



**Vietnam School of Earth Observation, 2018**

# **Assessment of the potential for future deposition of tidal flats in the northern coast of Vietnam**

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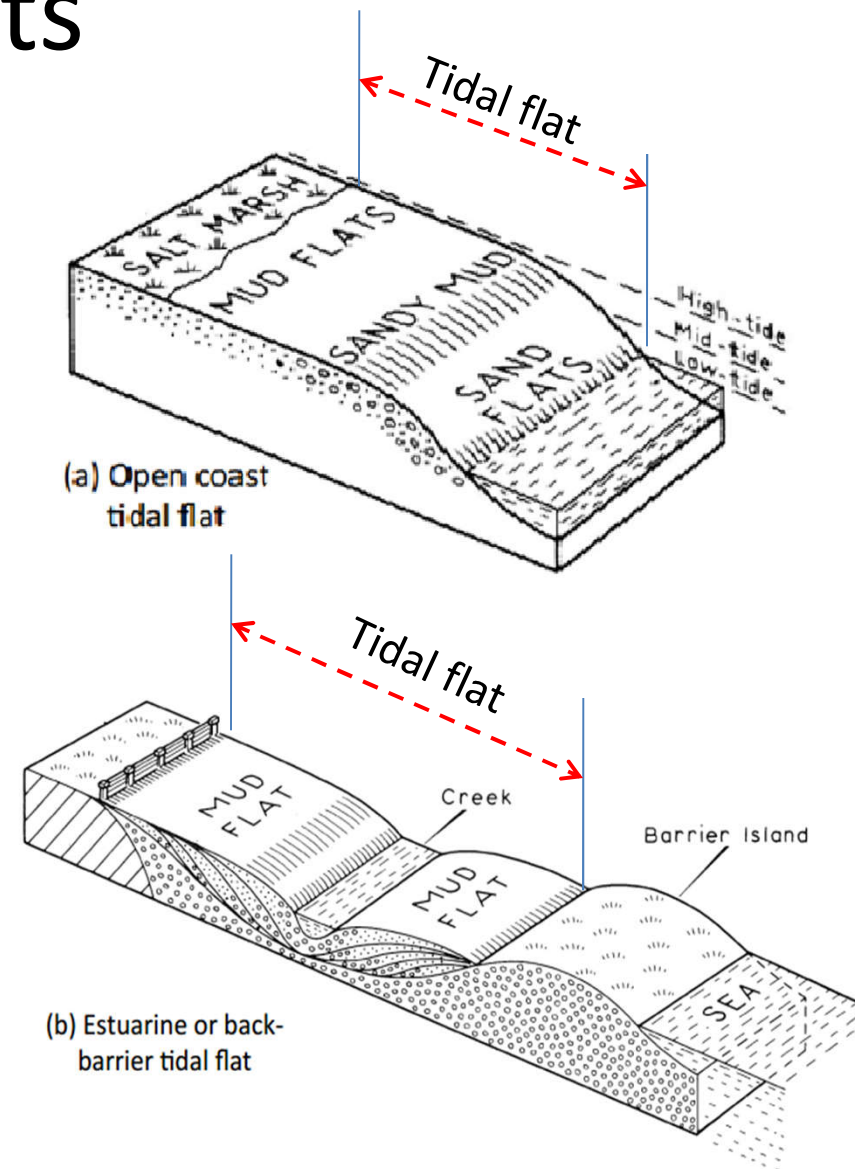
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# Tidal flats



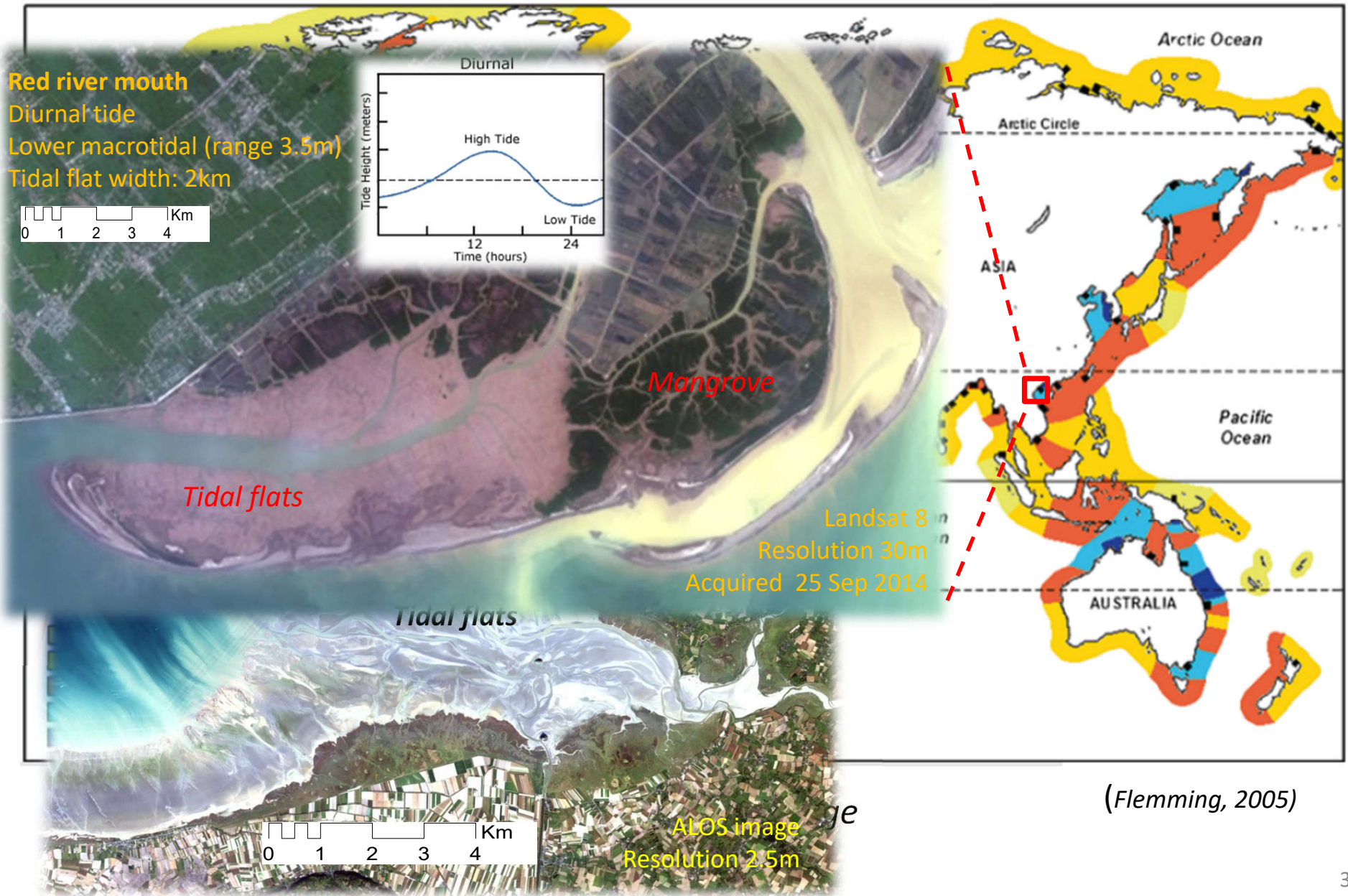
Tidal flats (Semidiurnal tide) in Shiokawa, Aichi, Japan



**Tidal flats:** - Areas between low and high tides, without vegetation

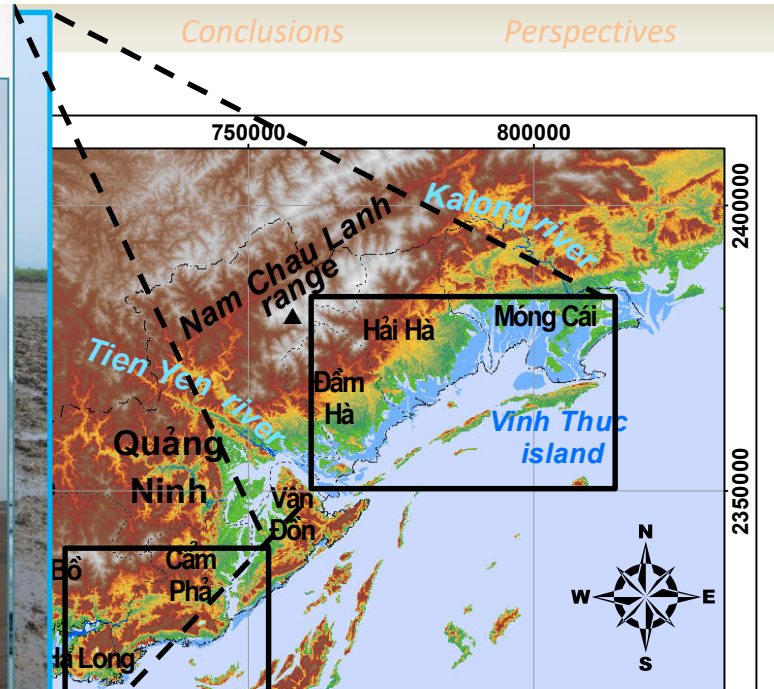
- Alternately covered and uncovered by tides
- Divided into Low tidal flats, mid tidal flats and high tidal flats

# Global distribution of tidal flats

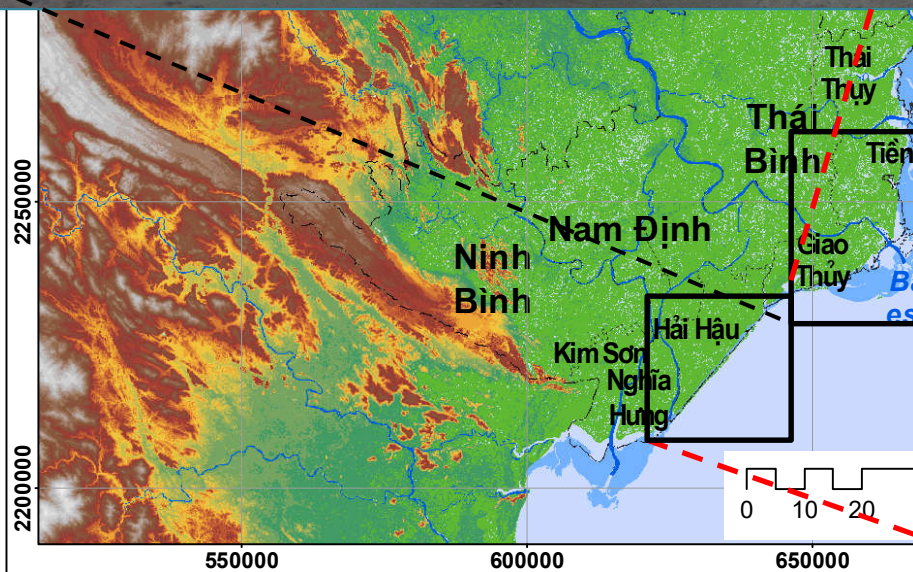


# Tide domination

Wave domination  
Sediments from Red river  
High deposition



Wave domination  
Erosion coast



# Objectives

- Monitoring the tidal flat change over period 1989-2014 using optical images
- Assessment of potentials for future deposition of tidal flats

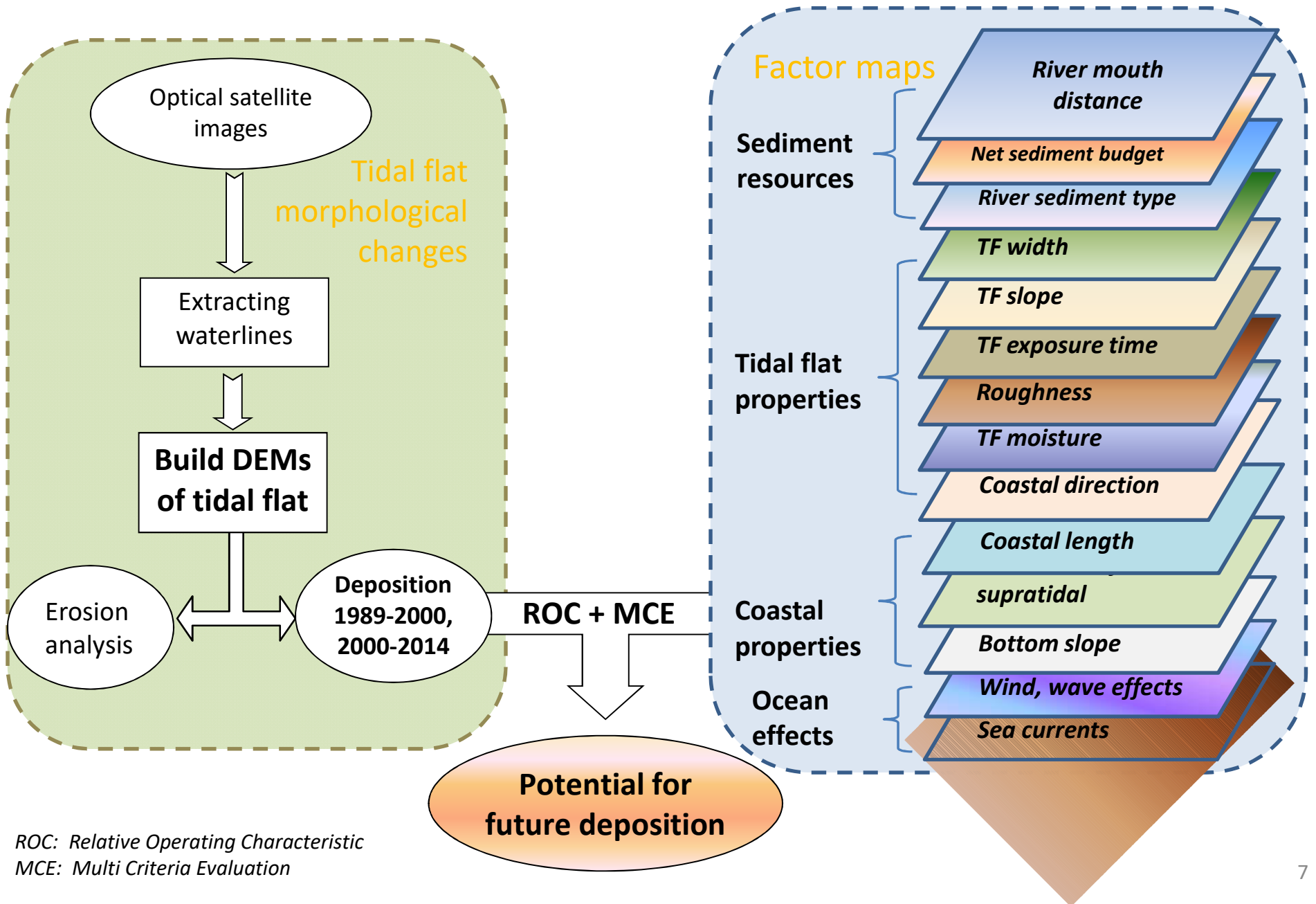
# Data

- **Satellite images:** 117 Landsat to build 3 new DEMs of tidal flats in 1989, 2000, 2014

Sensor	Acquired time	Number of image	Resolution (m)	Note
Landsat	1989-1990	45	30	<i>For making DEMs</i>
	1999-2000	34		
	2013-2014	38		
Worldview 2	13 <sup>th</sup> Apr, 2015	1	0.6	<i>Selecting bands for extracting waterline</i>
Spot 2	31 <sup>st</sup> Aug, 2002	1	20	
Aster	17 <sup>th</sup> Feb, 2001	1	15	

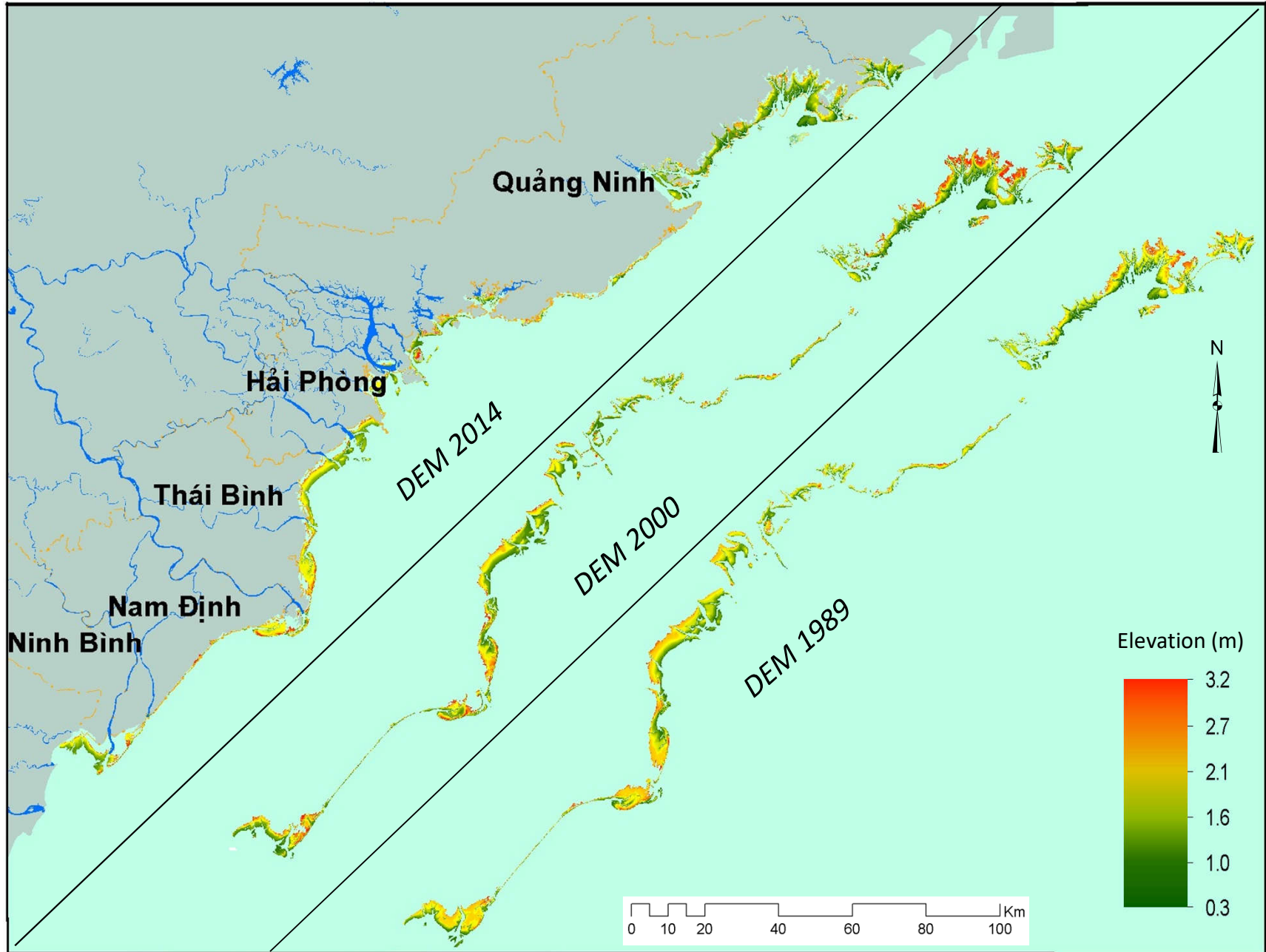
- **Tide level:** estimating at exactly acquisition time of images from SHOM service
- **Factor maps:** 14 factor maps related to Sediment resources, Tidal flat properties, Coastal properties, Ocean effects

# General methodology



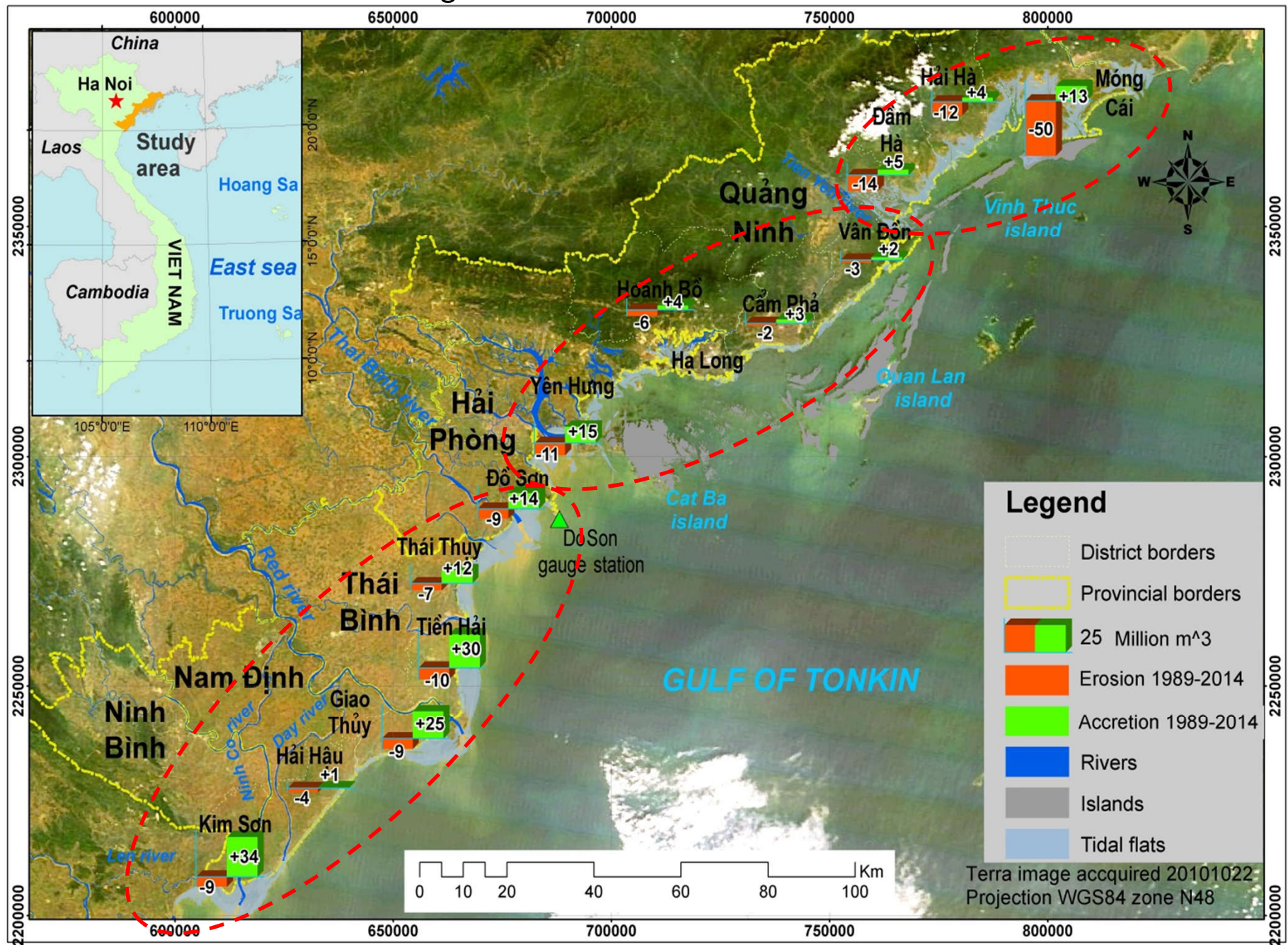
ROC: Relative Operating Characteristic  
MCE: Multi Criteria Evaluation

# DEMs of tidal flats

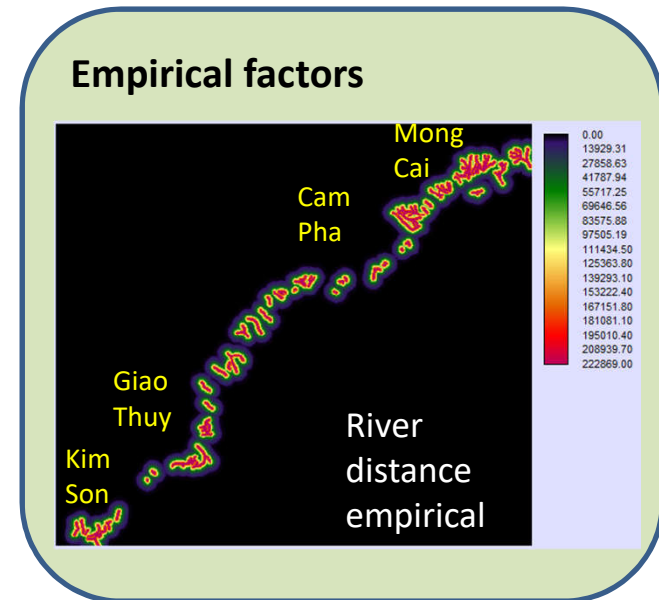
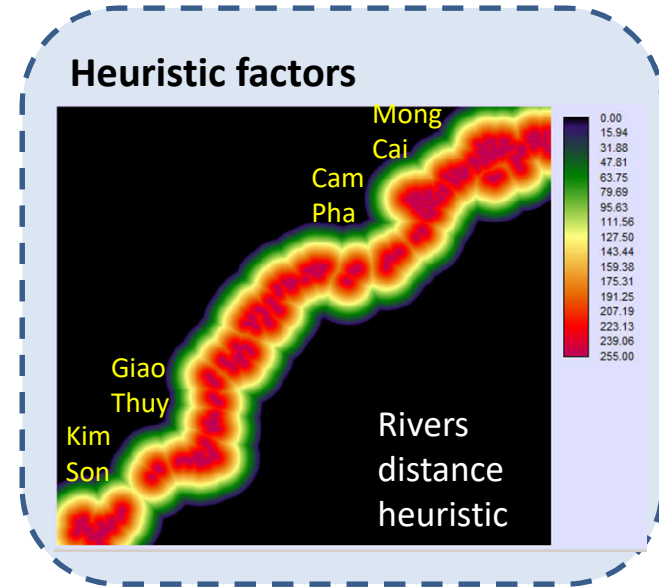
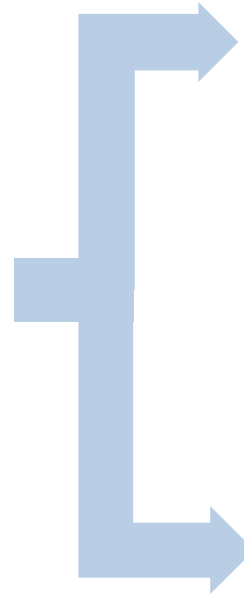
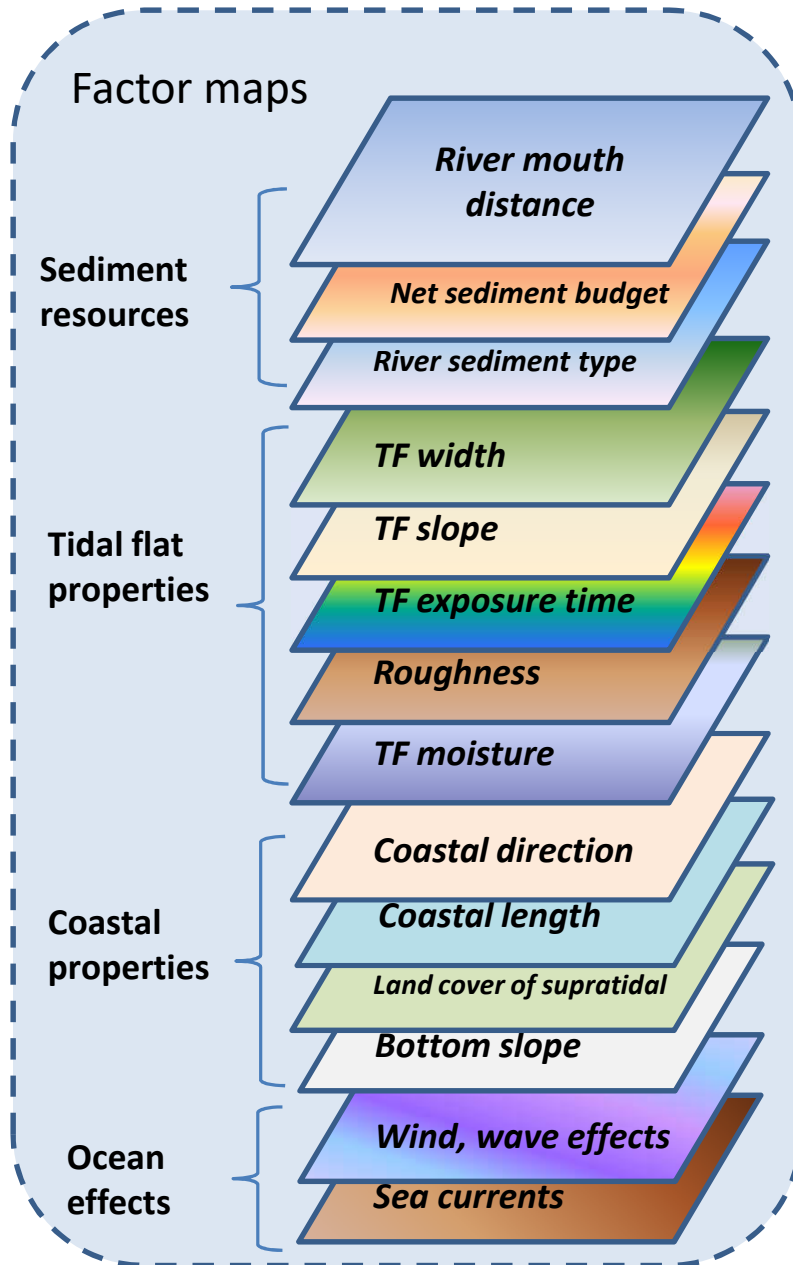




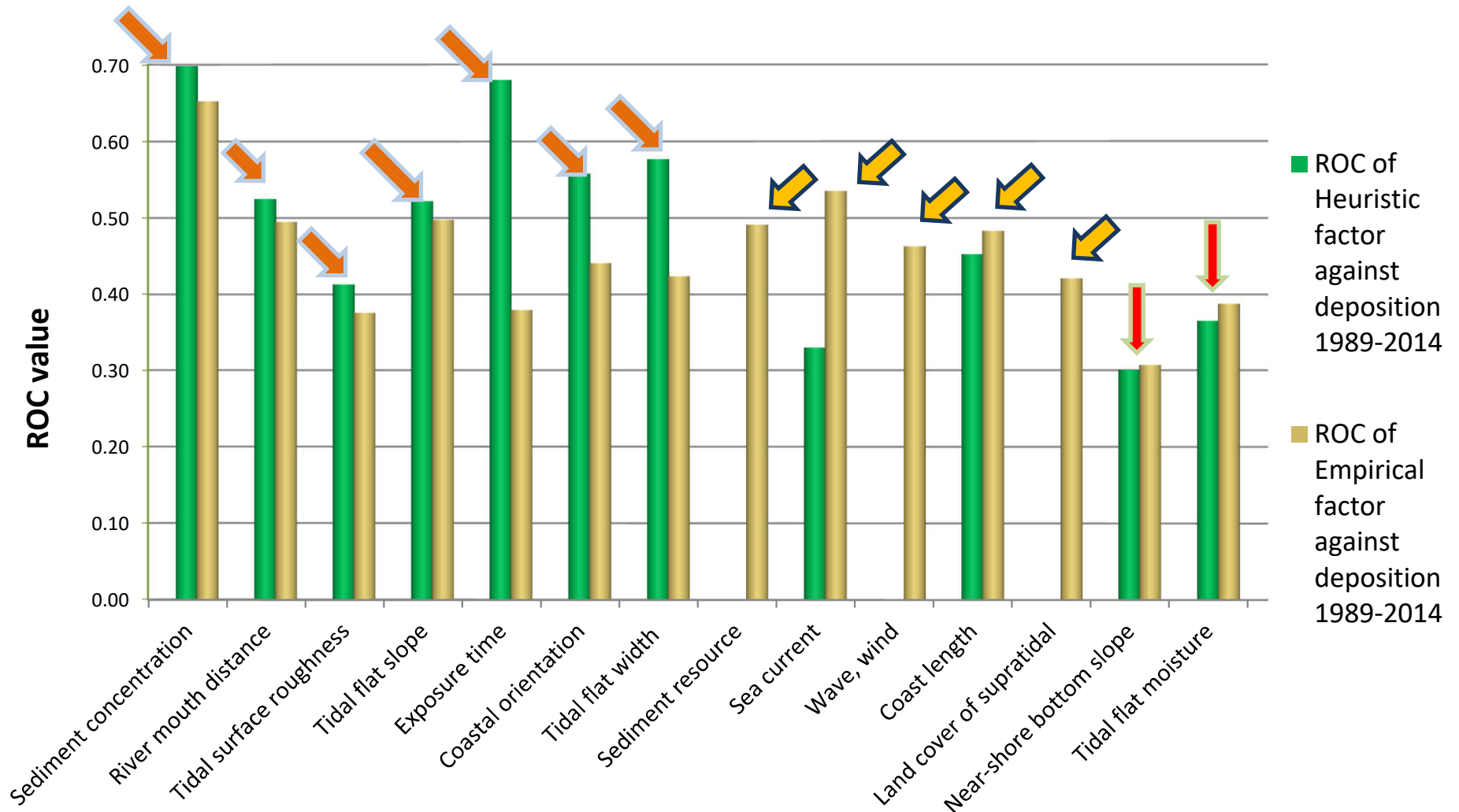
Volume change of tidal flats between 1989 and 2014



# Assessment of Potential for future deposition



## Selecting factors for making potential map



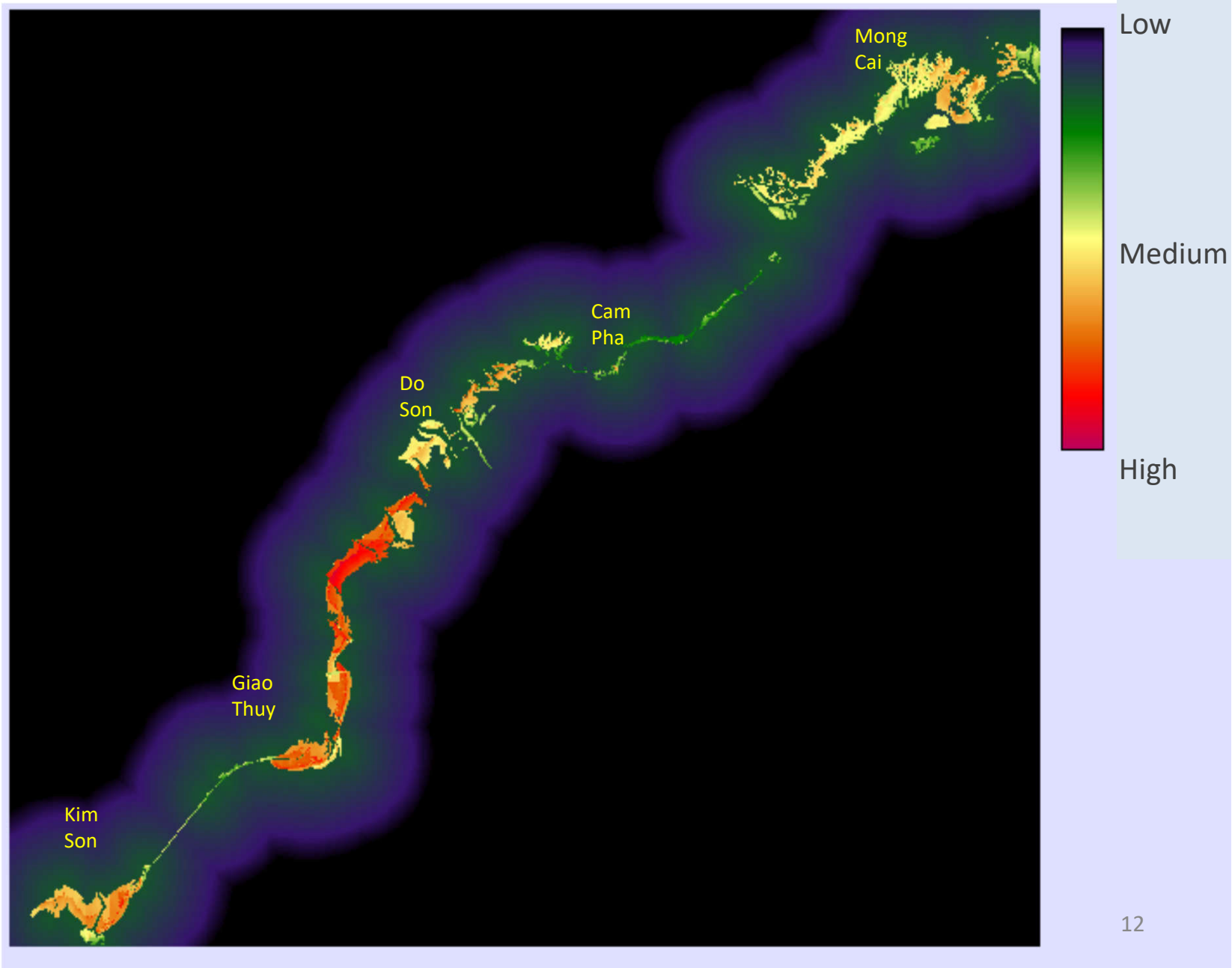
- Factor with the higher ROC is higher explanatory historical deposition
- Selecting factors with higher ROC for mapping potential deposition

# Potential for future deposition

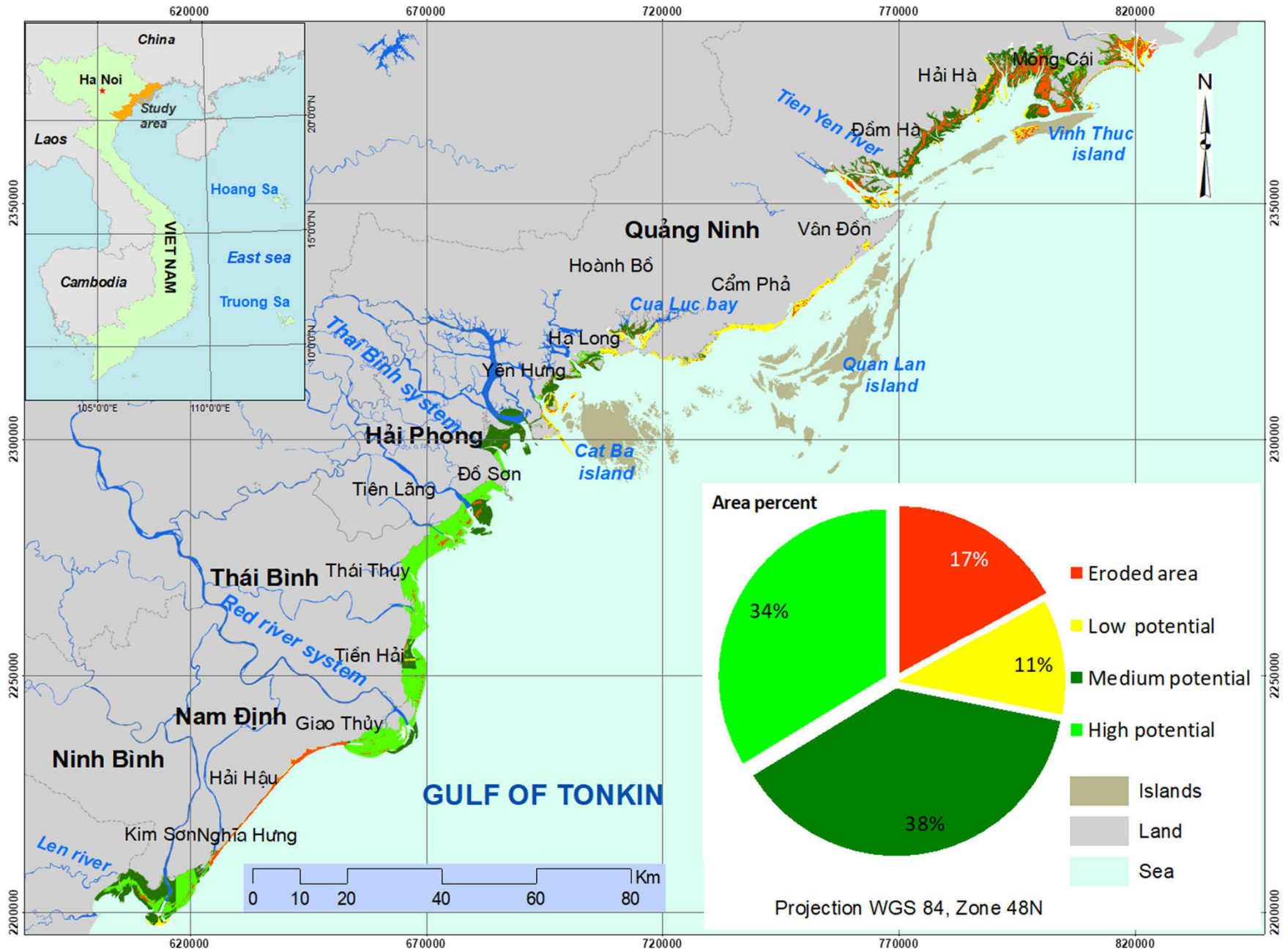
7 heuristic factors



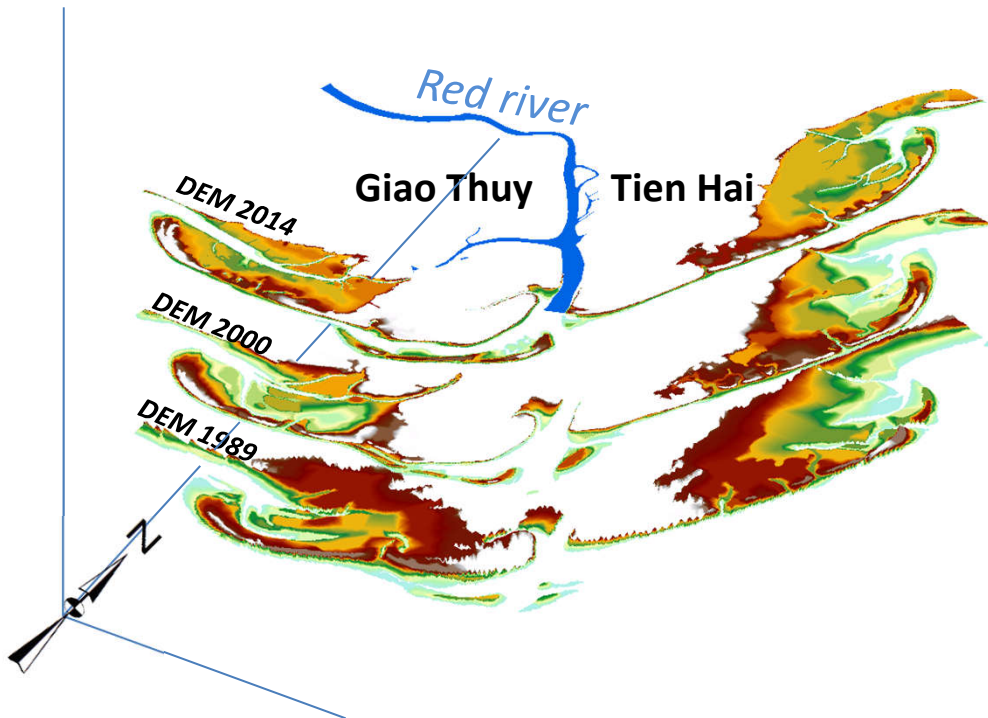
5 empirical factors



# Map of potential for future deposition

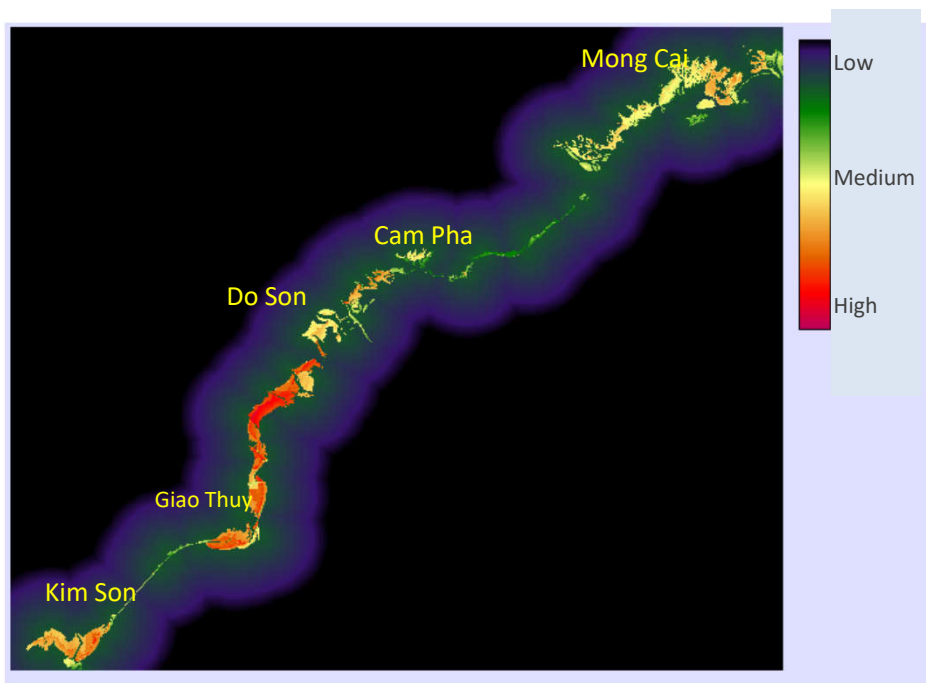
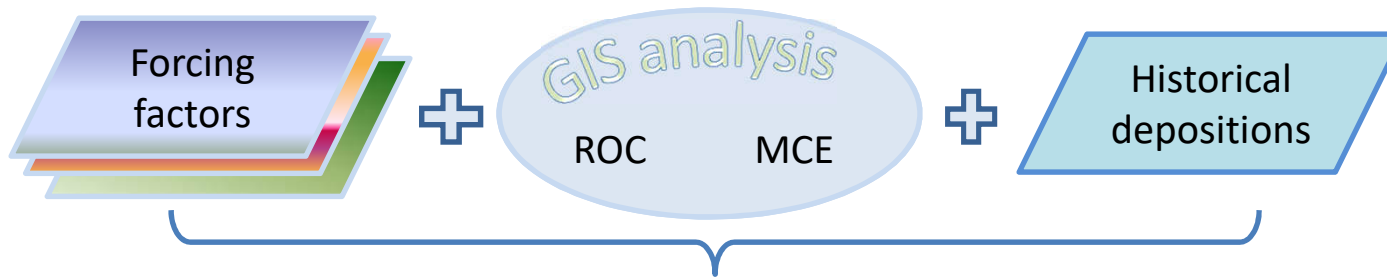


# Conclusions



- Unique DEMs of tidal flats in 1989, 2000, 2014 (Vertical accuracy: 14cm, horizontal: 30m with the average slope 0.75 degree )
- Erosion occurs in the north, deposition in the south
- Evolution information is important data for local government.

## Potential for future deposition



- Successfully applied the GIS analysis for assessing potential for future deposition

- Difficult to integrate the extreme phenomena in the model. (storms, cyclones).

- Potential deposition is suitable for future 50 years in context of climate change.

*(sea level rise 0.3cm/year x 50 years = 15cm > 14.4cm accuracy of DEMs)*



*Thank for your attention*

