

Establishment of a National Ocean Database and Information Network in Taiwan

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*Taiwan Ocean Research Institute,
National Applied Research Laboratories,
Taipei, Taiwan*

Outline

@ **National Applied Research Laboratories**

@ **Taiwan Ocean Research Institute**

@ **Major marine databases in Taiwan**

@ **Ocean Data Bank, NCOR**

@ **National Ocean Data Catalog**

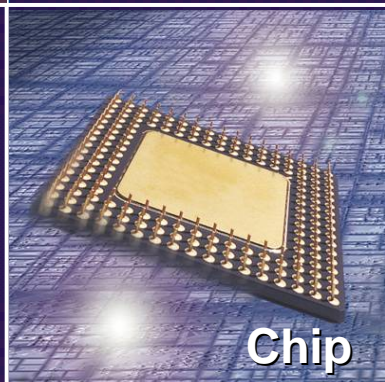
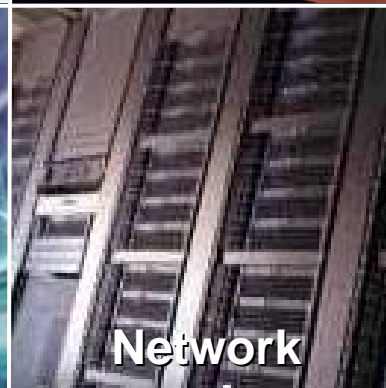
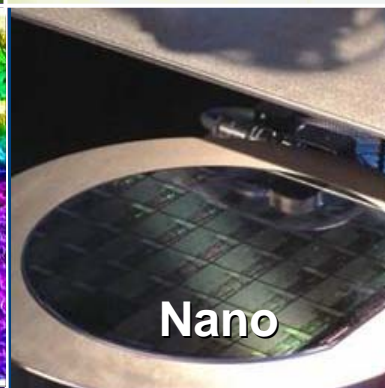
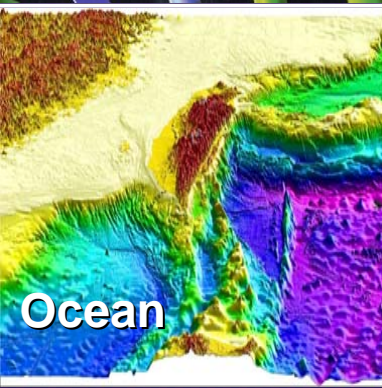
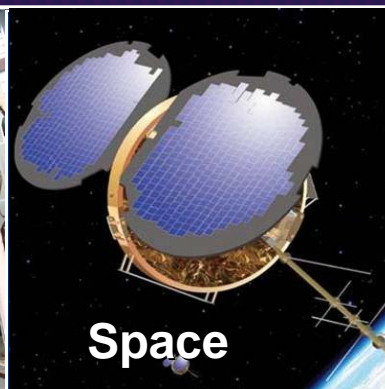
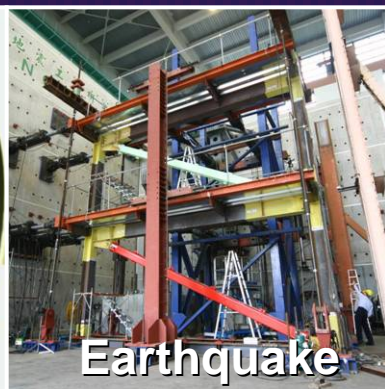
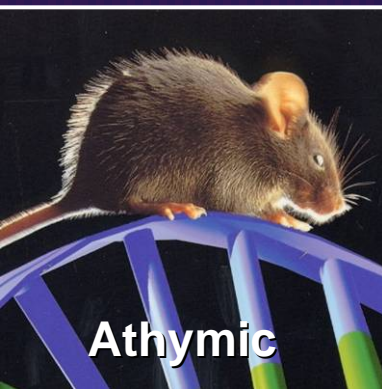
@ **TODnet – a national ocean database network**

@ **TORI's Ocean Database & Information Network**



National Applied Research Laboratories

A Non-Profit Organization



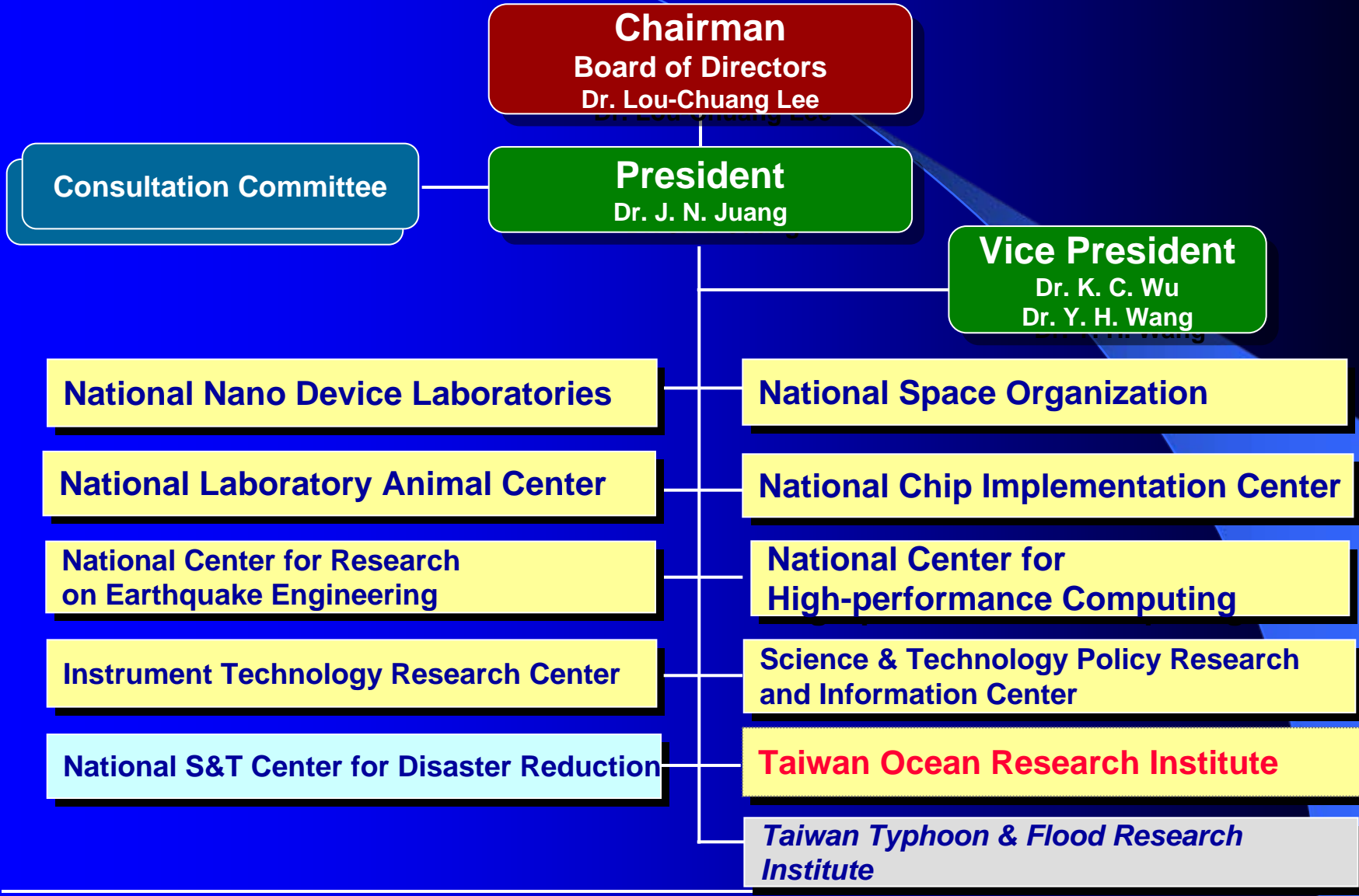
NARL Introduction

- ✓ National Applied Research Laboratories (NARL) was established in **June 2003**.
- ✓ NARL is a non-profit organization comprising of eleven research laboratories.
 - One preparatory office for typhoon and flood research.
 - Supervising operations of National S&T Center for Disaster Reduction (NCDR) for NSC.
- ✓ **NARL promotes horizontal integration of existing laboratory resources as well as vertical integration of the nation's R&D systems.**





NARL Organization





Integrated Projects

NARL

Committee

A. R&D Platform
B. Service Platform

A. Foresight for Integrated Projects
B. NARL Management & Operations Research

HQS

Planning & Eval.

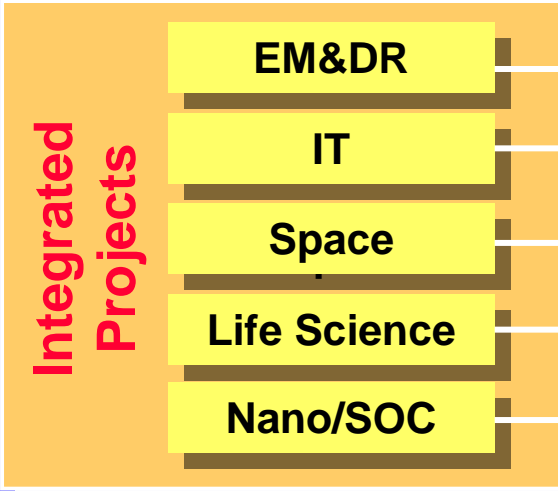
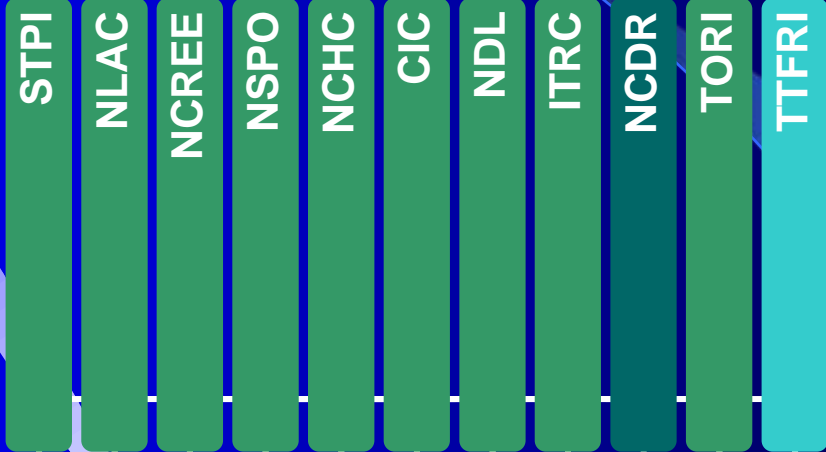
Business Dev.

Administration

Accounting

Auditing

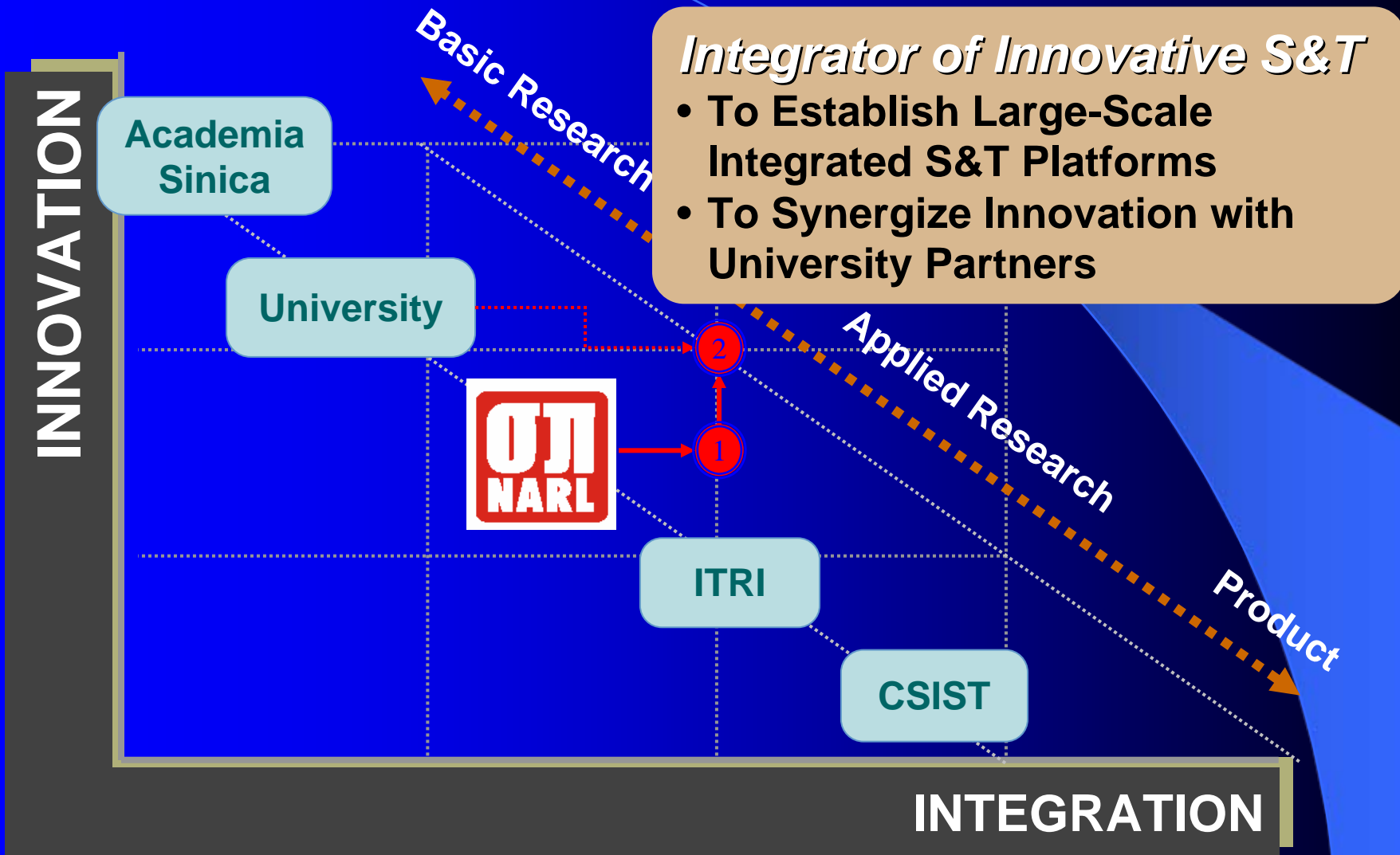
System Mgmt's Office



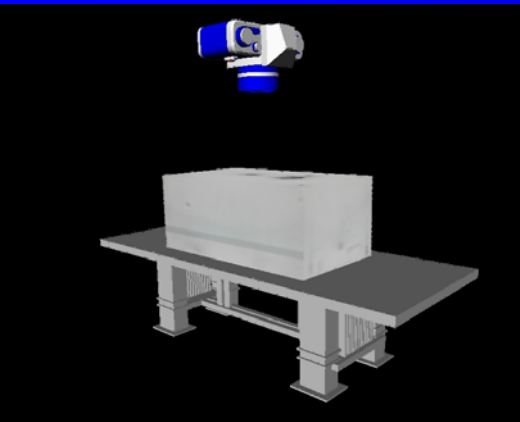
Activity Based Costing



Positioning of NARL



☑ Platforms for R&D and Services

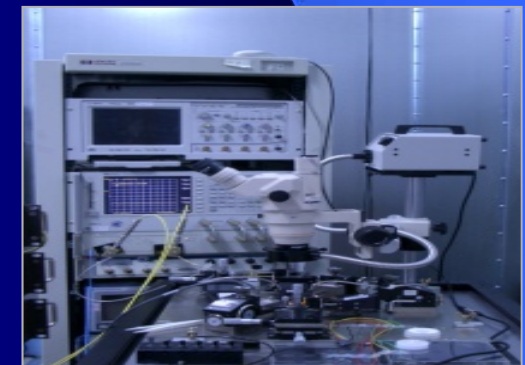


Model Animal Analysis

World's Top 49th Mainframe

Sounding Rocket

Satellite Integration and Testing

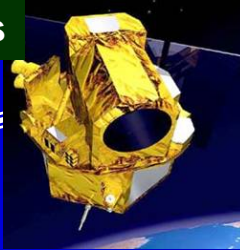


Integrated S&T Information Service

Marine Research Ship 2,700 Ton

RF/MW Measurement

Remote Sensing Satellites



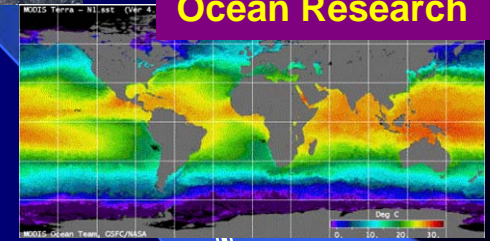
Typhoon Research



Instrumentation



Ocean Research



Optic Airplane Imaging



Earthquake Engineering



- High-Performance Computing/Networking/Storage
- High-Resolution Image DB

Grid Technology



3D Visualization



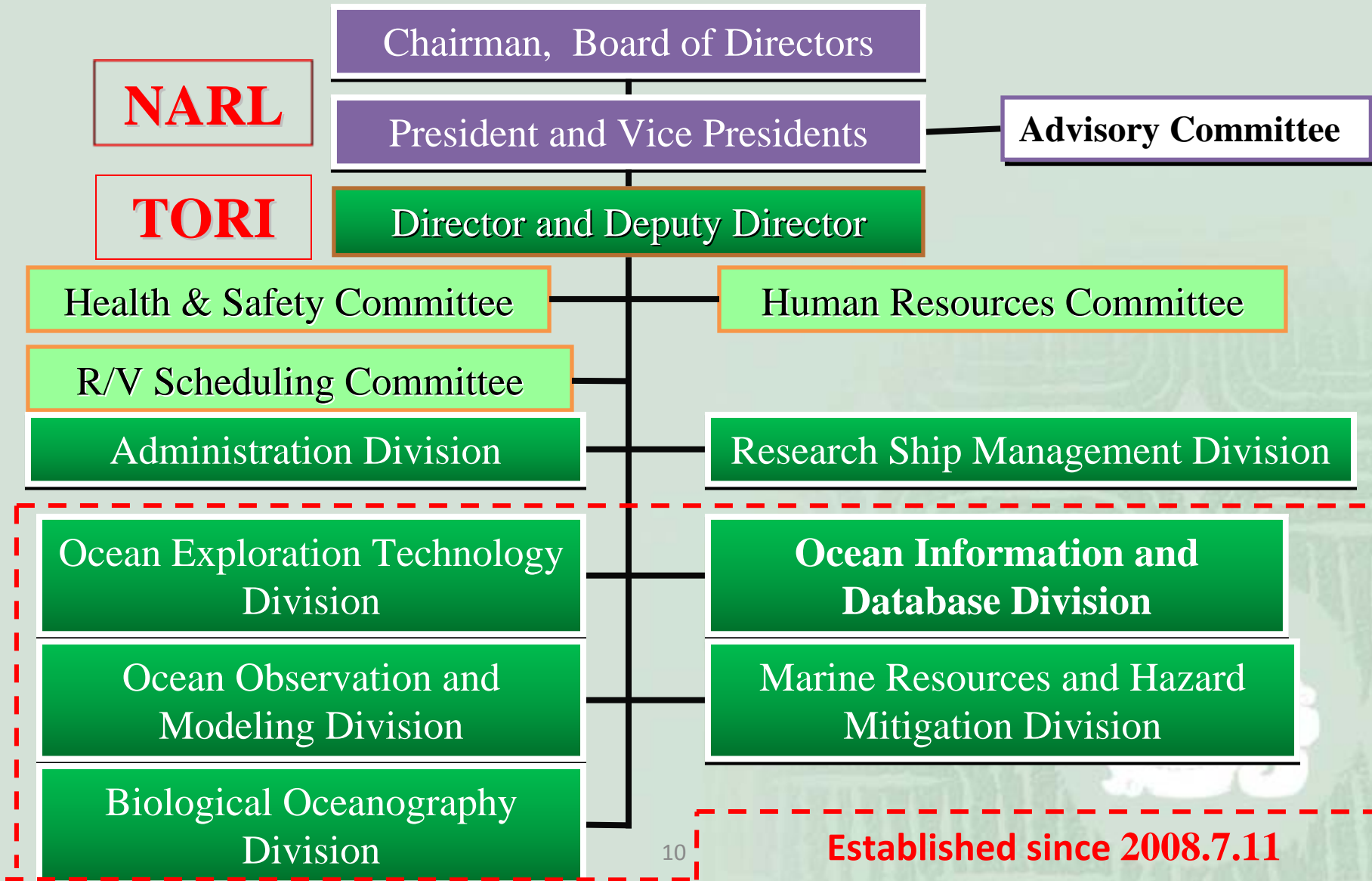
DR Technology Sichuan earthquake



Before

After

Organization of TORI (Taiwan Ocean Research Institute)

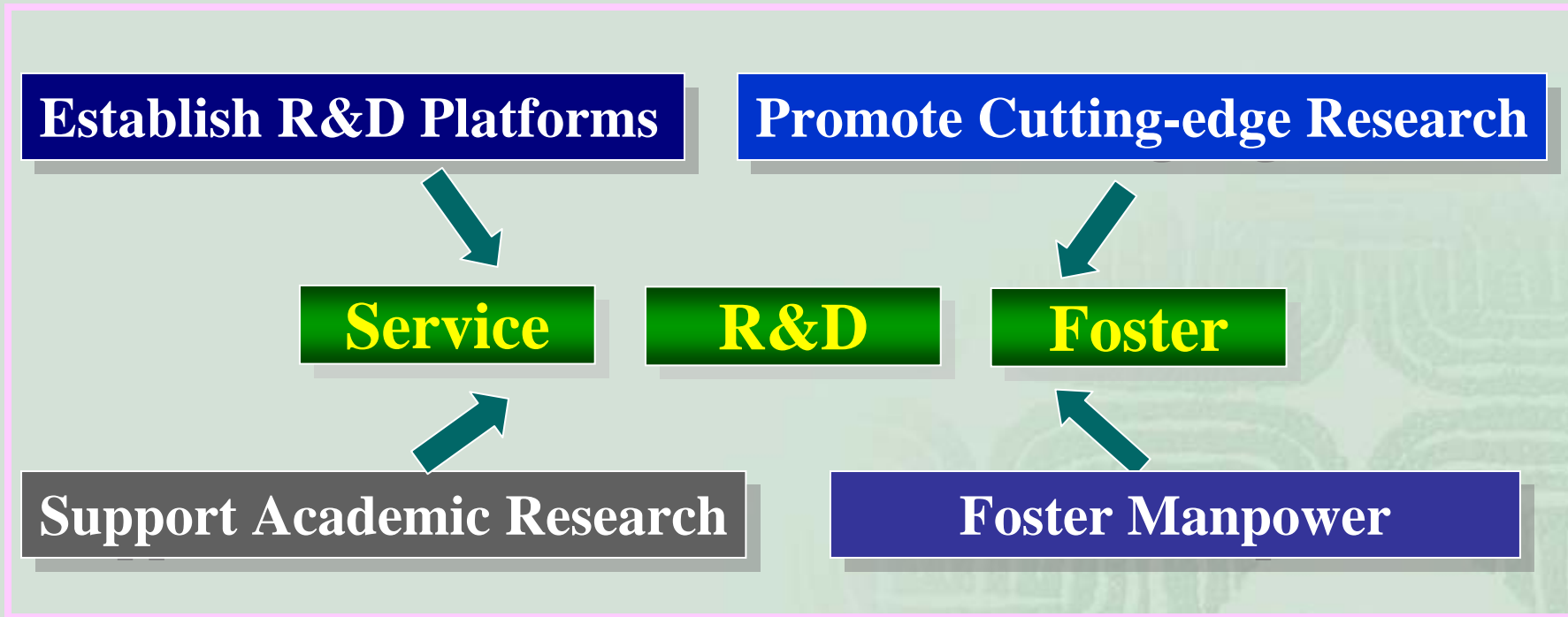


NARL

TORI

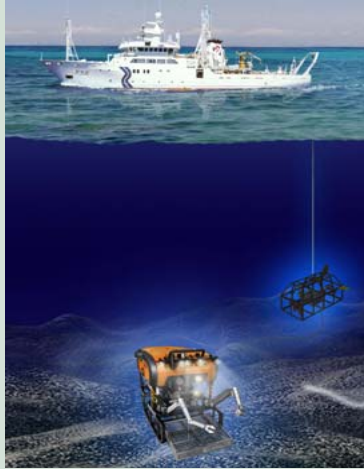
Missions

For Ocean Research

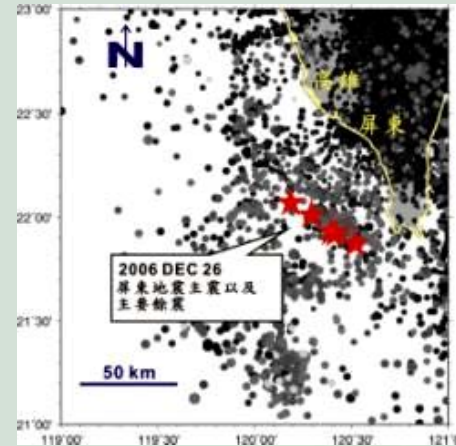


**TORI is derived from NCOR,
a 10-year project-based Ocean Research Center**

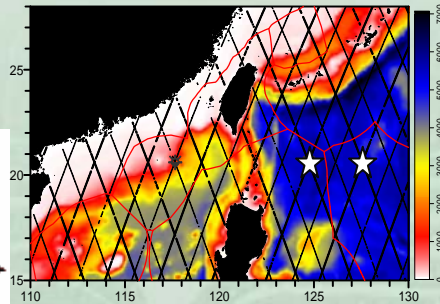
Major Tasks



- Building and operation of a 2700-ton R/V



- Set-up seafloor observatories for earthquake and tsunami monitoring offshore SW and southern Taiwan

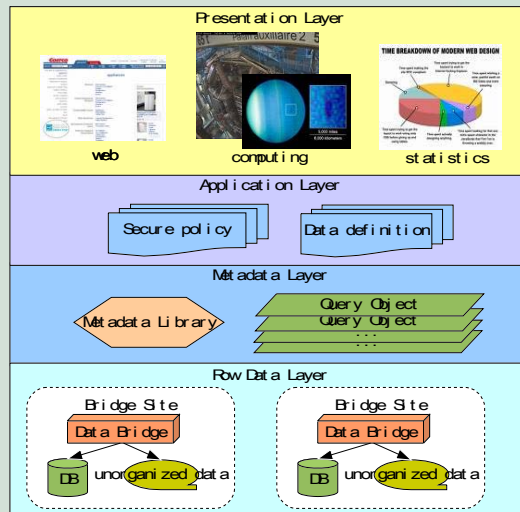


- Set-up a long-term observation network and development of operational ocean model



- Wave energy related technology development

- Technology of marine biomass energy from algae
- Biological Oceanography



- Development of a 3000-m ROV

- Set-up a national ocean database and information network (Data Grid)

Ocean Environment Monitoring

- Physical Oceanography -

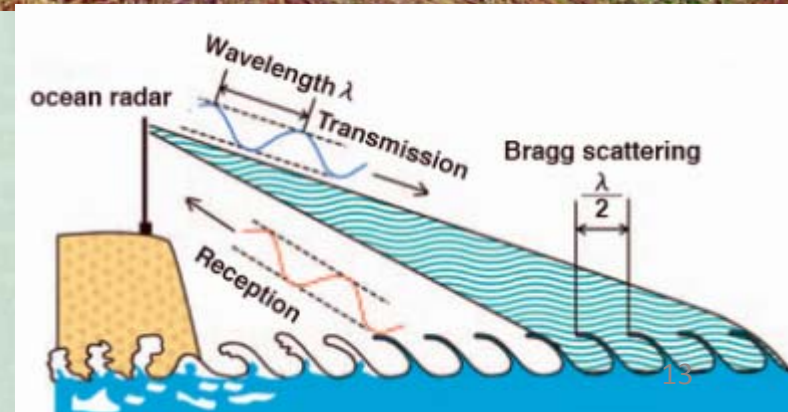
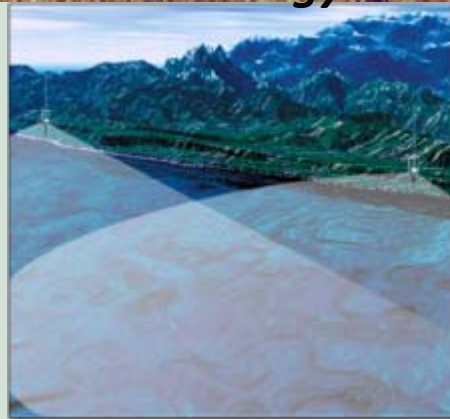
SeaSonde/CODAR HF radar system --- the solution for making continuous, wide-area, long-range ocean surface real-time observations (primarily surface currents).

Scientific and societal applications:

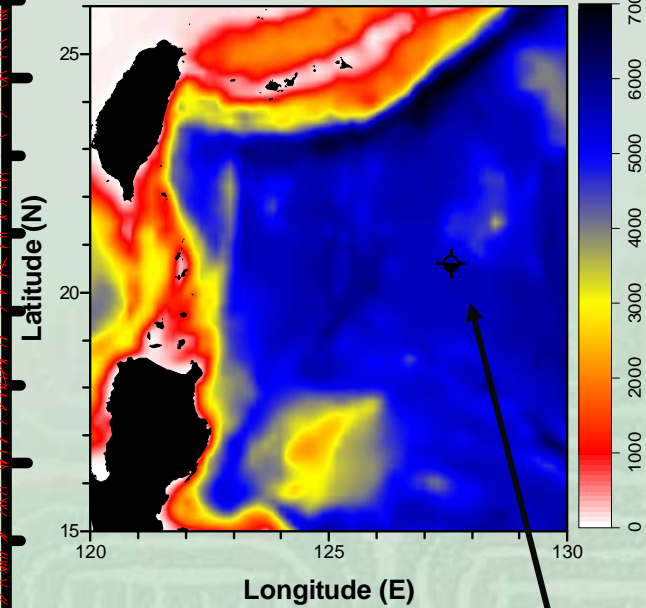
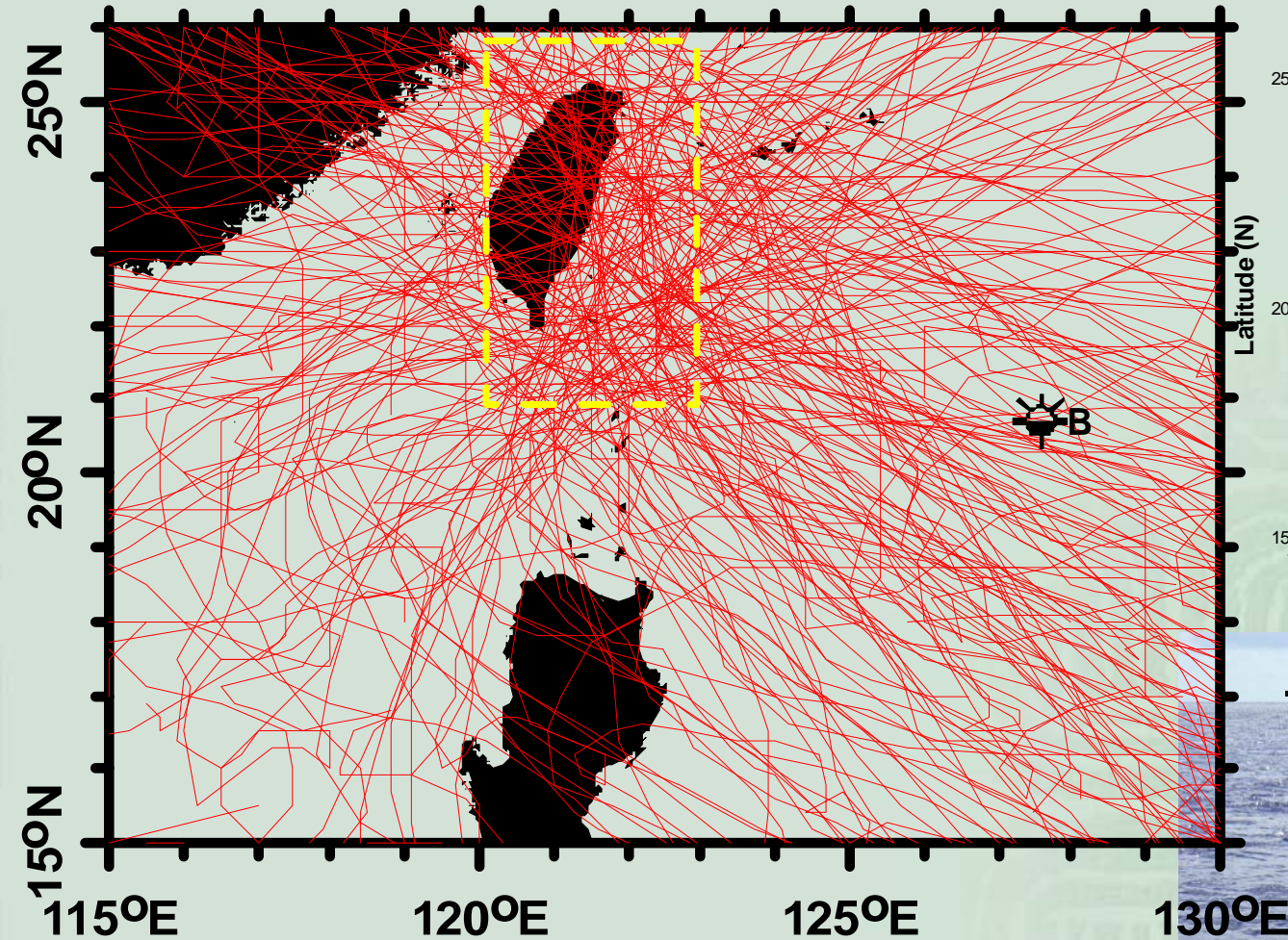
- *Ecological studies,*
- *Fate and transport of pollutants tracking,*
- *Oil spill response,*
- *Assessment of beach water quality,*
- *Search and rescue,*
- *Maritime operations,*
- *Tracking changes in ocean climate*
- *Ocean current energy*

First Phase

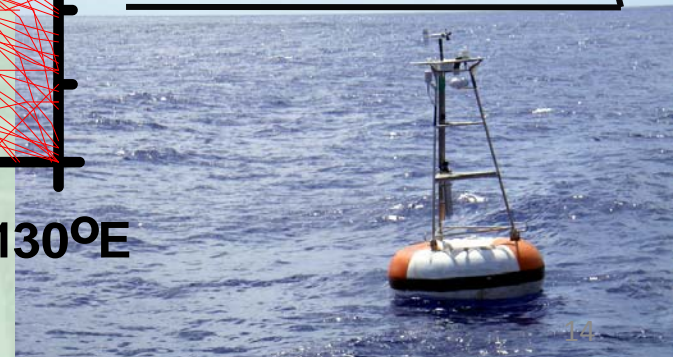
off east Taiwan



Typhoon Trajectories hit Taiwan 1951~2007



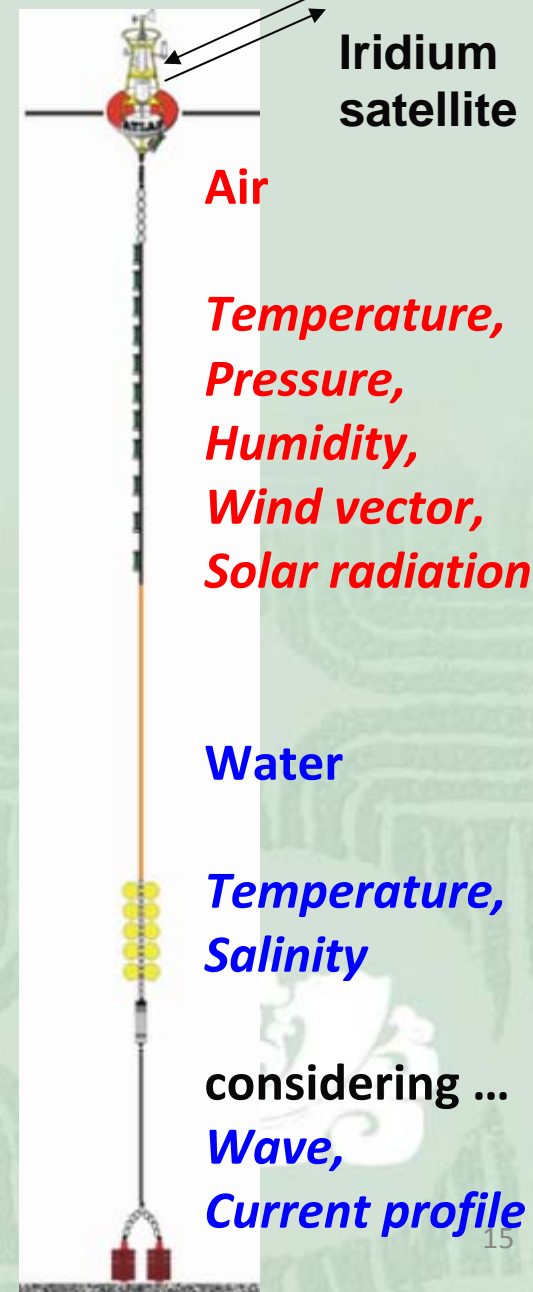
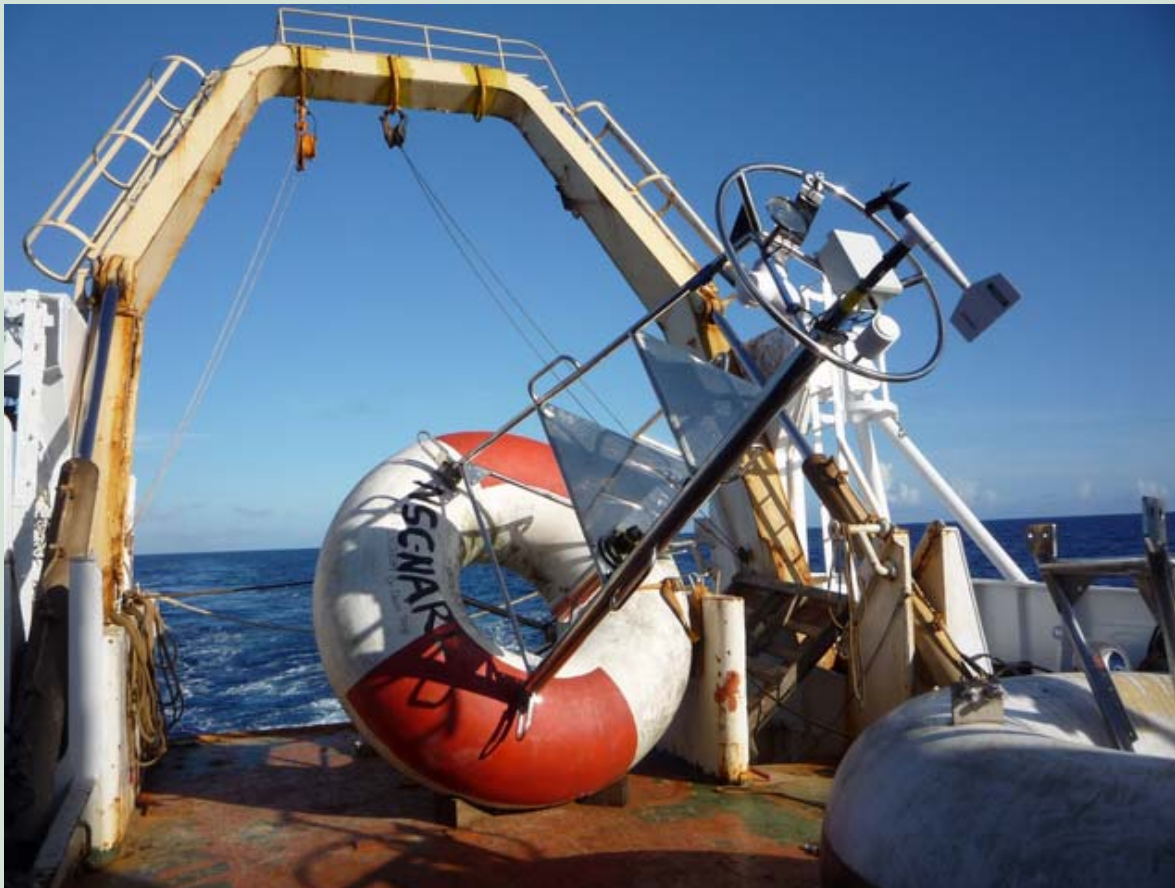
Operational Data Buoy



Real-time, long-term ocean and atmosphere monitoring in open ocean by moorings

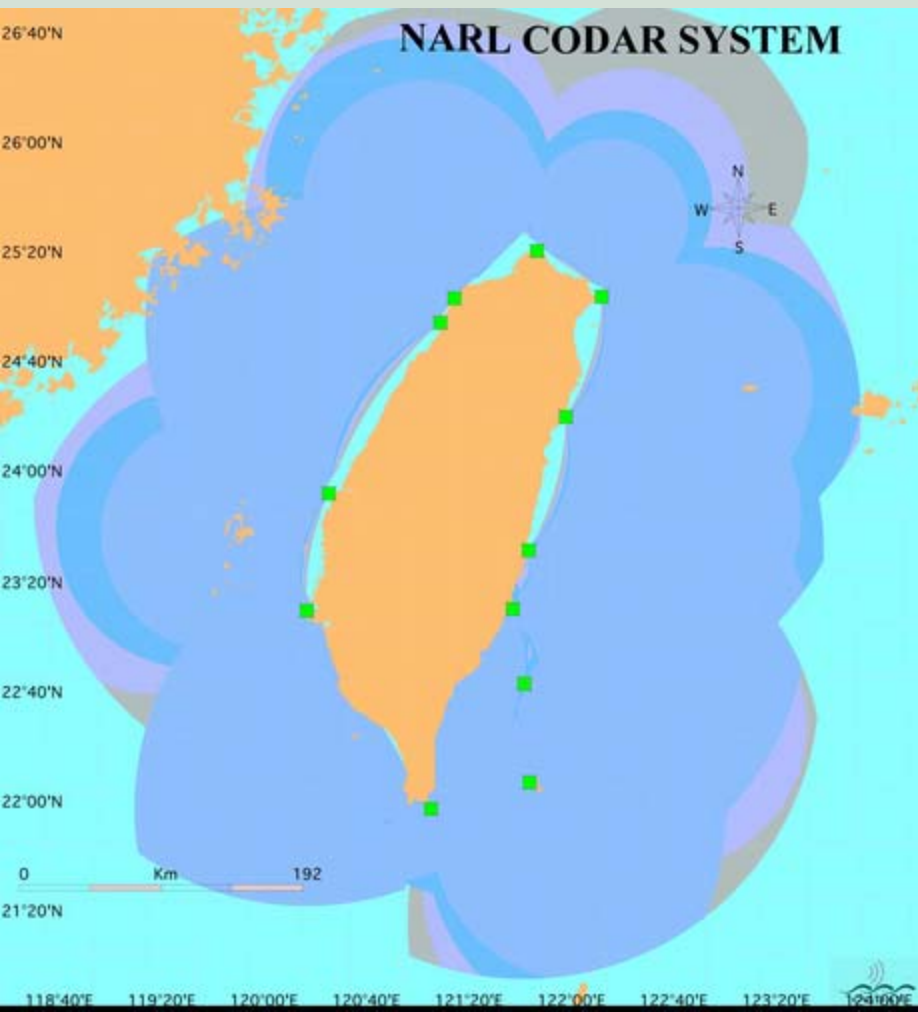
Scientific and societal applications:

*Air-sea interaction,
Extreme weather monitoring/forecasting,
Tracking changes in ocean climate,
Natural hazards monitoring/mitigation*

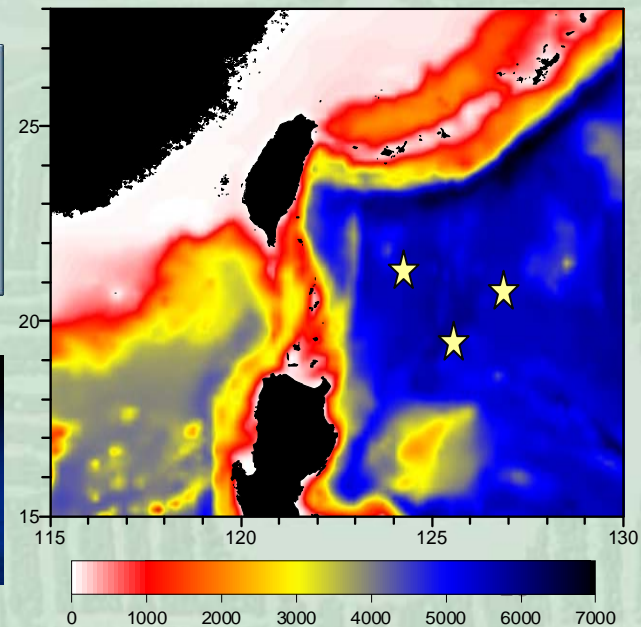
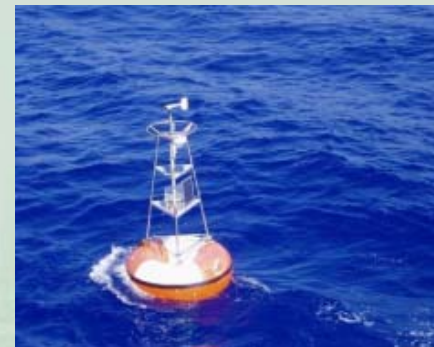
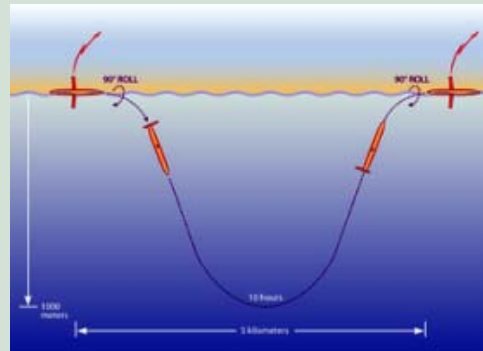


Real-Time 4-D Oceanography

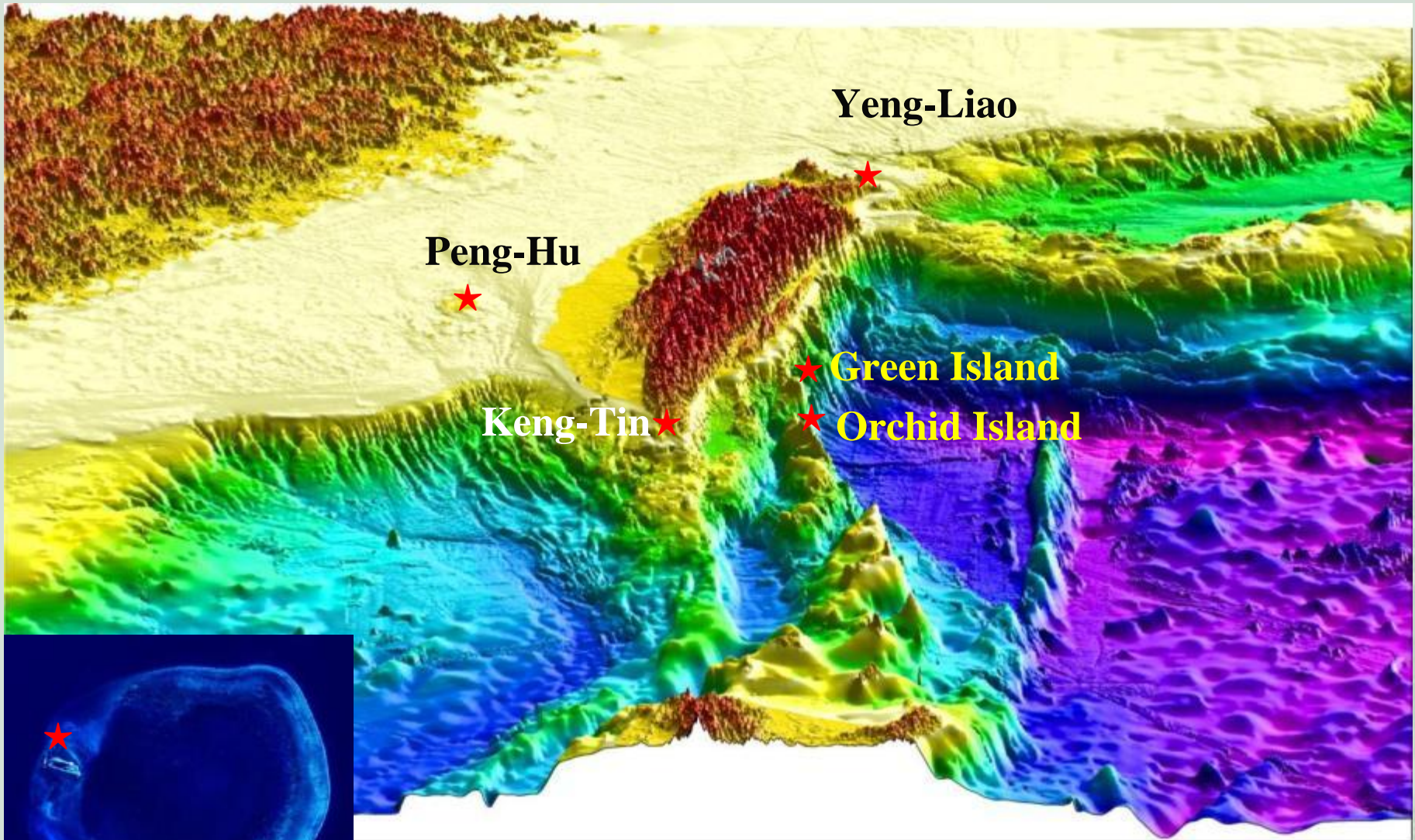
Surround-island ocean surface current monitoring by land-based HF-radar system



Ocean hydrography monitoring via underwater gliders and moorings



Long-Term Monitoring the Ecosystem of Coral Reefs



Locations of Coral Reefs in Taiwan

Coral Reef and Fishes in Orchid Island



Coral Reef Observation Station at Ochied Island

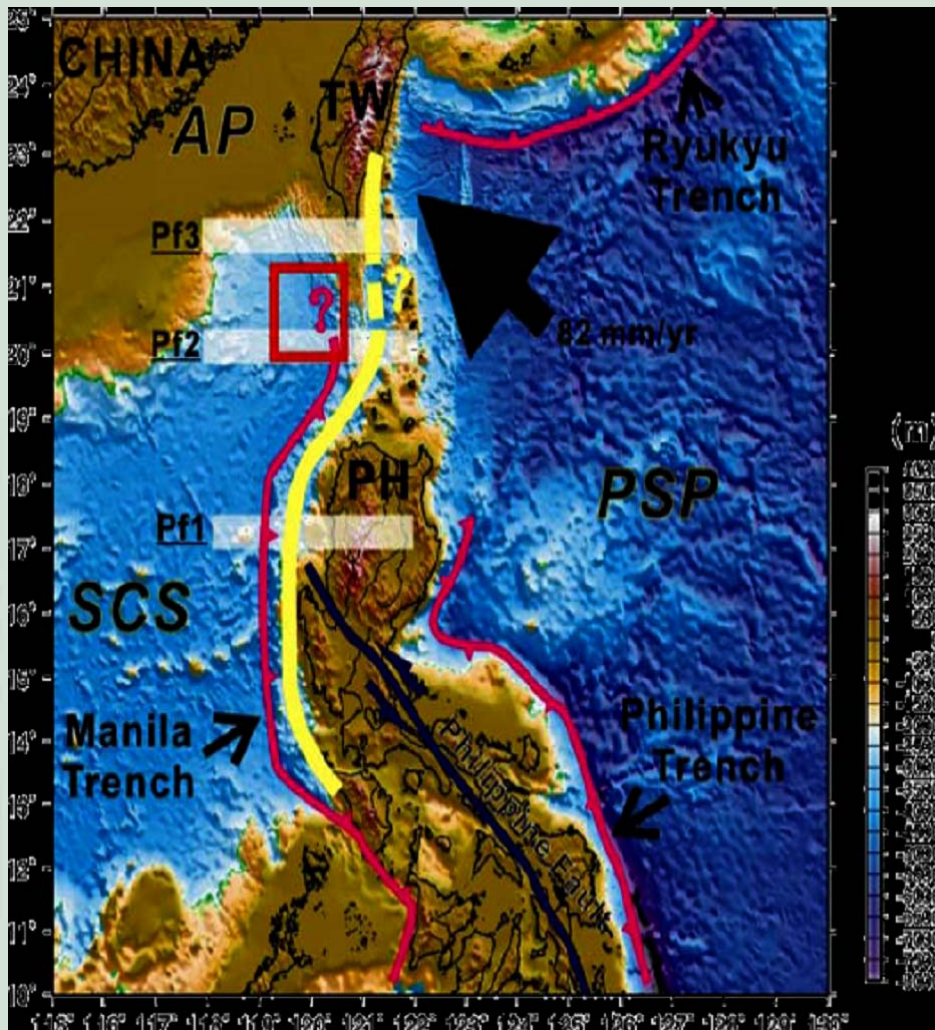


Coral Reef Observation Station at Keng-Tin

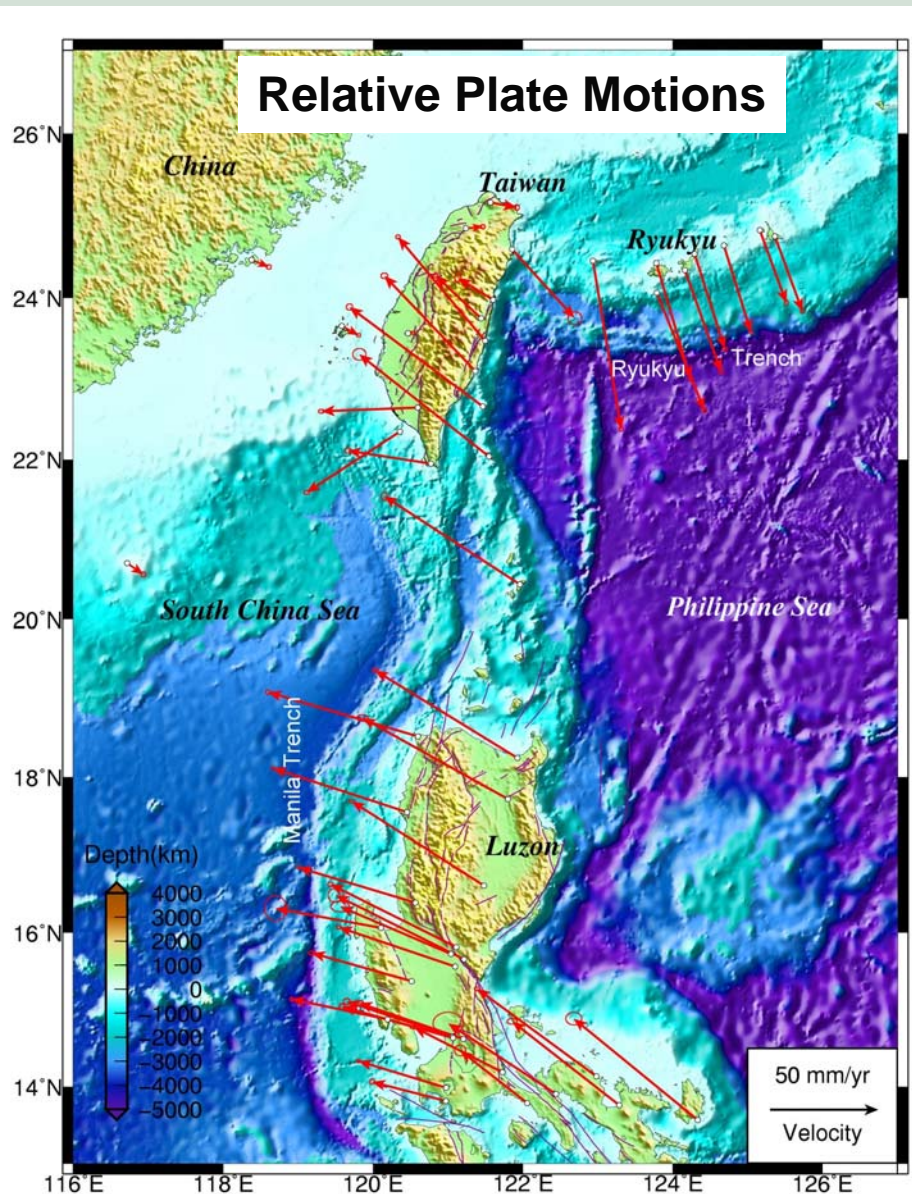


Coral Reef and Fishes in Orchid Island

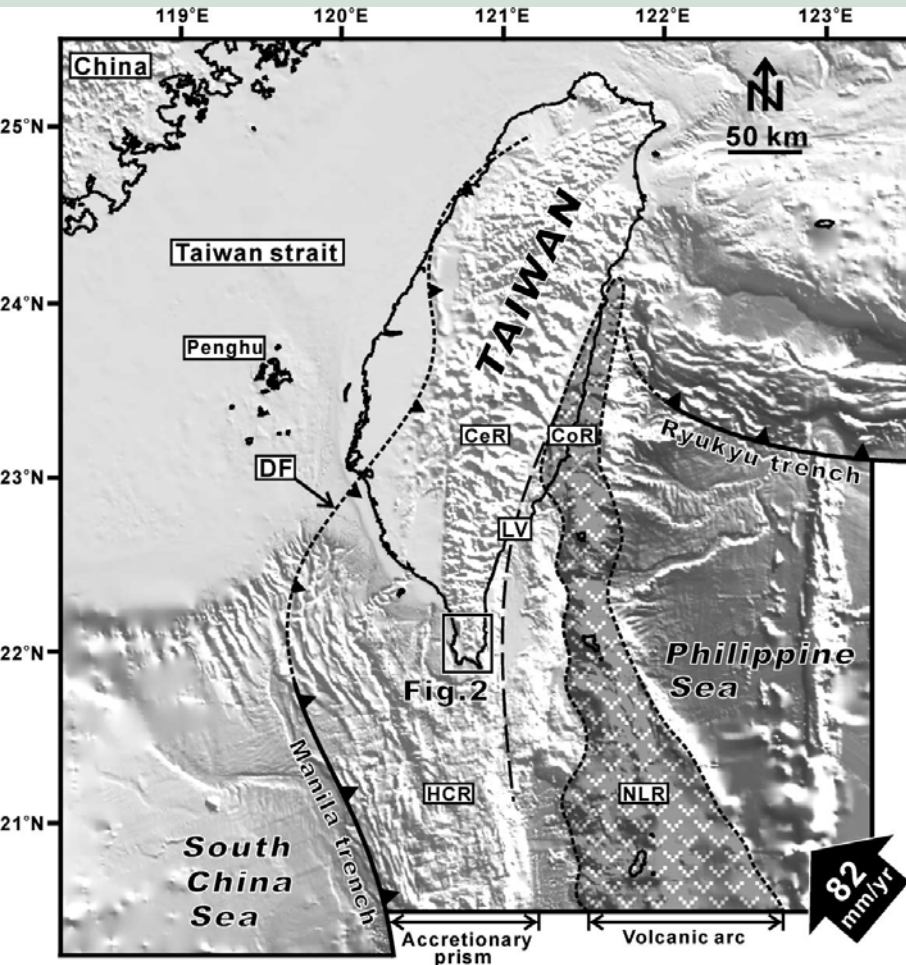
Earthquake and Tsunami Hazards and Crustal Deformation Monitoring



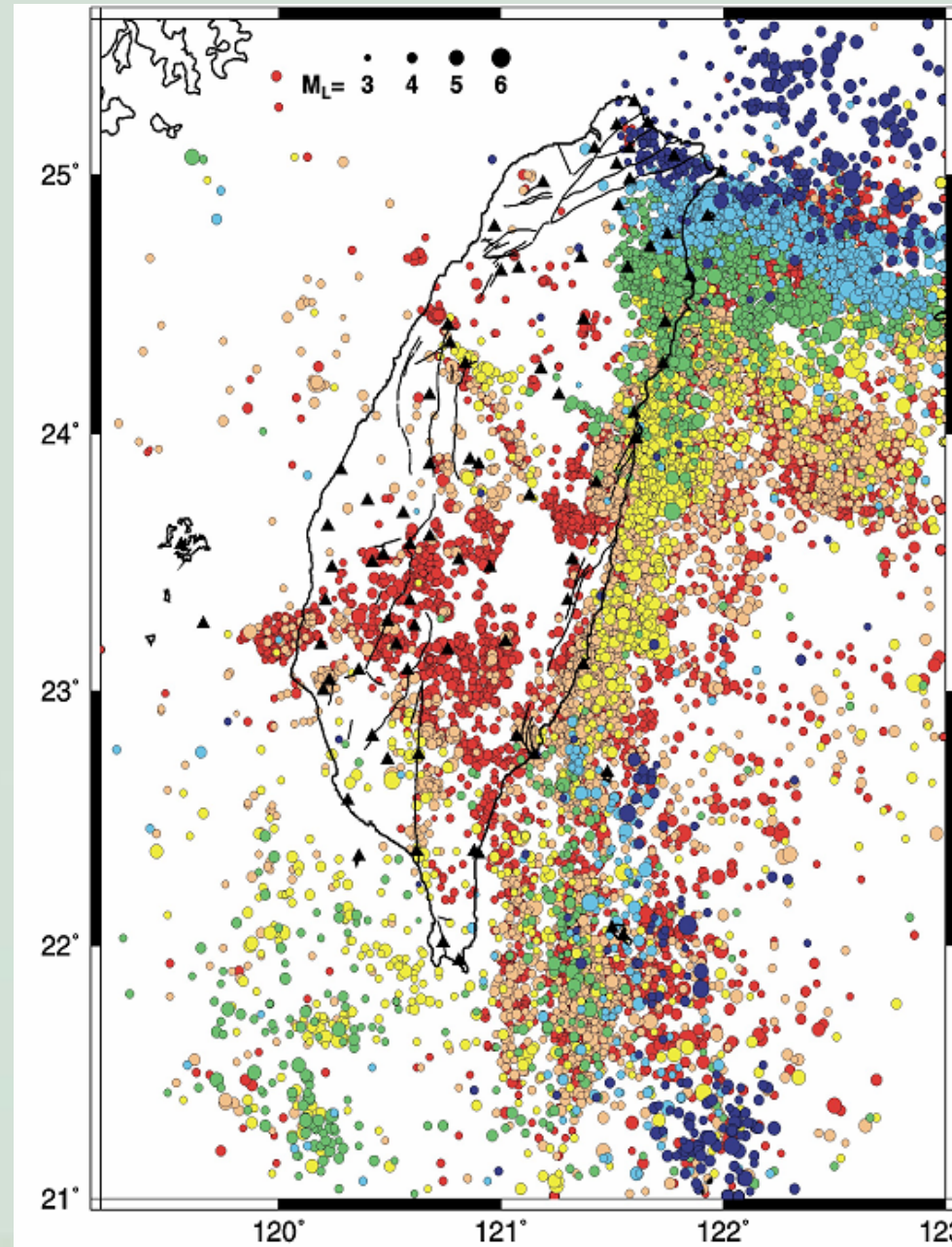
One of the Highest Risk Zones for Large Earthquake and Tsunami Hazards

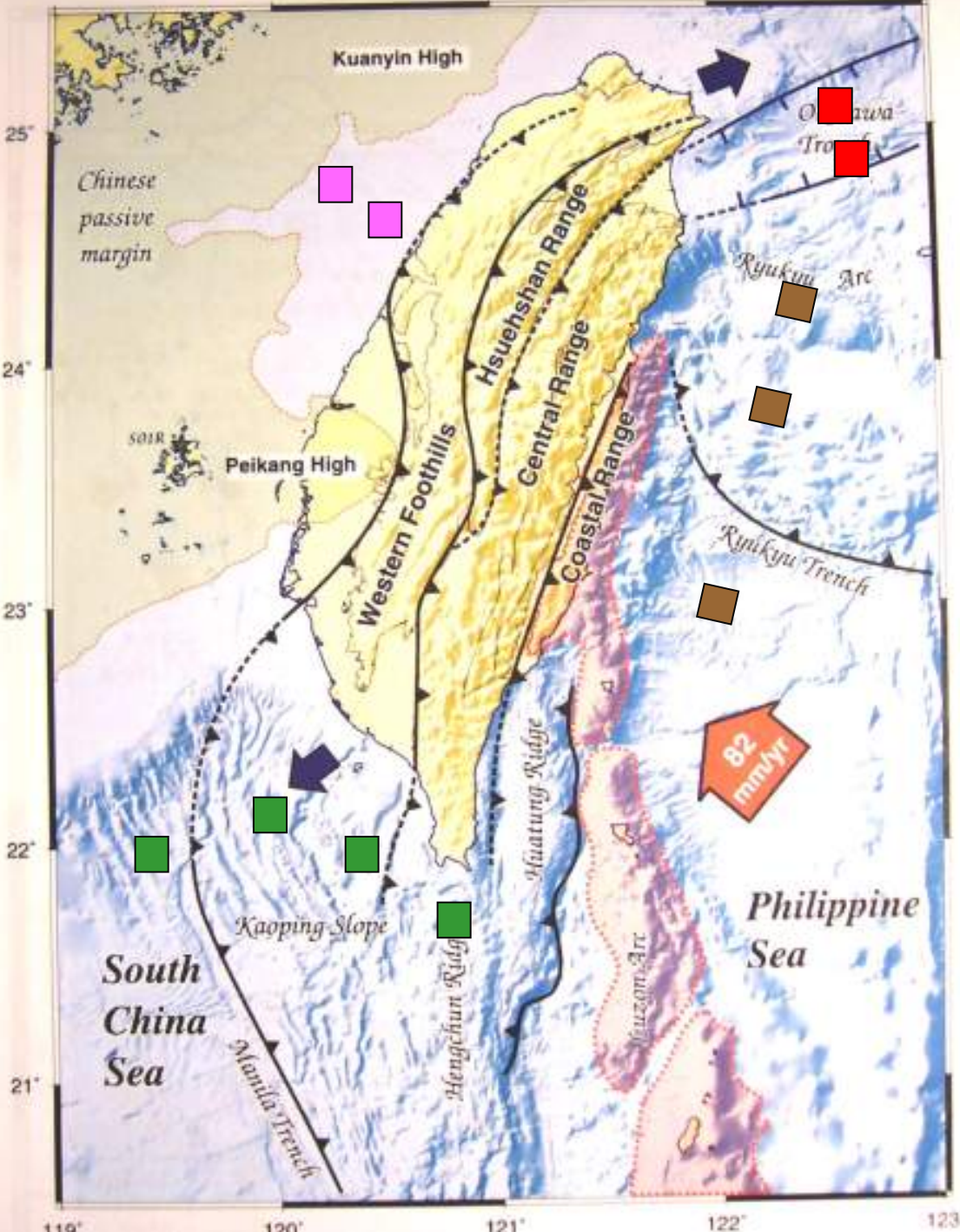


Earthquakes Occurred Mostly Offshore

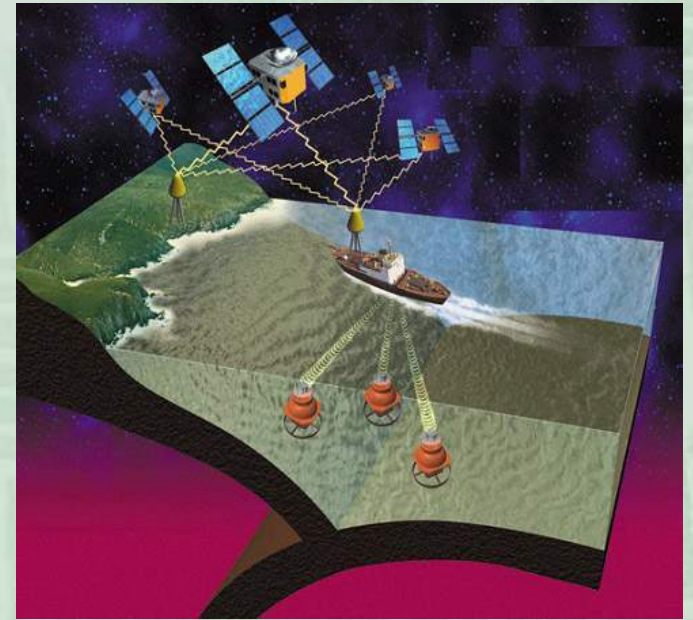


Active Tectonics Onland and Offshore Taiwan





OBS and Seafloor Observatory for earthquakes, tsunami and crustal deformation monitoring



Objectives of a National Ocean Database and Information Network

- To promote the exchange of marine data and metadata, and to establish some standards on data formats and quality assurance procedures
- To provide a platform for integrating various marine metadata using computer and internet technology for quick search, easy access and fast services
- To serve as a national ocean data archive and repository center for safe and efficient data management and dissemination
- To act as a window for domestic ocean data inquiry and international cooperation



Major Marine Databases in Taiwan

Academia Sinica

Taiwan Biodiv. Inform. Facility

Fish database of Taiwan

Shell database of Taiwan

Deep-sea Fauna Database

Ministry of Economic Affairs

Hydrographic database

Marine sand resources database
Gas hydrate database

Ministry of Education

Ocean education information system (proposed)

National Science Council

Ocean Data Bank

Ministry of Defense

Ocean database

Council of Agriculture

Fishery management database

International fishery database

Fishery information system

Remote Sensing & hydrographic database

Ministry of Interior

National Park marine ecology database

Continental shelf survey database

Ministry of Transportation and Communi.

Harbor oceanic & meteorological database

Marine Meteorology Database

Ocean Data Bank, National Science Council

National Center for Ocean Research
1998-2007

□ Shipboard data

- ∞ Ocean Researcher 1 (NTU)
- ∞ Ocean Researcher 2 (NTOU)
- ∞ Ocean Researcher 3 (NSYSU)

□ Satellite ocean remote sensing



R/V OR1



R/V OR2



R/V OR3

Ocean Data Bank, National Science Council

Databases in ODB

- ∞ Hydrographic data (CTD)
- ∞ Ocean Current data (Sb-ADCP)
- ∞ Bathymetric data (SBES)
- ∞ Seismic Reflection data
- ∞ Sub-bottom Profiler data (Chirp sonar)
- ∞ Coring Site Metadata
- ∞ EK500 Acoustic data
- ∞ Bio-geochemical data (SEATS)
- ∞ Satellite Remote Sensing data

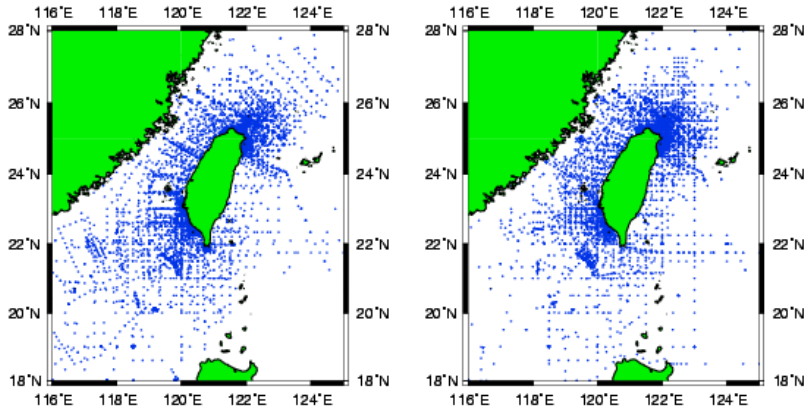


Ocean Data Bank, National Science Council

Distribution of CTD casts

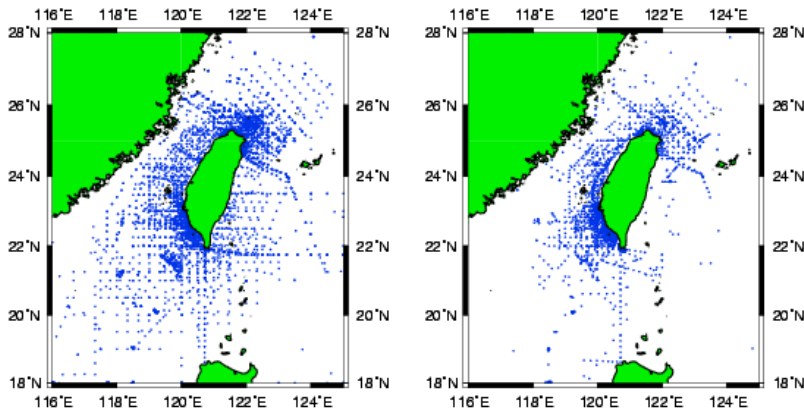
Spring No. 7676

Summer No. 7147



Autumn No. 6326

Winter No. 3493



CTD casts

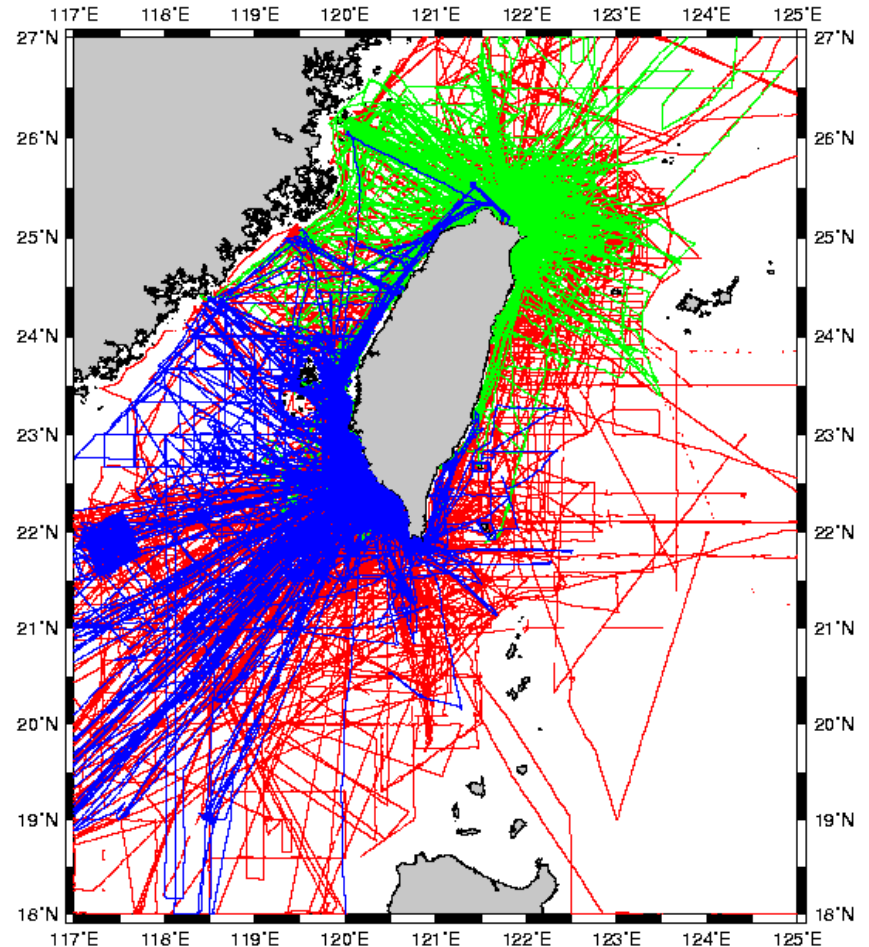


Shipboard Bathymetric Data Distribution Map

NTU R/V OR1, Date:19891211--20041023, Datapoints:9304062

NTOU R/V OR2, Date:19940415--20041030, Datapoints:3941364

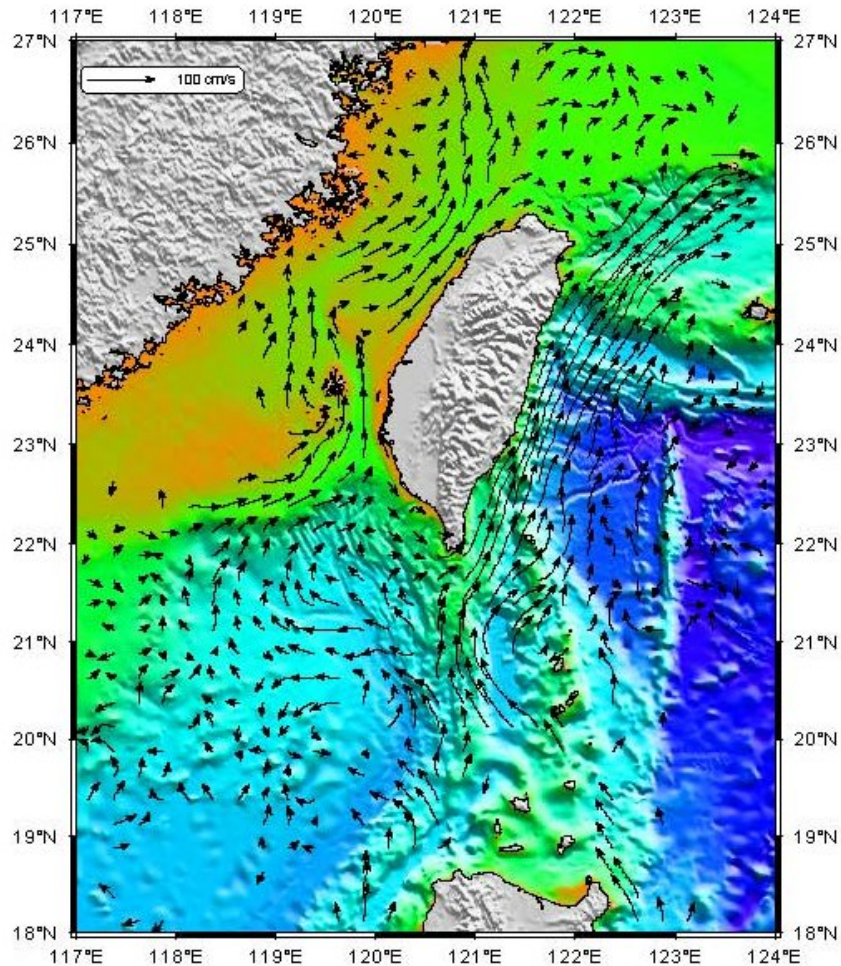
NSYSU R/V OR3, Date:19950109--20040913, Datapoints:5827006



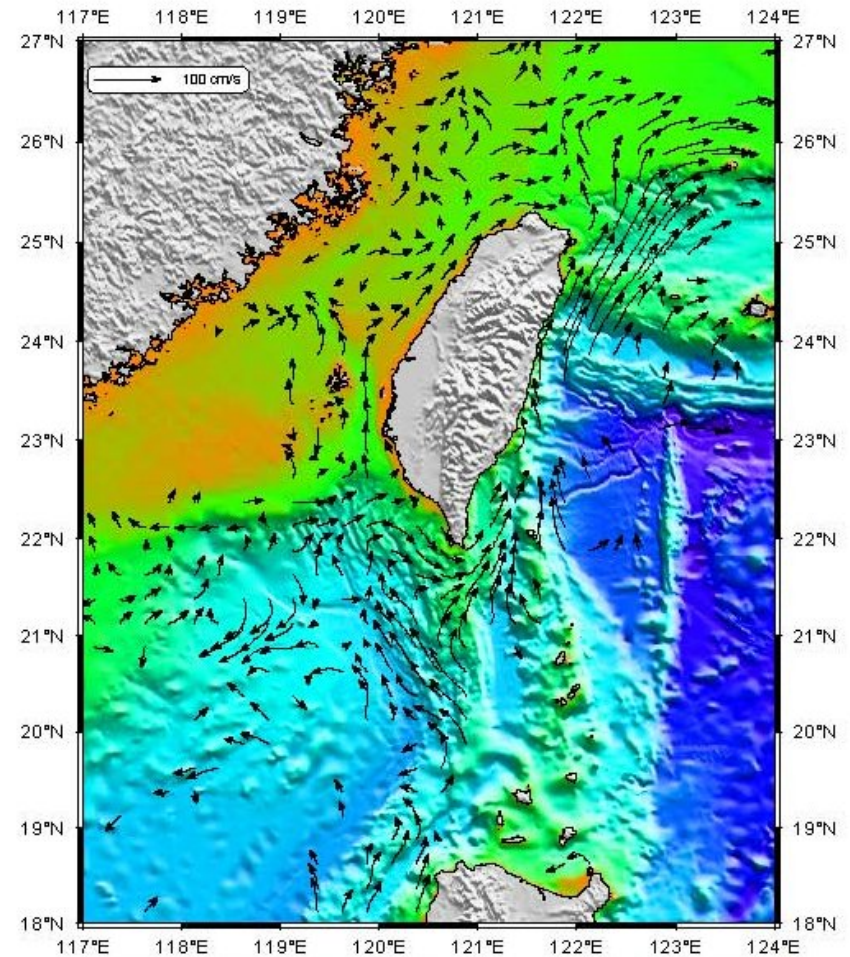
SBES, S_b-ADCP

Ocean Data Bank, National Science Council

Composite Current Velocity Vectors at 020 m
Southwest Monsoon (May. - Oct.)



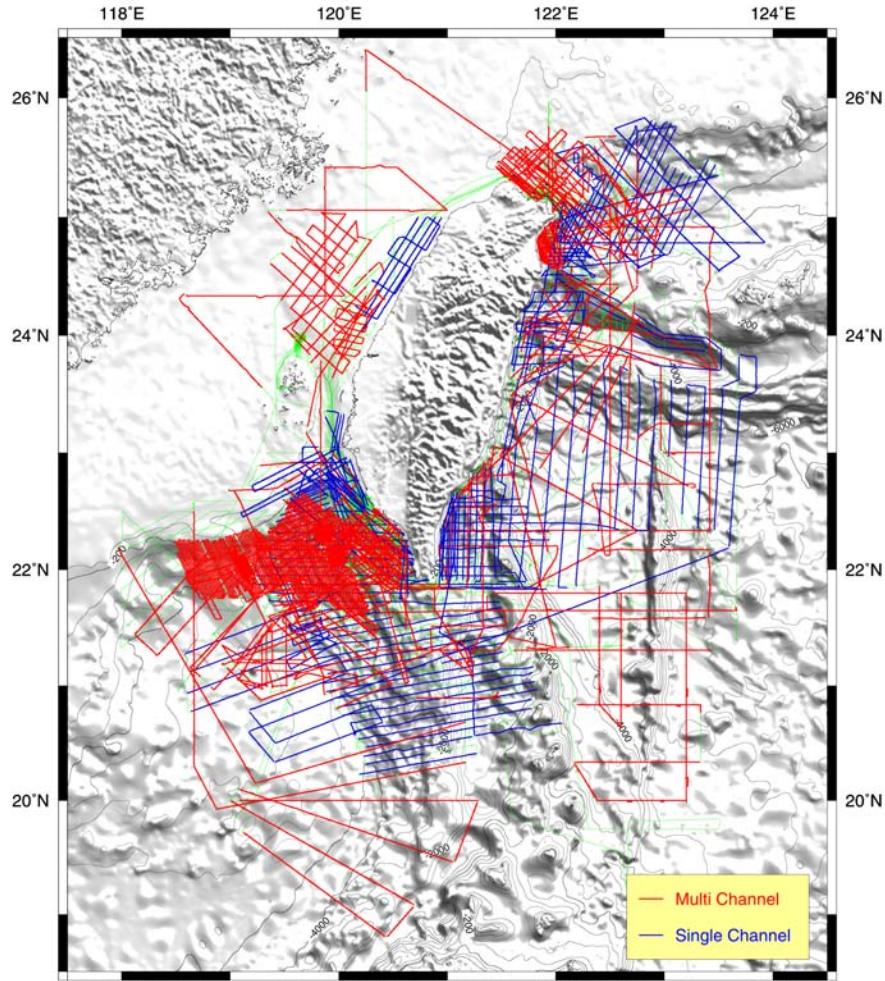
Composite Current Velocity Vectors at 020 m
Northeast Monsoon (Nov. - Apr.)



Composite Current Velocity Vectors at 20 m

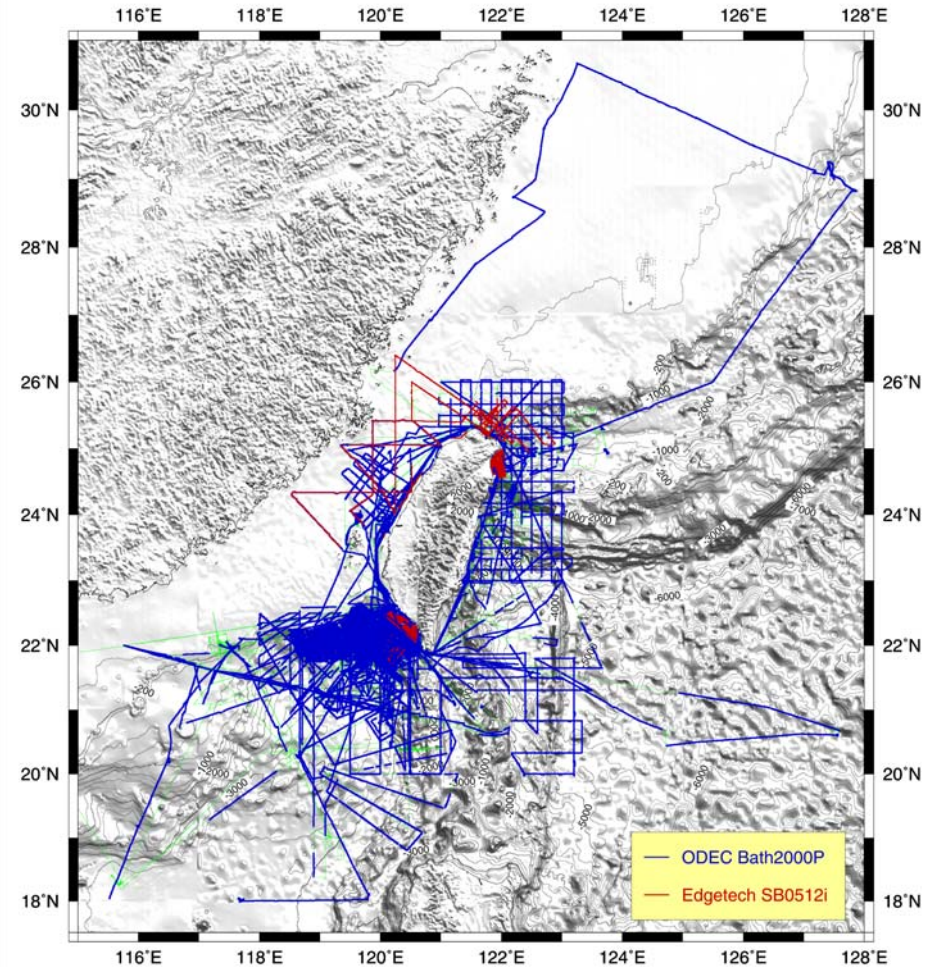
Ocean Data Bank, National Science Council

台灣週邊海域反射震測測線分布圖



Seismic reflection database

海床底質剖面測線分布圖



Sub-Bottom Profile database

Ocean Data Bank, National Science Council

Data Sources

Box core, Gravity core,
Piston core, Grab, etc.
from research vessels:

R/Vs OR1, OR2 and OR3

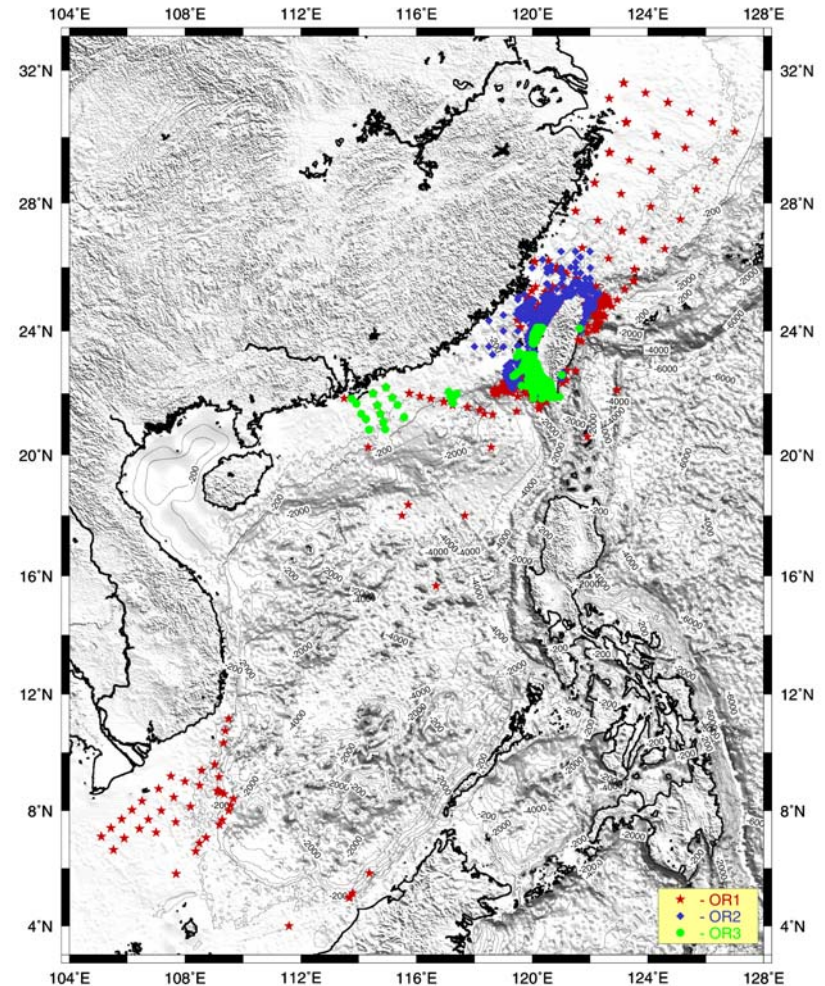
Database summary

252 cruises, 3343 sites,
4011 core sample **metadata**

Core Repository

At National Taiwan Ocean
University

海洋岩心沉積物採樣點分布圖



Coring Site Metadata

Ocean Data Bank, National Science Council

Satellite Ocean Remote Sensing Data

∞ **AVHRR** : SST, 1.1 km (2000 ~)

- Daily SST Browse Images
- Monthly-Average SST Browse Image

∞ **SeaWiFS** : Chl-A, 1 km (2000 ~ 2005)

- Daily SeaWiFs Chlorophyll A Browse Images
- Monthly-Average SeaWiFs Chlorophyll A Browse Images

∞ **MODIS** : SST and water color, 250 m – 1 km
(2006 ~)

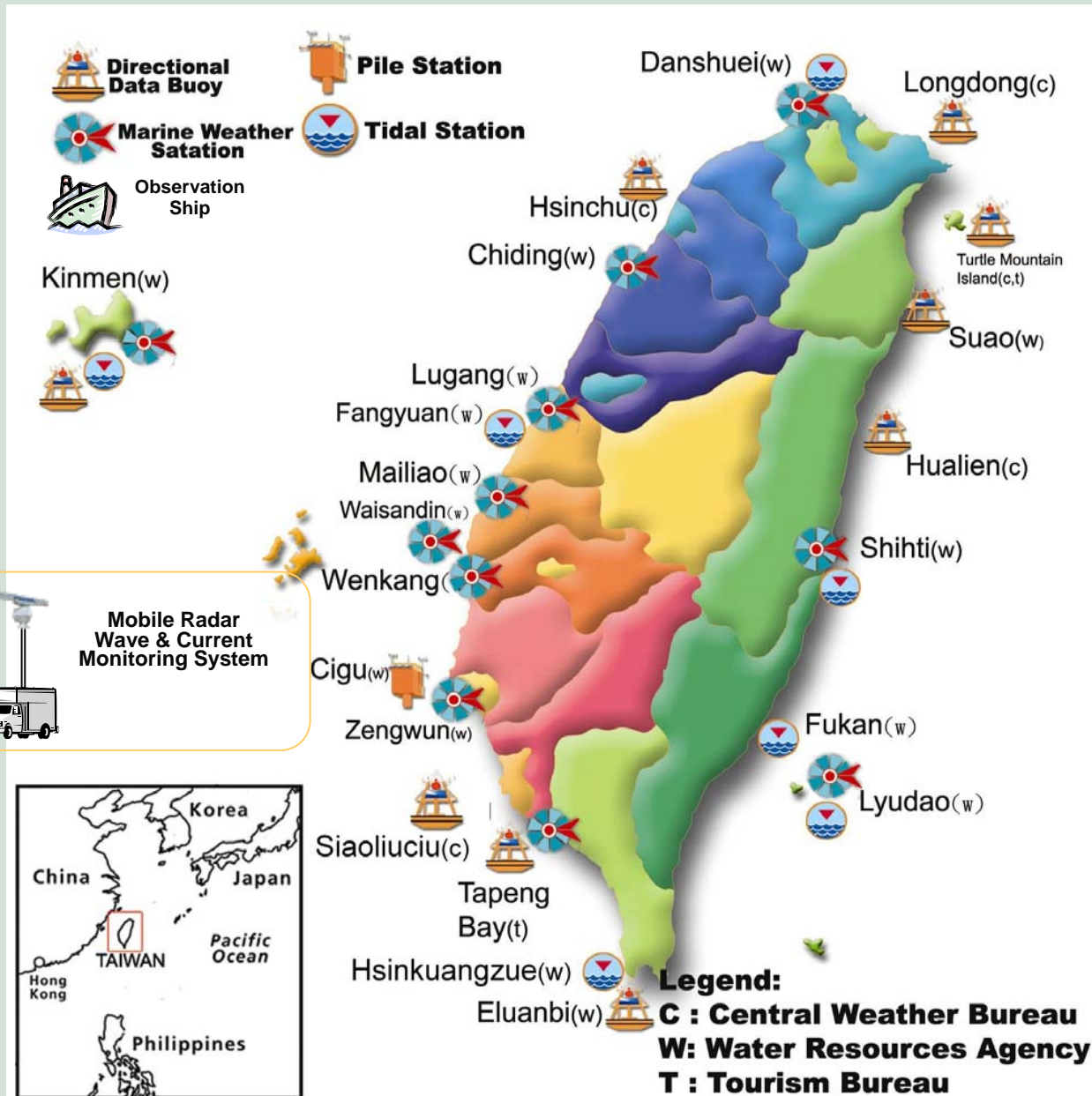
AVHRR: Advanced Very High Resolution Radiometer

SeaWiFS: Sea-viewing wide field-of-view sensor

MODIS: MODerate resolution Imaging Spectroradiometer



Coastal Ocean Monitoring Database



Data Types

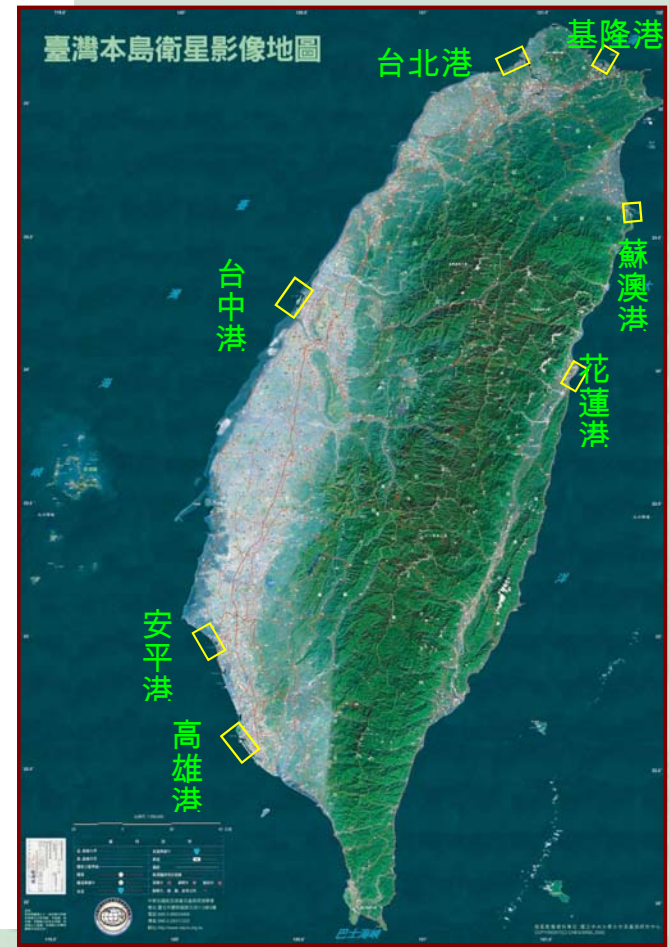
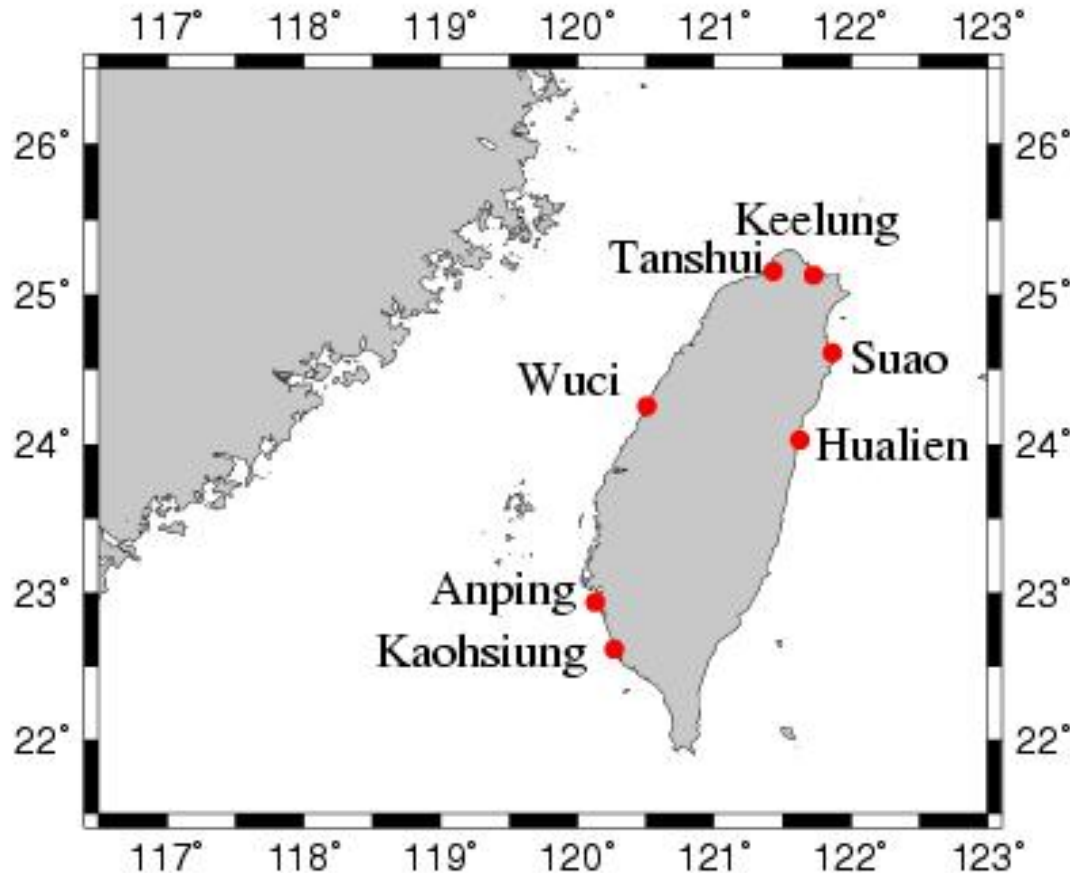
- ✓ Waves
- ✓ Currents
- ✓ SST
- ✓ Tides & water elevation
- ✓ Marine meteorological factors
- ✓ Remote sensing : X band radar images sequence
- ✓ Ship reports

Harbor Oceanic & Meteorological Database

(Harbor & Marine Technology Center, Institute of Transportation)

Waves, Currents, Tides, Wind Speed, Water Temp., Water Depths, etc.

Ministry of Transportation and Communications



Marine Meteorology DataBase

Data Types:

Tides

Waves

Sea water Temperature

Air Temperature

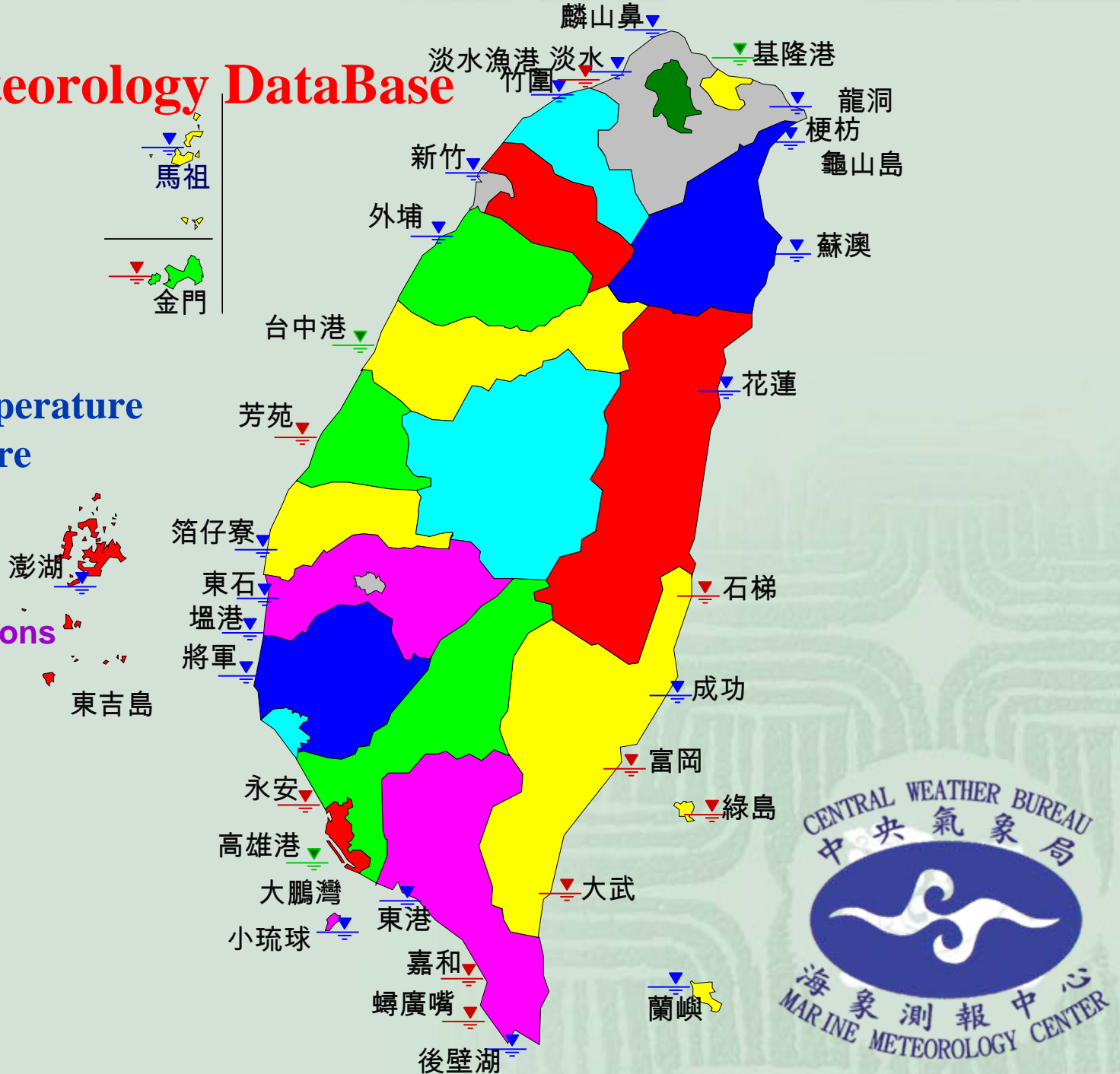
Air Pressure

Tidal Gauge Stations

▼ CWB

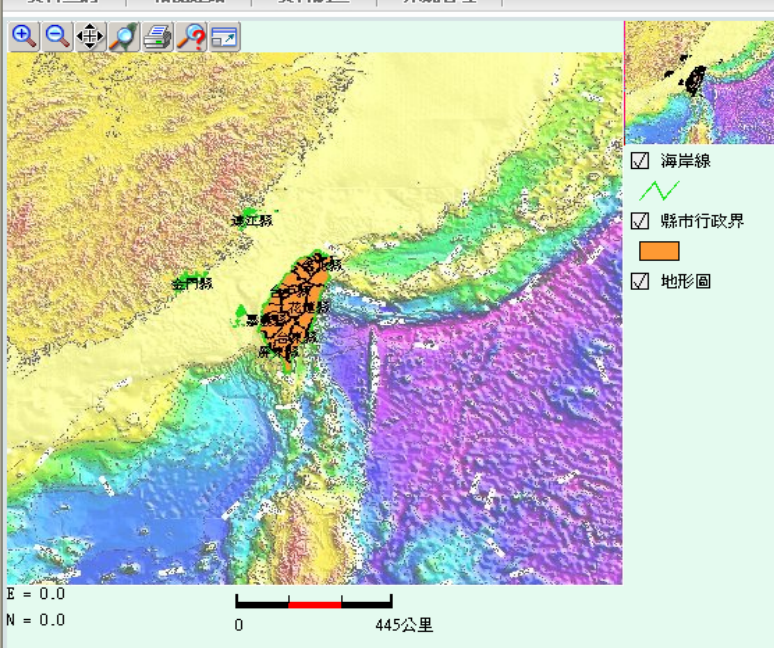
▼ WRA

▼ HA



National Ocean Data Catalog 2005-2006

System operated under Linux,
ArcIMS+Java+PostgreSQL



Three Databases:

1. Ocean Data Bank, NSC
2. Harbor oceanic & meteorological database, HOMD
3. Marine Meteorology DataBase, CWB

TaiBIF (Taiwan Biodiversity Information Facility)

Connecting to "FishBase"

Cephalopholis miniata
Coral hind

Cephalopholis miniata (Forsk., 1775)

Family: [Serranidae](#) (Sea basses: groupers and fairy basslets), subfamily: Epinephelinae

Order: [Perciformes](#)

Class: [Actinopterygii](#) (ray-finned fishes)

FishBase name: Coral hind

Max. size: 45.0 cm TL (male/unsexed)

Environment: reef-associated; marine ; depth range 2 - 150 m

Climate: tropical; 40°N - 40°S

Importance: fisheries: commercial; gamefish: yes; aquarium: commercial

Distribution: Indo-Pacific: Red Sea to Durban, South Africa and eastward to the Line Islands, including most islands in the Indian and west-central Pacific oceans. Absent from Persian Gulf and Gulf of Oman. Misidentified as *C. cyanostigma* from Reunion (Ref. 6453).

Diagnosis: Dorsal spines (total): 9-9; Dorsal softrays (total): 14-15; Anal spines: 3-3; Anal soft-rays: 9-9. Red with large, evenly spaced blue spots on head, body and fins.

Biology: Inhabits clear waters of coral reefs; more often found in exposed rather than protected reef areas (Ref. 5213). Feeds on fishes (60%, mainly *Pseudanthias squamipinnis*) and crustaceans. It forms harem groups comprising of a dominant male and 2 to 12

Academia Sinica

The Fish Database of Taiwan - Microsoft Internet Explorer

網址 (URL): <http://fishdb.sinica.edu.tw/2001new/english2.asp>

Fish Video Classification Query from FishBase

Scientific Name	<i>Cephalopholis miniata</i>		
Nomenclator	(Porscall, 1775)		
Chinese	青星九刺鮨		
Family_Chinese	鮨科		
Family	320	Serranidae	
Holotype-Locality	Red Sea	Chinese_Mainland	青星九刺鮨
Habitats	Coral	Common Name	紅格仔鮨、過魚石斑
Habitats Depth	2 - 150 M	Eatable Fish	Yes
Poisonous Fish	No	Aquarium Fish	No
Reference	臺灣魚類誌		
Economic Fish	Yes		
Distribution in Taiwan	South - Sau-luchu - Pon-Fu - Lan-I - Lue-Dau - East - West		
Character	體長橢圓形，頭長等於體高。吻圓鈍，眶間區窄，前方有一後凹，上頰骨後端擴大，延伸至眼後緣下方，前鰓蓋骨後緣具細鋸齒，不甚明顯，鰓蓋骨具三齒不齊，胸鰭寬大，稍長於後頭部，體呈橘紅色至紅褐色。頭部、體側及奇鰭軟條著帶暗色綠之淡藍灰色小斑點；胸鰭橘黃色；背鰭軟。		
Habitats	棲息於水深2~150公尺處礁石底之海域，主要於清晨及午後覓食，以小魚為主要。		
Distribution	分佈於印度-太平洋之東部，西起非洲東岸，西至馬撒爾群島，北自日本南部，南至澳洲。本省主要產於澎湖。		
Utility	一般漁法以一支釣、魚籠捕獲，魚體較小型，以煮過較宜，肉質佳。		

臺灣魚類資料庫 - Microsoft Internet Explorer

網址 (URL): <http://fishdb.sinica.edu.tw/2001new/main1.asp>

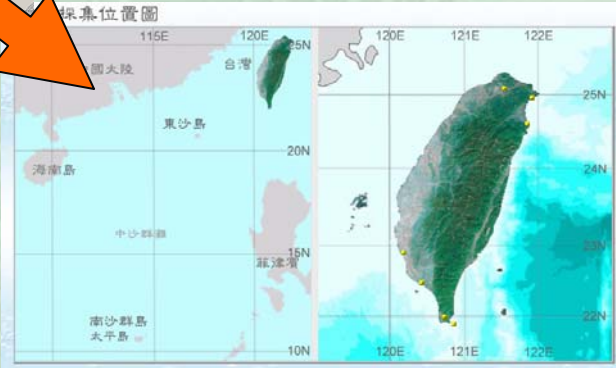
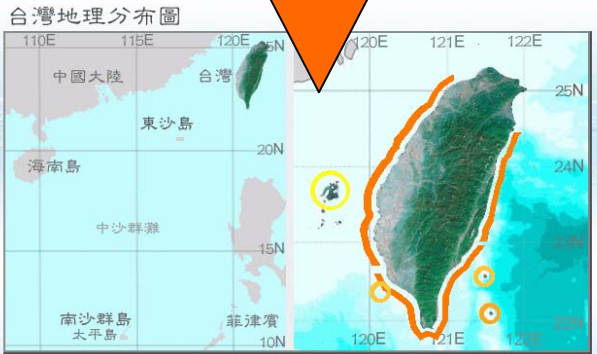
Cephalopholis miniata 生態照

台灣魚類資料庫
網站導覽
基本資料庫
分類系統
載基本資料
分類查詢
外型查詢
載名錄
載典類



It's classification system

- Classification Table of *Cephalopholis miniata*
- Subphylum Vertebrata
 - Class Actinopterygii 輻鰭魚綱
 - Subclass Neopterygii 新鰭魚亞綱
 - Order Perciformes 鱸形目
 - Suborder Percoidae 鱸亞目
 - Family Serranidae 鮨科
 - Genus *Cephalopholis* 九刺鮨屬
 - Cephalopholis miniata* 青星九刺鮨
 - This is Taiwanese Fish
 - Query from Taiwan Fishbase

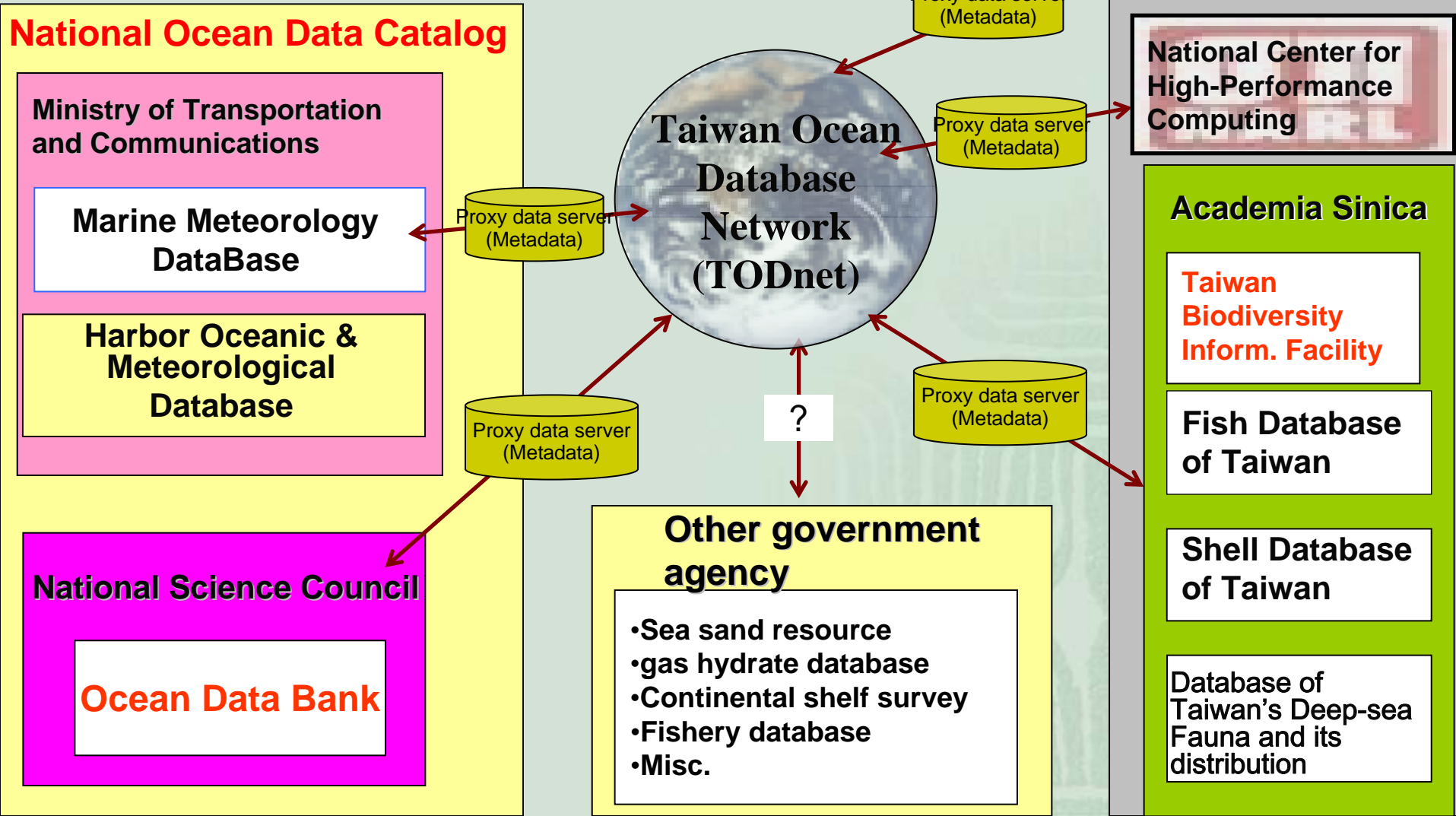


青星九刺鮨 *Cephalopholis miniata* 分佈於台灣：東部、西部、南部、澎湖、小琉球、蘭嶼、綠島

Cephalopholis miniata 計有「12」筆標本典藏

Taiwan Ocean Database Network (TODnet)

A national platform for exchange and integration of oceanographic and marine data and information



A Role Model

IODOE - SeaDataNet - Windows Internet Explorer

http://www.iode.org/index.php?option=

檔案(F) 編輯(E) 檢視(V) 我的最愛(A) 工具(C)

Google G SeaDataNet 開啟

IODOE - SeaDataNet

INESCO IODE Intergovernmental Oceanographic Commission of UNESCO International Oceanographic Data and Information Exchange

General Information

- Home
- About IODE
- Data Management
- Info Management
- Outreach/Promotion

Expert Information

- Policy/Strategy
- Structure
- Activities
 - Global Activities
 - Standards Forum
 - ASFA
 - CODAR
 - CTSP
 - GOSUD
 - Marine XML
 - MEDI
 - OceanDocs
 - OceanExpert
 - Ocean Data Portal
 - OceanPortal
 - OceanTeacher

Home > Activities > Global Activities > SeaDataNet

SeaDataNet

EU Project: a Pan-European infrastructure for Ocean and Marine Data Management (SeaDataNet)

Introduction

SeaDataNet (2006 - 2010) is a major Pan-European and EU-funded project, undertaken by the National Oceanographic Data Centres (NODCs), marine information services of major national institutes, from nearby all coastal states bordering the European seas. It focuses on interconnecting the data centres to provide integrated on-line access to the most comprehensive sets of multidisciplinary in-situ and remote sensing marine data, meta-data and products. The consortium comprises 49 partners of major oceanographic institutes of the 35 participating countries, acting as National Oceanographic Data Centres (NODC), Satellite Data Centres (SDC), two expert modeling centres and three international bodies. The NODCs and SDCs are highly skilled and actively engaged in data management for several decades and have the basic capabilities and facilities for data quality control, perennial safeguarding, retrieval and dissemination to both intermediate users (value adding organisations) and end-users.

SeaDataNet continues and expands previous initiatives of the consortium, in particular Sea-Search (2002-2006) and several distributed data management structures developed during MAST and the following EU marine environment projects. The recent developments made during Sea-Search were focused on metadata and have designed and populated an array of Pan-European directories (ED) of marine data & information

網際網路

開始 2 Wi... Conta... 即時... 收件... 2 Mi... 2 Int... 國家... UNEP... 下午 10:24

Ocean Database in TORI (2009-)

- **Shipboard**

 - Hydrographic data

 - Geological data

 - Geophysical data

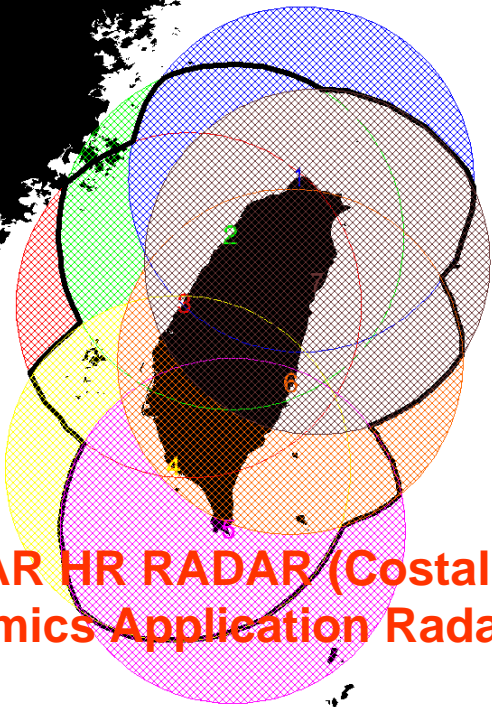
 - Biological data

- **Long-term observatory and monitoring data**

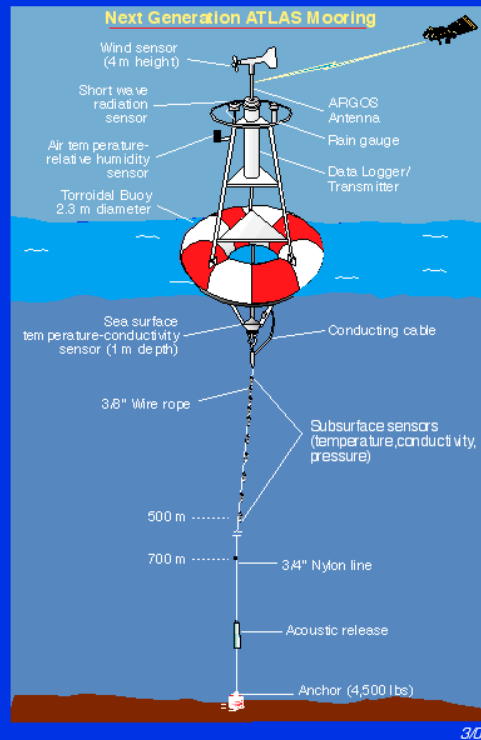
- **Remote sensing data (ocean color / SST)**

- **Core repository**





CODAR HR RADAR (Costal Ocean Dynamics Application Radar)

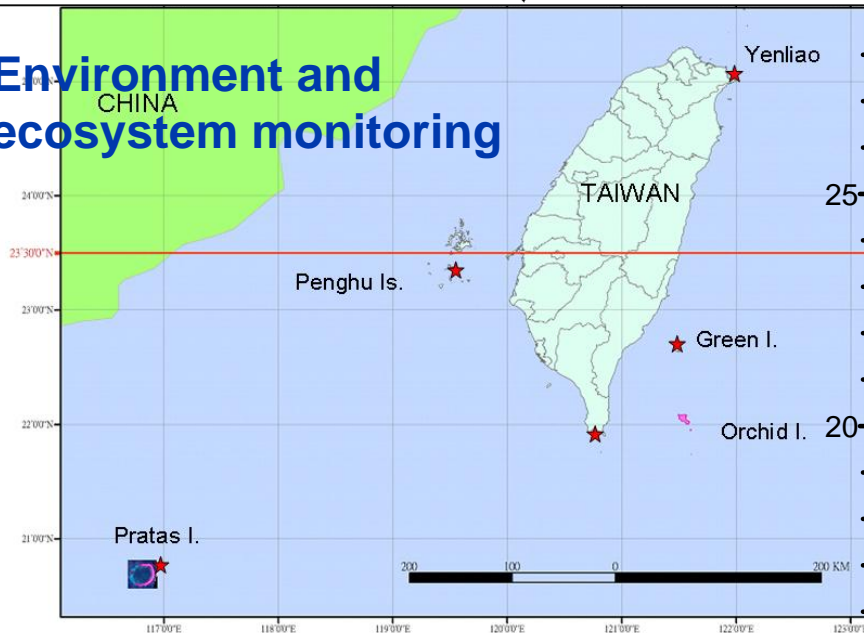


Long-Term Observatories

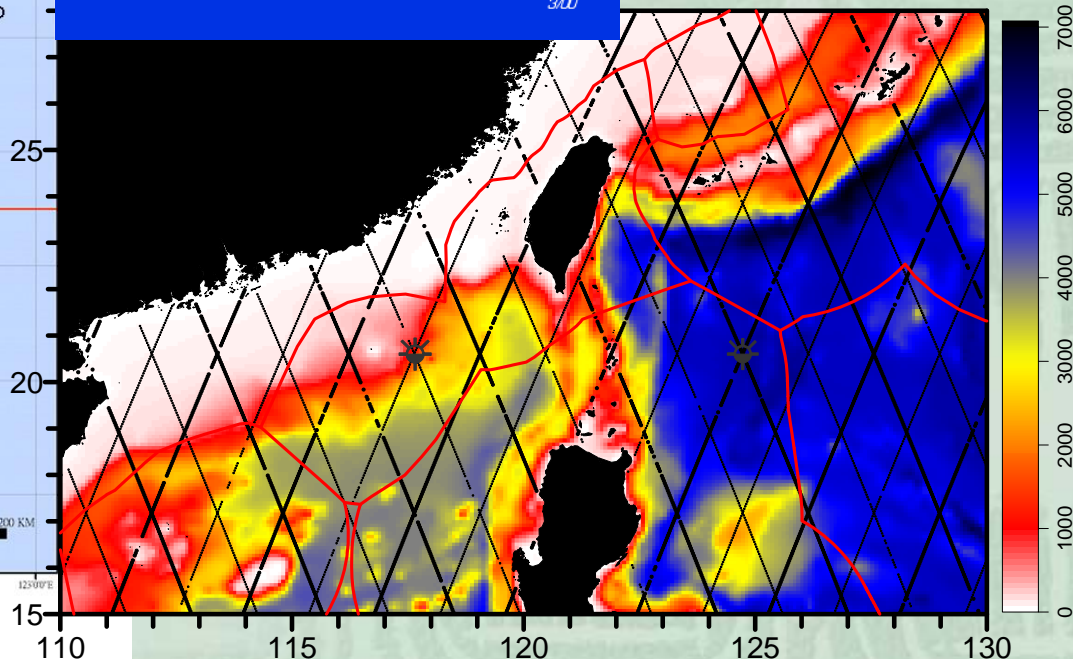
Monsoon Observatories (Deep Sea Moored Buoys)

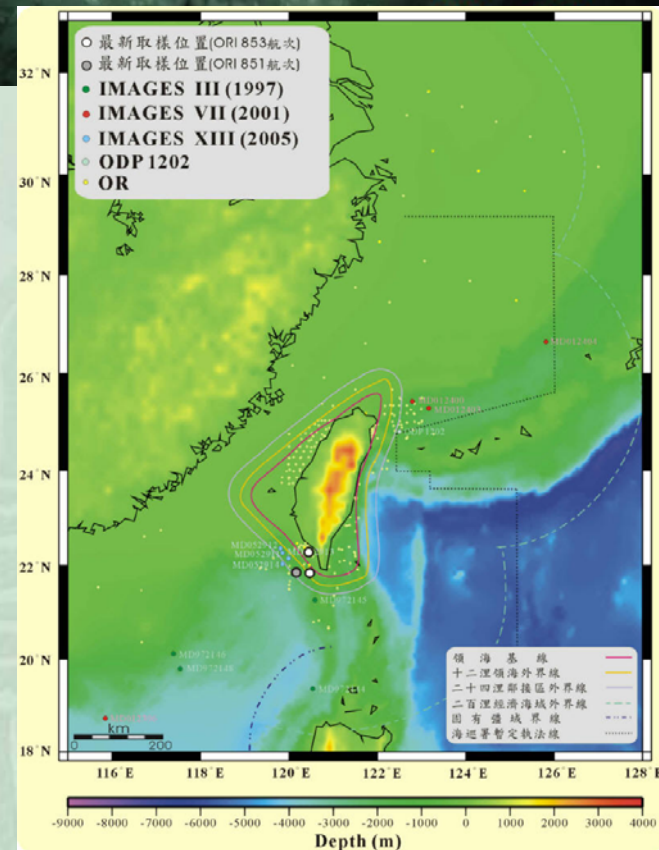
Satellite Data

Environment and ecosystem monitoring



* Asterisks indicate the proposed ICON sites





Core Repository and Laboratory

1. Store and archive high-quality marine sedimentary core samples.
2. Facilitate first-rate laboratory and data base equipments for marine sedimentary core research.
3. Provide service on core sampling, analysis, and consultation for scientists on marine sedimentary core research.

Summary

- **A national ocean data and metadata network will be established (a 2-phase 8-year project).**
- **A new national core repository and laboratory will be constructed at Taiwan Ocean Research Institute (TORI) headquarter campus (2012?).**
- **Experience sharing and international cooperations are welcome.**

