Ocean Modeling Study in Malaysia: Current Status & Needs

Prof. Dr. Fredolin Tangang

School of Environmental & Natural Resource Sciences,
Faculty of Science & Technology
The National University of Malaysia

UNIVERSITI KEBANGSAAN MALAYSIA
National University of Malaysia

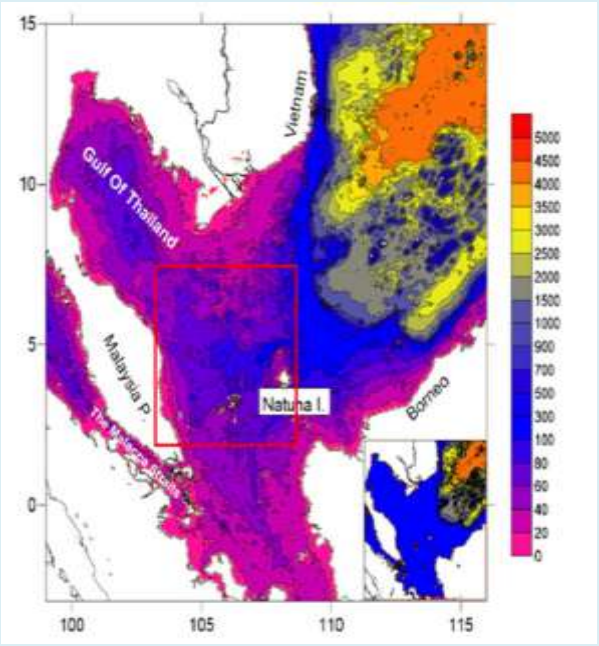
Ocean Modeling Study in Malaysia

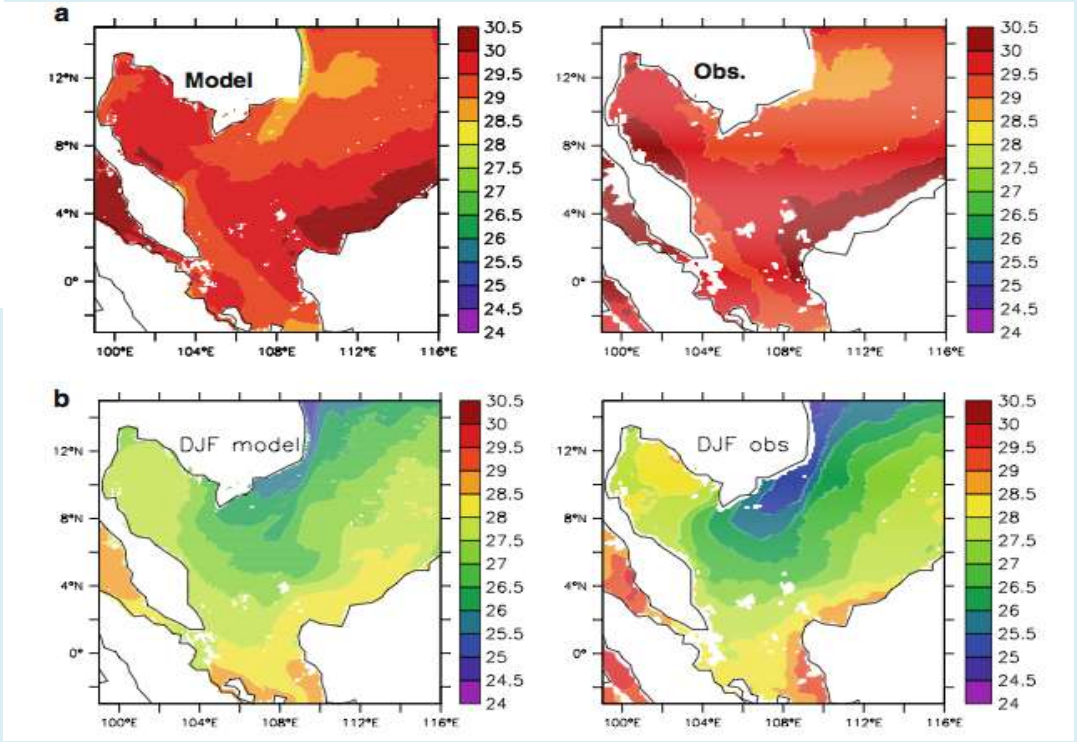
- Marine science / oceanography research in Malaysia mainly focuses on biological and chemical aspects and least on physical oceanography / ocean modeling
- Number of published materials in physical oceanography and ocean modeling in Malaysia is still very low
- Why? Lack of researchers, ocean modeller
- Only 2-3 universities carry out research in PO and ocean modeling
- We need to build up more research groups in carry out PO and ocean modeling research in Malaysia
- Next few slides highlight sample of works from UKM & UMT group

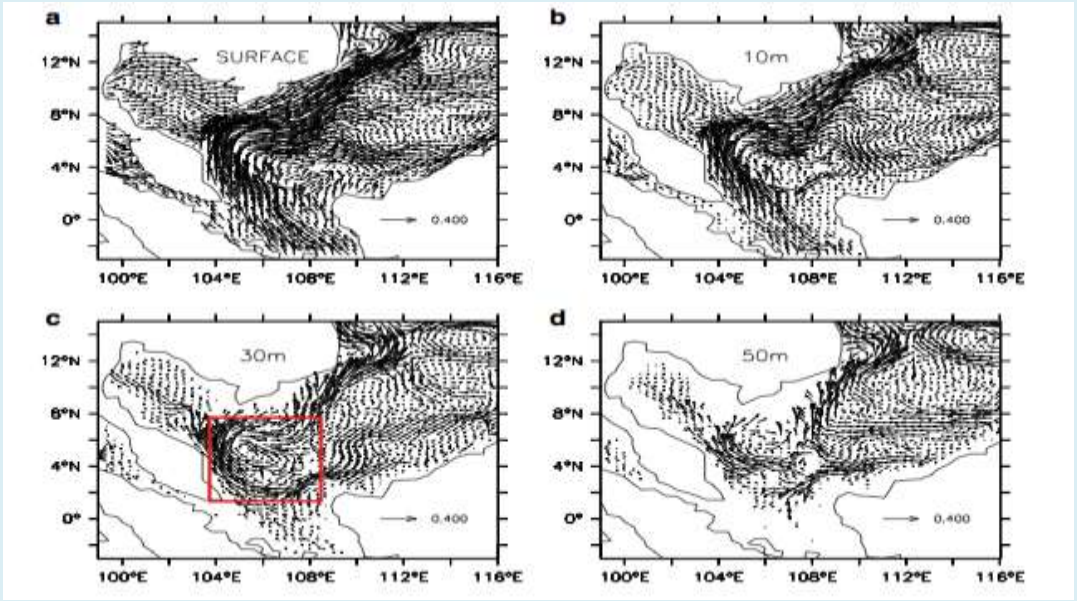
Ocean Dynamics
DOI 10.1007/s10236-011-0432-5

Seasonal circulations in the Malay Peninsula Eastern continental shelf from a wave–tide–circulation coupled model

Fredolin T. Tangang · Changsui Xia · Fangli Qiao · Liew Juneng · Feng Shan

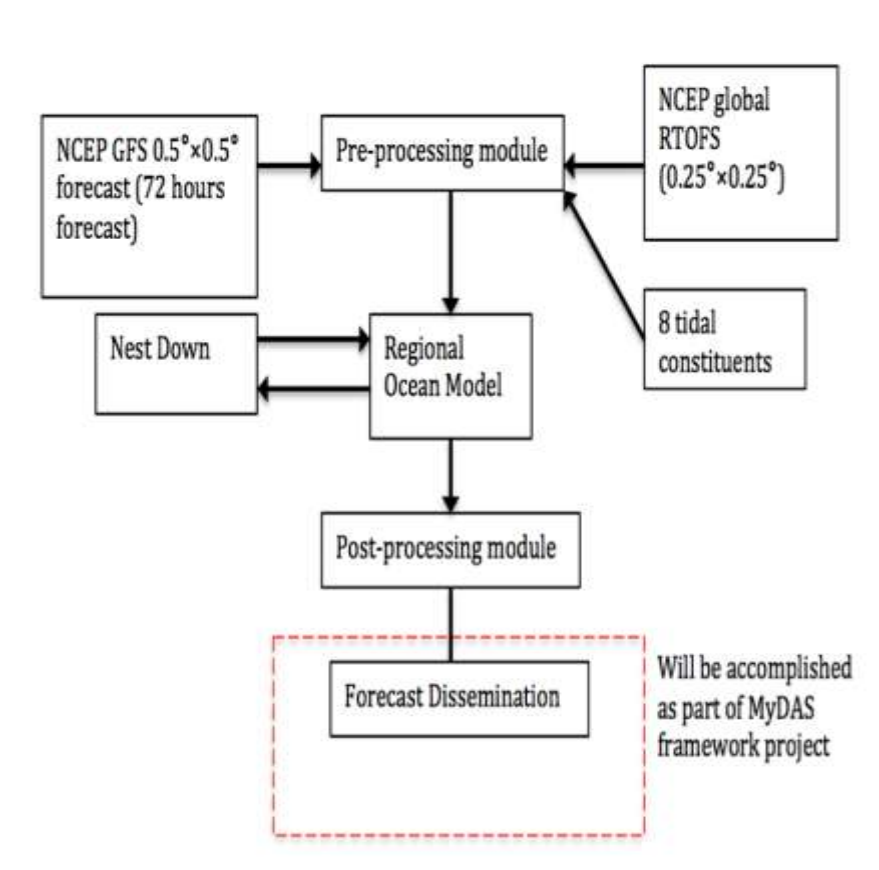


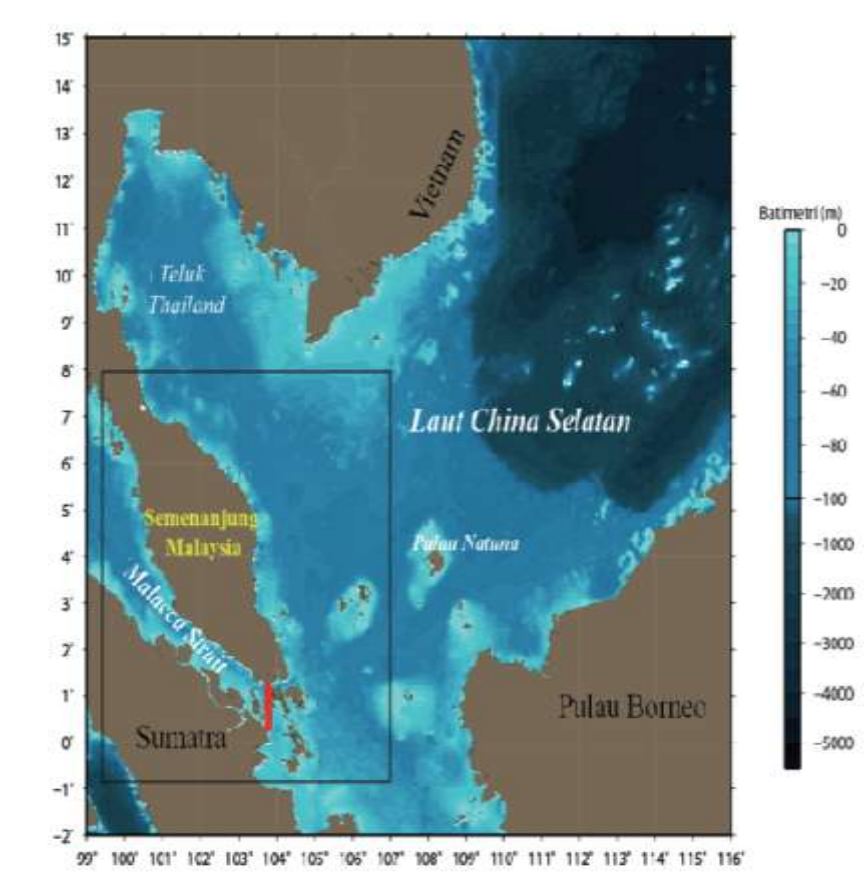


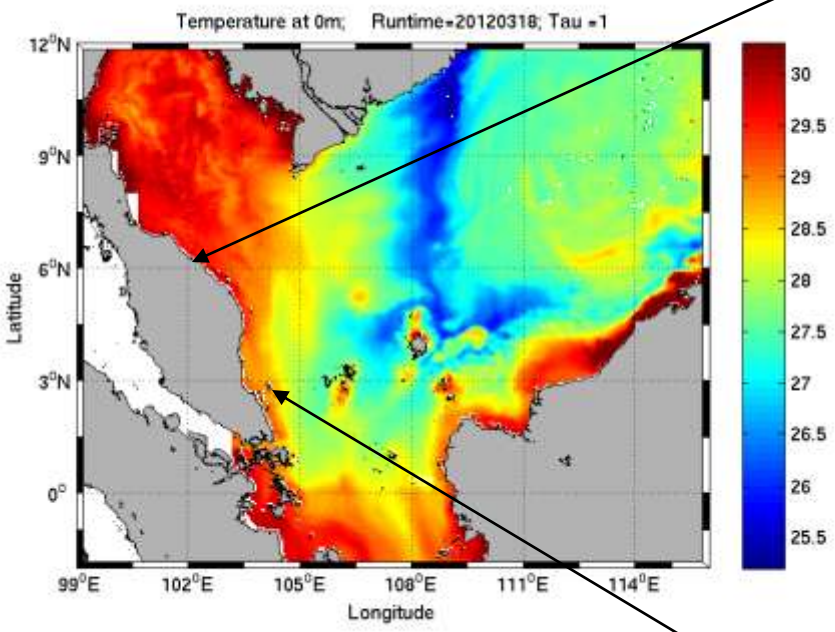


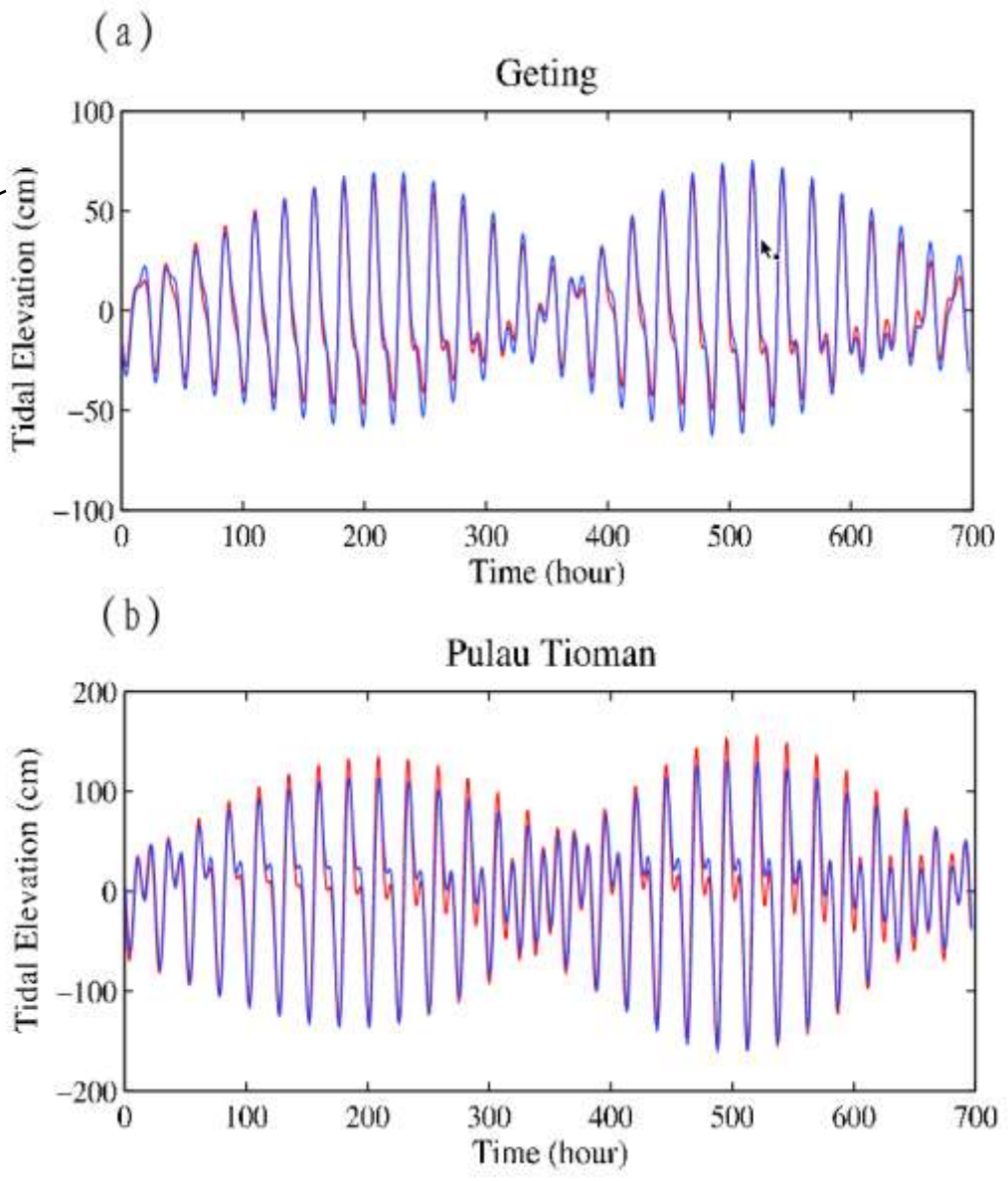
Model: POM, Resolution: 6km, forcings: climatological winds, heat fluxes from CAODS, tides at open boundary, T&S from Levitus

Ocean Forecasting System for Malaysian waters





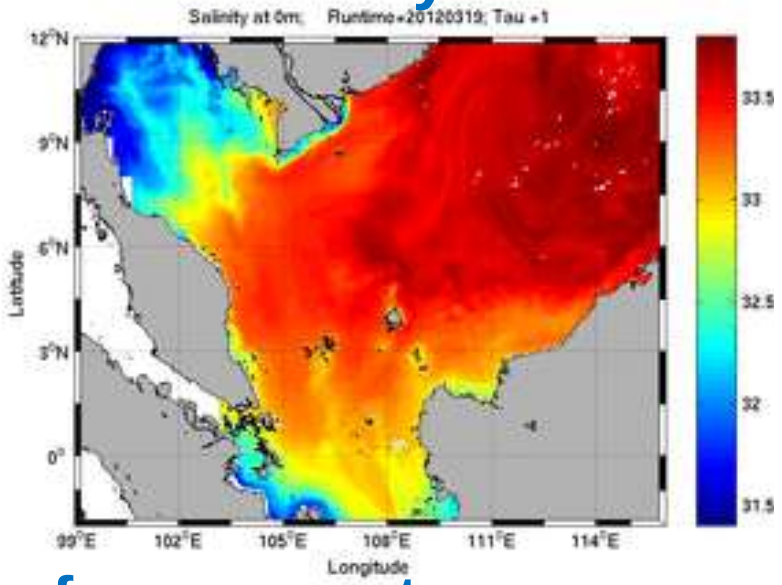




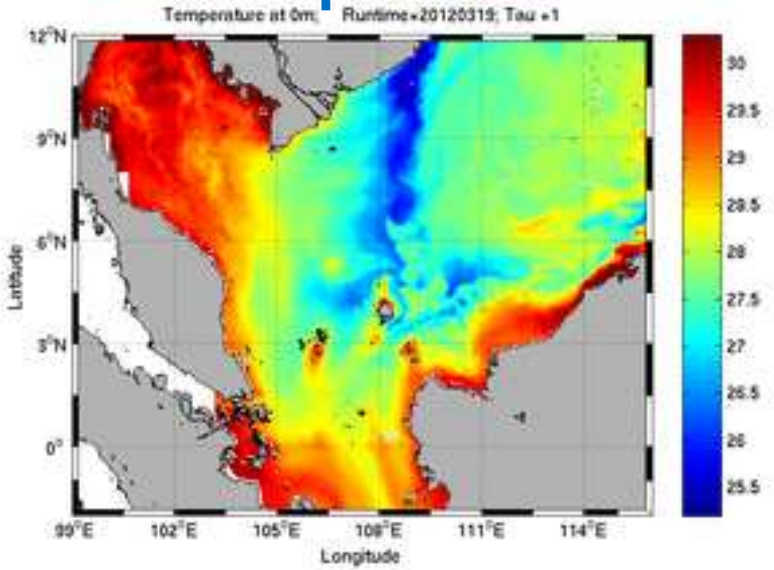
- Tidal forecast quality is crucial.
- First examine separately using only the 2D model.

Some surface forecasts snapshots

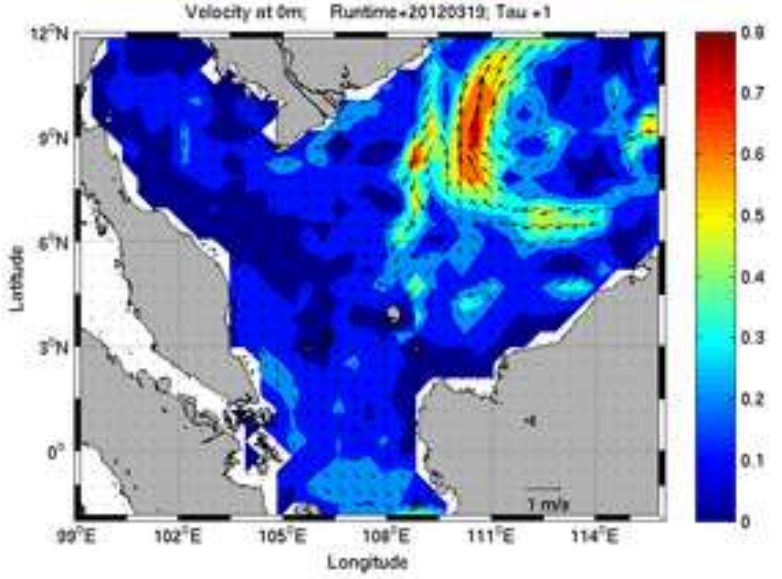
Surface Salinity



Surface Temperature

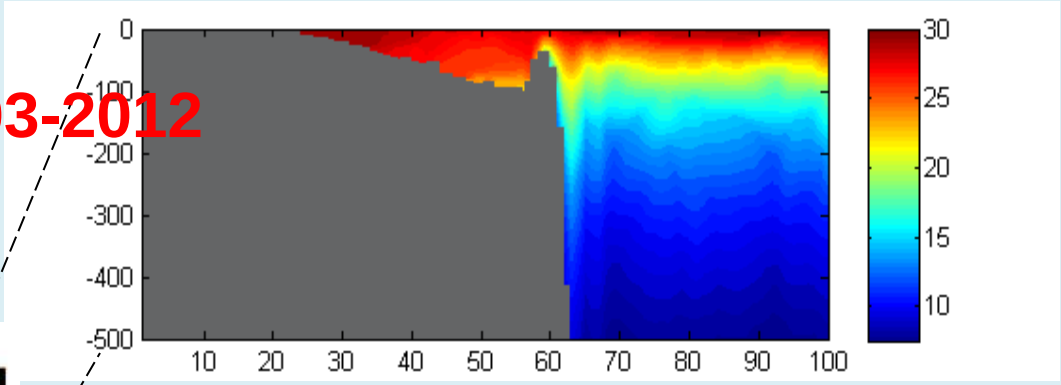


Surface current

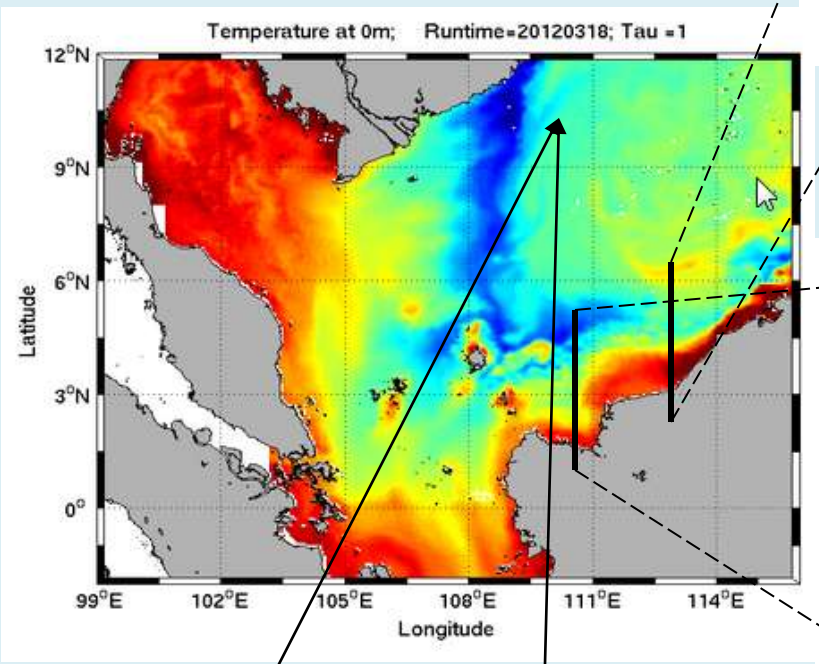


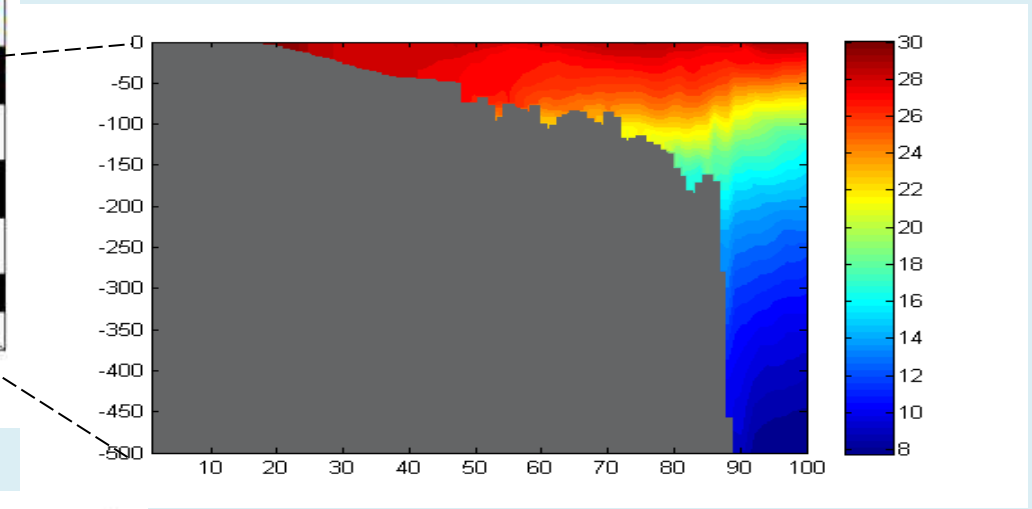
Initialized at 00UTC 19-03-2012

Initialized at 00UTC 18-03-2012

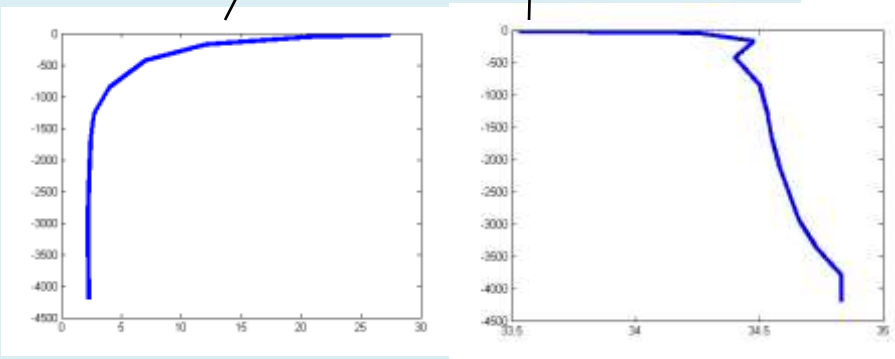


Temperature latitudal cross-section



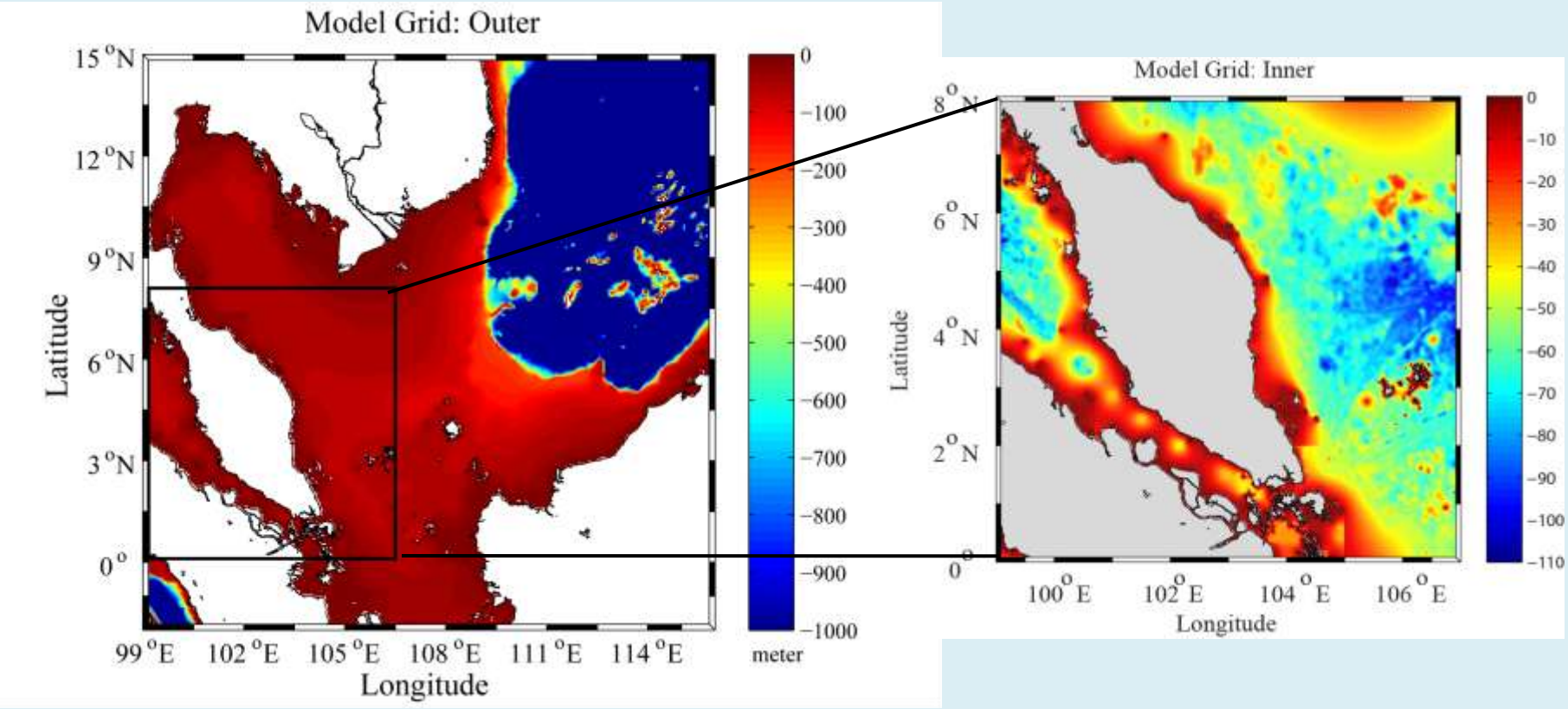


Temperature latitudal cross-section



Vertical Profile of temperature and salinity at random point

Sub-model Configuration

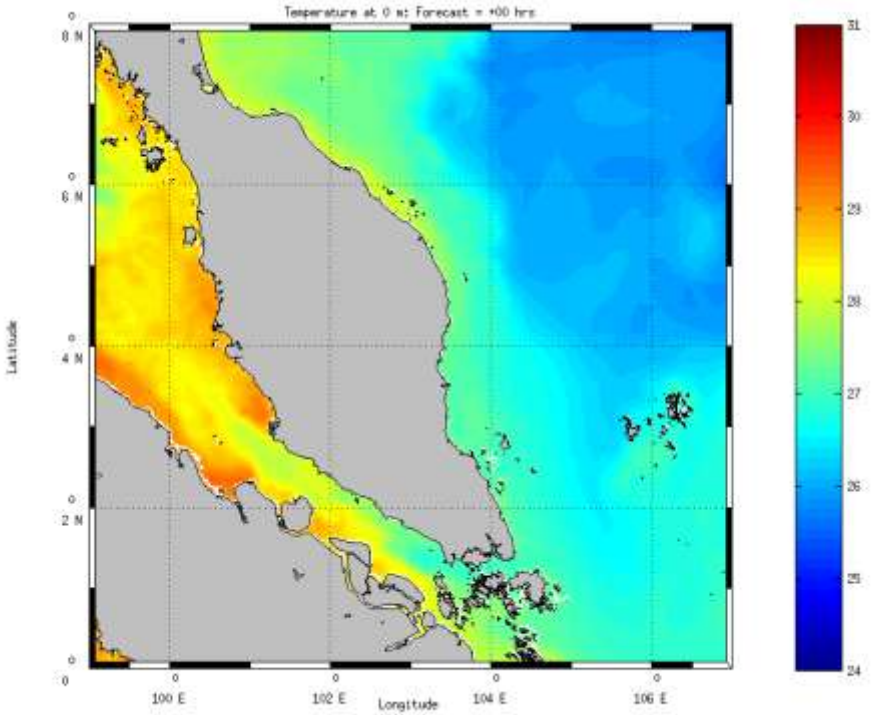


Configuration:

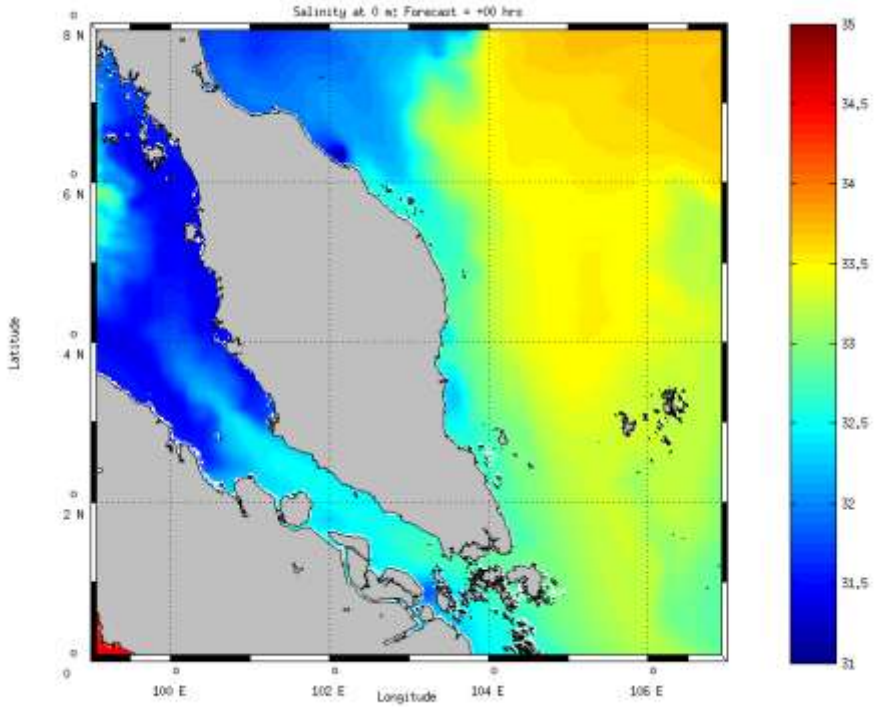
- **rectilinear 1/55° × 1/55° (~2km) grids**
- **15 sigma layers**
- **ETOPO1 (1 arc min; ~1.85km)**
- **1 run per day, initialize at 00 UTC**
- **forecast length: 72 hours (3 days)**

Example: initialized at 00UTC 12/2/2014

Surface temperature

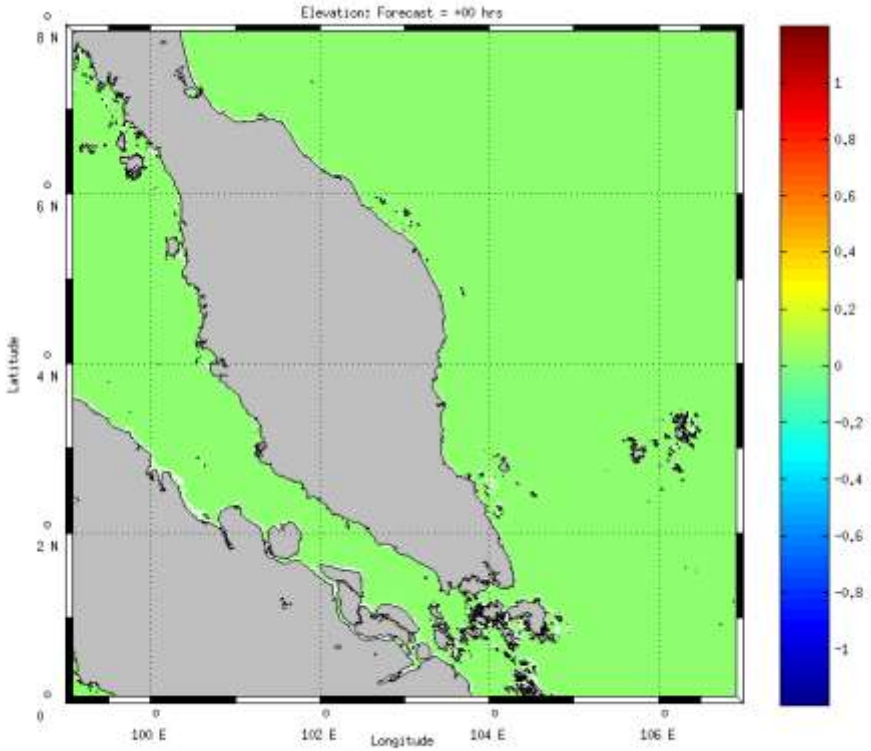


Surface salinity

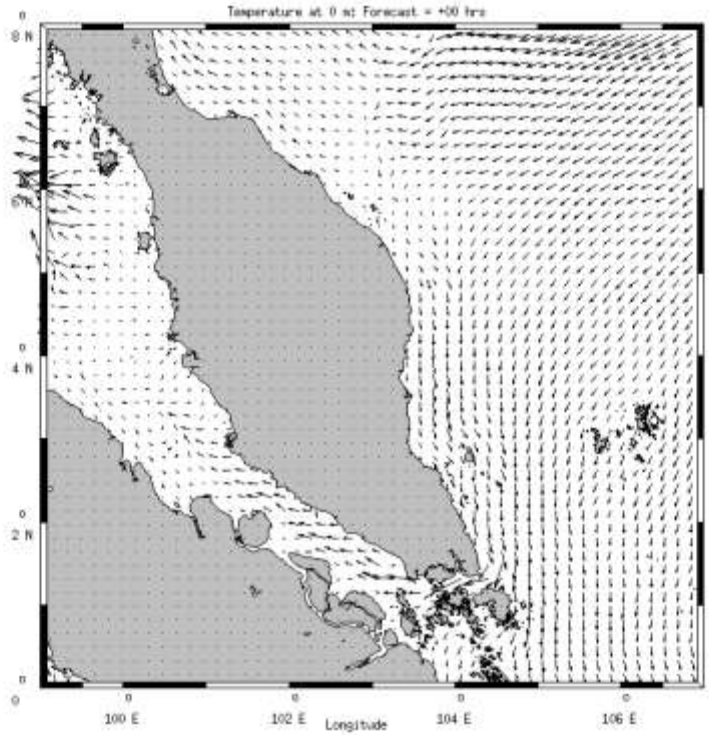


Example: initialized at 00UTC 12/2/2014

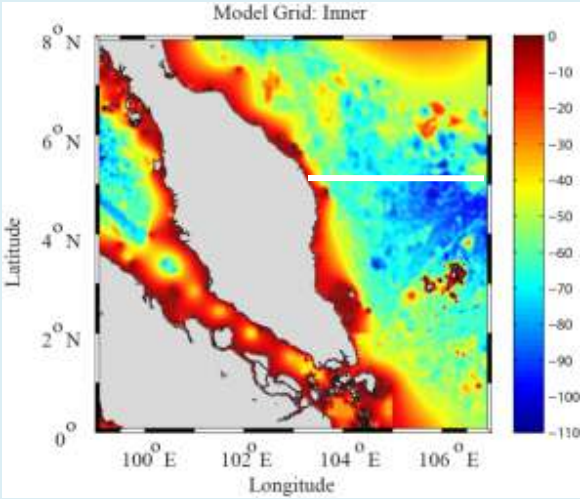
Elevation



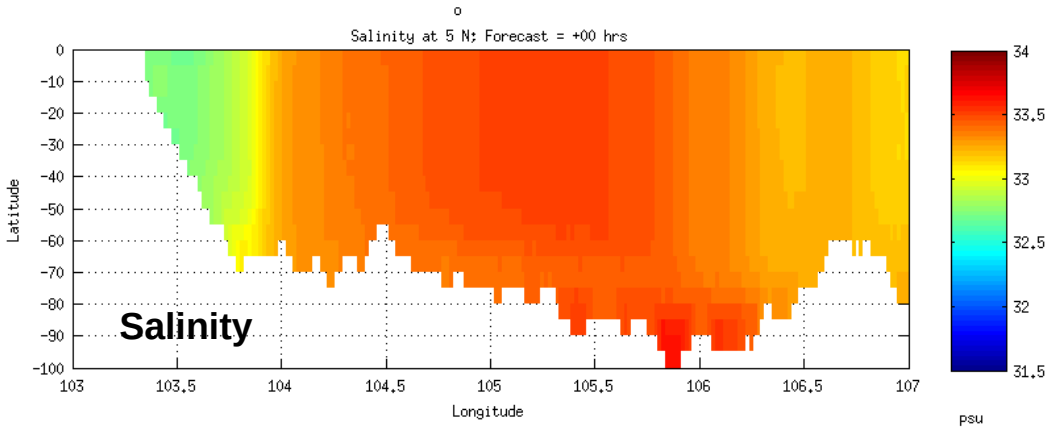
Surface current

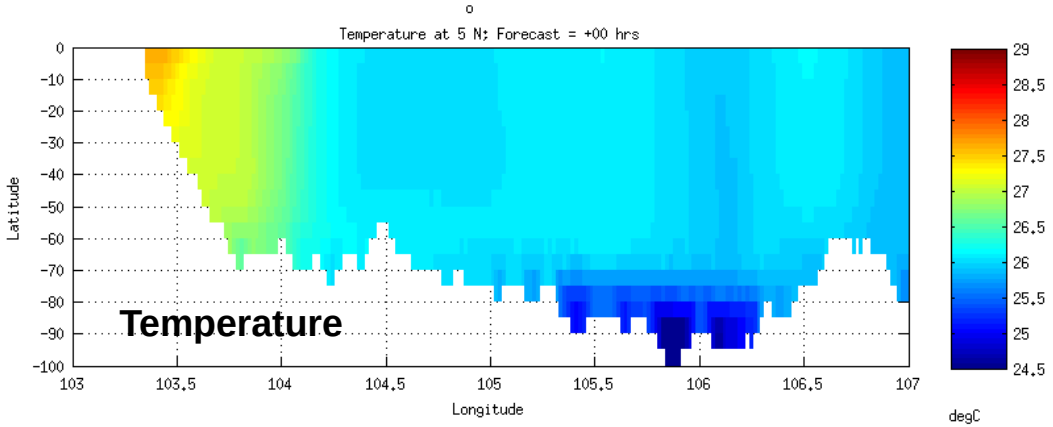


e.g. Vertical profile of density at 5°N, 103-107°E

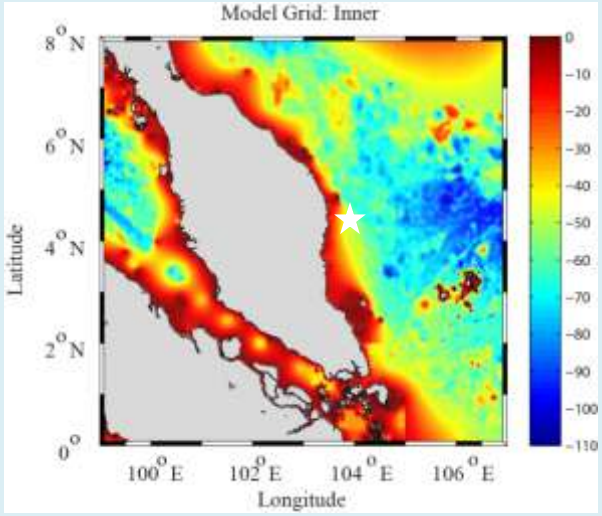


Example: initialized at 00UTC 12/2/2014

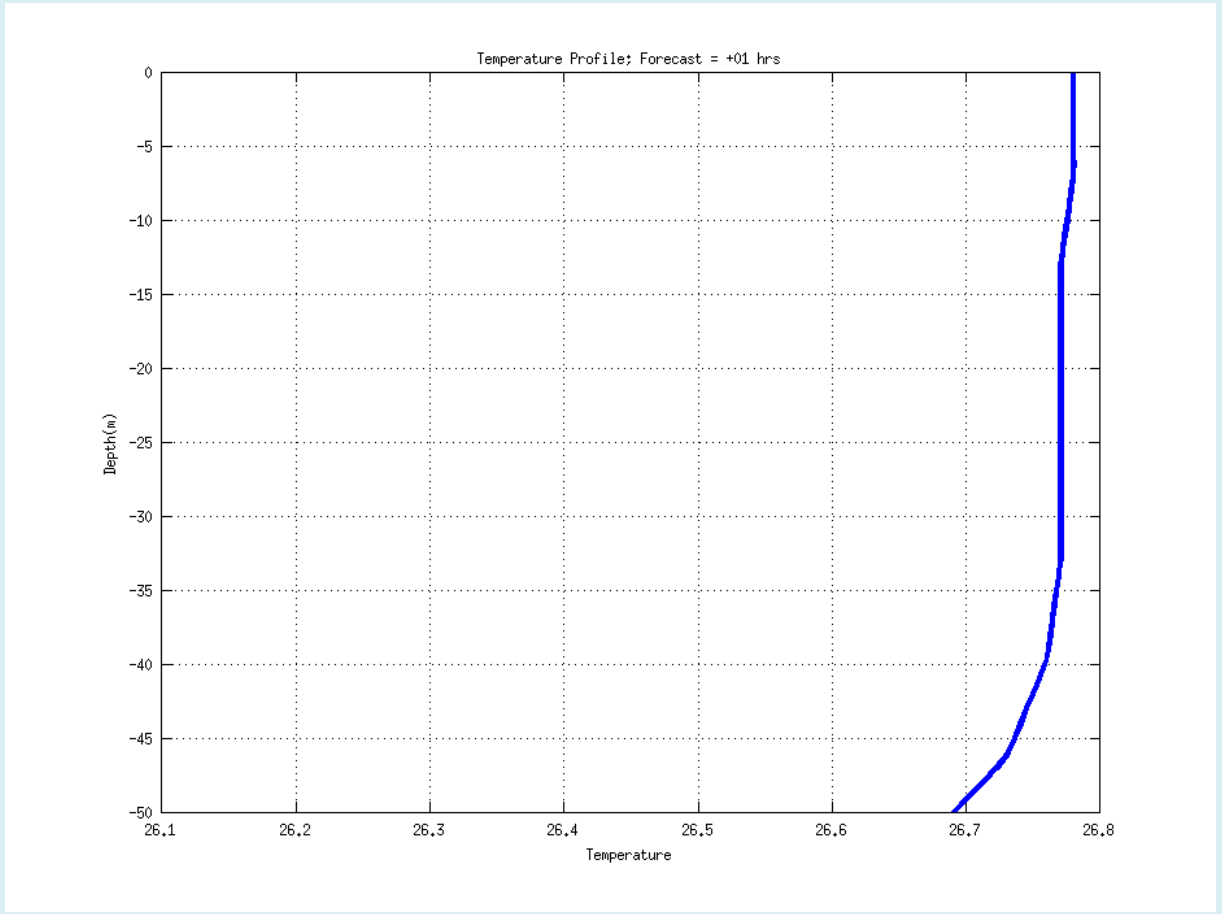




Temperature profile at 4.7°N, 104°E



Example: initialized at 00UTC 12/2/2014



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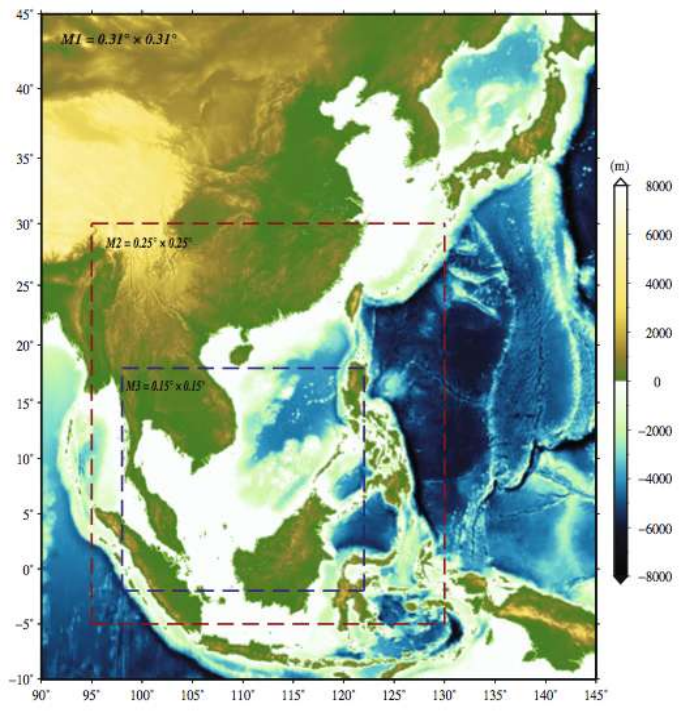
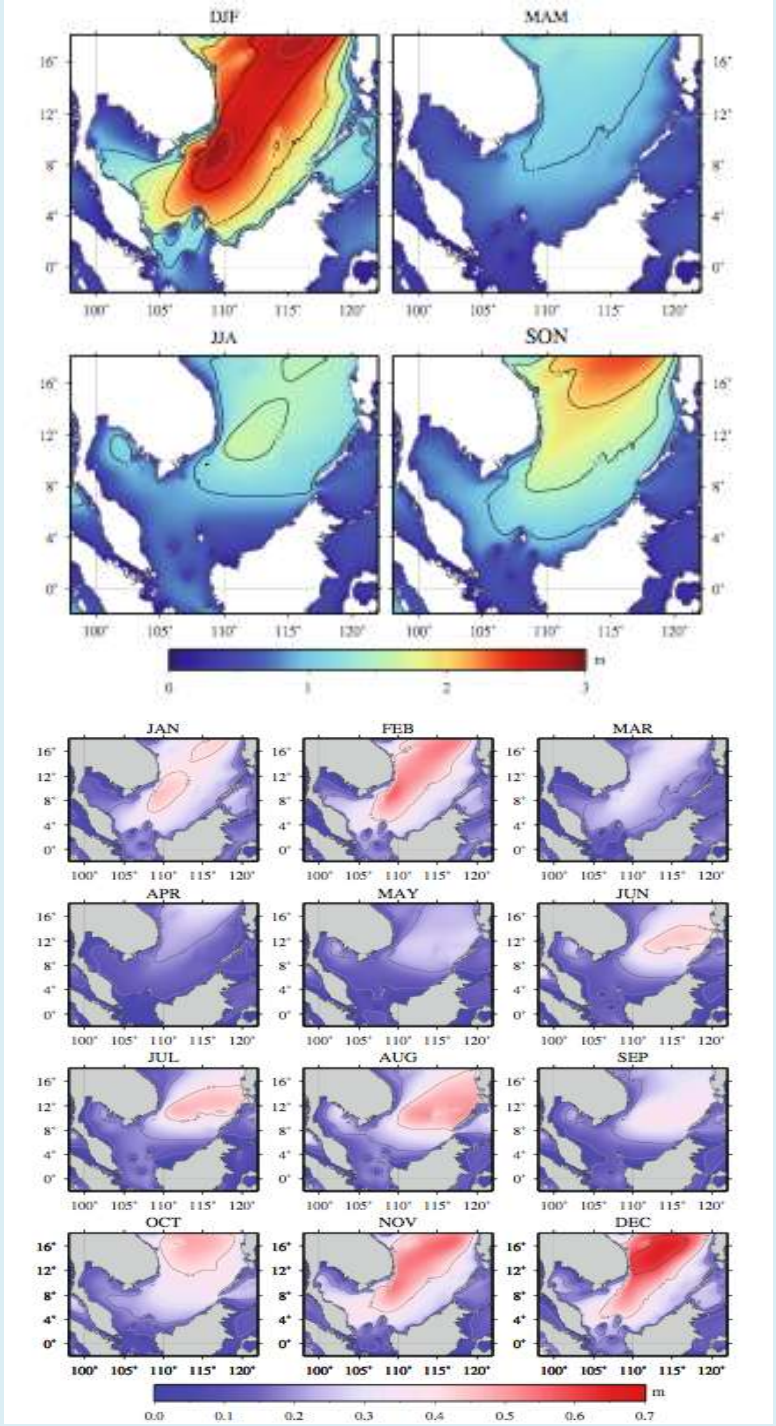
Wave climate simulation for southern region of the South China Sea

Ali Mirzaei · Fredolin Tangang · Liew Juneng · Muzneena Ahmad Mustapha · Mohd Lokman Husain · Mohd Fadzil Akhir



Model: Wave Model WW3



Renewable Energy 80 (2015) 454–470

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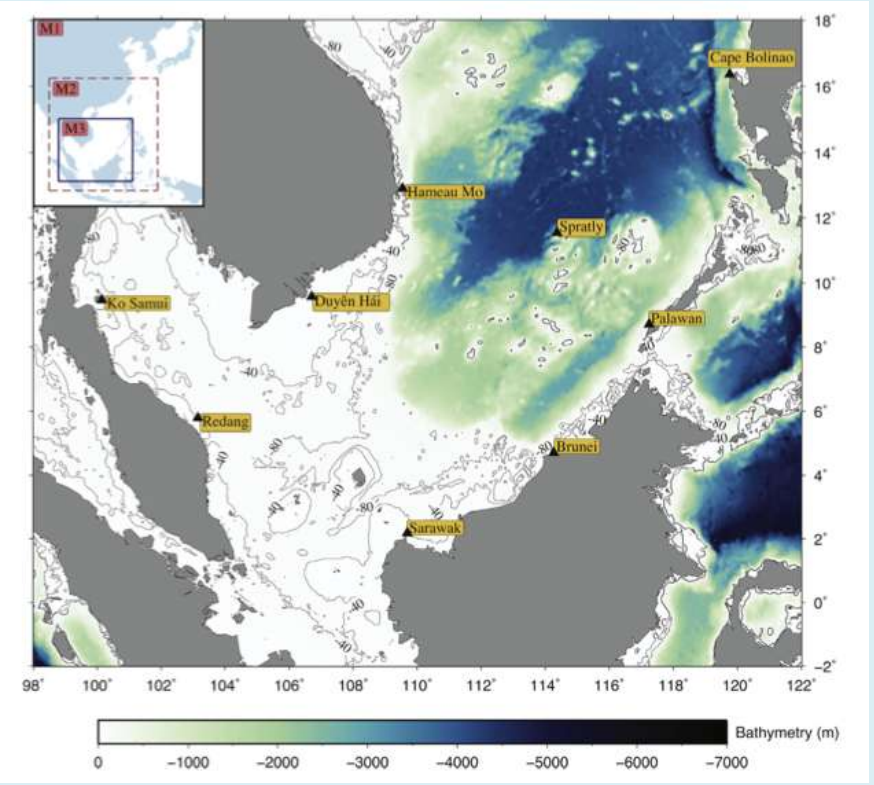
Wave energy potential assessment in the central and southern regions of the South China Sea

Ali Mirzaei, Fredolin Tangang*, Liew Juneng

School of Environmental and Natural Resource Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia



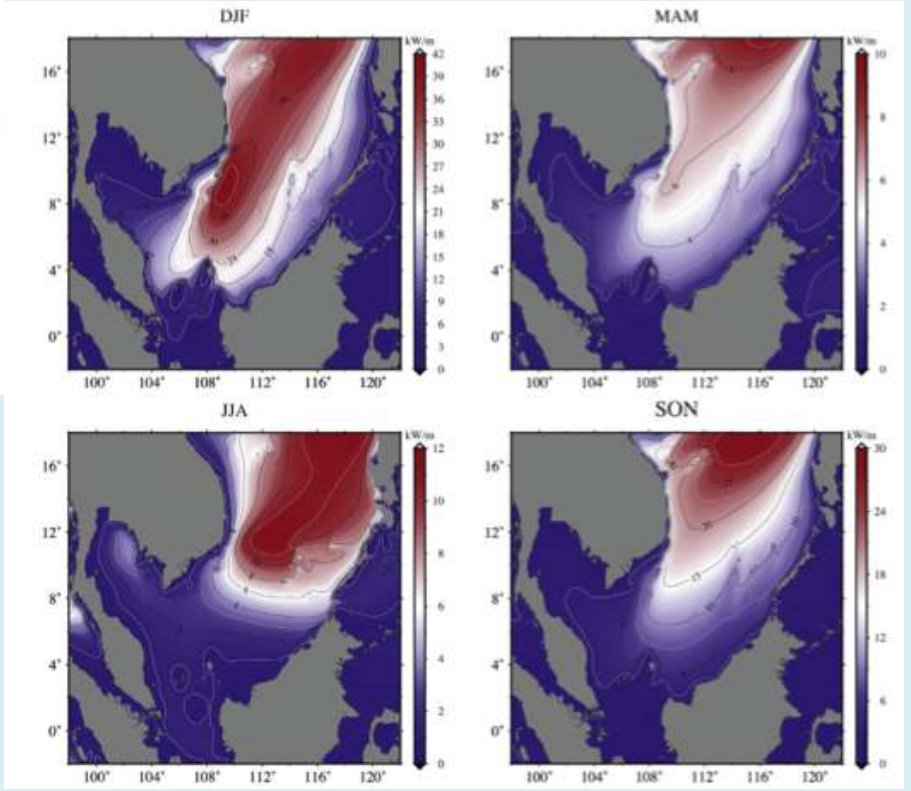


Table 3
Estimated average electric power (in kW) in selected sites corresponding to four different WEC devices.

Sites	WEC devices							
	Pelamis		Aqua Buoy		Wave Dragon		Oyster	
	Annual	Sep–Feb	Annual	Sep–Feb	Annual	Sep–Feb	Annual	Sep–Feb
Cape Bolinao	38.5	57.4	10.9	16.9	480.8	647.8	46.1	67.9
Palawan	71.3	95.3	20.9	29.3	712.4	935.4	74.0	99.9
Spratly	142.4	196.9	43.0	63.4	1211	1680	120.8	158.5
Hermeau Mo	96.1	162.4	31.6	55.6	941.9	1571	86.9	136.8
Duyên Hải	21.7	36.0	4.4	7.5	333.1	441.4	36.4	53.9
Brunei	38.6	57.4	10.9	16.9	481.7	647.8	46.2	67.9
Sarawak	34.0	59.0	11.0	18.8	464.6	673.2	39.4	67.4
Redang	31.7	55.6	7.1	12.9	364.5	513.9	35.4	60.1
Ko Samui	6.0	10.4	0.9	7.5	206.0	241.0	13.6	20.4

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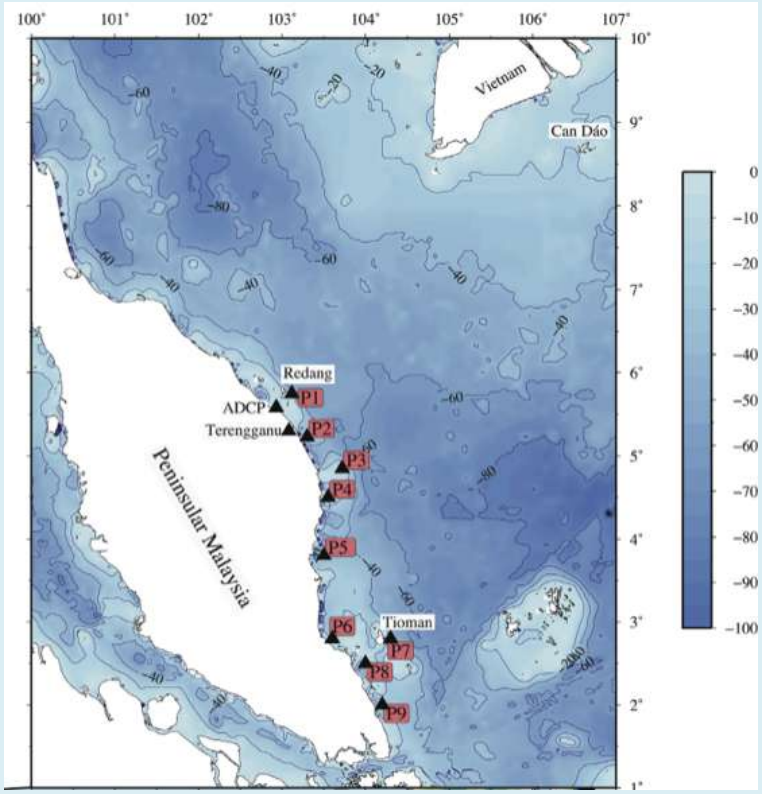
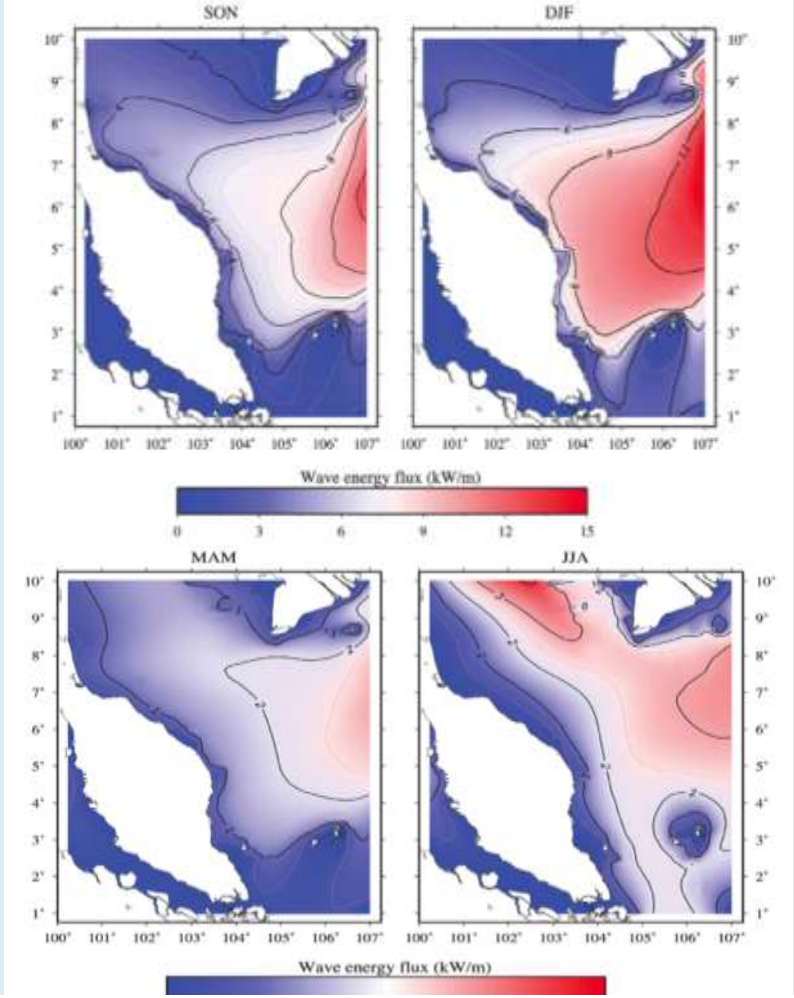
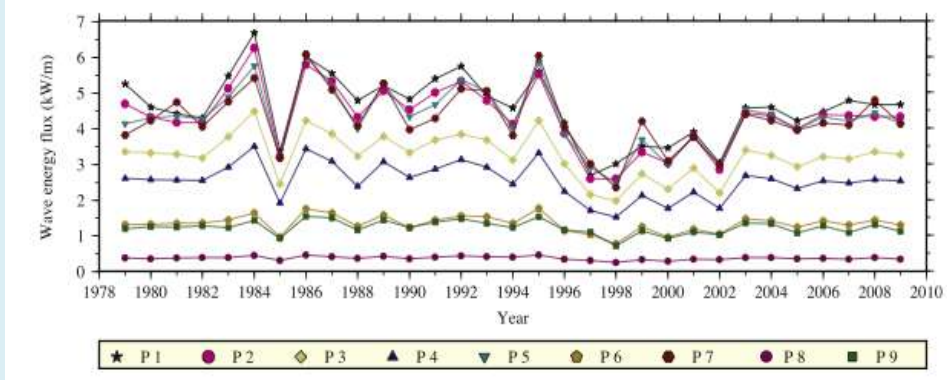
Wave energy potential along the east coast of Peninsular Malaysia

Ali Mirzaei, Fredolin Tangang*, Liew Juneng

School of Environmental and Natural Resource Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia







Thank You