

# Monsoon-induced surge during high tides at the Central and Southeast coast of Vietnam – a numerical modeling study

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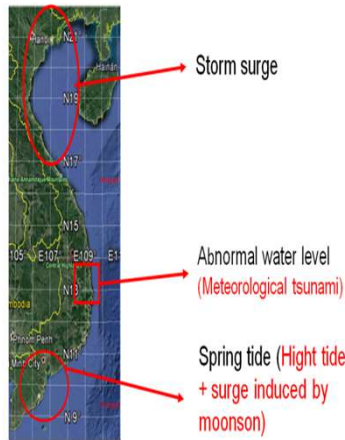
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## Problems:

The Central and Southeast coast are low plains, and a large estuary system, which makes this area vulnerable to increased sea levels during spring tide. High water levels frequently occur in this region.

## Objective:

The monsoon-induced surge in the spring tide phases at Central and Southeastern coast of Vietnam were analyzed based on tidal observations and simulations with ROMS 2D & 3D.



Coastal risk related to high water level in Vietnam

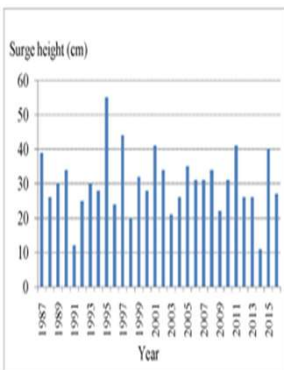


Spring tide in Ho Chi Minh city

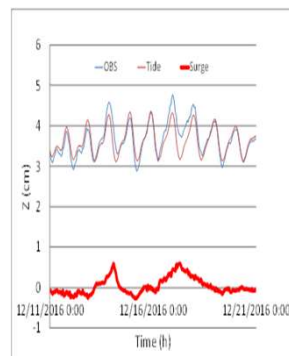


Abnormal surge on the Central coast

## Observation data:

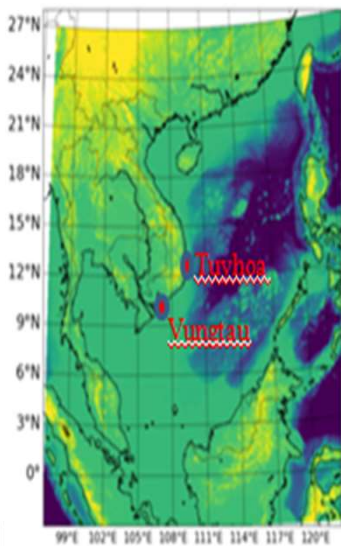


Max. surge height at Vung Tau station in 1987-2017.



Time series of water level, tide and surge at a temporary station (Tuy Hoa) on the Central coast in Dec., 2016.

## Numerical model:

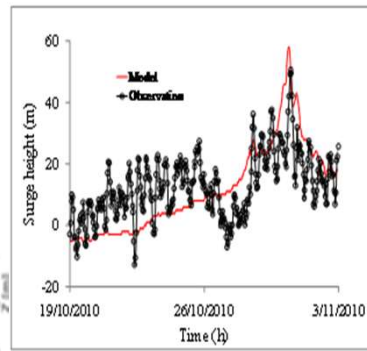


Ocean model: ROMS 2D & 3D  
Meteo. model: WRF  
Grid size: 498 x 498  
Res.: 2.6 -6.6 km.

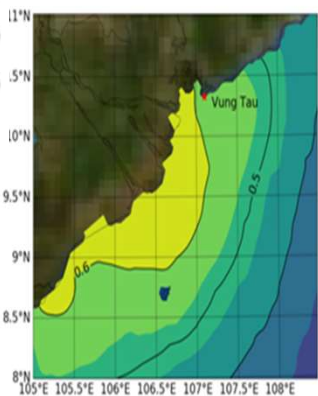
## Discussion and Conclusions:

- At the Southeast coast: Surge is mainly due to the wind stress on the sea surface. ROMS 2D reproduced the wind-induced surge relatively well.
- At the Central coast: The abnormal surge is generated by wind stress on the sea surface, wave radiation stress and Ekman pumping. ROMS 3D underestimated the surge.

## Surge on the Southeast coast

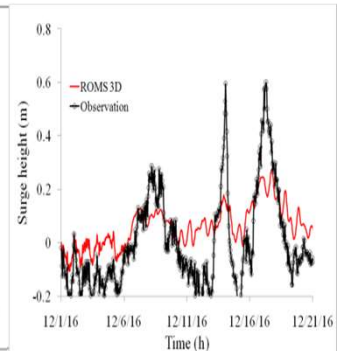


Numerical and observed surge at Vung Tau

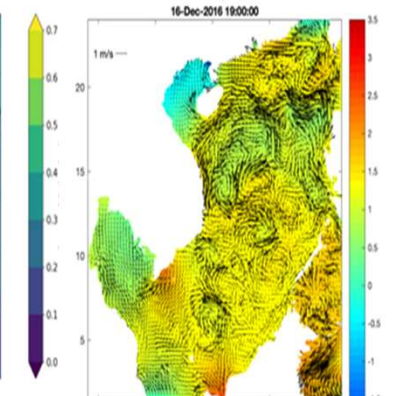


Maximum surge height due to monsoon

## Surge on the Central coast



Numerical and observed surge at Tuy Hoa



Water level and velocity in the abnormal surge case

## Future work:

- A coupled river and ocean model to be used for simulating the coastal and river site inundation.
- A coupled model of ROMS 3D and Swan will improve the abnormal surge simulation.

## Acknowledgments:

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