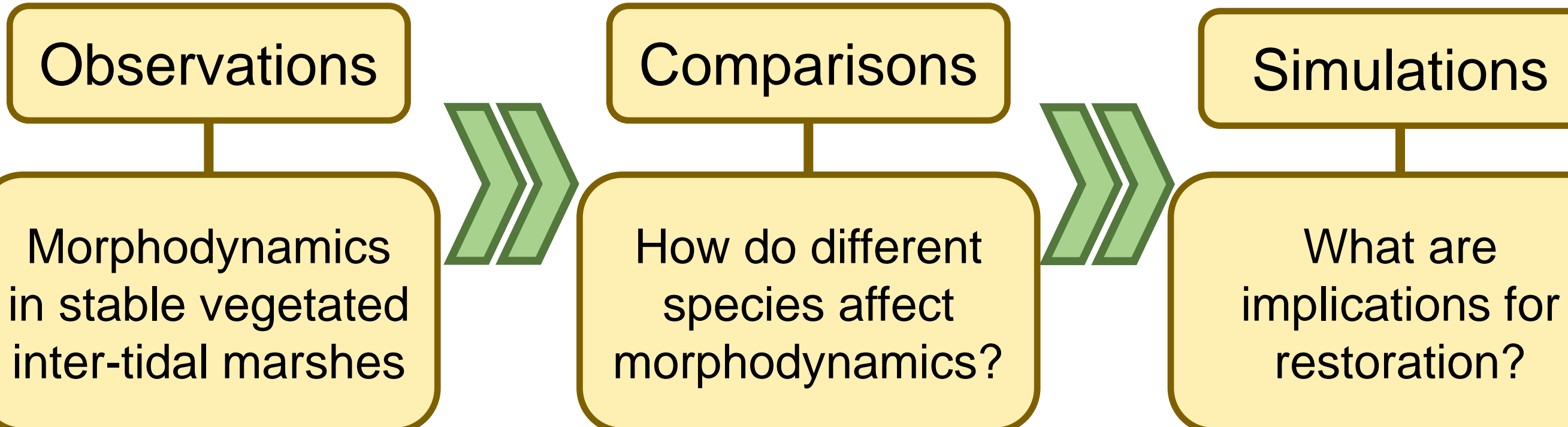


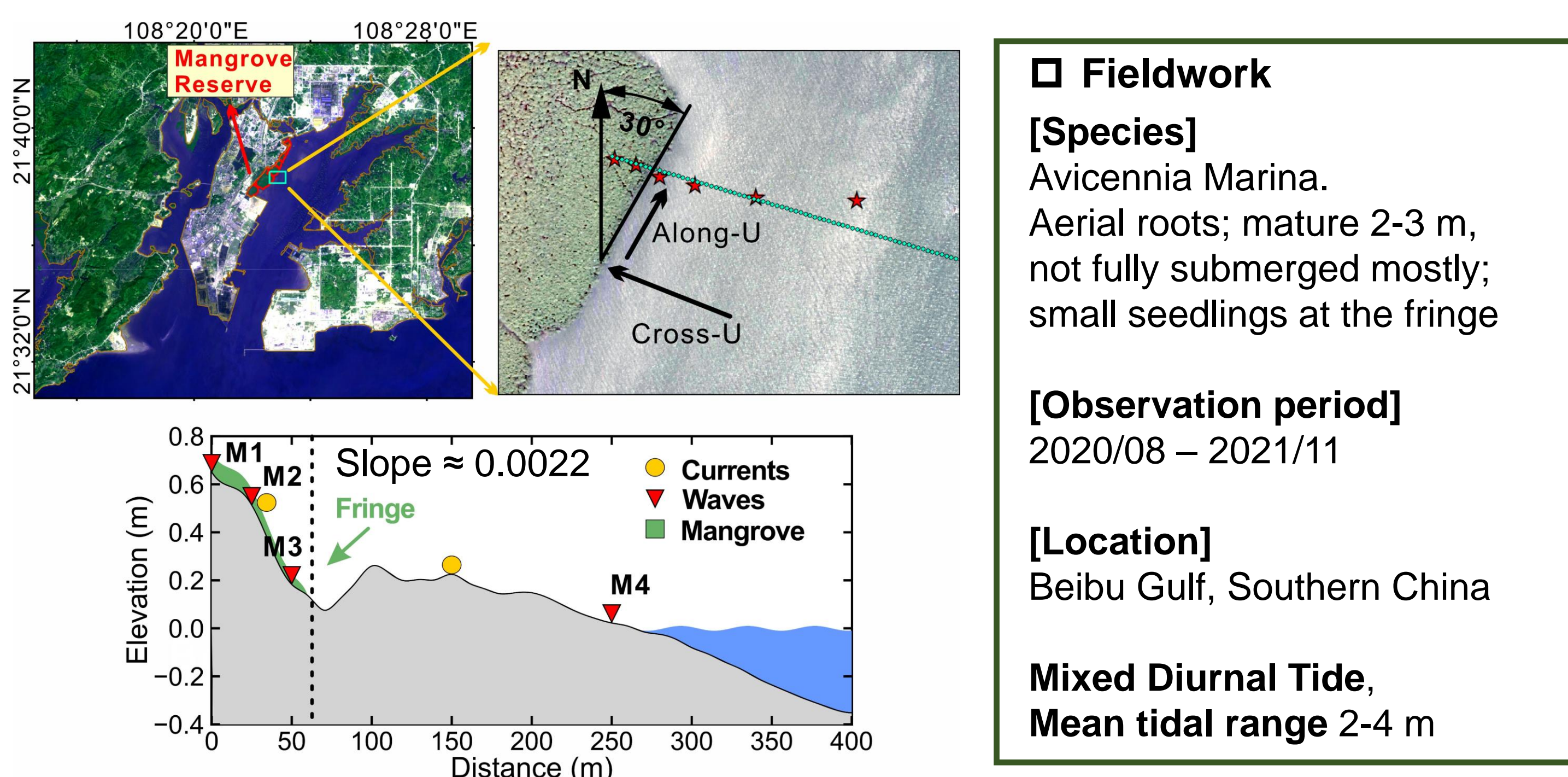
## Introduction

Under global change, tidal wetlands are experiencing significant shifts, including potential mutual invasion between mangrove and salt marsh species. However, their regional morphodynamic impacts remain unclear. Here, we compare seasonal observations of hydro-morphological differences in two wetlands dominated by mangroves and salt marshes. Furthermore, restoration efforts are being compared between salt marshes and mangroves in two regions through integrated measurements and modeling.

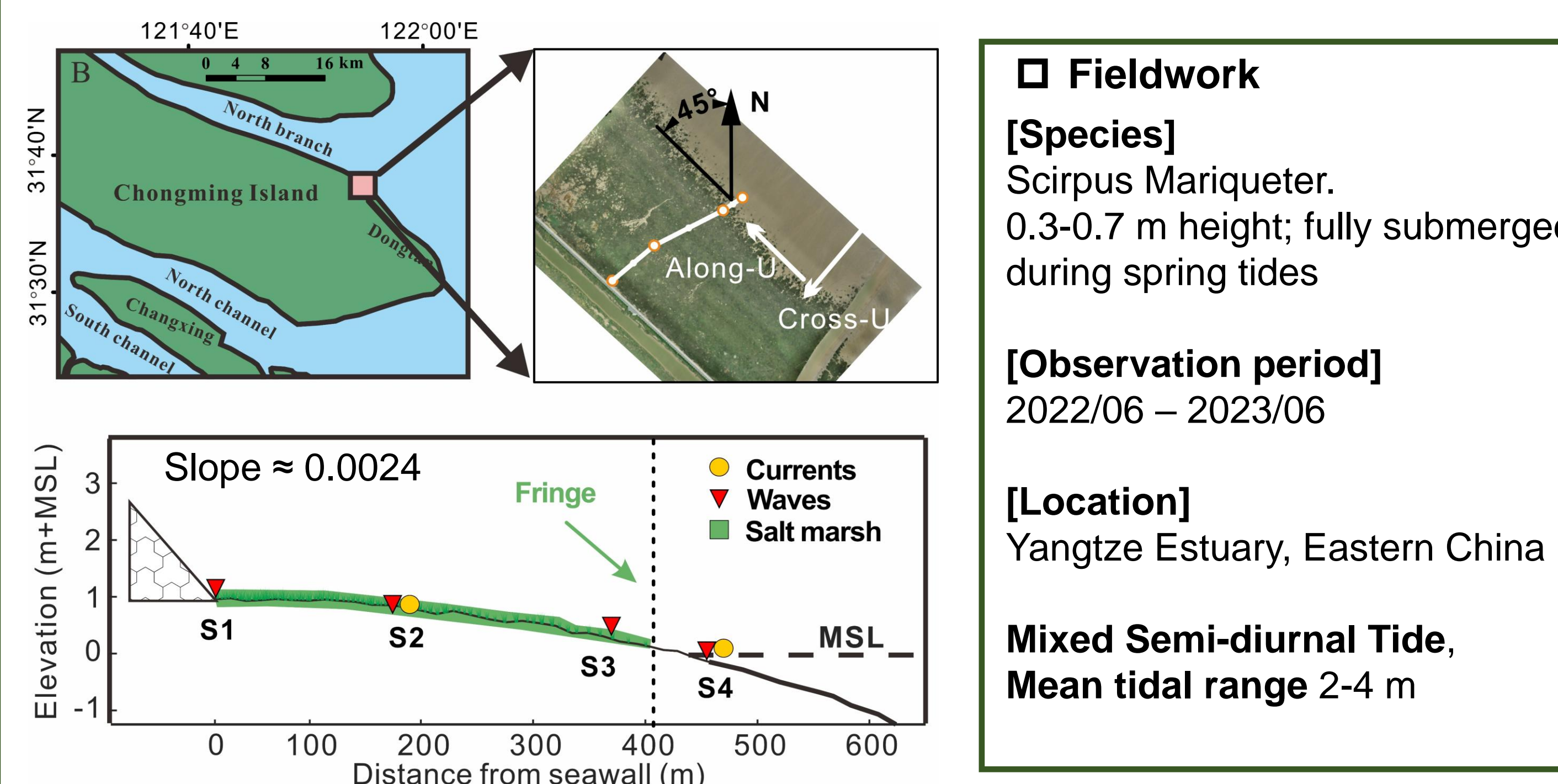
## Framework



## Mangrove



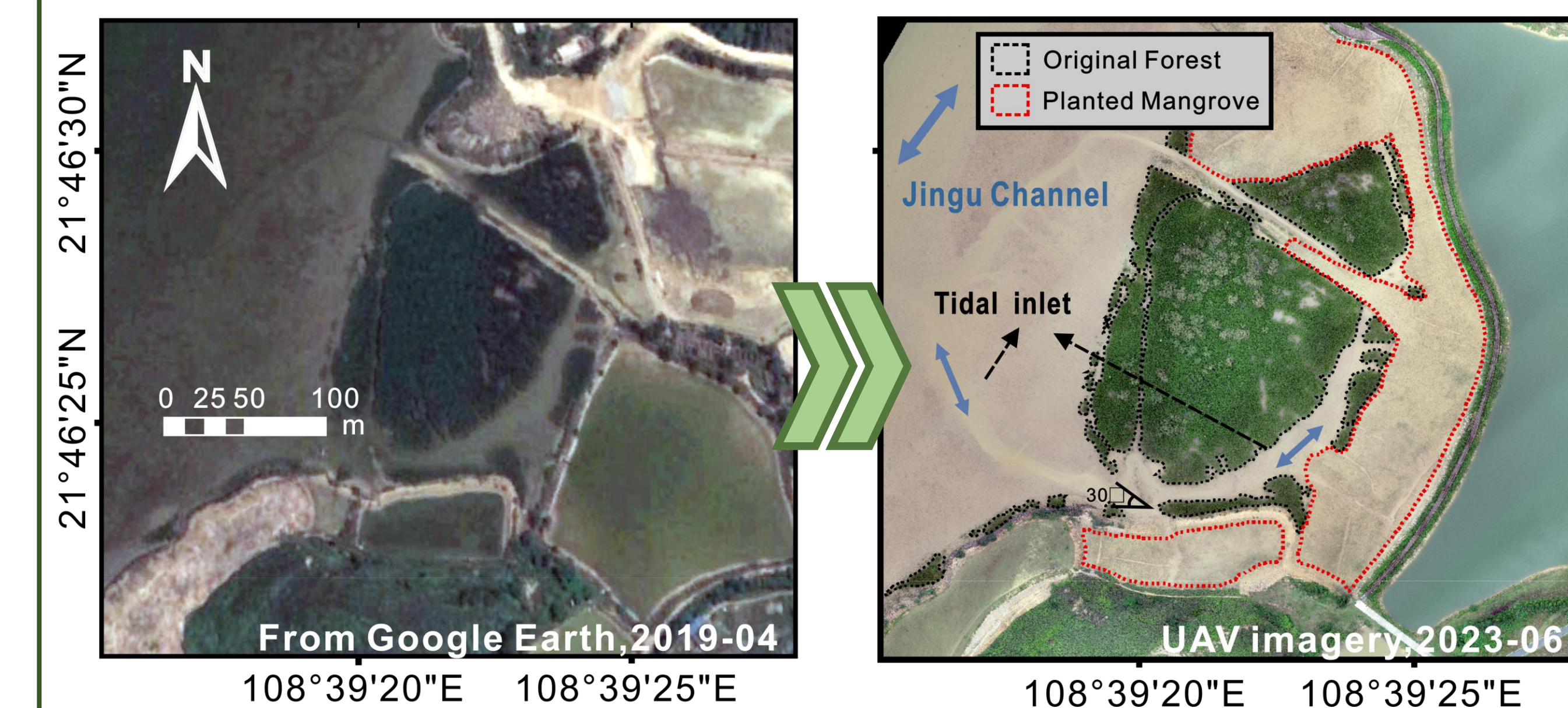
## Salt marsh



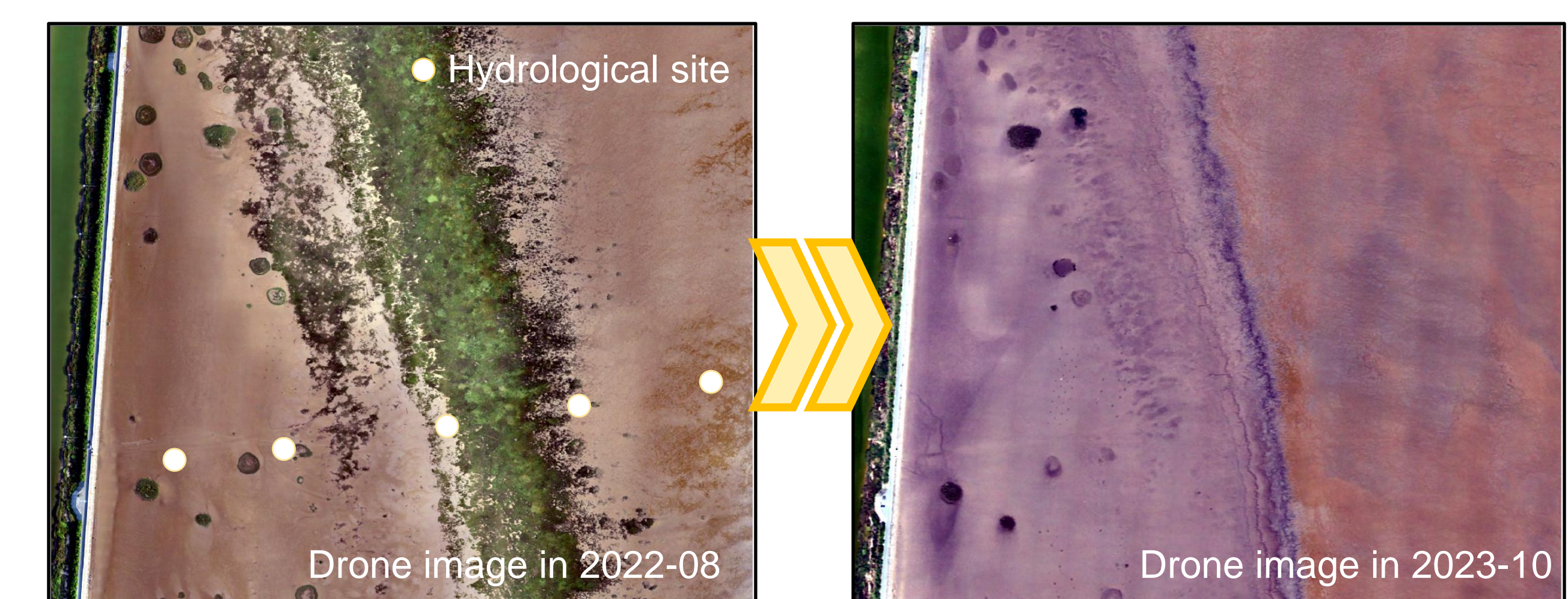
## Future Work

**Ongoing Modeling:** mangrove saplings growth exhibits a non-linear influence on sediment deposition dynamics within a restored pond<sup>[4]</sup>

### Pond-to-mangrove restoration

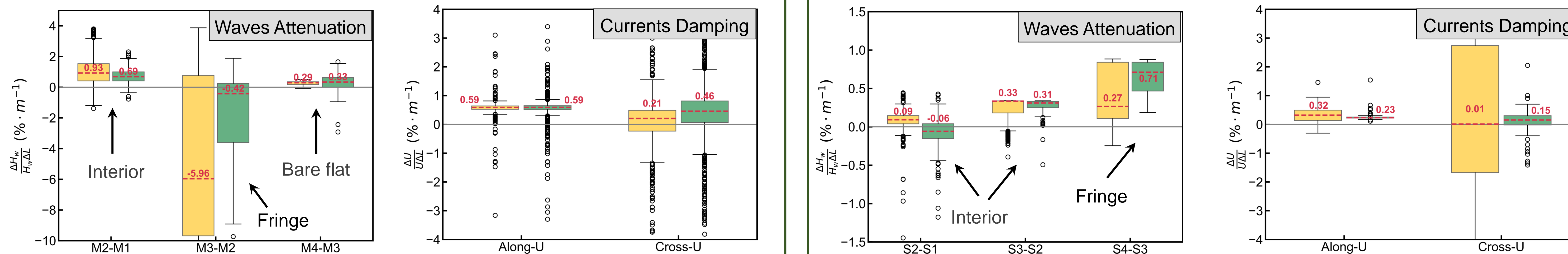


### Drone-observed disappearance of salt marsh in a restored region

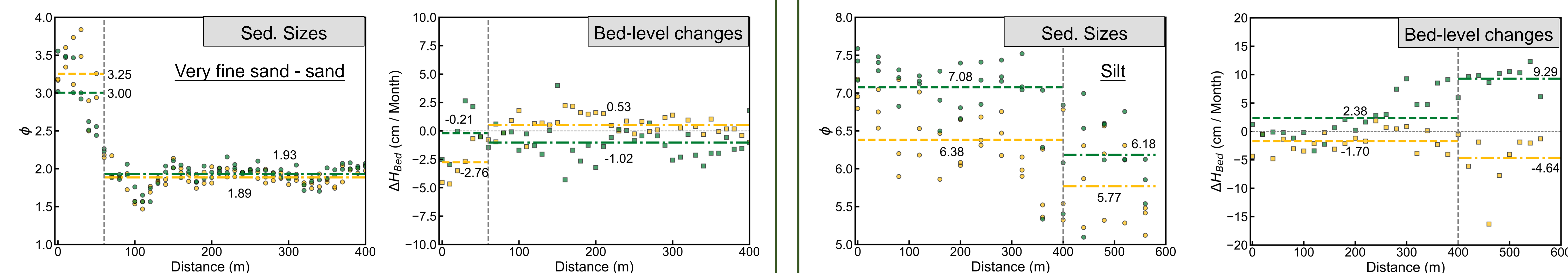


**Modelling the morphodynamic effect of significant gain and loss of salt marsh (including seasonal variations) based on observation**

1. Vegetated areas are more effective in dissipating hydrodynamics compared to bare flats<sup>[1, 2]</sup>.
2. Seasonal variations in vegetation result in differing rates of wave and current attenuation<sup>[3]</sup>.
3. Vegetated fringe of mangrove exhibits an anomalous increase in wave height, whereas salt marsh presents the most significant decrease.



1. Seasonal variation of sediment grain sizes and bed level changes is more significant in salt marsh compared to mangrove.
2. Mangrove exhibits contrasting trends in sediment grain sizes and bed levels between vegetated areas and fringing flat, but the salt marsh doesn't.



**References:**

[1] Jiang, W., Huang, Z., Dai, Z., Luo, J., Zeng, W., & Liang, X. (2025). Attenuation of hydro-sediment dynamics progradation over mangrove wetland. *Journal of Geophysical Research: Oceans*, 130(2), e2024JC021531.

[2] Shi, M., Dai, Z., Luo, J., Wang, J., Pang, W., Liang, X., & Cheng, J. (2025). Wave attenuation over a Scirpus maritimus salt marsh during Typhoon Muifa. *Estuarine, Coastal and Shelf Science*, 109155.

[3] Zhou, X., Dai, Z., Carniello, L., Long, C., Wang, R., Luo, J., & Huang, Z. (2022). Linkage between mangrove wetland dynamics and wave attenuation during a storm—a case study of the Naniu Delta, China. *Marine Geology*, 454, 106946.

[4] Luo, J., Dai, Z., Liang, X., Zeng, W., Wang, R., Huang, H., and Nienhuis, J. H. Hydro-sediment dynamics in an abandoned estuarine pond under artificial mangrove restoration. Submitted to *Journal of Hydrology* (under review) [Jan. 2025].

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