



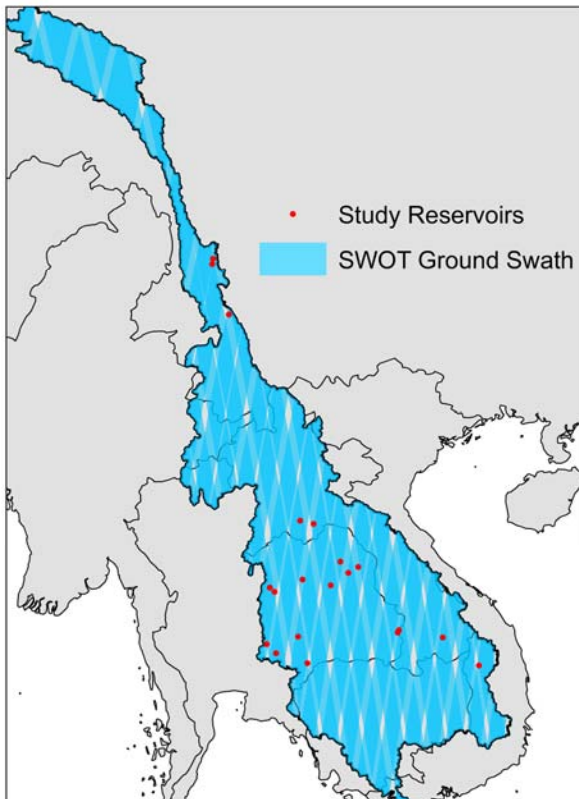
Using SWOT to Advance Water Management for Better Ecosystem services from Hydropower Dam Operations

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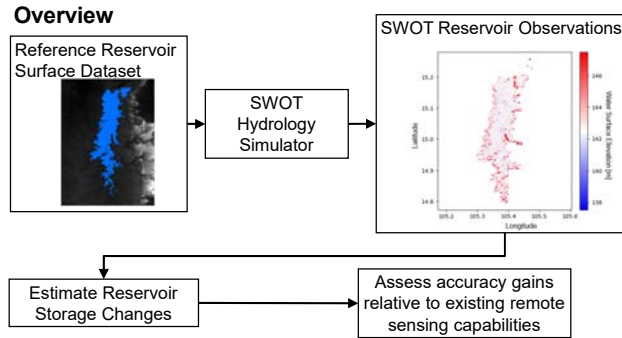
Objectives

- Evaluate accuracy of simulated SWOT observations of reservoir storage change for 20 reservoirs in the Mekong River Basin
- Merge SWOT water quantity observations with water temperature observations from other sensors to understand and manage ecosystem impacts downstream of hydropower dams

Expected SWOT observations in the Mekong River Basin

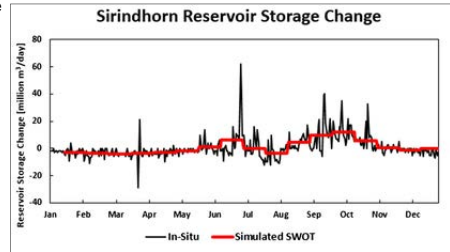


Simulated SWOT Reservoir Observations



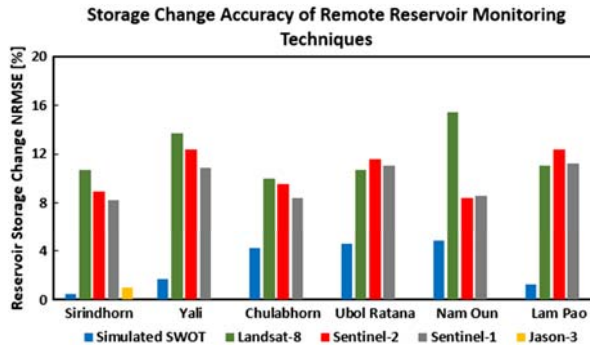
Accuracy of Synthetic SWOT Observations

- Reservoir storage changes were generally well represented by synthetic SWOT observations
- Elevation RMSE typically <0.10m
- Surface area NRMSE typically <15%
- Three layover impacted reservoirs experienced higher errors



Sirindhorn Reservoir simulated SWOT storage change observations compared to daily in-situ storage changes

SWOT Reservoir Observations in the Context of Current Satellite Sensors



References

Bonnema, M., and F. Hossain (2017), Inferring reservoir operating patterns across the Mekong Basin using only space observations, *Water Resour. Res.*, 53, (doi:10.1002/2016WR019778).
 Bonnema, M., and F. Hossain (2019), Assessing the potential of the Surface Water and Ocean Topography mission for reservoir monitoring in the Mekong River Basin, *Water Resour. Res.*, 55

Acknowledgements

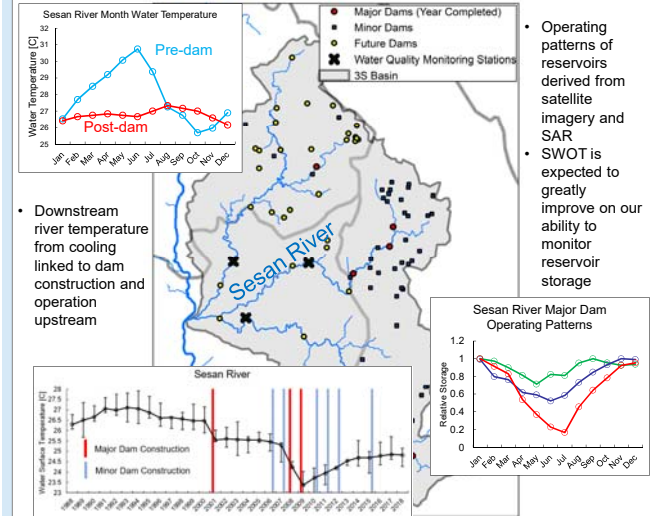
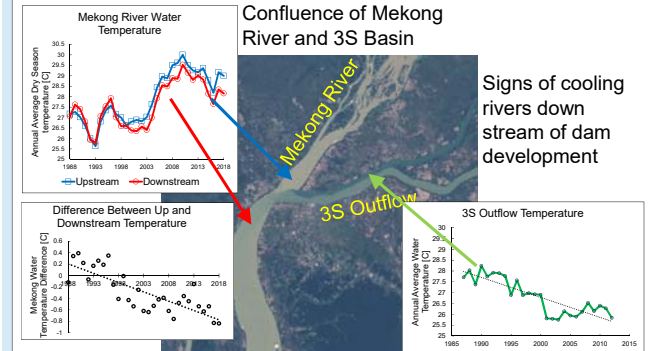
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Satellite Based River Temperature Observations

Overview

- Water quantity observations from SWOT and other sensors can be complemented by satellite based water quality observations such as river surface temperature
- Landsat thermal imagery used to infer impacts of hydropower dams on rivers downstream in Mekong River Basin
- Pair thermal information with remotely sensed operations of upstream reservoirs
- Test of water temperature observations in Mekong tributary, 3S Basin, location of major dam development in recent decades

River Temperature from Landsat Thermal Imagery



Conclusions

- Overall, storage change of the 20 Mekong Basin reservoirs was accurately estimated from the simulated SWOT observations
- SWOT represents a dramatic improvement in reservoir storage change estimation over current methods
- The impacts of dams on downstream river temperature can be detected by Landsat thermal imagery
- By combining remotely sensed thermal observations with remotely sensed reservoir operations, we can understand and manage better the ecosystem impacts downstream from hydropower operations