



# SISTEMA OCEANO

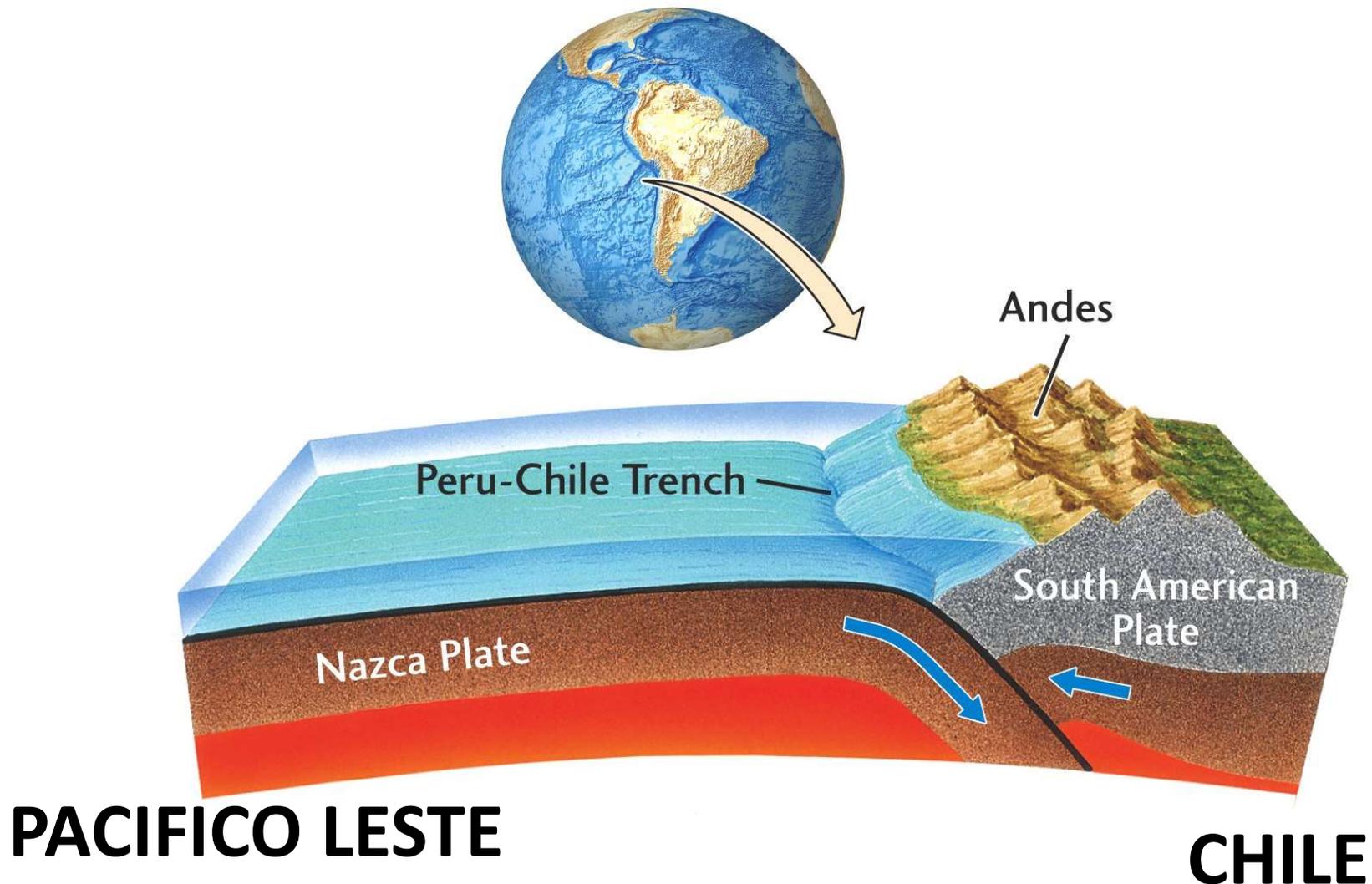
## Gênese e Evolução dos Fundos Marinhos

### Parte II

Prof. Dr. Christian Millo  
Dep. de Oceanografia Geológica (IOUSP)  
26 de outubro de 2023  
(millo@usp.br)

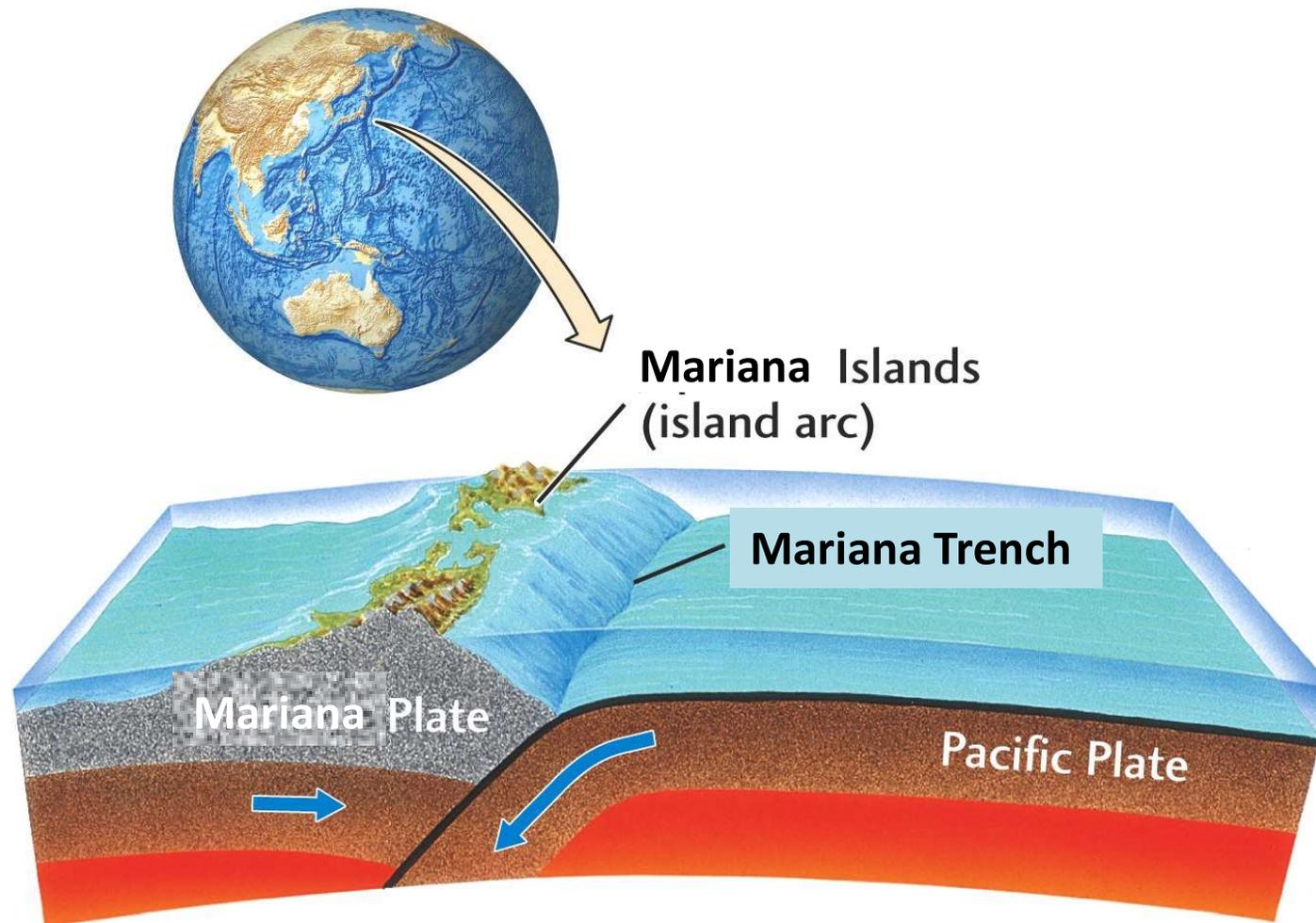
# Processos de Colisão

## 1) Placa oceânica – Placa Continental



# Processos de Colisão

2) Placa oceânica – Placa oceânica (por ex. Marianas)

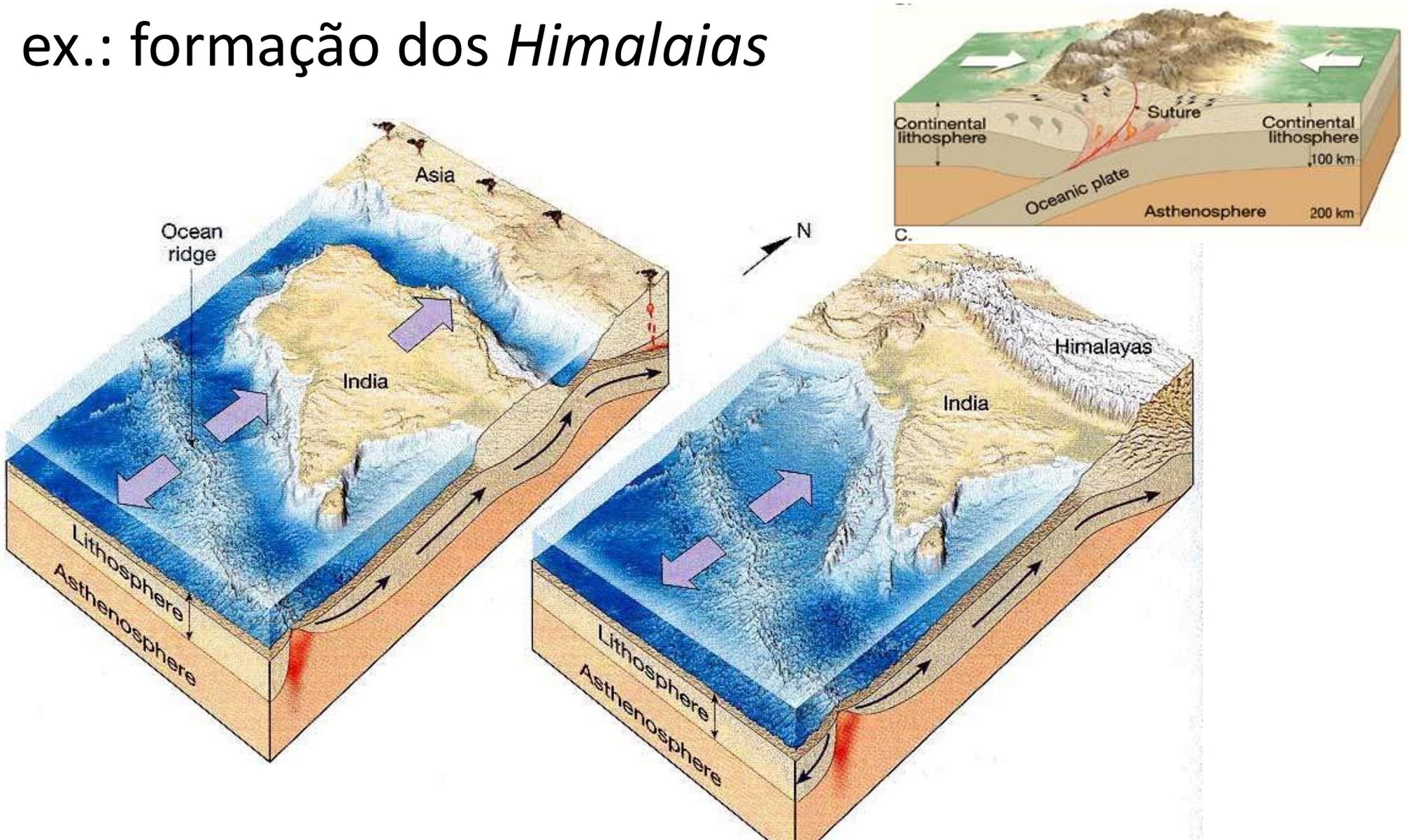


**MAR DAS FILIPINAS**

**PACIFICO OESTE**

# Processos de Colisão

3) Entre placas Continentais  
ex.: formação dos *Himalaias*



**WORLD OCEAN FLOOR**

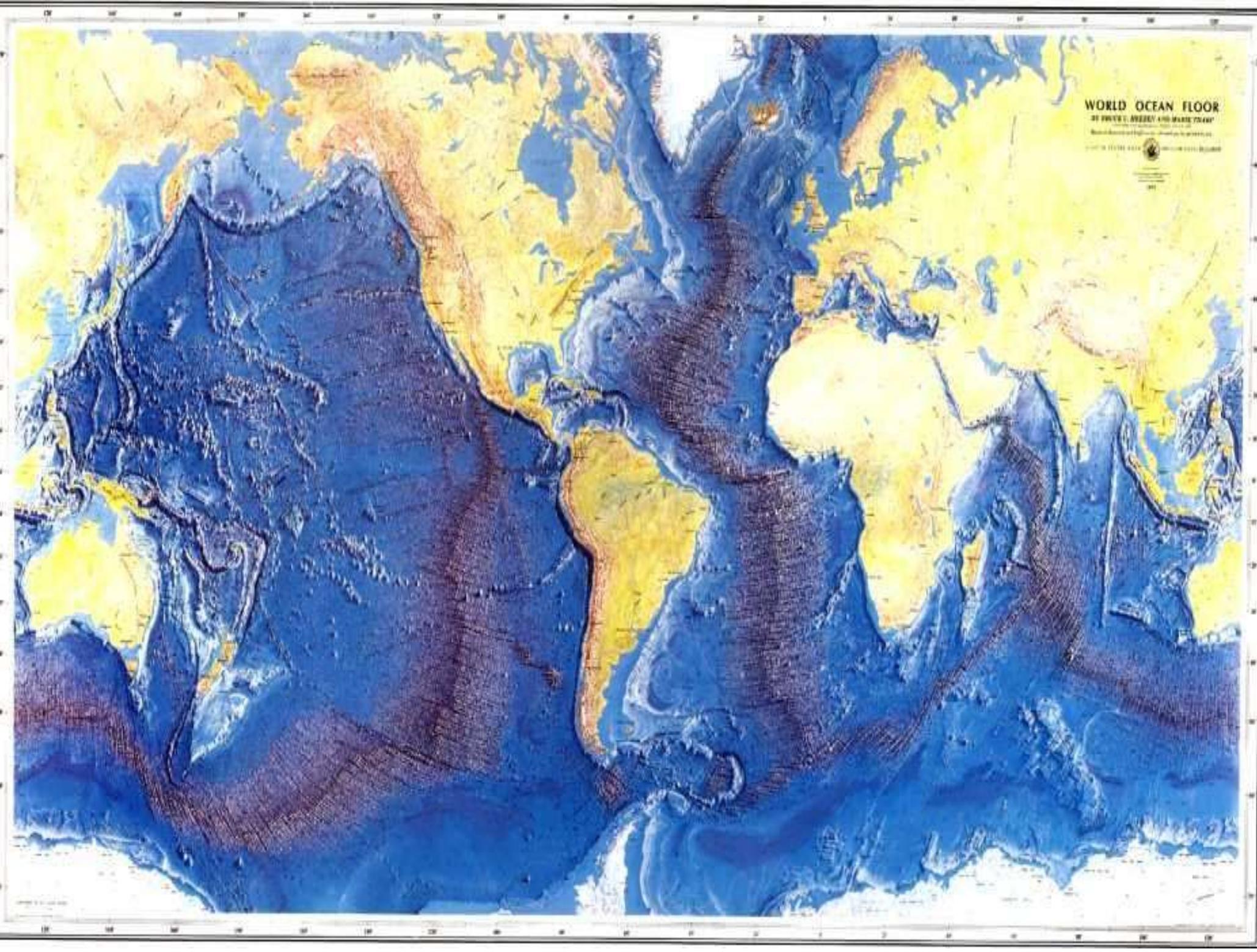
BY PHILIP H. ABNEY AND MARIE THOMPSON

Map of the World Ocean Floor, showing bathymetry and topography of the ocean floor.

Map of the World Ocean Floor, showing bathymetry and topography of the ocean floor.



1963



- Plataformas Continentais
- Fossas Oceânicas
- **Dorsais Oceânicas**
- Planícies Abissais
- Montes submarinos

# **TECTÔNICA DE PLACAS**



Dorsais Oceânicas:

Altitude: **2500 – 3000 m**

Comprimento: **75000 km**

WORLD OCEAN FLOOR

BY PHILIP H. ABNEY AND MARIE THOMPSON

Map of the World Ocean Floor

© 1977 by the United States Government

Printed in the United States of America

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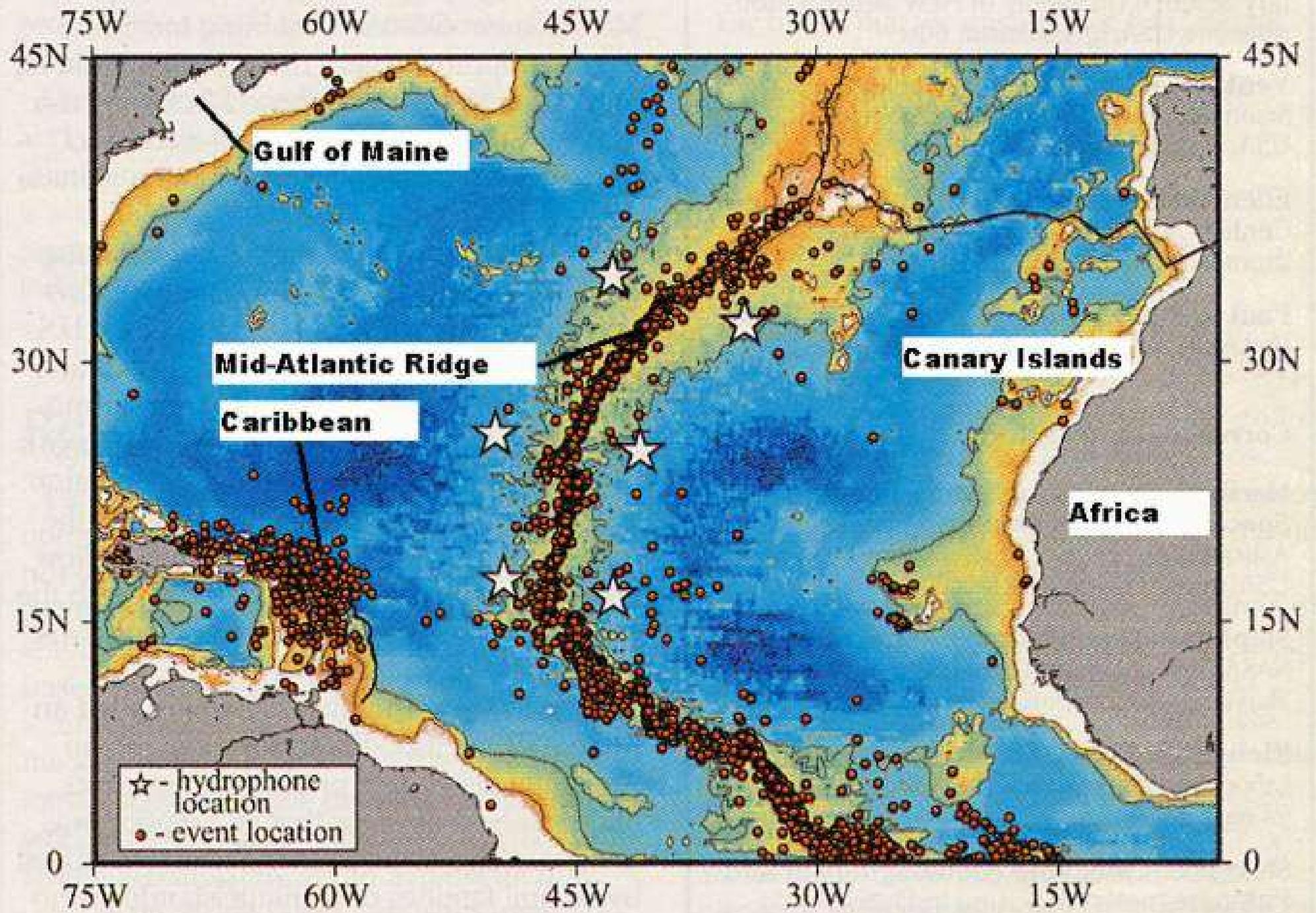
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# LAVA EM ALMOFADA



# Formação de lava em almofada

pillow lava, ocean crust, croûte océanique, basalt.mp4



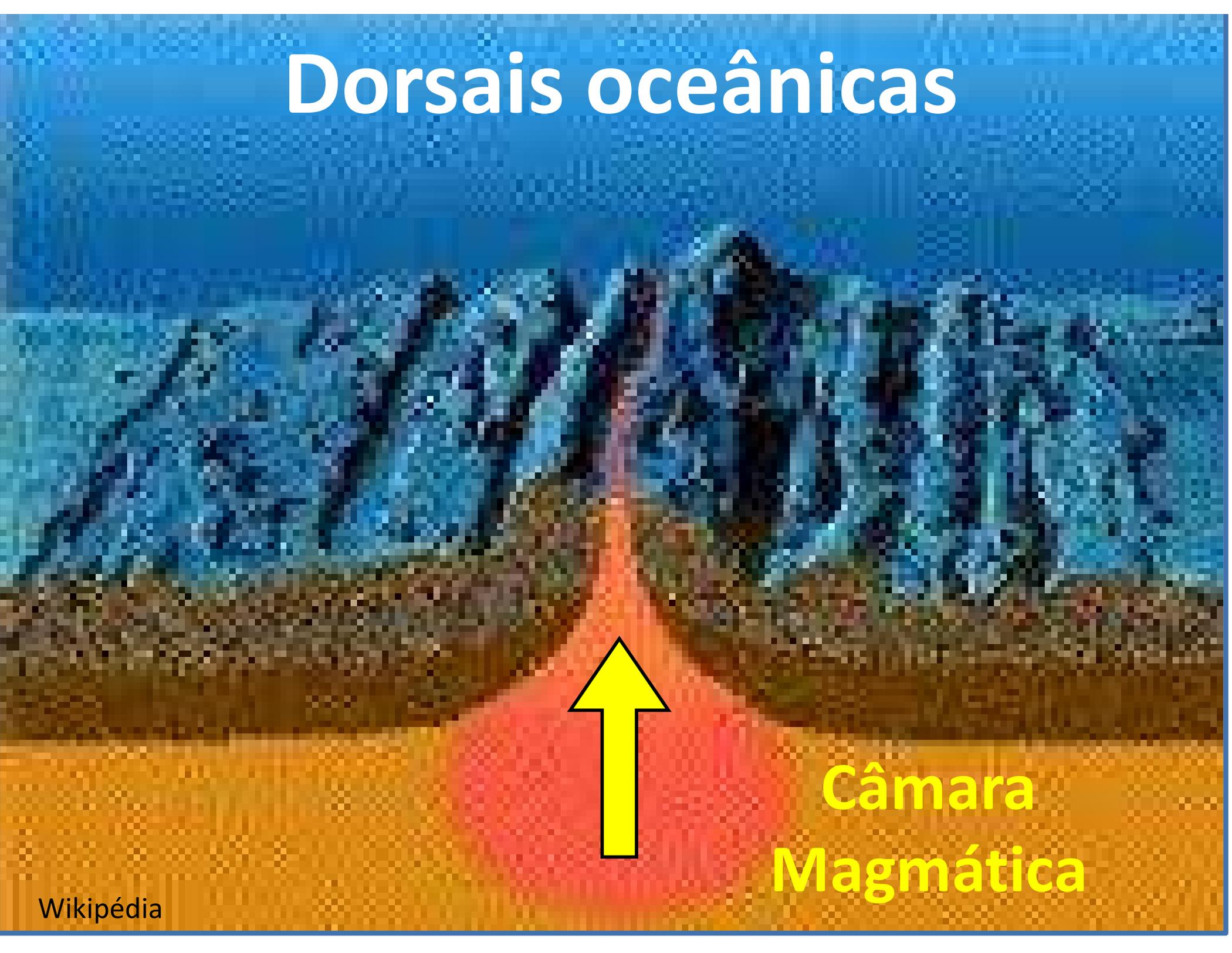
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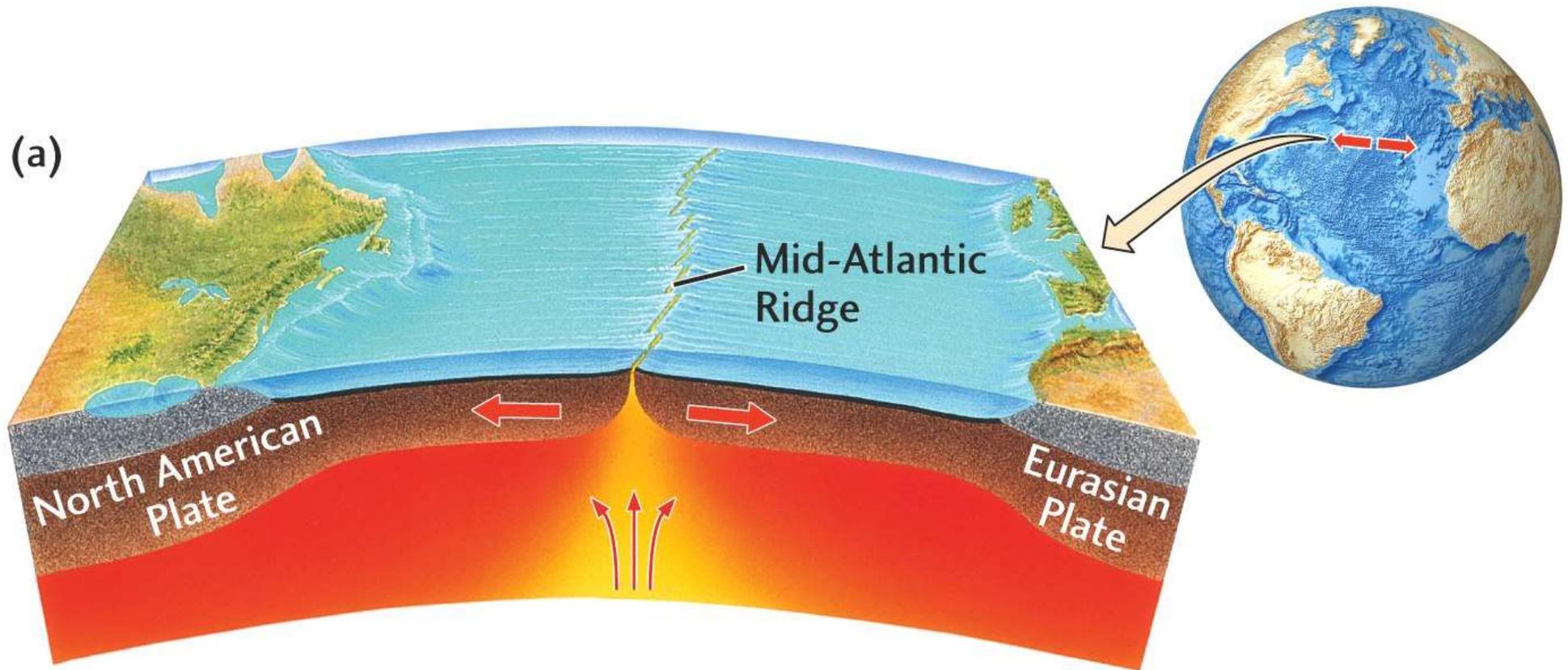
Crédito: [www.ronbleud.fr](http://www.ronbleud.fr) Walk on the core, Juan de Fuca, Joides Resolution, IODP, ODP.

# Dorsais oceânicas

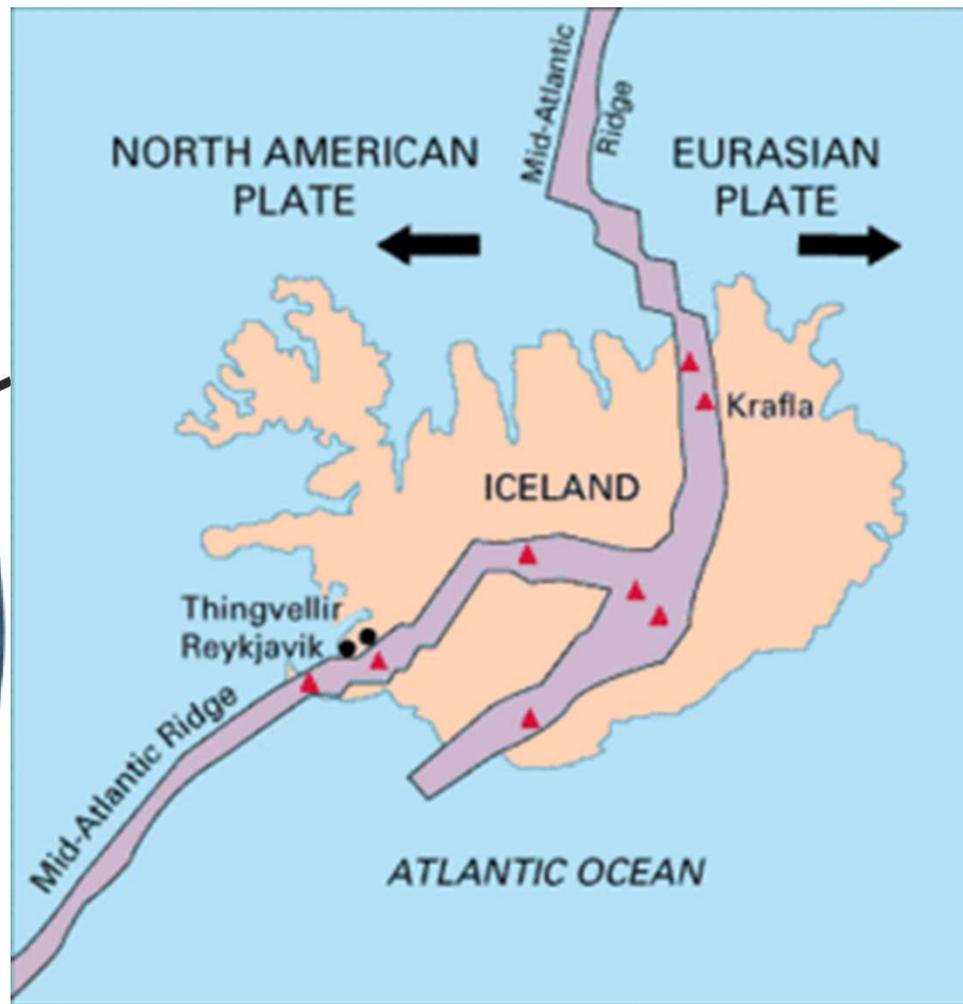
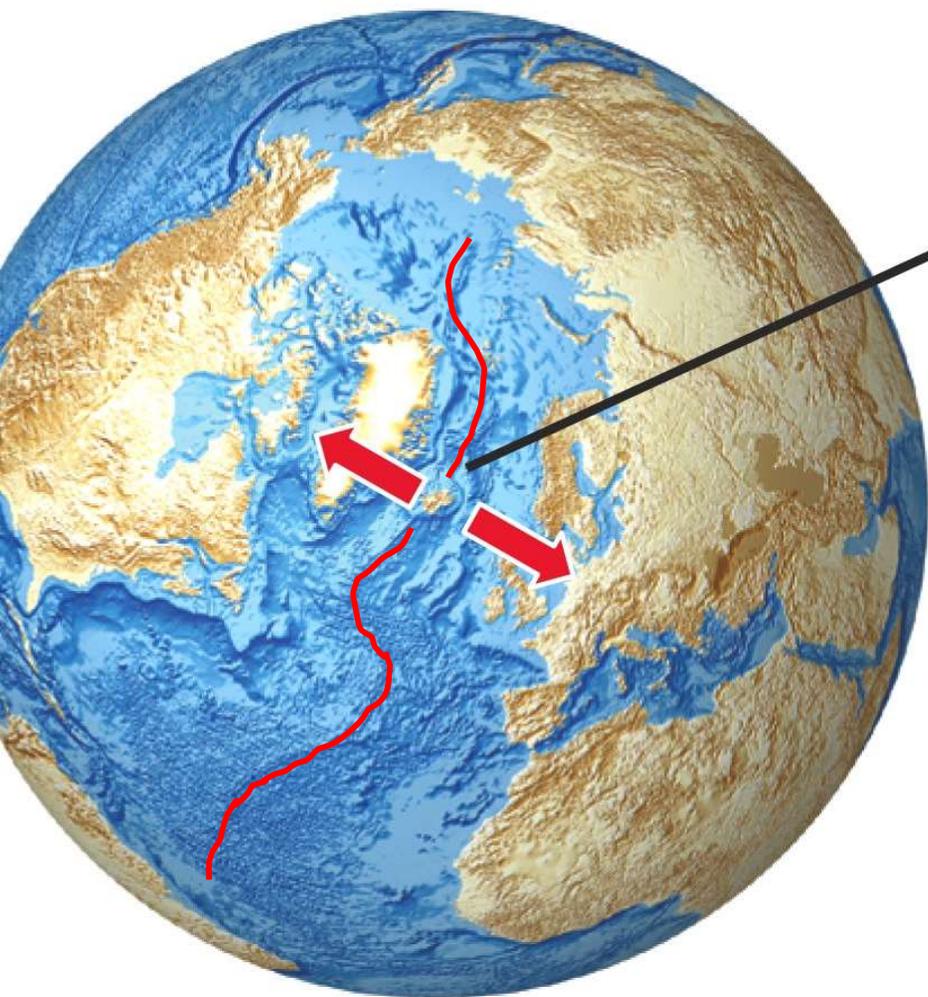


Câmara  
Magmática

# Limites de Placas Divergentes

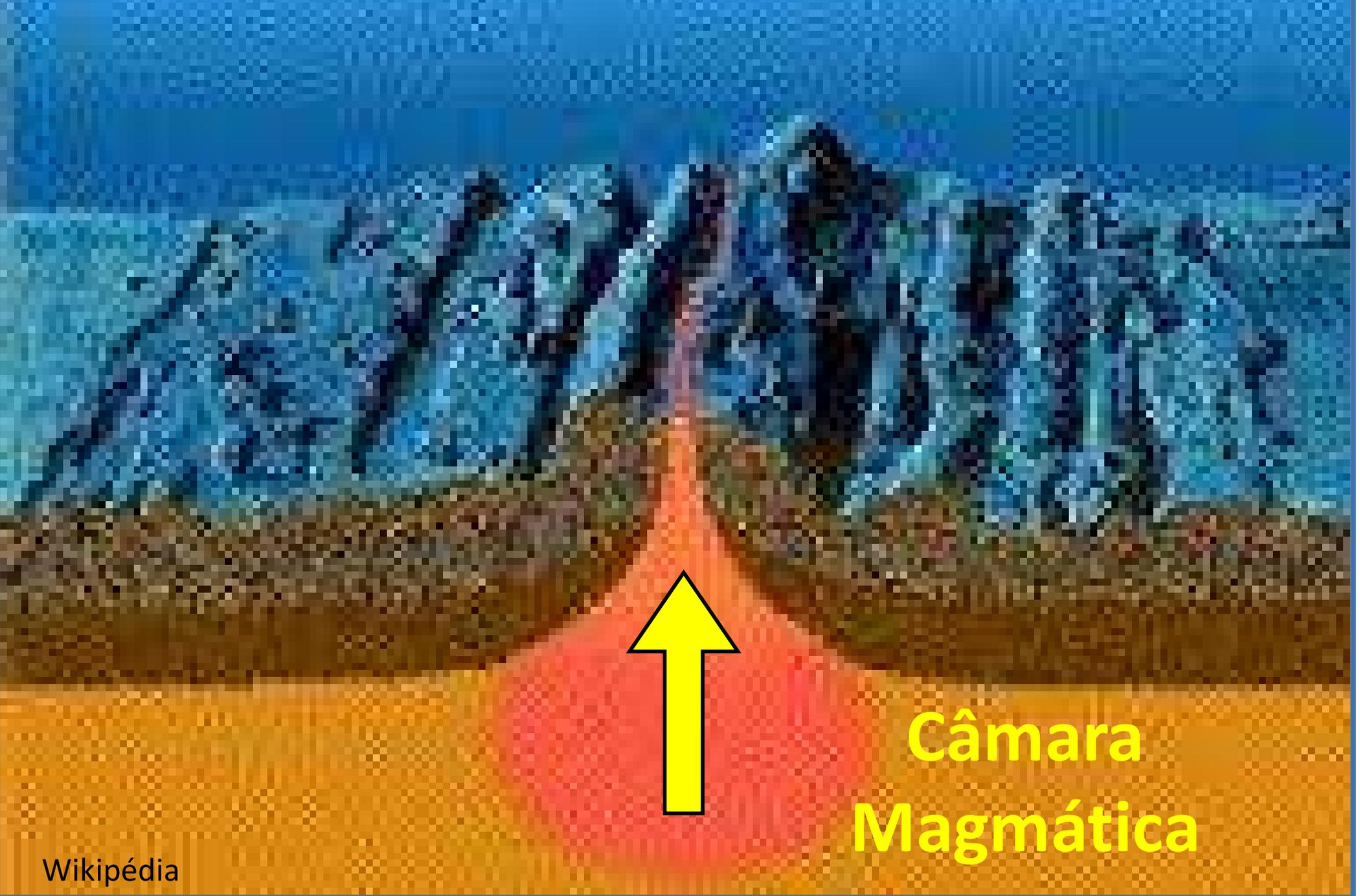


**Islândia**



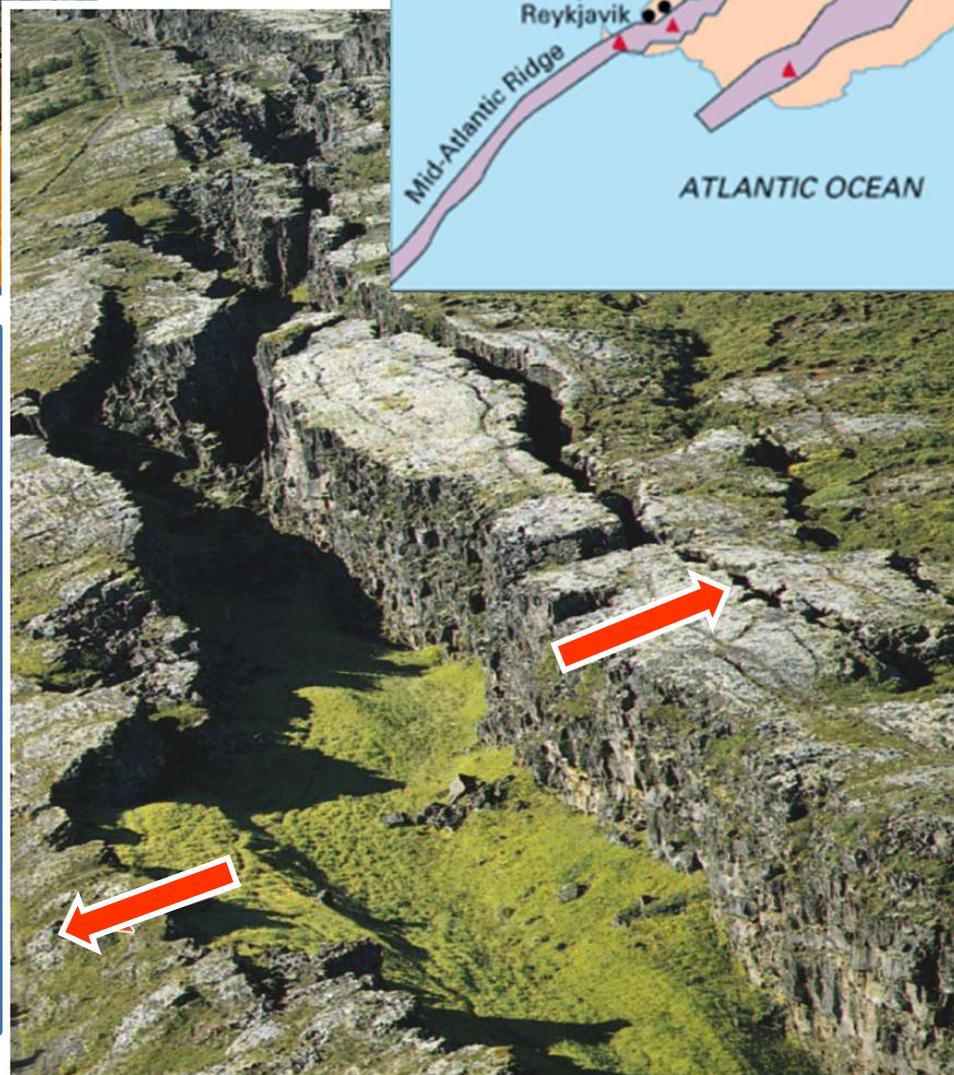
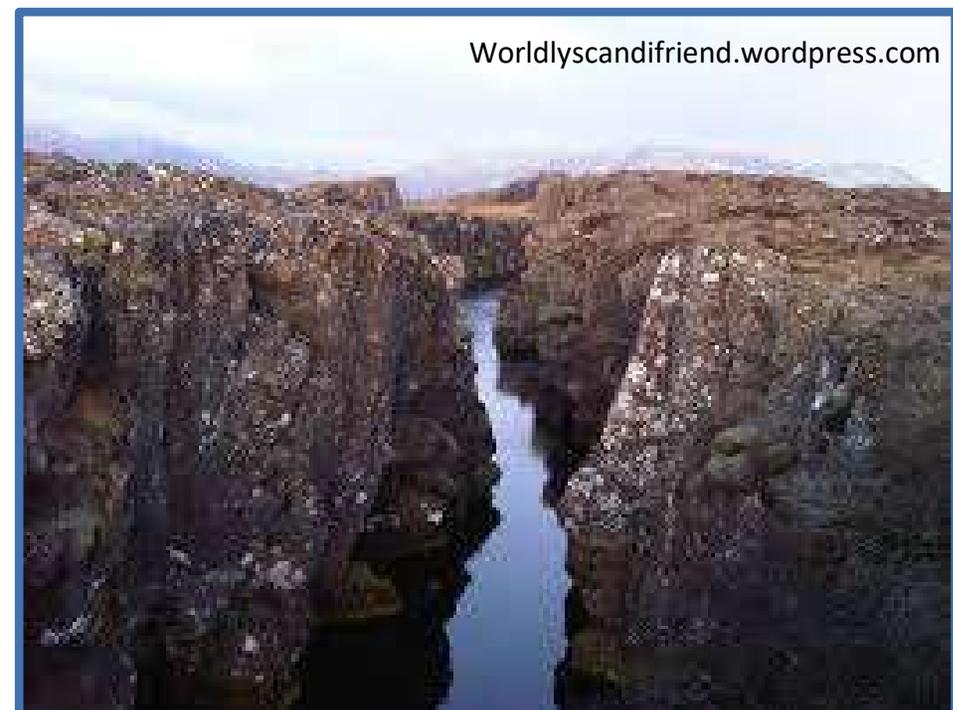
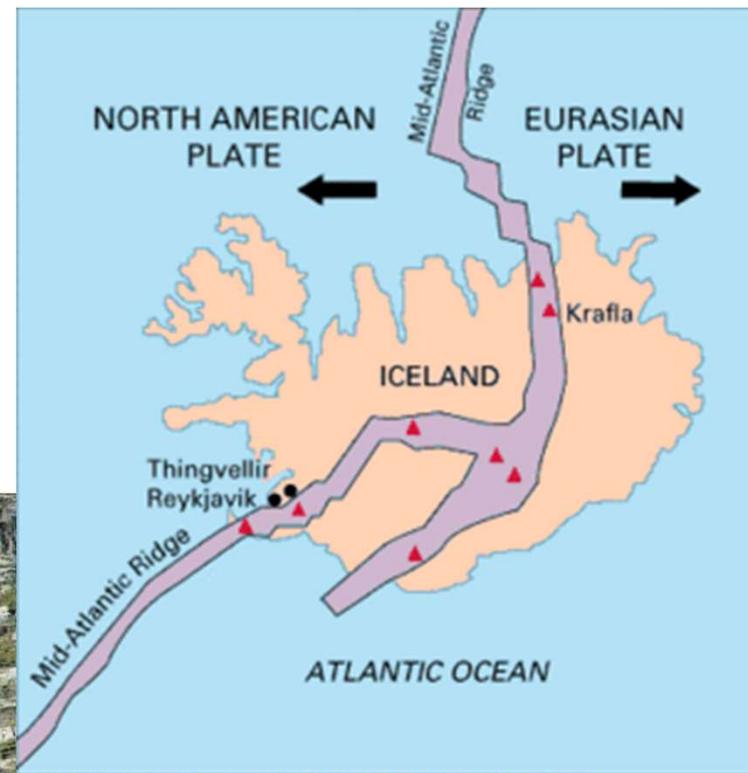
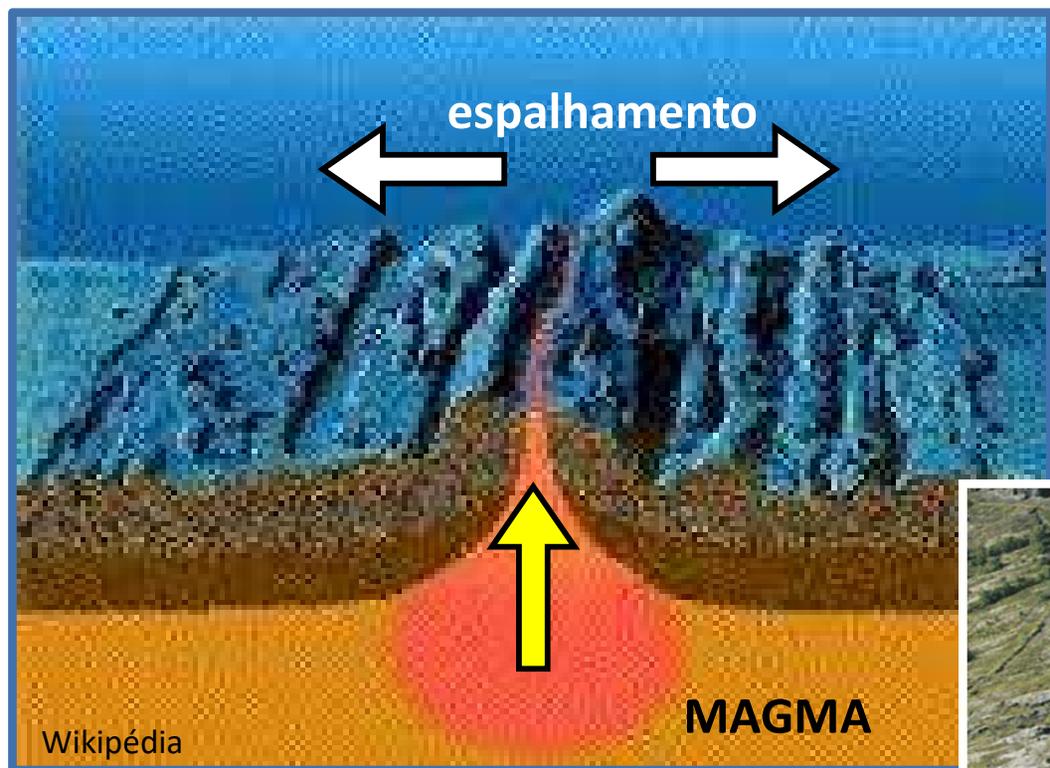


# Dorsais oceânicas



Câmara  
Magmática





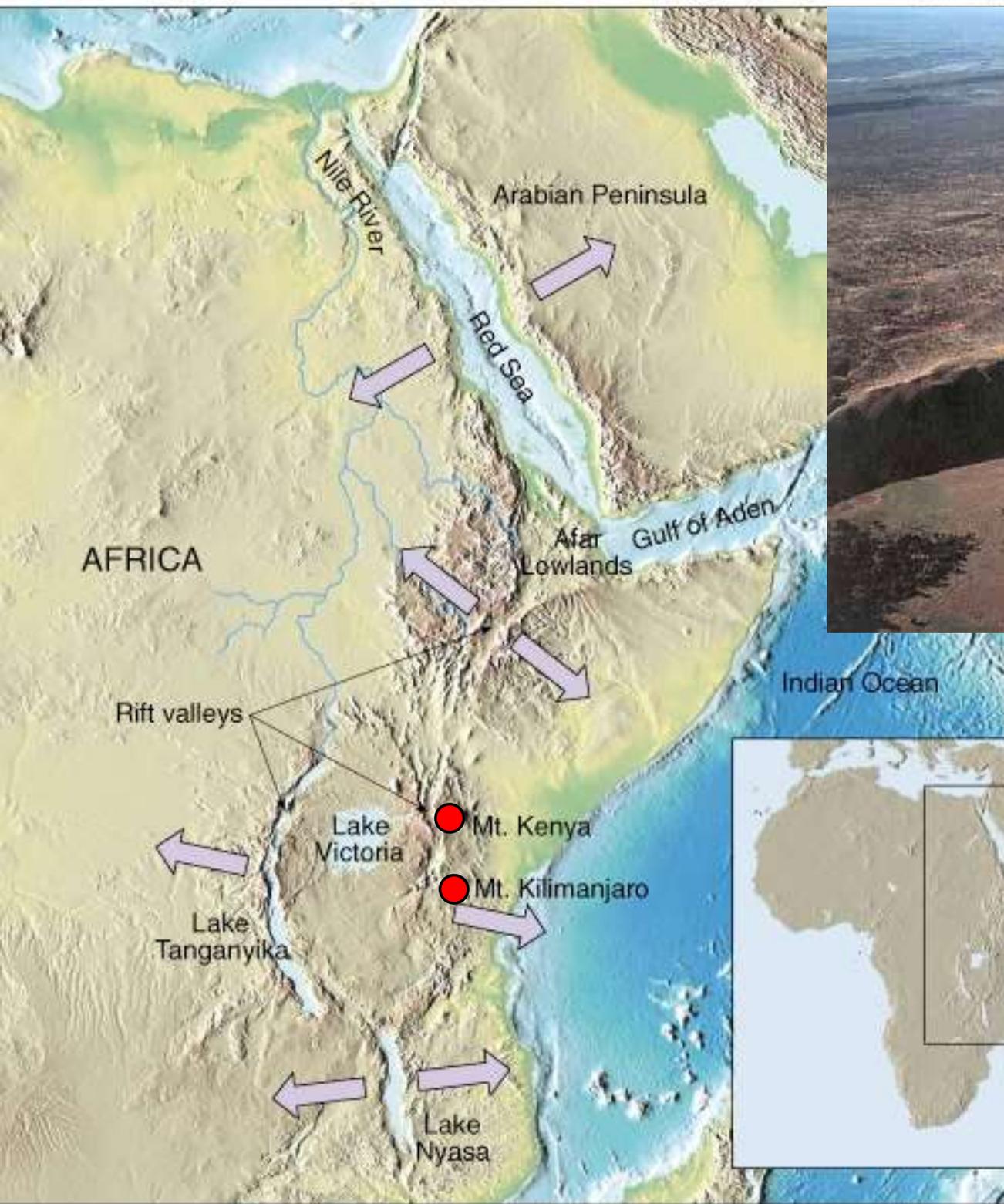
# Formação de novos oceanos

# **Oceanos em formação**

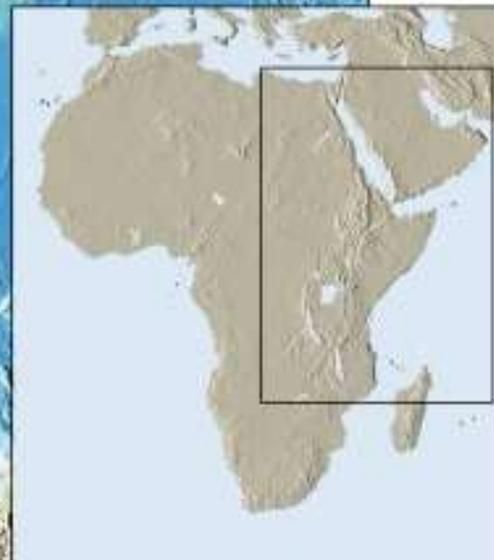
**Exemplo: Mar Vermelho e  
o Vale do Rift Africano**

# RIFT VALLEY





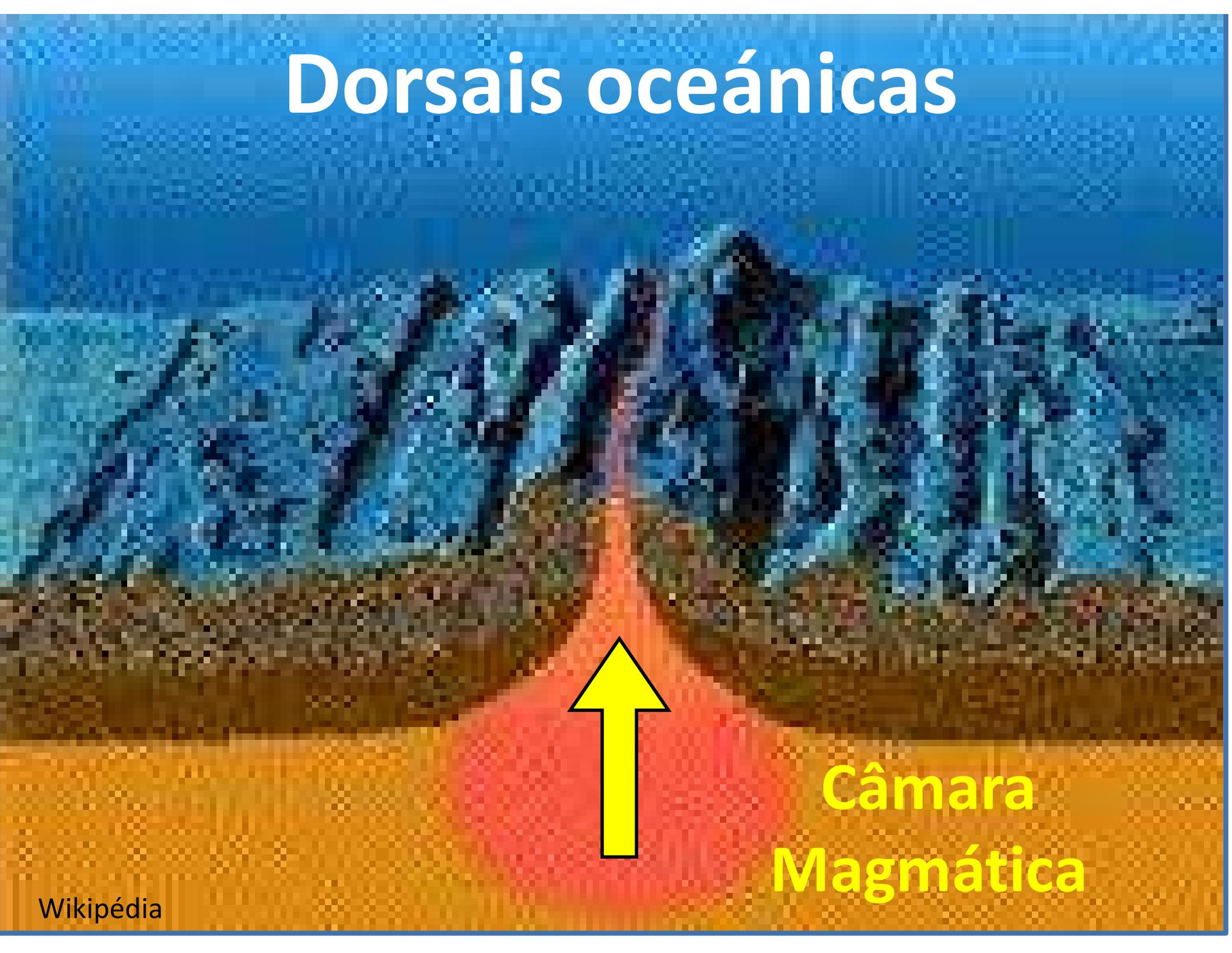
# RIFT VALLEYS



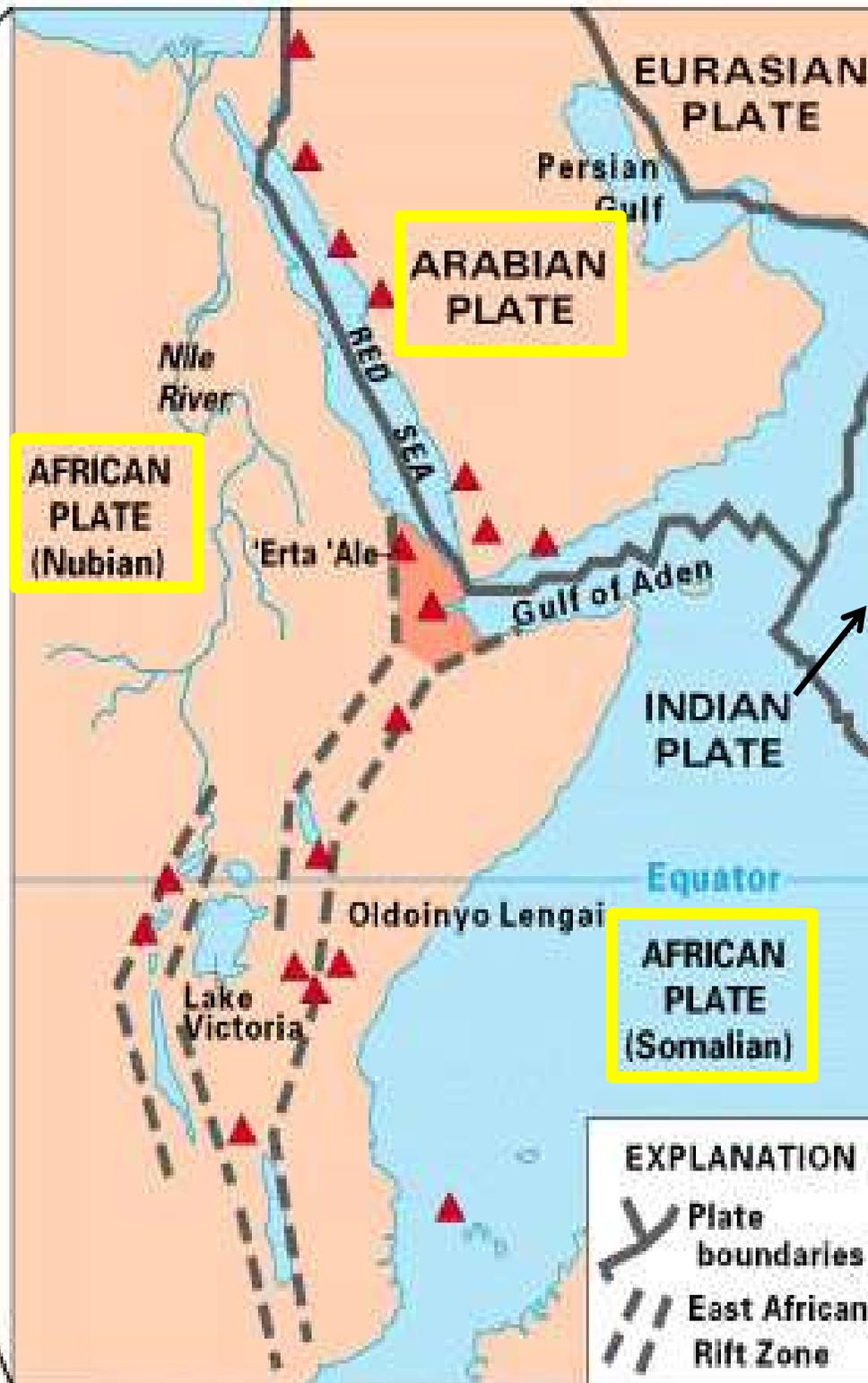
# RIFT VALLEY

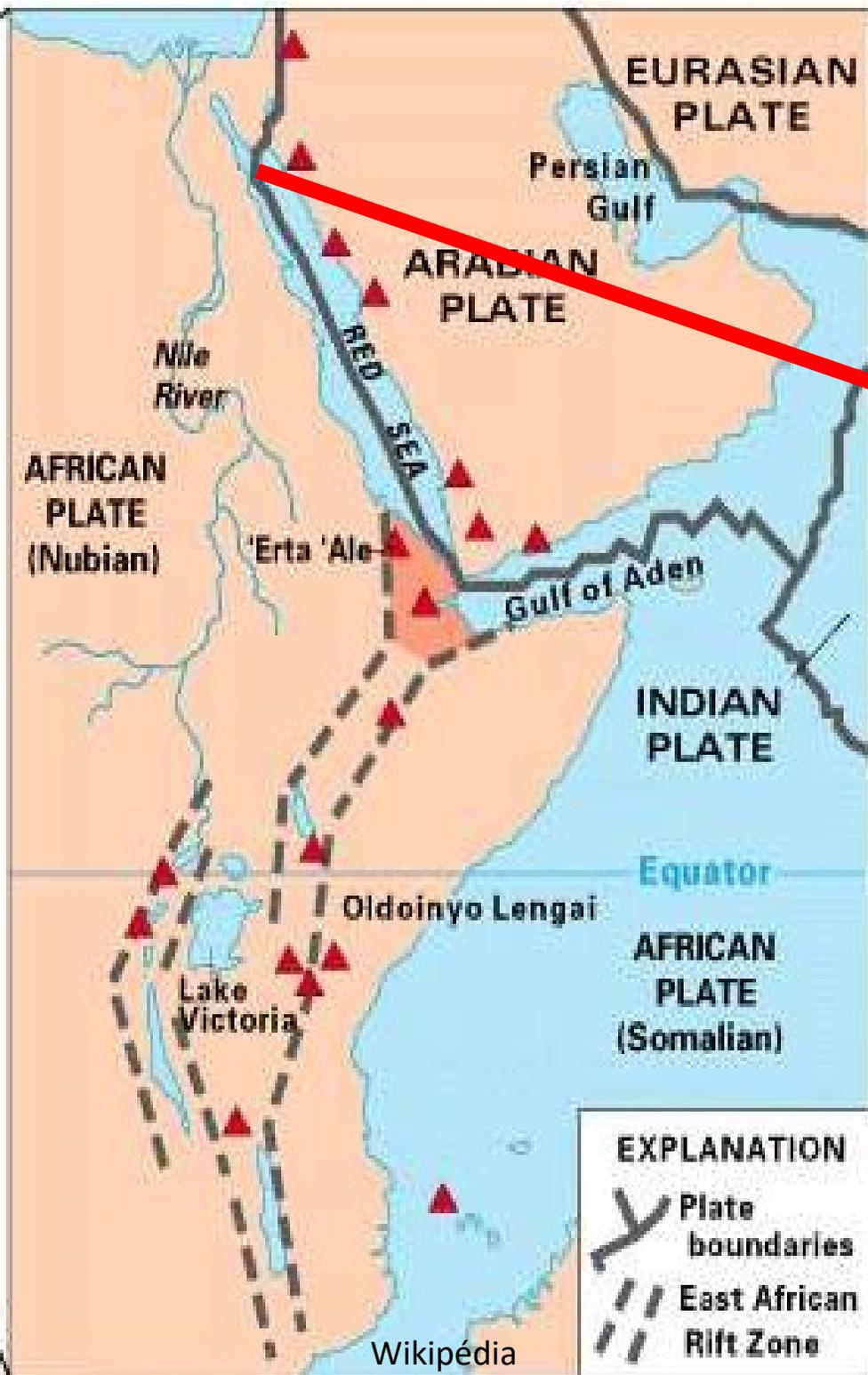


# Dorsais oceánicas



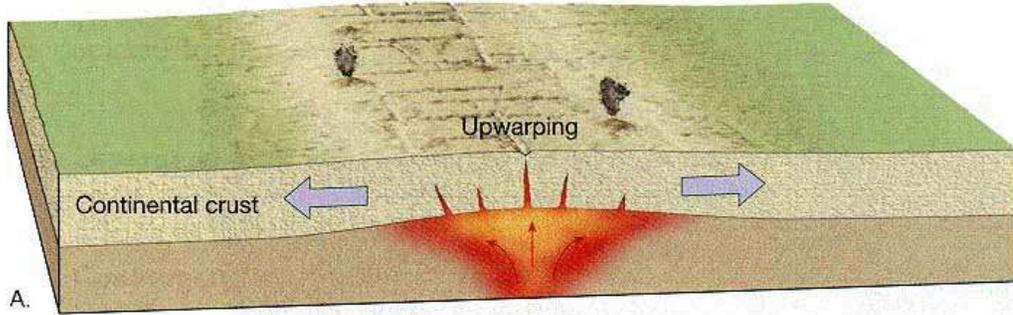
Câmara  
Magmática



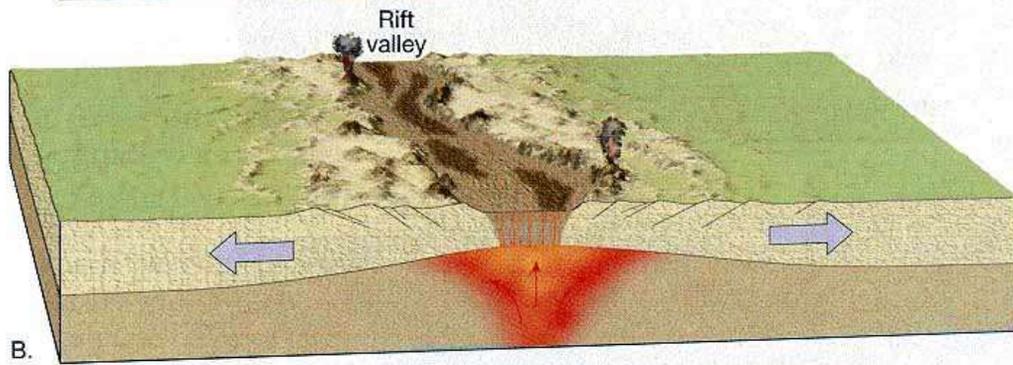


Fonte: NASA

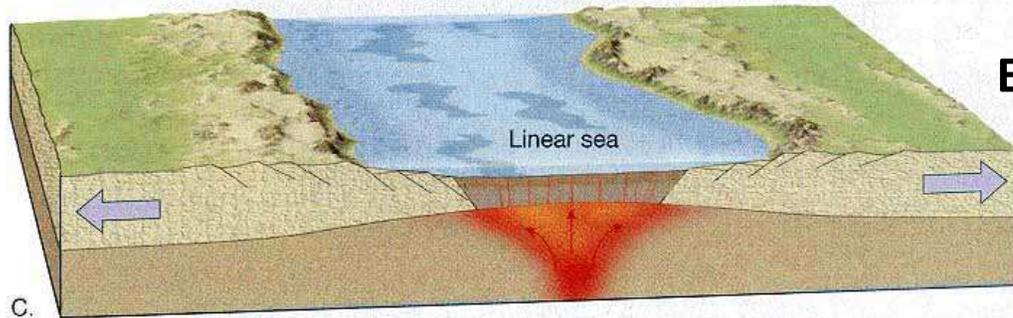
# Etapas de formação de um oceano



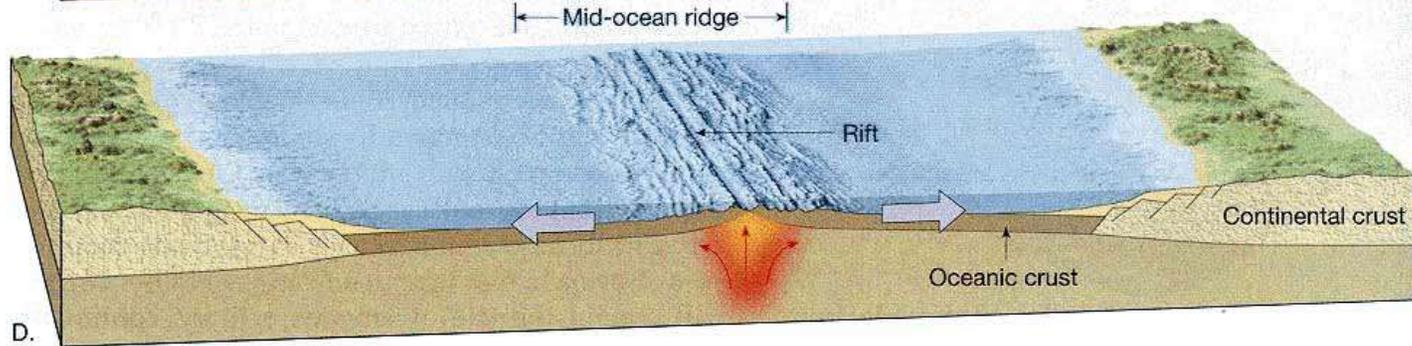
A.



B.



C.



D.

Rift Valley



Ex. Mar Vermelho



Ex. Oceano Atlântico

- Plataformas Continentais
- Fossas Oceânicas
- Dorsais Oceânicas
- **Planícies Abissais**
- Montes submarinos

# **TECTÔNICA DE PLACAS**

**WORLD OCEAN FLOOR**

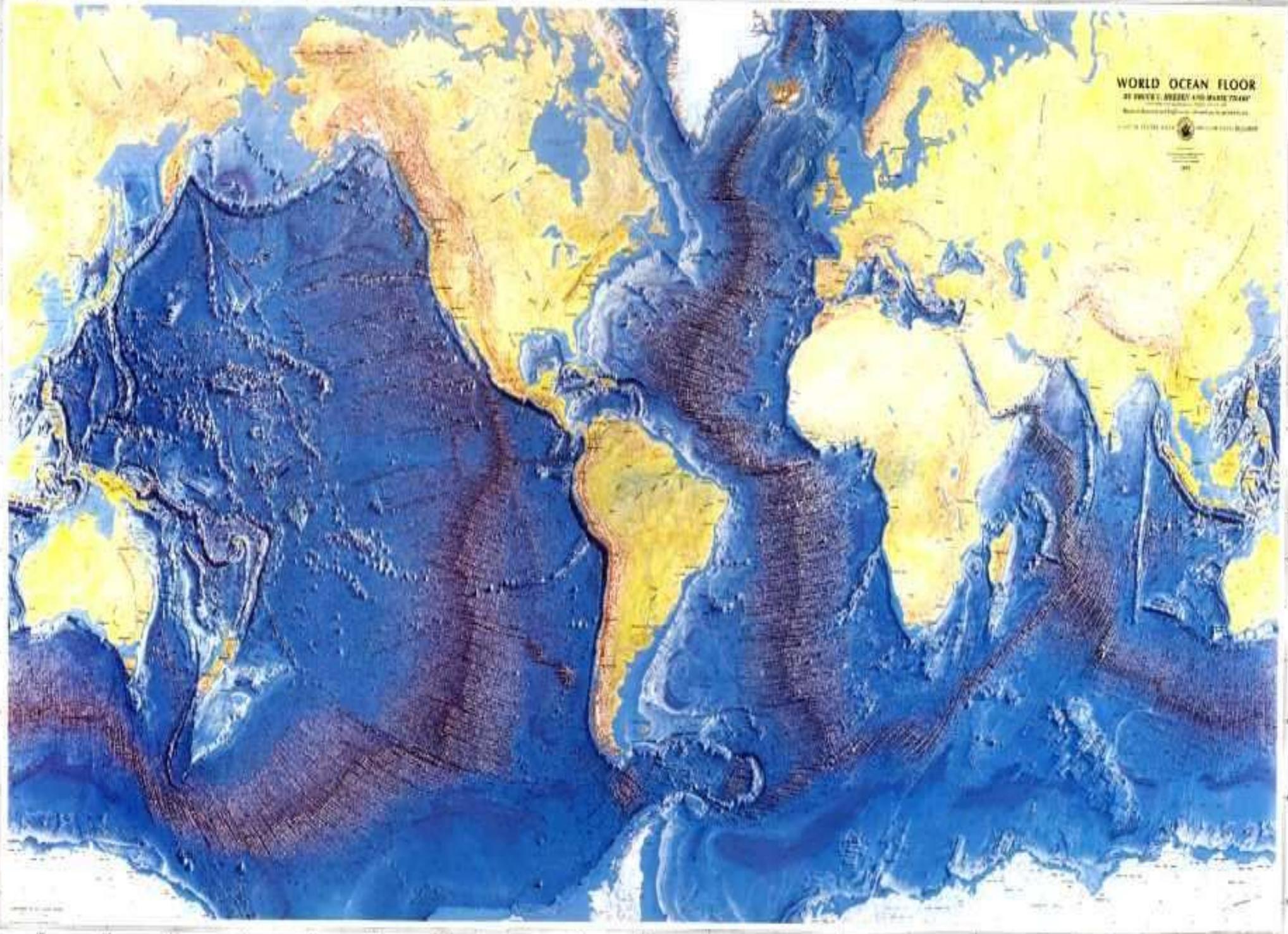
BY PHILIP H. ABNEY AND MARIE THOMPSON

Map of the World Ocean Floor, showing the bathymetry of the world's oceans and seas. The map is color-coded to show depth, with yellow representing shallow continental shelves and deep blues representing the abyssal plains. Major tectonic features like mid-ocean ridges and trenches are clearly visible. The map includes a coordinate grid and is framed by a double-line border.

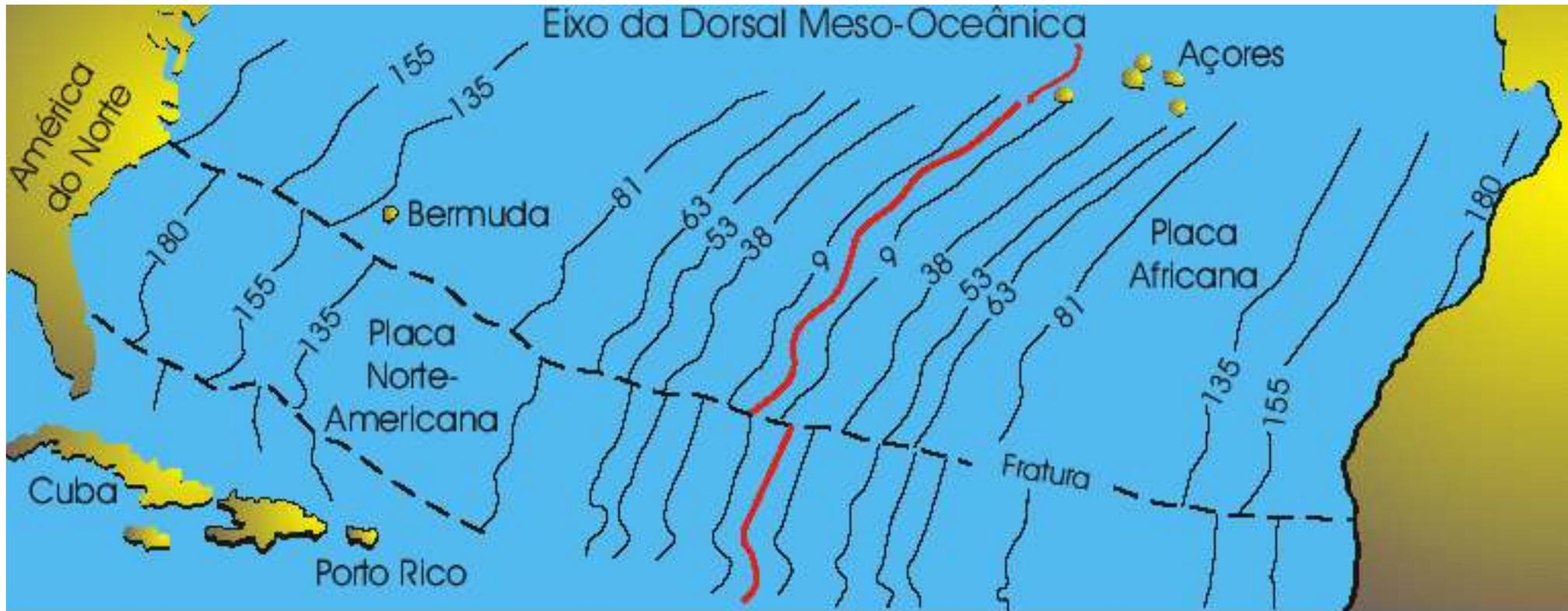
Map of the World Ocean Floor, showing the bathymetry of the world's oceans and seas. The map is color-coded to show depth, with yellow representing shallow continental shelves and deep blues representing the abyssal plains. Major tectonic features like mid-ocean ridges and trenches are clearly visible. The map includes a coordinate grid and is framed by a double-line border.



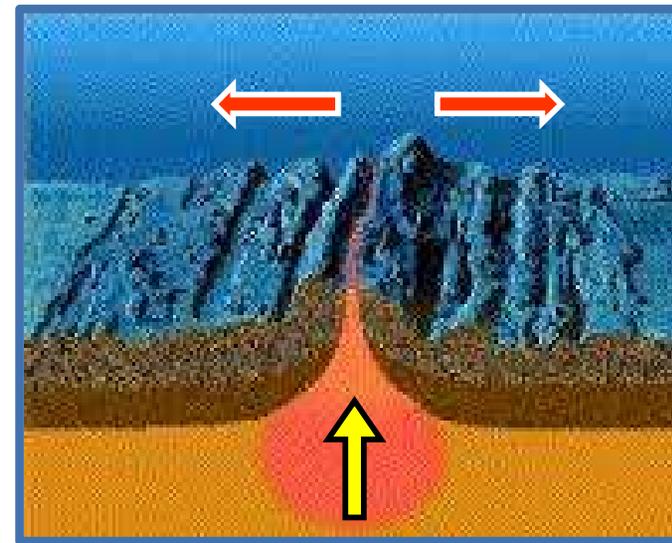
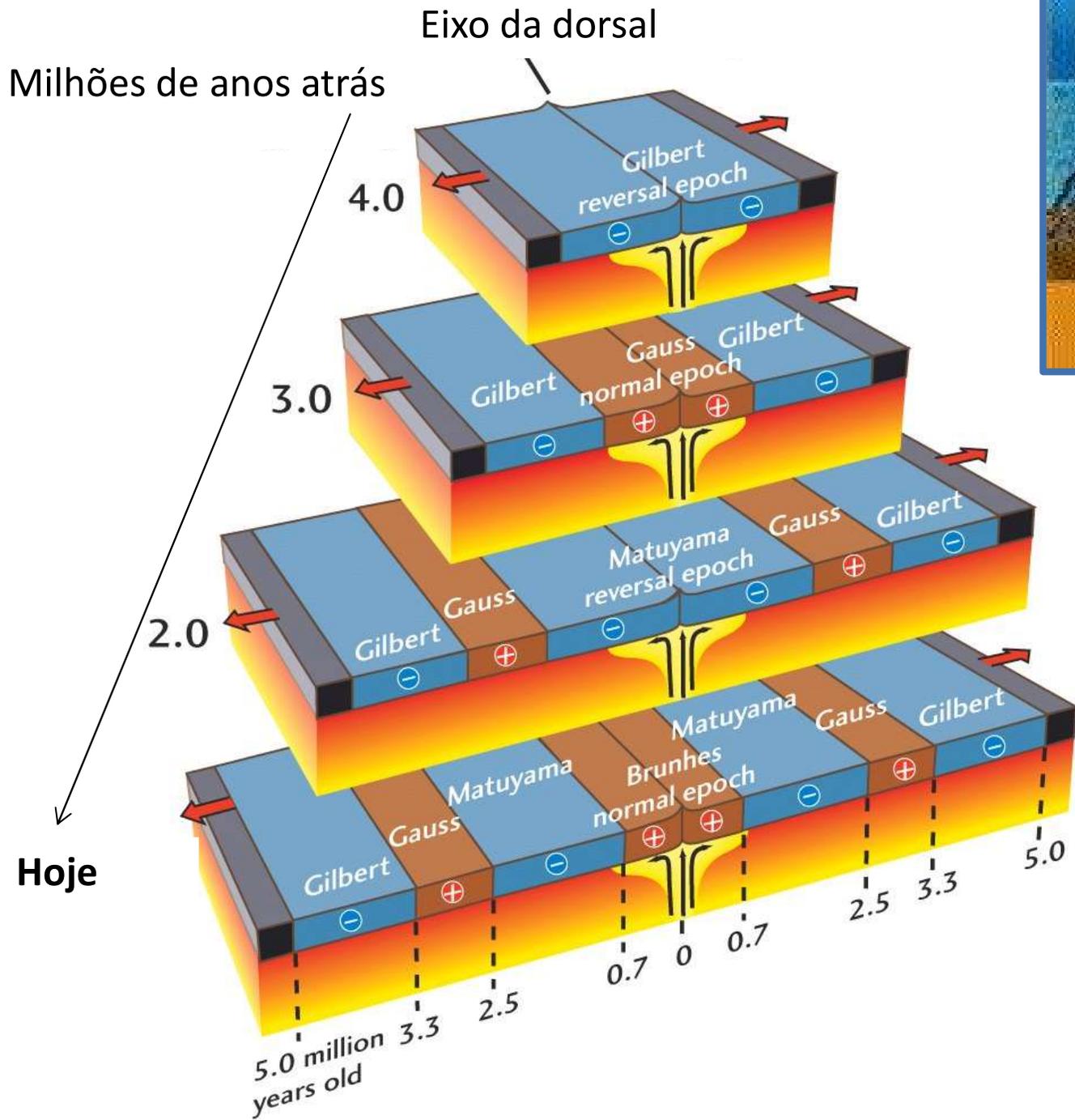
1961



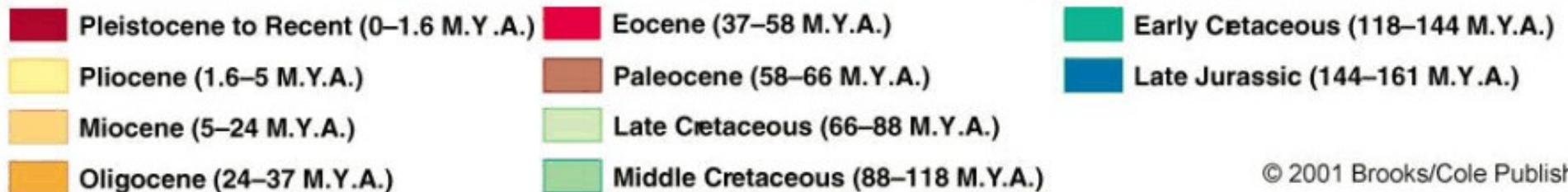
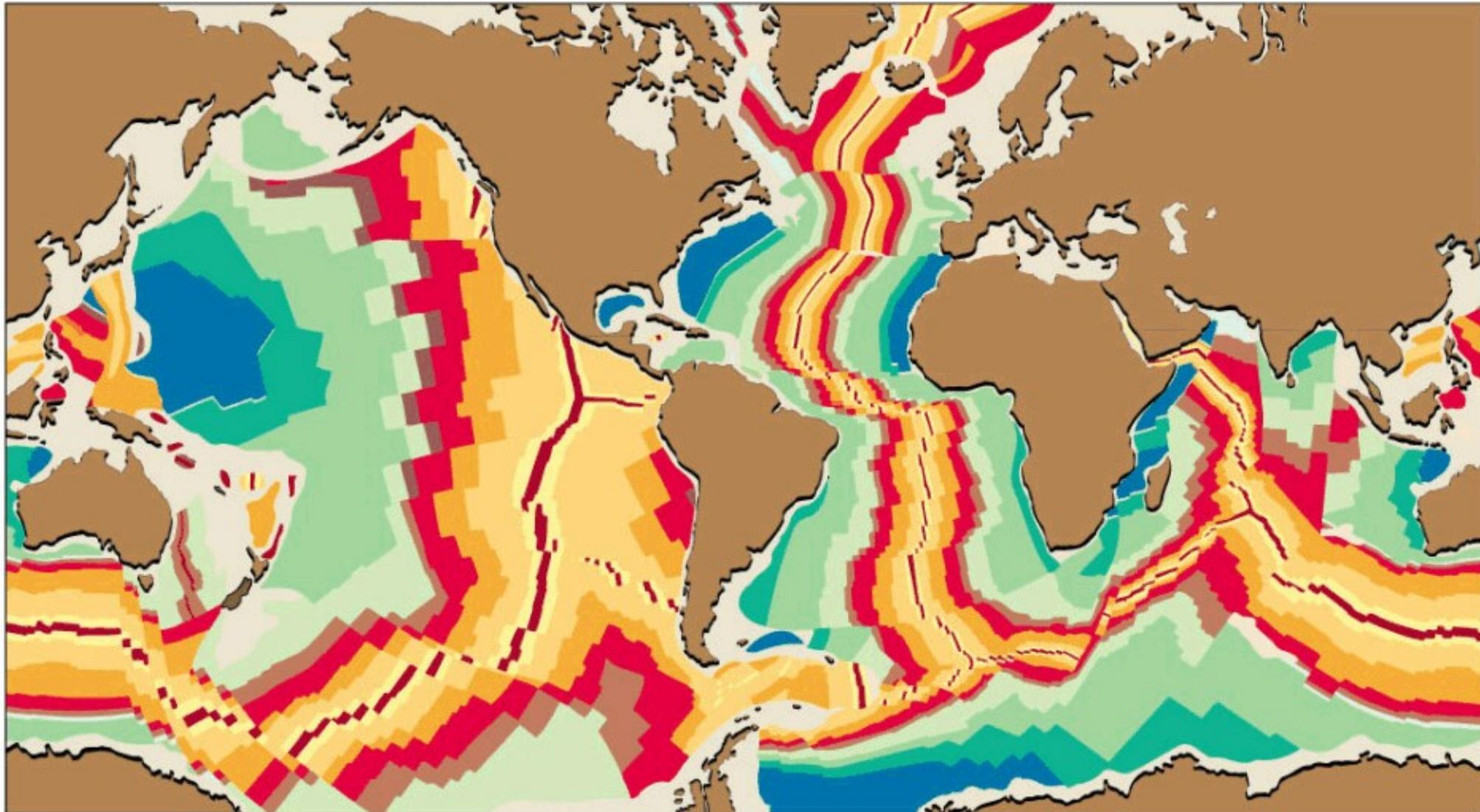
# Idade da crosta oceânica (em milhões de anos)



**Fig. 6.3** Distribuição das idades geocronológicas do fundo oceânico do Atlântico Norte, onde se observam as idades (em Ma) mais jovens próximas à dorsal meso-oceânica.

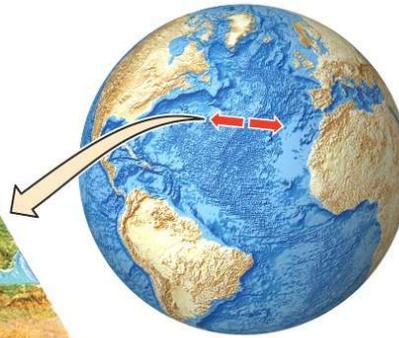
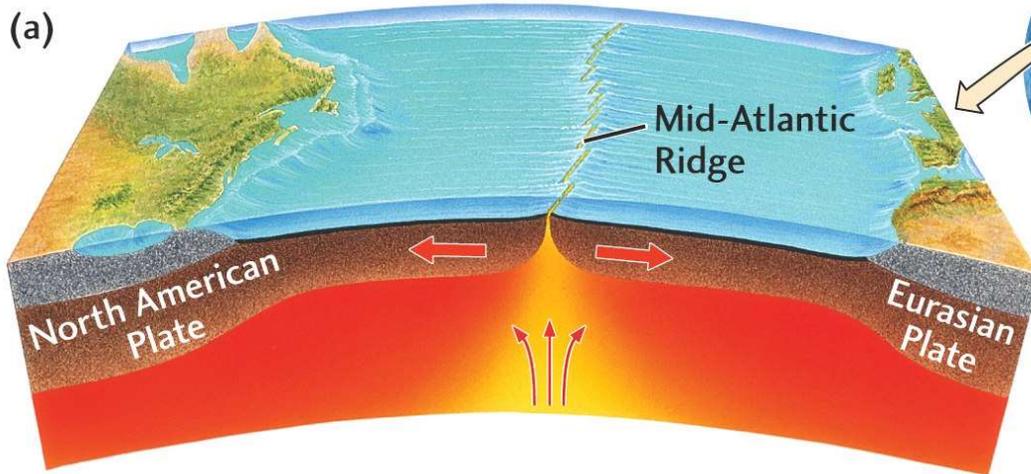


# Idade das Bacias Oceânicas

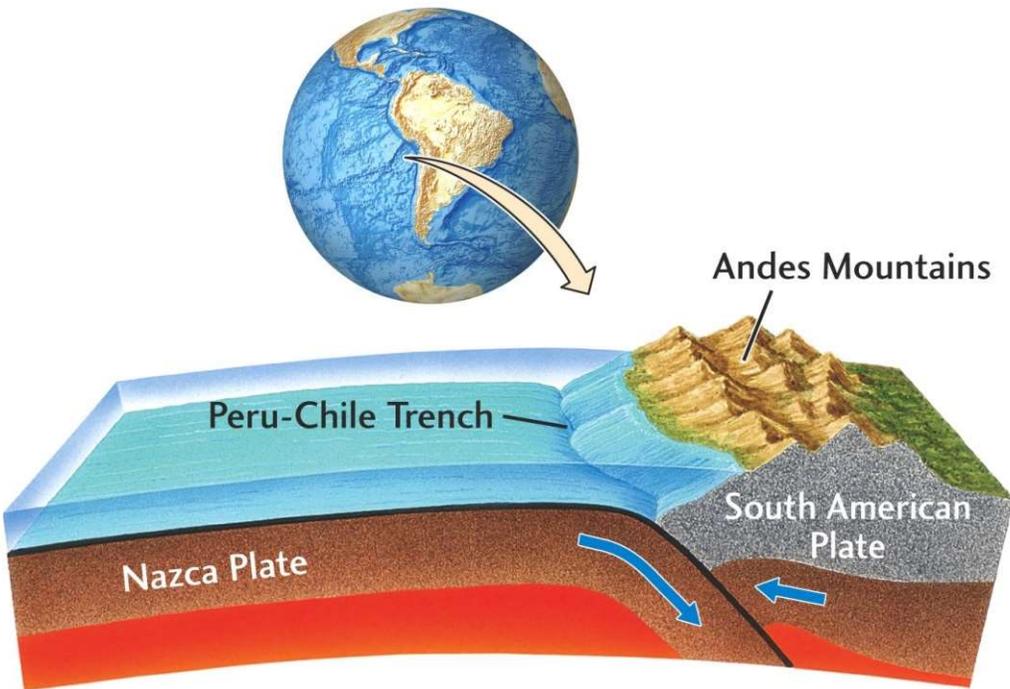


# Resumo

# Resumo



**DORSAIS:**  
formação de  
nova crosta oceânica



**FOSSAS:**  
destruição de  
crosta (antiga)

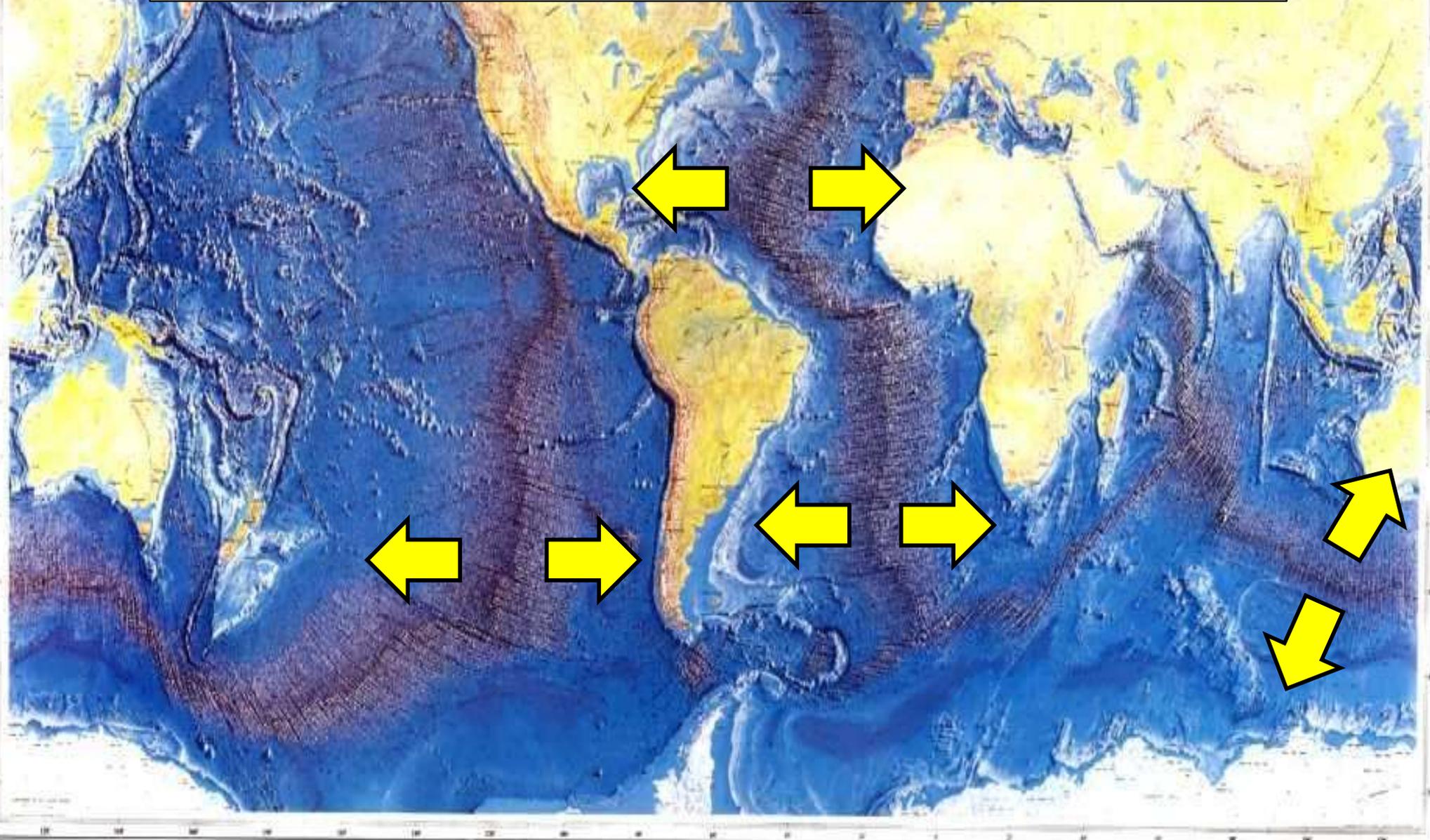
**Existe equilíbrio entre**  
**formação de nova crosta oceânica**  
**nas dorsais**

**e**

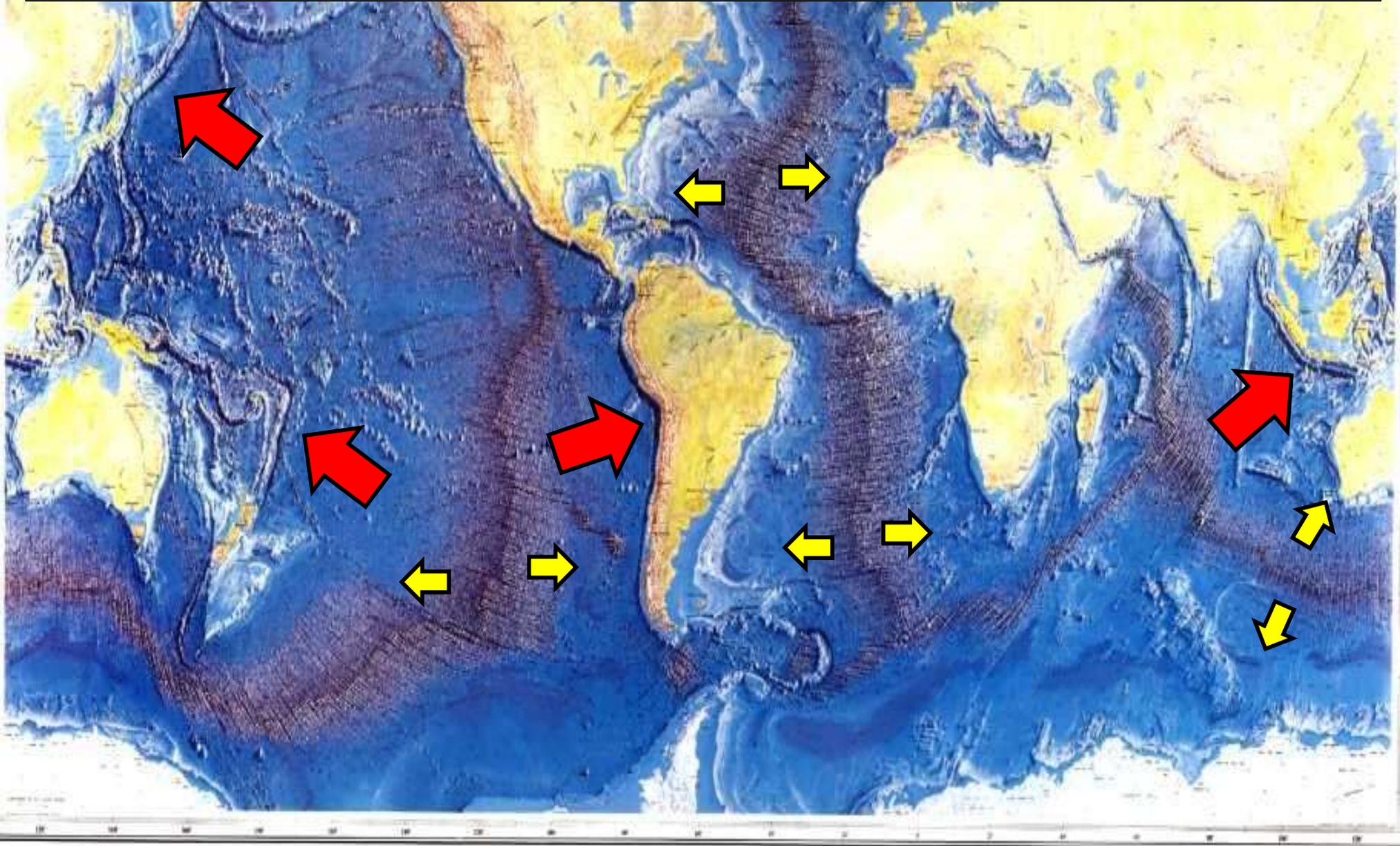
**destruição de crosta oceânica**  
**antiga por subducção**  
**(a subducção forma ás fossas)**

# Dorsais oceânicas: formação de nova crosta oceânica

OCEAN FLOOR  
BREEZY AND WINDY  
THE NATIONAL OCEANOGRAPHIC SOCIETY  
1981



Zonas de subducção (fossas):  
destruição de **crosta oceânica** (antiga)



# **Tectônica de Placas**





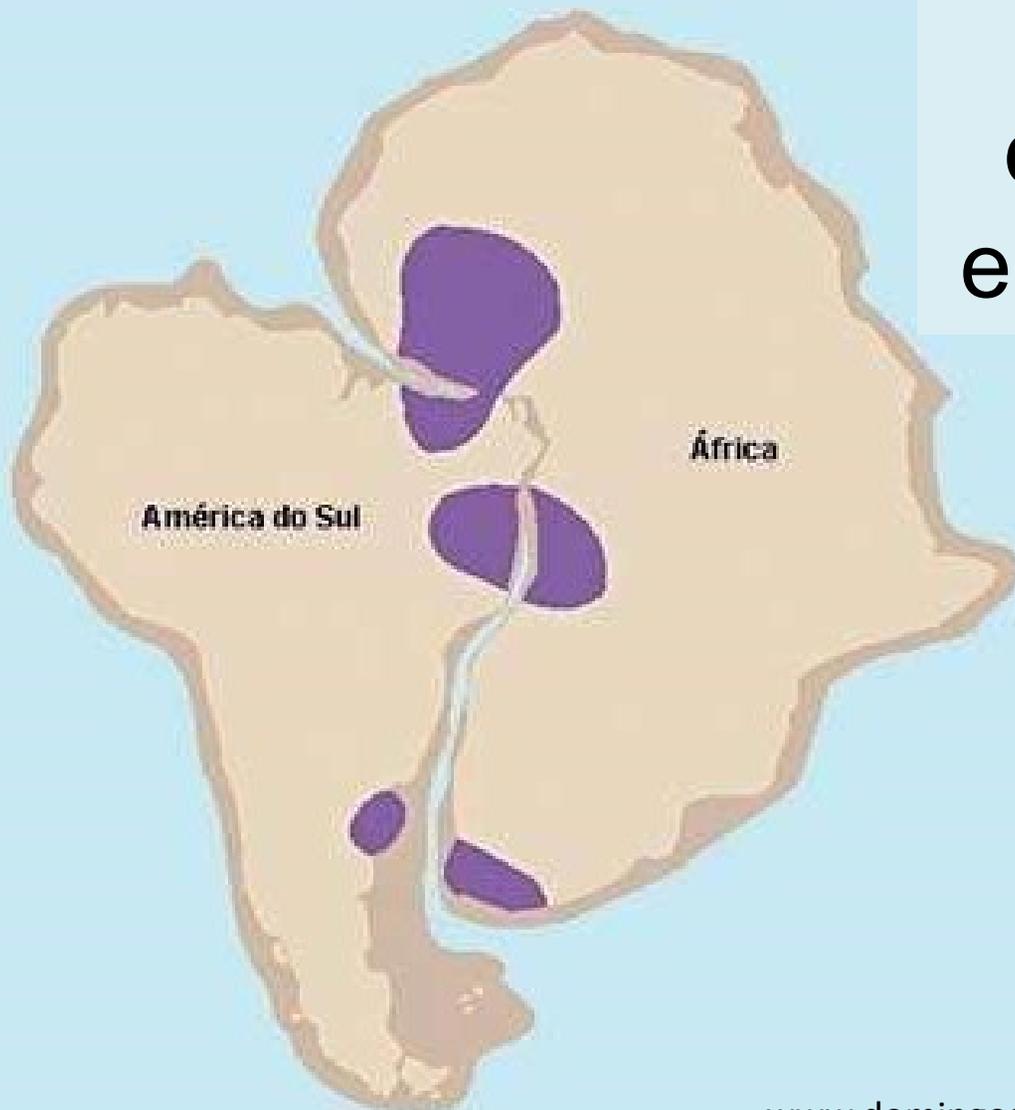
Era um único continente?

Altitude (em metros)	Profundidade (em metros)
2000	0
500	200
200	4000
0	Picos ▲
Depressão	

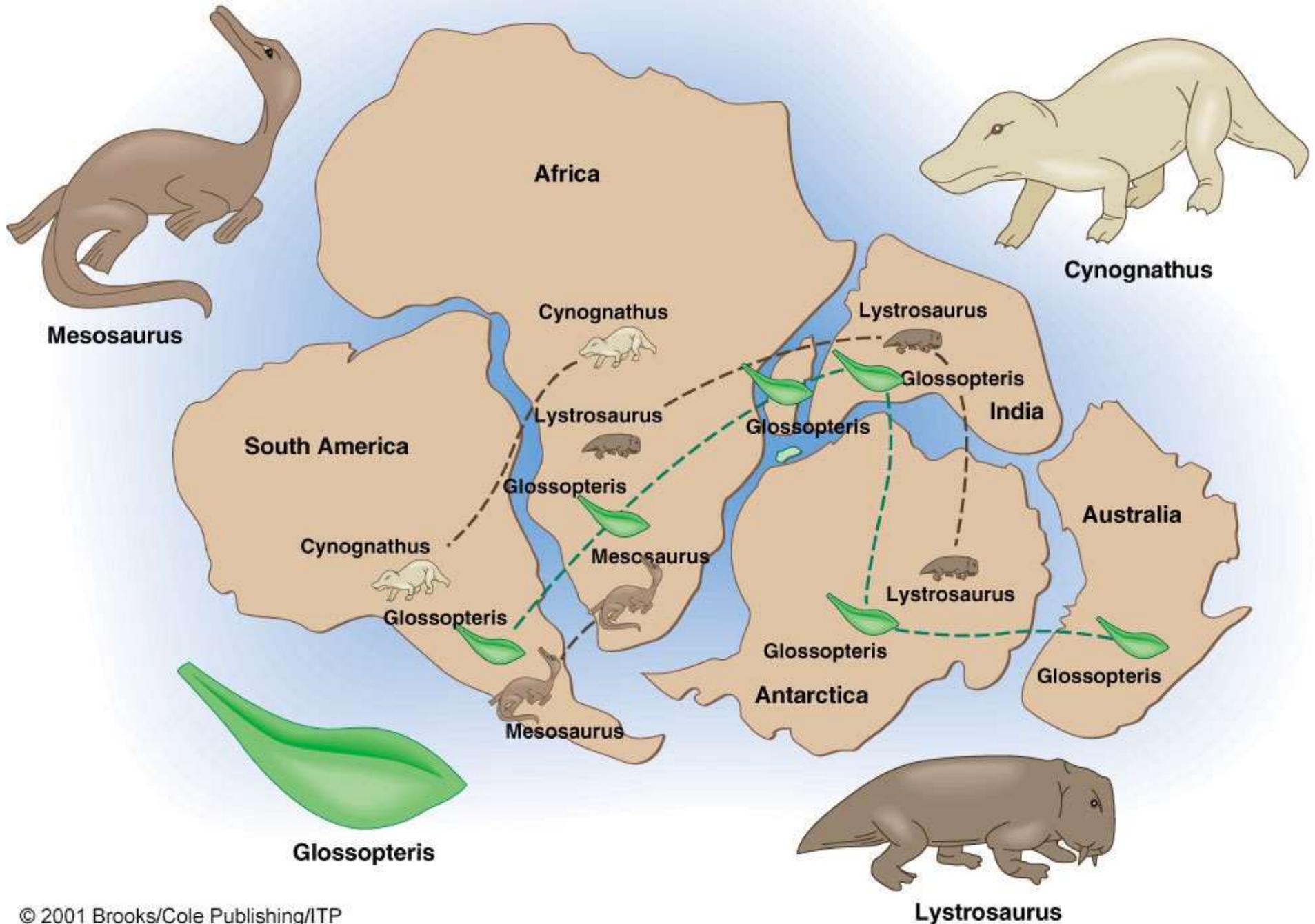
ESCALA 1:180.000.000  
0 1800 3200 km  
(no Equador)

# Evidências geográficas

linhas da costa  
de alguns continentes  
encaixam perfeitamente



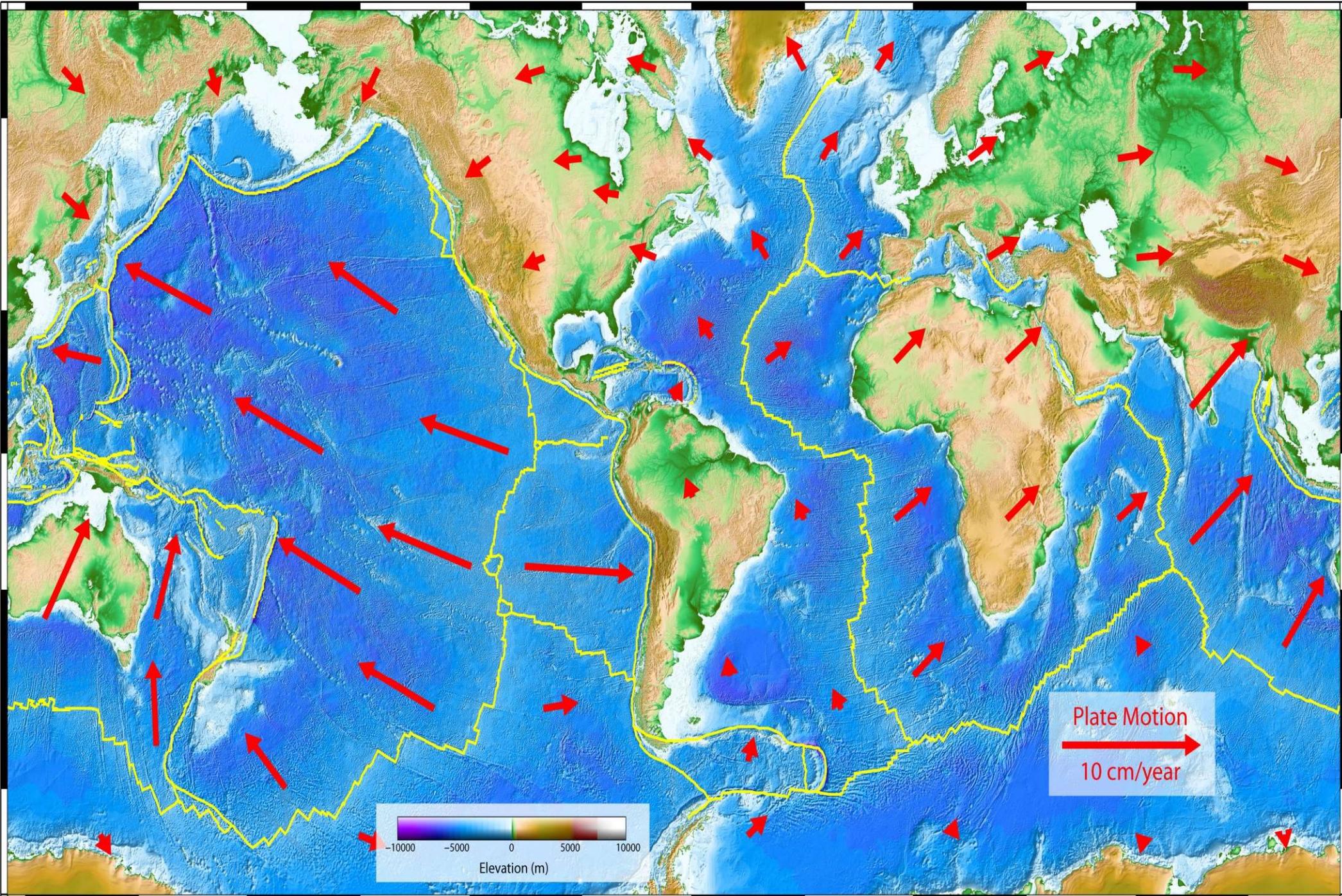
# Combinação Fóssil



# **Tectônica de Placas**

## Evidencias Direitas

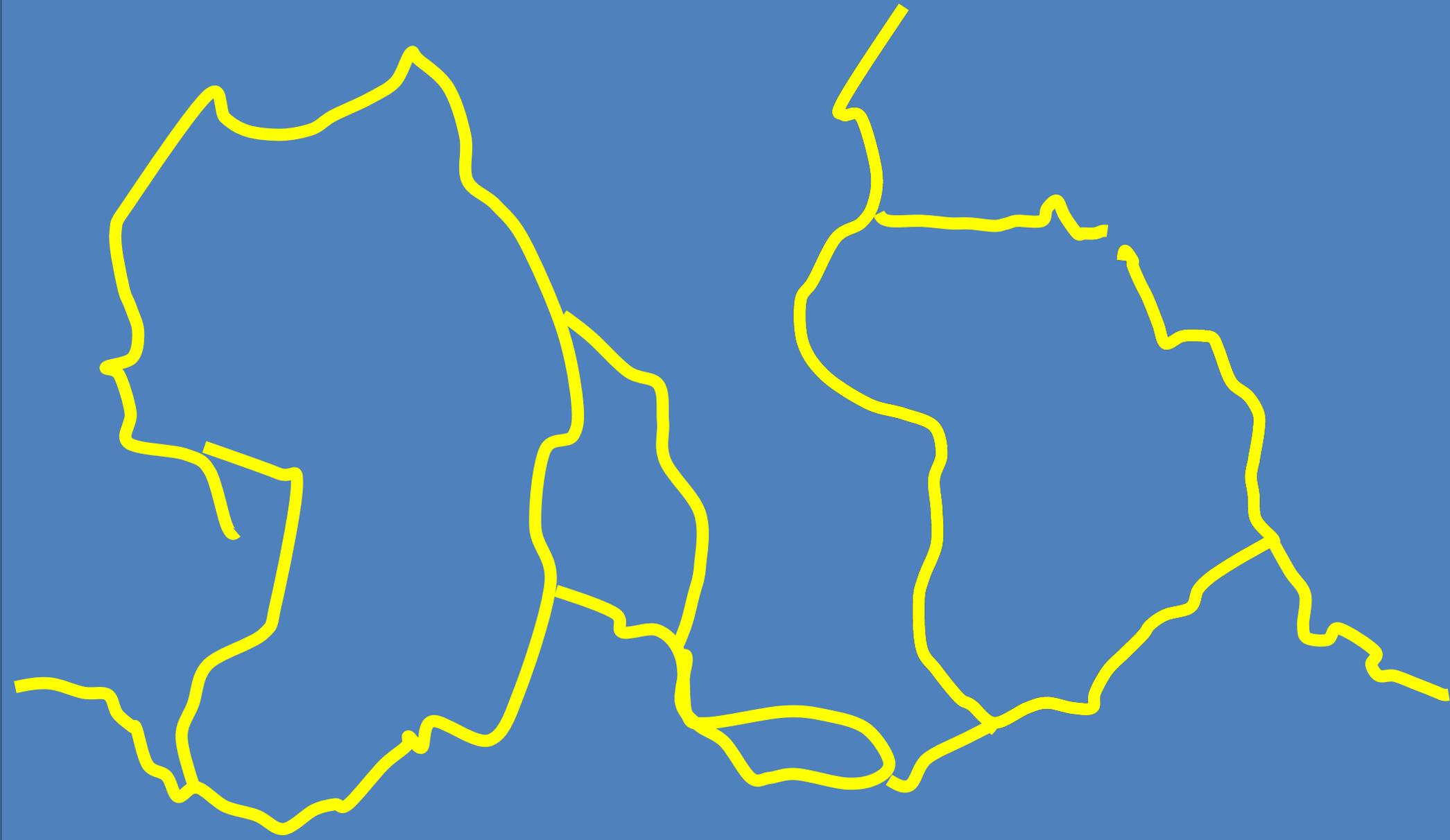


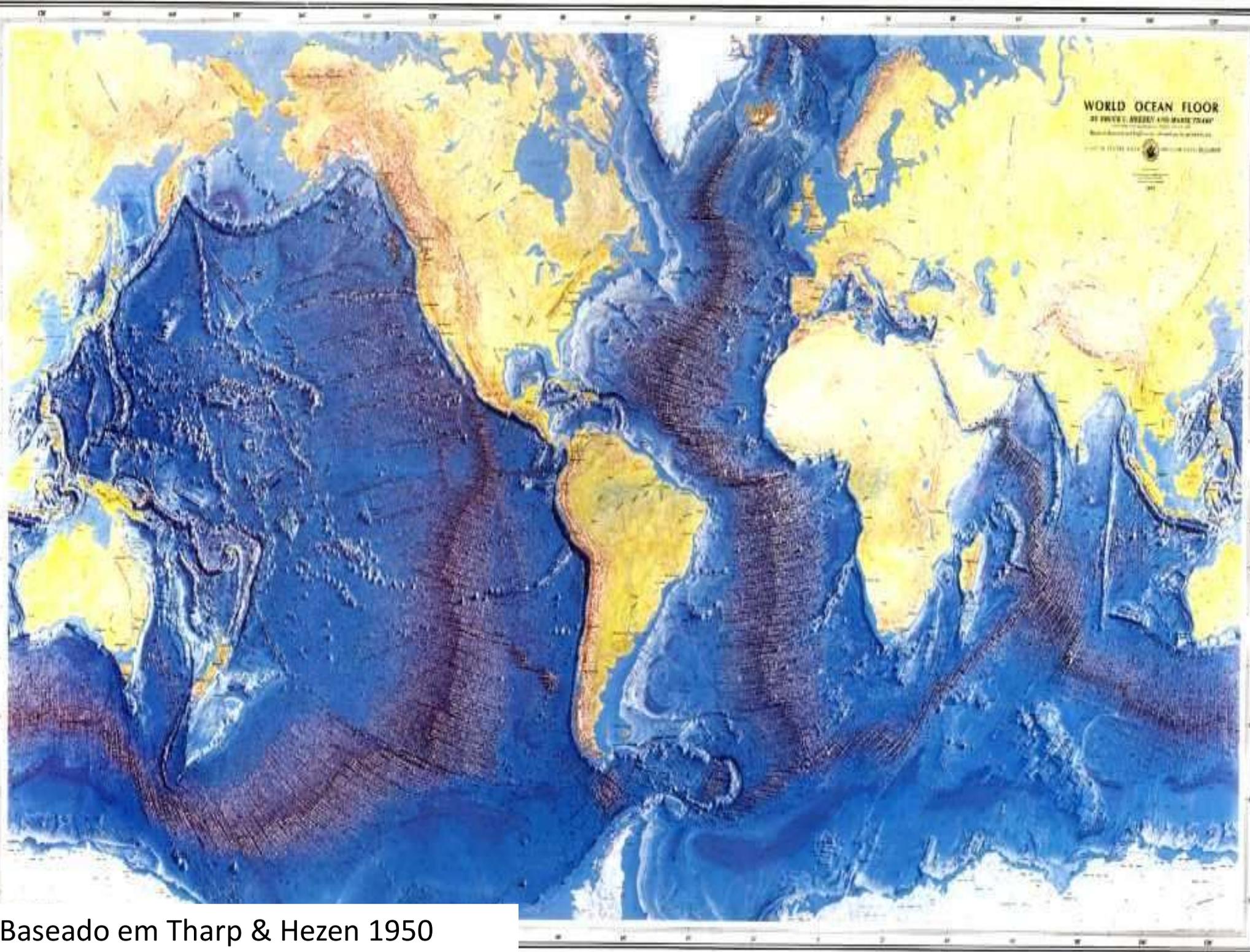


# As placas tectônicas



# Limites das placas tectônicas





WORLD OCEAN FLOOR

BY PHILIP H. ABNEY AND MARIE THARP  
NATIONAL ACADEMY OF SCIENCES, NATIONAL RESEARCH COUNCIL ON OCEANOGRAPHY  
U.S. GOVERNMENT PRINTING OFFICE

Baseado em Tharp & Hezen 1950

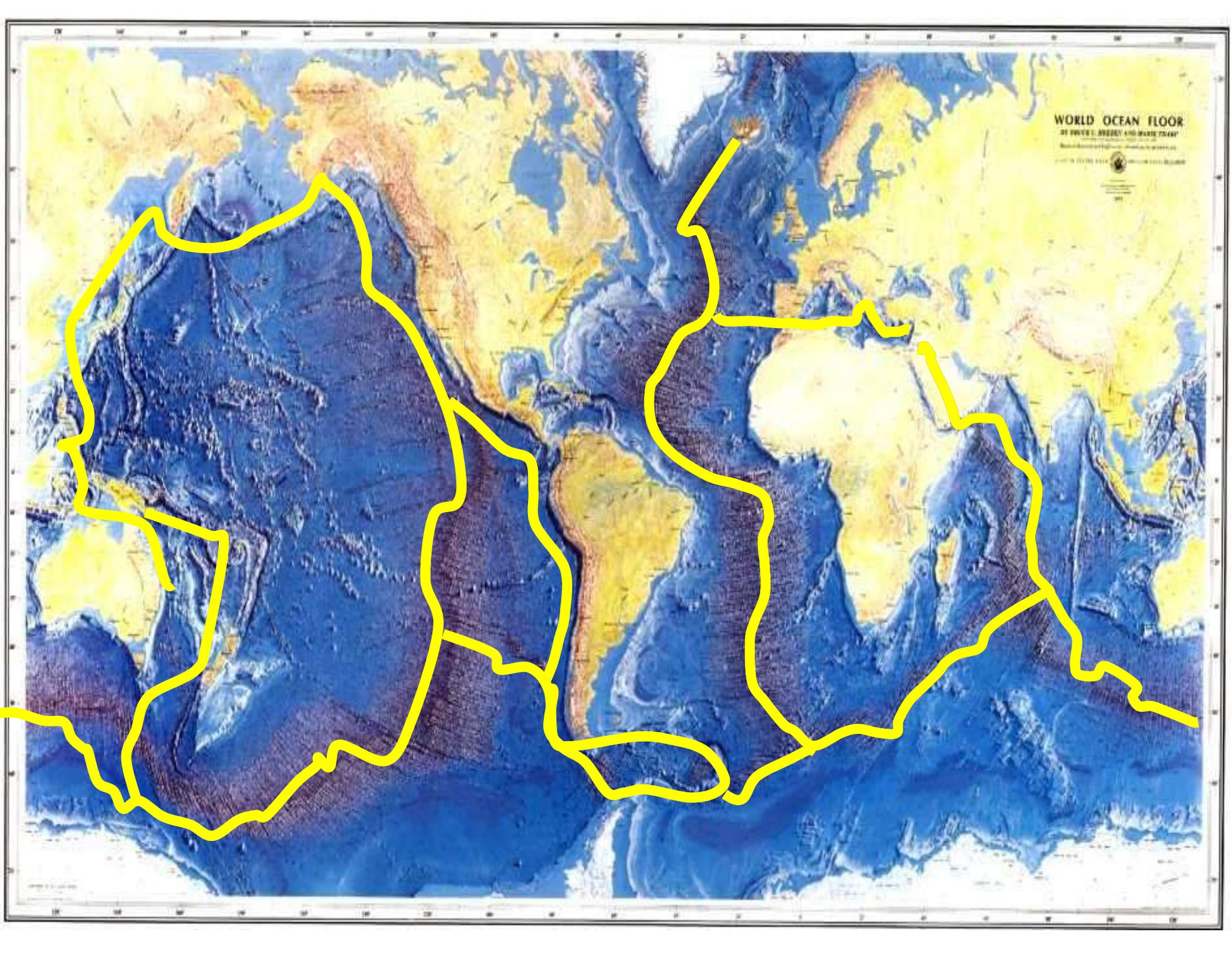
**WORLD OCEAN FLOOR**

BY PHILIP H. ABNEY AND MARIE TOUHY

Map of the World Ocean Floor

United States Geological Survey

1961



**IMPORTANTE:**

as fossas e as dorsais estão  
localizadas nos **limites das**  
**Placas Tectônicas**

**IMPORTANTE:**

**Fossas: limites convergentes**

**Dorsais: limites divergentes**

Porque existe  
a tectônica de placas:

# **Teoria da Tectônica Global**

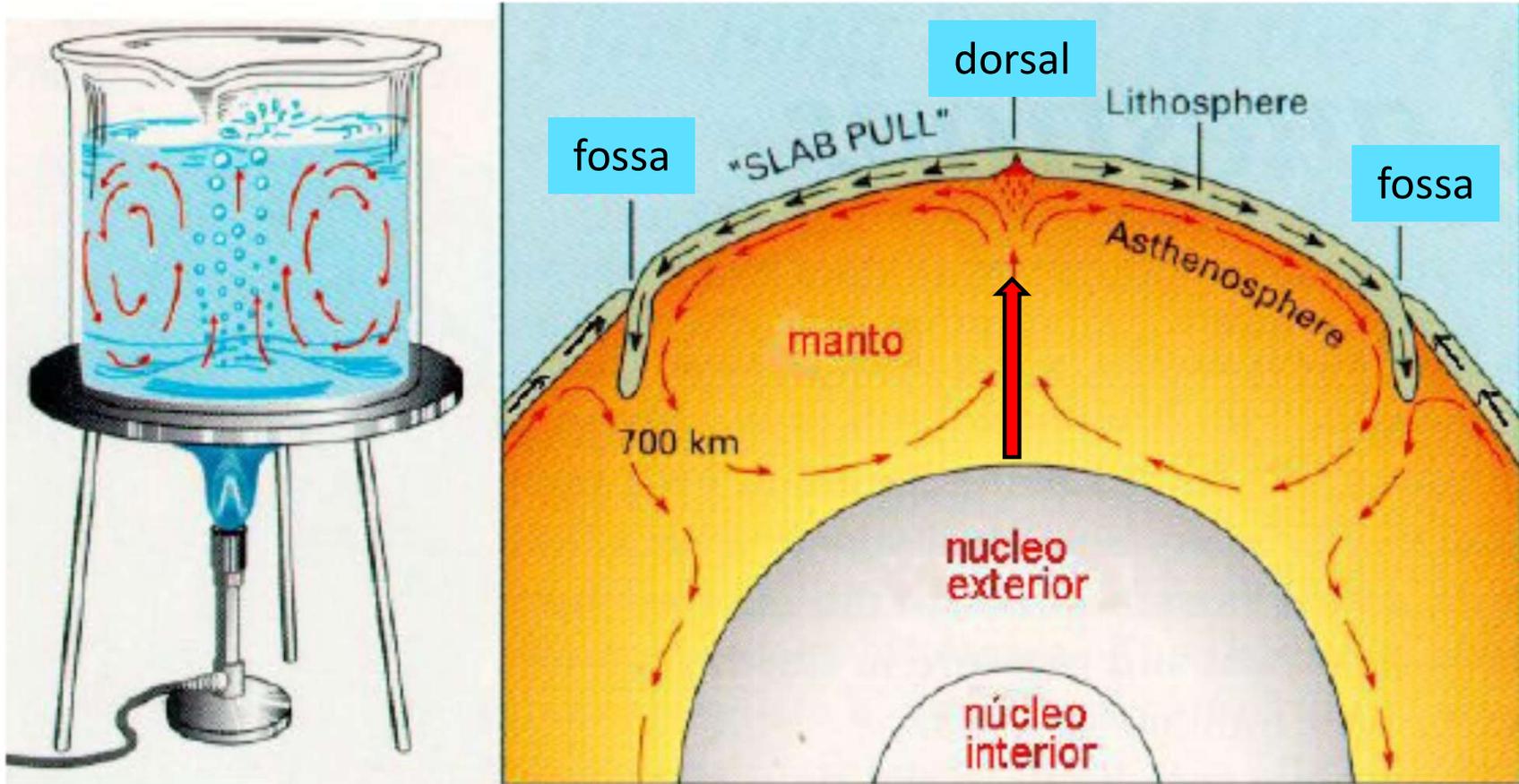
# **A Tectônica Global**

**Explica a ligação entre**

**expansão dos fundos oceânicos nas dorsais**

**e subducção (que forma as fossas)**

# Motor da Tectônica Global



- **Correntes convectivas no manto**

# Teoria da Tectônica Global (Harry H. Hess, 1960)

