

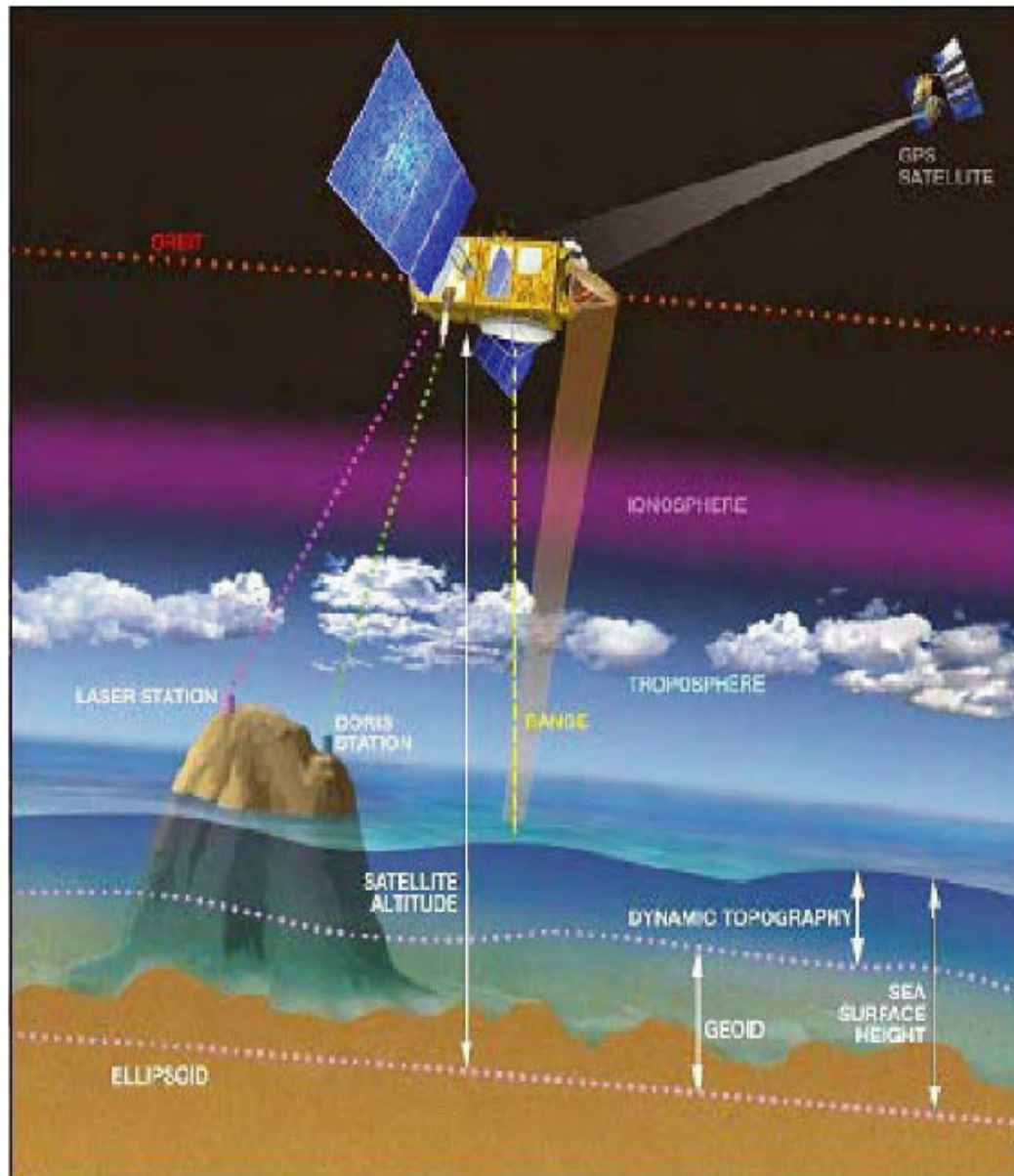
Les fonds océaniques

Olivier LACOMBE

Laboratoire de Tectonique, UMR CNRS 7072, Université Pierre et Marie Curie, Paris, France



Principe de l'Altimétrie Radar

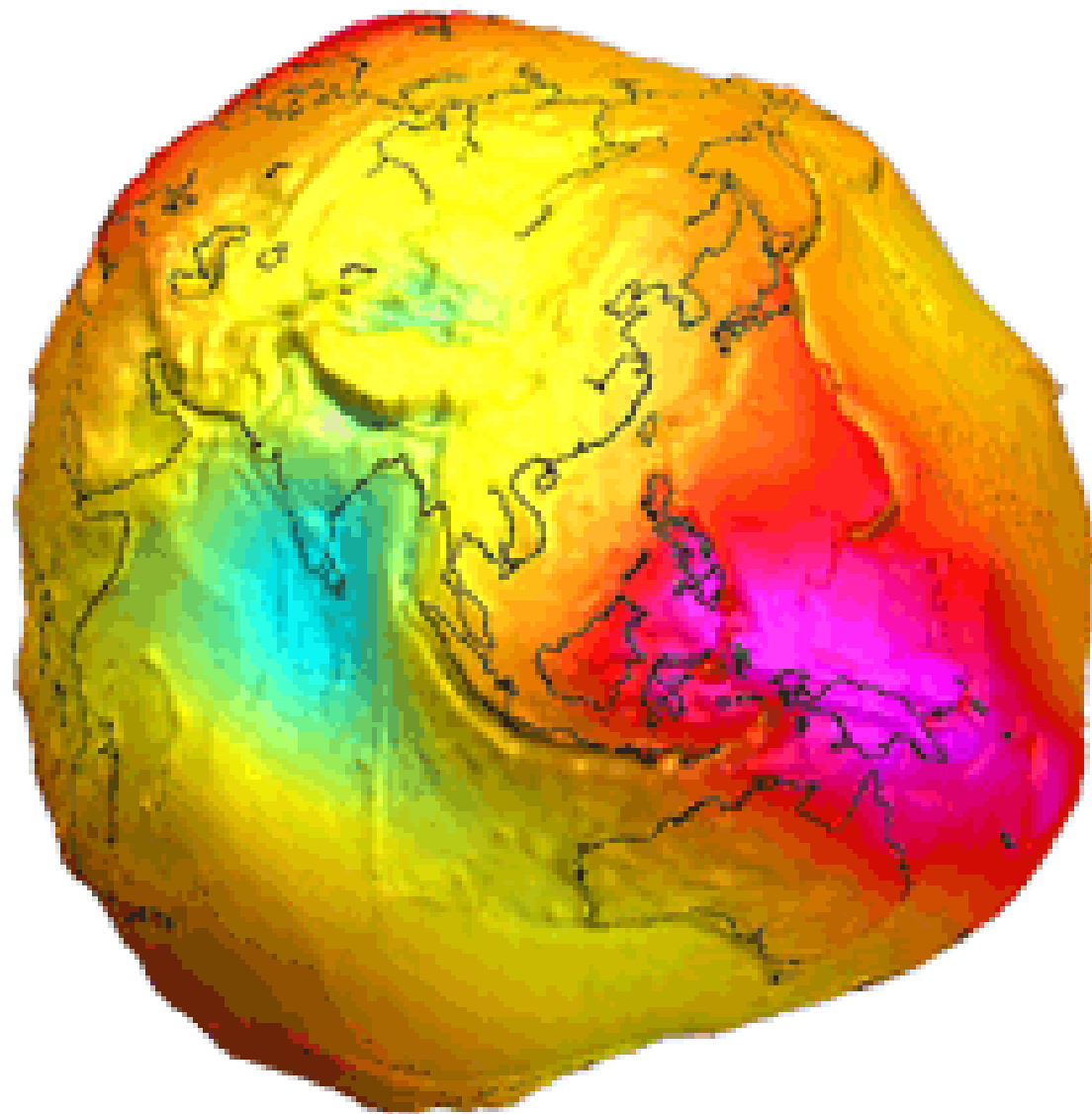


H = altitude du satellite
calculée / ellipsoïde

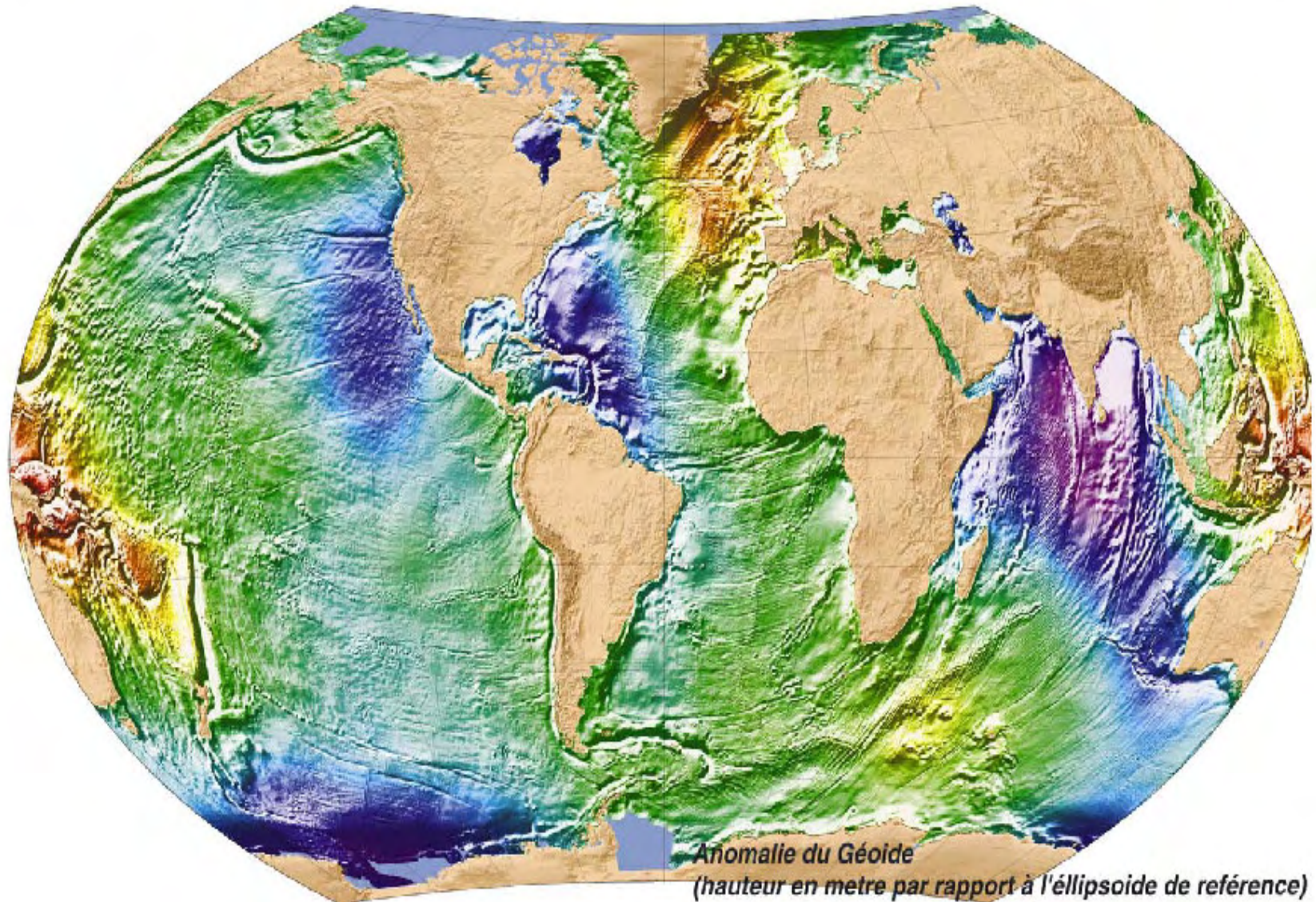
h = distance mesurée
par altimétrie radar

$(H-h)$ = hauteur
océan/ellipsoïde =
anomalie du géoïde

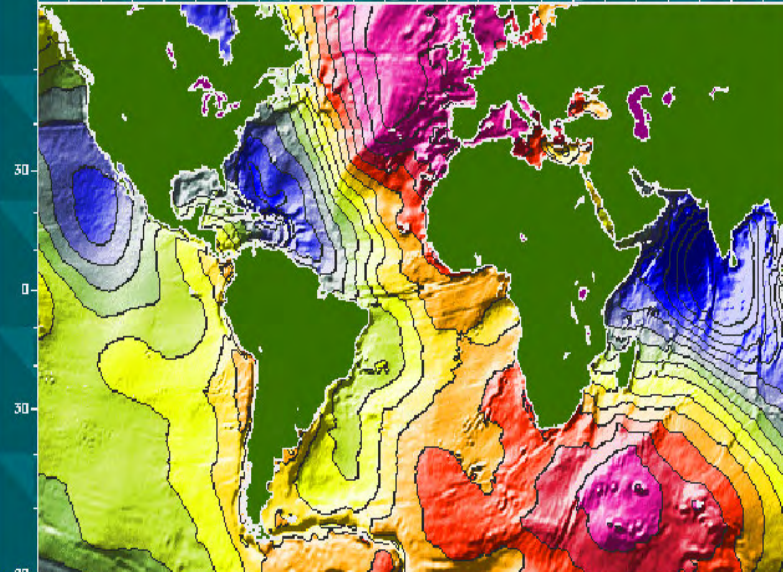
Composante dynamique
 h_c = écart entre géoïde
et surface instantanée



Anomalie du géoïde et bathymétrie des océans

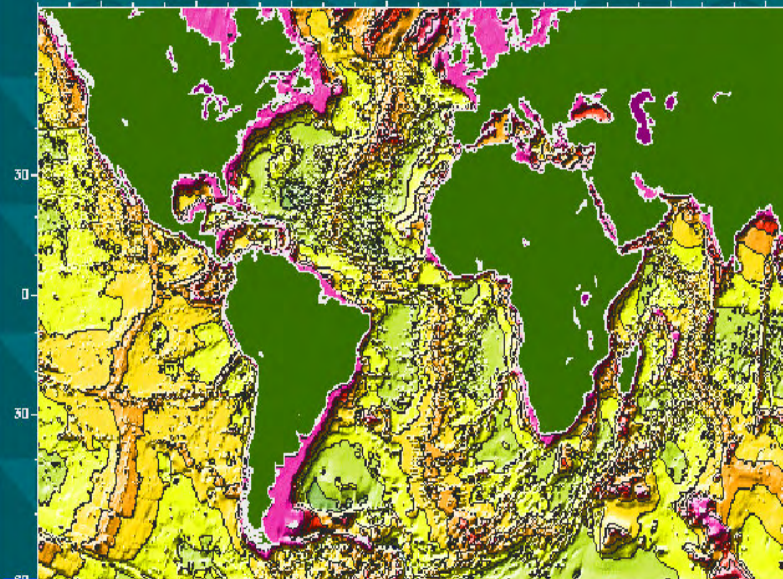


Anomalies du géoïde grandes longueurs d'onde



DEOS

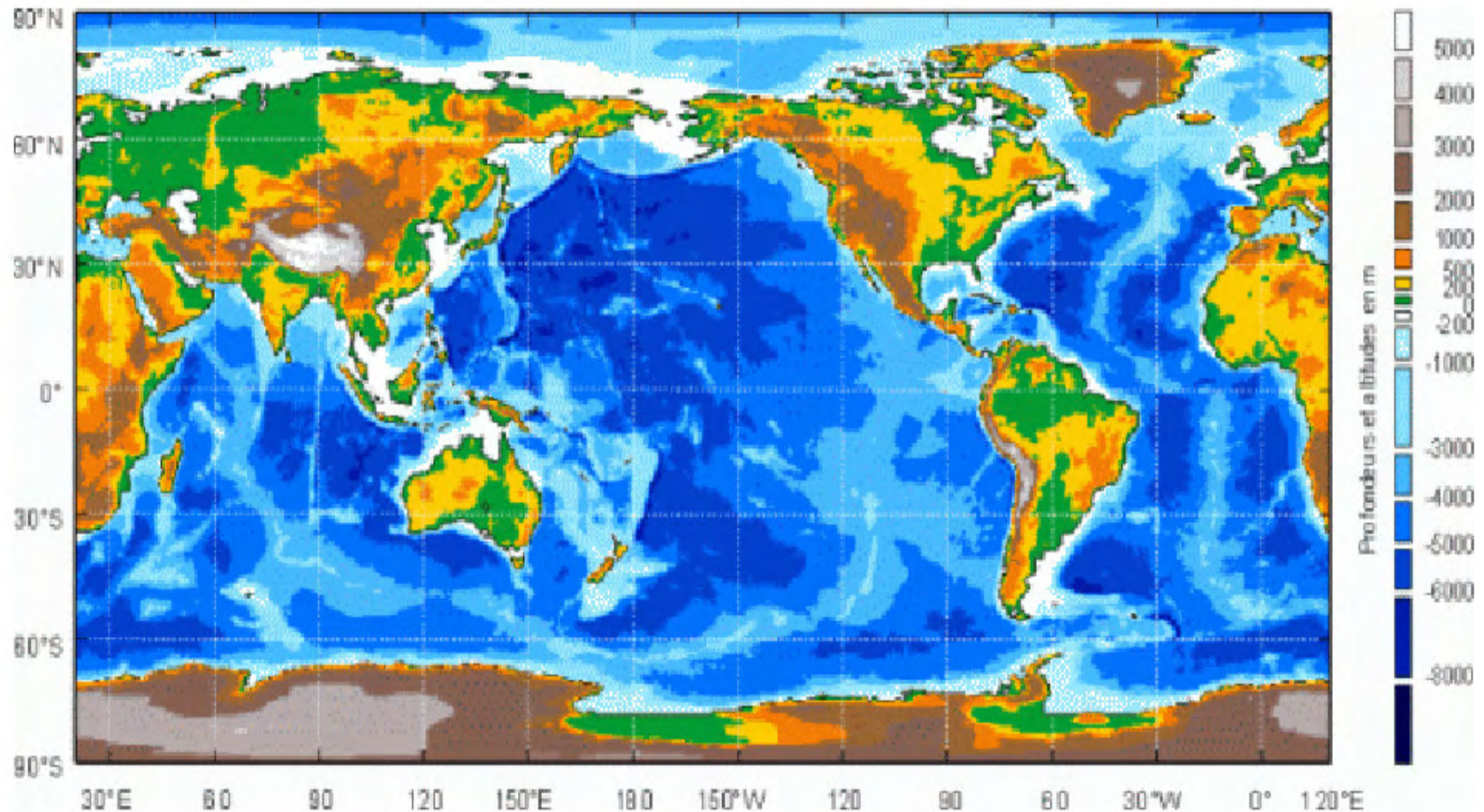
Anomalies du géoïde petites longueurs d'onde



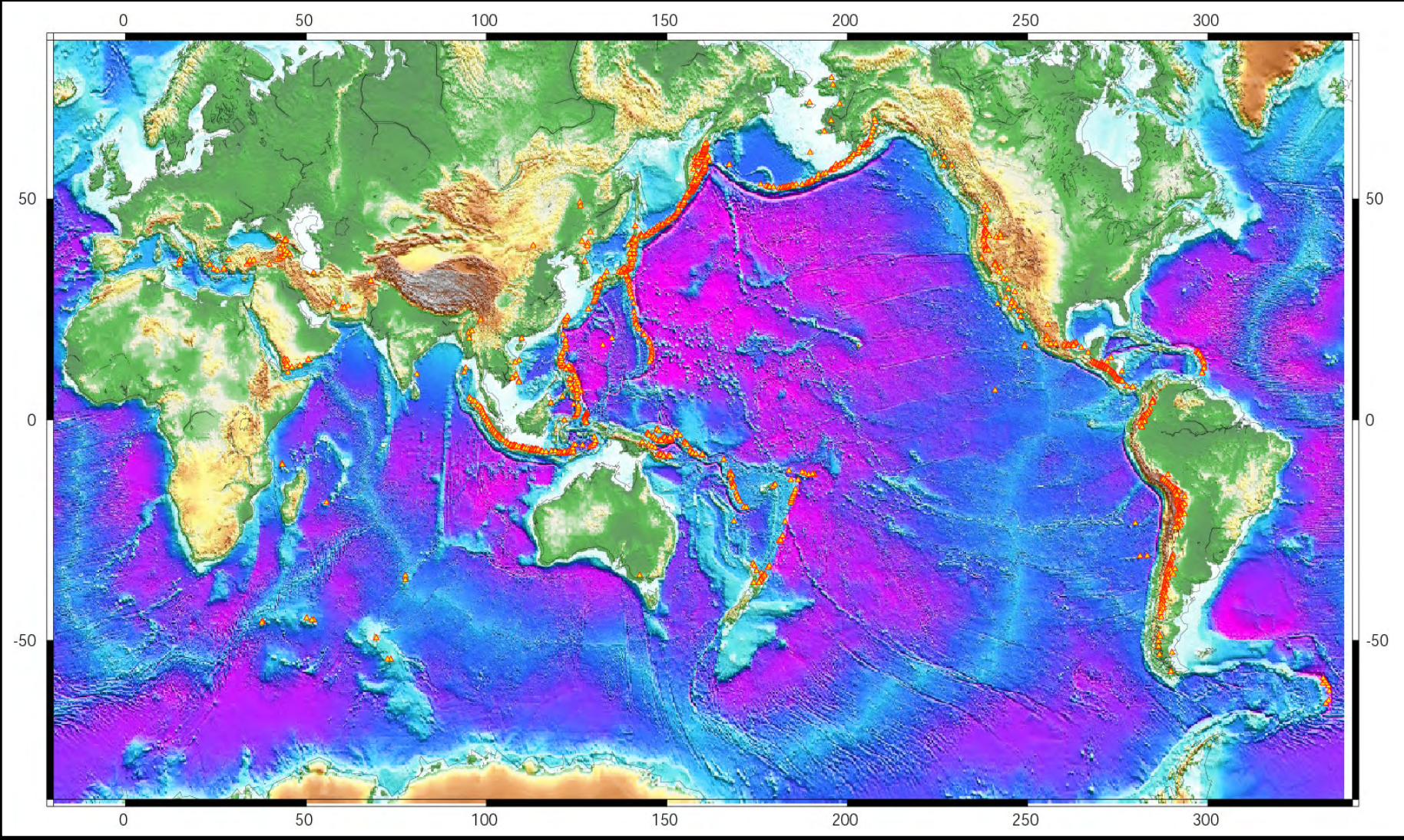
DEOS



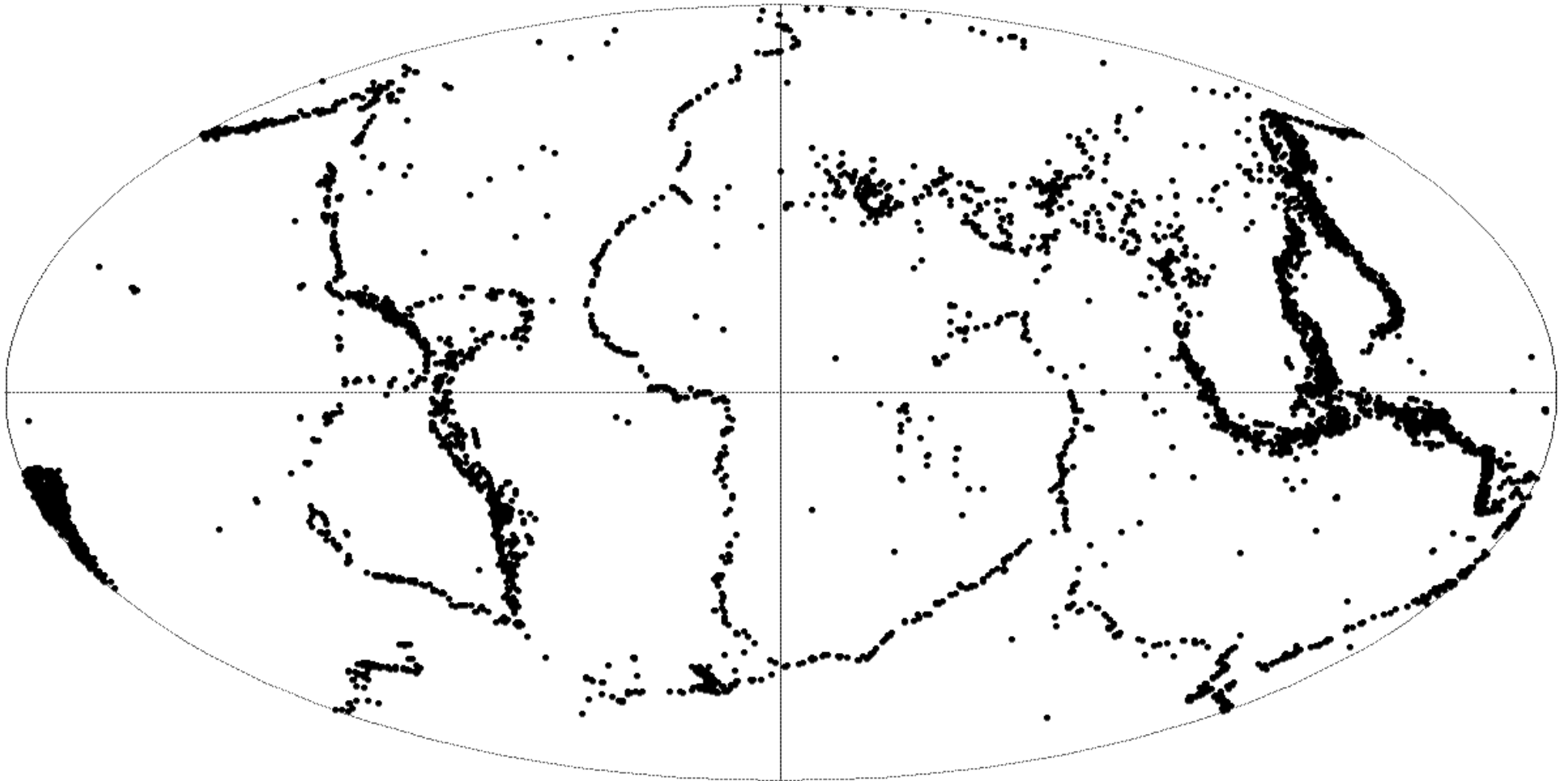
Données bathymétriques (sondages réalisés par des navires) + Mesures issues des satellites d'altimétrie



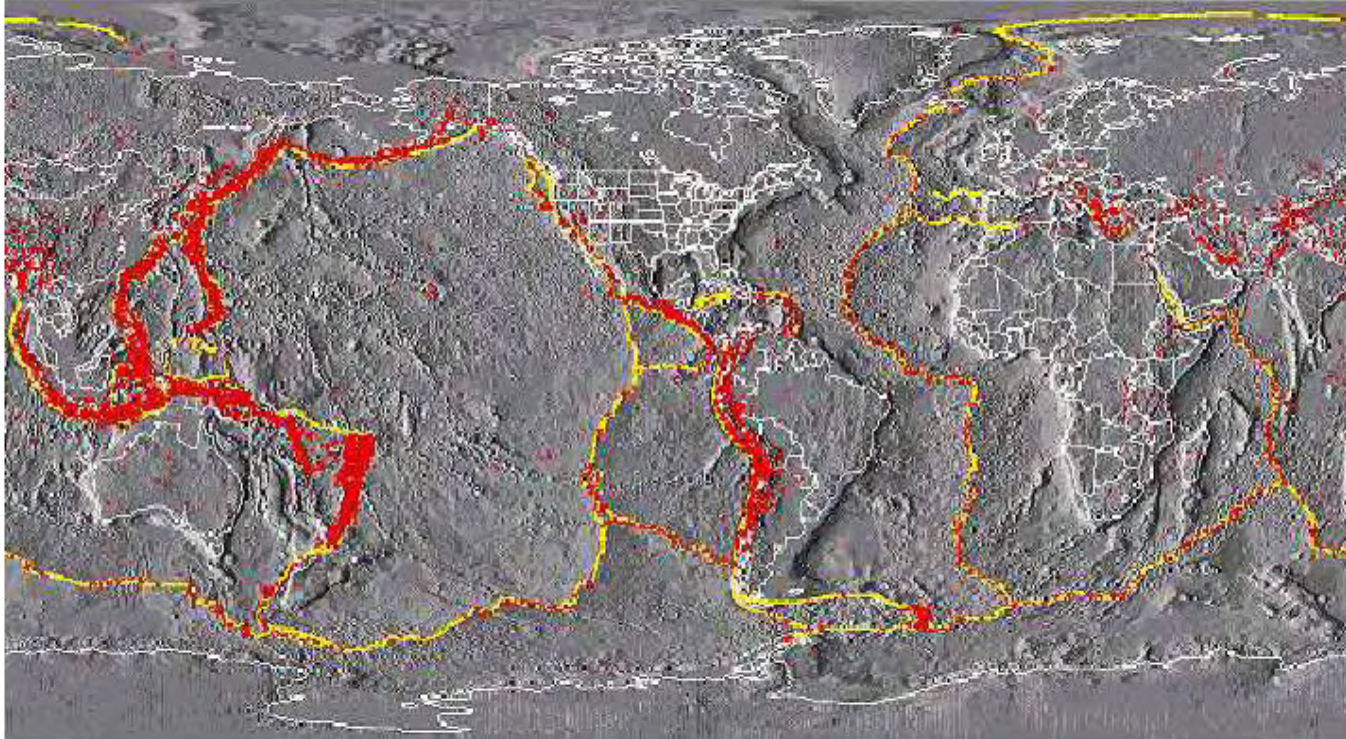
GTOPO30 : cette base de donnée fournit des mesures et estimations de la bathymétrie et de la topographie avec une résolution de 30 secondes d'arc (approximativement 1 km) pour l'ensemble de la planète.



Sismicité mondiale

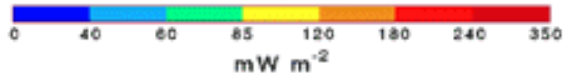
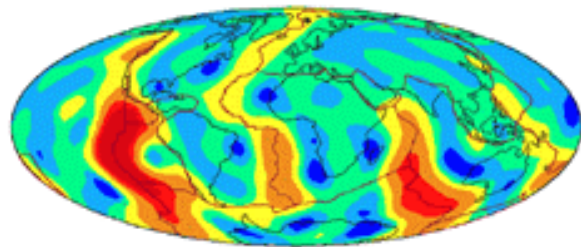


Earthquake distribution

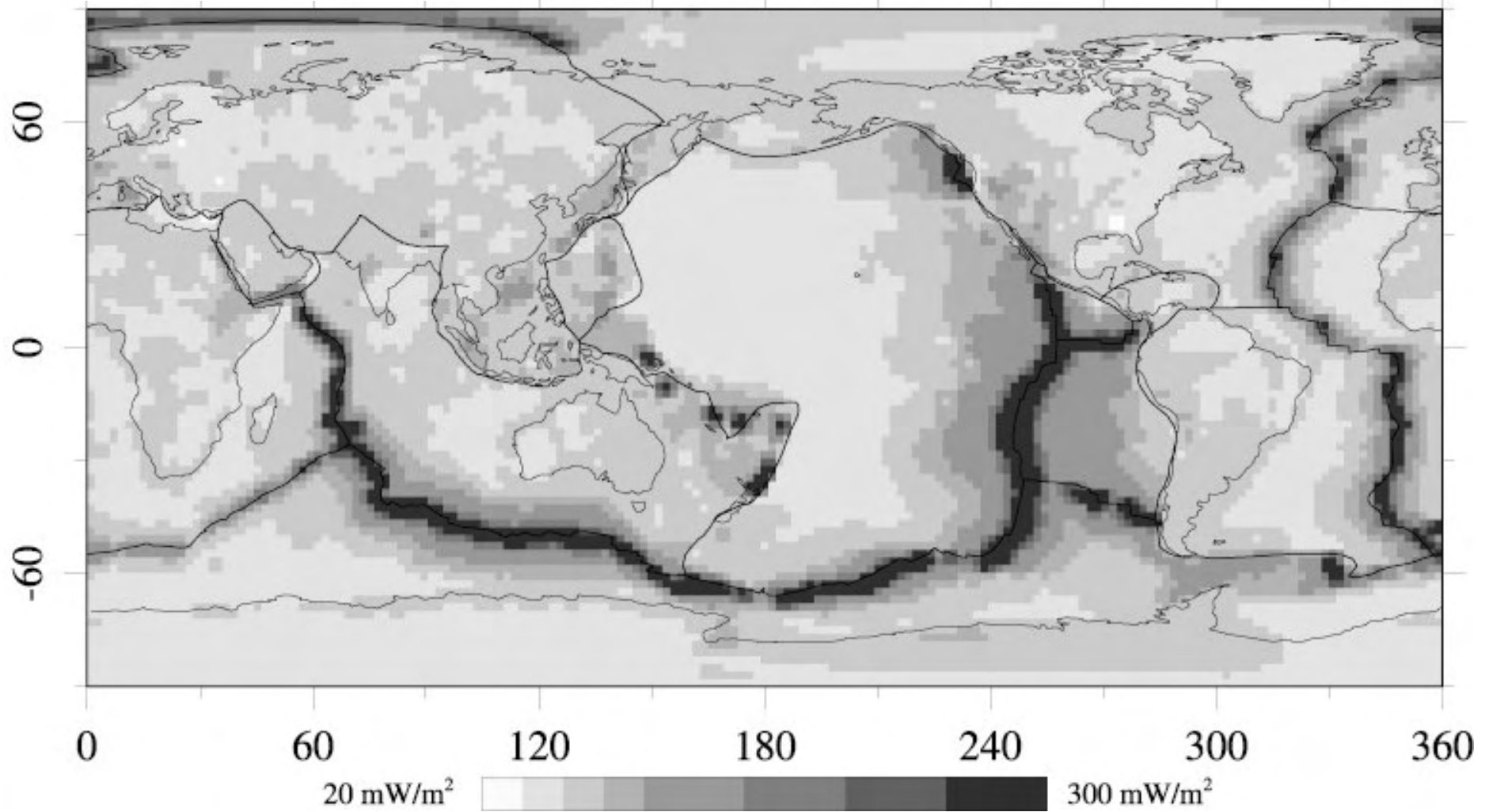


- Vast aseismic areas
- Earthquakes concentrated along narrow bands

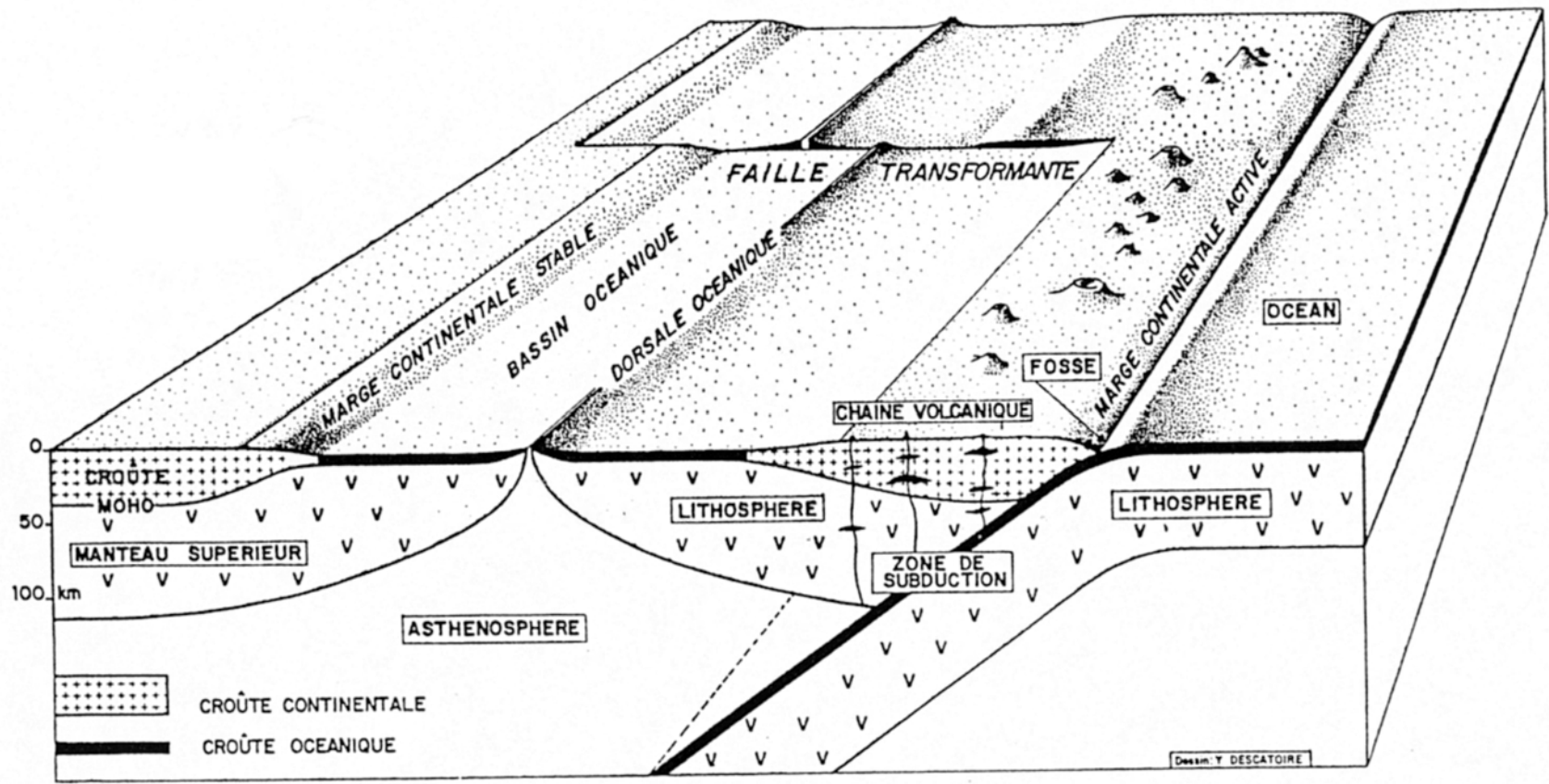
DISTRIBUTION DE FLUX DE CHALEUR

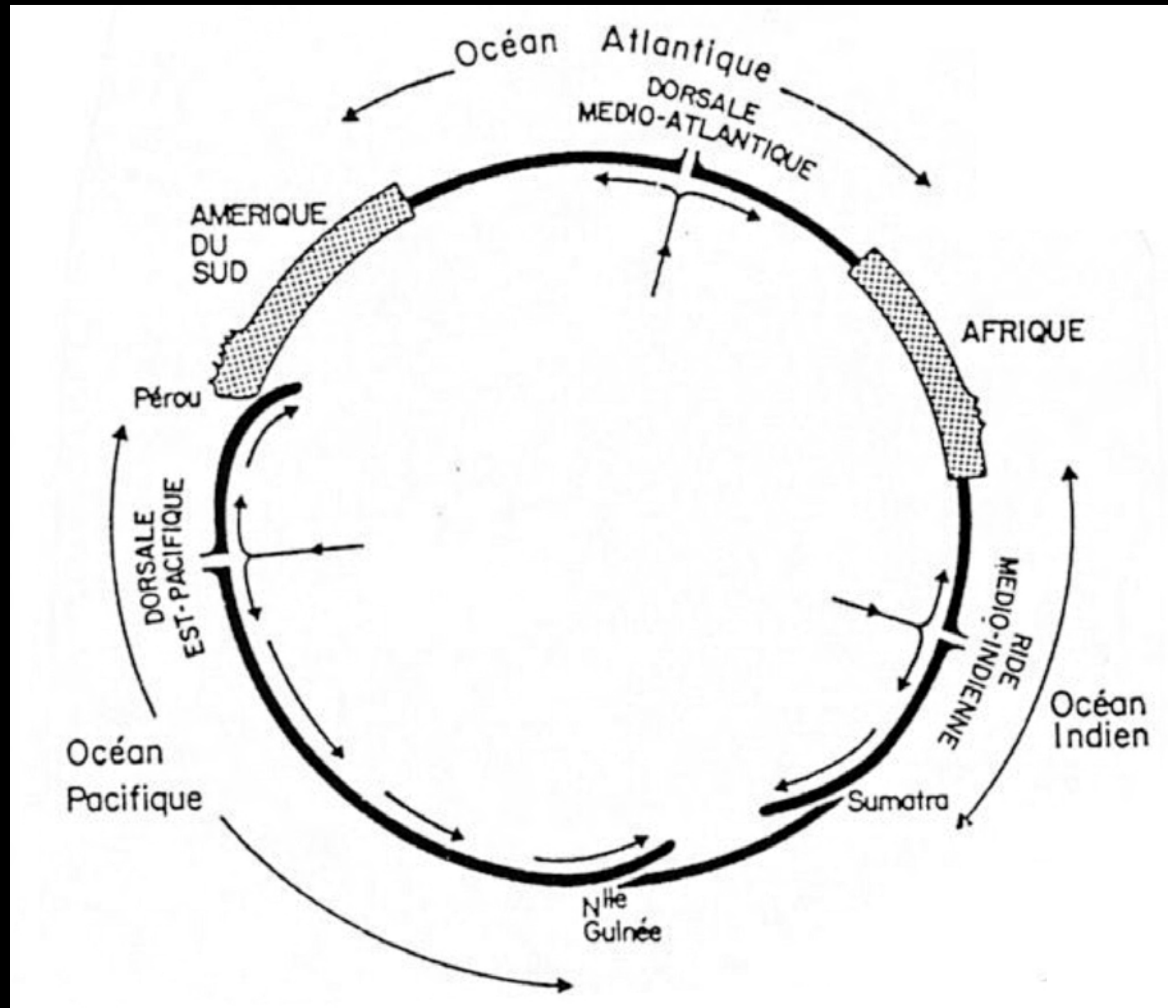


FLUX DE CHALEUR

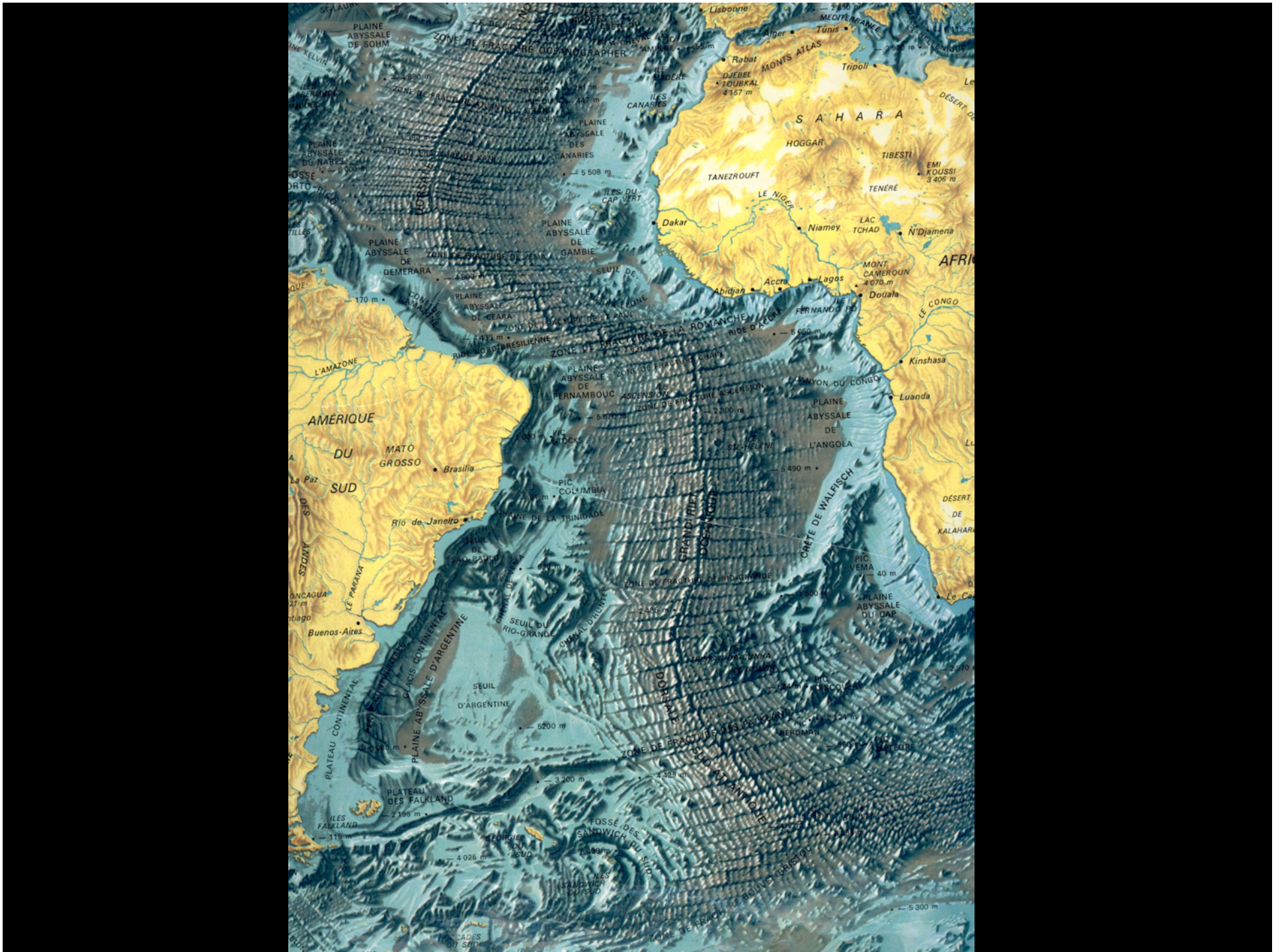




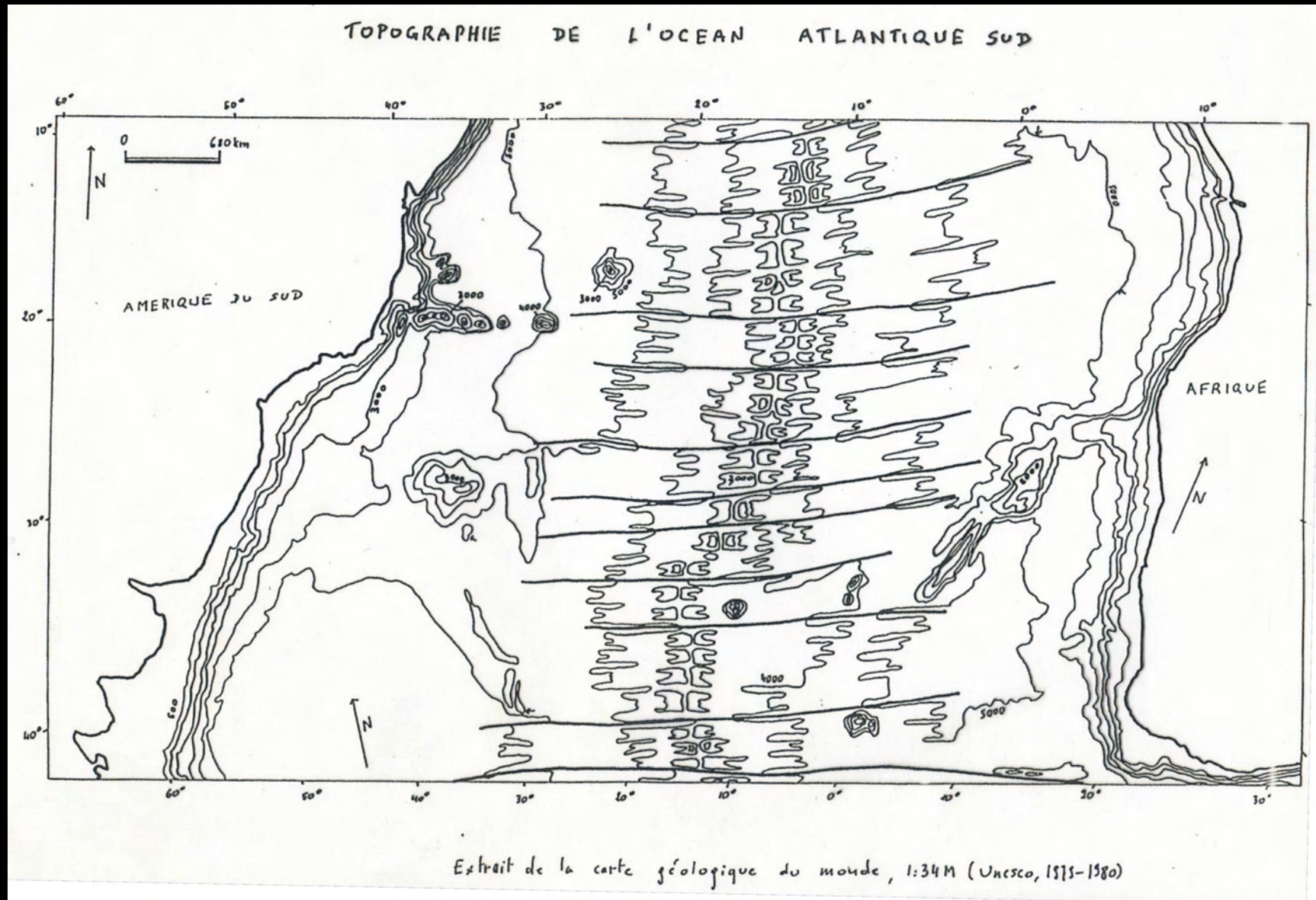


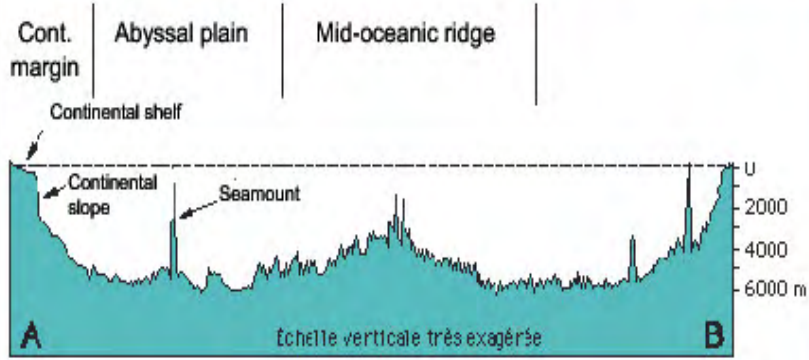
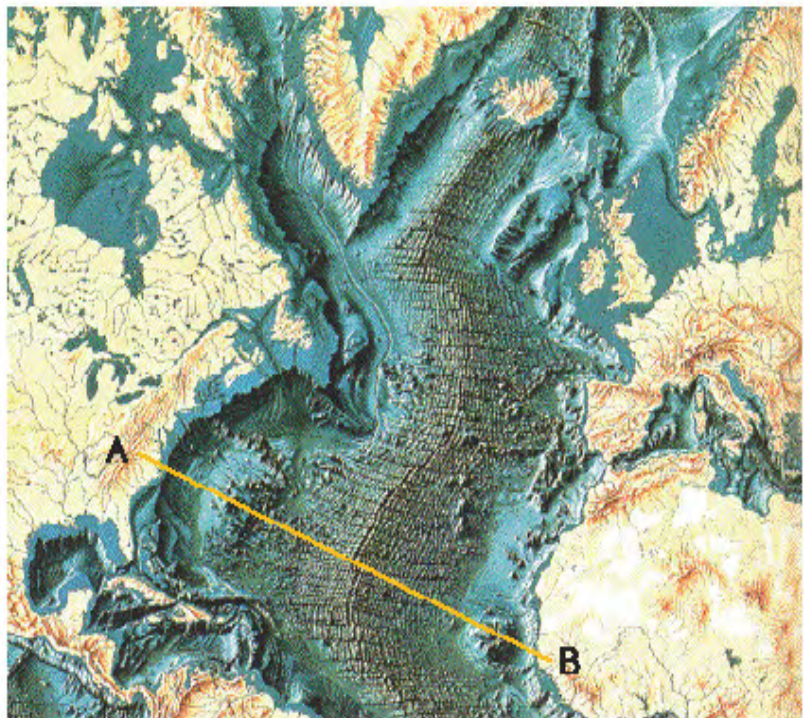


**Dorsales
et accrétion océanique**

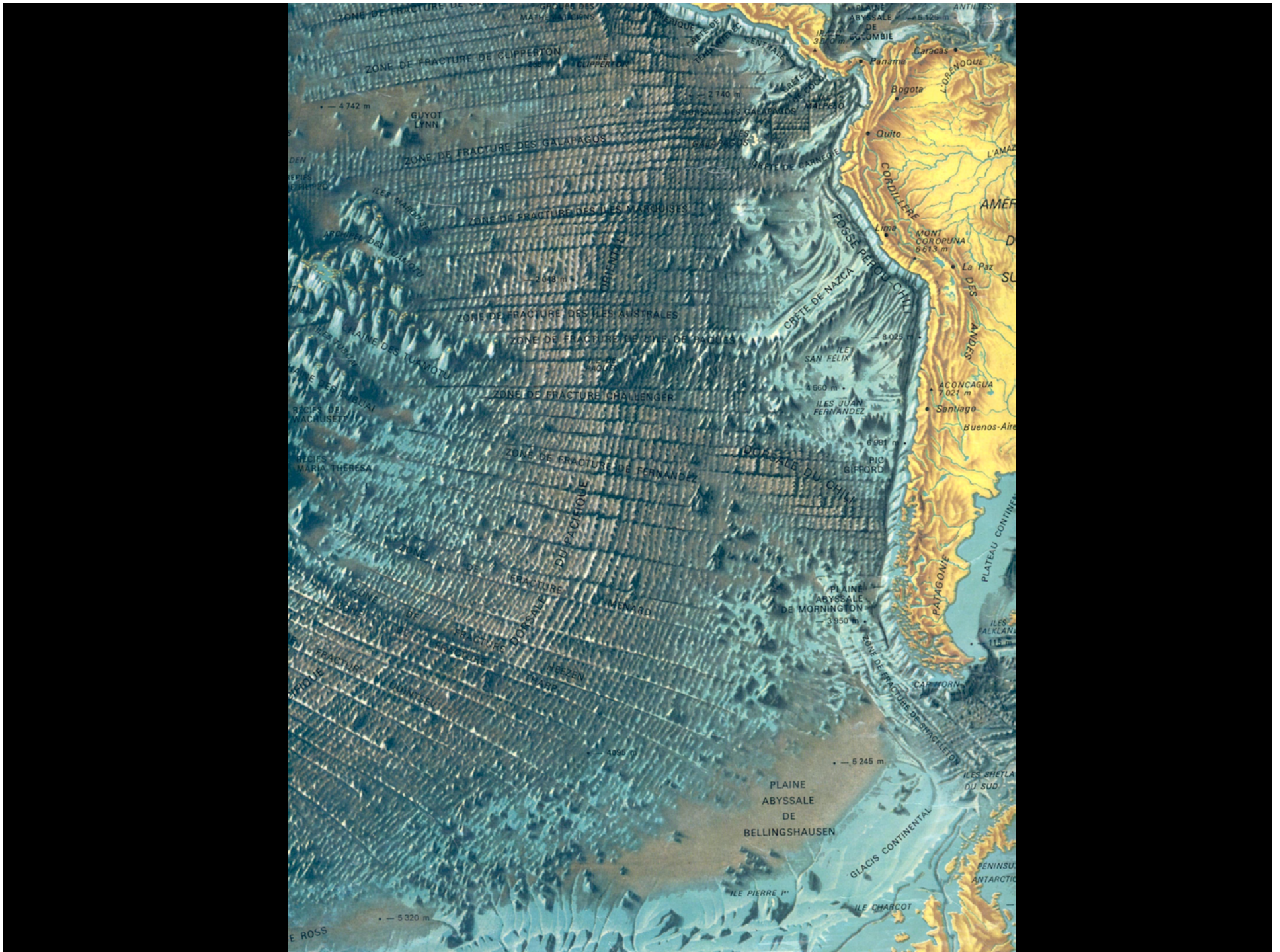


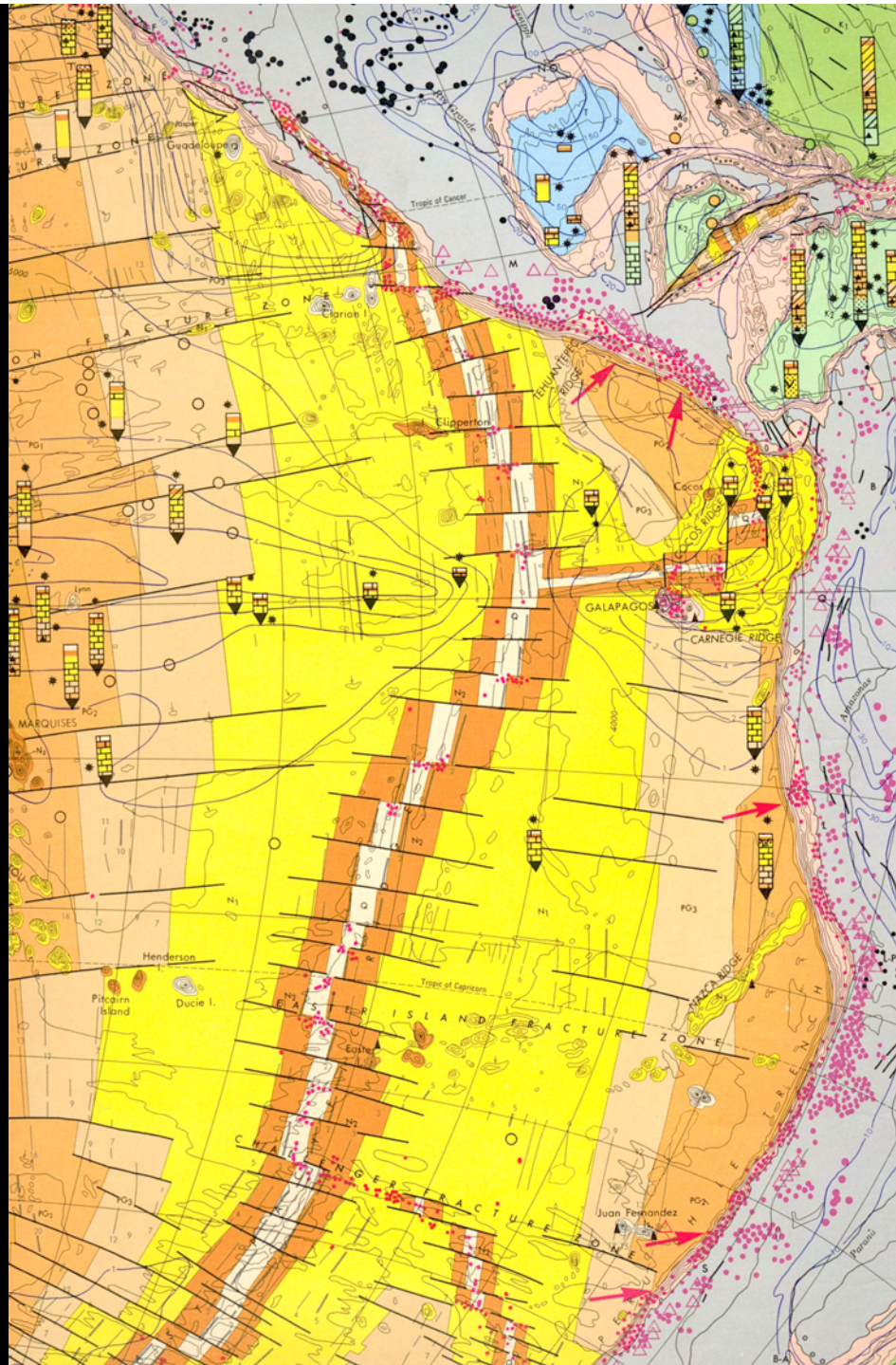
Dorsale atlantique - bathymétrie



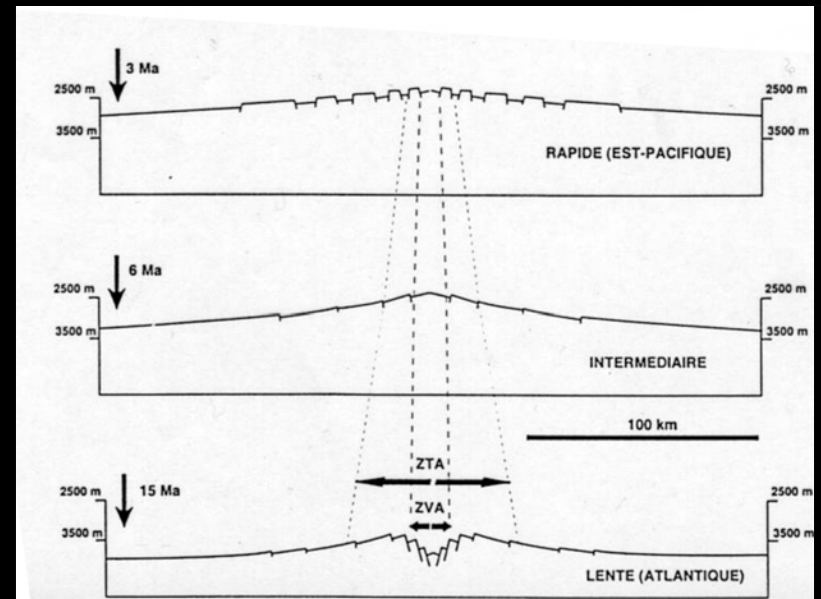
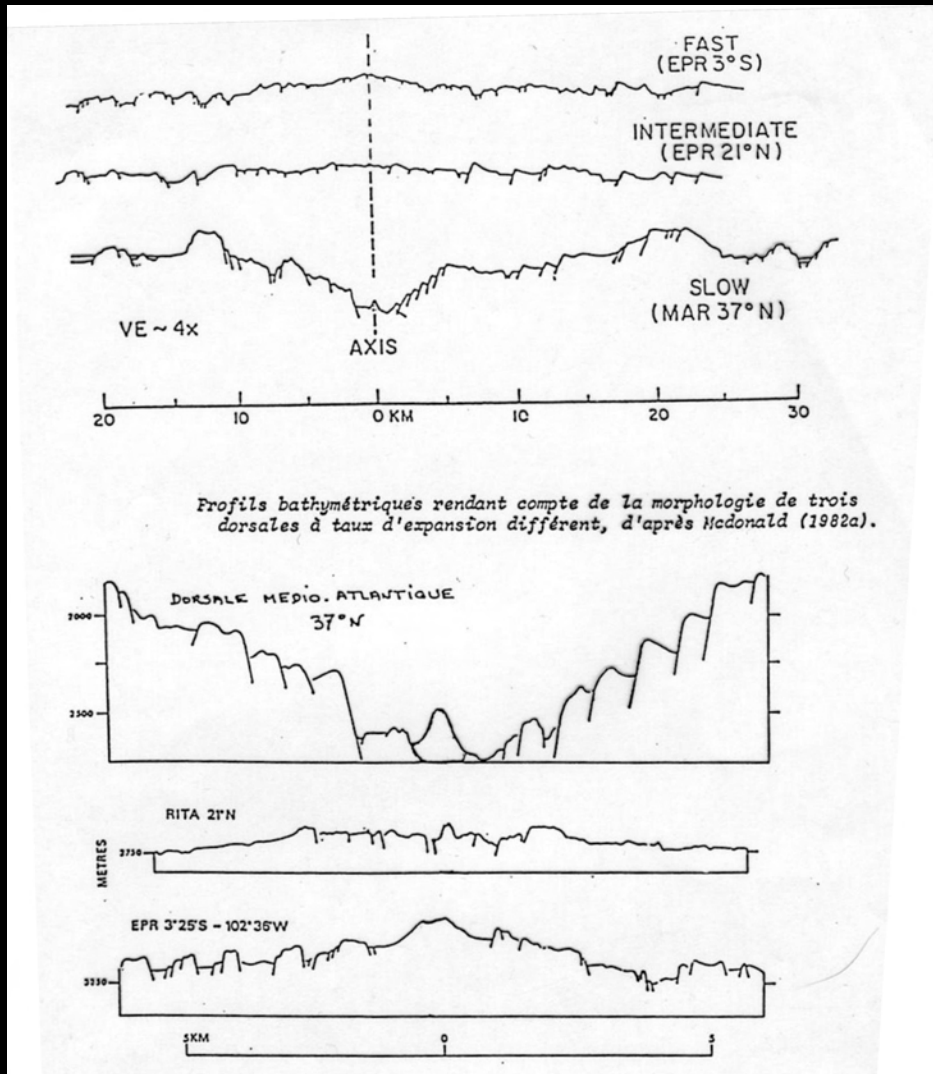


Bathymetric profile across the Central Atlantic



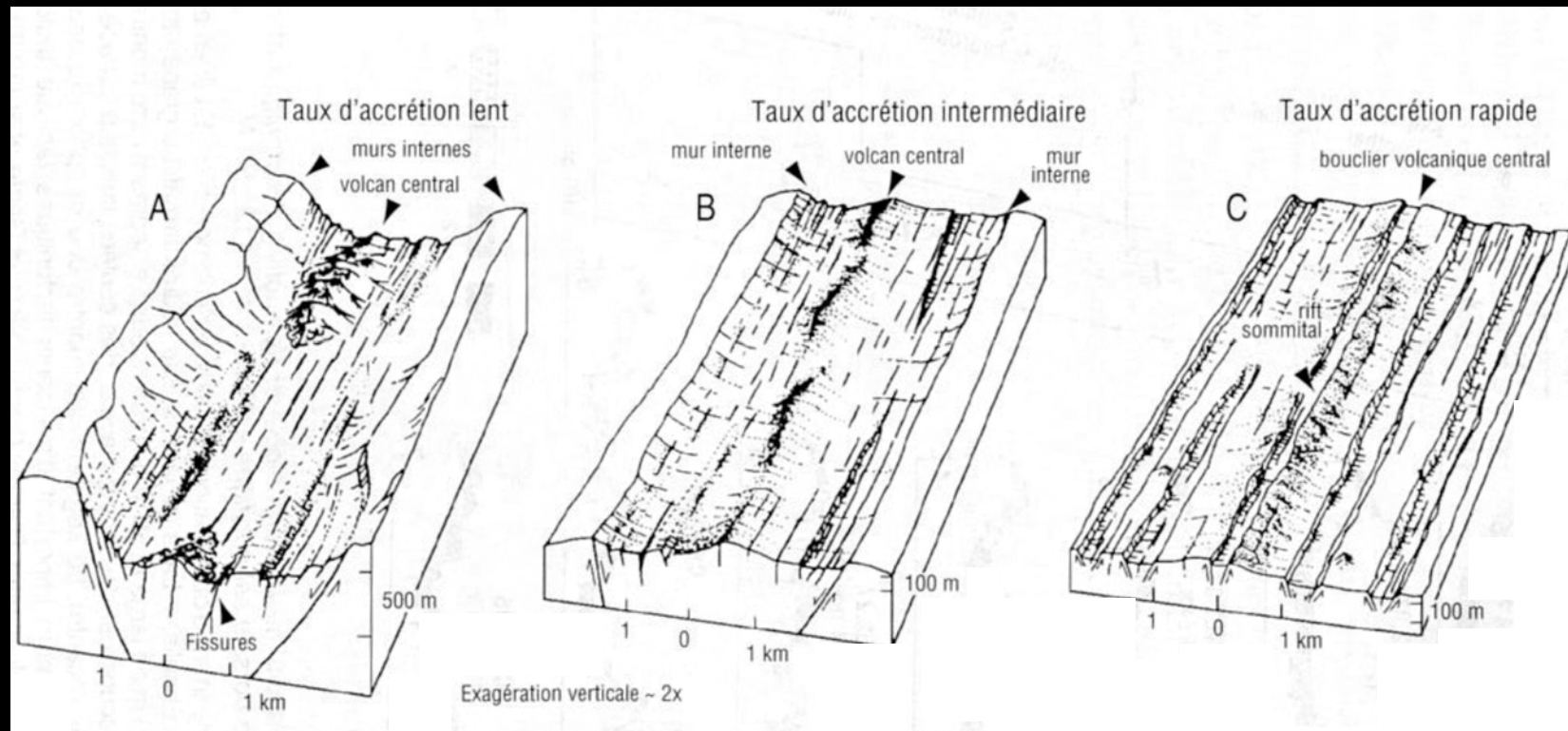


Dorsales- bathymétrie



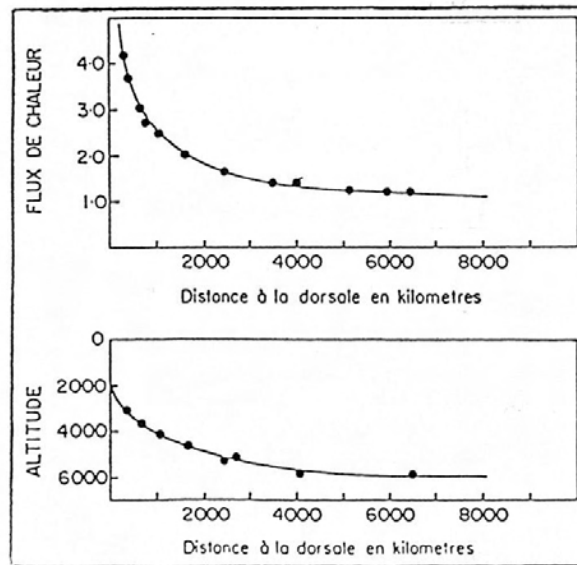
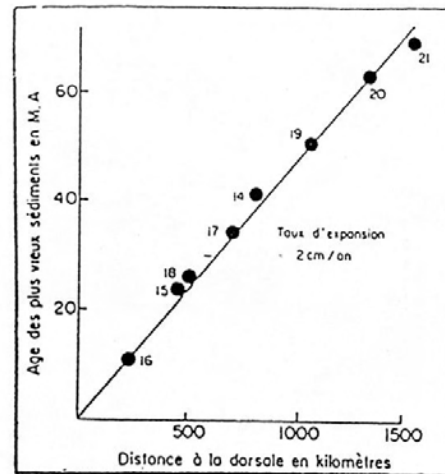
(In Caron et al., Enseigner la planète Terre;
Jolivet et Nataf, Géodynamique)

Dorsales - morphologie

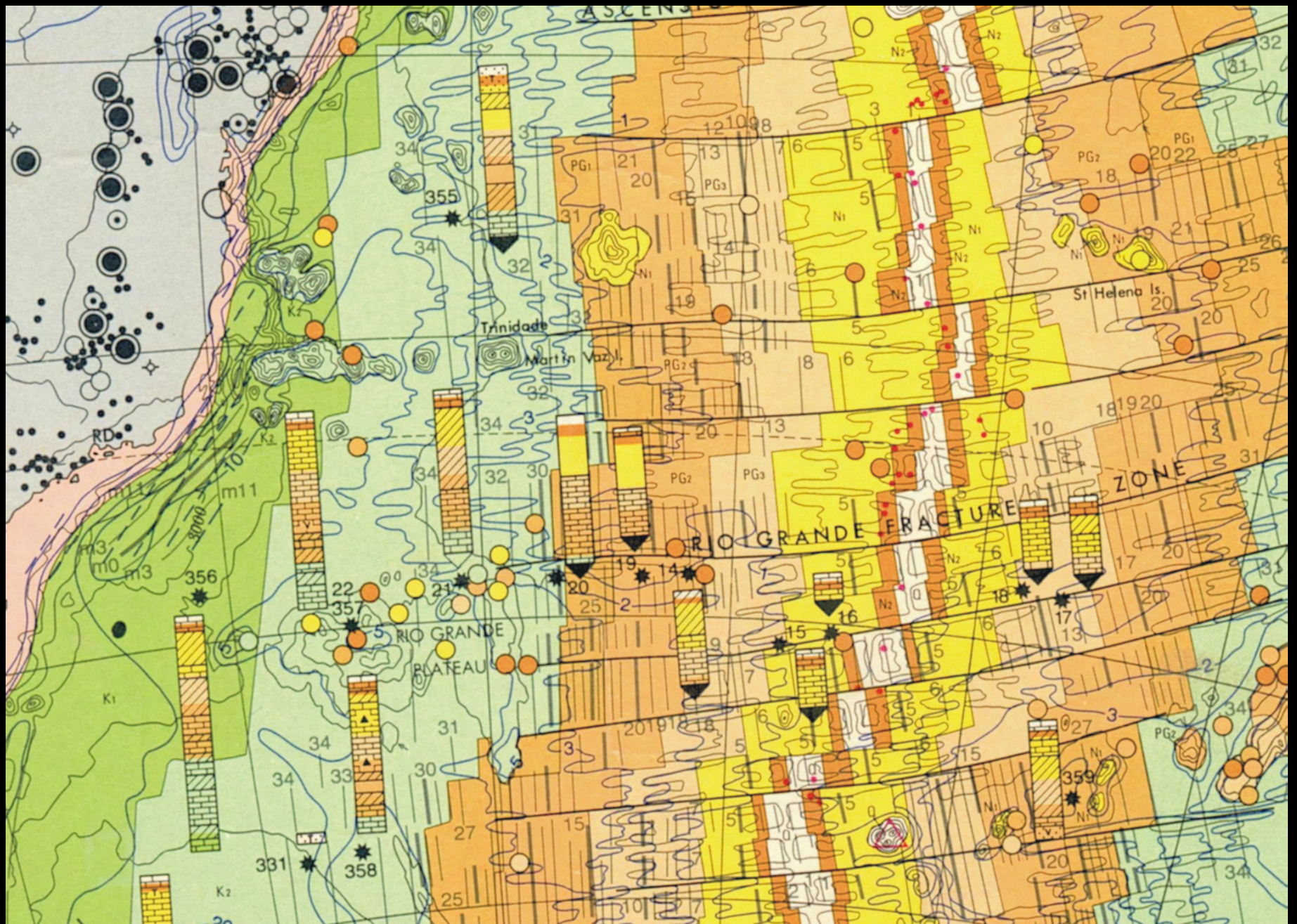


(In Juteau et Maury, Géologie de la croûte océanique)

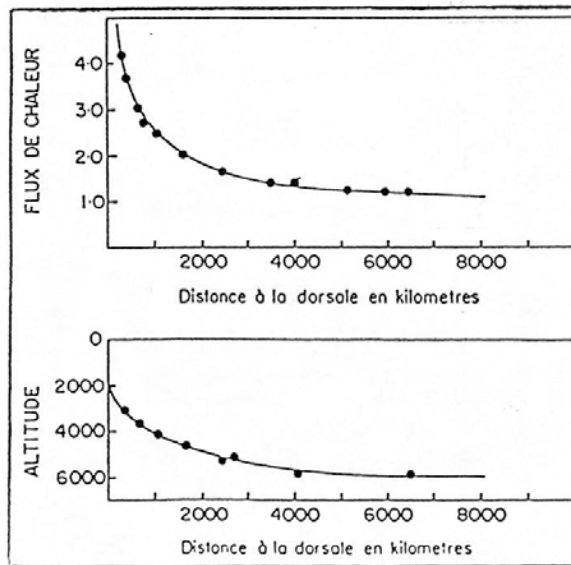
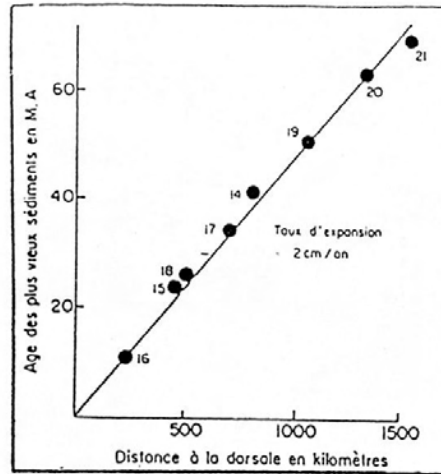
Accrétion- thermosubsidence



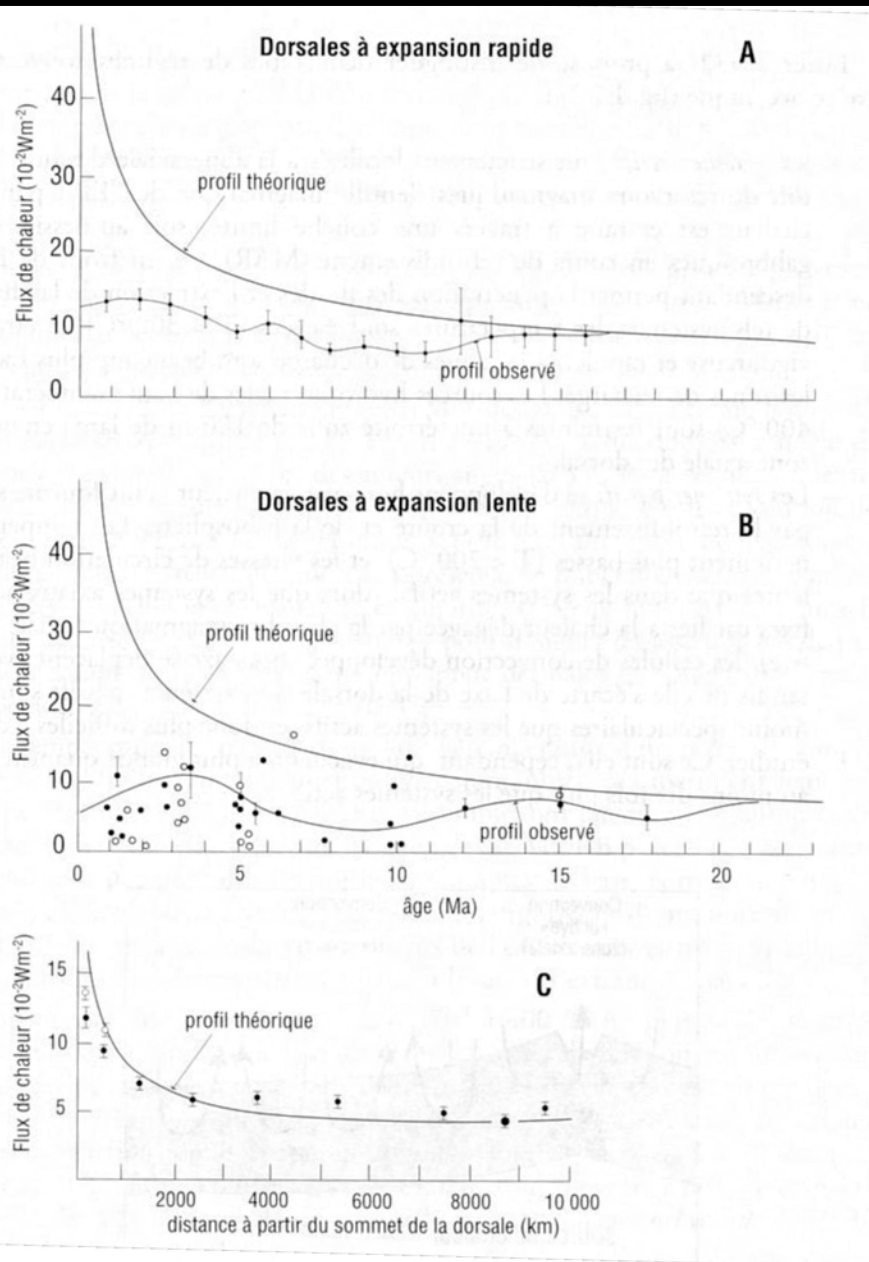
(In Allègre, l'Ecume de la Terre)



Accrétion- thermosubsidence

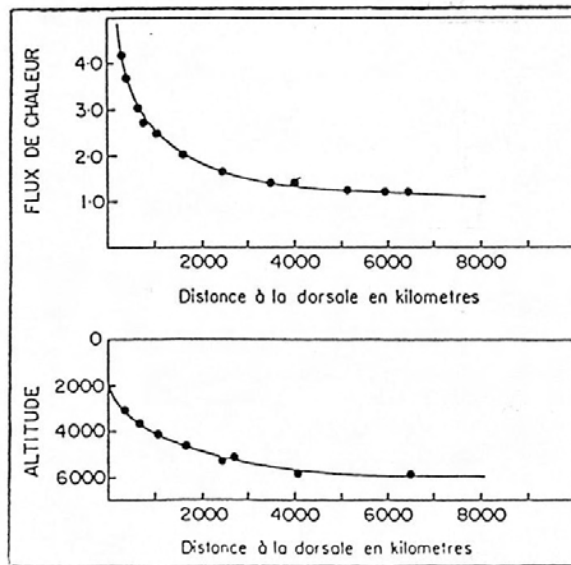
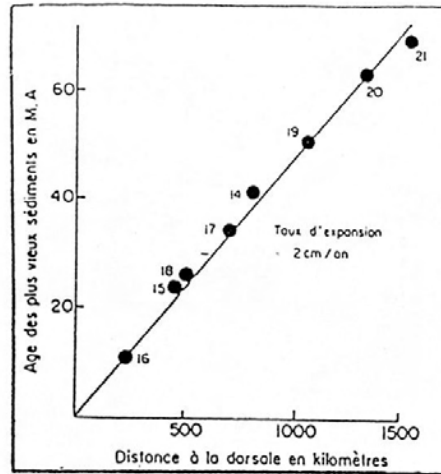


Accrétion- flux de chaleur

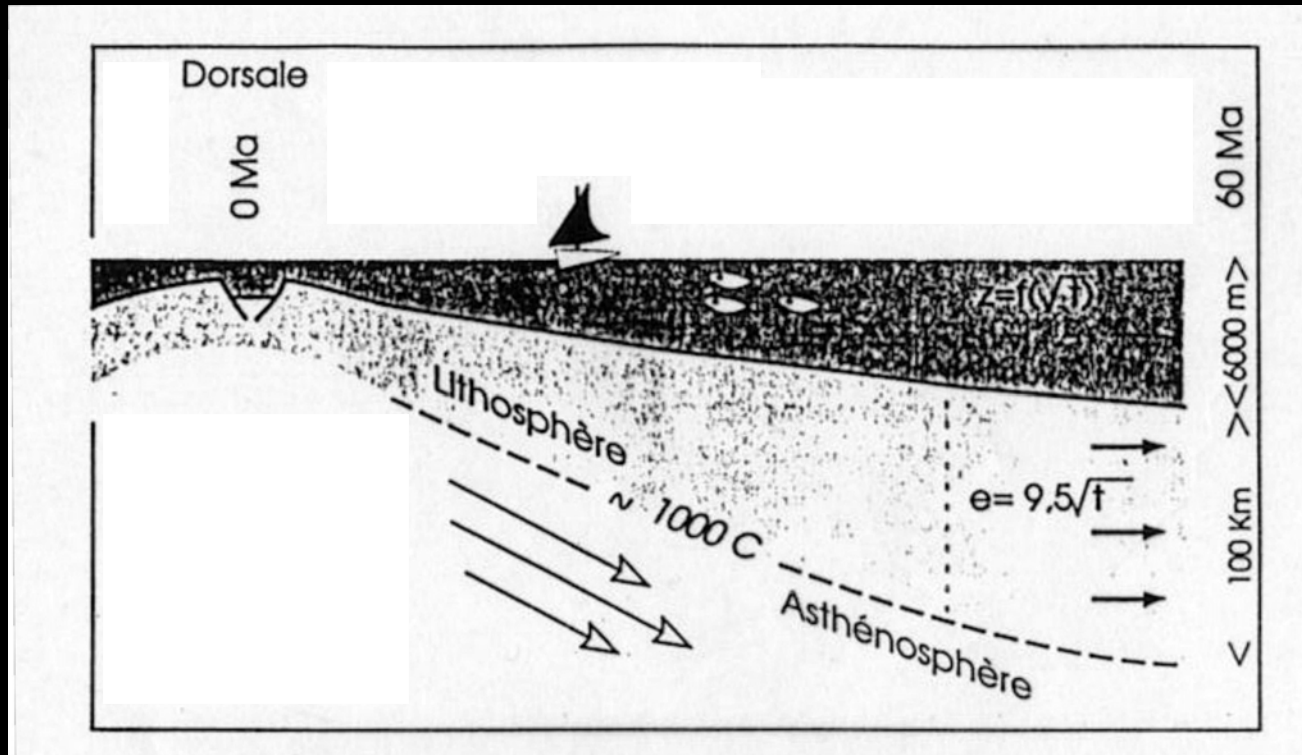


(In Juteau et Maury,
Géologie de la croûte océanique)

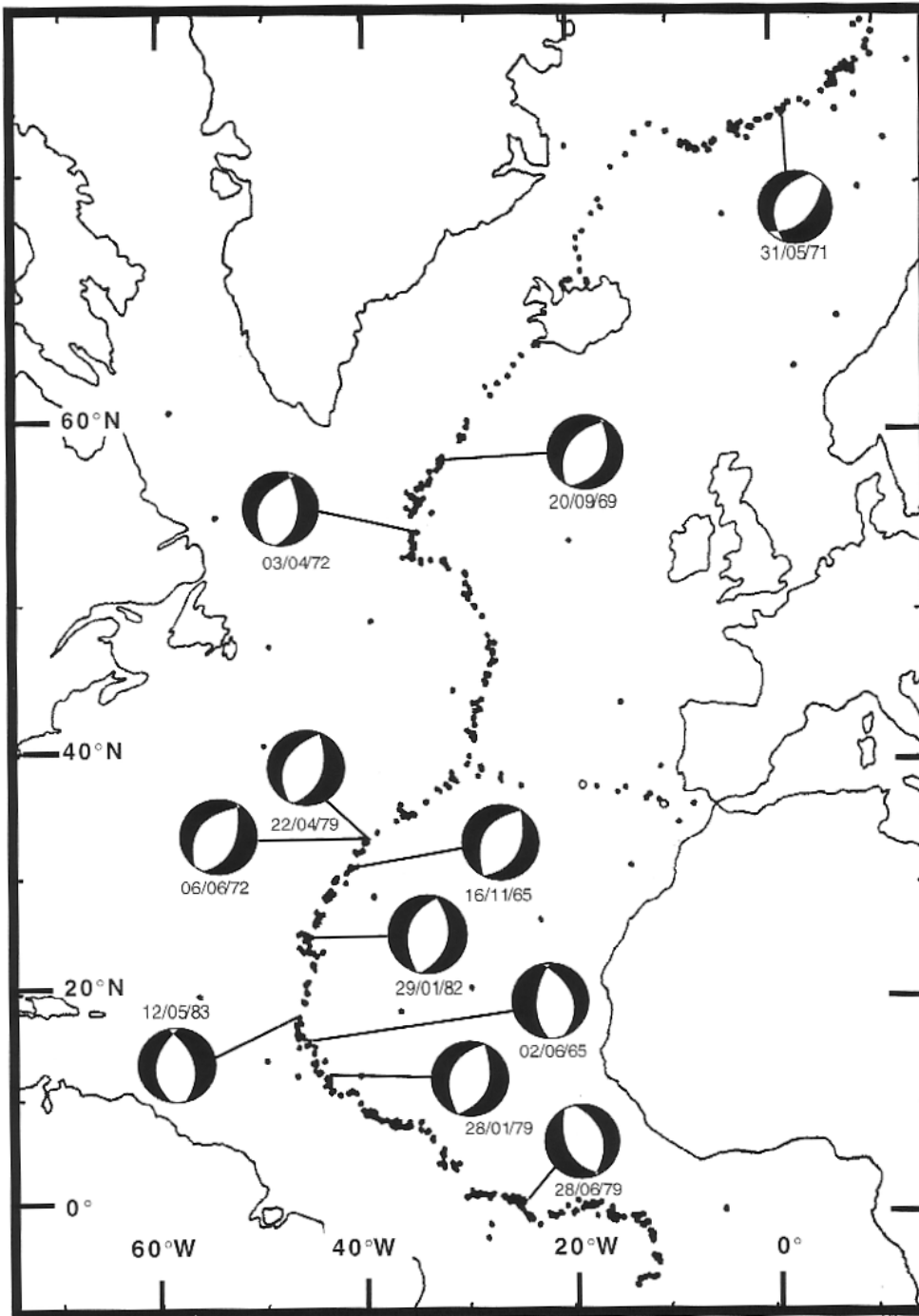
Accrétion- thermosubsidence



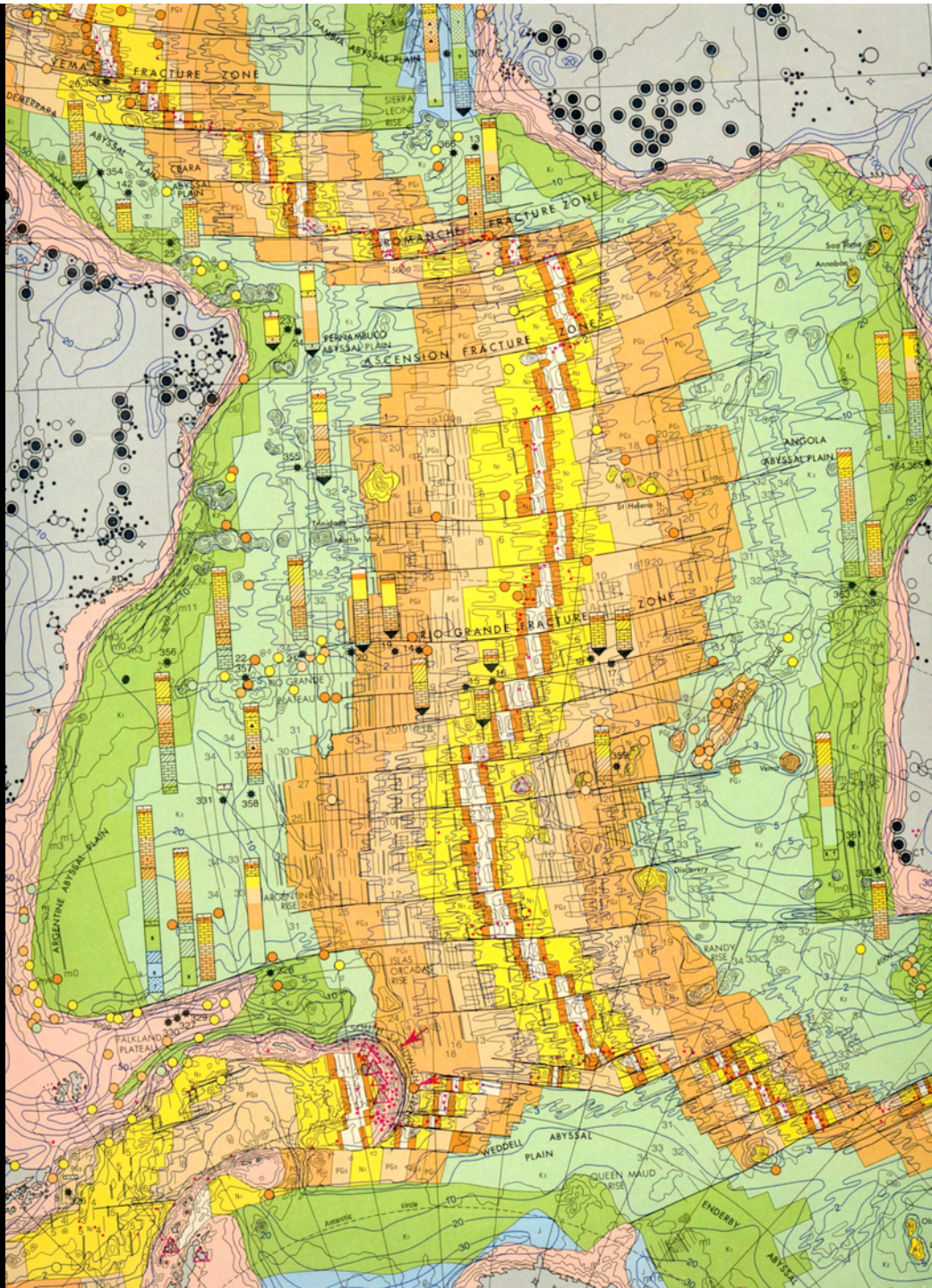
Accrétion- thermosubsidence



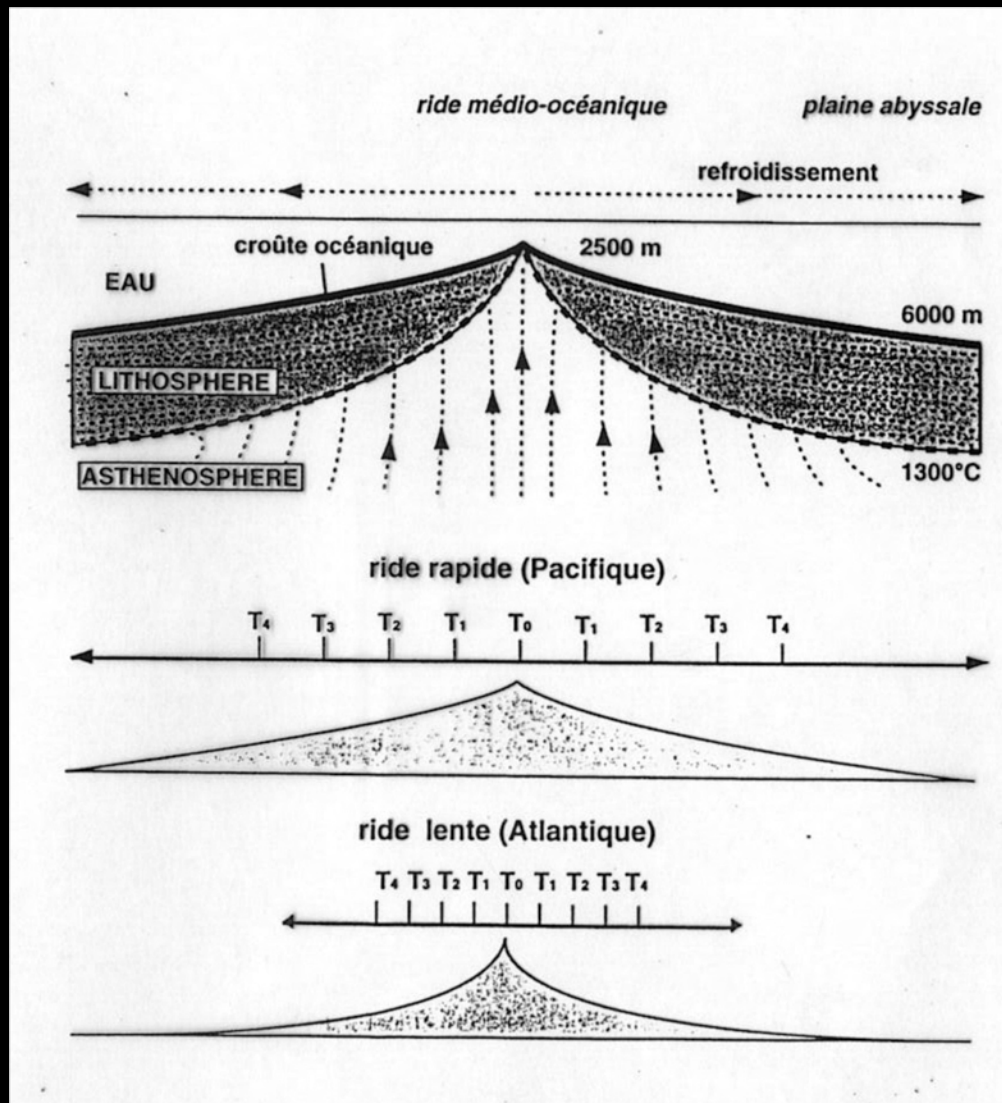
(In Nicolas, Les montagnes sous la mer)



(In Jolivet et Nataf,
Géodynamique)

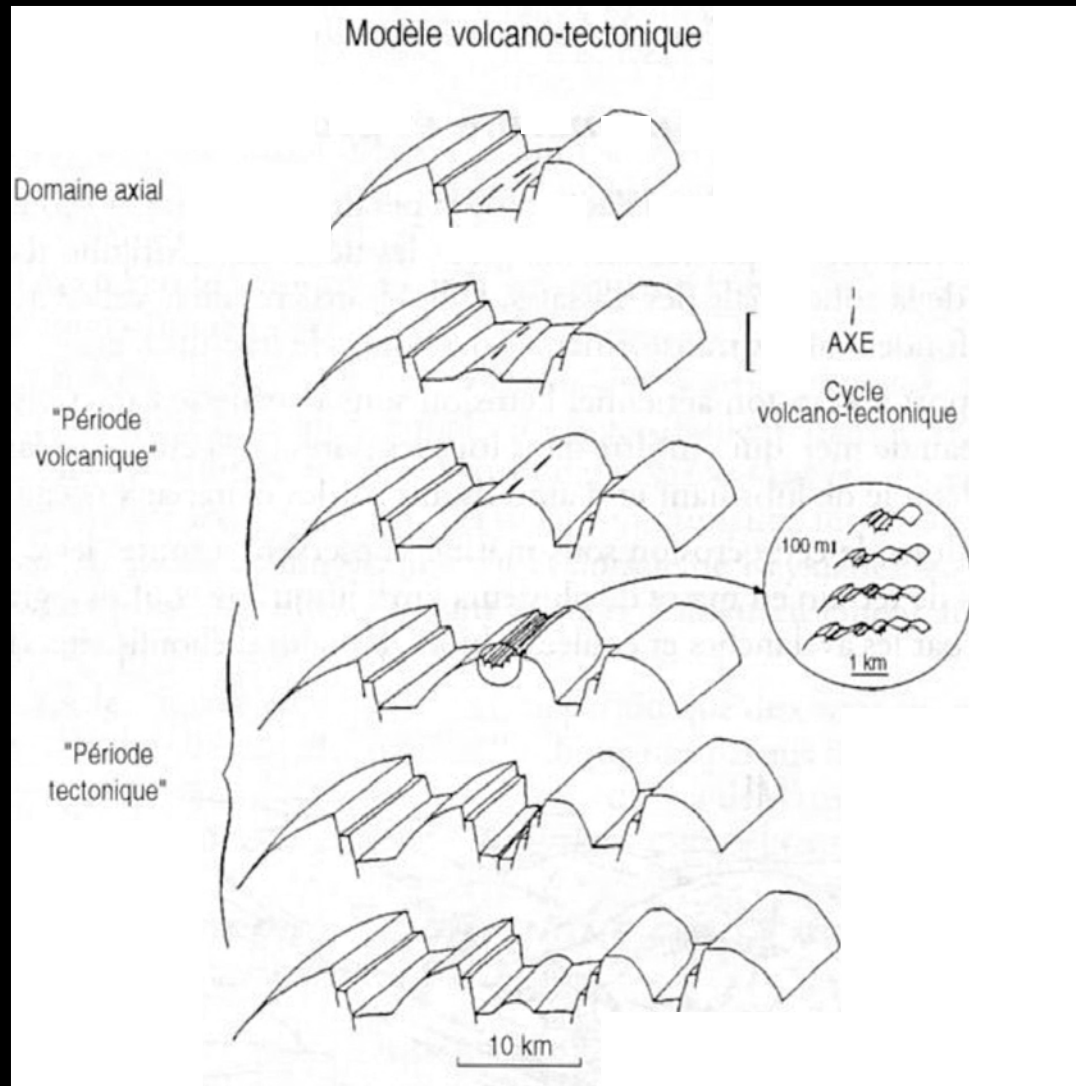


Dorsales- thermosubsidence



(In Jolivet,
La déformation des continents)

Accrétion- cycle volc-tect.

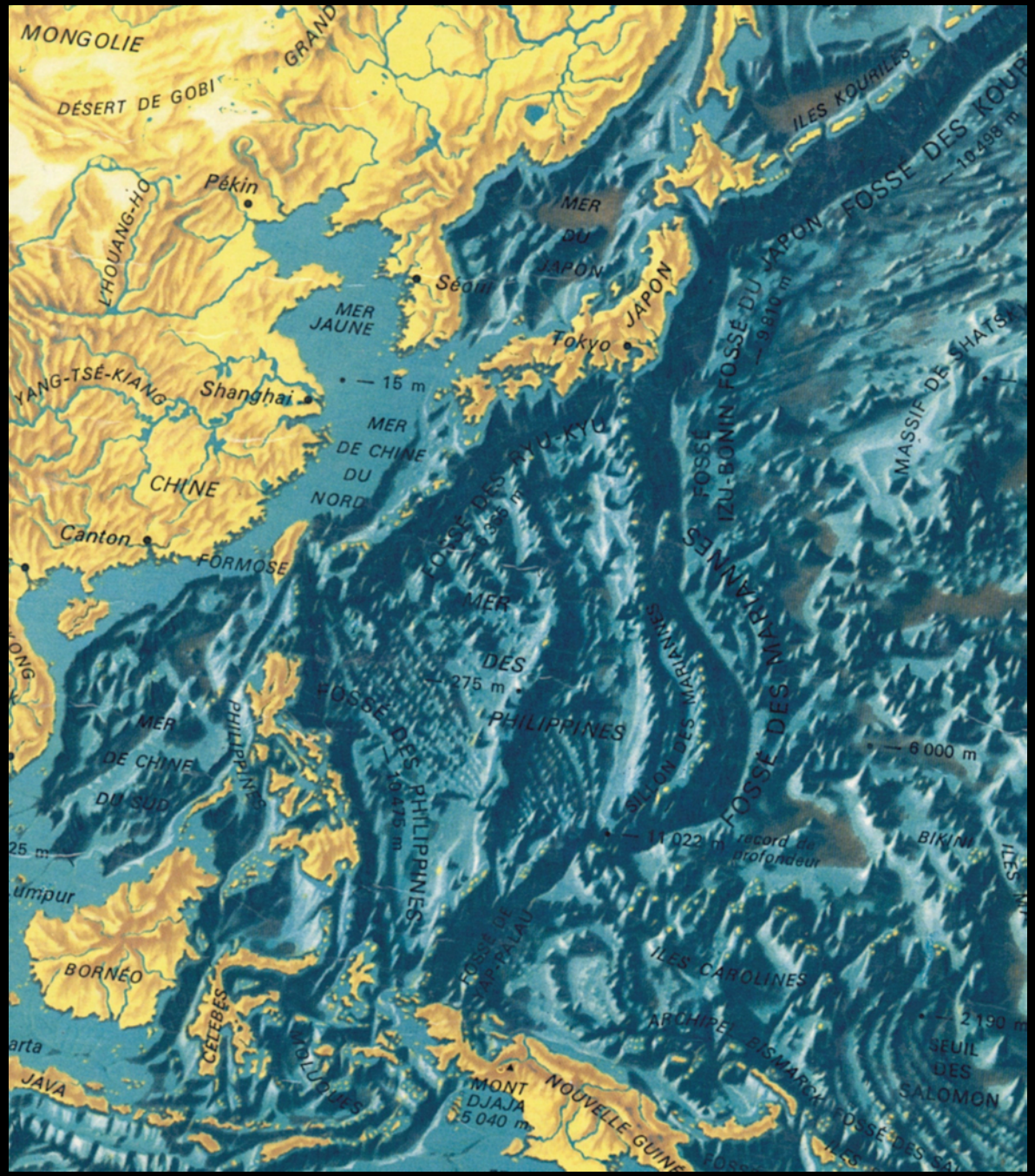


(In Juteau
et Maury,
Géologie de la
croûte océanique)

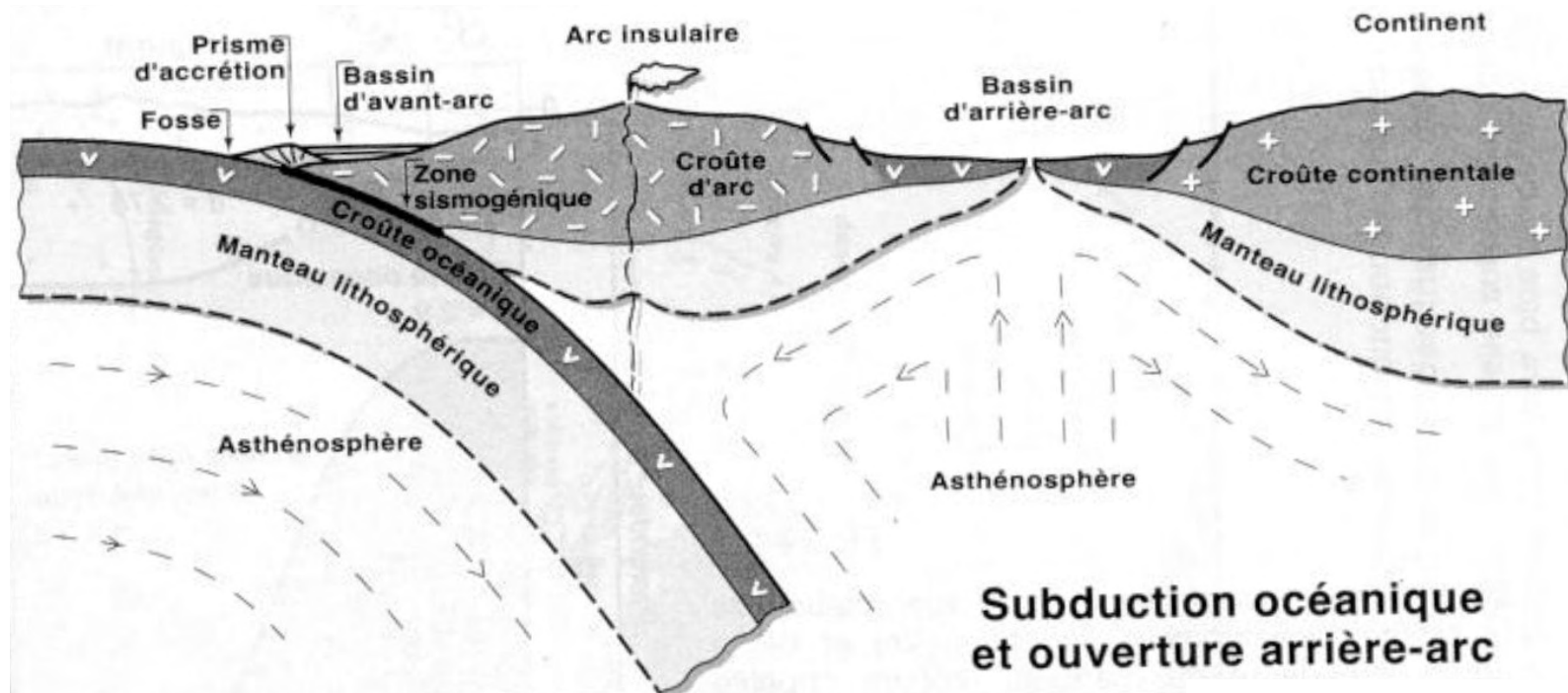
La subduction océanique

La subduction océanique

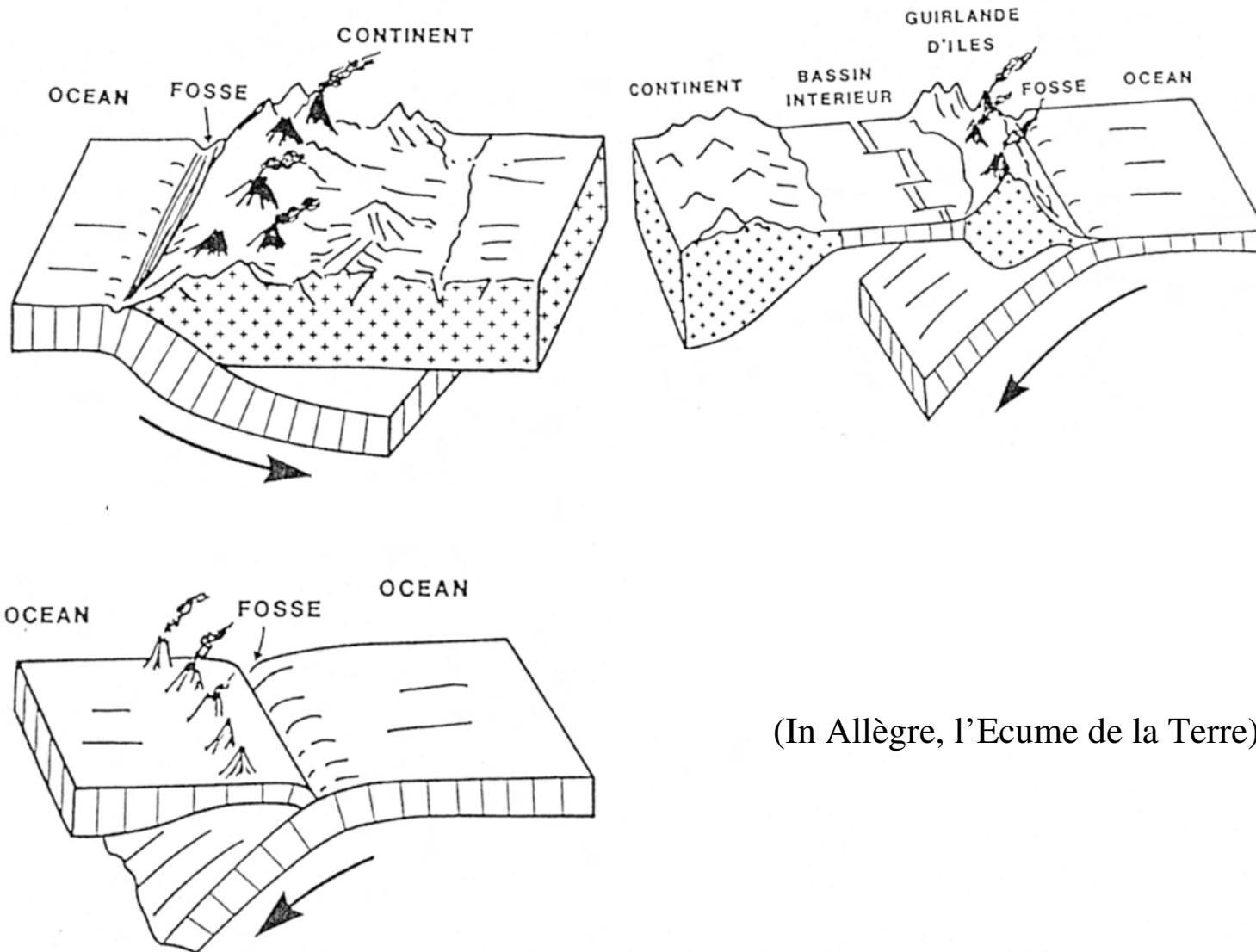
Bathymétrie-morphologie







(In Lallemand, La subduction océanique)



(In Allègre, l'Ecume de la Terre)

La subduction océanique

Sismicité

Subduction- sismicité

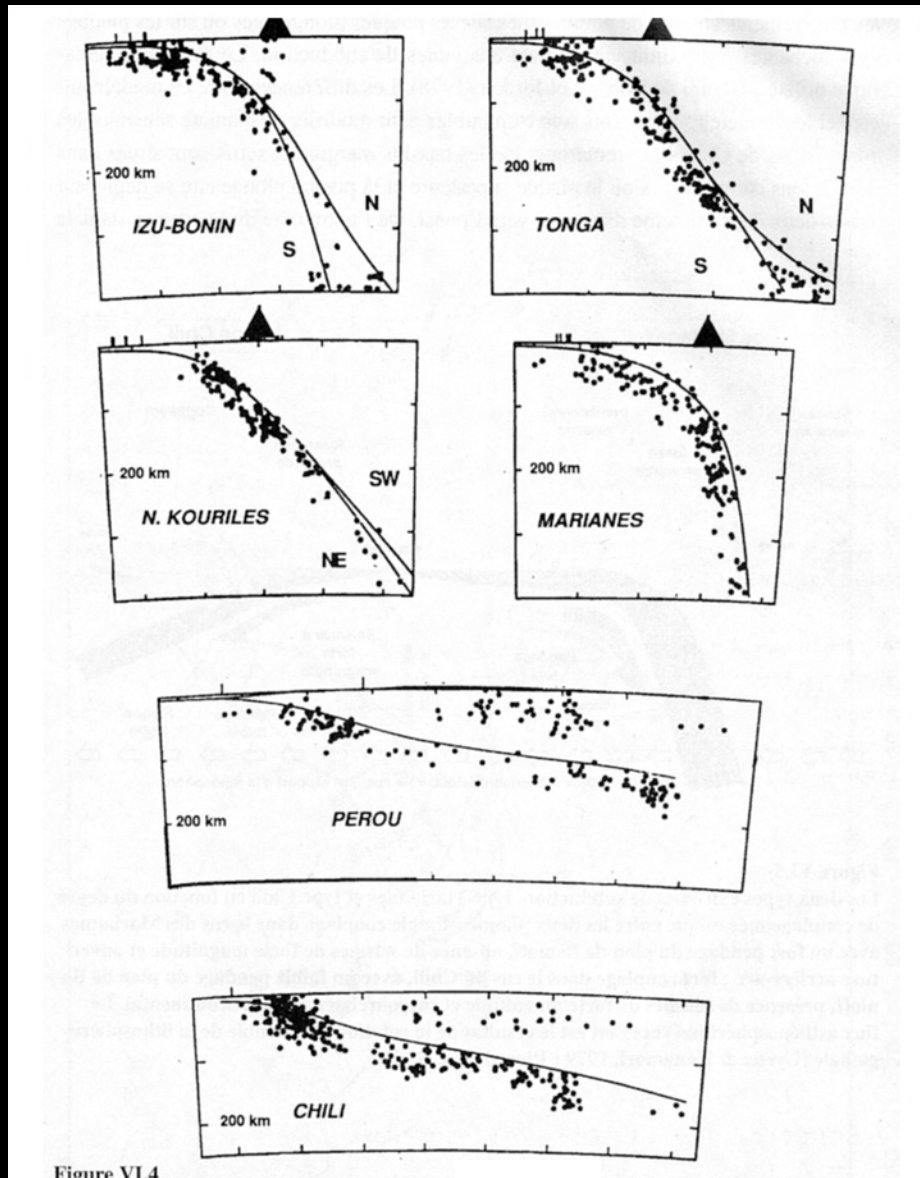
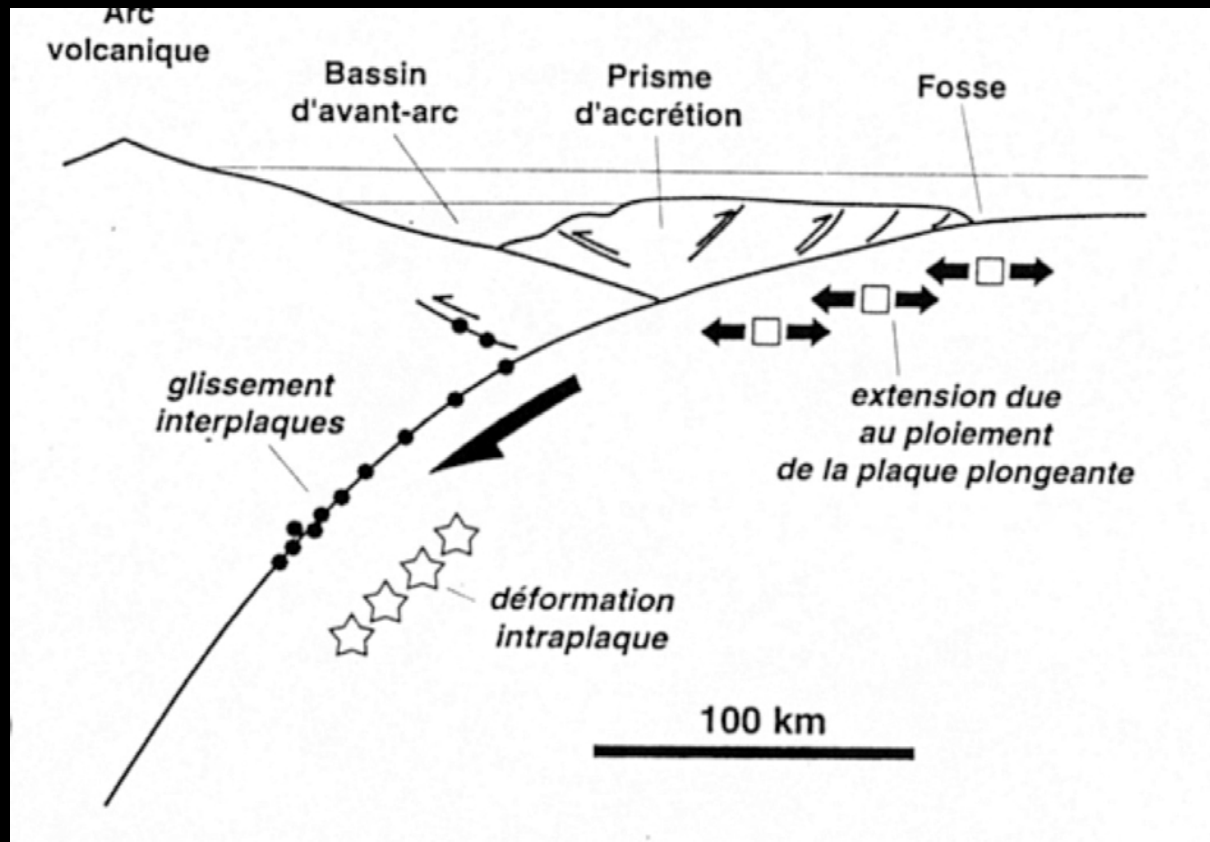


Figure VI.4

(In Jolivet,
La déformation des continents)

Subduction- sismicité

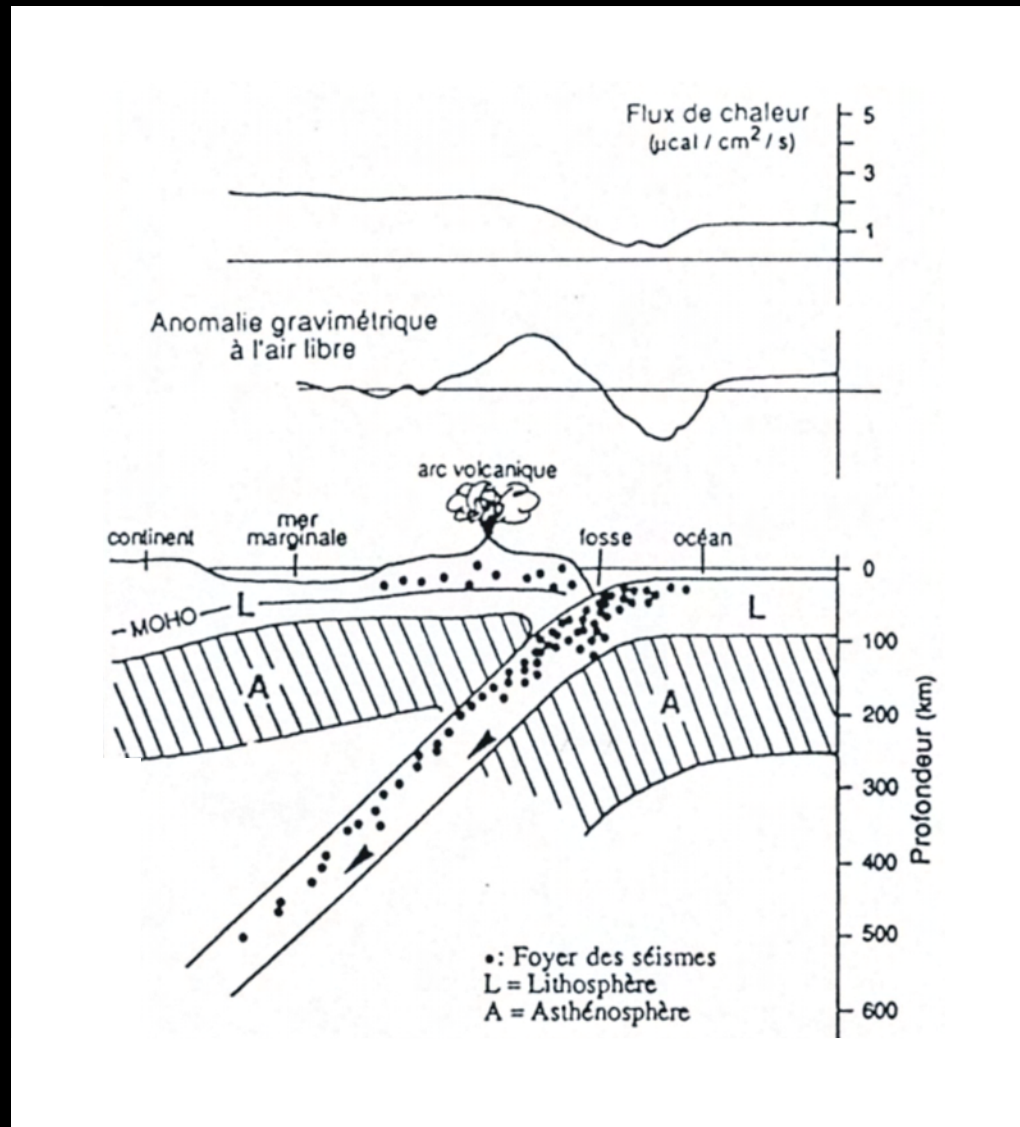


(In Jolivet,
La déformation des continents)

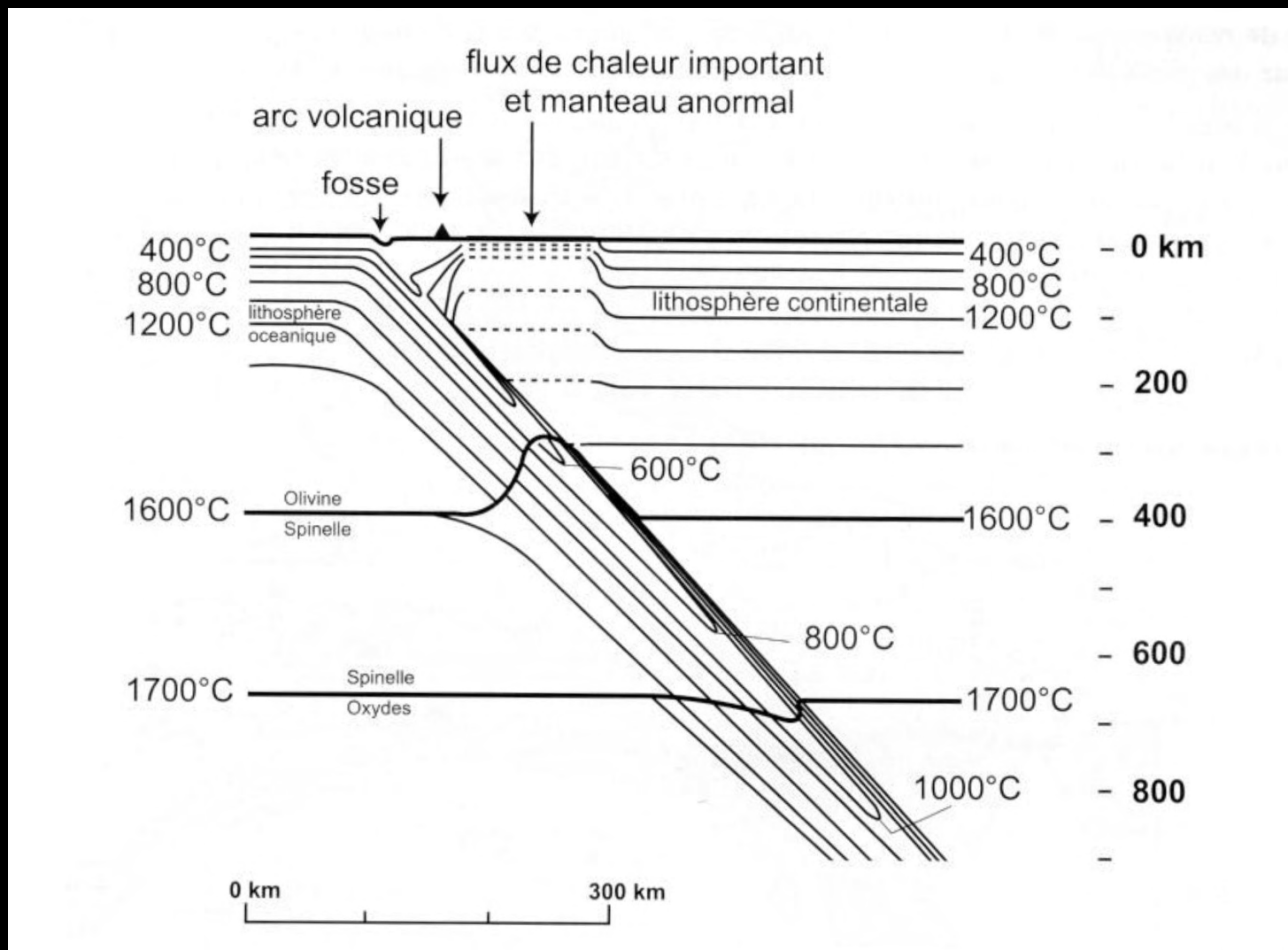
La subduction océanique

Anomalies thermiques et gravimétriques

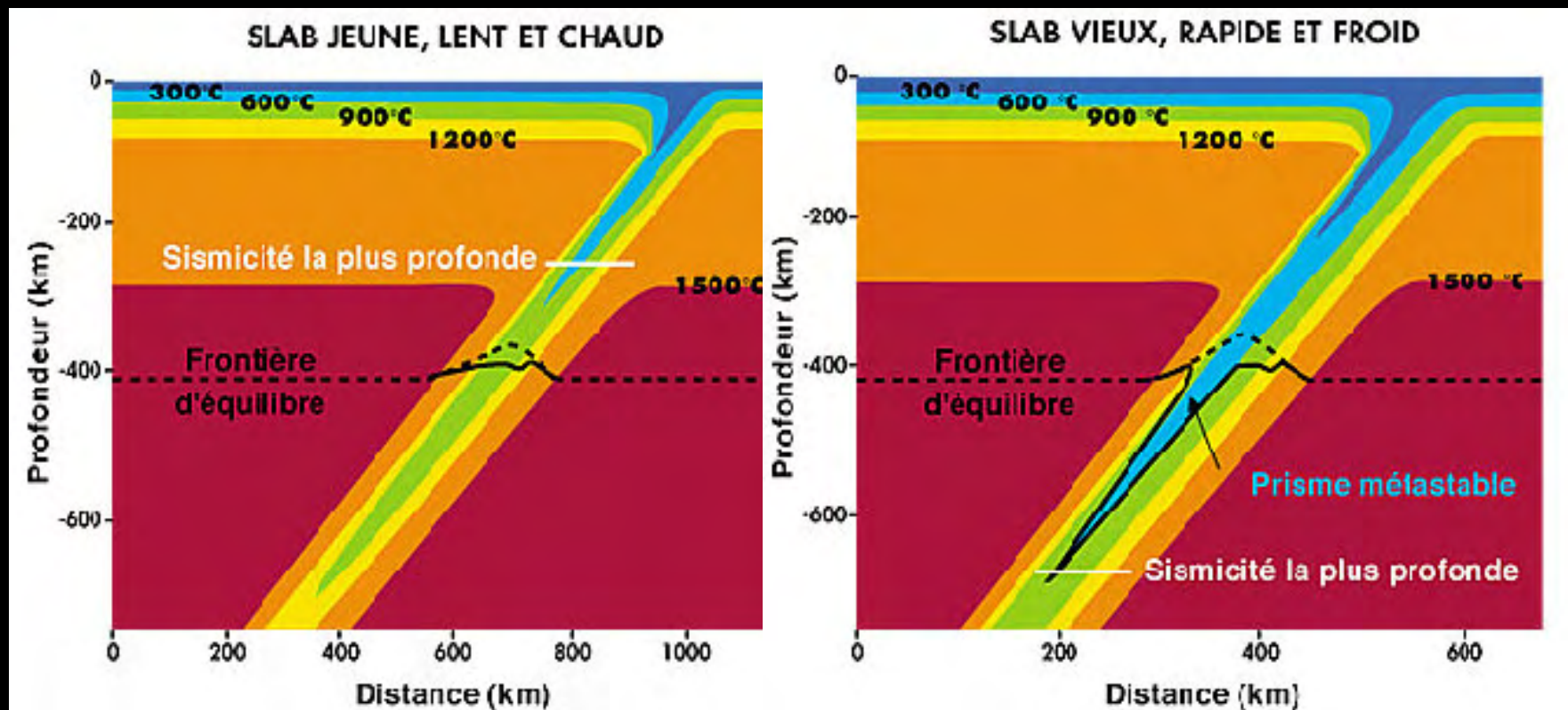
Subduction- gravimétrie – flux de chaleur



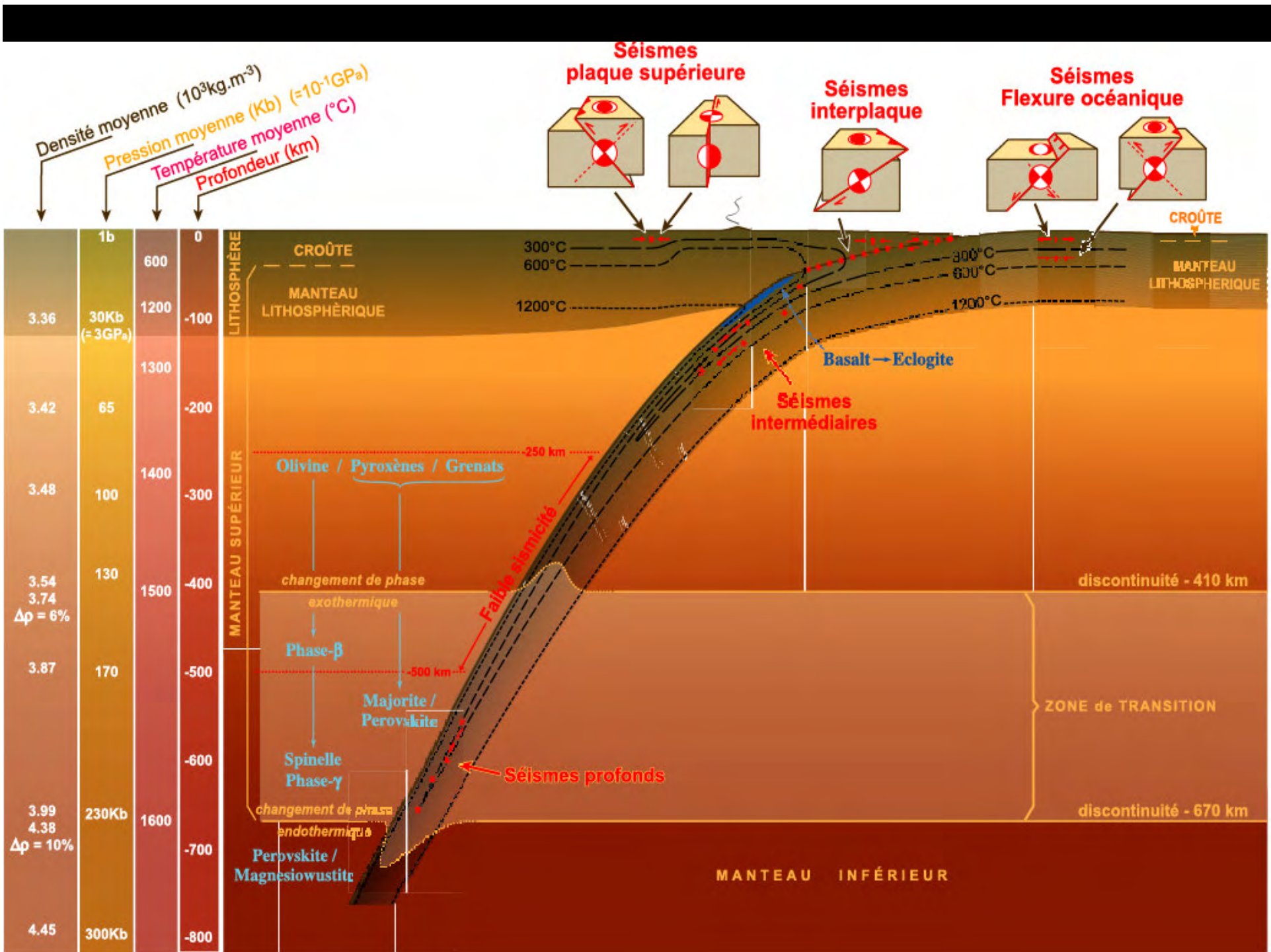
Subduction – modélisation thermique



Subduction – modélisation thermique



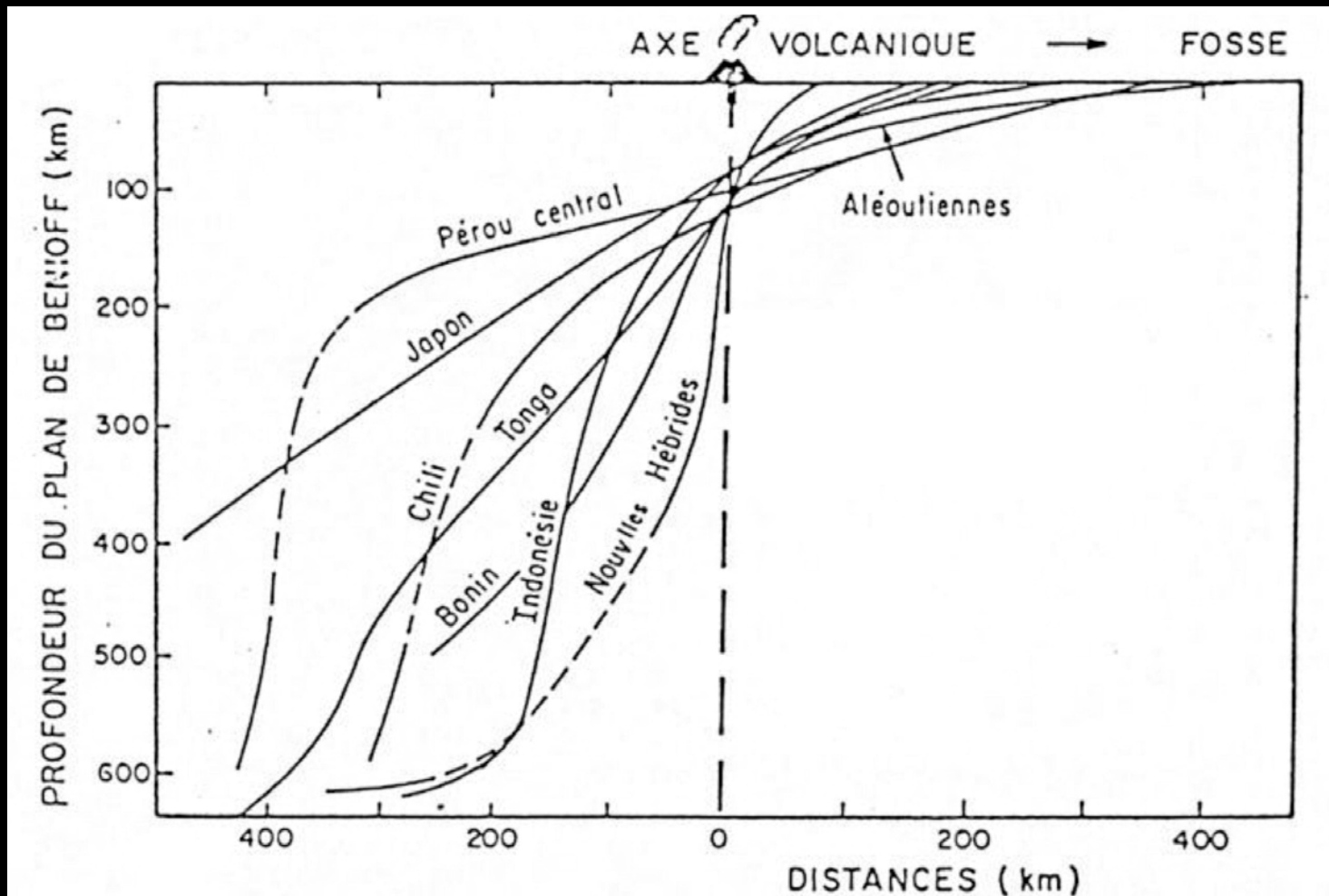
(In Lallemand et al., Convergence lithosphérique)



La subduction océanique

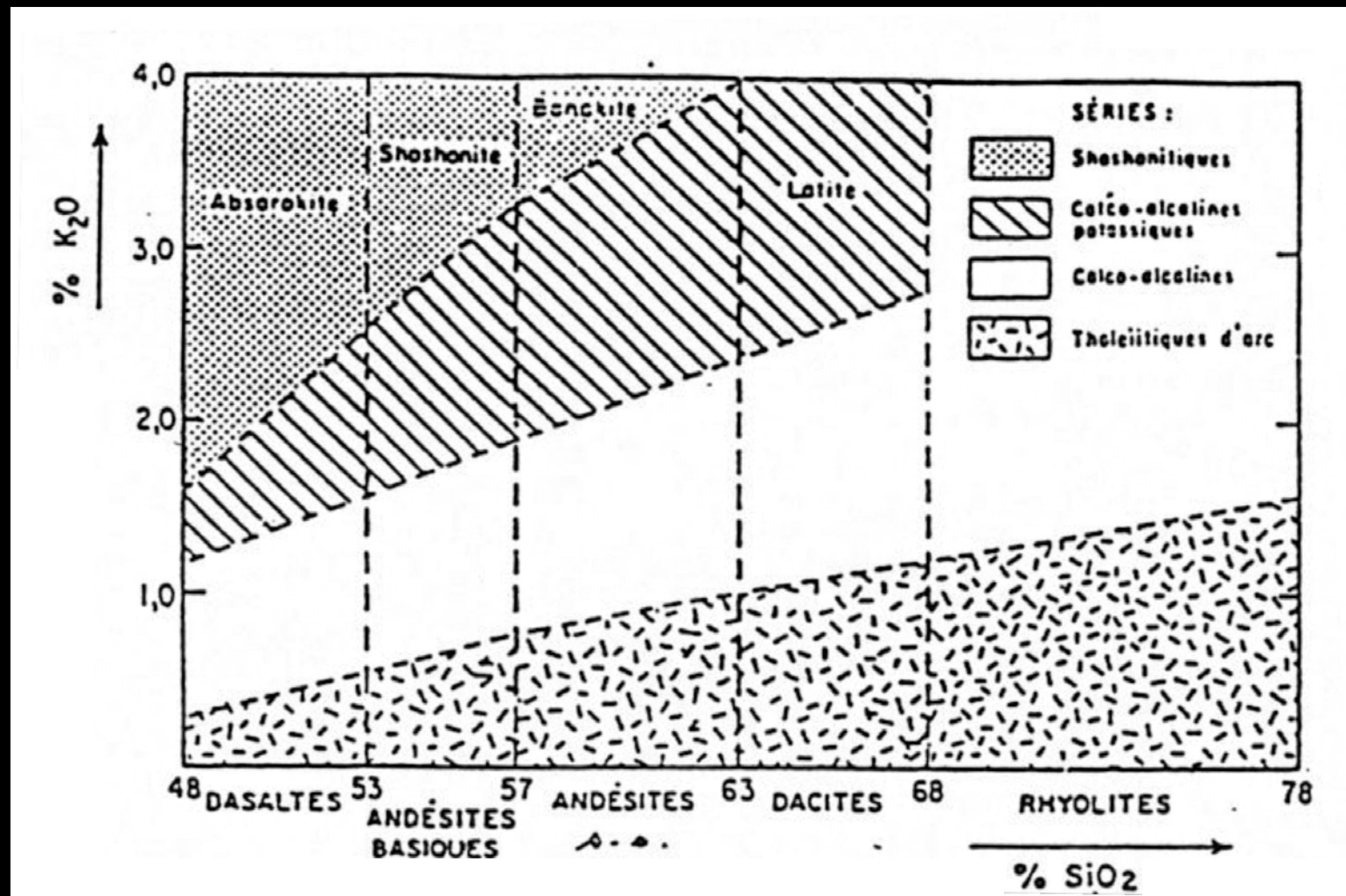
Magmatisme

Subduction- magmatisme



Maury, Des océans aux continents

Subduction- magmatisme



Subduction- magmatisme

ex: Tonga. Il n'existe pas de zonation du magmatisme. on trouve seulement des tholéïtes d'arc

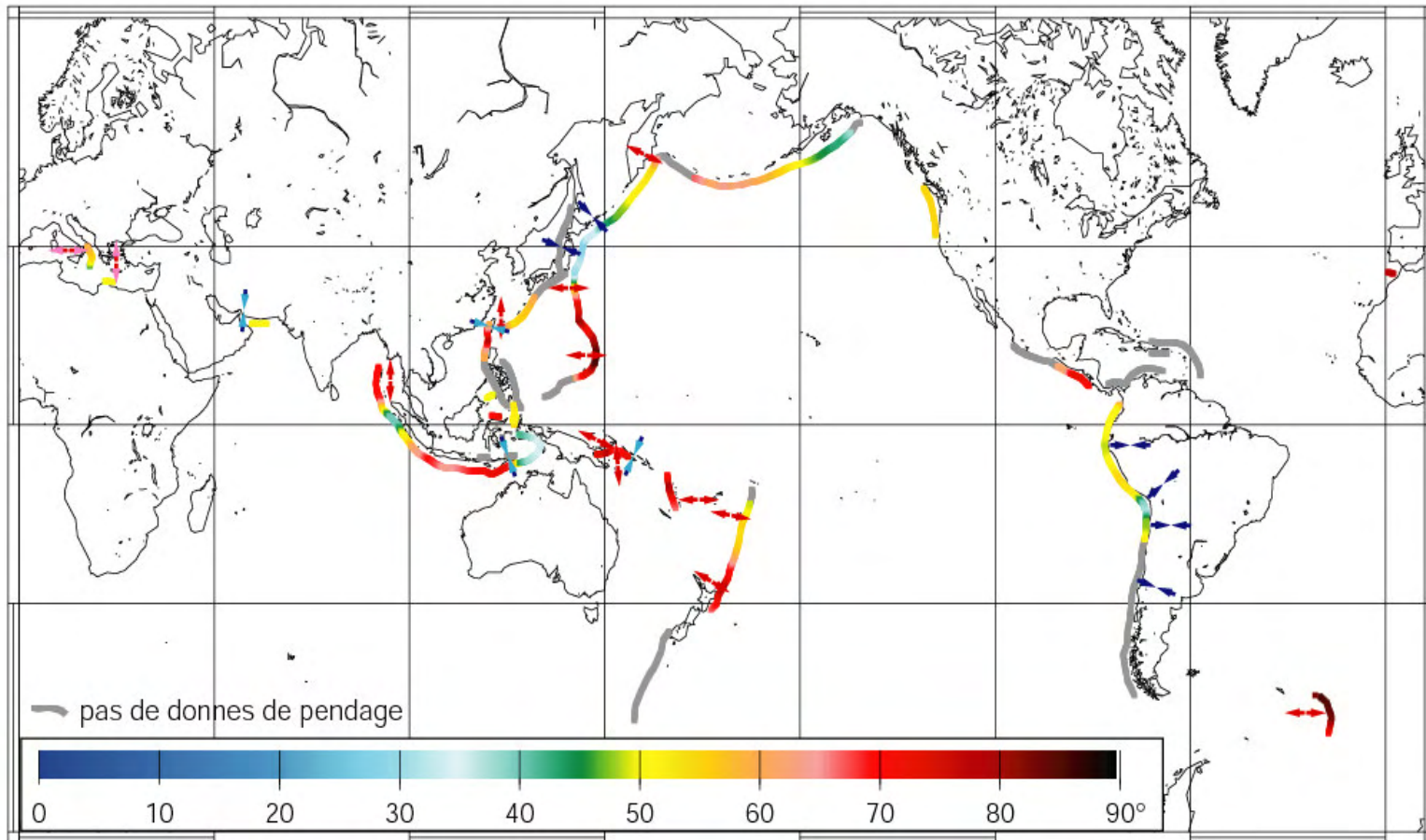
CONTEXTES TYPES DE SERIES	ARCS INSULAIRES				MARGES CONTINENTALES ACTIVES
	sur croûtes océaniques	sur croûtes intermédiaires	sur fragments continentaux	sur péninsules continentales	
THOLEIITIQUES D'ARC	[shaded area]				
CALCO-ALCALINES	[shaded area]				
CALCO-ALCALINES POTASSIQUES		[shaded area]			
SHOSHONITIQUES		[shaded area]			
ANATECTIQUES (RHYOLITIQUES)		[shaded area]			

— Distribution schématique des séries volcaniques dans les différents types de zones de subduction.

— Schematic distribution of volcanic series in subduction zones.

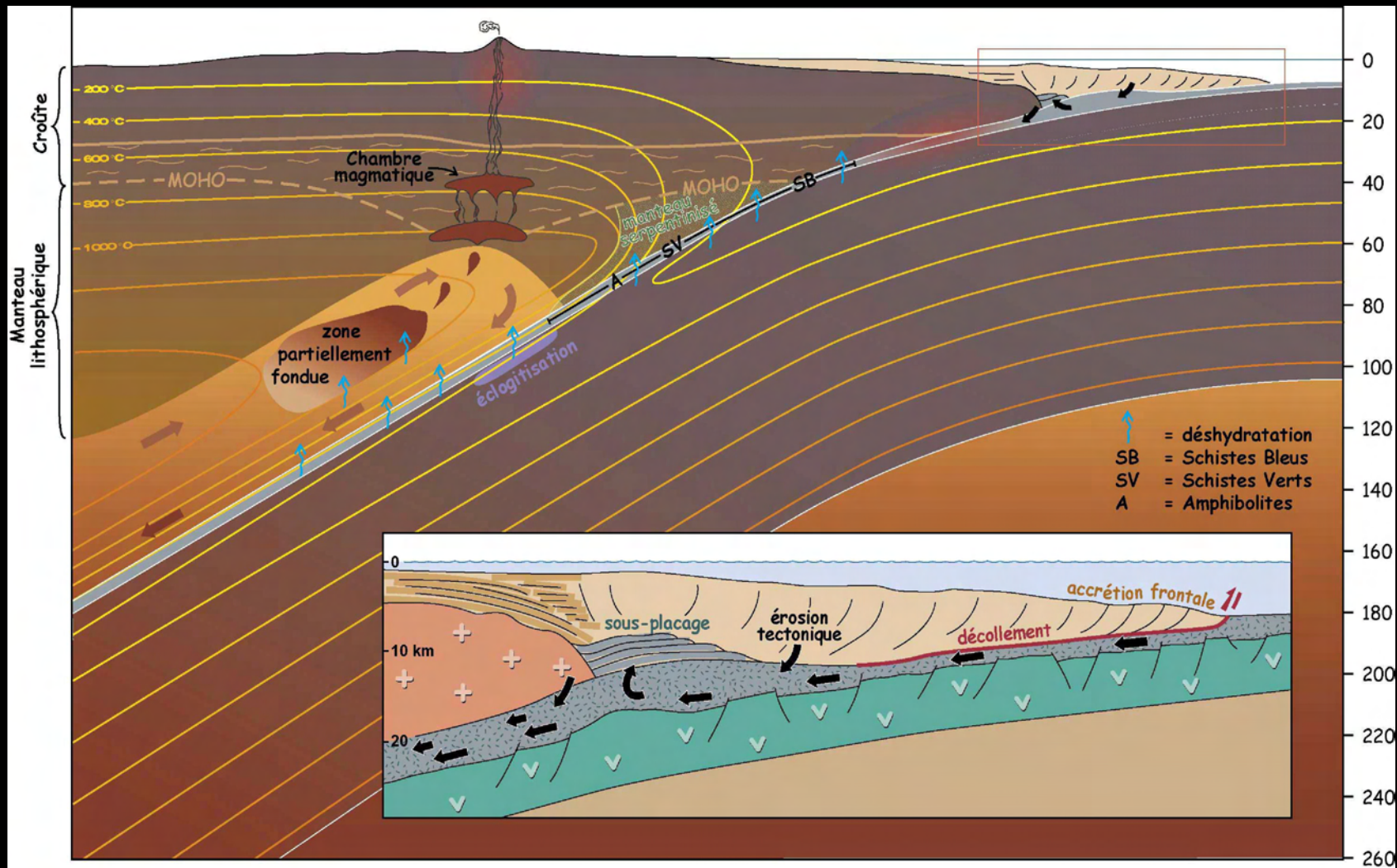
Maury, Des océans aux continents

Croûte continentale
(pas de tholéïtes d'arc)



Pendage moyen du slab profond (125-670 km)

(In Lallemand et al., Convergence lithosphérique)

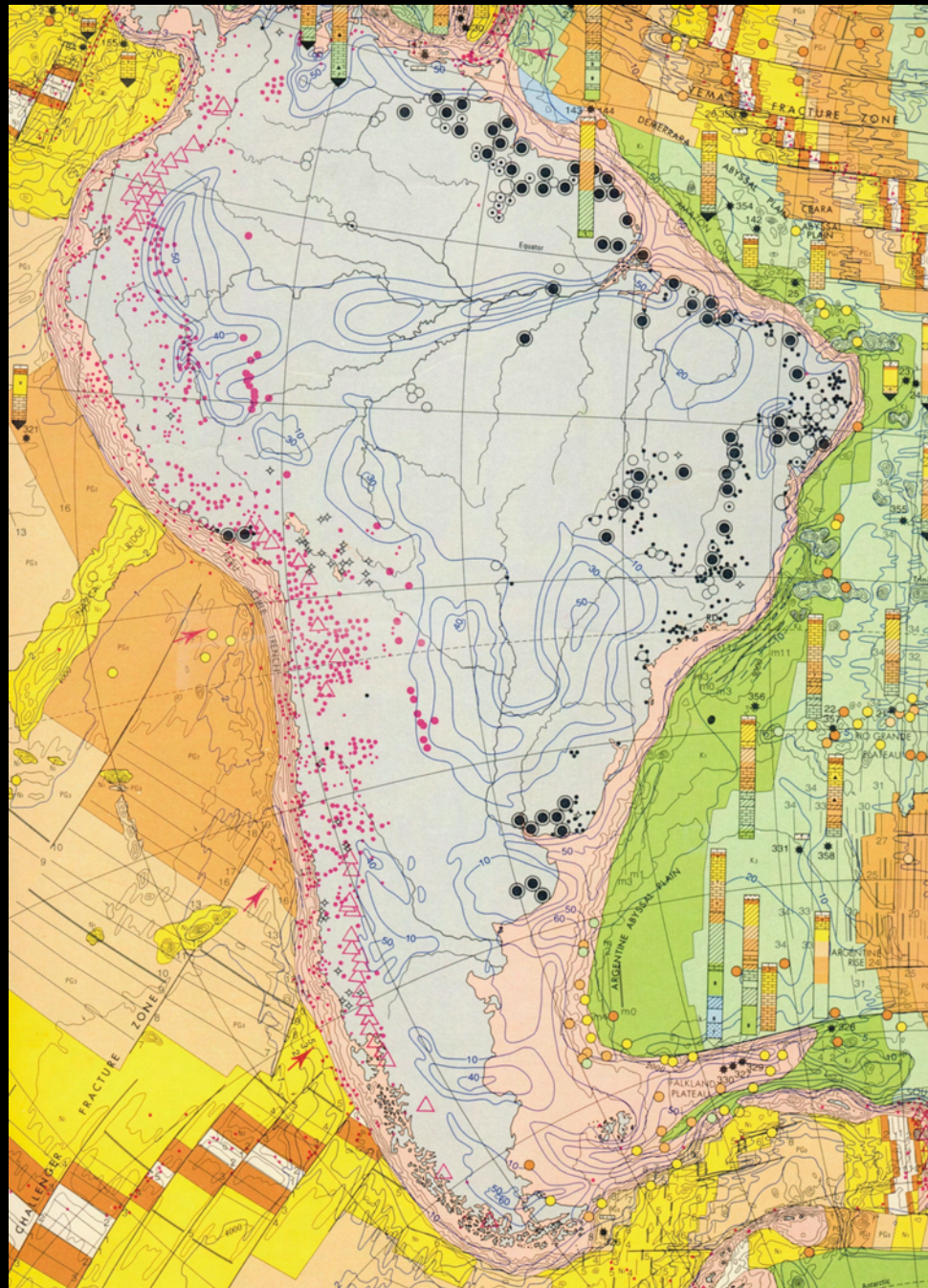


(In Lallemand et al., Convergence lithosphérique)

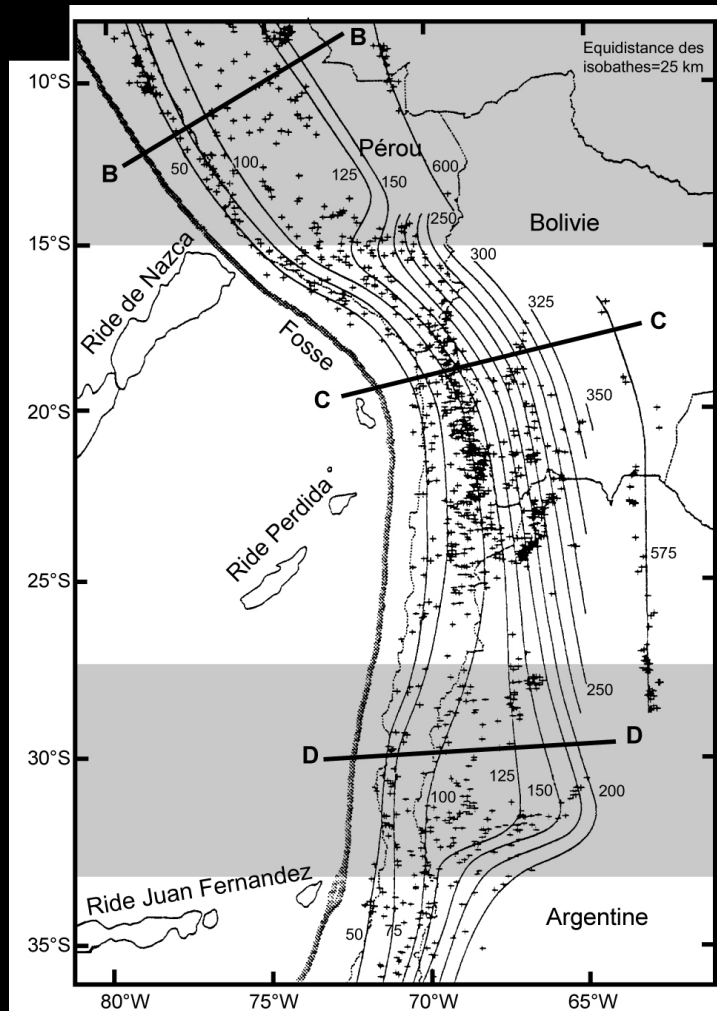
La subduction océanique

**Type Chili et type Mariannes
comparaison**

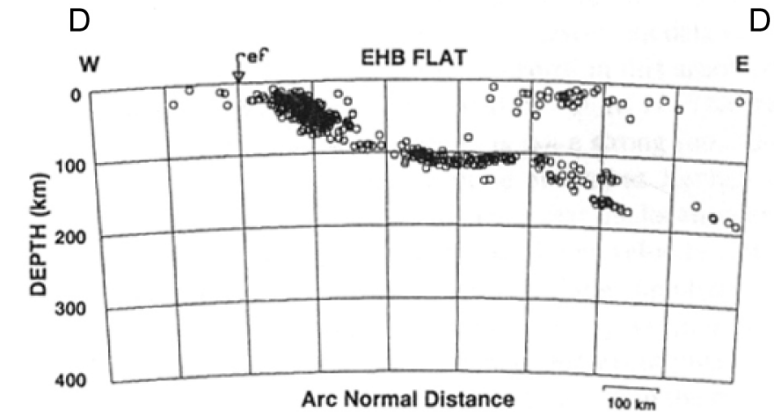
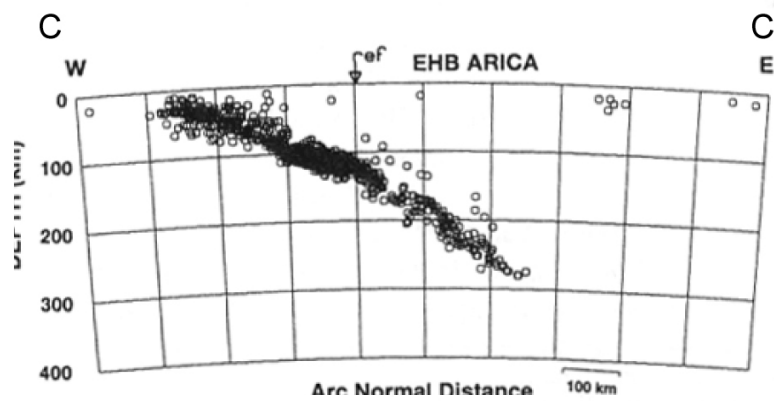
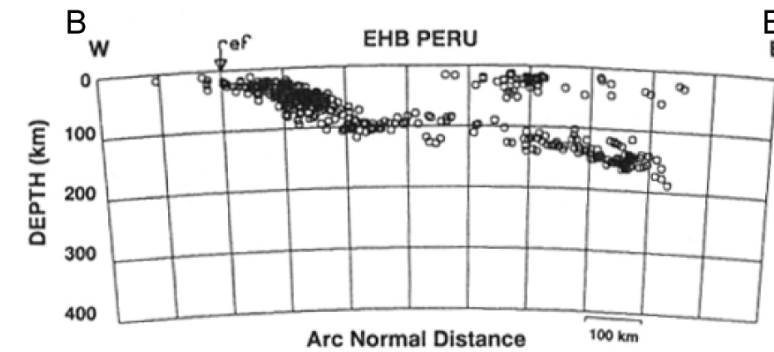




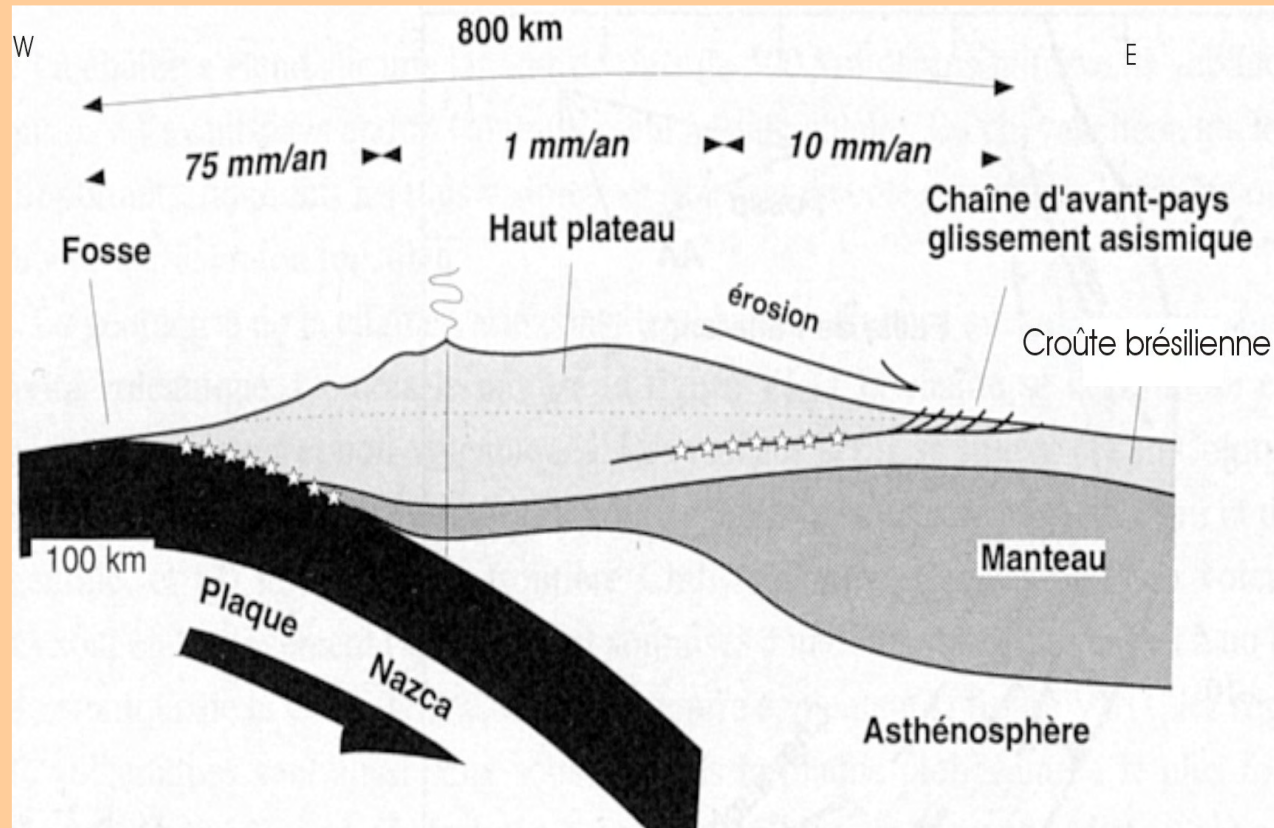
Subduction- type Andes



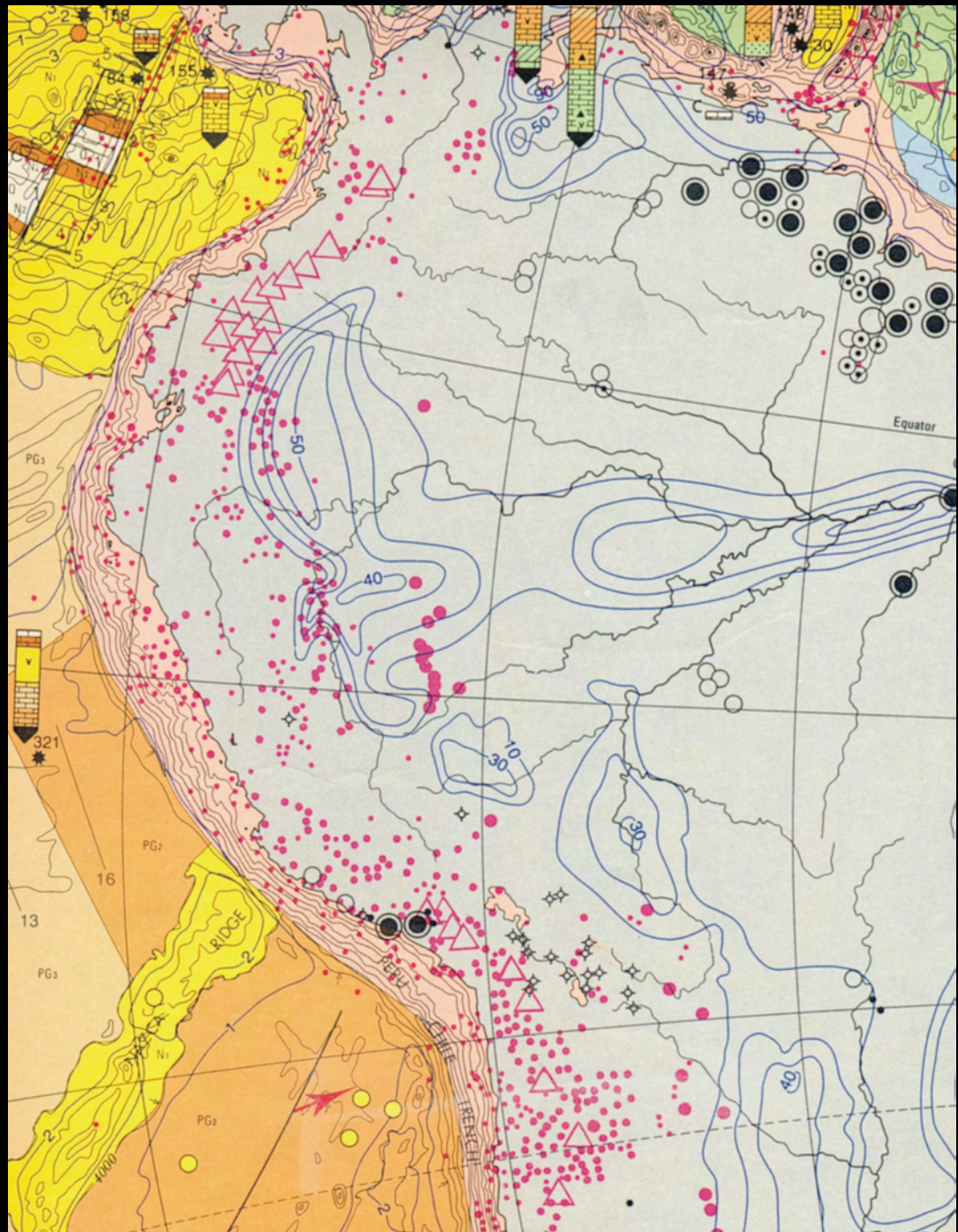
Engdahl et al. (1998)



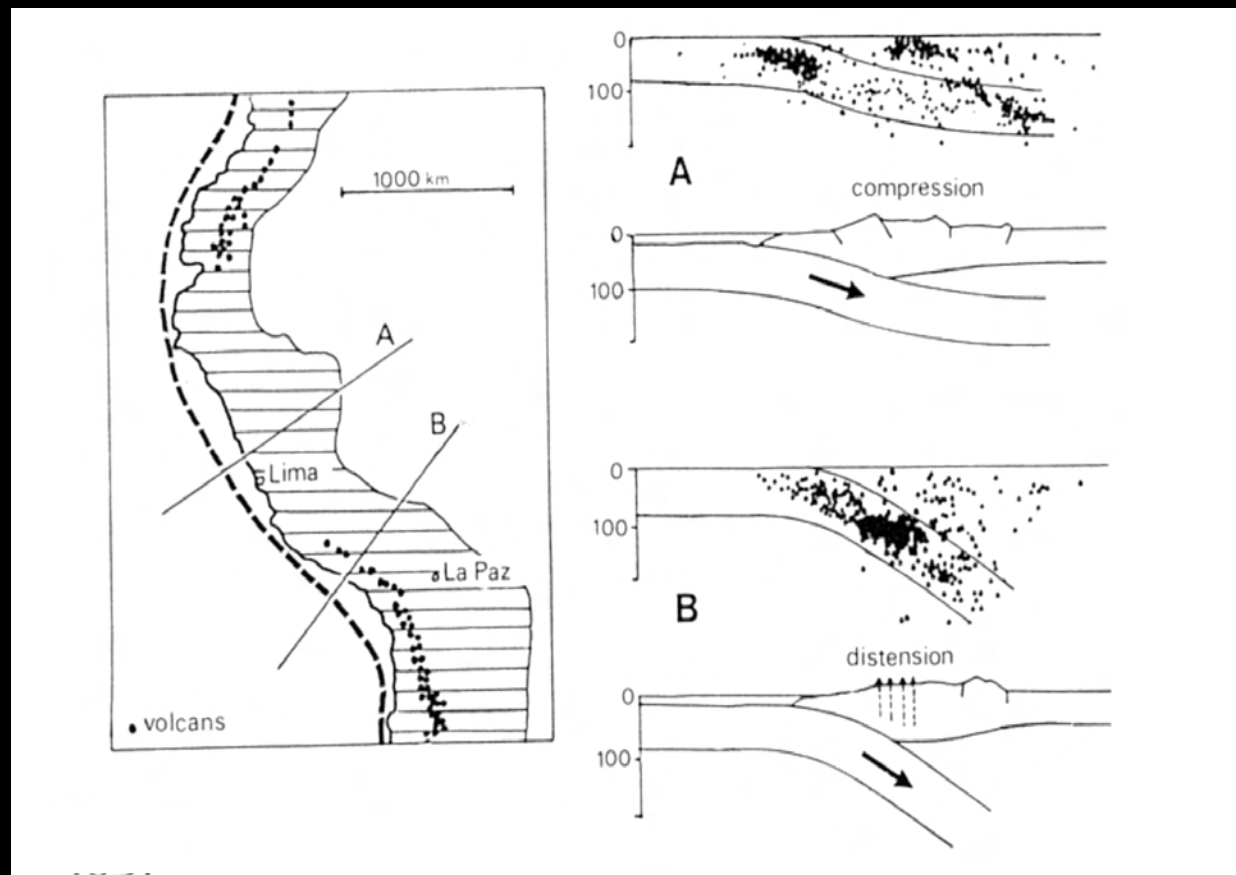
Subduction- type Andes



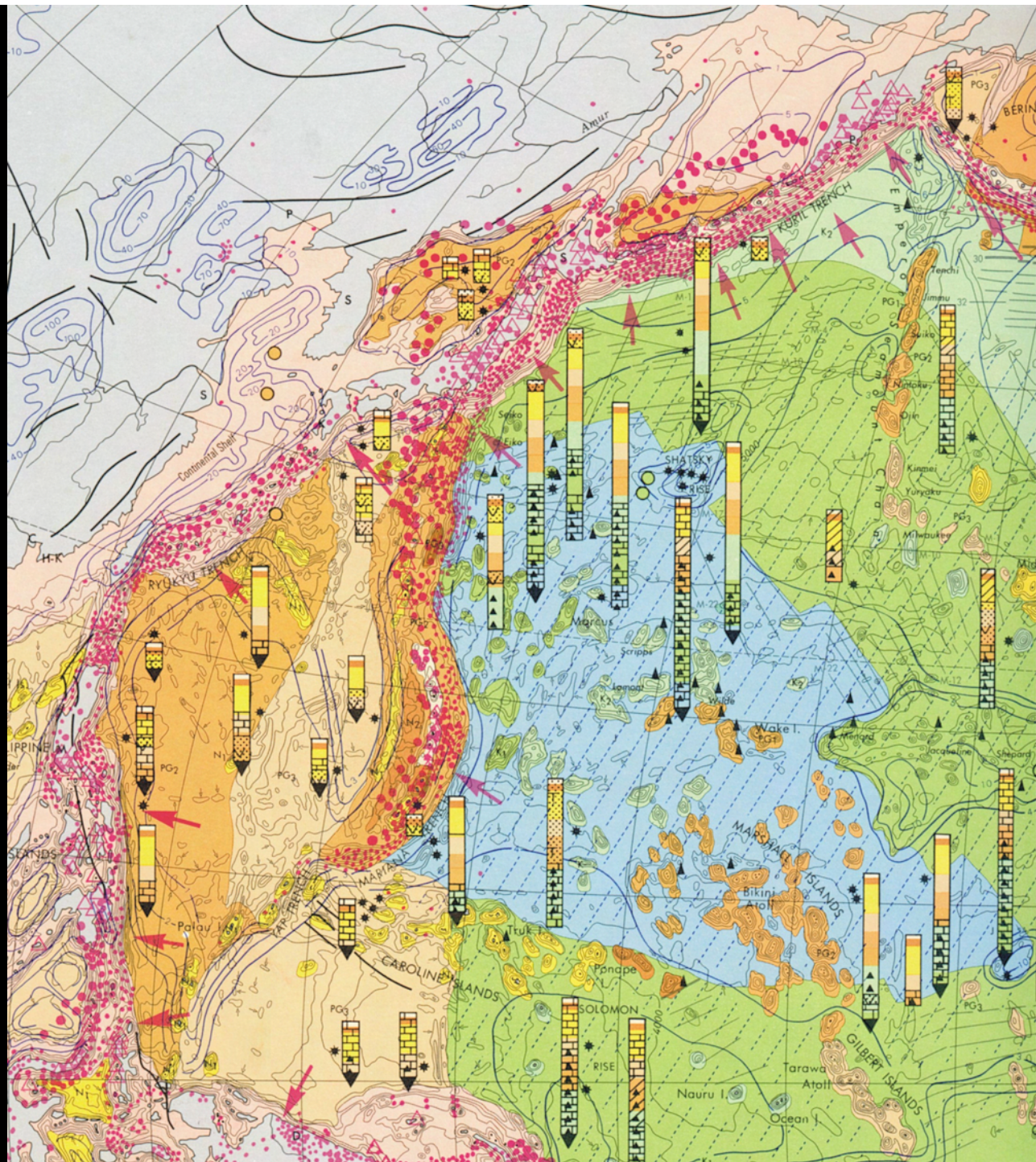
(In Jolivet,
La déformation des continents)



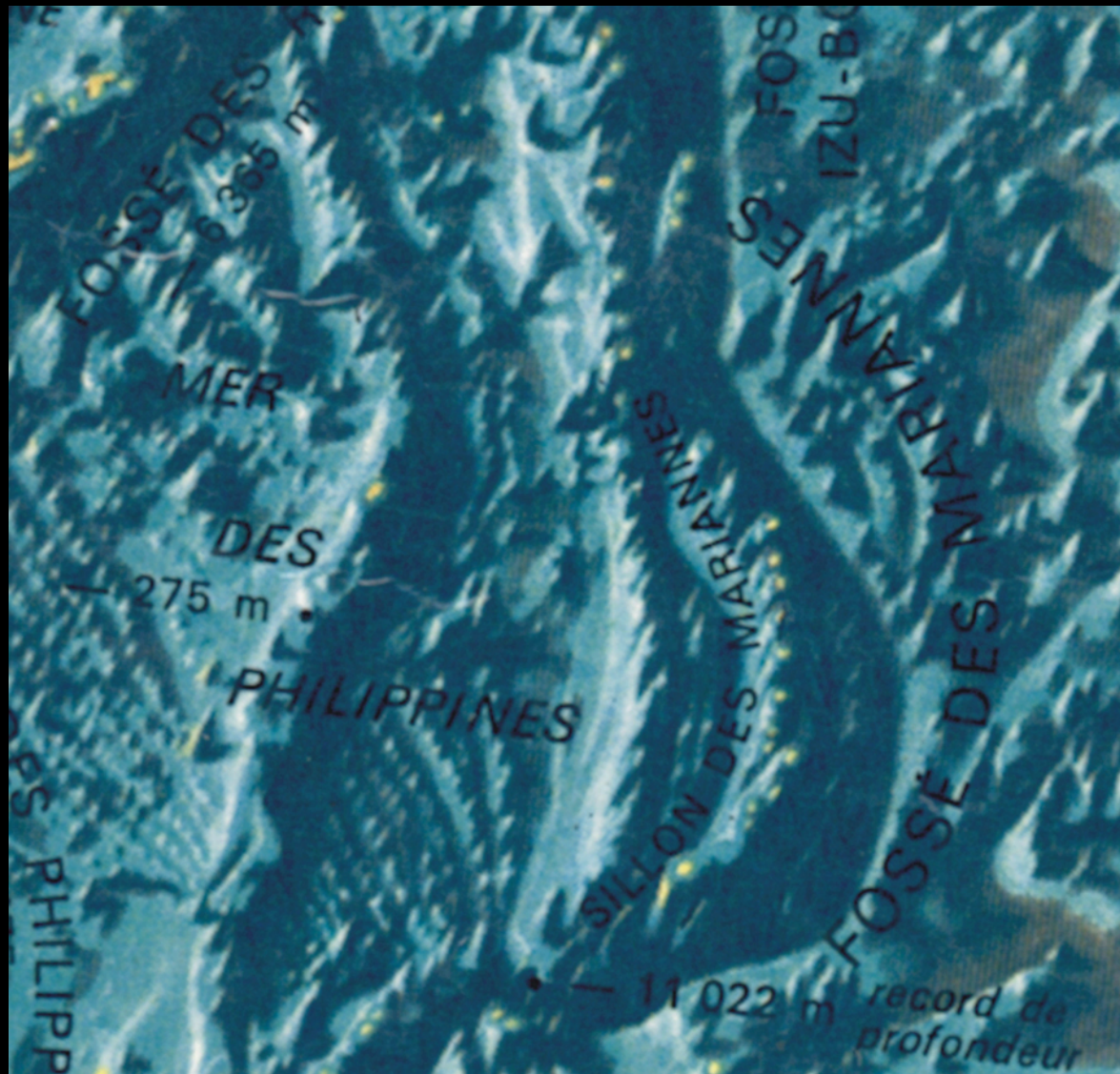
Subduction- type Andes

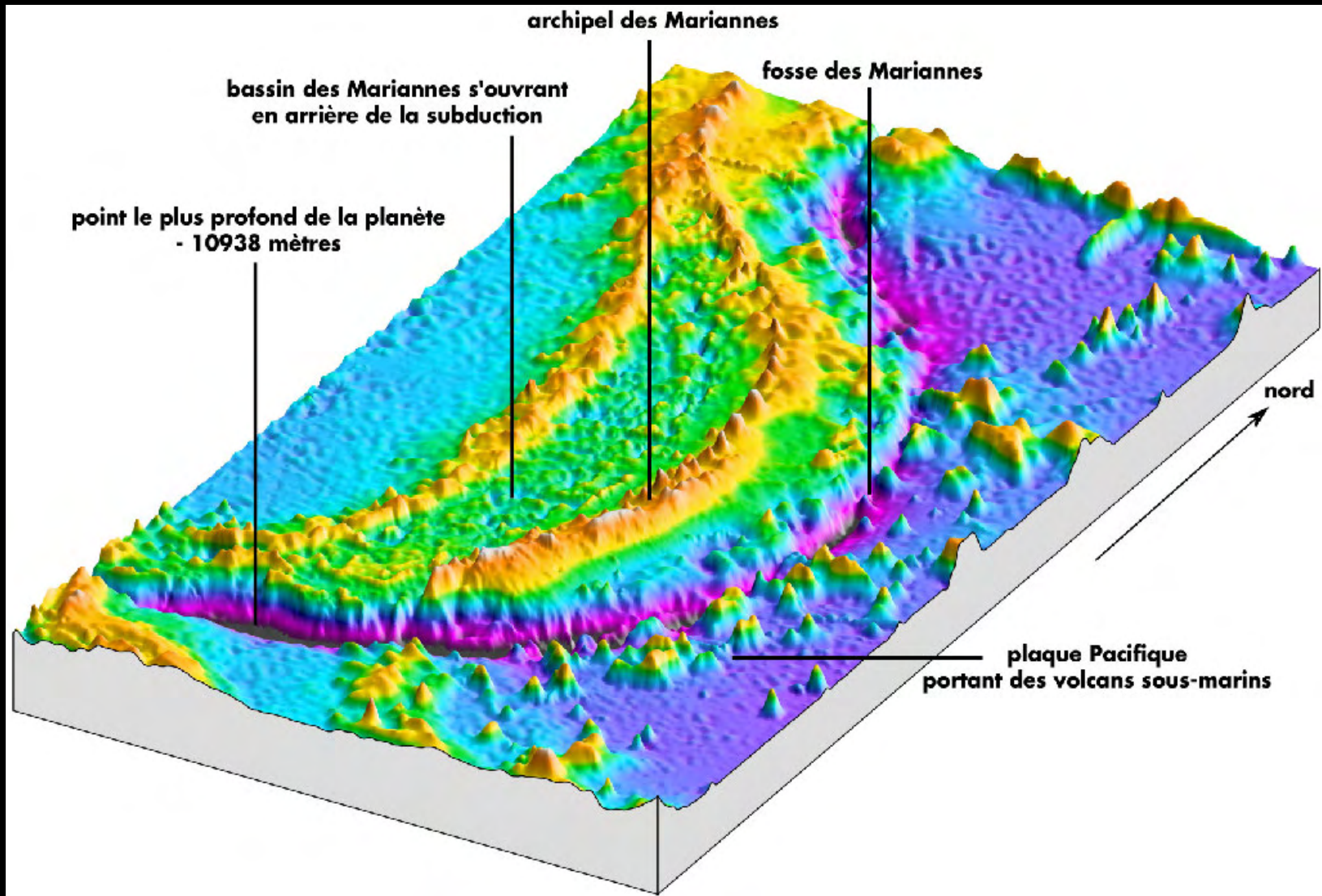


(In Debelmas et Mascle, Les grandes structures géologiques)

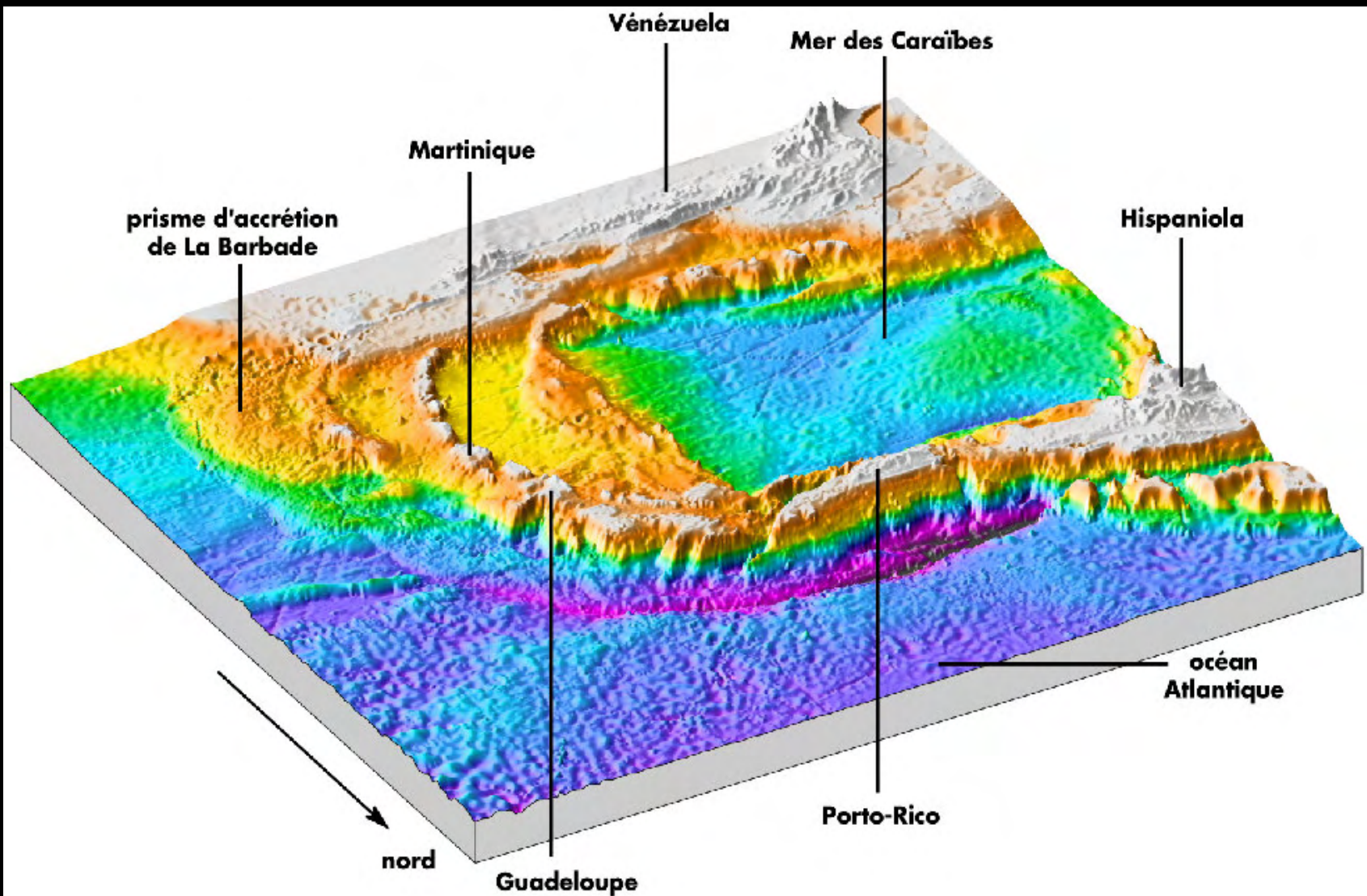


Subduction- type Mariannes

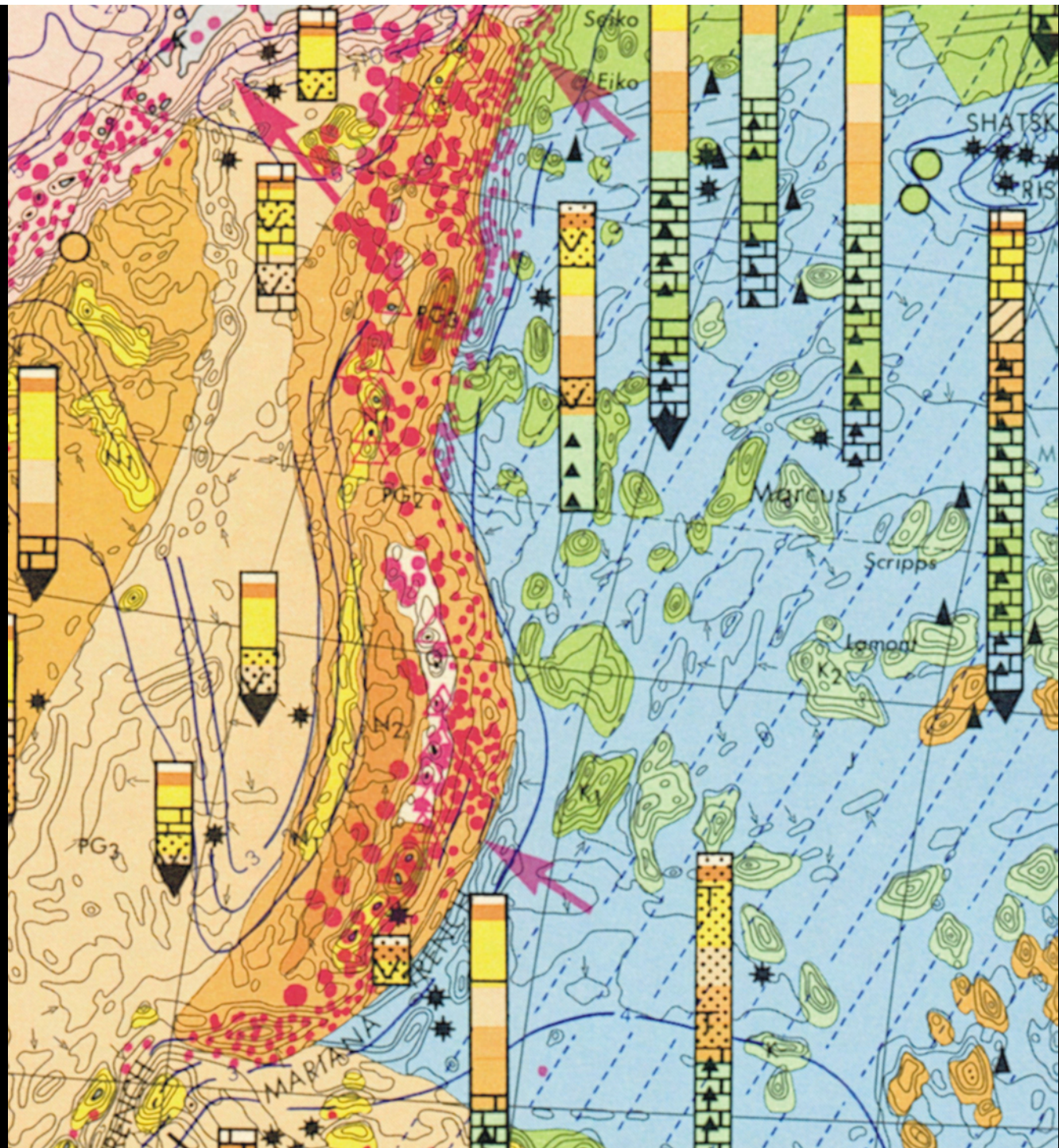




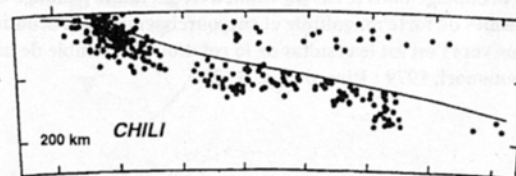
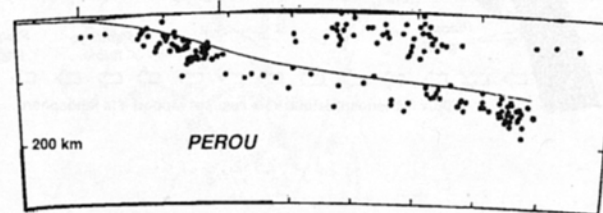
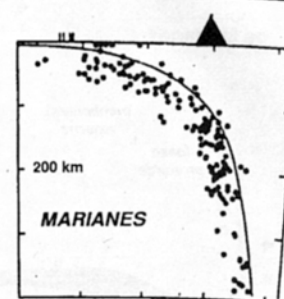
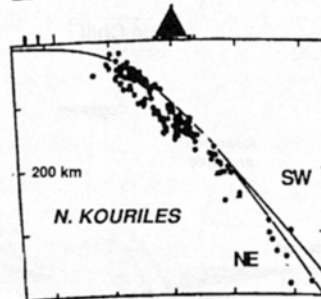
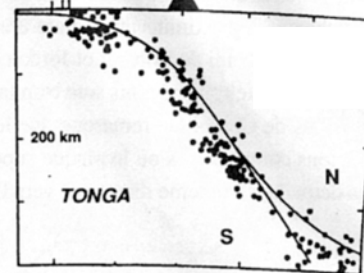
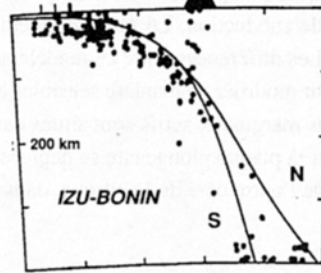
(In Lallemand et al., Convergence lithosphérique)



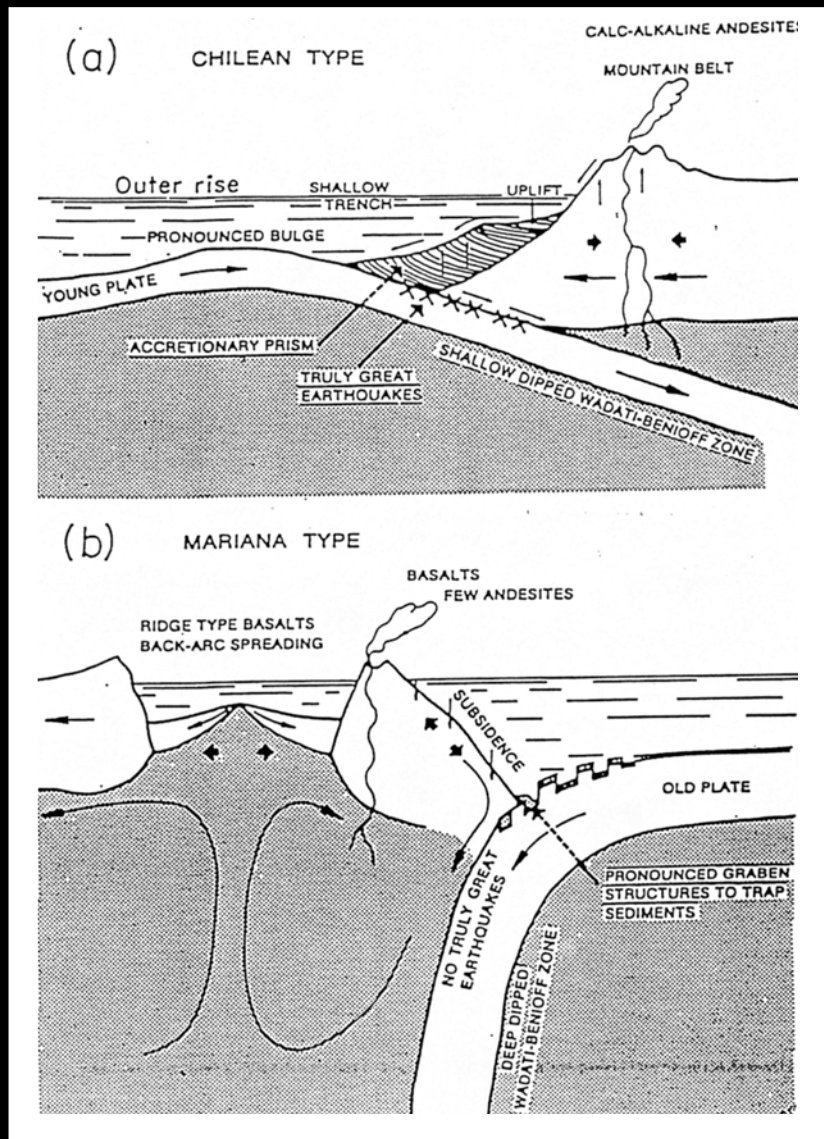
(In Lallemand et al., Convergence lithosphérique)



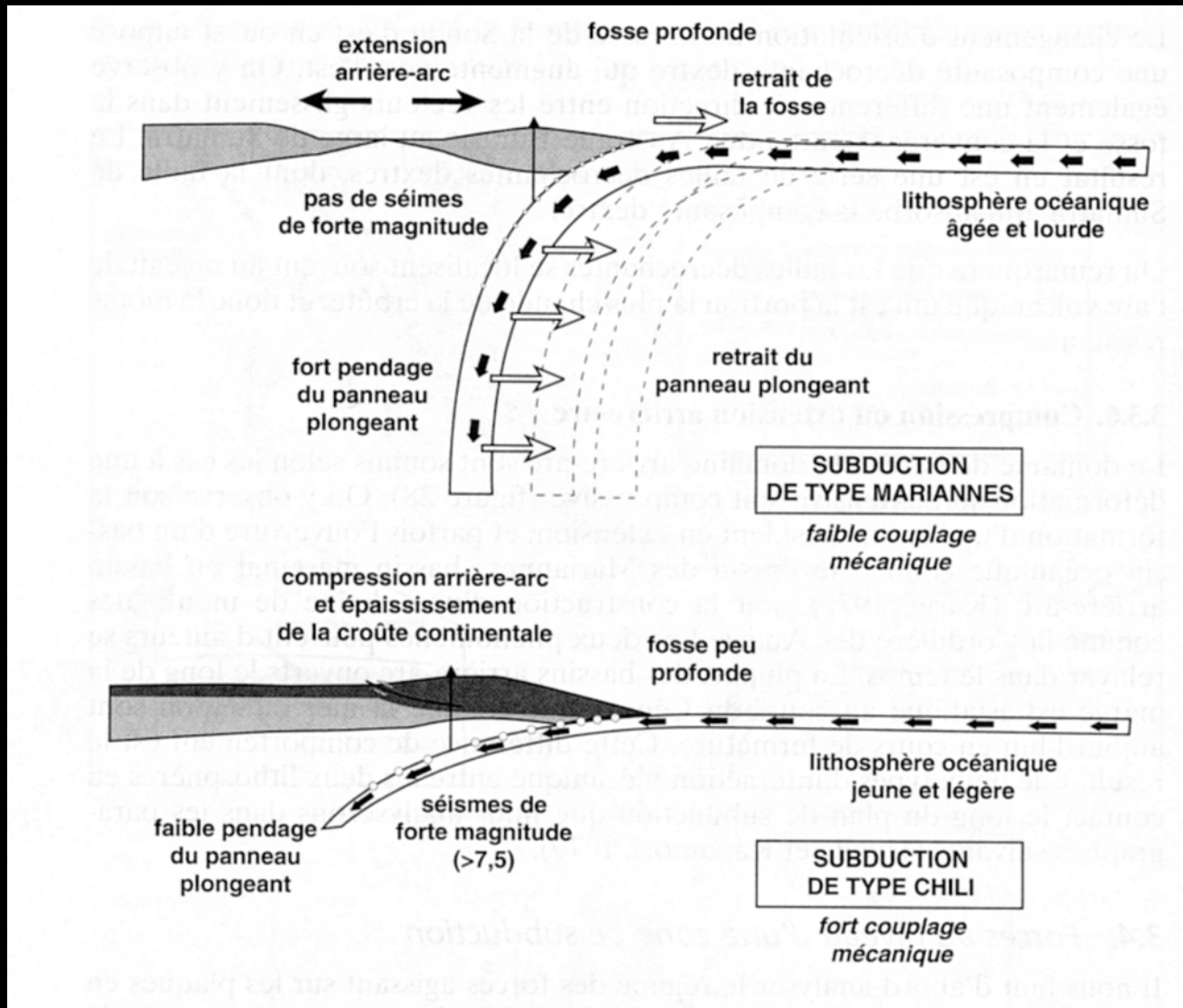
Subduction- comparaison M/C



Subduction- comparaison M/C

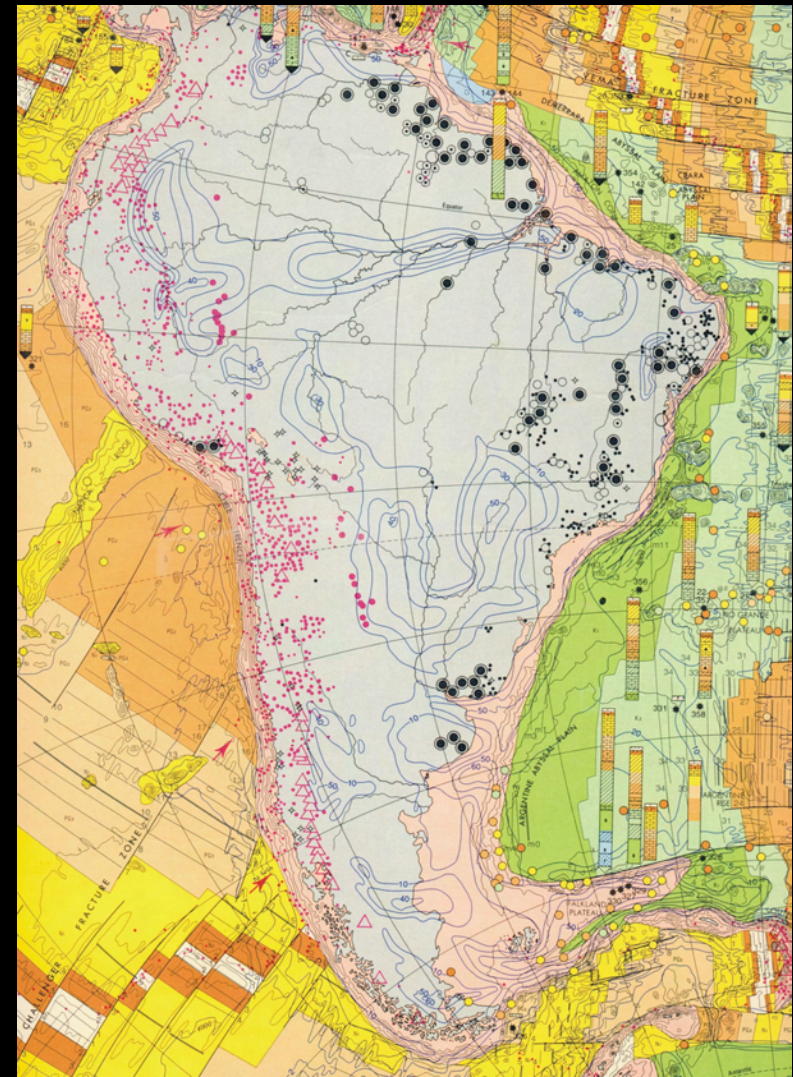
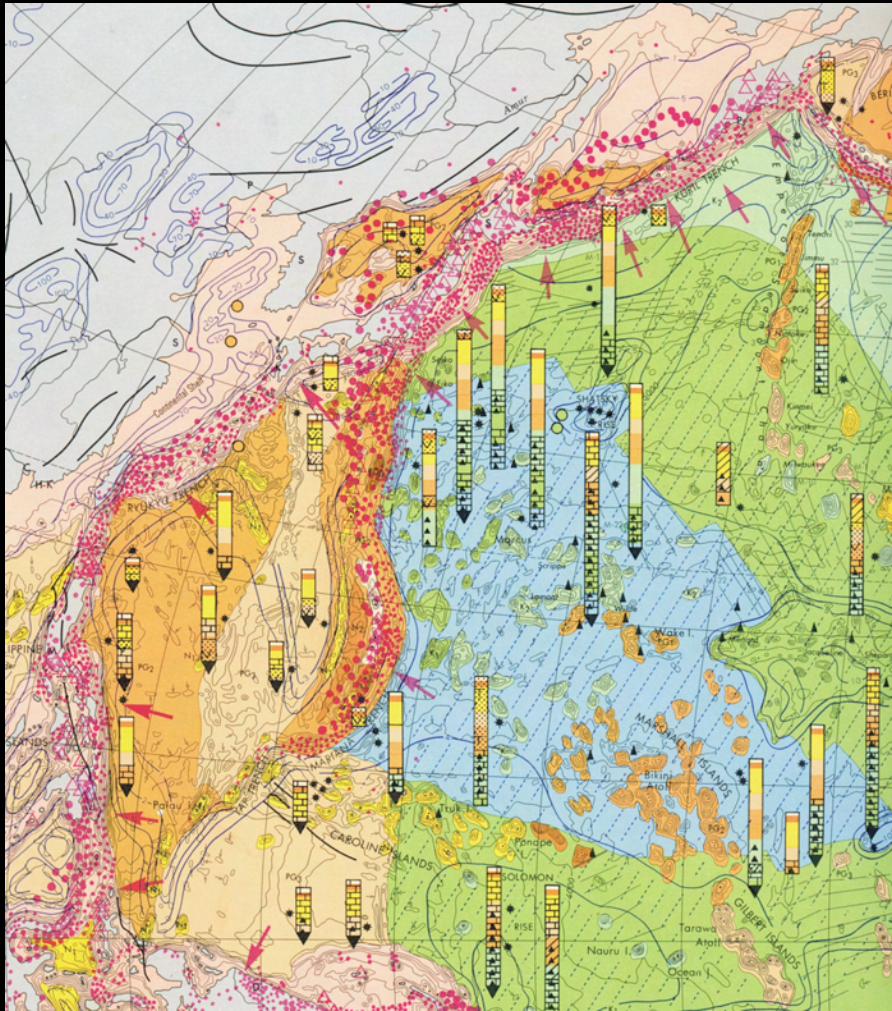


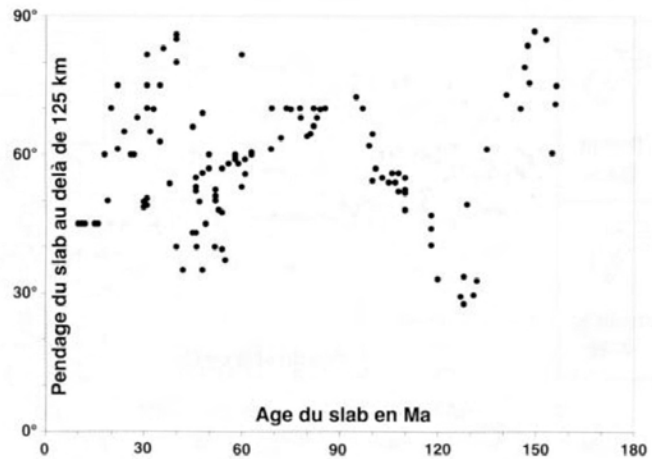
Subduction- comparaison M/C



(In Jolivet et Nataf, Géodynamique)

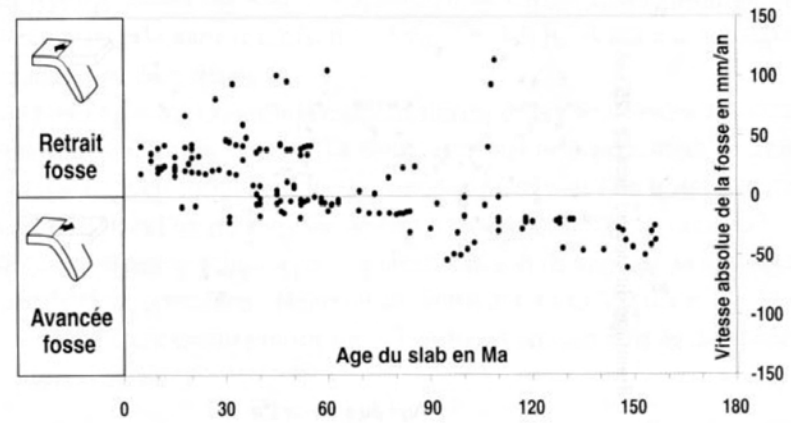
Subduction- comparaison M/C





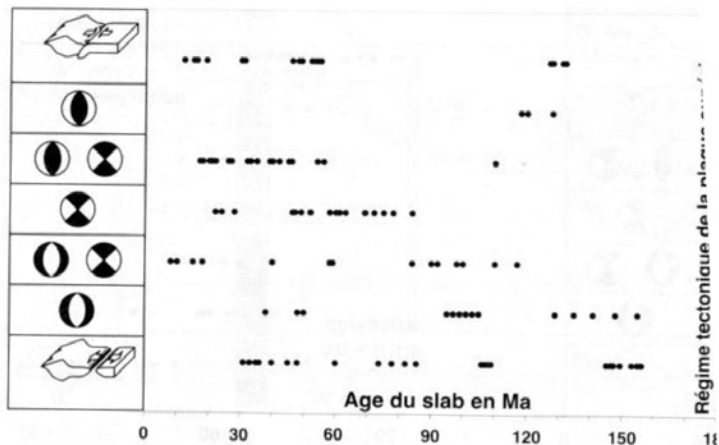
Pas de relation directe entre âge et pendage profond du slab

Mesures réalisées tous les 200 km sur toutes les subductions océaniques.



Pas de relation directe entre extension arrière-arc et retrait du slab

Mesures réalisées tous les 200 km sur toutes les subductions océaniques.



Pas de relation directe entre régime tectonique dans la plaque sup. et âge du slab

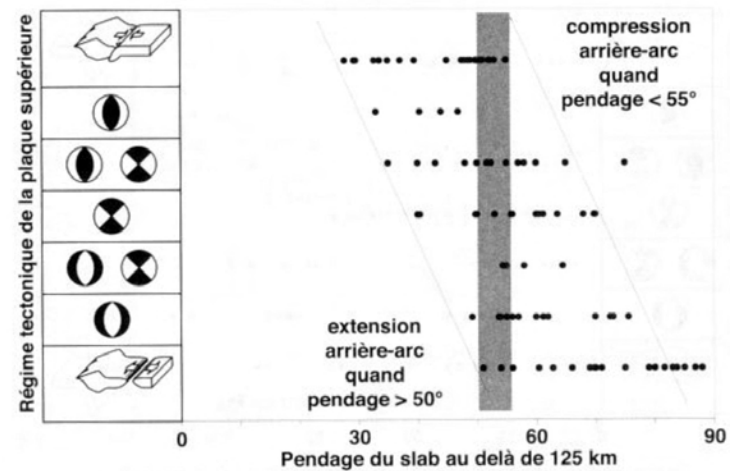


Diagramme illustrant la corrélation entre le pendage du slab delà de 125 km de profondeur et le régime tectonique de la plaque supérieure

(In Lallemand et al., Convergence lithosphérique)