

# Progress on the Environmental Simulation and Informatorium in Thailand

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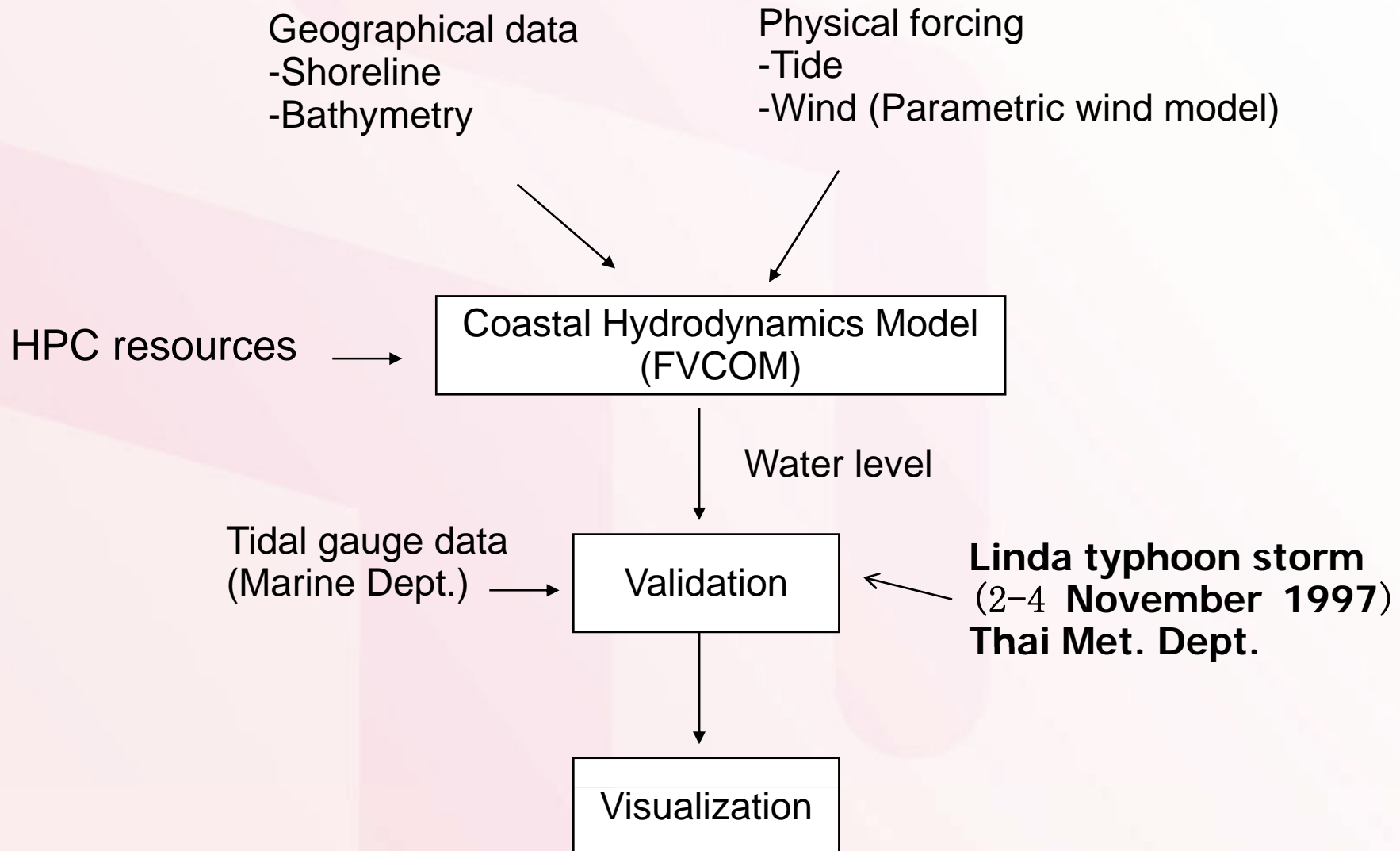
# PART I

## Simulation of Coastal Change in the Gulf of Thailand: Storm Surge

The figure is a map of Southeast Asia, including Myanmar, Thailand, Laos, Vietnam, Cambodia, Laos, and parts of China, India, and the Philippines. It displays a network of connections between various locations, represented by colored dots (blue, red, yellow, green) and lines. The connections are labeled with names in blue text, such as HARBET, GAY, LINDA, NOUL, MAYSAR, NURI, HAGUPIT, JANGMI, and DOLPHIN. The map includes a scale bar (0 to 100 km) and a Google logo in the bottom left corner. The map data is attributed to ©2009 Kingway, Tele Atlas, AND, NFGIS, MapIT, Europa Technologies - Terms of Use.



# Methodology



# Parametric wind model

$$V(R) = \sqrt{\frac{B(P_a - P_c)}{\rho} \left(\frac{RMW}{R}\right)^B \exp\left[-\left(\frac{RMW}{R}\right)^B\right] + \frac{R^2 f^2}{4} - \frac{Rf}{2}}$$

where  $P_a$  is the ambient pressure,  $P_c$  is the storm central pressure,  $B$  is the coefficient of storm

$RMW$  is the radius of maximum wind speed,  $R$  is radial distance from the center of the storm,  $f$  is the Coriolis parameter and  $\rho$  is air density.

(Holland's model, 1998)

# Coastal ocean hydrodynamic model

The governing equations used in the present study are the Boussinesq, hydrostatic approximations of the primitive equations of mass and (water) momentum conservation which can be written in Cartesian coordinates as below:

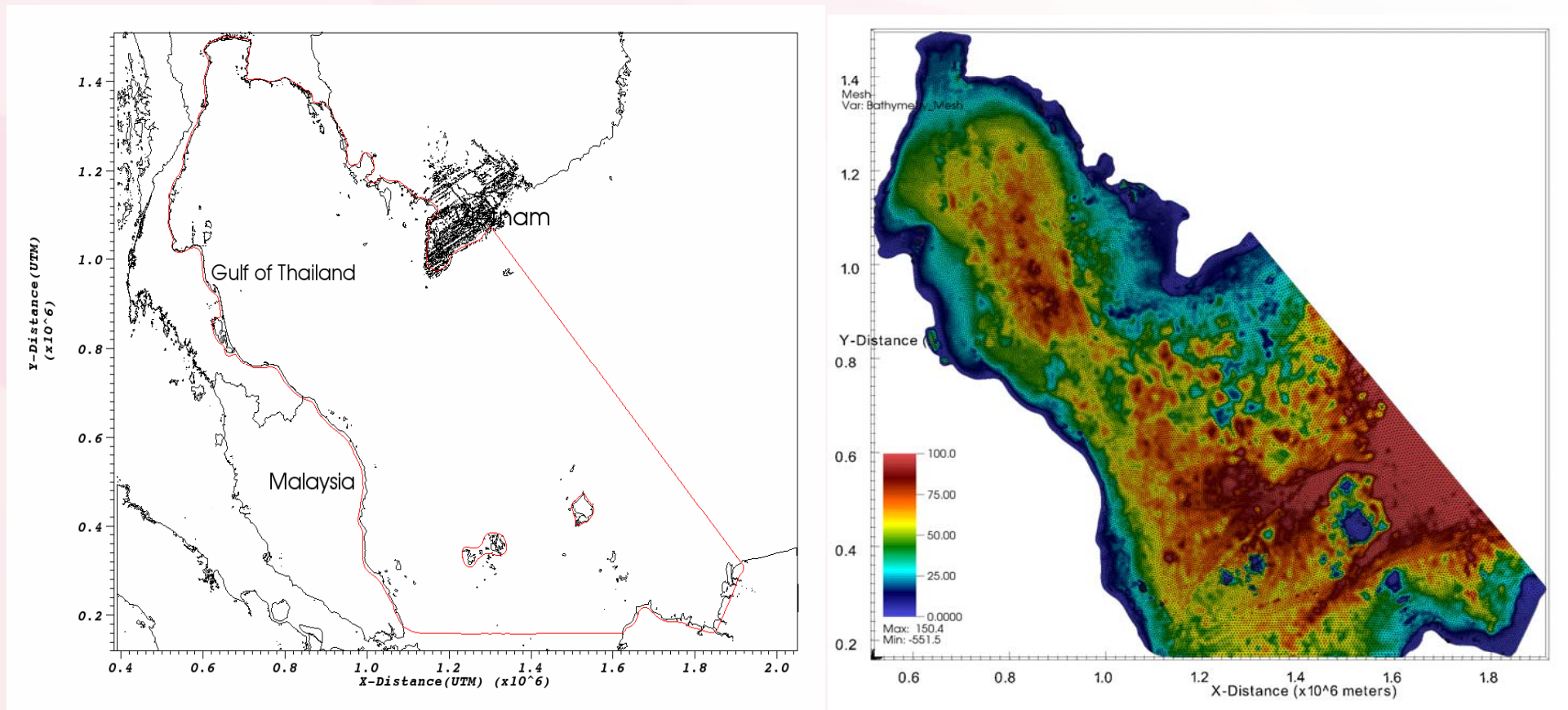
$$\frac{\partial u}{\partial t} + u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y} - fv = -\frac{1}{\rho_0} \frac{\partial p_a}{\partial x} - g \frac{\partial \eta}{\partial x} + \frac{\partial}{\partial x} \left( N_h \frac{\partial u}{\partial x} \right) + \frac{\partial}{\partial y} \left( N_h \frac{\partial u}{\partial y} \right) + \frac{\tau_{sx} - \tau_{bx}}{\rho_0 (h + \eta)}$$

$$\frac{\partial v}{\partial t} + u \frac{\partial v}{\partial x} + v \frac{\partial v}{\partial y} + fu = -\frac{1}{\rho_0} \frac{\partial p_a}{\partial y} - g \frac{\partial \eta}{\partial y} + \frac{\partial}{\partial x} \left( N_h \frac{\partial v}{\partial x} \right) + \frac{\partial}{\partial y} \left( N_h \frac{\partial v}{\partial y} \right) + \frac{\tau_{sy} - \tau_{by}}{\rho_0 (h + \eta)}$$

$$\frac{\partial \eta}{\partial t} + \frac{\partial(uh)}{\partial x} + \frac{\partial(vh)}{\partial y} + \frac{\partial(u\eta)}{\partial x} + \frac{\partial(v\eta)}{\partial y} = 0$$

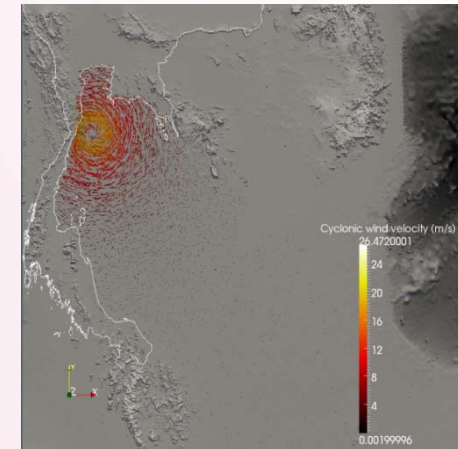
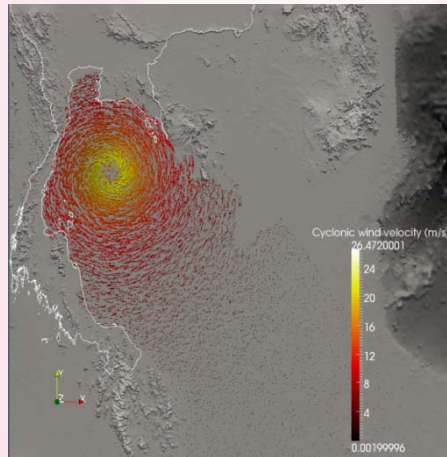
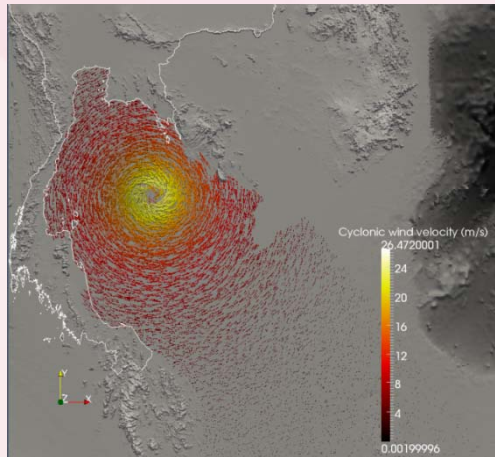
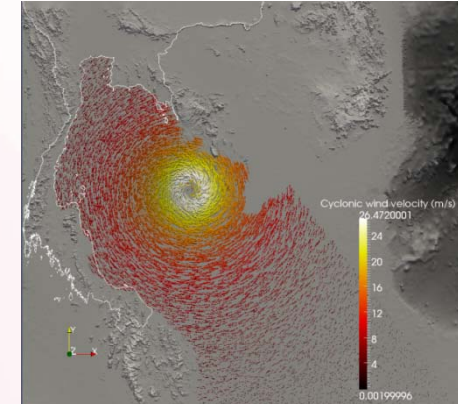
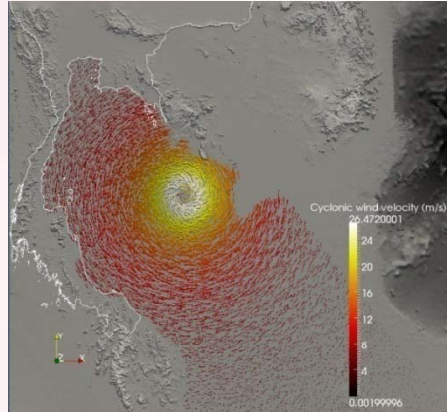
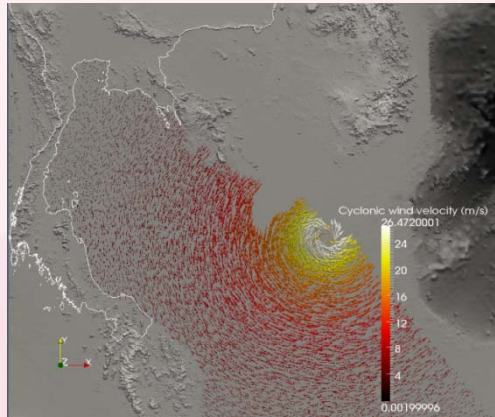


# Computational domain



Computational domain (left) and a view of mesh overlaid bathymetry (right).

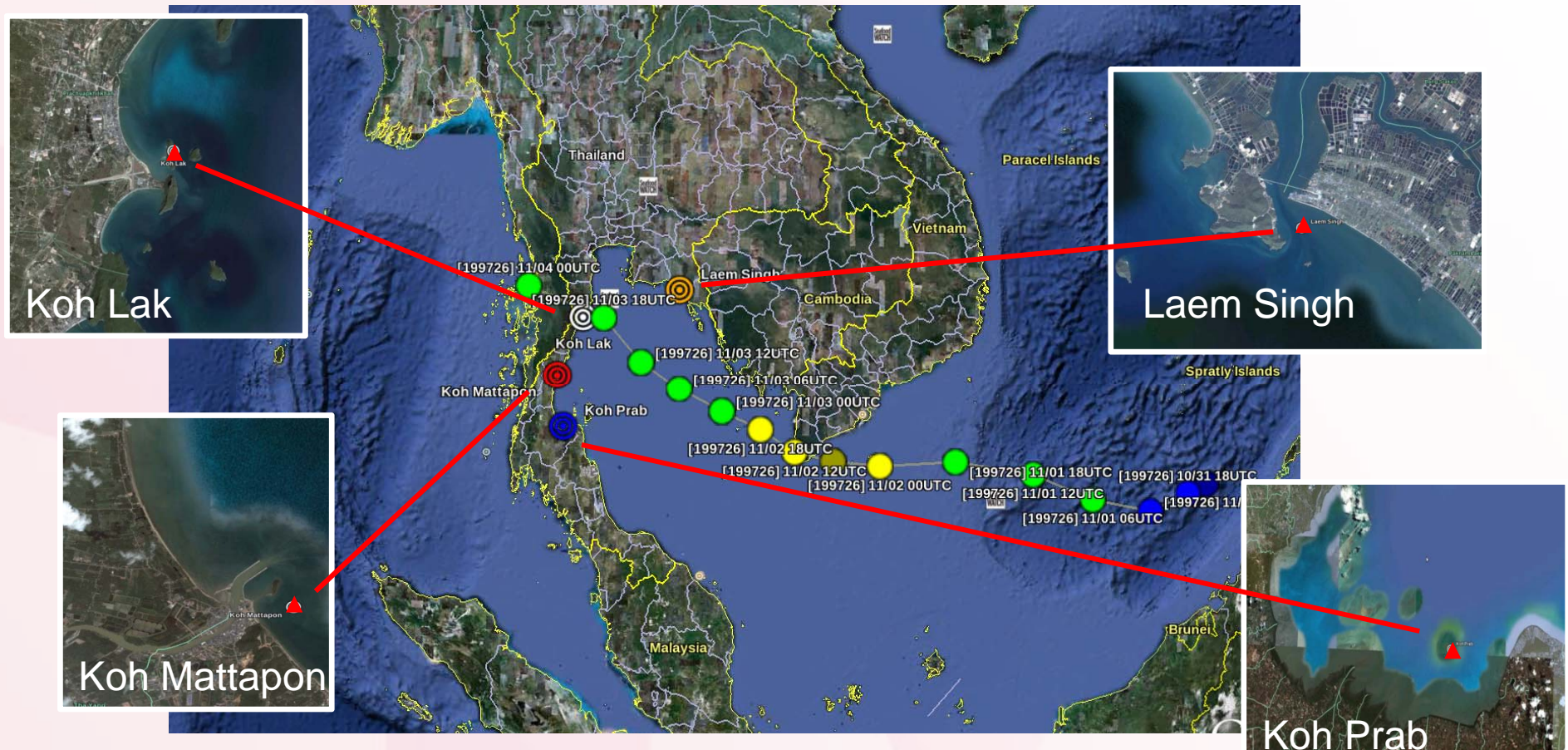
# Cyclonic wind field



- Typhoon Linda wind field from 10:00:00 02/11/97 UTC to 00:00:00 04/11/97 UTC
- Calculated from parametric wind model

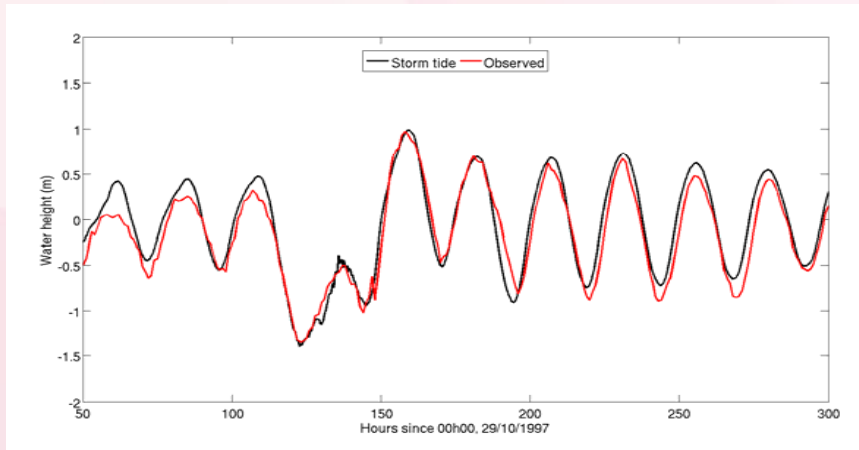


# Model validation: Typhoon Linda

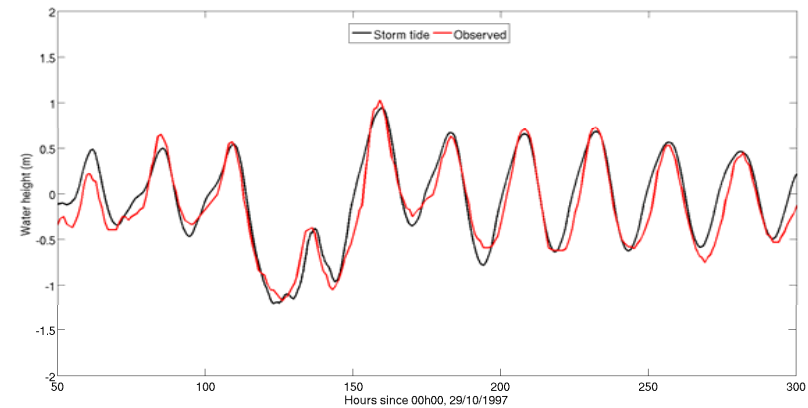


Historical typhoon tracks over the Gulf of Thailand and tidal stations with available sea level data cover the period of the typhoon Linda in 1997

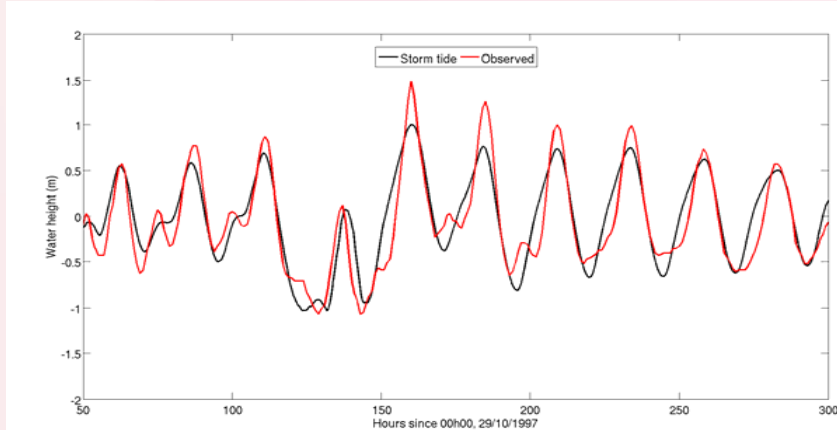
# Validation Results



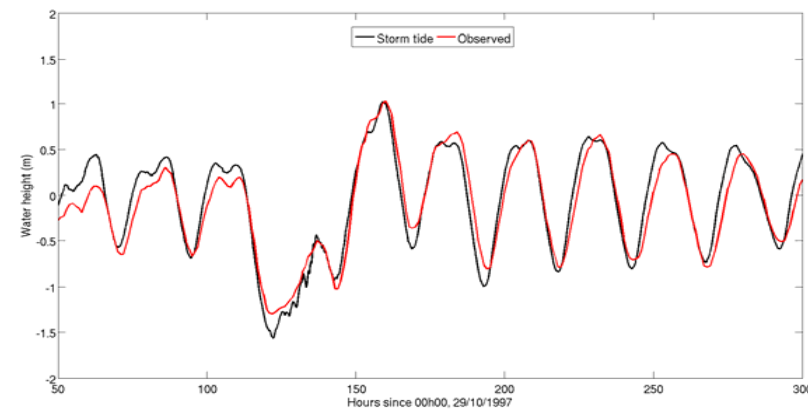
Koh Lak



Koh Matapon

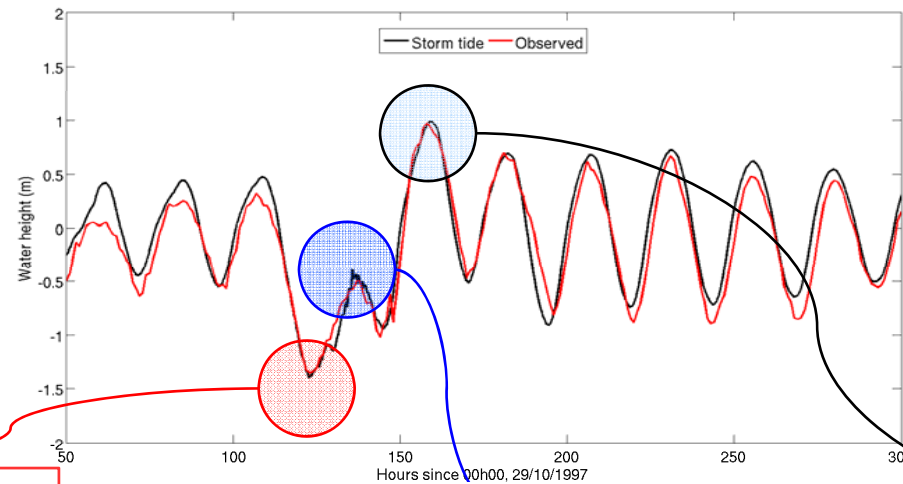


Koh Prab

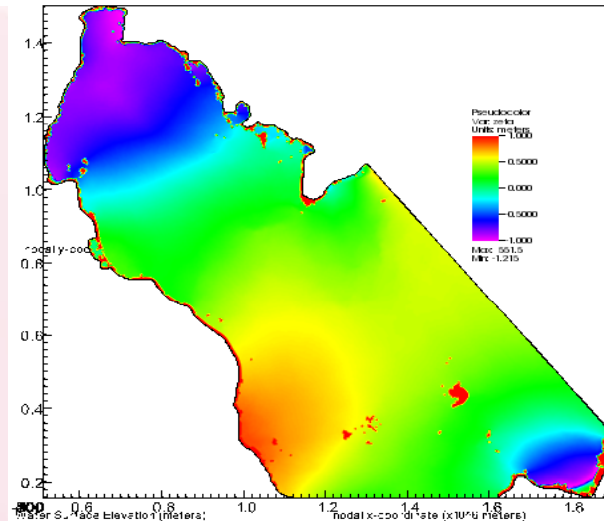
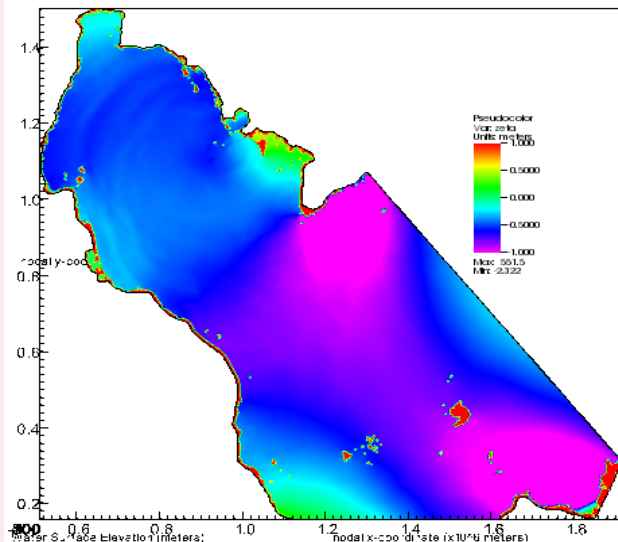


Laem Singh

## Koh Lak

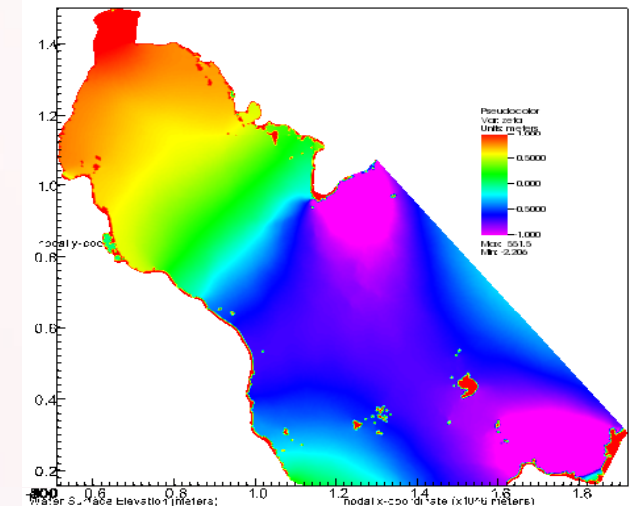


- Interaction process between the storm surge wave VS the tidal wave
- Storm surge wave become stronger
- Amplifying of the negative tide



- Vanishing of the storm surge wave
- Strong circular flow cell
- The circular flow drain the water away from the GOT coast
- Tides become depressed

- Rising of the highest tide period
- Remaining circular flow cell
- Amplifying of the positive tide





# Conclusion

- The characteristics of tropical cyclone are calculated from a parametric wind model
- The validation results for storm tide are quite good agreement to the observation
- The wave interaction process between the storm surge wave and the tidal wave can amplified the negative surge in the Gulf of Thailand (GOT)
- The interactive process of the current induced by typhoon Linda and the tidal wave in the GOT can depresses the water elevation in the high tide period as the circular flow cell still stronger
- The influence of the high tide supported by the remaining current induced by the typhoon can amplify the positive surge of water elevation along the coast of the GOT

## **Part II**

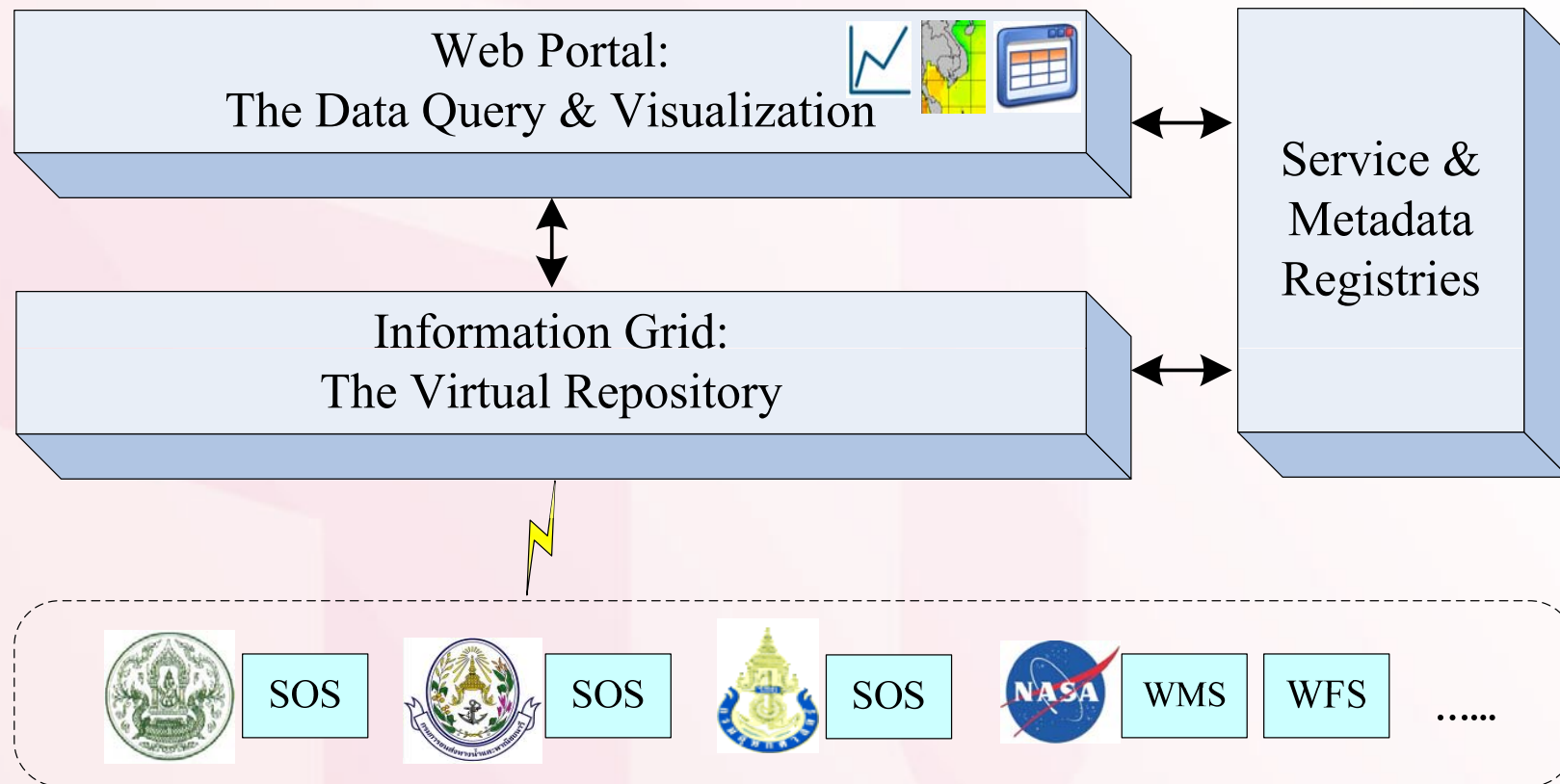
# **Environment Informatorium: The Sustainable Web Portal for Observation Data**



# Objectives

- Data Consumer Perspective:
  - To support the retrieval of the desirable, standard, observation data across geographically distributed repositories with ease
  - To facilitate the application of observation data in a user-oriented manner
- Data Provider Perspective:
  - To promote the publication of the standard observation data on-line without changes in the legacy systems
  - To support the workflow for servicing observation data to public

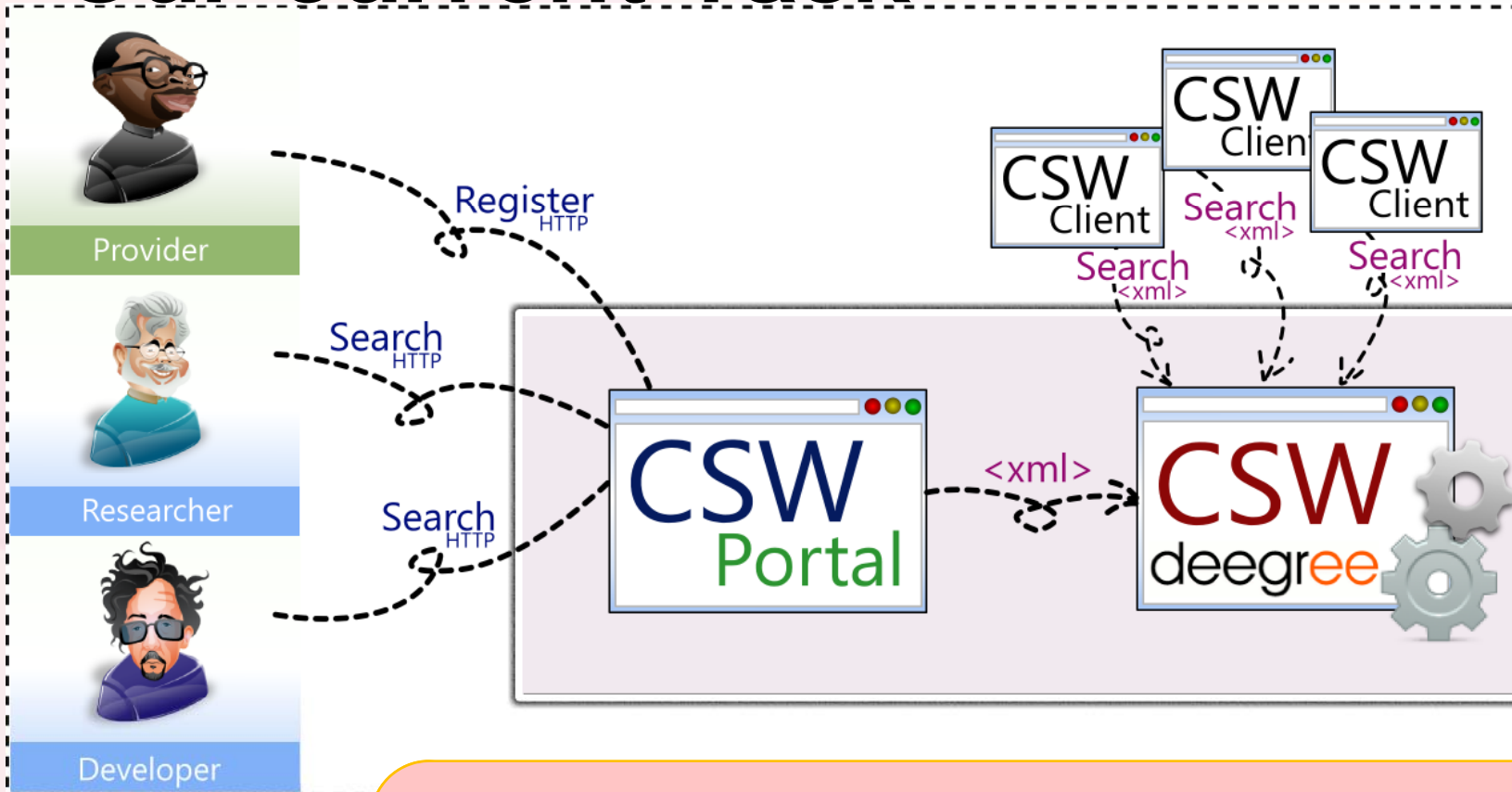
# Environment Informatorium Architecture



# Why Service Registry?

- A number of services are geographically distributed
  - Hard to find the potential ones
  - A place for advertising and discovering services is needed!!!
- Essentially, service registry enable our Environment Informatorium to promote the data utilization and interoperability across distributed services

# Our Current Task



## Features of CSW Portal:

- 1) Access CSW functionalities without understanding of the standard
- 2) Automatically generate CSW Transaction message for service registration
- 3) Search web services via keywords and CQL with ranked hits
- 4) Explore web services through service categories

# Registration

Environment Informatorium

HOME SEARCH

Powered by NECTEC LSR

Account login

Menu

- Home
- Register
- Search
- Contact

Link

Register Service

CSW Registry

URL :	<input type="text" value="http://igrid1.lsr.nectec.or.th/iGridSOS/sos"/>
Service Type :	<input type="text" value="SOS"/>
Language :	<input type="text" value="Thai"/>
<input type="button" value="Continue"/>	


Category

Detail


Home | Register | Search | Contact



# Registration



Environment Informatorium



Powered by  
**NECTEC**  
a member of NSTDA

[HOME](#)   [SEARCH](#)

[Account login](#)

[Menu](#)

- Home
- Register
- Search
- Contact

[Link](#)

[Register Service](#)


[CSW Registry](#)

[Category](#)

Category :	ocean:tide
Operations:	GetFeatureOfInterest
Metadata URI :	urn:ogc:def:phenomenon:igrid:1.0.0:tide
Begin Date :	2004-01-01T00:00:00.000+07:00
End Date :	2009-09-30T23:00:00.000+07:00
Category :	ocean:t
Open	tide
Metadata URI :	urn:ogc:def:phenomenon:OGC:1.0.30:waterlevel
Begin Date :	2008-04-01T17:44:00.000+07:00
End Date :	2010-08-26T00:44:15.000+07:00
<a href="#">Continue</a>	

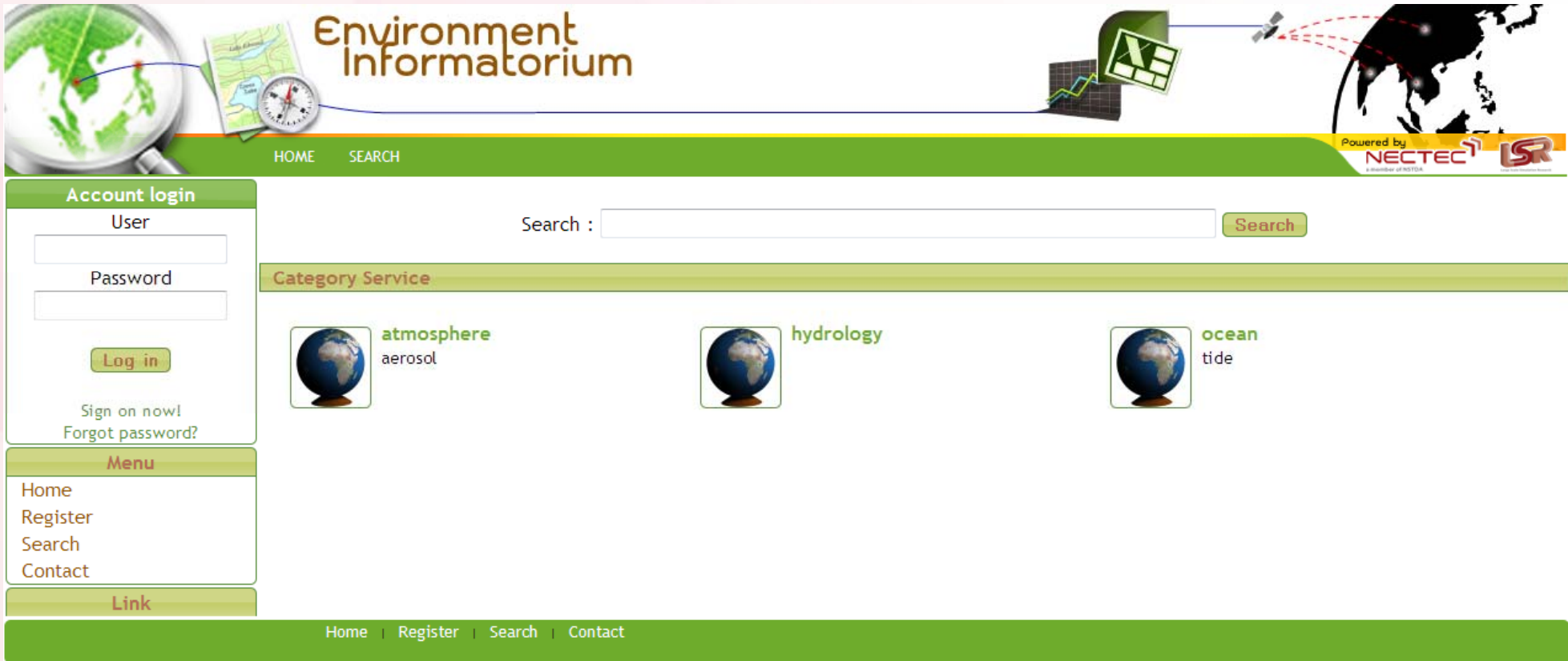
[Detail](#)

# Search by CQL



The screenshot shows the 'Environment Informatorium' website interface. At the top, there is a header with a magnifying glass over a globe, a map, and a compass. The title 'Environment Informatorium' is prominently displayed. Below the header, there is a navigation bar with 'HOME' and 'SEARCH' links. On the right side of the header, there is a logo for 'Powered by NECTEC' and 'LSR'. The main content area is divided into two columns. The left column contains a sidebar with 'Account login', 'Menu' (Home, Register, Search, Contact), and 'Link'. The right column is titled 'Result' and contains a search bar with the text 'Search : keyword="sos"' and a 'Search' button. Below the search bar, there are two search results, each featuring the 'GEOGrid' logo and a title: 'Tide [SOS:20080401-20100826 N:3.3 S:1.1 E:4.4 W:2.1]' and 'Water level [SOS:20080401-20080401 N:3.3 S:1.1 E:4.4 W:2.2]'. Both results are labeled 'Information Grid SOS'. At the bottom of the page, there is a green footer bar with the text 'Home | Register | Search | Contact'.

# Browse by Category



The image shows a screenshot of the 'Environment Informatorium' website. The header features a banner with a globe, a map, a compass, and a satellite, with the text 'Environment Informatorium' in a stylized font. Below the banner is a green navigation bar with 'HOME' and 'SEARCH' links. On the right side of the banner, it says 'Powered by NECTEC a member of NSTDA' with the LSR logo.

On the left side, there is a 'Account login' section with fields for 'User' and 'Password', a 'Log in' button, and links for 'Sign on now!' and 'Forgot password?'. Below this is a 'Menu' section with links for 'Home', 'Register', 'Search', and 'Contact'. At the bottom left, there is a 'Link' section.

In the center, there is a search bar with the text 'Search : ' and a 'Search' button. Below the search bar is a 'Category Service' section with three categories, each represented by a globe icon and text: 'atmosphere aerosol', 'hydrology', and 'ocean tide'.

At the bottom of the page, there is a green footer bar with the text 'Home | Register | Search | Contact'.

# Browse by Category



The screenshot shows the 'Environment Informatorium' website. The header features a navigation bar with 'HOME' and 'SEARCH' links, and a banner with the title 'Environment Informatorium' and various environmental icons. The main content area is titled 'Home >>> ocean >>> tide'. It displays two data entries, each with a 'GEOGrid' logo and a title: 'Tide [SOS:20080401-20100826 N:3.3 S:1.1 E:4.4 W:2.1]' and 'Water level [SOS:20080401-20080401 N:3.3 S:1.1 E:4.4 W:2.2]'. Both entries are labeled 'Information Grid SOS'. On the left side, there is an 'Account login' section with fields for 'User' and 'Password', a 'Log in' button, and links for 'Sign on now!' and 'Forgot password?'. Below this is a 'Menu' section with links for 'Home', 'Register', 'Search', and 'Contact'. At the bottom, there is a 'Link' section and a footer with the same navigation links: 'Home | Register | Search | Contact'.

# Future Work

- Fulfil Env. Informatorium to be able to
  - access information from services in different standards
  - view information via graph & map
- Collaborate with other organizations to
  - publish information through Env. Informatorium
  - access information from Env. Information



# THANK YOU