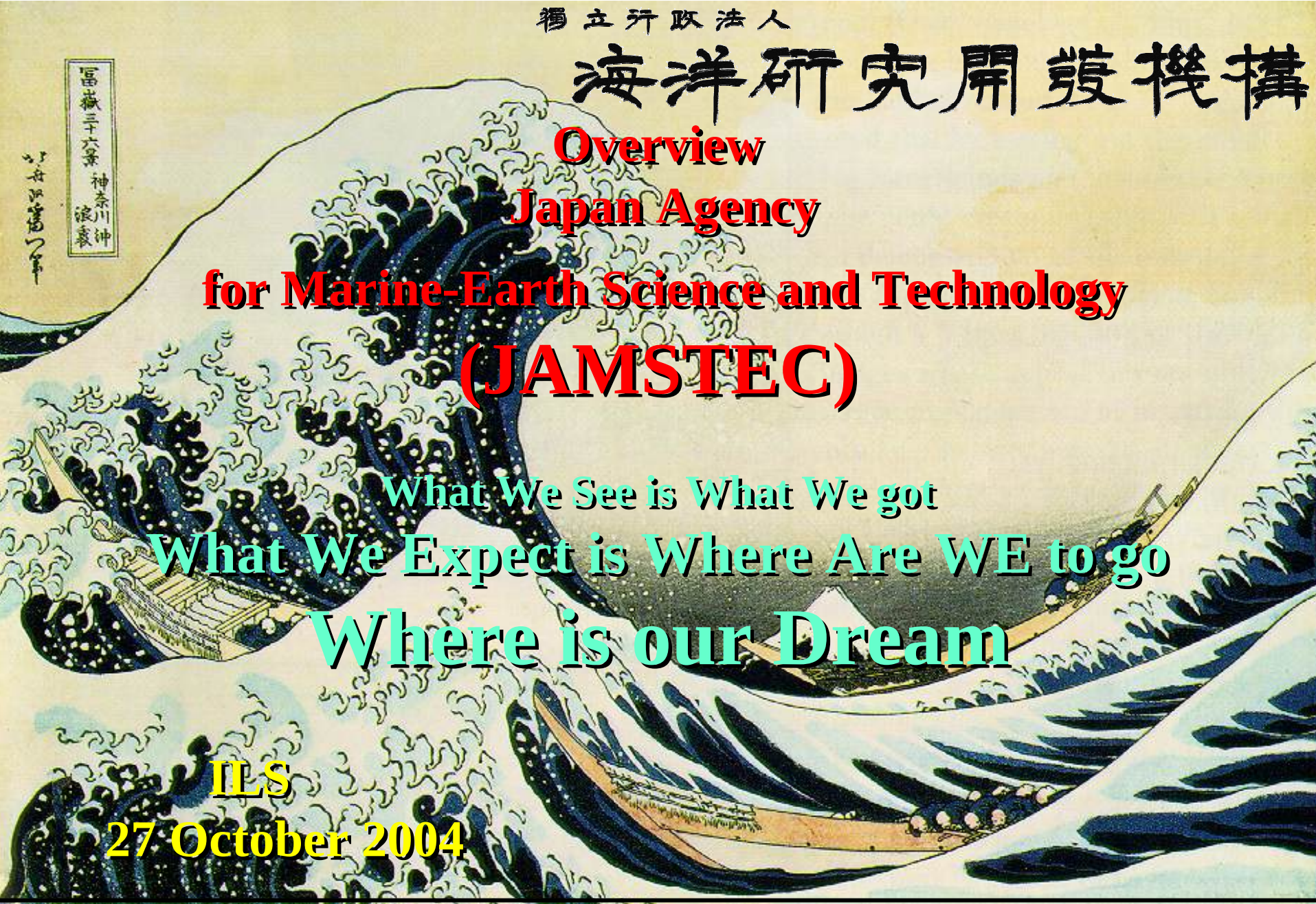


独立行政法人

# 海洋研究開発機構

## Overview

## Japan Agency

## for Marine-Earth Science and Technology

## (JAMSTEC)

What We See is What We got

What We Expect is Where Are WE to go

Where is our Dream

ILS

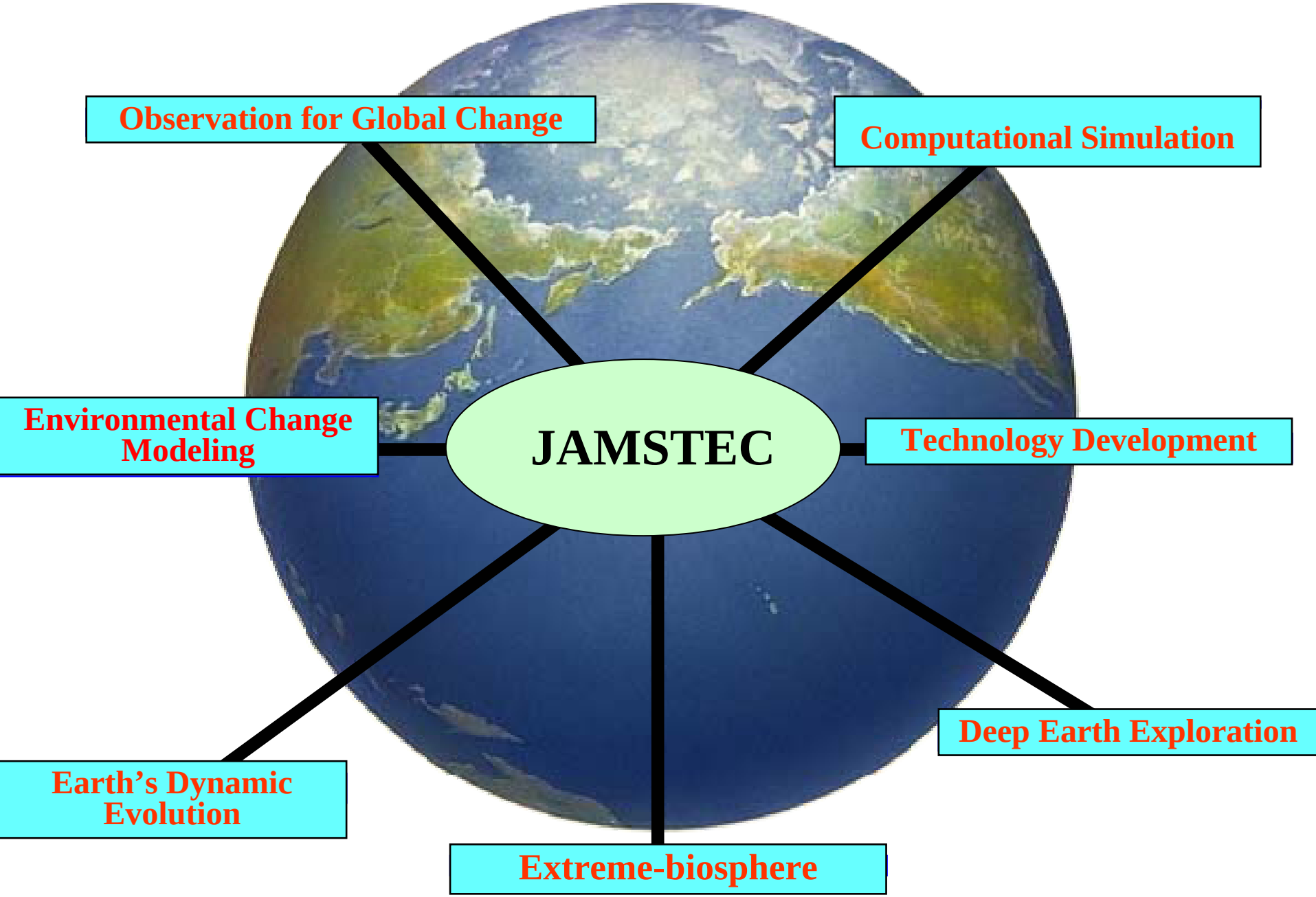
27 October 2004



Jim Kinoahita

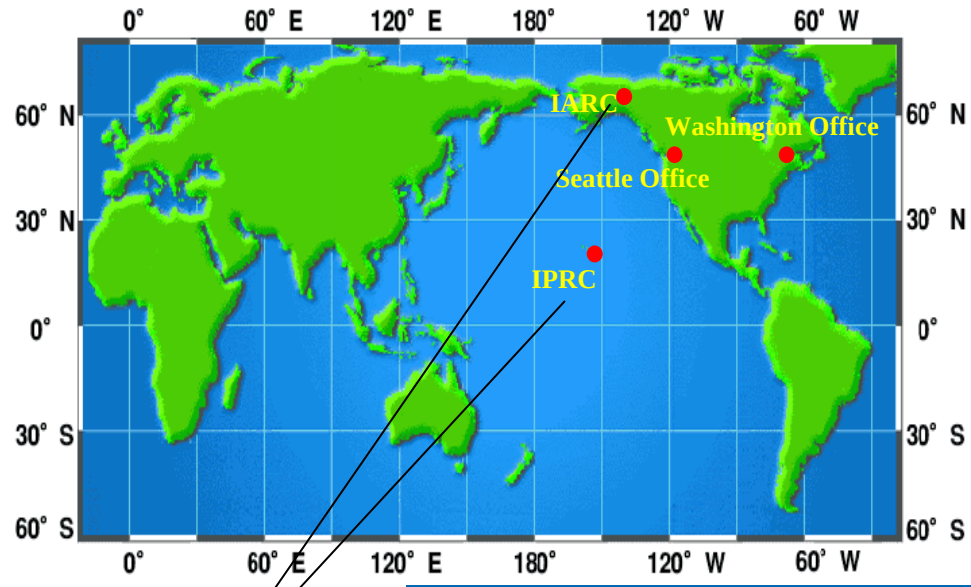
Atmosphere/Ocean/Solid Earth

Engineering/Technology




Treasure Hunter

# Location




Contract of Research

Mutsu Institute for Oceanography (MIO)

Tokyo Office

Yokohama Institute for Earth Sciences (YES)

*Headquarters*

Kochi Office

*IODP*

Global Oceanic Data Center (GODAC)

Japan Agency for Marine-Earth Science and Technology

JAMSTEC

# *What We are Doing and Where*

*Fleet Consisting of:*

1 **Oceanography** R/V (with Ice Class)
2 **Seismic Exploration** R/V
3 Manned-Deep Sea **Subs**
4 Unmanned Deep Sea Subs: **AUV, ROV**
5 Deep Sea **Drilling** R/V

# JAMSTEC FLEET
## (Research Vessel)

### *NATSUSHIMA(1981)*

- Length: **67.4m**
- Breadth : **13.0m**
- Depth : **6.3m**
- Draft : **3.6m**
- Gross Tonnage : **1,553t**

Rov

### *KAIYO(1985)*

- Length: **61.6m**
- Breadth : **28.0m**
- Depth : **10.6m**
- Draft : **6.3m**
- Gross Tonnage : **3,176t**

G

### *YOKOSUKA(1990)*

- Length: **105.2m**
- Breadth : **16.0m**
- Depth : **7.3m**
- Draft : **4.5m**
- Gross Tonnage : **4,439t**

Sub

### *KAIREI(1997)*

- Length: **105.2m**
- Breadth : **16.0m**
- Depth : **7.3m**
- Draft : **4.5m**
- Gross Tonnage : **4,628t**

Seis

### *MIRAI (1997)*

- Length: **128.6m**
- Breadth : **19.0m**
- Depth : **10.5m**
- Draft : **6.9m**
- Gross Tonnage : **8,687t**

O

### *TANSEI-MARU (1982)*

- Length: **50.0m**
- Breadth : **9.2m**
- Depth : **4.2m**
- Draft : **3.7m**
- Gross Tonnage : **480t**

F

### *HAKUHO-MARU (1989)*

- Length: **100.0m**
- Breadth : **16.2m**
- Depth : **8.9m**
- Draft : **6.0m**
- Gross Tonnage : **3,987t**

G

# JAMSTEC FLEET
## (Submersible and Underwater Vehicles)

## Deep

### *KAIKO7000(2004)*

| | Launcher | Vehicle |
|---|---|---|
| Length: | **5.2m** | **2.8m** |
| Breadth : | **2.6m** | **1.8m** |
| Height : | **3.2m** | **2.0m** |
| Diving Capability : | | **7,000m** |

## Manned


### *SHINKAI 6500(1990)*

| | |
|---|---|
| Length: | **9.5m** |
| Breadth : | **2.7m** |
| Height : | **3.2m** |
| Diving Capability : | **6,500m** |

## Shallow


### *Hyper-Dolphin(1999)*

| | |
|---|---|
| Length: | **3.0m** |
| Breadth : | **2.0m** |
| Height : | **2.3m** |
| Depth Capability : | **3,000m** |
| Weight (air) : | **3.8t** |


## Auto

### *URASHIMA(2000)*

| | |
|---|---|
| Length: | **9.7m** |
| Breadth : | **1.3m** |
| Height : | **1.5m** |
| Depth Capability : | **3,500m** |
| Range : | **300km** |

*Japan Agency for Marine-Earth Science and Technology*

**JAMSTEC**

# *Development of Cutting-Edge Technologies of Earth and Ocean Observing and Monitoring Systems*

# Autonomous


*Hydrogen Fuel Cell : Metallic $H_2$ Storage , Nano-metal $O_2$ Storage Compounds*
*Optical Fiber Gyro*
*Hyper Vision TV and High Sensitivity Camera (ASA 4000)*
*Depth Range 3500 m Cruise Range 300 km Repeatability 10 km*
*Data Uplink to a Surface Support Transmitter Side Scan 400 kHz Seabeam 100 kHZ*
*Water Sampler and other heavy duty tools*


Chikyu
112 m
57,500tons
150 persons
2500 m Riser
Extension: 4000 m
12,000 m Drill String
ちきゅう
CHIKYU

# Scrutinizing Earth's Interior

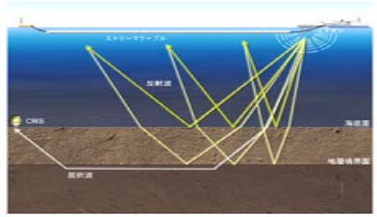
**Pre-site Survey**

*Diving*

*Surface*

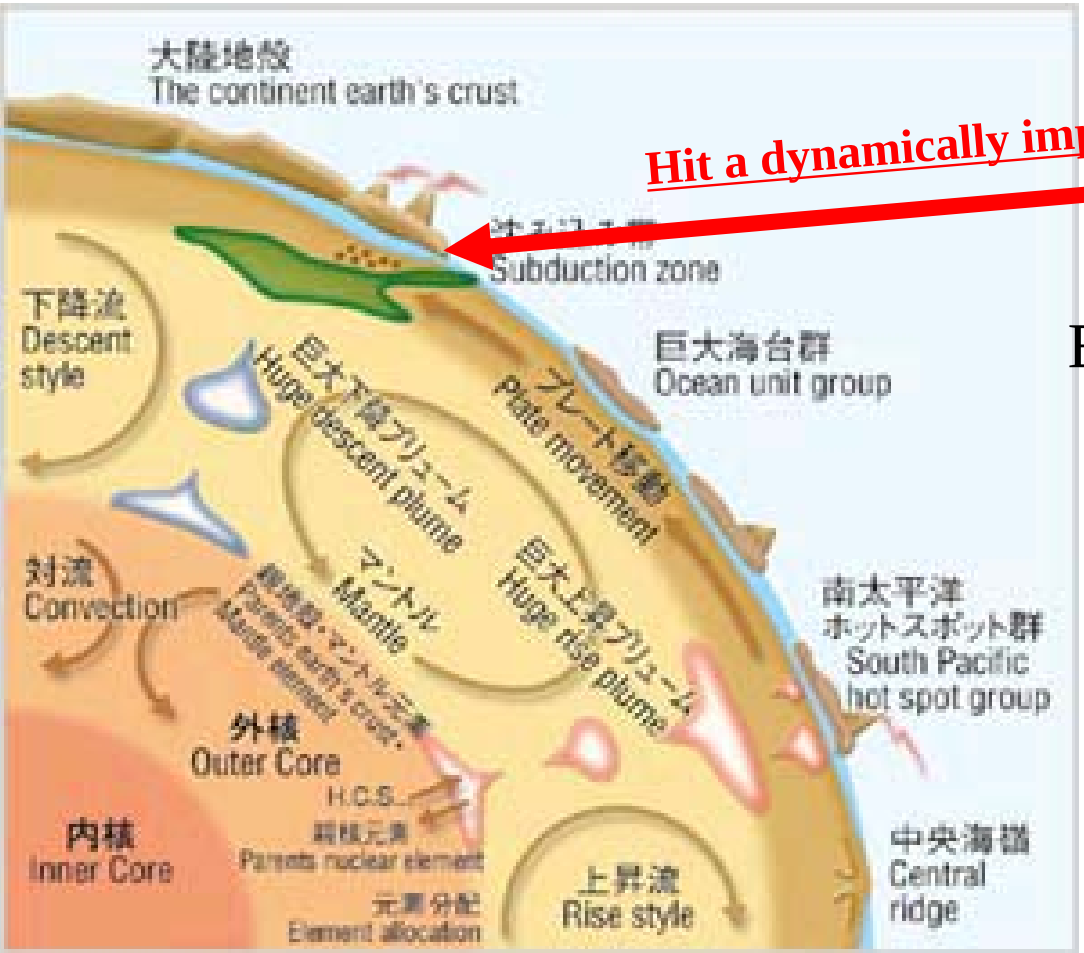
**Pre-drill Survey**

*Bottom*



*Tapping*

*Drilling*




**Hit a dynamically important point**

Technology

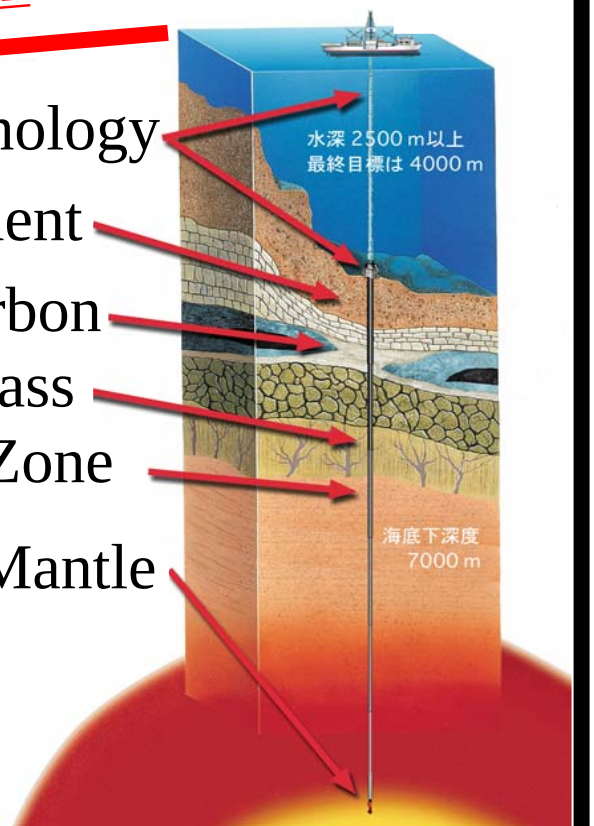
Environment

Hydrocarbon

Biomass

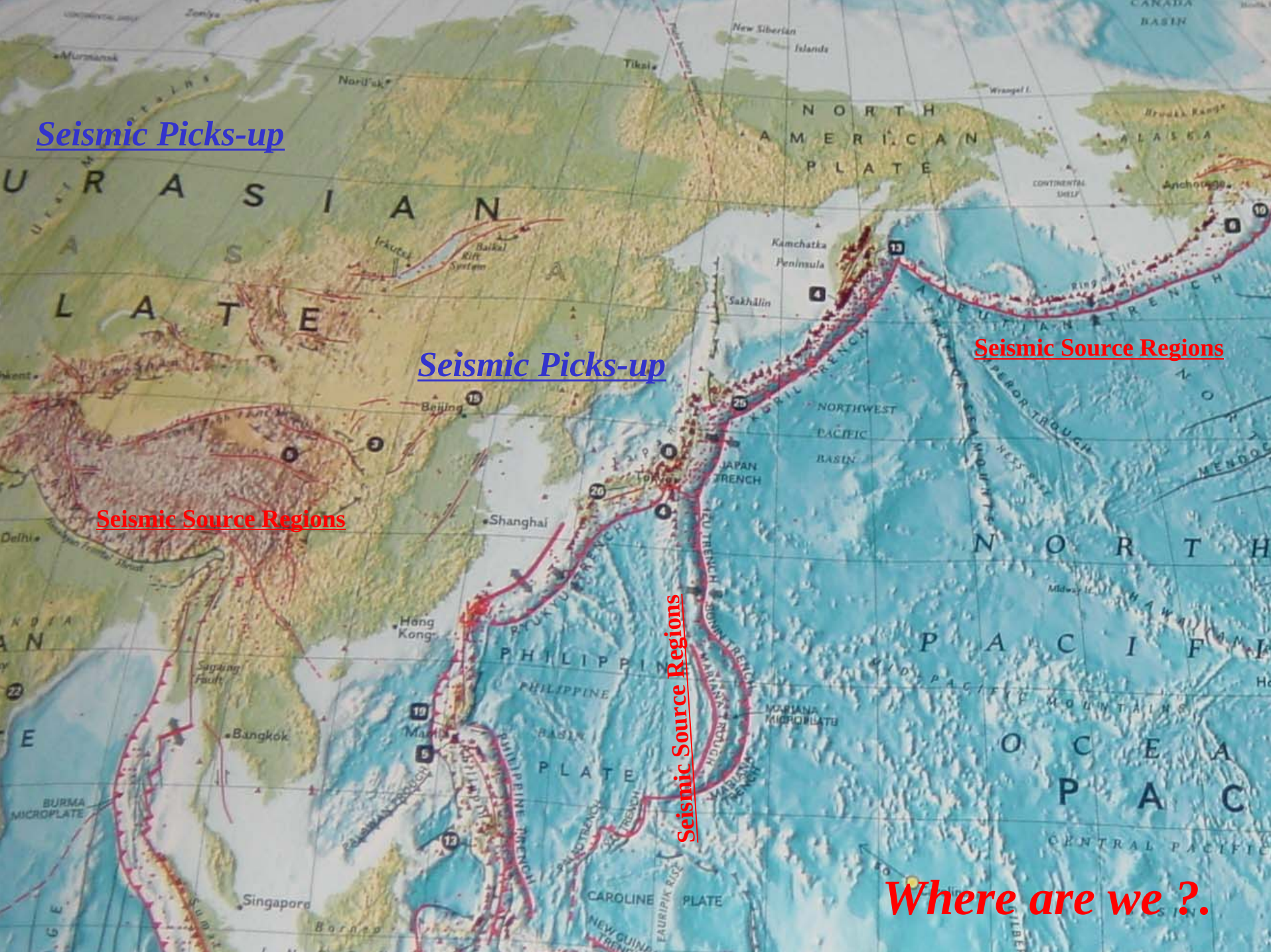
Seismic Zone

Mantle

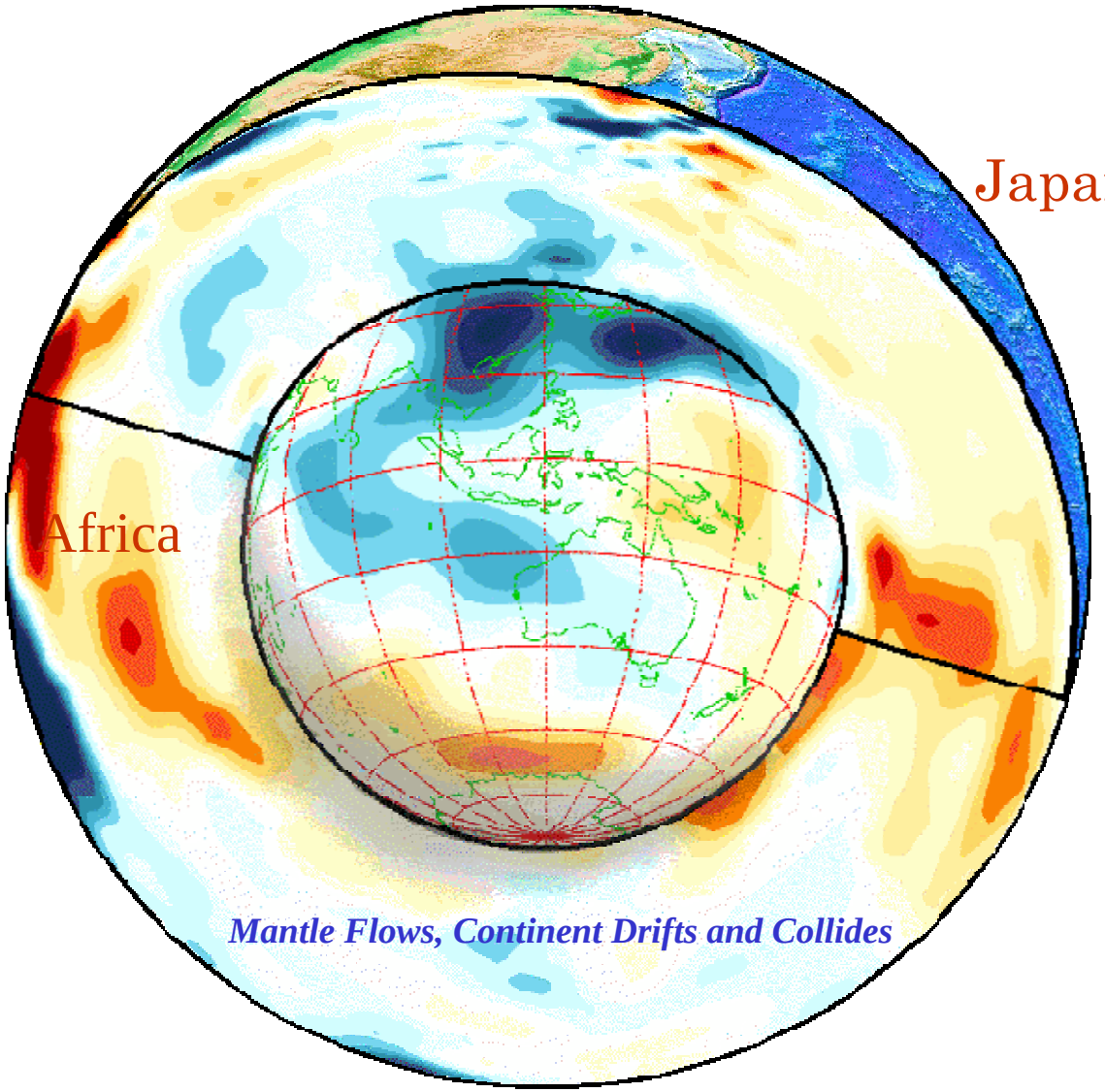


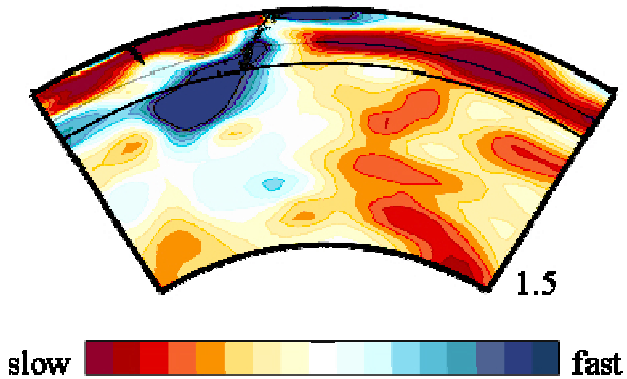
# *Understanding Dynamic Behavior of the Solid Earth Interior*

*Via Seismic Methods*

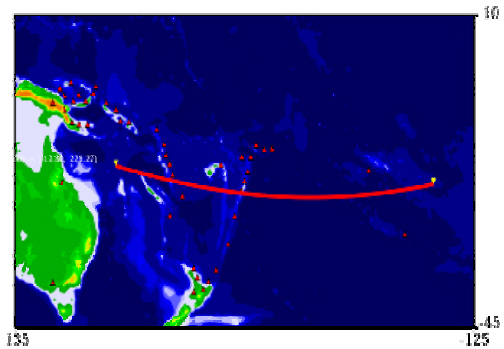

Seismic Picks-up
Seismic Picks-up
Seismic Source Regions
Seismic Source Regions
Seismic Source Regions
Where are we ?.
EURASIAN PLATE
NORTH AMERICAN PLATE
PACIFIC OCEAN
PHILIPPINE PLATE
CAROLINE PLATE
BURMA MICROPLATE
Murmansk
Norilsk
Tiksi
New Siberian Islands
Irkutsk
Baikal Rift System
Kamchatka Peninsula
Sakhalin
Anchorage
Beijing
Shanghai
Hong Kong
Delhi
Bangkok
Singapore
Borneo
Sagaing Fault
Andaman Trench
Philippine Trench
Japan Trench
Izu Trench
Bonin Trench
Mariana Trench
Aleutian Trench
Kuril Trench
Ryukyu Trench
Philippine Basin
Northwest Pacific Basin
Hawaiian Ridge
Emperor Trough
Mendocino
Central Pacific

# Inner Earth Seismic Tomography

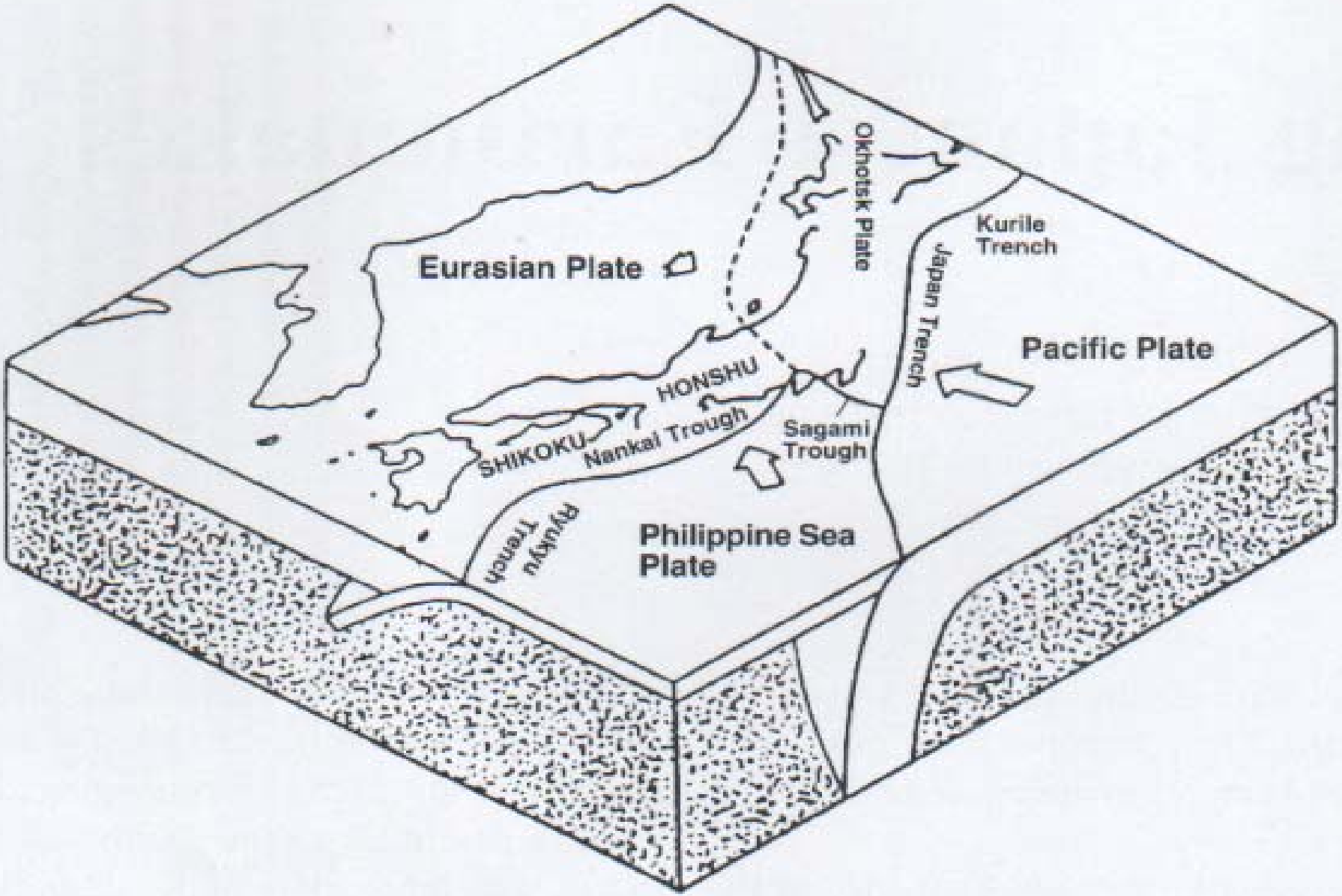


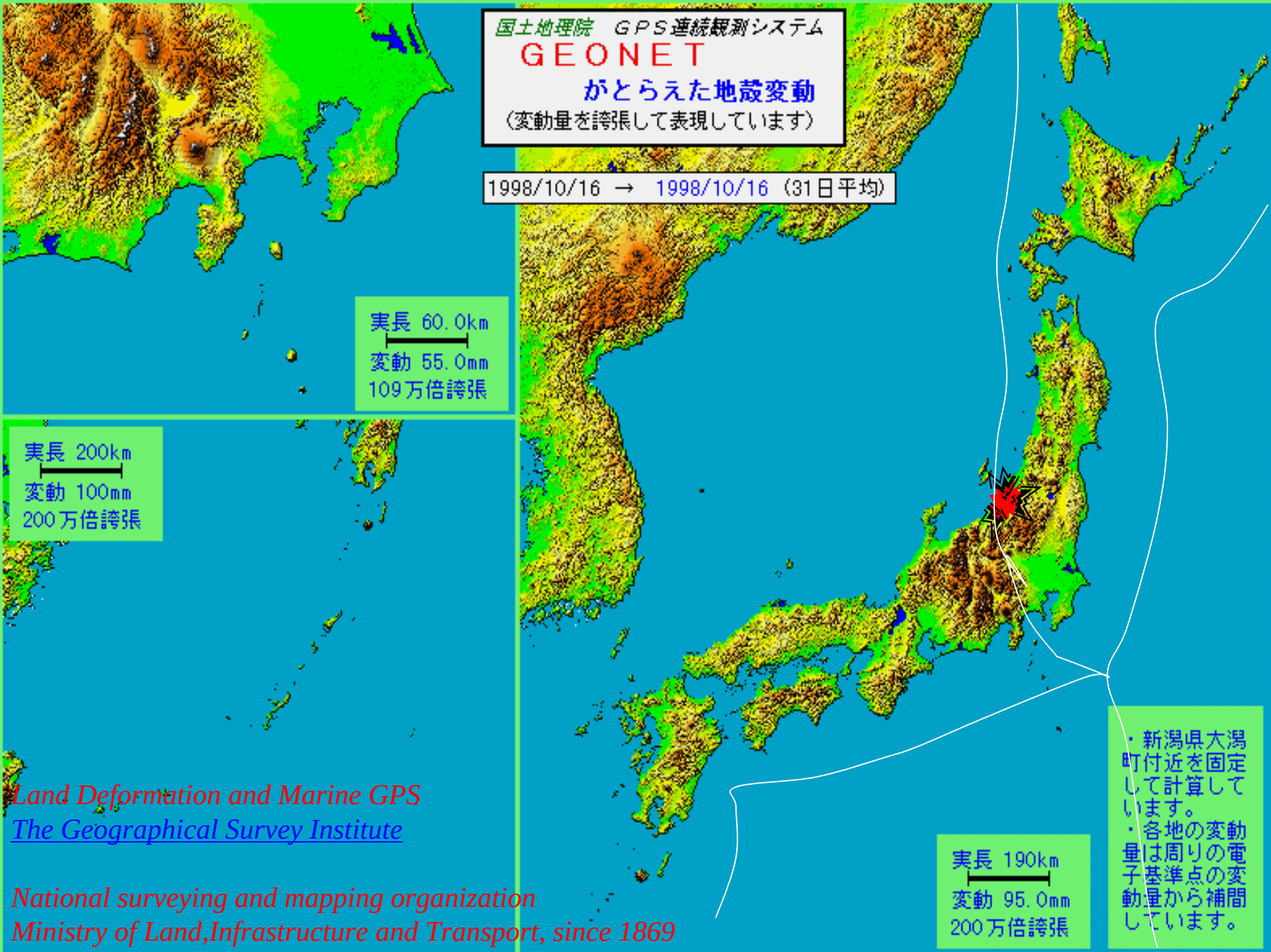

Polynesia




**Thausands of Seismic Sources** ***VS*** **Hundreds of Seismic Pick-up**



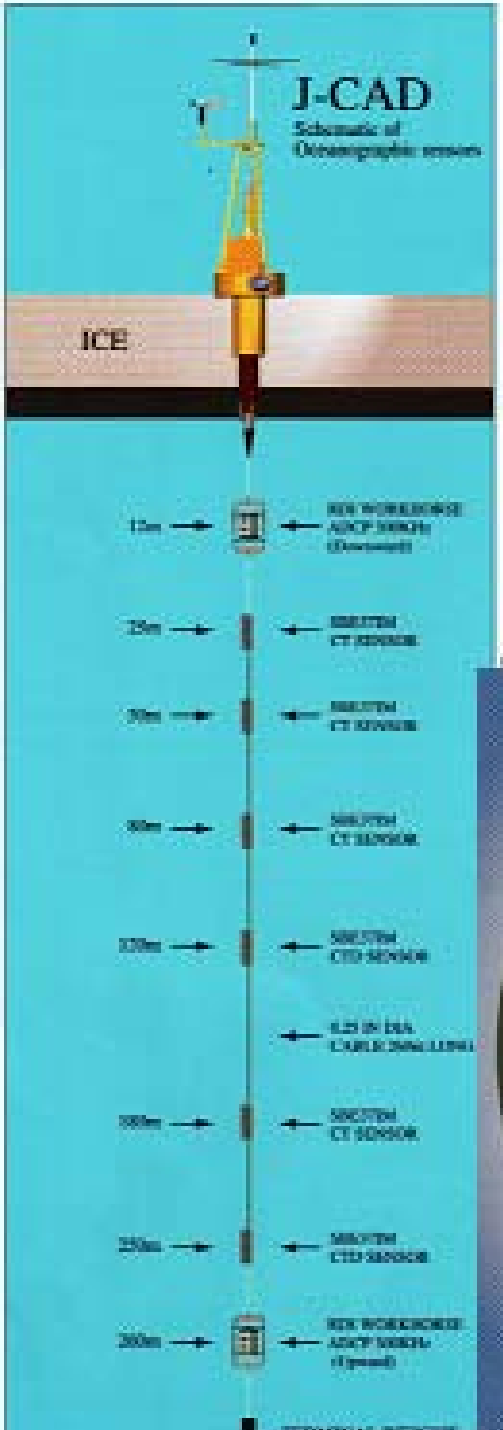

***Million seller novel: Japan Subsides***


国土地理院　ＧＰＳ連続観測システム
GEONET
がとらえた地殻変動
（変動量を誇張して表現しています）
1998/10/16 → 1998/10/16 （31日平均）
実長 60.0km
変動 55.0mm
109万倍誇張
実長 200km
変動 100mm
200万倍誇張
実長 190km
変動 95.0mm
200万倍誇張
・新潟県大潟町付近を固定して計算しています。
・各地の変動量は周りの電子基準点の変動量から補間しています。
Land Deformation and Marine GPS
The Geographical Survey Institute
National surveying and mapping organization
Ministry of Land,Infrastructure and Transport, since 1869

# *Understanding the Interaction between Ocean and Atmosphere*

## *Carbon Cycle*

## *Heat Flux*



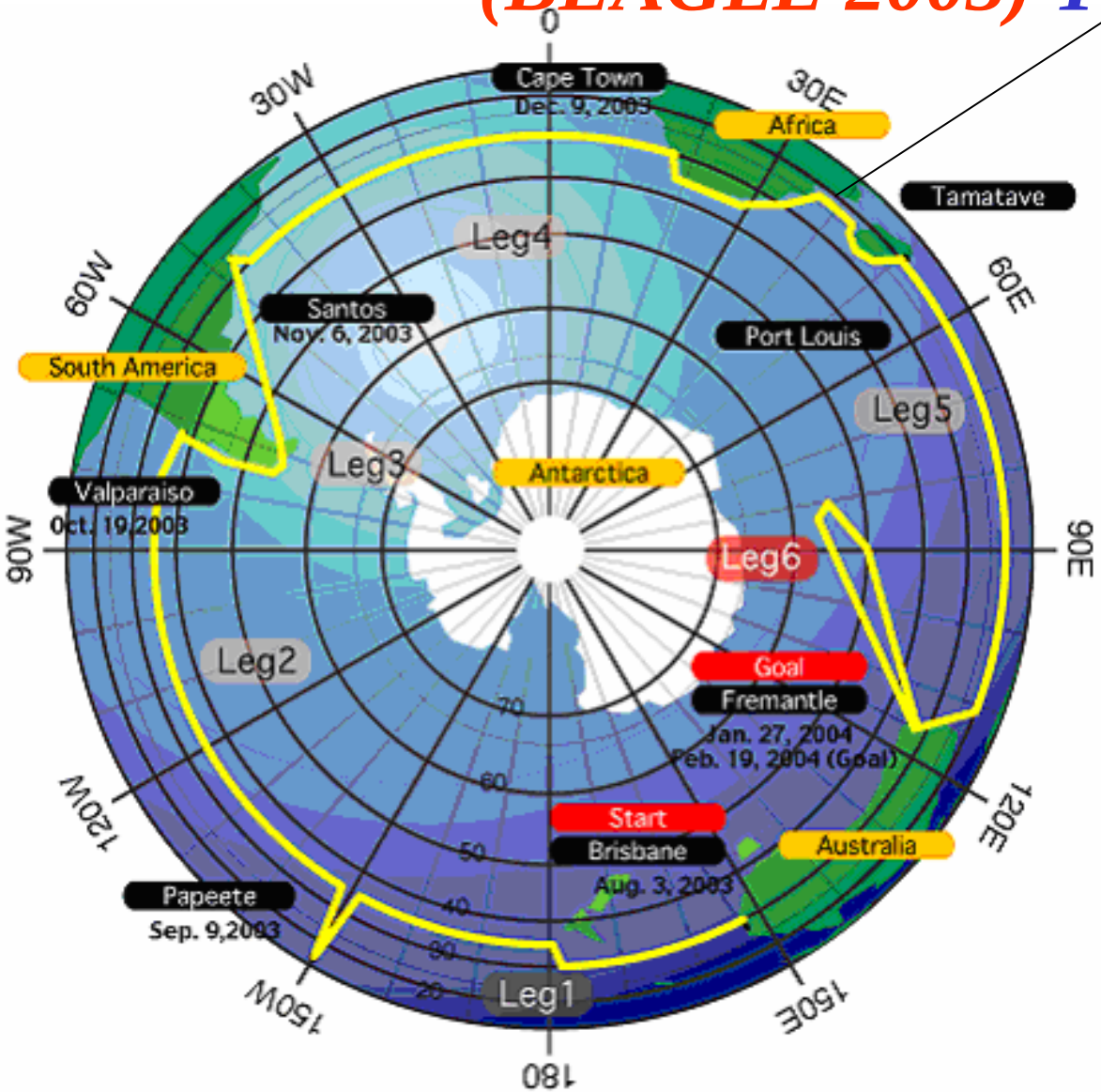

# *J-CAD Project*

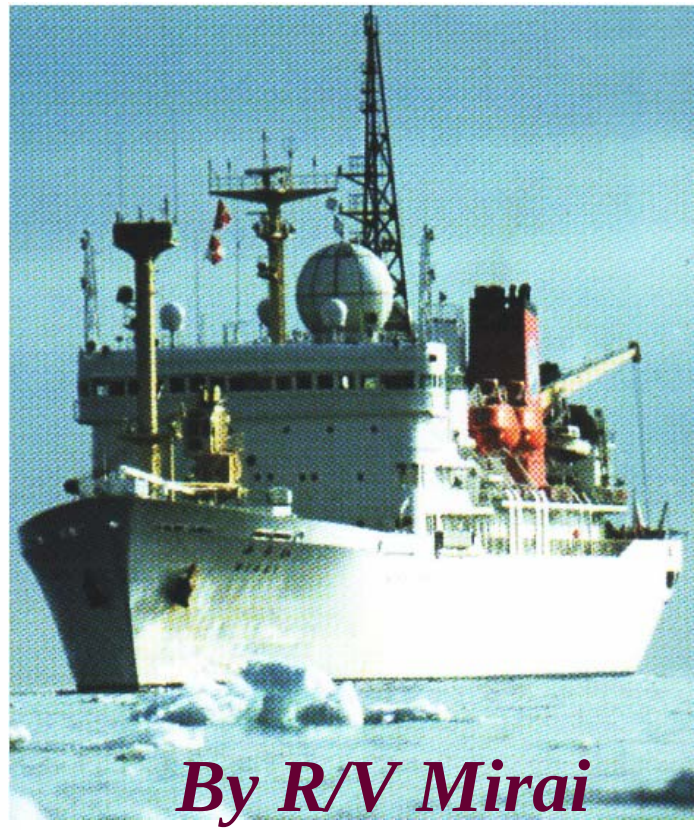
## *Searching Oceano-graphic Variability*

## *Arctic Ice Region*

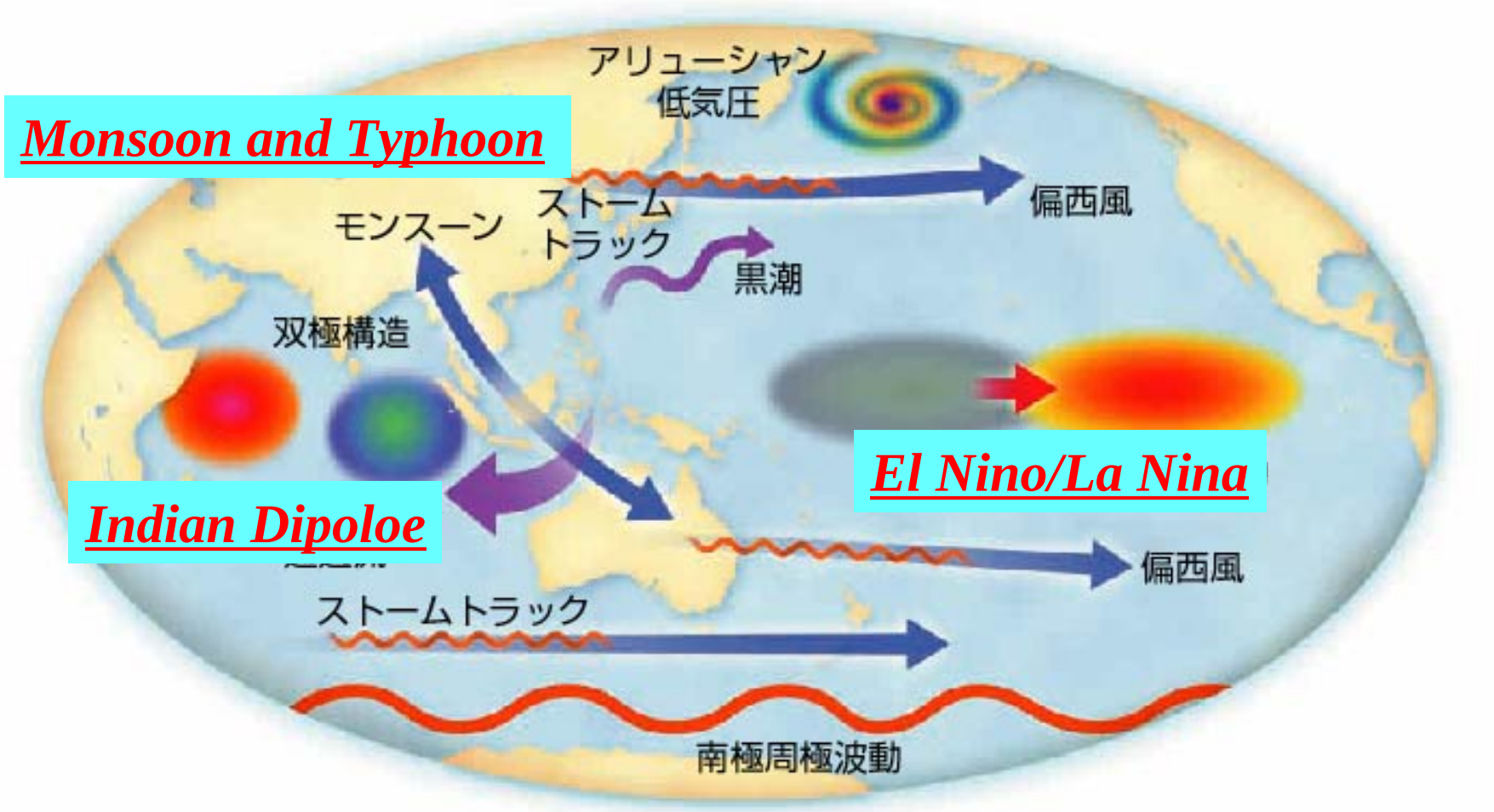
***by JAMSTEC***

# *Blue Earth Around the GLobe Experiment (BEAGLE 2003) Track*



# *El Nino　ENSO (El Nino Southern Oscillation)*



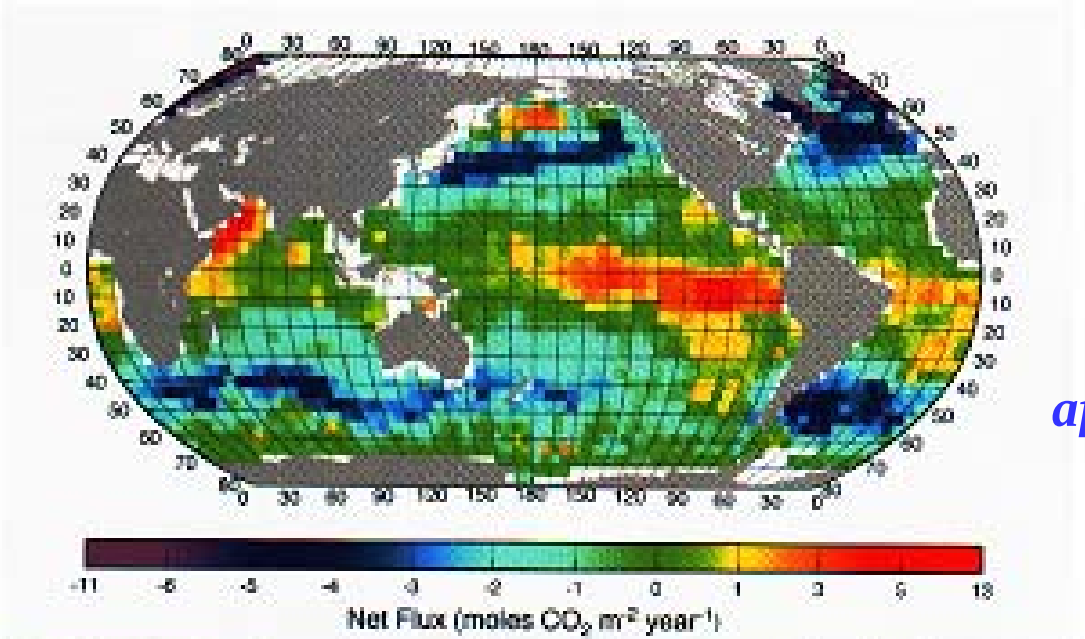

***Monsoon and Typhoon***

***El Nino/La Nina***

***Indian Dipoloe***

# *Thermohaline Circulation and Carbon Cycle*

***Discharge and Up Take of $CO_2$***




*1.5 million obs. averaged for Aug. 1995*

***aft. T. Takahashi***


***Model***

***Aft. W. Broecker***

*Ocean and The Earth*

# *Understanding the Dynamic Behavior of the Deep Earth and Deep Sea*

# *Biomass Ecosystems*

## *under Extreme Conditions (P and T)*

## *something to do with*

# *Scrutinizing the Origin of Life*


The ***Shinkai 6500*** of JAMSTEC is a manned research submersible constructed in 1990 for operational depth to 6500m. It has a length of 9.5 m, a width of 2.7 m, a height of 3.2 m and a weight of 26 t. Its pressure hull is 2.0 m in diameter and

***We'll go deeper down to 6500m and… You'll get NYLON !***

**Assistant Director, Geosciences NSF**

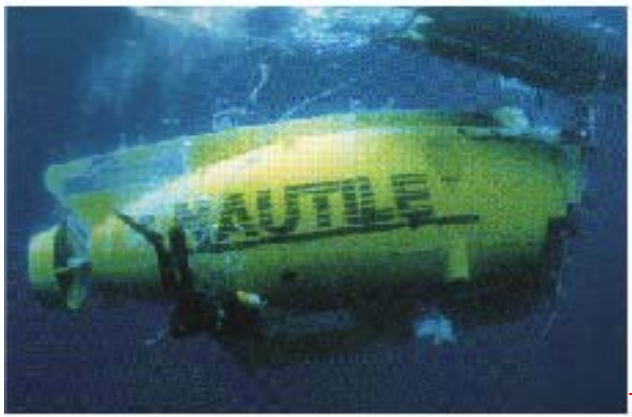




*Image of new ALVIN*

***Name after Allyn Vine***

***Service 1964 - 2007(?)***

***Big discovery 1977***

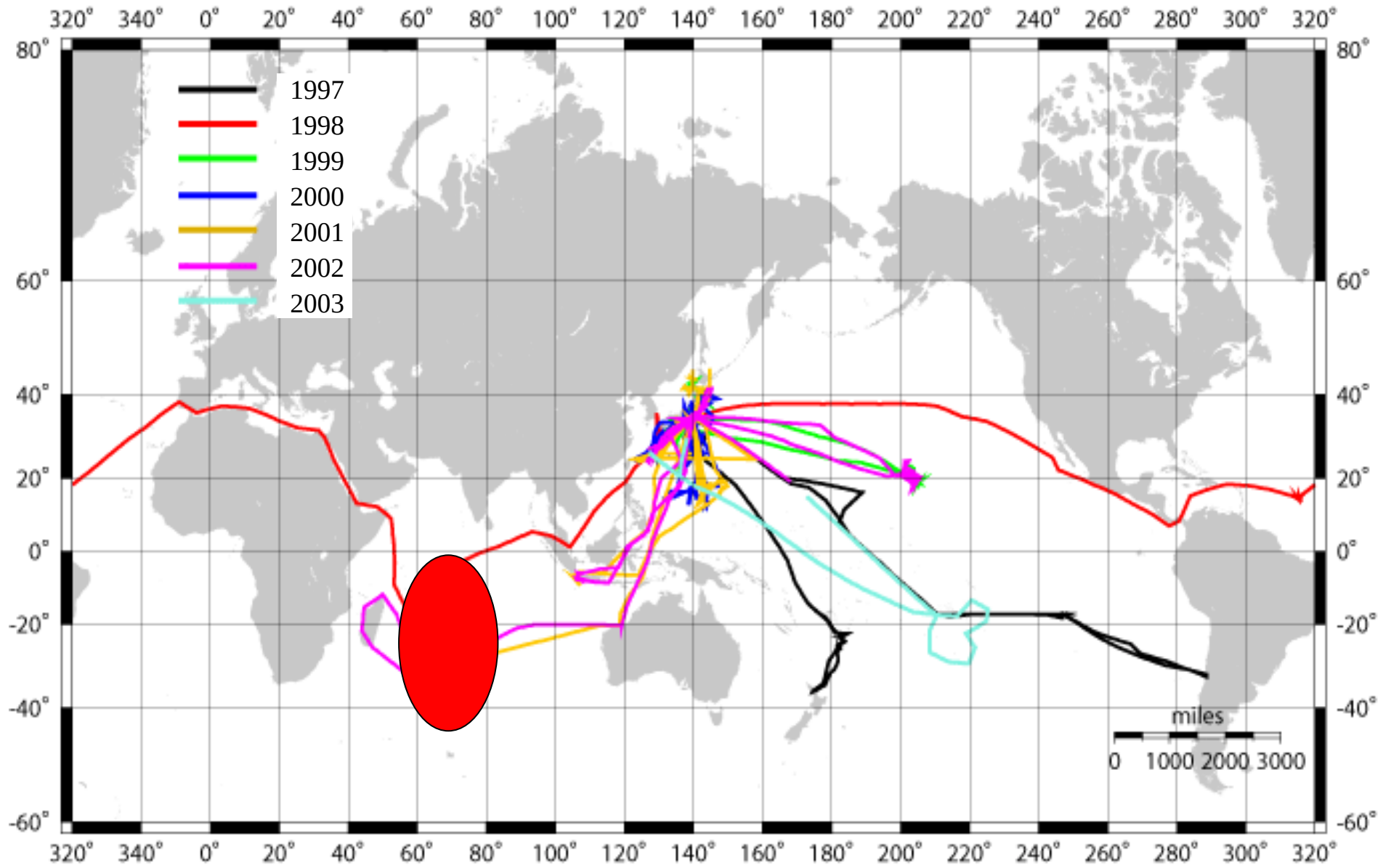
***of Deep sea biomass***

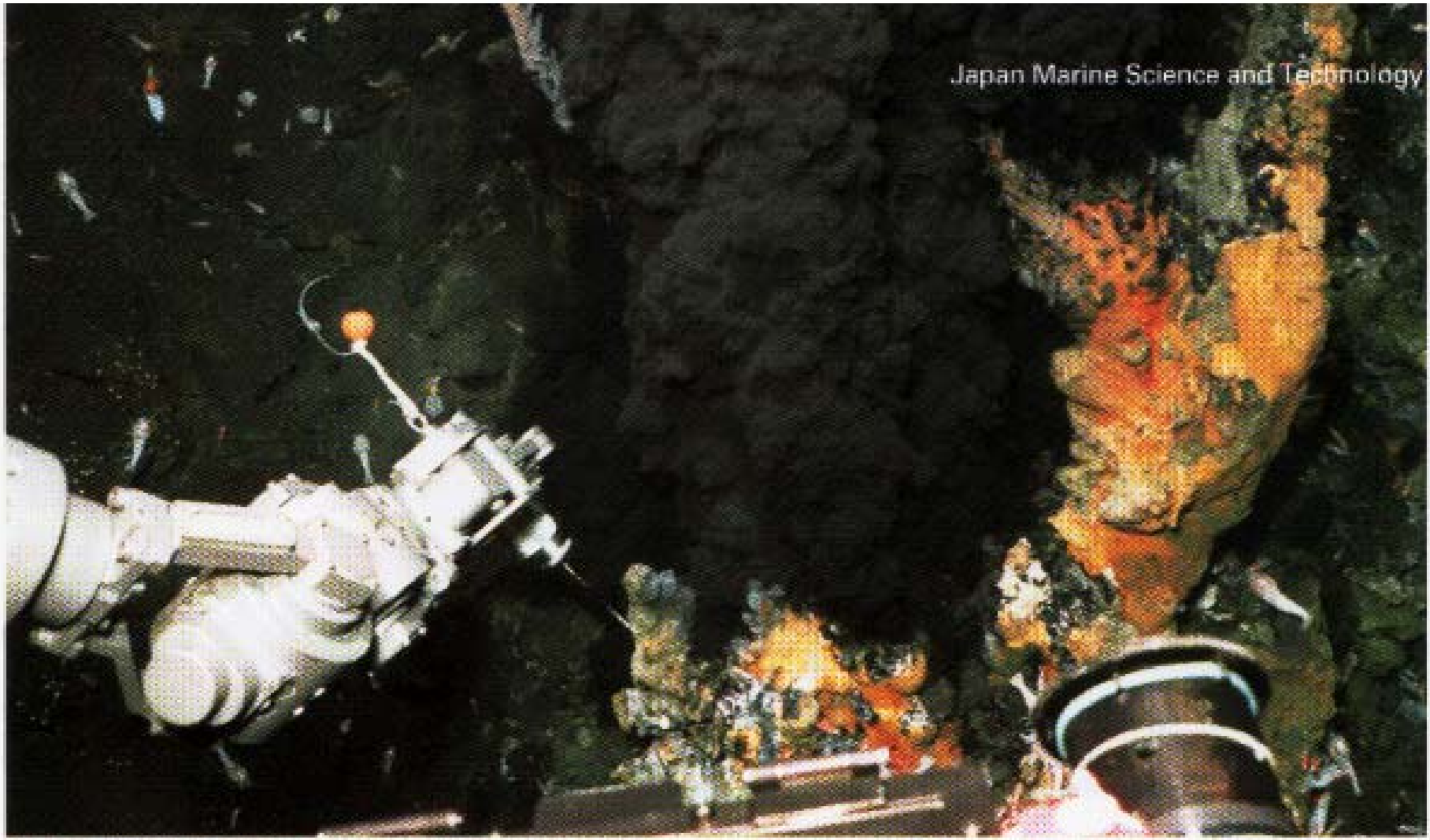
***at Galapagos Ridge***

***Newly built 2007***

***Four persons ??***

# M/V YOKOSUKA Cruise Tracks from 1997 to 2003



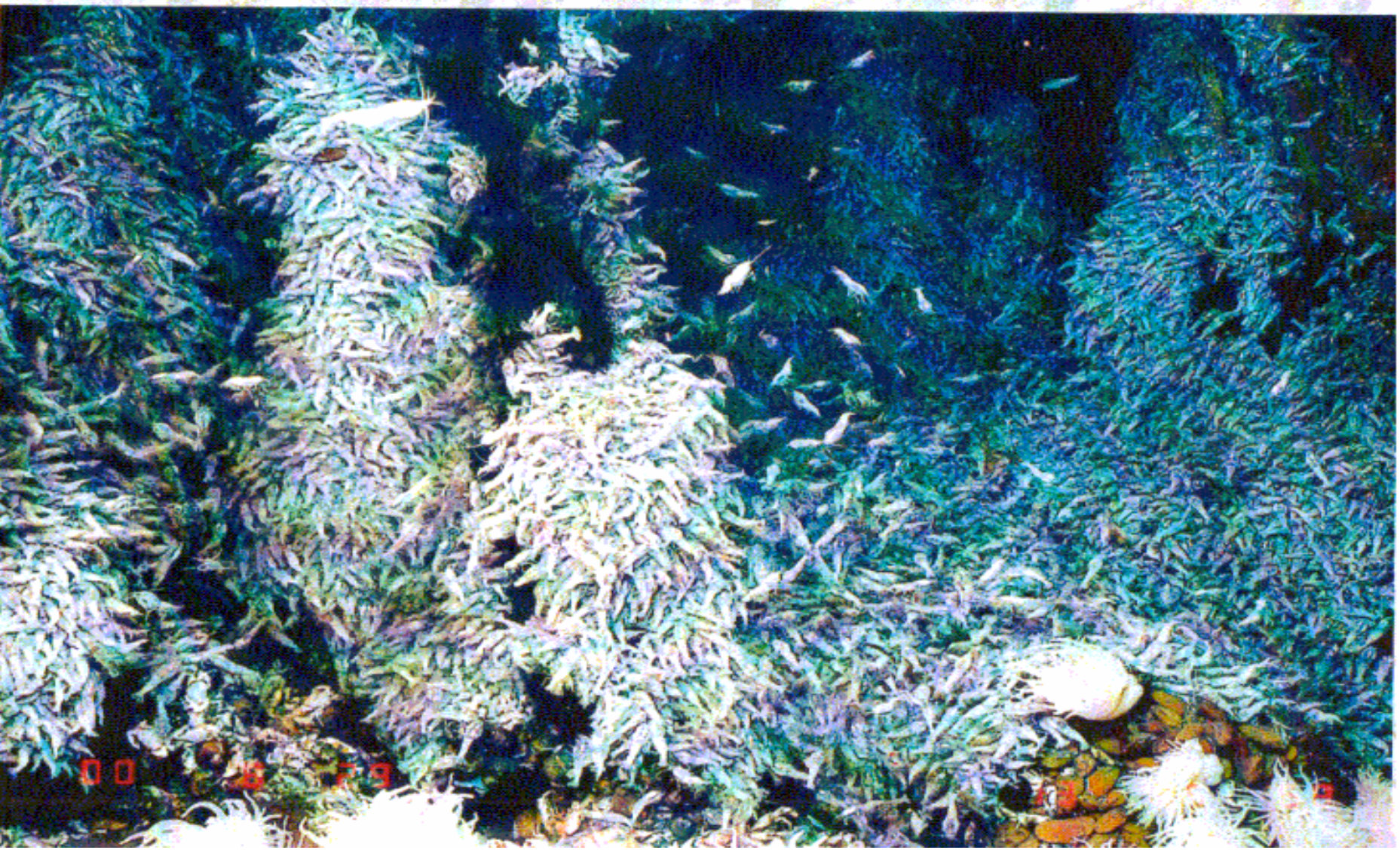



熱水噴出孔周辺の海底下には超好熱性の地殻内微生物生態系が存在する可能性が高い。（写真はインド洋中央海嶺で発見された熱水噴出孔）

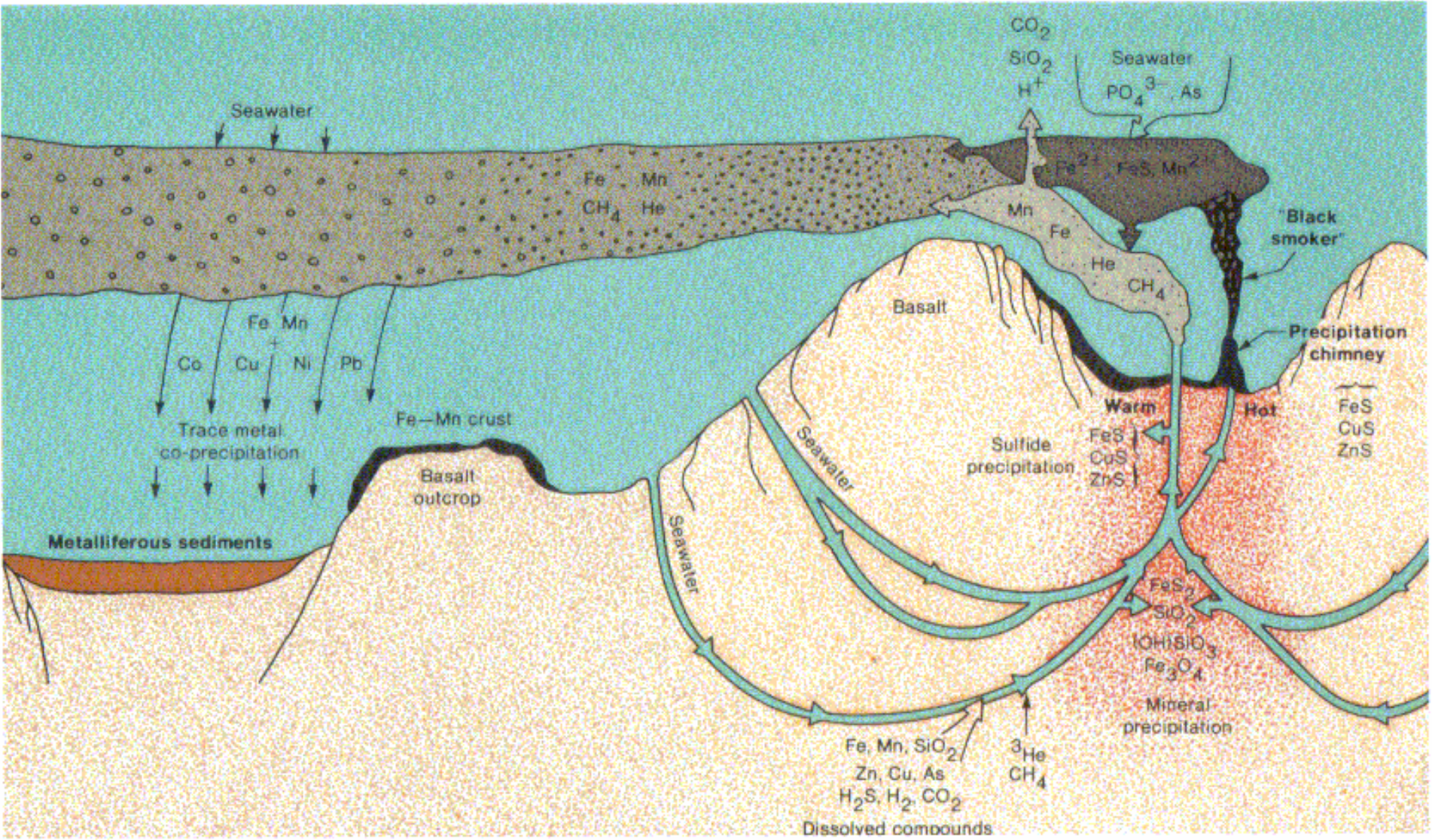
# Rodoriguez TTT, Ind. Ocean 1999

***Fuming, ejecting and belching fury of Rodoriguez Junction, SW Ind. Ocean***

# インド洋ロドリゲス三重点で見つかった
# 熱水噴出孔生物群集



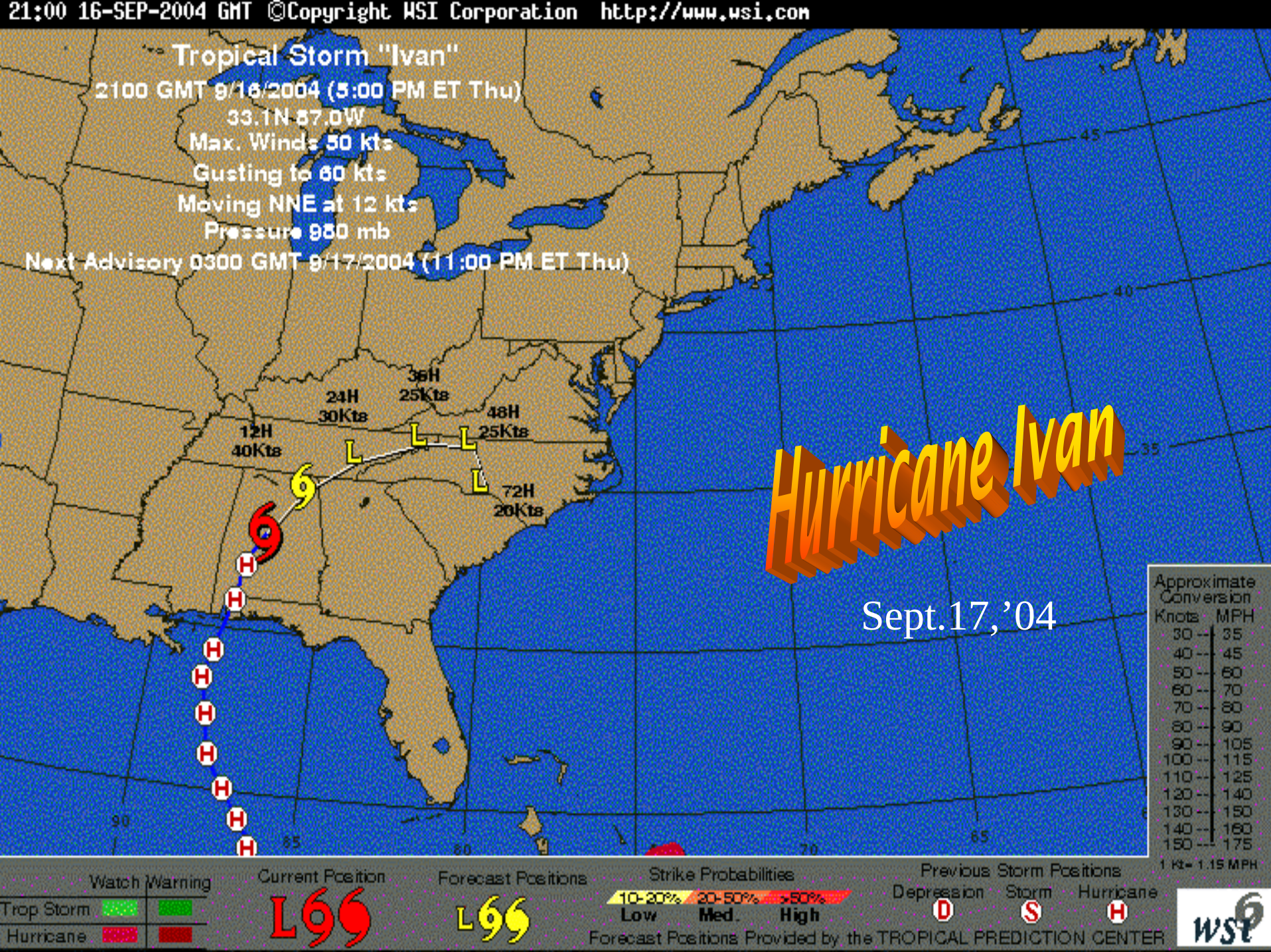
*Deep sea hot spa, SW Ind . Ocean*



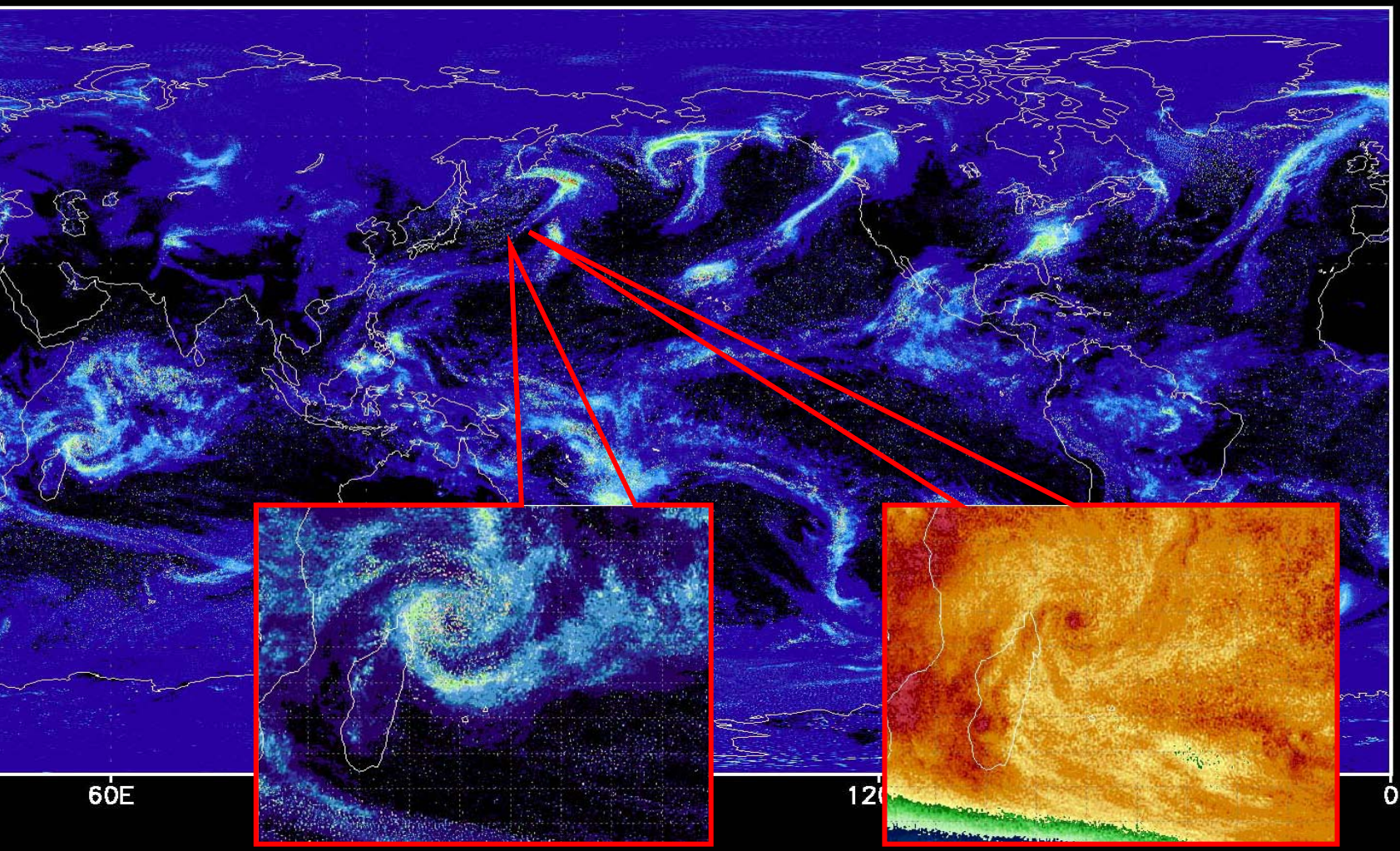

コスタリカリフト近くのDSDP/ODP504B掘削孔による成果
（水深 3,475 m, 海底下 2,111 m）

***Hydrothermal Scheme, Hole 504B***

# *Global Climate Change in terms of our Capability of Prediction*


21:00 16-SEP-2004 GMT ©Copyright WSI Corporation http://www.wsi.com
Tropical Storm "Ivan"
2100 GMT 9/16/2004 (5:00 PM ET Thu)
33.1N 87.0W
Max. Winds 50 kts
Gusting to 60 kts
Moving NNE at 12 kts
Pressure 980 mb
Next Advisory 0300 GMT 9/17/2004 (11:00 PM ET Thu)
12H 40Kts
24H 30Kts
36H 25Kts
48H 25Kts
72H 20Kts
Hurricane Ivan
Sept.17,'04
Approximate Conversion
Knots MPH
30 -- 35
40 -- 45
50 -- 60
60 -- 70
70 -- 80
80 -- 90
90 -- 105
100 -- 115
110 -- 125
120 -- 140
130 -- 150
140 -- 160
150 -- 175
1 Kt= 1.15 MPH
Watch Warning
Trop Storm
Hurricane
Current Position
Forecast Positions
Strike Probabilities
10-20% 20-50% >50%
Low Med. High
Previous Storm Positions
Depression Storm Hurricane
Forecast Positions Provided by the TROPICAL PREDICTION CENTER
wsi

# Precipitation Pattern with 10 km grid of the Globe





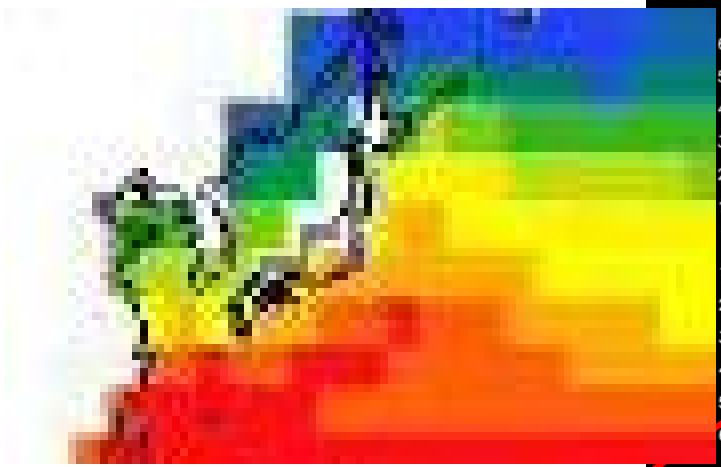


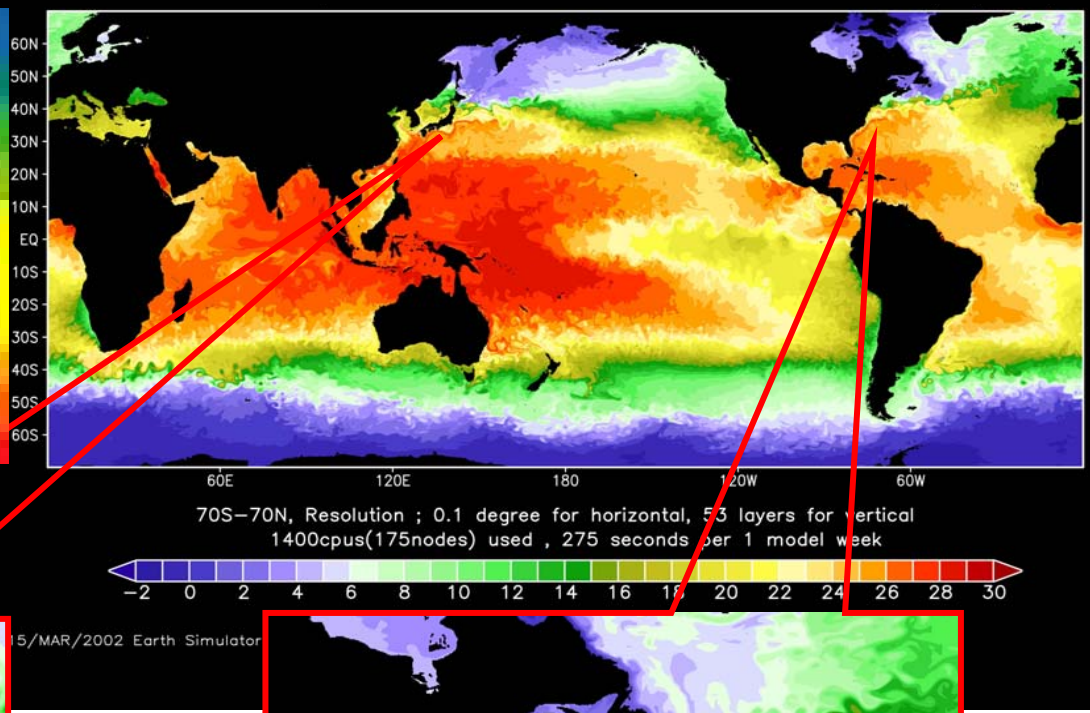


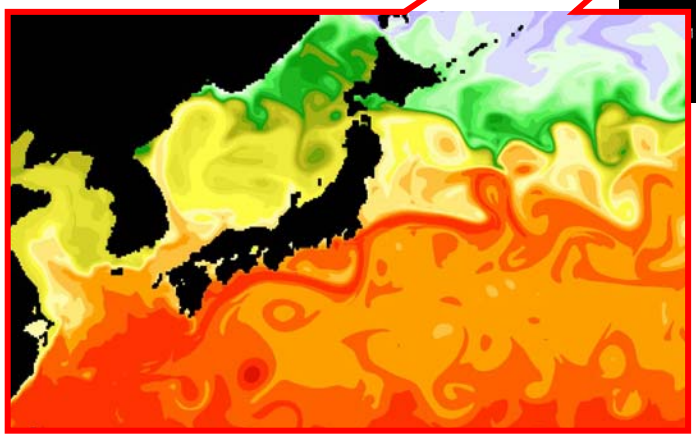
Hurricane Attacks Madagascar（L：Rain，R：Temp）

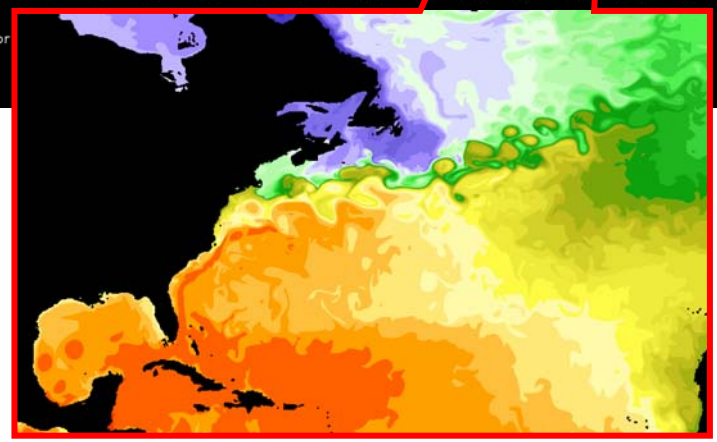
WOCE

# SST （10km grid）







処理時間：９４ｎｏｄｅ・１０Ｈ／年、１８８ｎｏｄｅ・６Ｈ／年、

# Non-Ecoconscious Model A1B

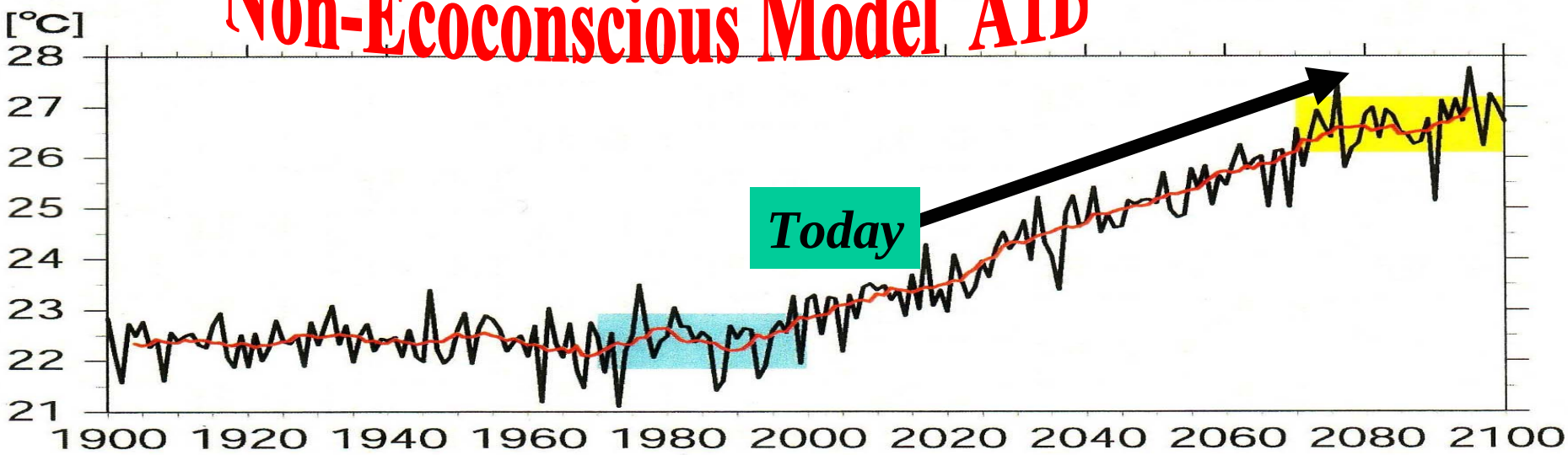



図４　計算された、1900 年から 2100 年までの日本の領域で平均した夏季（６・７・８月）の平均気温（2001 年以降についてはシナリオ「A1B」を用いた結果）。黒線が年々の値で、赤線が１０年移動平均を施したもの。2071～2100 年の年々のゆらぎの標準偏差は 0.52 で

***Thank you***

***for your***

***Attention***

***Iron Side***
***Constitution***
***Launched, 1797***

*Integrated Ocean Drilling Program (IODP)*

# *Environment, Sea Level Change*
# *Hydrothermal Geochemistry*
# *Biosphere*
# *Dynamism of Solid Earth*

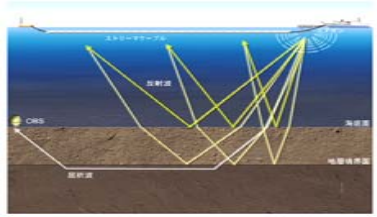
*DSDP since 1968*
*IPOD since 1975*
*ODP since 1985*
*IODP since 2004*

# Scrutinizing Earth's Interior

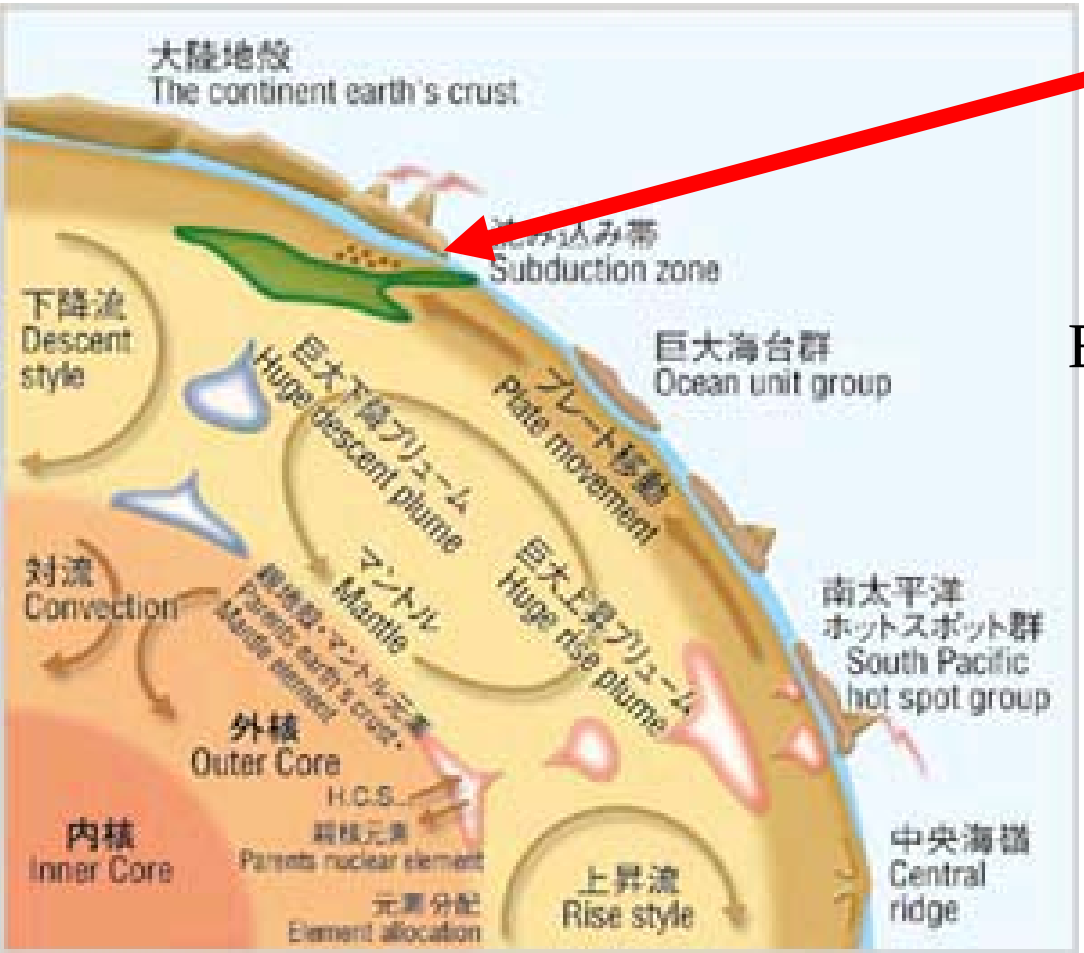
*Diving*

*Surface*

*Bottom*



*Tapping*




*Drilling* ***Deep into the Earth***

Technology

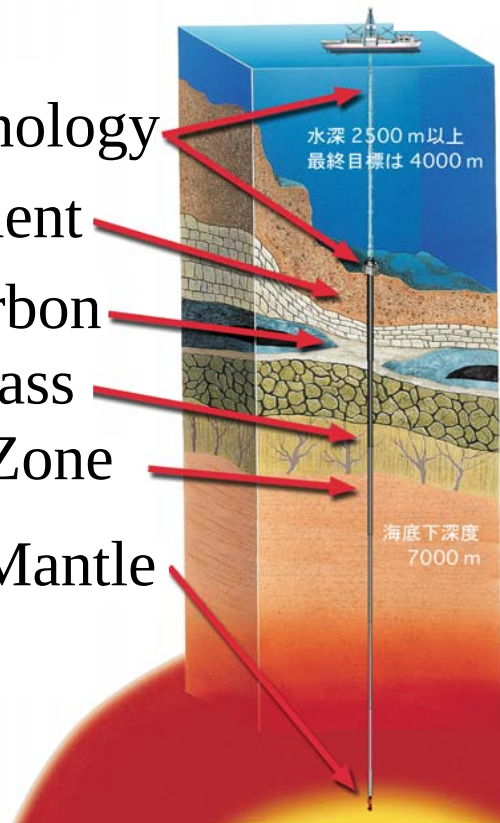
Environment

Hydrocarbon

Biomass

Seismic Zone

Mantle



# *JOIDES Resolution and Chikyu*

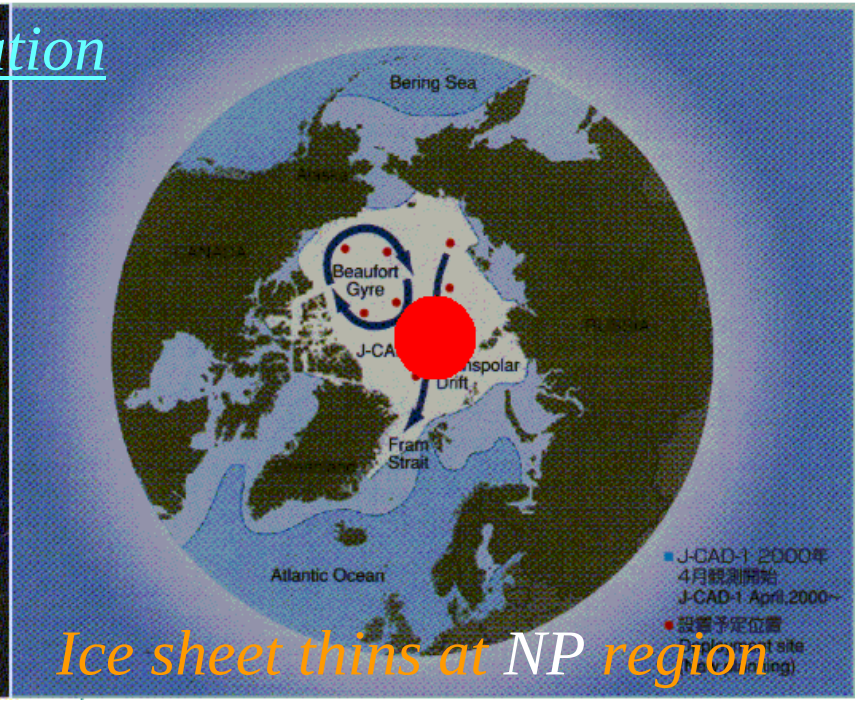
## *ODP and then IODP*

***11,600 tons***
***Since 1986***

***57,500 tons***
***To be after 2007***

*Imitation*

J/R in operation yet

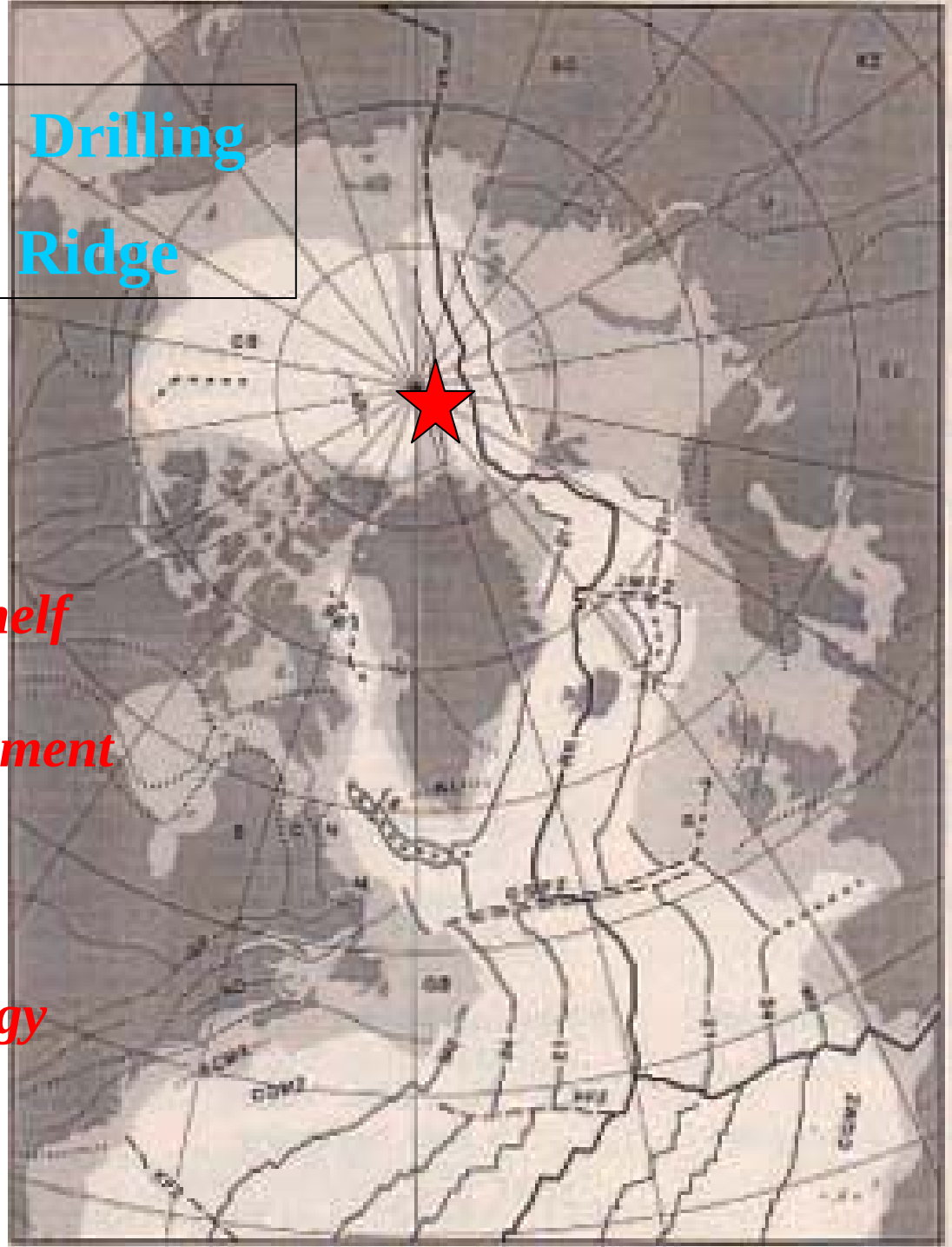



*Ice sheet thins at NP region*

***IODP bum got an idea: Let's dig a hole at the North Pole and It's done in summer this year, 2004.***

**North Pole Drilling**

**Lomonosov Ridge**

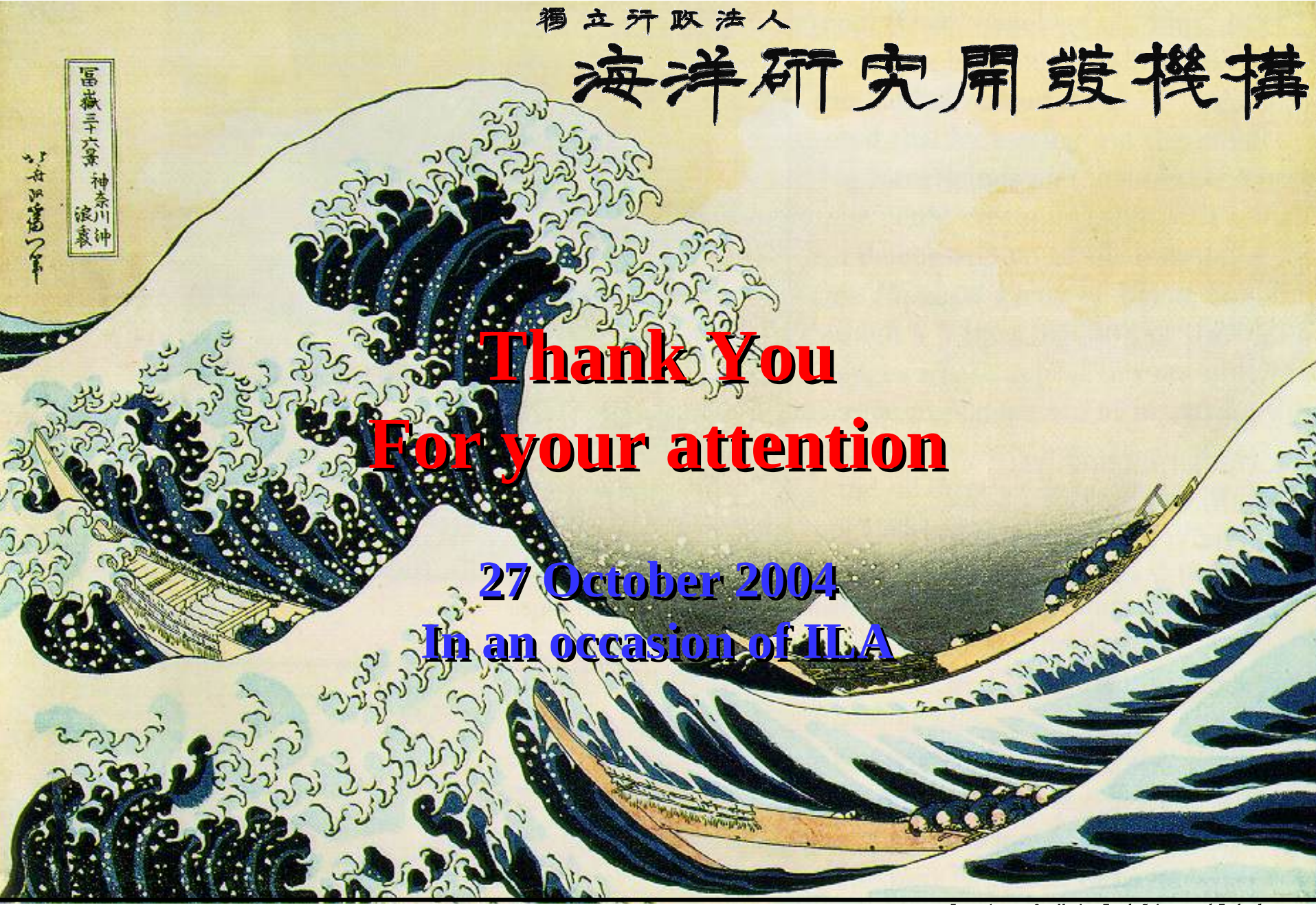


***Continental Shelf***

***Paleo-Environment***

***Hydrocarbon***

***New Technology***

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