RAPID PORT ENHANCEMENT: Port Assessment

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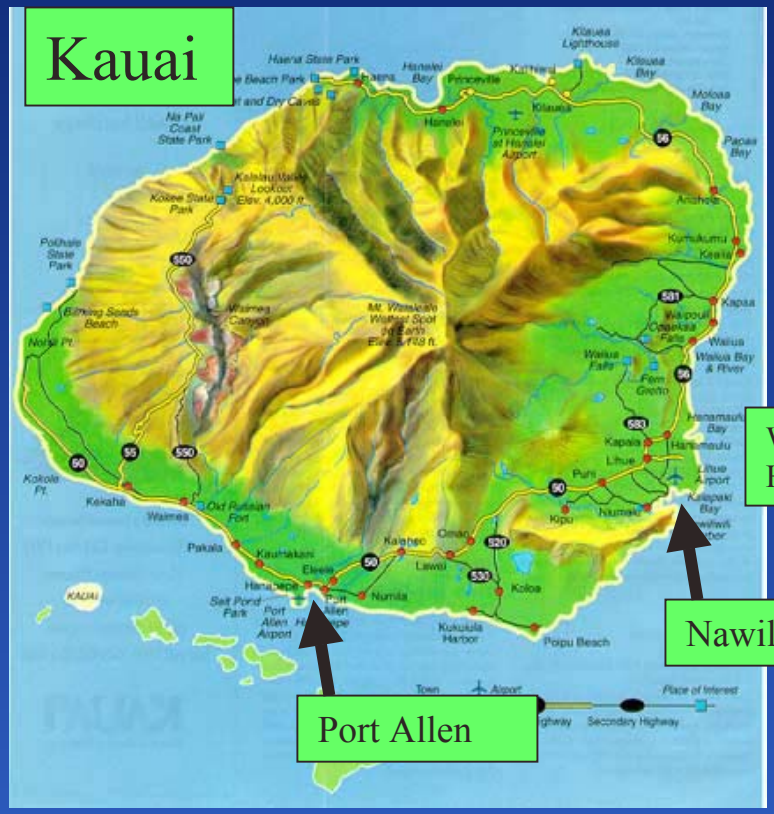
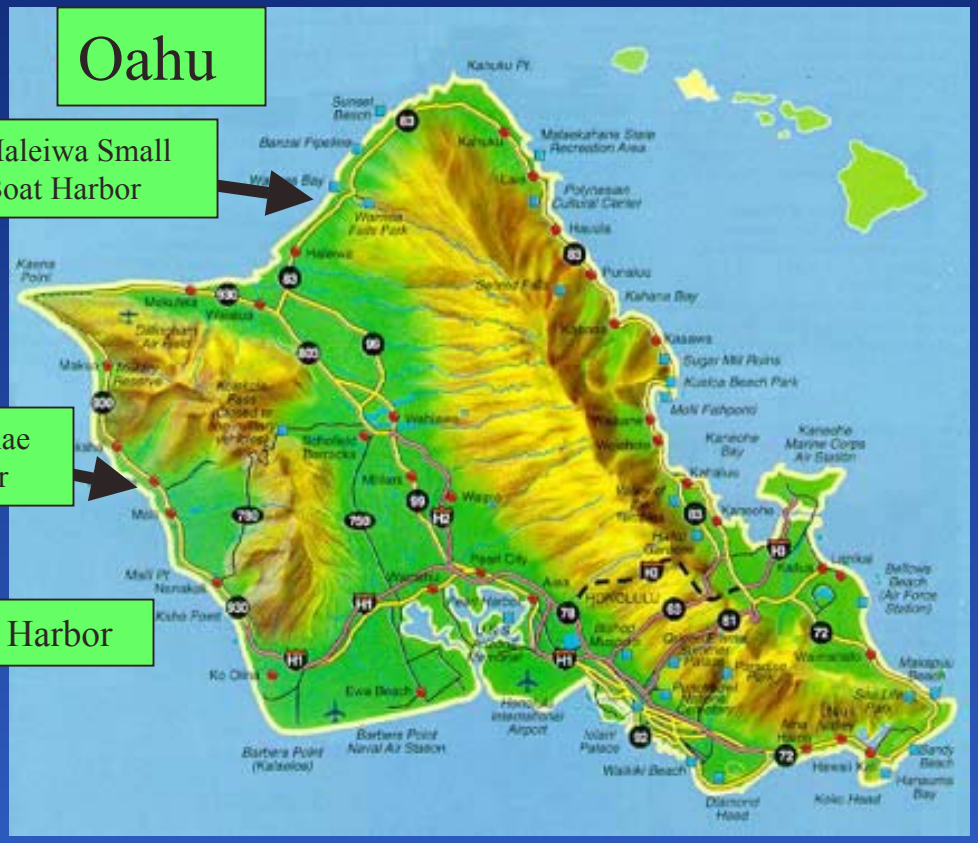
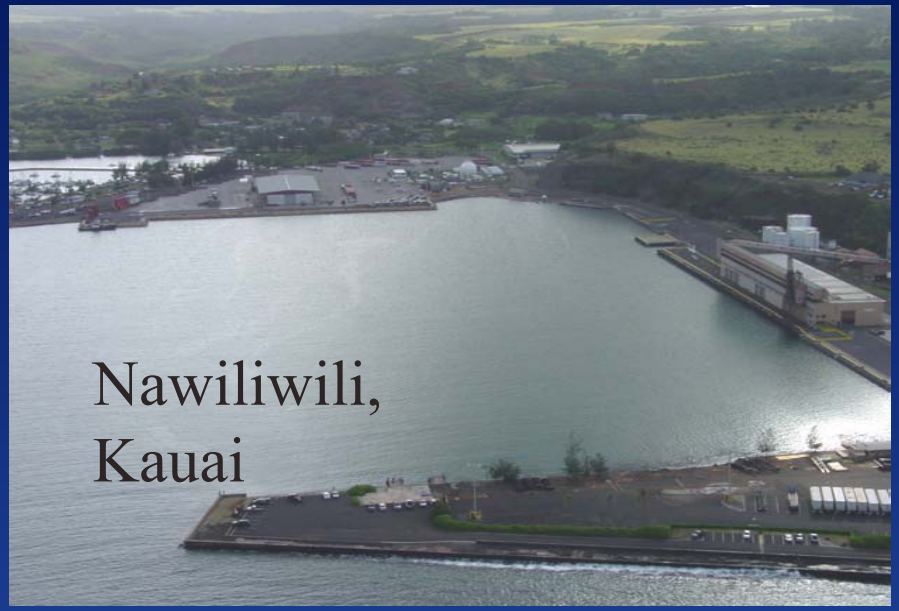
Outline

- *Data/Tools for TSV/HSC Planning*
- *Conventional Ports*
- *Alternative Offload Sites*
  - *Rivers*
  - *"Open" Coasts*

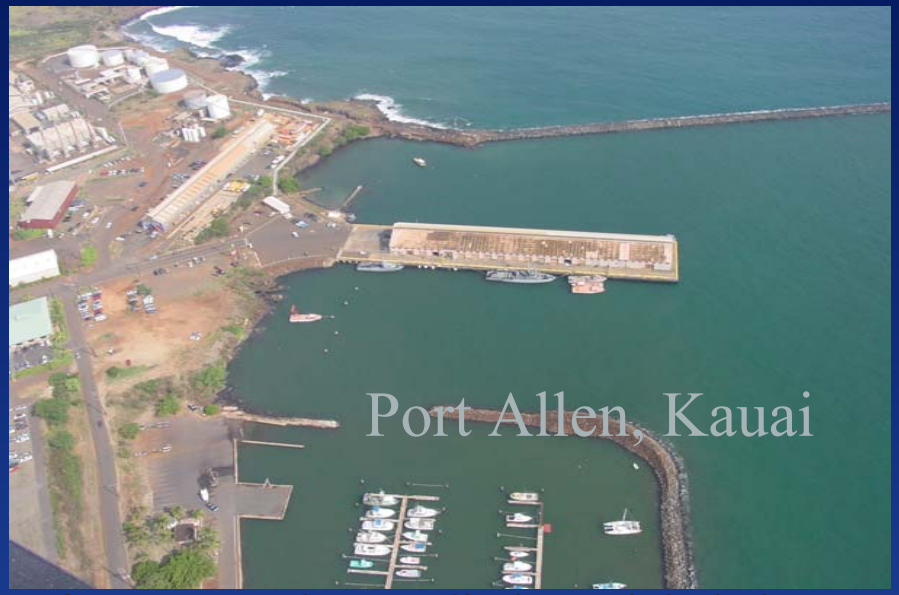
Small Port Assessments in Kauai and Oahu







TSV-compatible as is.



Infrastructure damage limits weight below 25 tons. Some upgrade/modifications required.

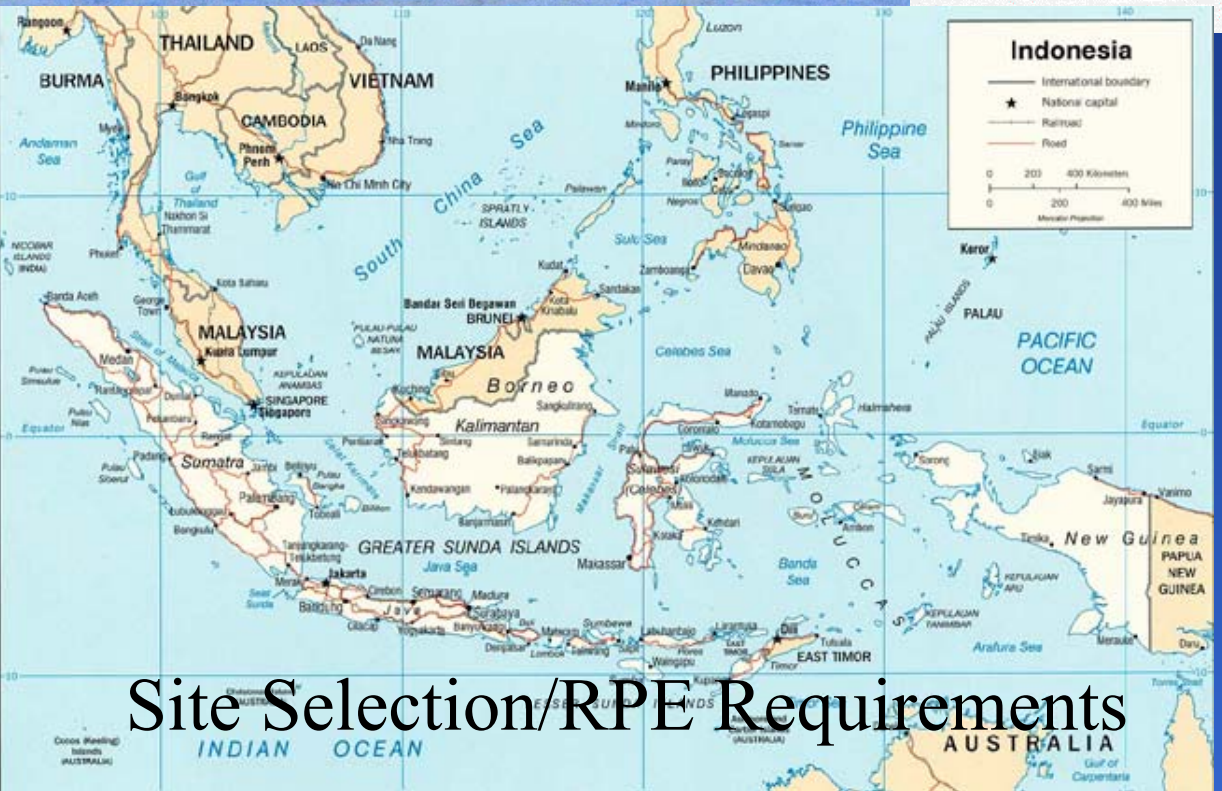
Draft limitations in 70 % of protected area. Some upgrade/modifications required – short causeway extension most likely fix.

Draft limitations in all of protected area. Som upgrade/modifications required – Long causeway & extension of breakwater likely fix

Ship Design Parameters

Prediction of Force Closure Times

Clousure Time in Days: *Stryker Brigade*			
	Case 1	**Case 2**	**Case 3**
Existing	**4.7**	**5.2**	**10.3**
Enhanced	**3.3**	**3.6**	**6.2**



Site Selection/RPE Requirements

Port Characterization

Information is needed for many applications

TOOLS

RPE tool-kit:Quantifies options/impacts of RPE
Simulation tools:quantify throughput processes

Waves Tides & Currents

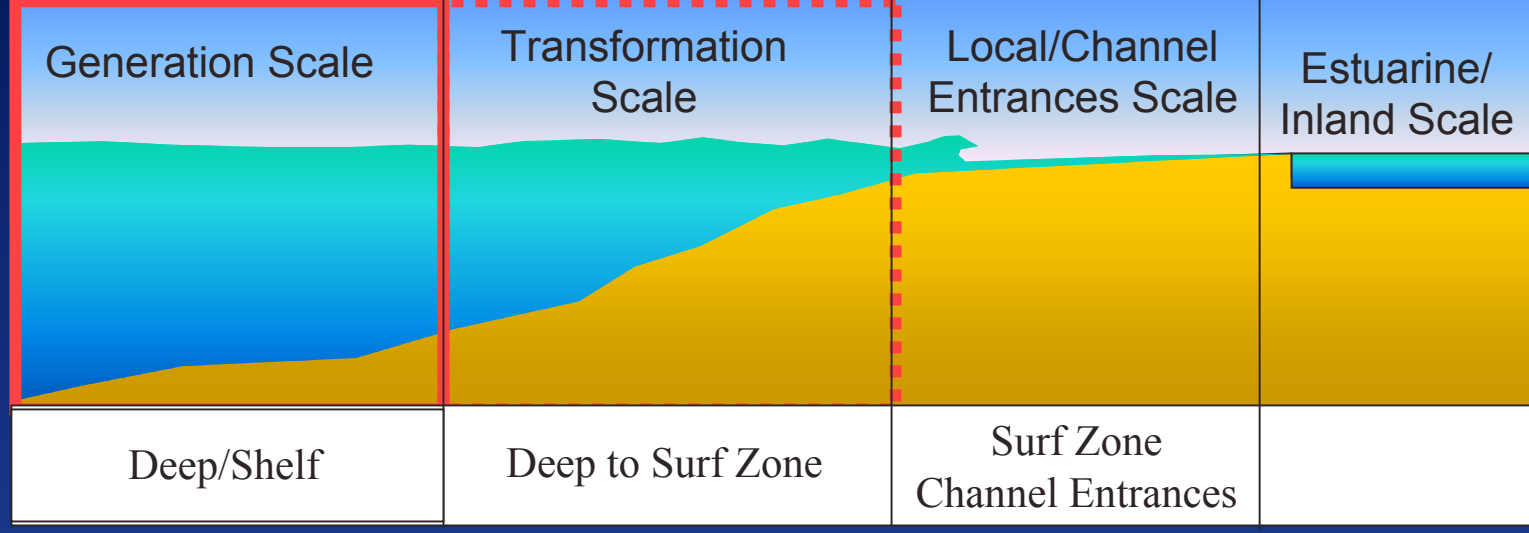
Navigation Characteristics

Infrastructure

Inland Ingress

DATA

Environmental information (waves/tides/currents)
Accurate navigation charts
Enhanced data sets for infrastructure
Information on link to inland transportation system



Characteristic Hydrodynamic Zones

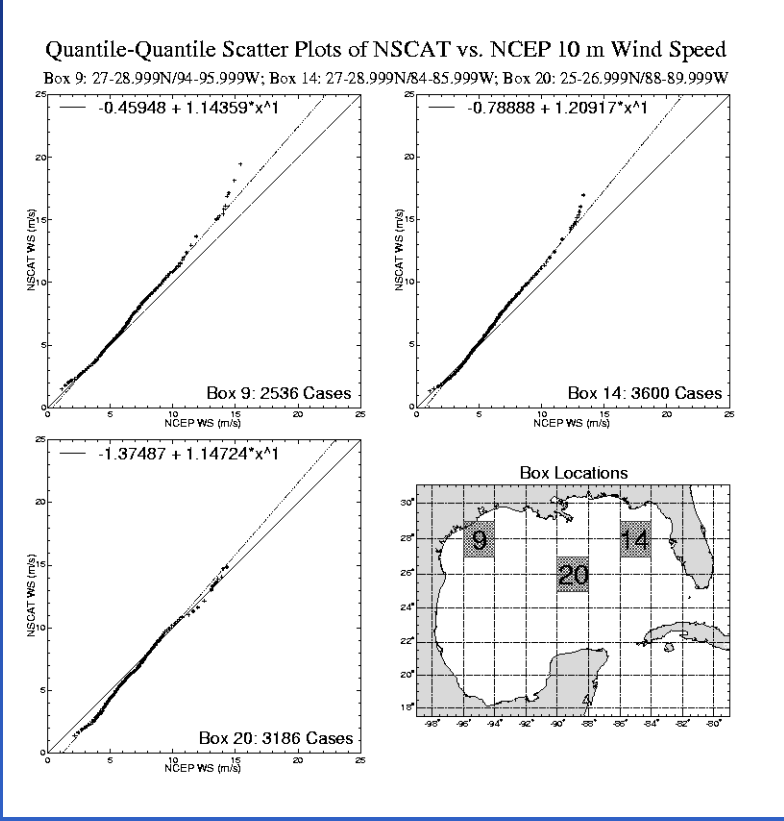
Waves/Tides in Coastal Areas

Donald T. Resio

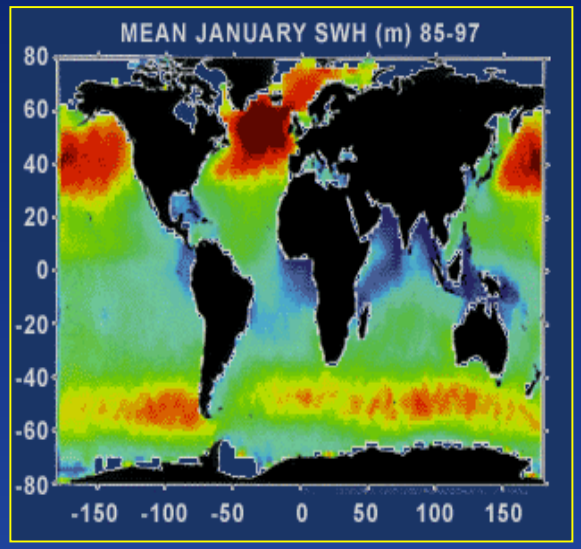
Accurate Global Wave/Tide Estimates for Coastal Operations

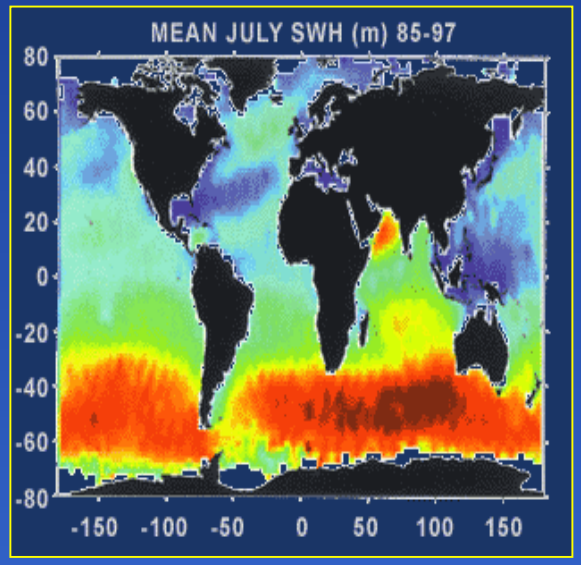
Global Wind Estimates for Coastal Areas

- ***NCEP plus statistical assimilation methodology***
- ***In-house, global database for all satellite wave measurements***
- ***Developed 40-year baseline climatology of wind fields***
- ***Ocean-scale tidal components can be calibrated via satellite***



Satellite Altimetry (A) and Scatterometry (S)





Geosat 1985 - 1989

Surface wind (A), Significant wave height, Sea Level

ERS-1 1991 - 1996

Surface wind (A,S), Significant wave height, Sea Level

ERS-2 1995 - present

Surface wind (A,S), Significant wave height

TOPEX 1992 - present

Surface wind (A,S), Significant wave height, Sea Level

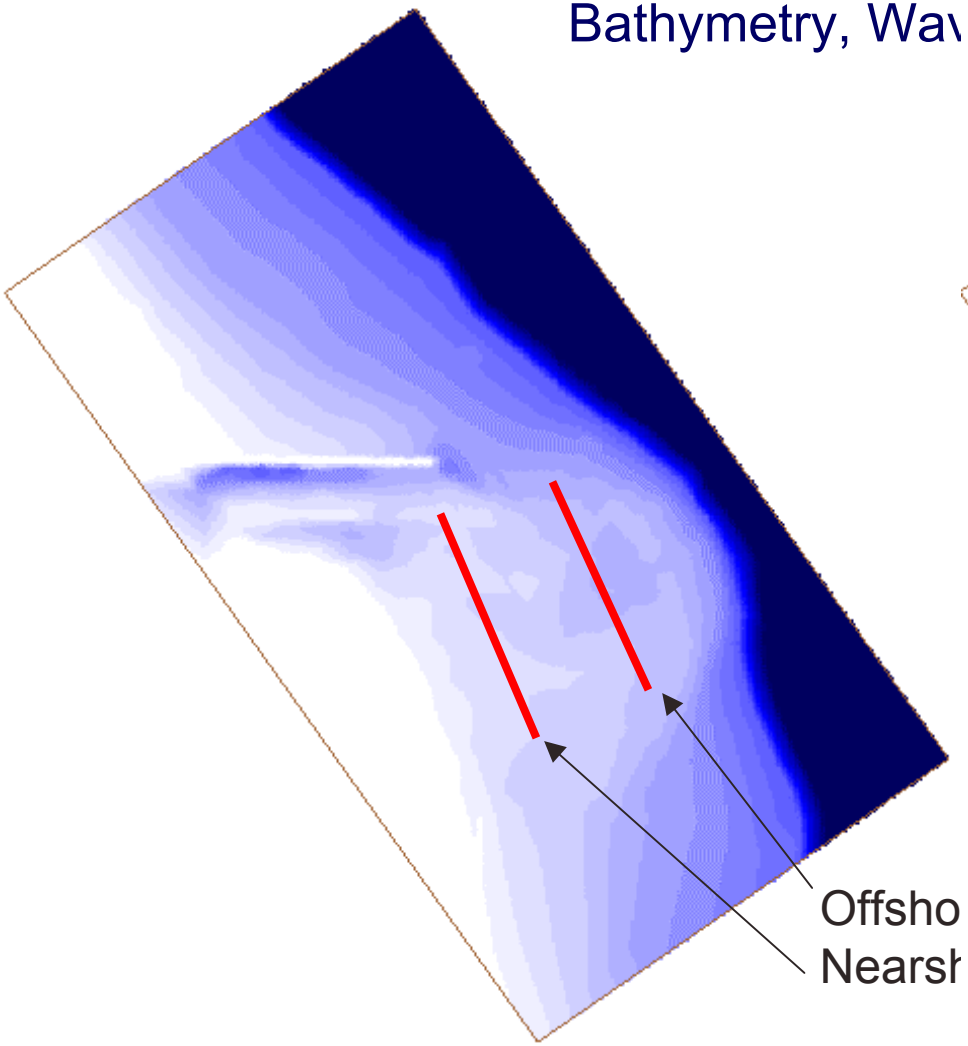
QuikSCAT 1999-present

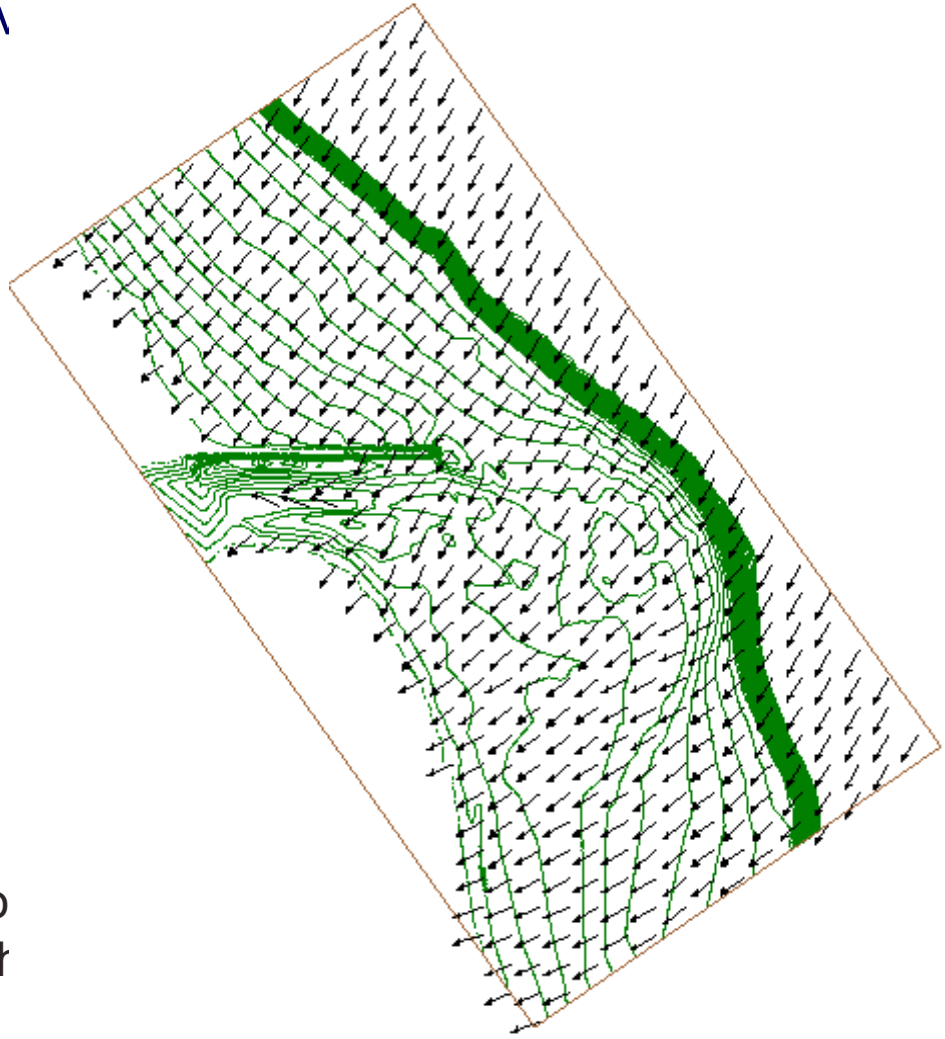
Surface wind (scatterometer mode only)

Waves in Entrance Channels

Ponce de Leon Inlet , FL

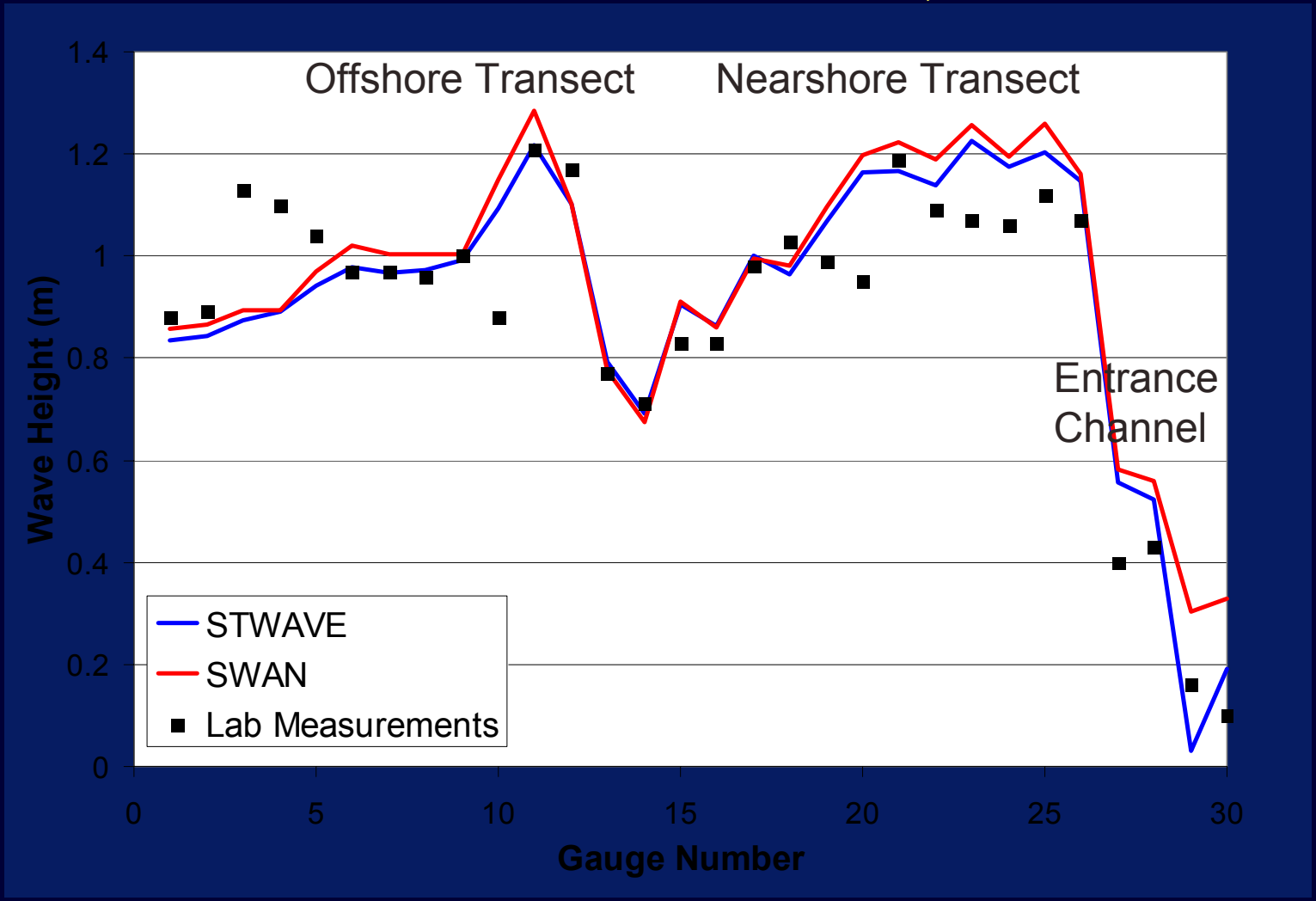
Bathymetry, Wav





Waves in Entrance Channels

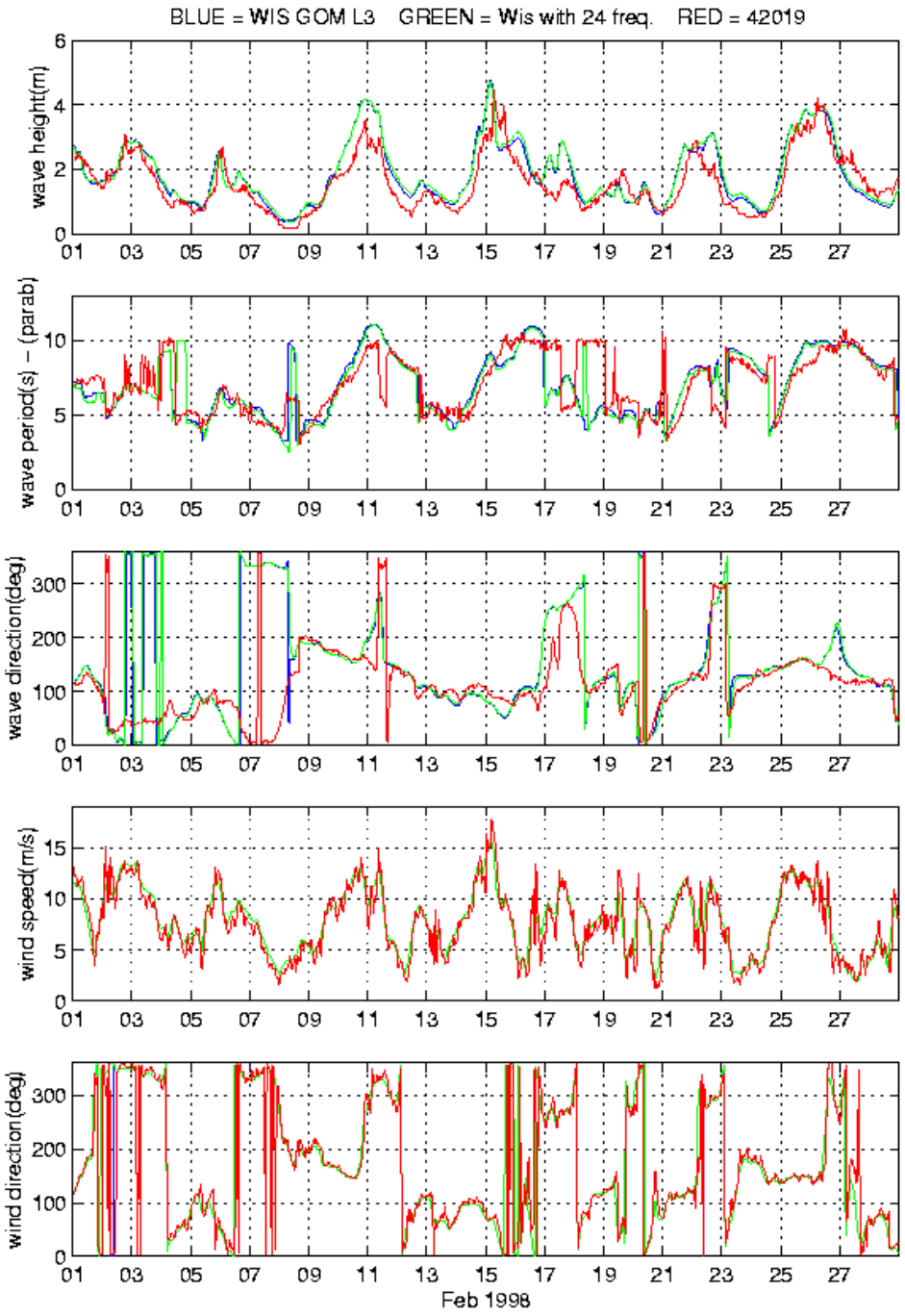
Ponce de Leon Inlet , FL



Typical comparison to measurements using global estimation methodology

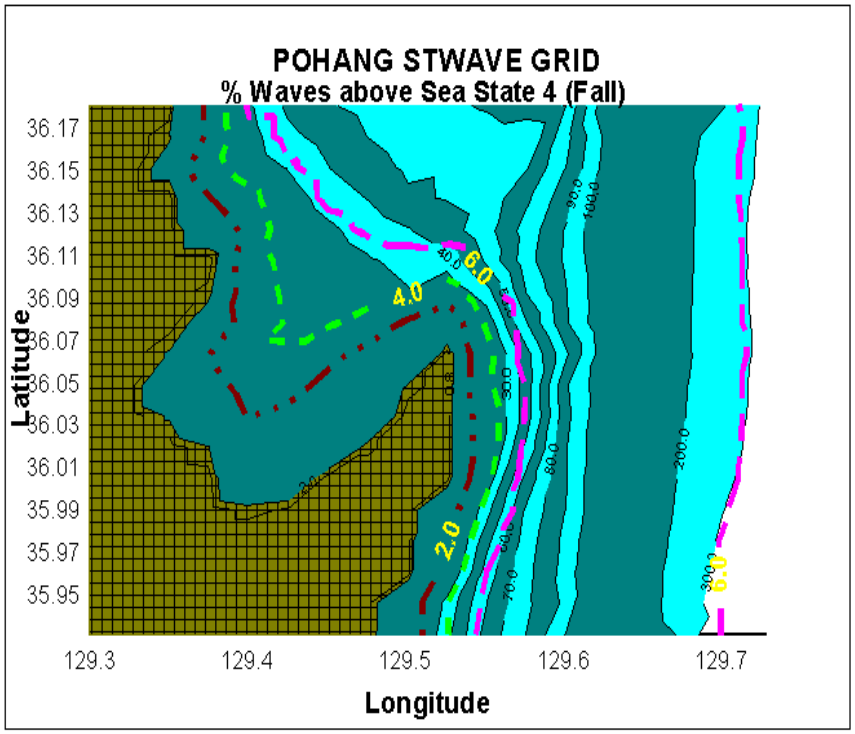
Accuracy is sufficient for Good estimates of H, T, θ

Adequate information for local wind, water level, and wave climates including "local" validation via satellite

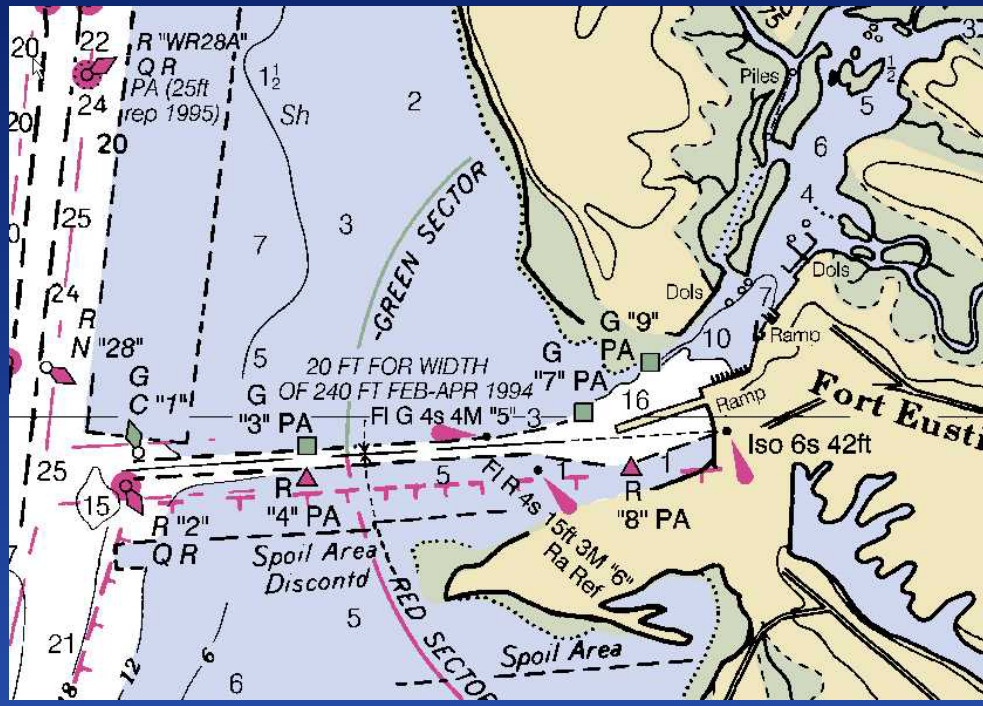


Rapid Generation Littoral Environments RAGLES

- *Results*
  - *RAGLES is capable of generating detailed wind, wave, and water level information*
    - *Many assumptions concerning sheltering are significantly incorrect*
  - *RAGLES incorporates numerical, model, satellite, and in situ data*
    - *Improved algorithm for satellite wave estimates*



Navigation/Topographic Chart Data



Data on charts is not static and is often out-of-date

Important factors include:

- limiting depth of channel/port
- length of channel
- channel characteristics
- size of turning basin
- size of cargo discharge area
- depth at discharge point
- connection to inland transportation routes

Difference between chart analysis and database mining can be very significant

Factors affecting TSV/HSC performance/access are only beginning to be understood – iterative approach to data mining

Information on Infrastructure

Much information is not available without a site visit

However, classes of ports have similar needs for infrastructure:

- petroleum offload
- agricultural products
- mining products
- fisheries
- etc.

Need an inferential tool!

Songkhla Harbor, Thailand (d >20)

Po Hang hang, SK (d = 15-20ft)

Pontianak, Indonesia (d =10-15 ft)

Sonsan Po, South Korea (d - 5-10 ft)

LINK TO INLAND INFRASTRUCTURE

Three different dimensions of site selection:

1. Throughput Rates

   Type of road network
   Environmental conditions
   Road characteristics
   Topography
   "Bottlenecks"
   Urban characteristics/congestion
   Off-road characteristics

2. Potential Threats

   Bridges
   Tunnels
   Topography
   Urban structures/damage

3. Maneuver Advantage

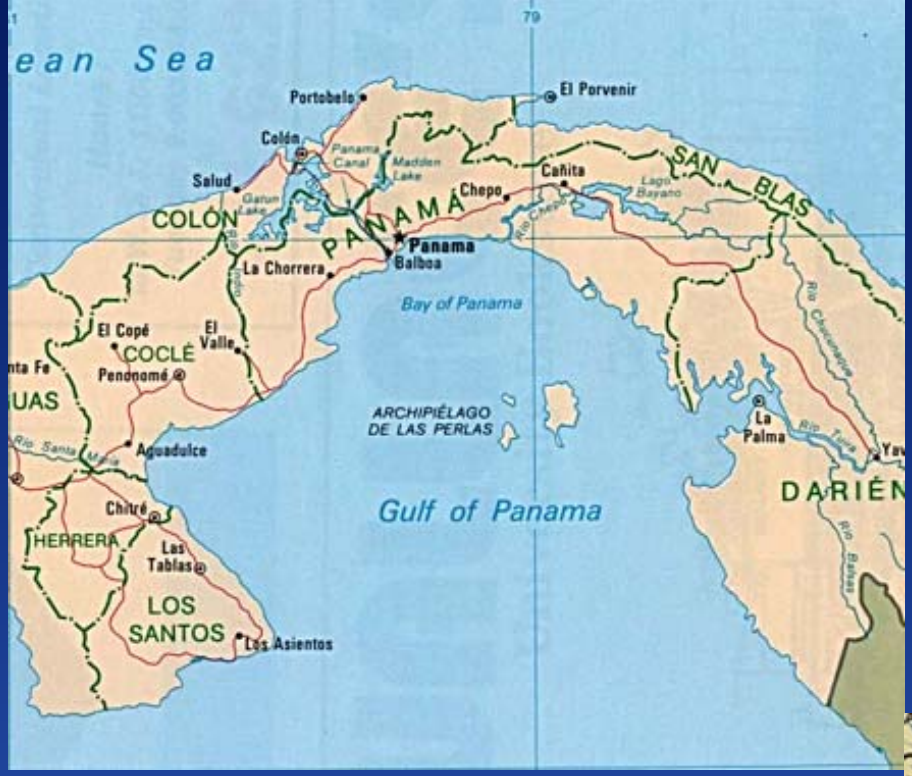
Indonesia
International boundary
National capital
Railroad
Road
THAILAND
BURMA
LAOS
VIETNAM
CAMBODIA
PHILIPPINES
Manila
Bangkok
Phnom Penh
Andaman Sea
Gulf of Thailand
South China Sea
Philippine Sea
SPRATLY ISLANDS
Sulu Sea
Celebes Sea
Bandar Seri Begawan
BRUNEI
MALAYSIA
Kuala Lumpur
SINGAPORE
Singapore
Borneo
Kalimantan
Sumatra
GREATER SUNDA ISLANDS
Java Sea
Jakarta
Java
Makassar
Banda Sea
Arafura Sea
Timor Sea
EAST TIMOR
LESSER SUNDA ISLANDS
INDIAN OCEAN
AUSTRALIA
PACIFIC OCEAN
PALAU
Koror
New Guinea
PAPUA NEW GUINEA
Equator

Korean Peninsula

In some areas of the world the road infrastructure is replaced by major river systems

Such rivers offer potential key Inroads for logistics operations at River-Road junctions

Alternative Offload Sites: **Rivers**



In some areas of the world the coast is protected by natural barriers –barrier islands, land masses, reefs, etc.

In such areas TSV/HSC operations <u>might</u> be possible on the "open" coast

Alternative Offload Sites: **Coasts**

(Estuaries, Open-coast sheltered areas)

QUESTIONS??

KOREA
P'yŏngyang
Seoul
SOUTH KOREA
Demarcation Line
Hohhot
Baotou
Beijing
Dalian
Tianjin
HEBEI
Shijiazhuang
Yinchuan
Taiyuan
NINGXIA
SHANXI
Jinan
Qingdao
SHANDONG
Yellow Sea
Xining
Lanzhou
Lianyungang
Xi'an
Zhengzhou
HENAN
JIANGSU
SHAANXI
ANHUI
Nanjing
Hefei
Shanghai
HUBEI
Wuhan
SICHUAN
CHONGQING
Hangzhou
ZHEJIANG
East China Sea
Chengdu
Chongqing
Changsha
Nanchang
HUNAN
JIANGXI
GUIZHOU
Fuzhou
FUJIAN
Taipei
Guiyang
Xiamen
Taiwan
YUNNAN
GUANGXI
GUANGDONG
Guangzhou
Kao-hsiung
Hong Kong
Nanning
Macau
Special Administrative Regions
Hanoi
Zhanjiang
LAOS
Haikou
HAINAN
Hainan Dao
South China Sea
Luzon
Vientiane
VIETNAM
PHILIPPINES
Hue
Manila
30
15

Caribbean Sea
COSTA RICA
San Isidro
Uatsi
Elena
Almirante
Bocas del Toro
Golfo de los Mosquitos
BOCAS DEL TORO
Palmar Sur
Cerro Punta
Bajo Boquete
Corredor
San Andrés
Golfito
La Concepción
David
Soloy
CHIRIQUÍ
Pedregal
Puerto Armuelles
Golfo de Chiriquí
Telé
Santa Fe
VERAGUAS
Santiago
El Tigre
Isla de Coiba
Portobelo
Colón
Salud
COLÓN
La Chorrera
El Copé
Penonomé
COCLÉ
El Valle
Aguadulce
Chitré
HERRERA
Las Tablas
LOS SANTOS
Los Asientos
PANAMÁ
Panama
Balboa
Bay of Panama
El Porvenir
Cañita
Chepo
SAN BLAS
ARCHIPIÉLAGO DE LAS PERLAS
Gulf of Panama
La Palma
Yaviza
DARIÉN
Turbo
COLOMBIA
NORTH PACIFIC OCEAN
Panama
International boundary
Province boundary
National capital
Province capital
Railroad
Road
San Blas is a territory (comarca).
0 25 50 75 Kilometers
0 25 50 75 Miles
Lambert Conformal Conic Projection, SP 9N17N

Legend

$5 \leq d < 10$

$10 \leq d < 15$

$15 \leq d < 20$

$20 \leq d <$