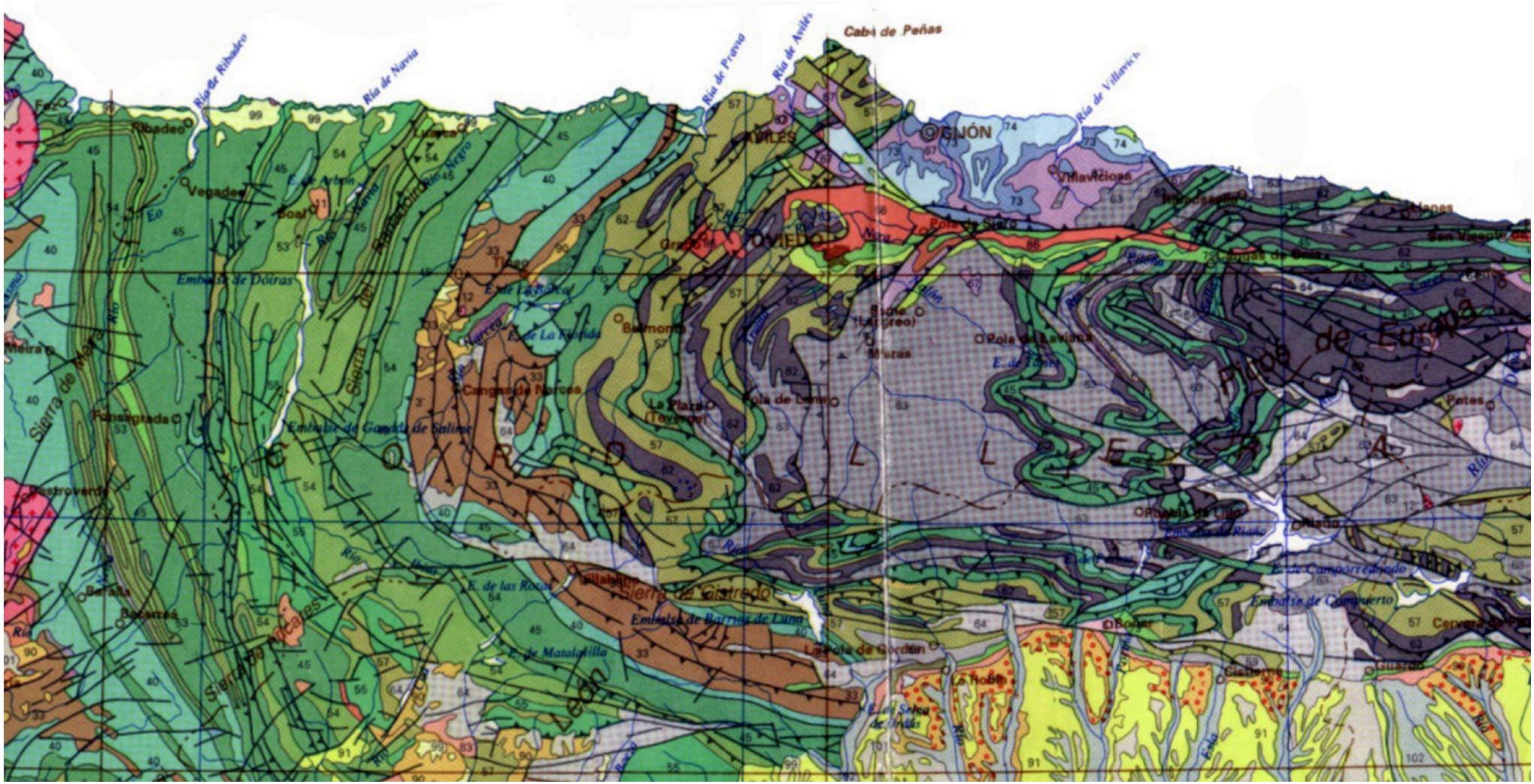
Historia Geológica de Asturias

Parte 2: De Pangea a la actualidad

David Pedreira

Mayo 2018


Cabo de Peñas
Ría de Ribadeo
Ría de Navia
Ría de Pravia
Ría de Avilés
Ría de Villaviciosa
GIJÓN
AVILES
OVIEDO
Ribadeo
Vegadeo
Boal
Tineo
Grado
Belmonte
Cangas de Narcea
La Plaza (Tineo)
Pola de Lena
Pola de Laviana
Mieres
Pola de Siero
Villaviciosa
Pola de Allande
Embalse de Doiras
Embalse de Grandas de Salime
Embalse de Barrios de Luna
Embalse de Camporredondo
Embalse de Riaño
Sierra del Fonsagrada
Sierra de Ancares
Sierra de Cistierna
Sierra de Peñas de Europa
Potes
Cangas de Onís
Pola de Gordón
La Robla
Boñar
Cistierna
Guardo
Riaño
Pola de Lillo
Pola de Lena
Pola de Laviana
Pola de Siero
Pola de Allande
Pola de Gordón
Pola de Lena
Pola de Lillo

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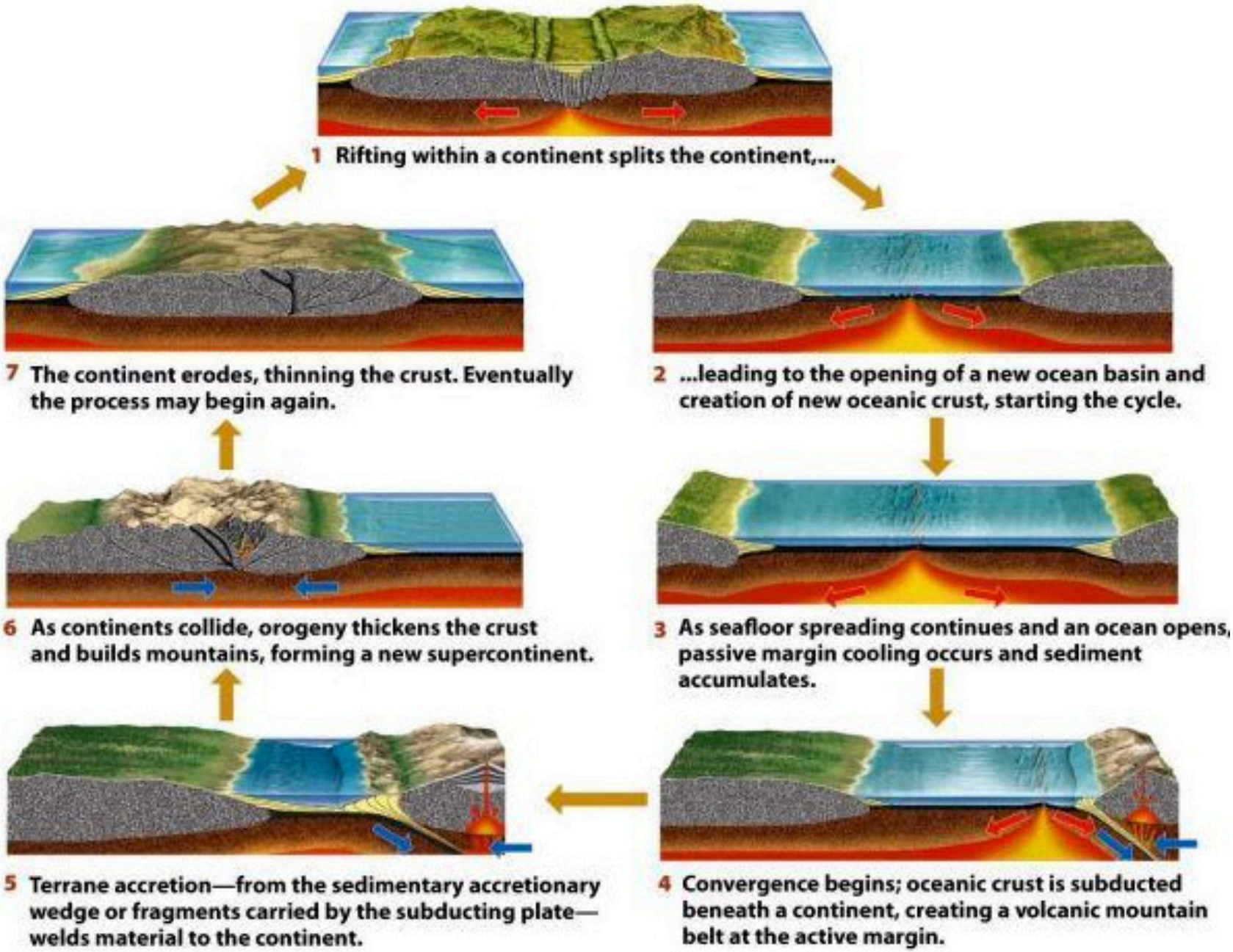
2. Etapa extensional Mesozoica: El desmembramiento de Pangea

3. Etapa compresiva Cenozoica: La orogenia Alpina

1

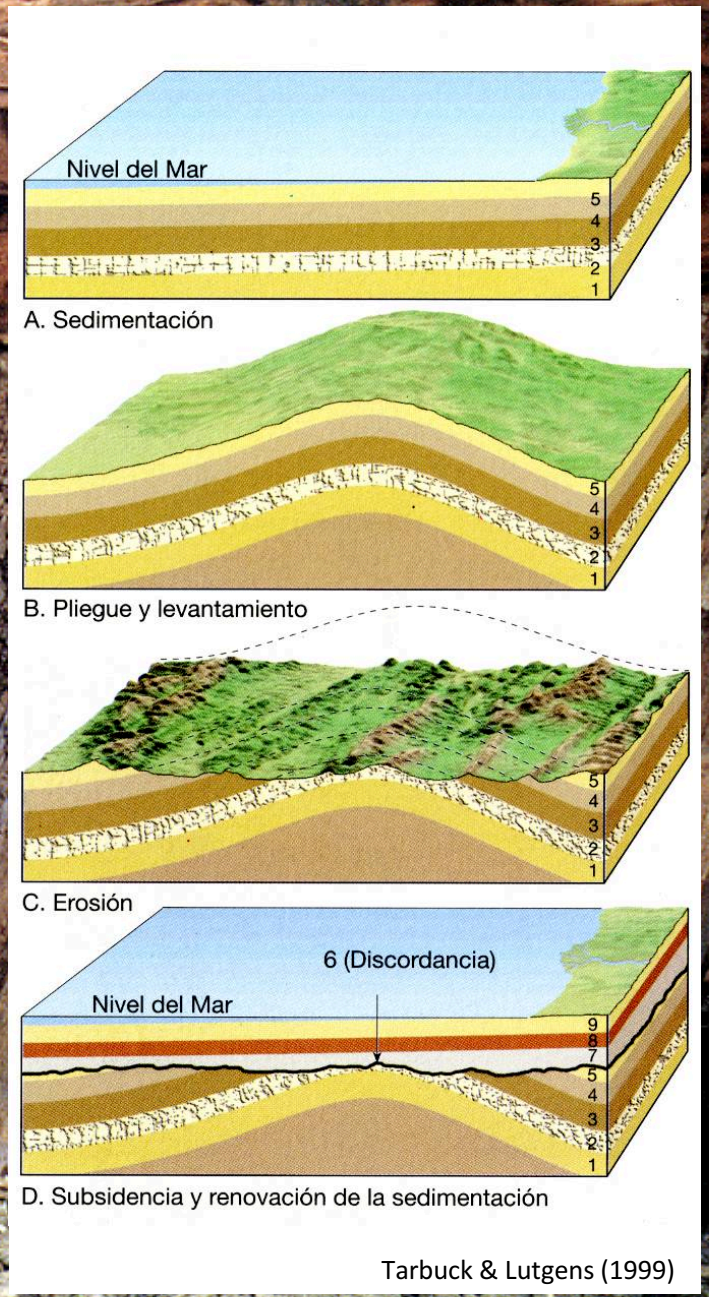
Introducción: El ciclo de Wilson

1. Introducción: El ciclo de Wilson



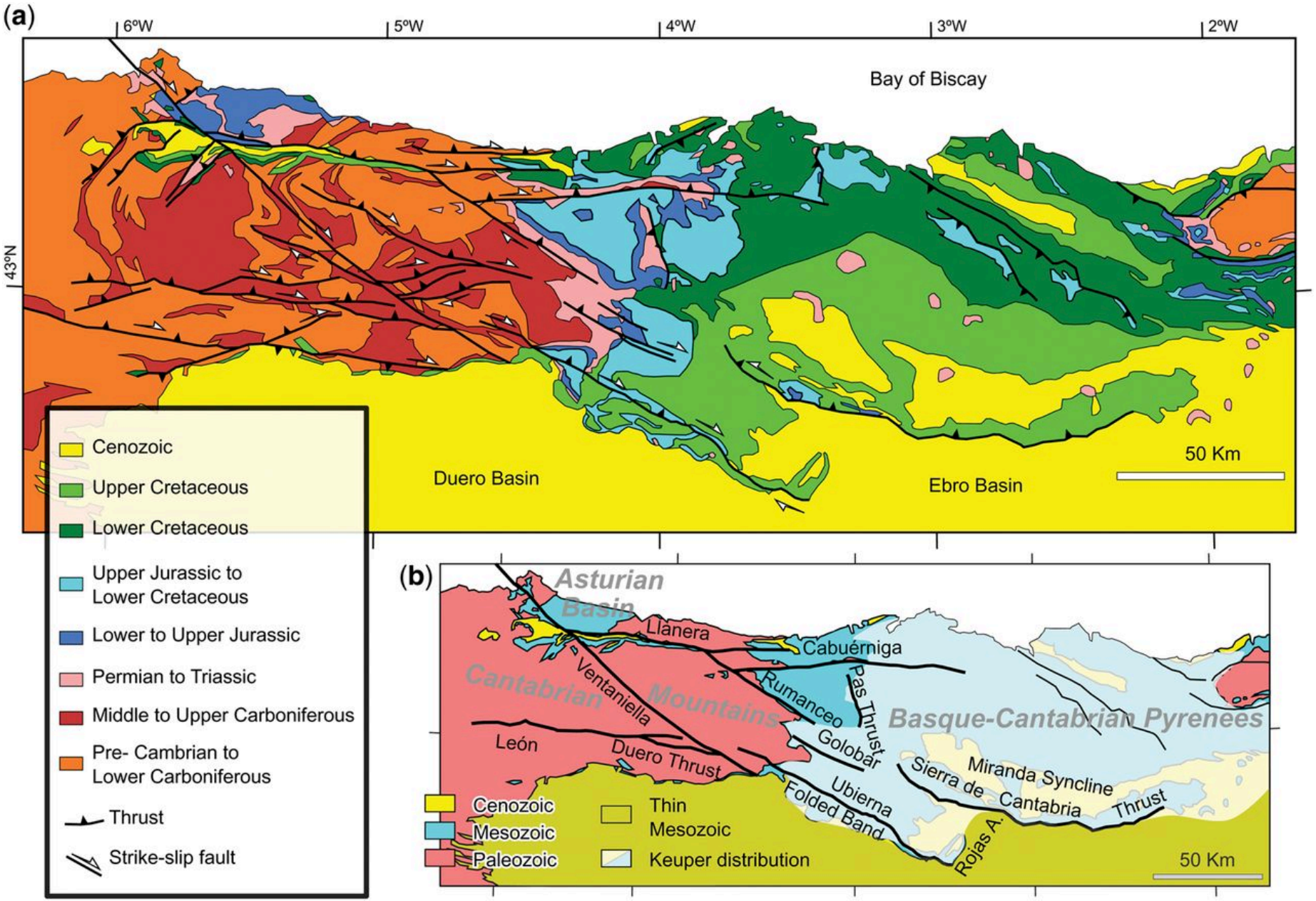
https://www.slideshare.net/josuecienciasnaturales/t1-2-tectonicaplacas2

Las discordancias separan ciclos orogénicos



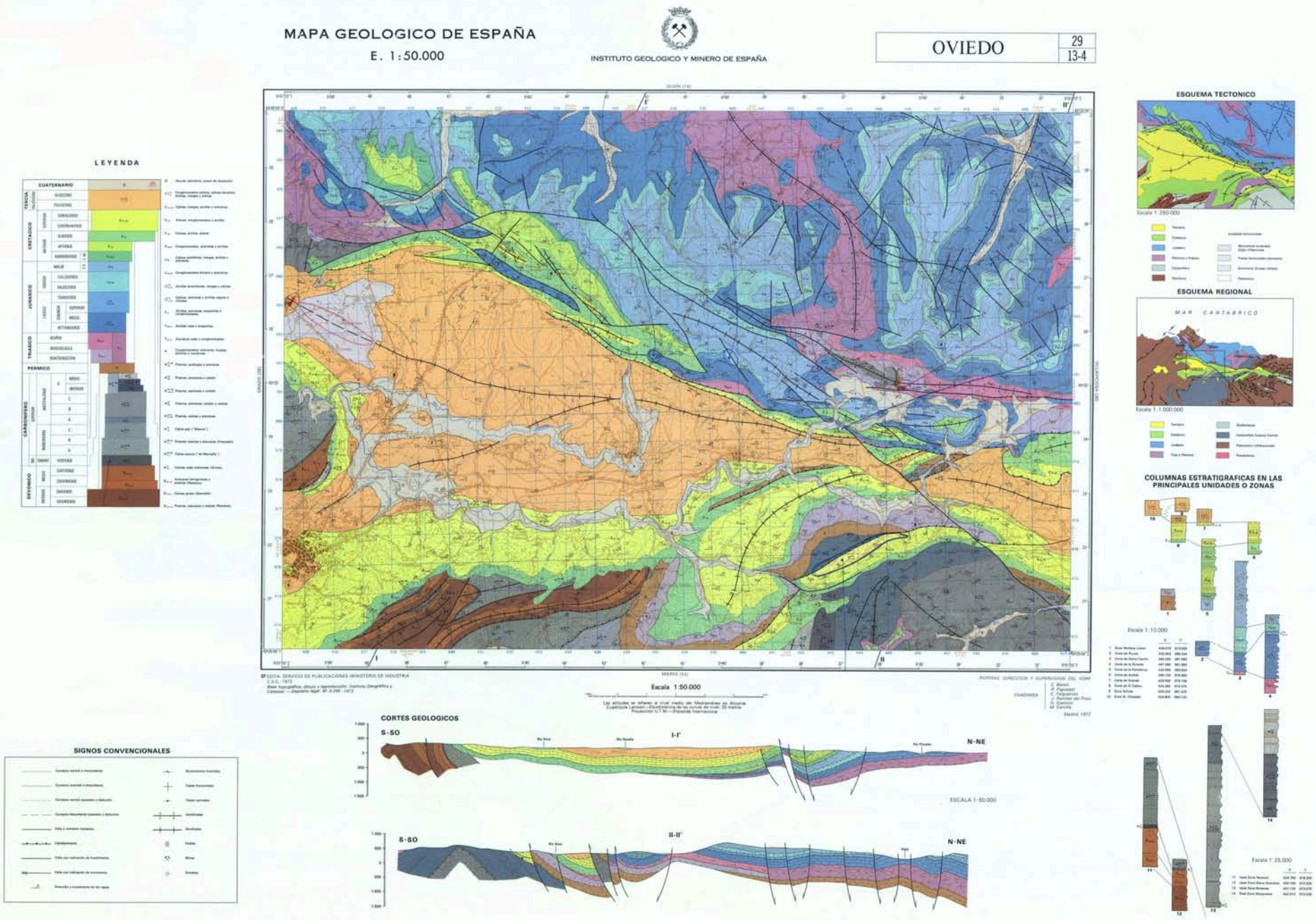
Tarbuck & Lutgens (1999)

Las edades de las rocas en Asturias



Carola et al. (2013)

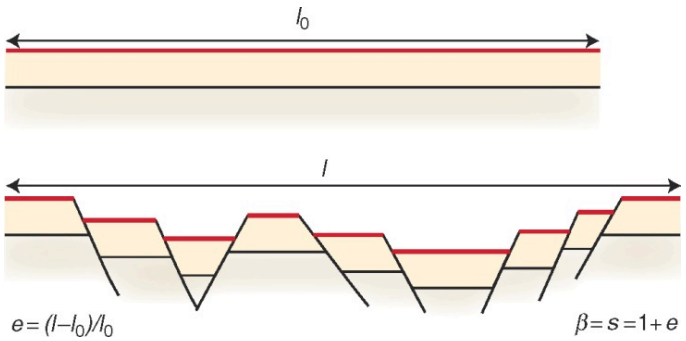
1. Introducción: El ciclo de Wilson

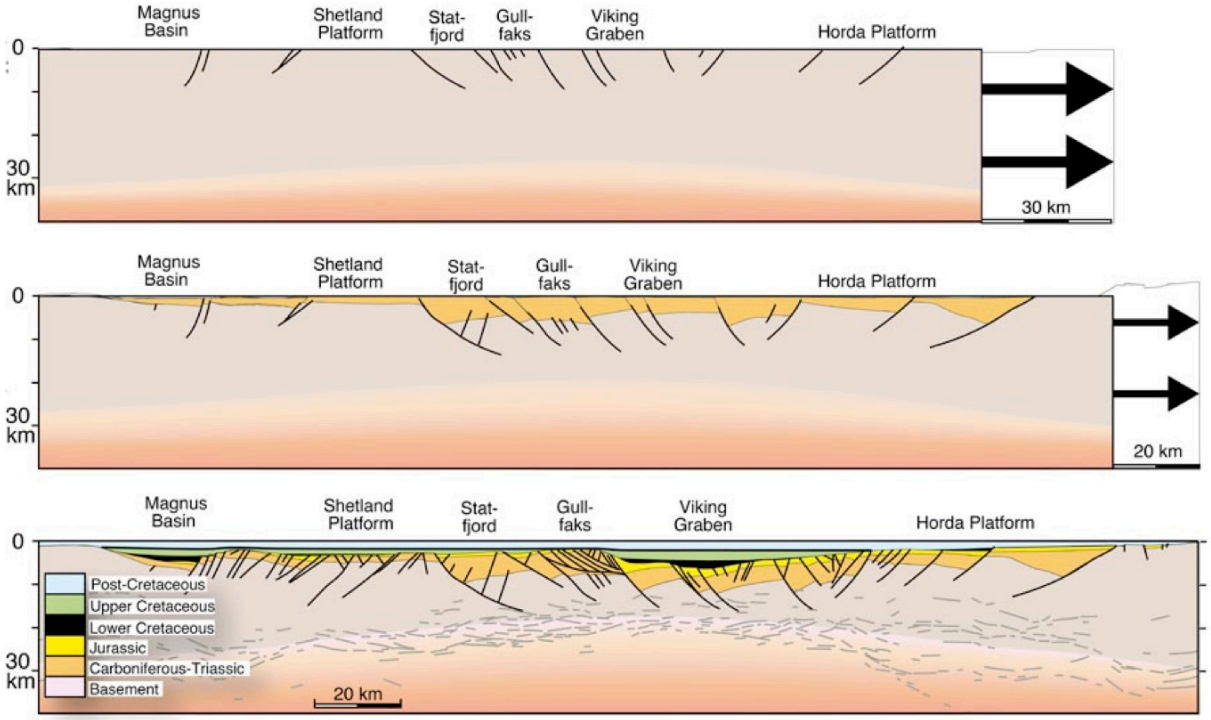


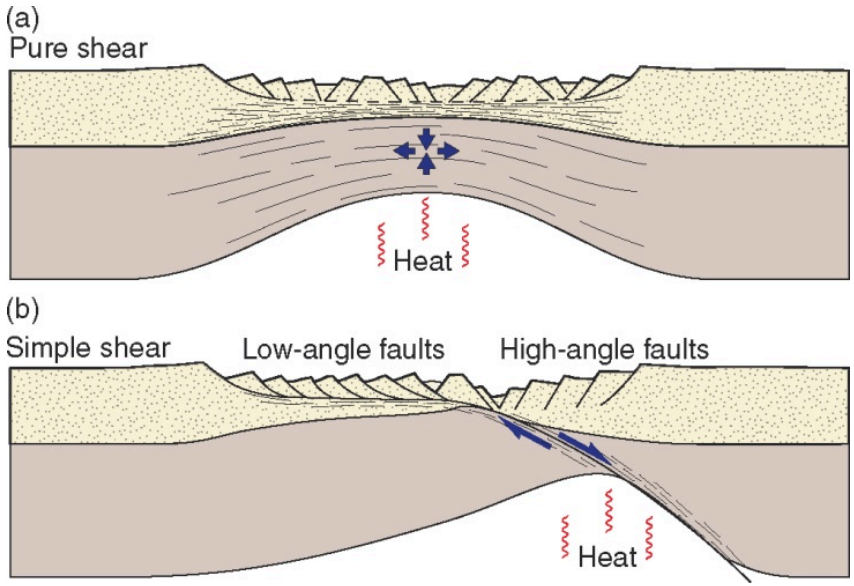
Playa de la Gargantera (Gozón)

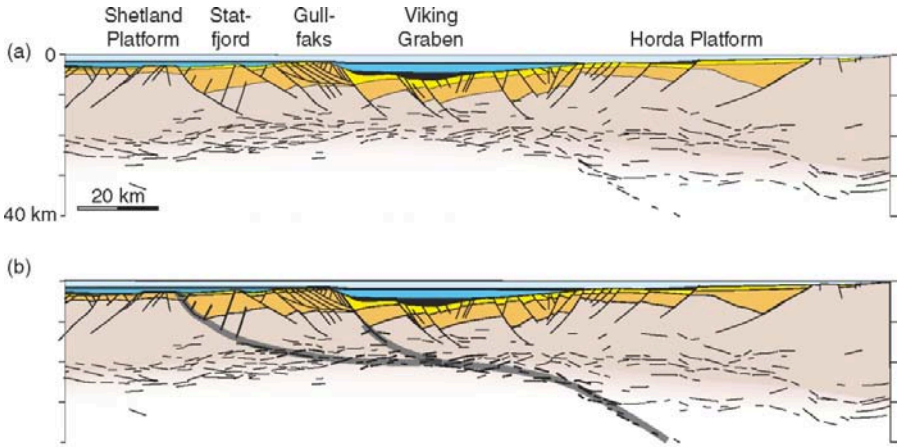
Farias y Pedreira (en prep.)

Extensión de la litosfera



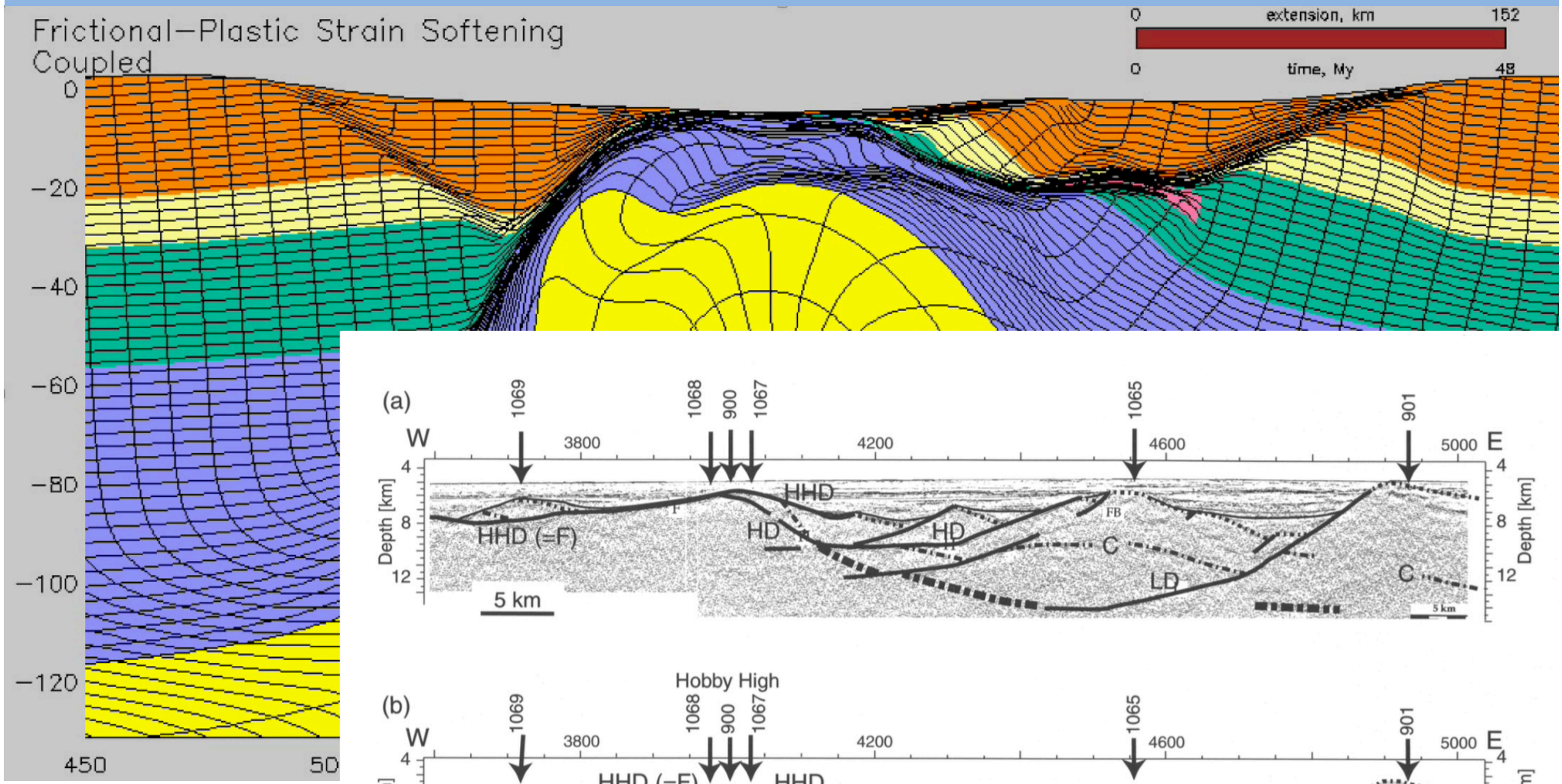




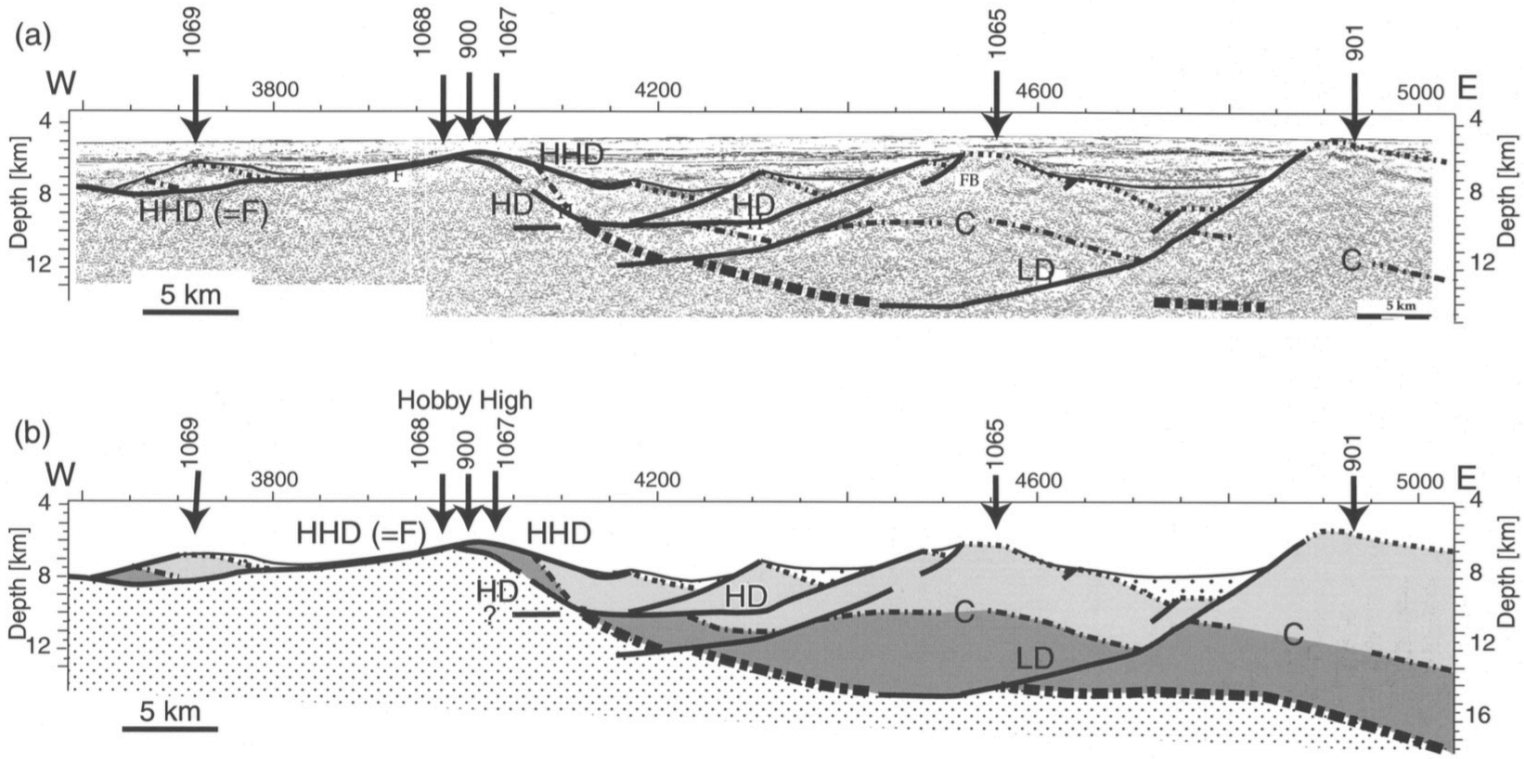


Fossen (2016)

1. Introducción: El ciclo de Wilson

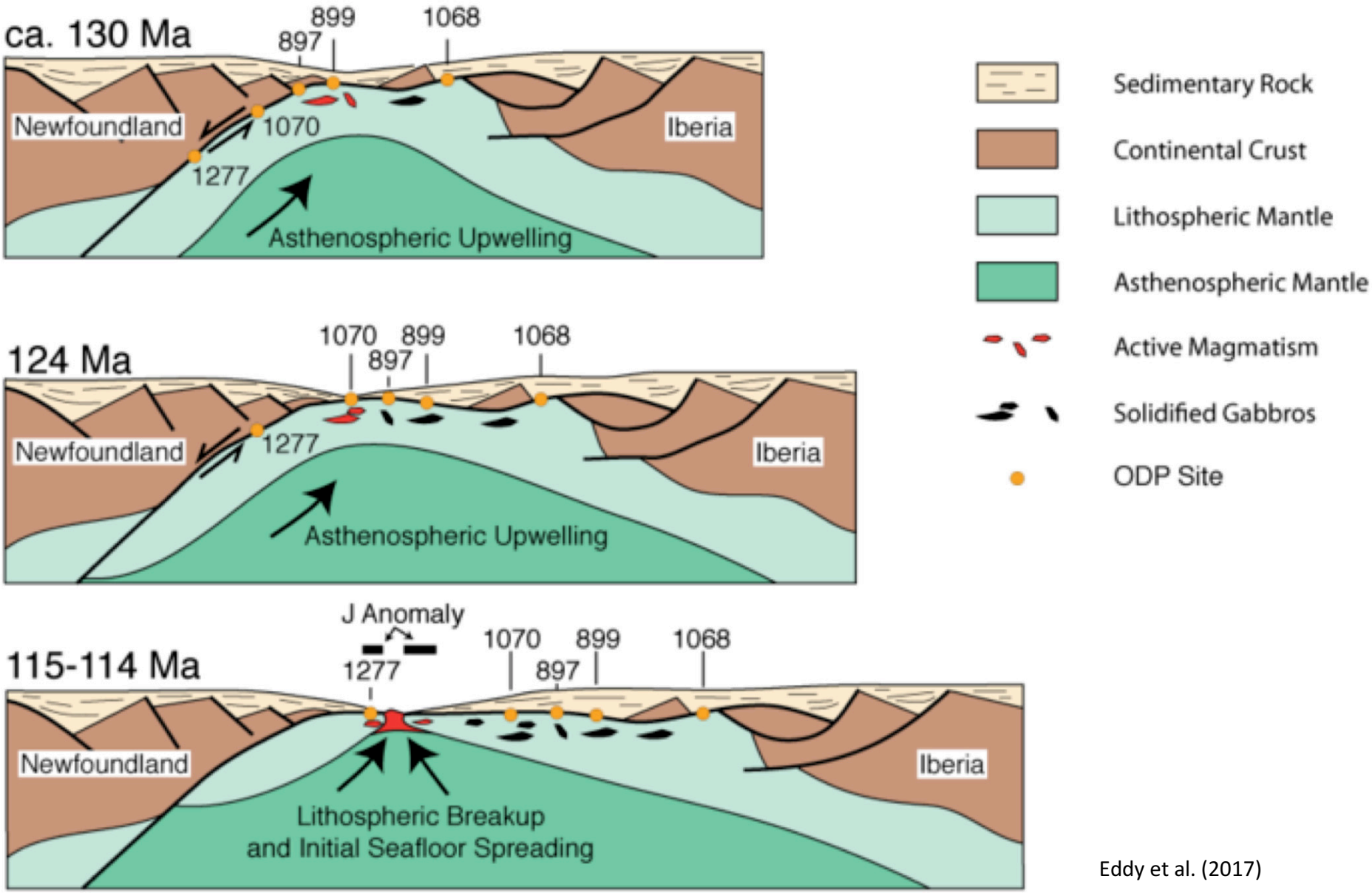


Huismans & Beaumont (2003)



Manatschal et al. (2001)

1. Introducción: El ciclo de Wilson

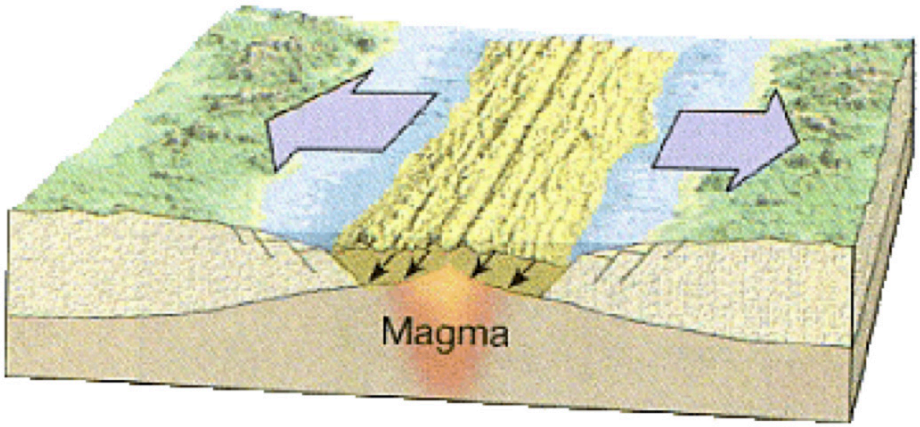


Eddy et al. (2017)

Anomalías magnéticas oceánicas

Mecanismo de formación de las anomalías magnéticas oceánicas

Período Normal

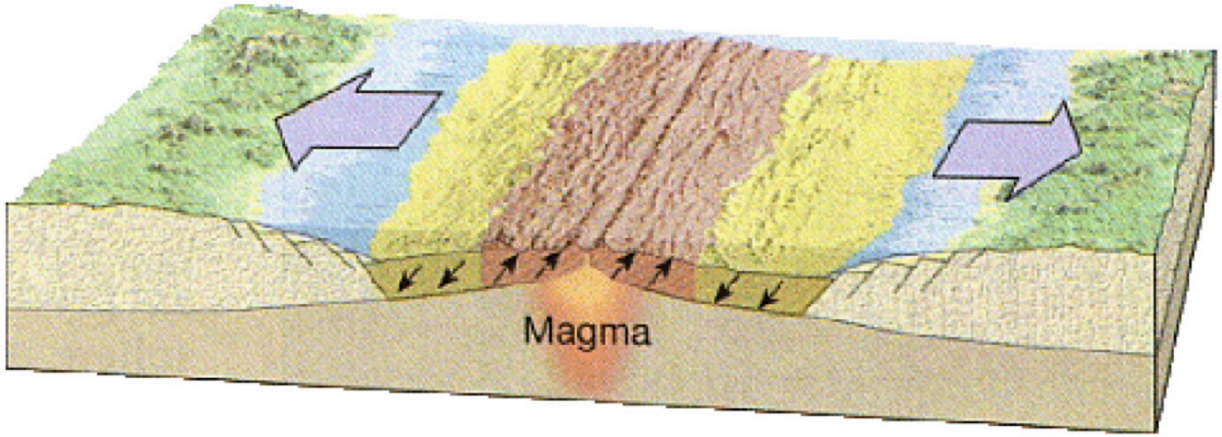


Tarbuck & Lutgens (1999)

Anomalías magnéticas oceánicas

Mecanismo de formación de las anomalías magnéticas oceánicas

Período Inverso

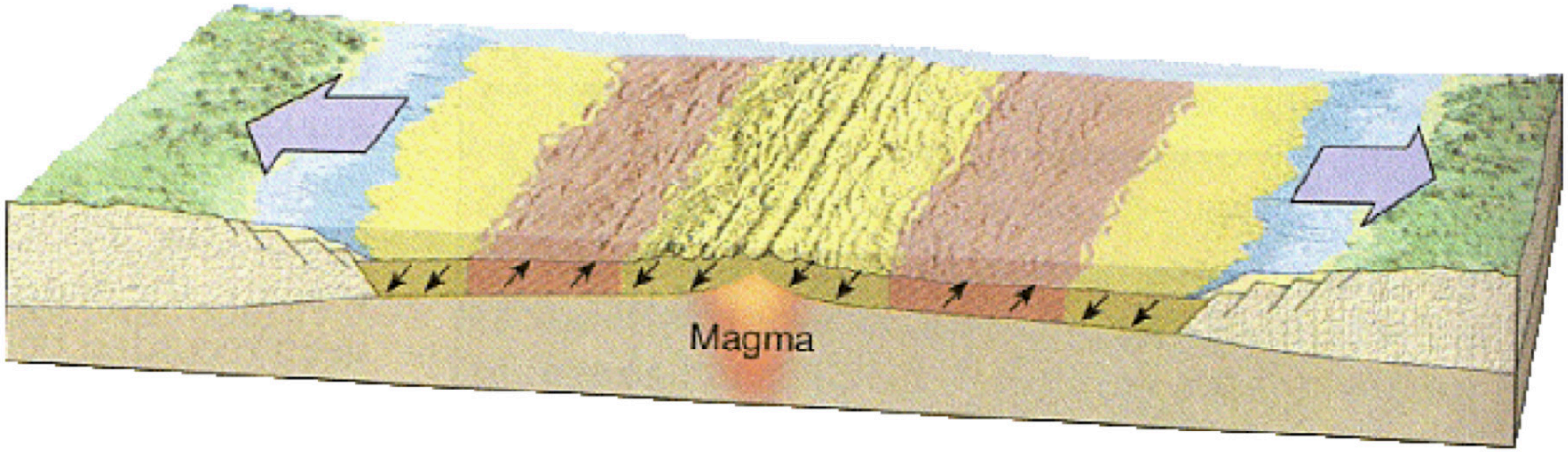


Tarbuck & Lutgens (1999)

Anomalías magnéticas oceánicas

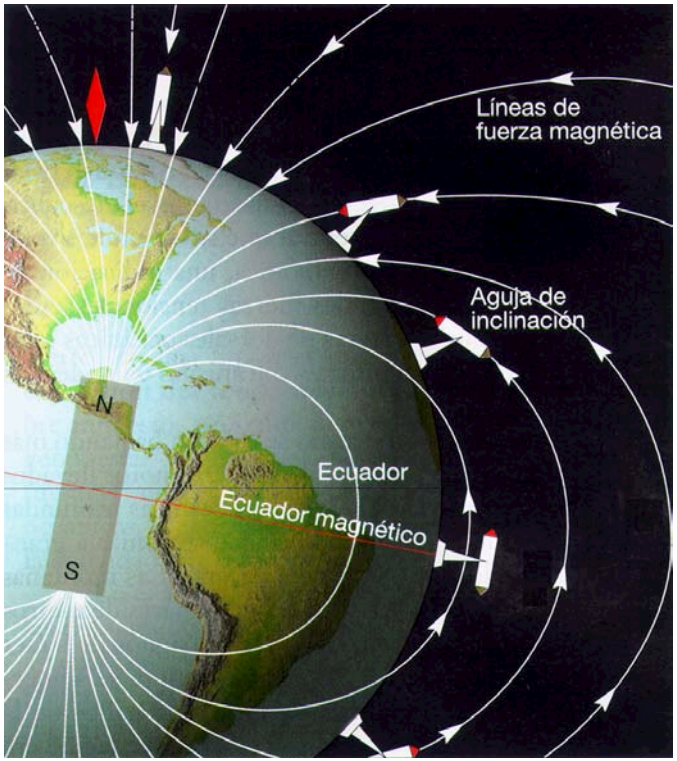
Mecanismo de formación de las anomalías magnéticas oceánicas

Período Normal



Tarbuck & Lutgens (1999)

El campo magnético terrestre

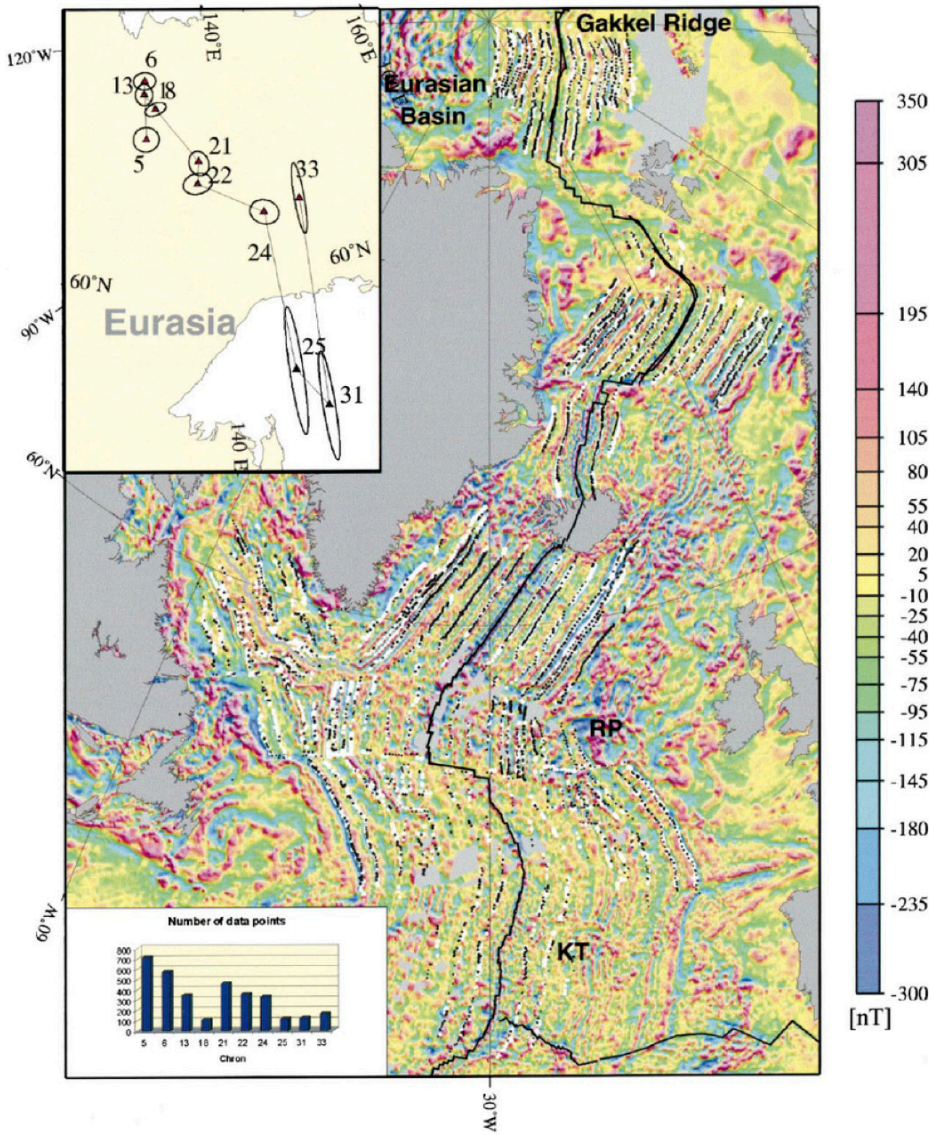


Tarbuck & Lutgens (1999)

$$\tan L = 0.5 \tan i$$

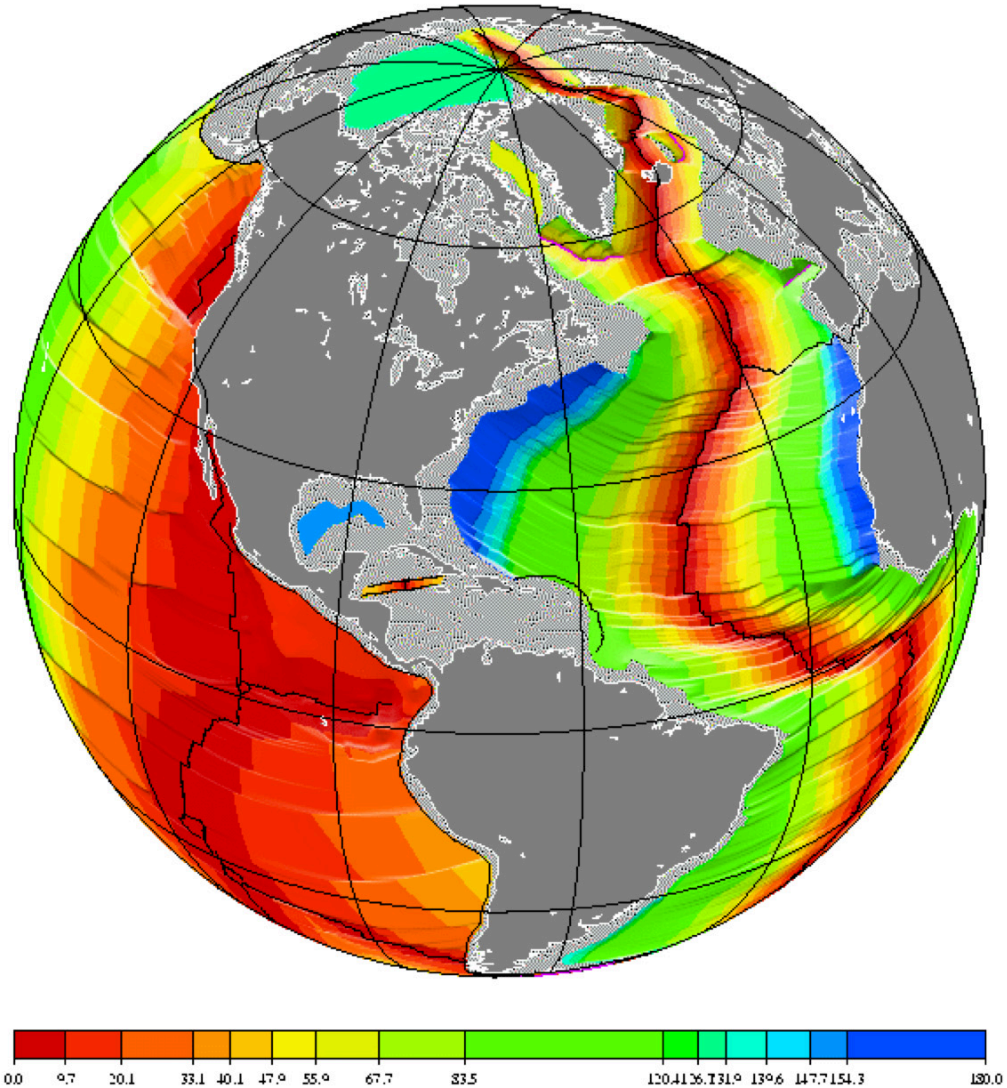
La inclinación magnética (*i*) es función de la latitud (*L*). Sabiedo la declinación y la inclinación del vector del magnetismo remanente, sabemos en qué dirección y a qué distancia estaba el polo norte magnético (y qué polaridad tenía) en el momento de adquisición de ese magnetismo remanente.

Anomalías magnéticas



Gaina et al. (2002)

Edad del fondo oceánico



Müller et al. (1997)

http://www.earthbyte.org/Resources/Agegrid/1997/digit_isochrons.html

Apertura del Atlántico Norte (www.scotese.com, https://www.youtube.com/user/cscotese)

2

Etapa extensional Mesozoica:
El desmembramiento de Pangea

La distensión Pérmica-Triásica: primeras fracturas en Pangea y formación de cuencas estrechas y profundas.

Endogene Dynamik

RWTH AACHEN UNIVERSITY

Additional movies to chapter 6.2; Transport processes

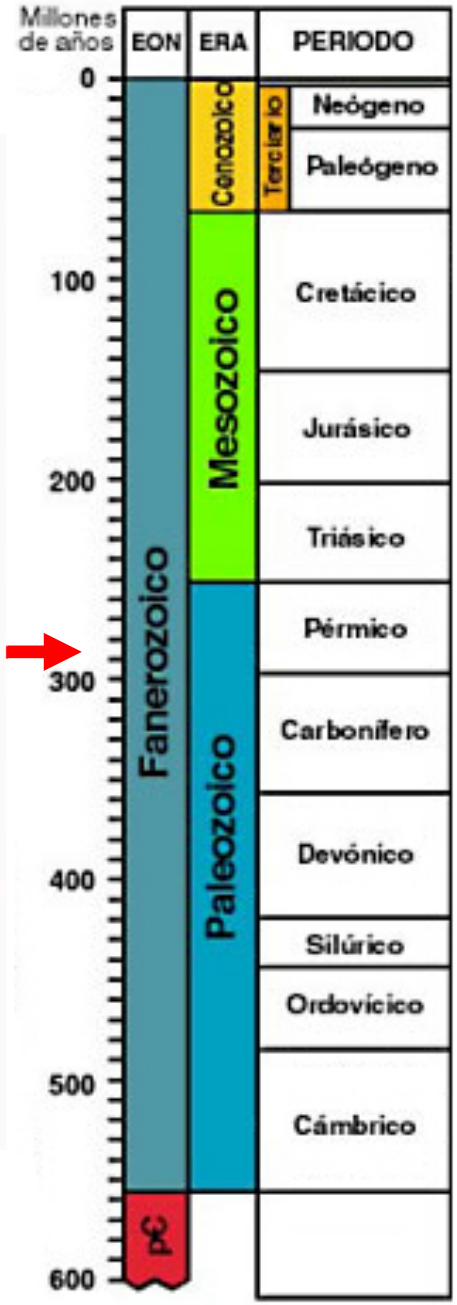
Open fractures in Sandbox experiments 3

by Heijn van Gent, Marc Holland & Janos L. Urai

Description: The inclusion of layers with hemihydrate/ graphite mixtures in cohesive Hemihydrate ($CaSO_4 \cdot \frac{1}{2} H_2O$) powder leads to wider and complex deformation zones. Cavities form along the main faults in the model.
Model: 20cm pure Hemihydrate with four hemihydrate/ graphite mixture layers of 1cm thickness.

References:
van Gent H. W. Holland M. Urai J. L. Loosveld R. (in revision) Evolution of fault zones in carbonates with mechanical stratigraphy – insights from scale models using layered cohesive powder. Journal of Structural Geology: Special publication
Holland M. Urai J. L. Martel S. (2006) The internal structure of fault zones in basaltic sequences. Earth and Planetary Science Letters 248 (1-2): 301
van Gent H. W. Holland M. Urai J. L. Loosveld R. (2006) The Internal Structure of Fault Zones in Carbonates Deformed at Shallow Crustal Level - Evidence From Scaled Physical Models Using Cohesive Powder. Eos Trans. AGU 87 (52): Fall Meet. Suppl., Abstract T23D-0531
van Gent H. W. Holland M. Urai J. L. Loosveld R. J. H. (2005) Scaled Analogue Models of the Evolution of Normal Fault Systems in Carbonates. European Geosciences Union General Assembly, Vienna. Geophysical Research Abstracts, 7, pp. 401.

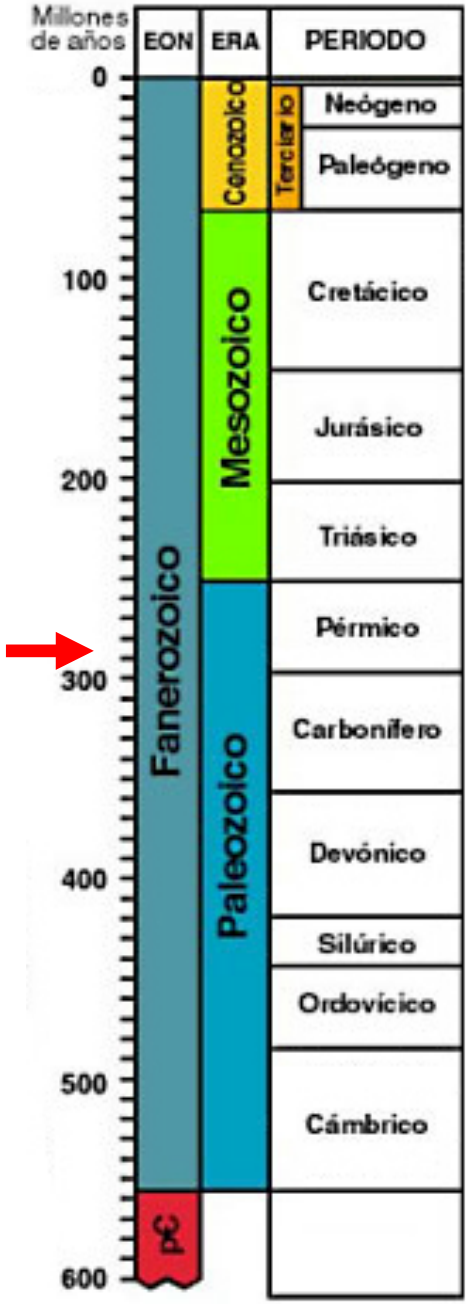
contact: h.vangent@ged.rwth-aachen.de web: www.ged.rwth-aachen.de



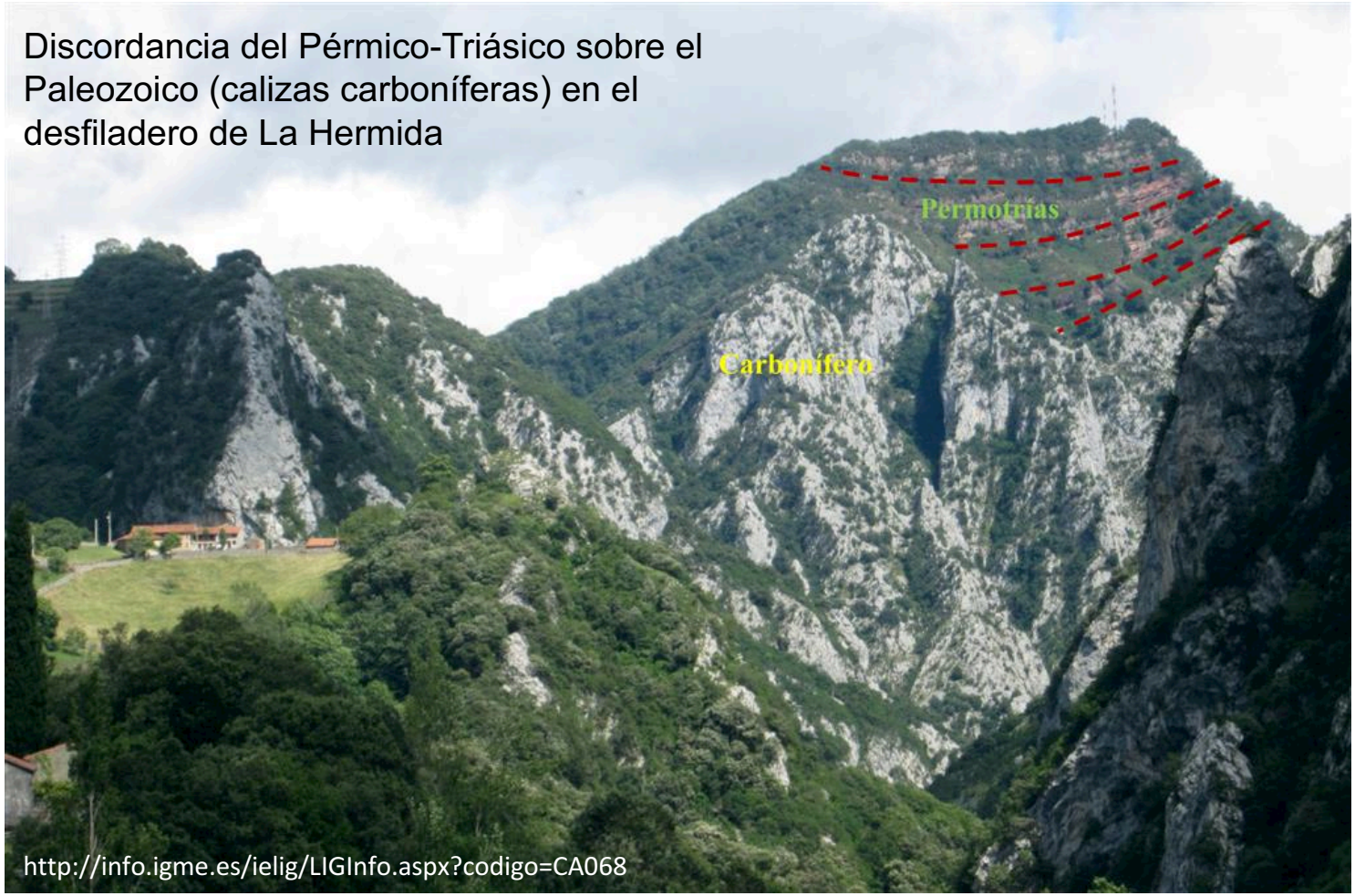
La distensión Pérmica-Triásica: primeras fracturas en Pangea y formación de cuencas estrechas y profundas.

Discordancia del Pérmico sobre el Paleozoico (calizas carboníferas) en el Sueve

Alonso et al. (2009)

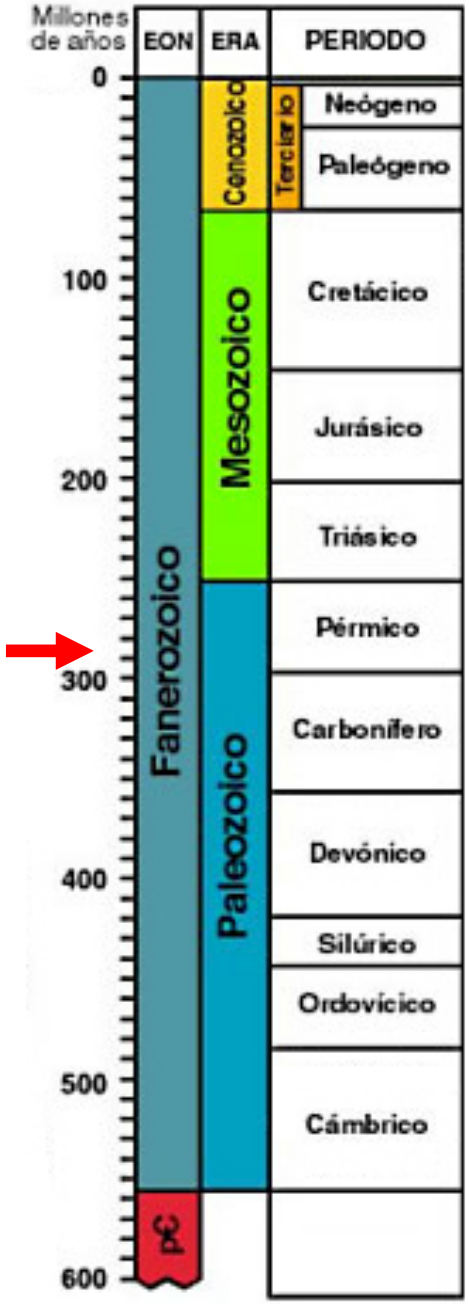


La distensión Pérmica-Triásica: primeras fracturas en Pangea y formación de cuencas estrechas y profundas.



Discordancia del Pérmico-Triásico sobre el Paleozoico (calizas carboníferas) en el desfiladero de La Hermida

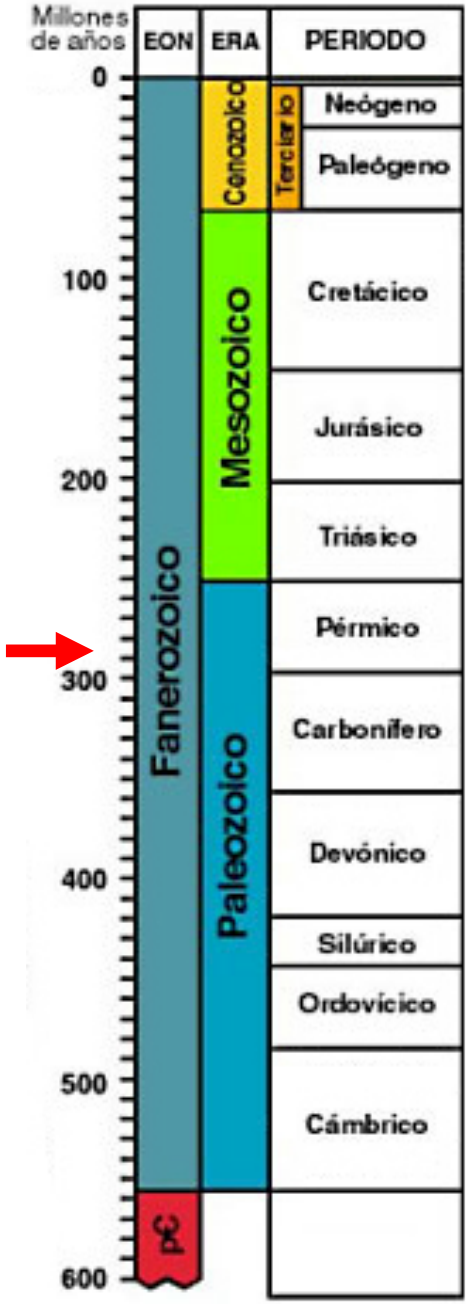
http://info.igme.es/ielig/LIGInfo.aspx?codigo=CA068



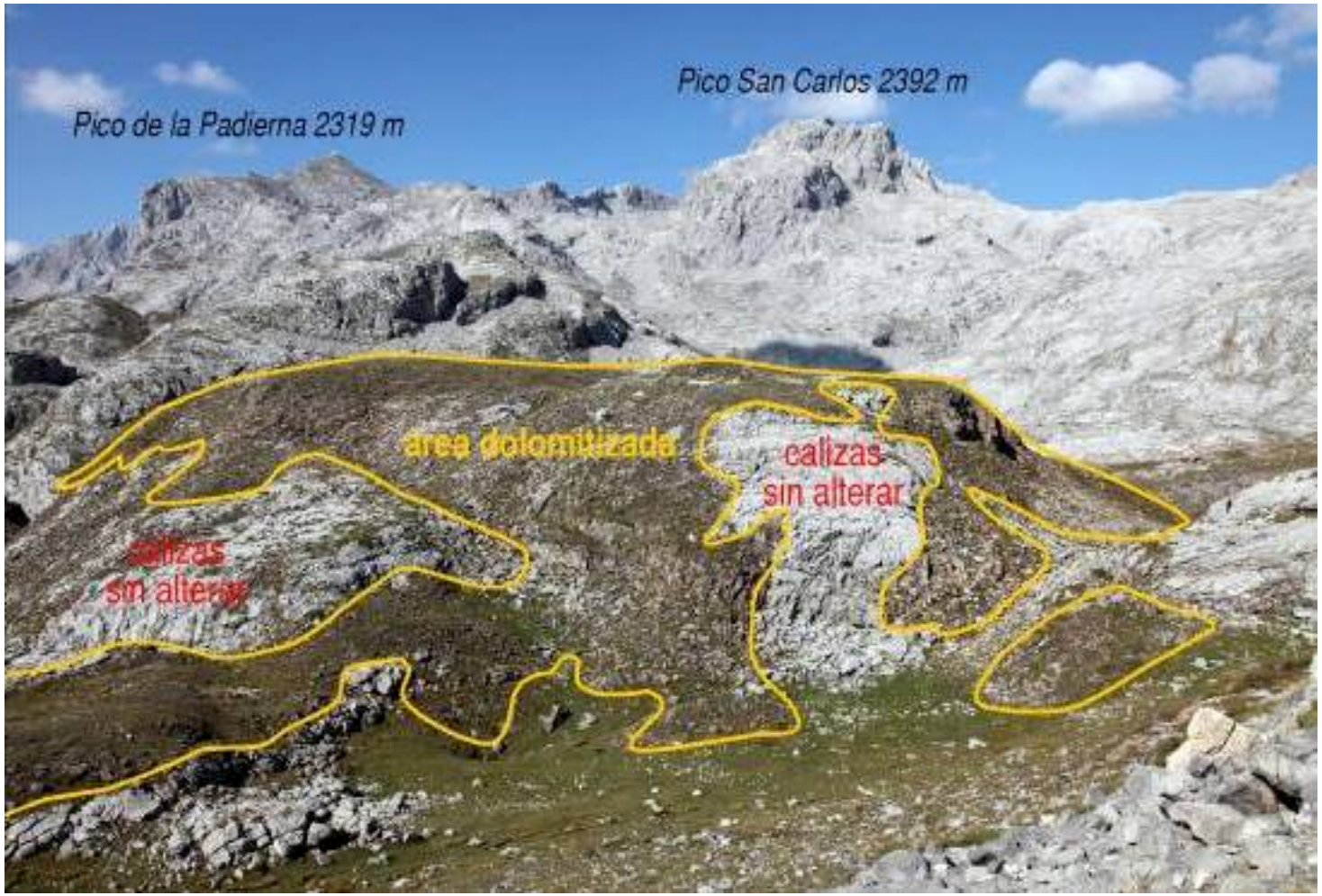
La distensión Pérmica-Triásica: primeras fracturas en Pangea y formación de cuencas estrechas y profundas.

Dolomitización secundaria de calizas (Barrios de Luna)

Farias et al. (2009)

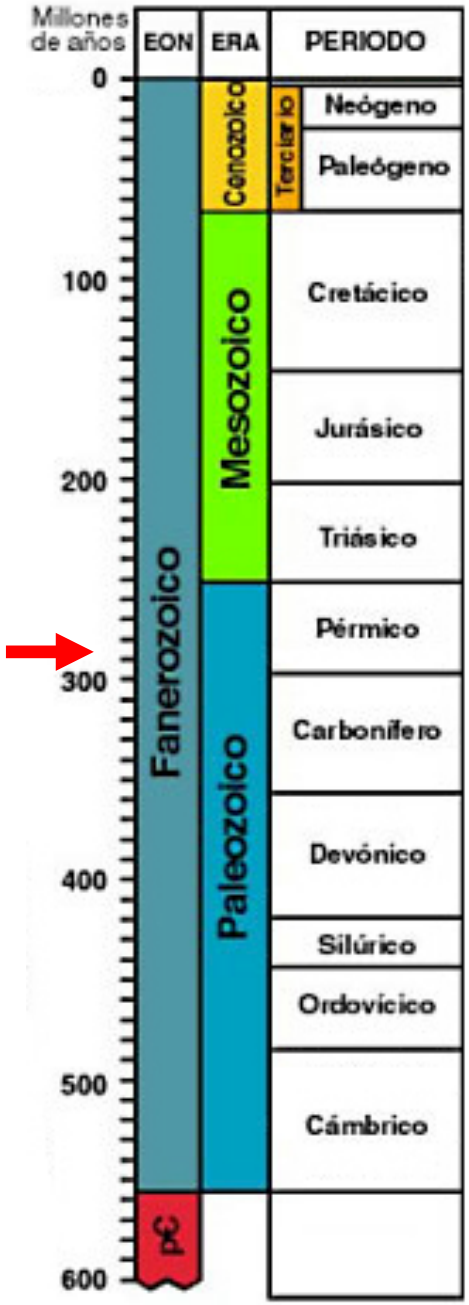


La distensión Pérmica-Triásica: primeras fracturas en Pangea y formación de cuencas estrechas y profundas.

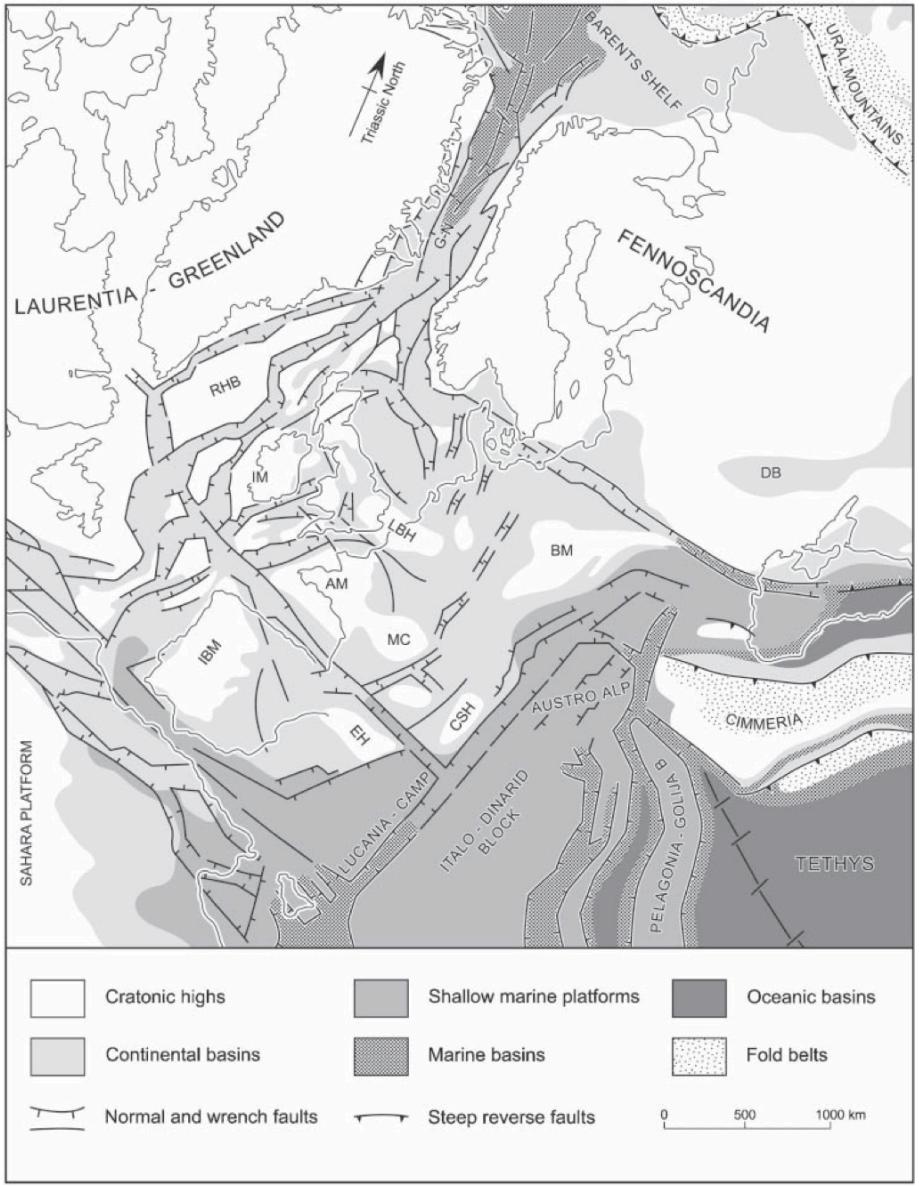


Dolomitización secundaria de calizas (Picos de Europa)

Adrados et al. (2010)

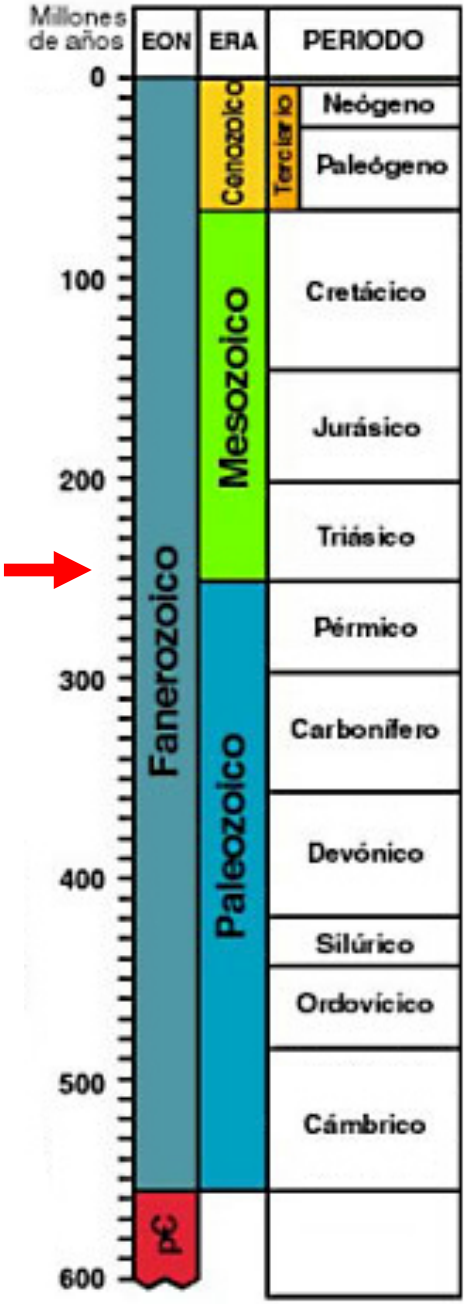


La distensión Pérmica-Triásica: primeras fracturas en Pangea y formación de cuencas estrechas y profundas.

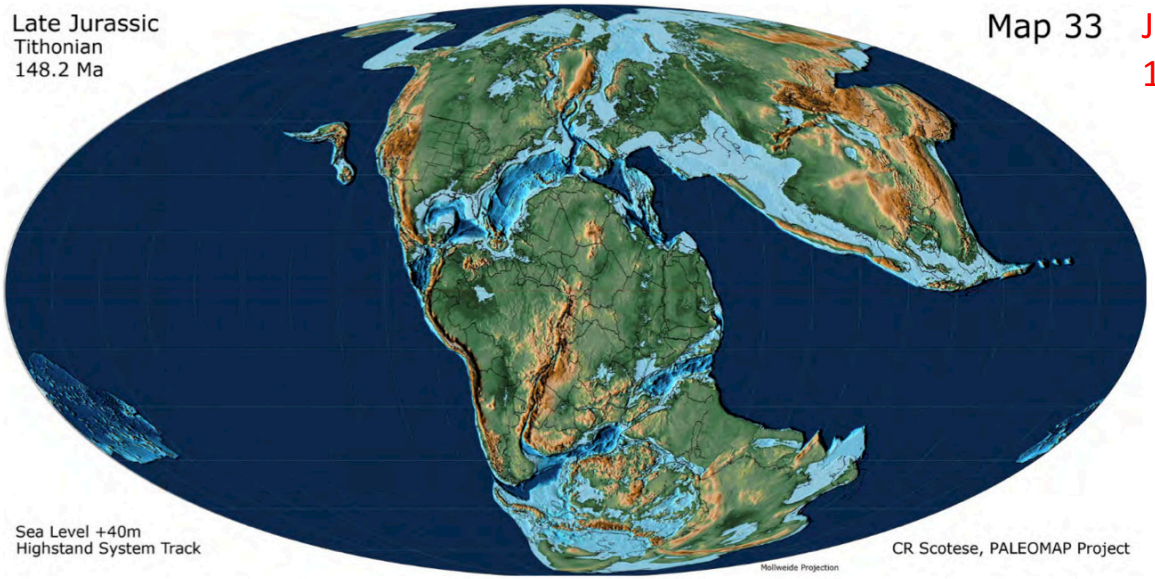


Cuencas continentales en el Triásico Inferior

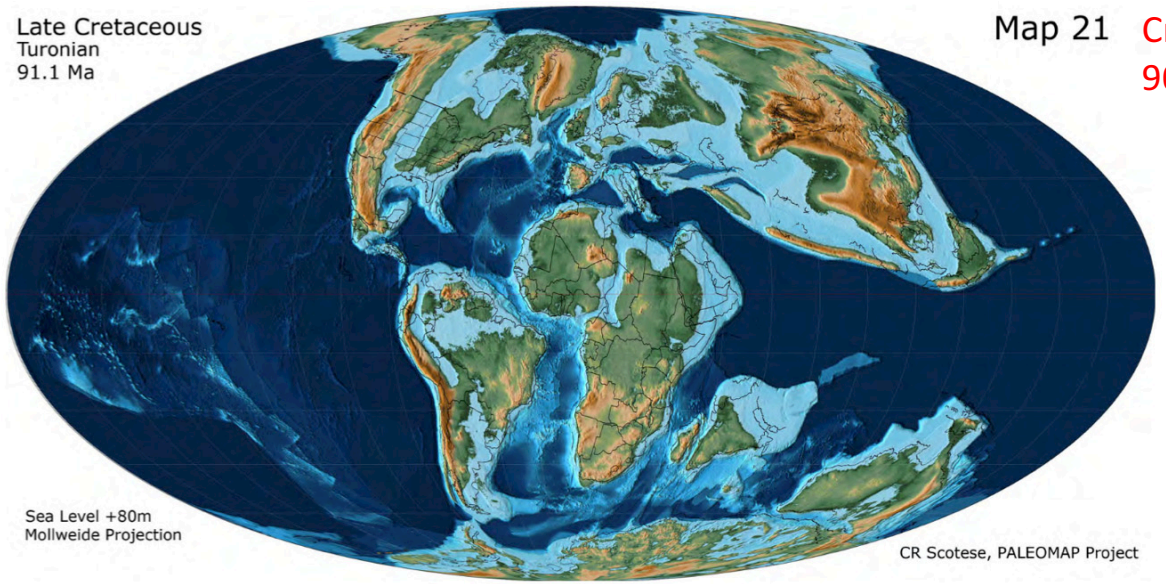
Hounslow & Riffell (2006)



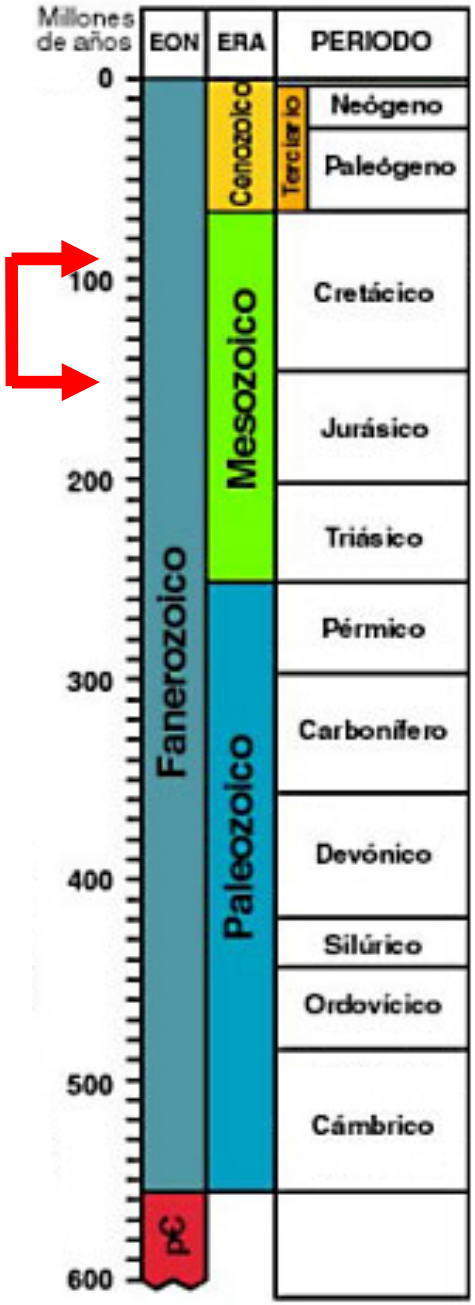
La extensión Jurásica-Cretácica: apertura del Atlántico y del Golfo de Vizcaya



Map 33 Jurásico Superior 148 Ma

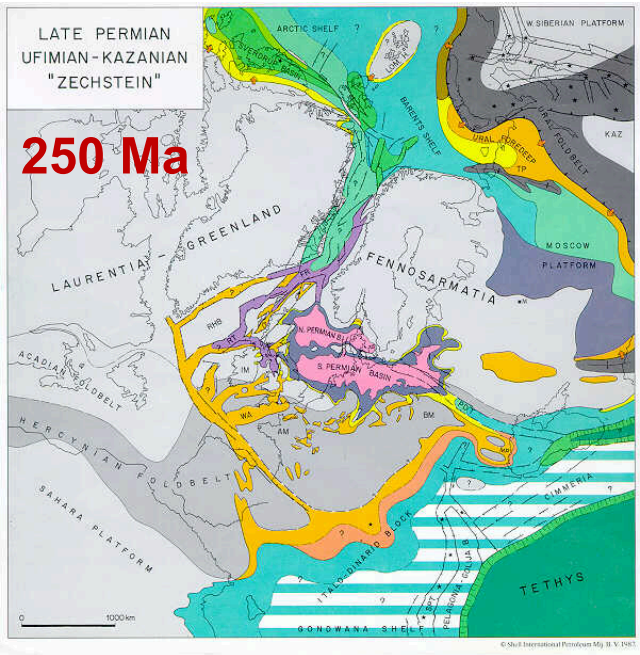


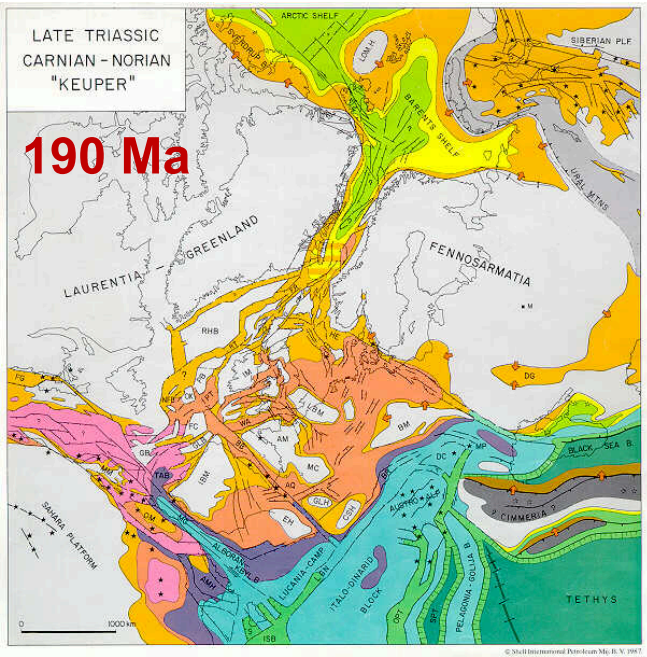
Map 21 Cretácico Superior 90 Ma

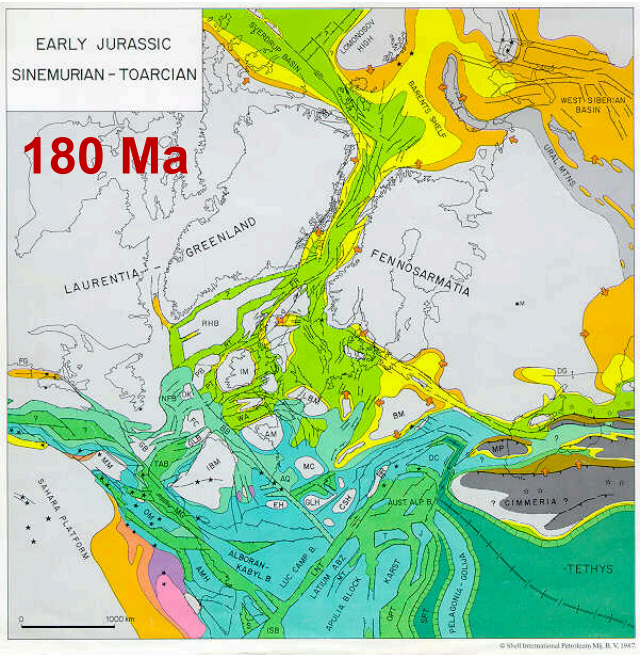


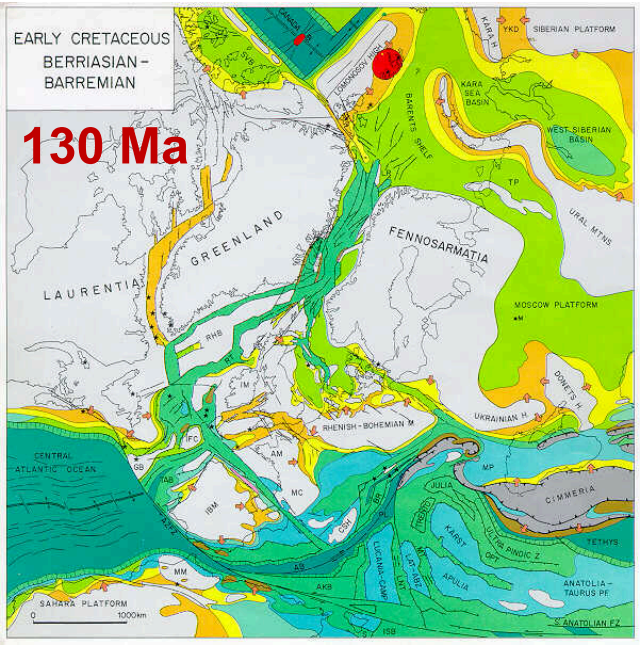
Scotese (2014a,b)

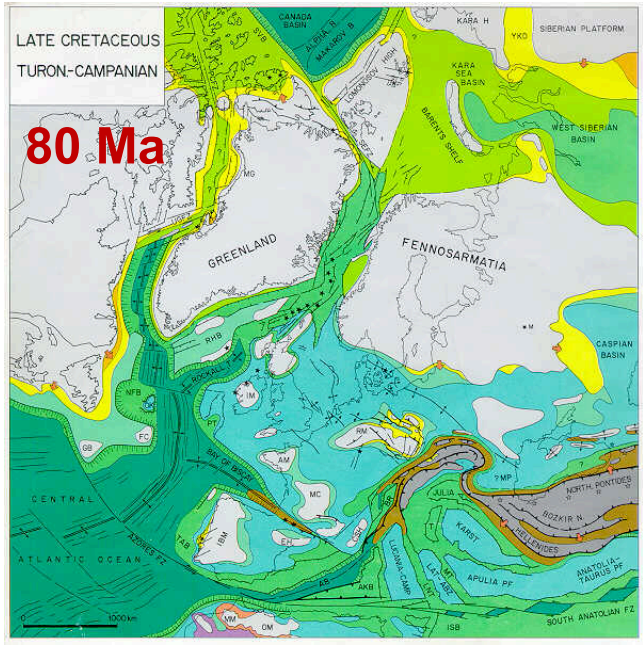
2. Etapa extensional Mesozoica: El desmembramiento de Pangea

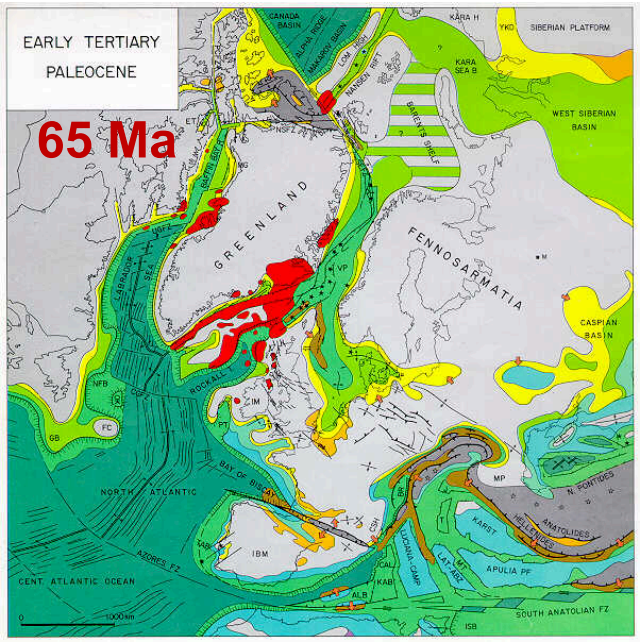






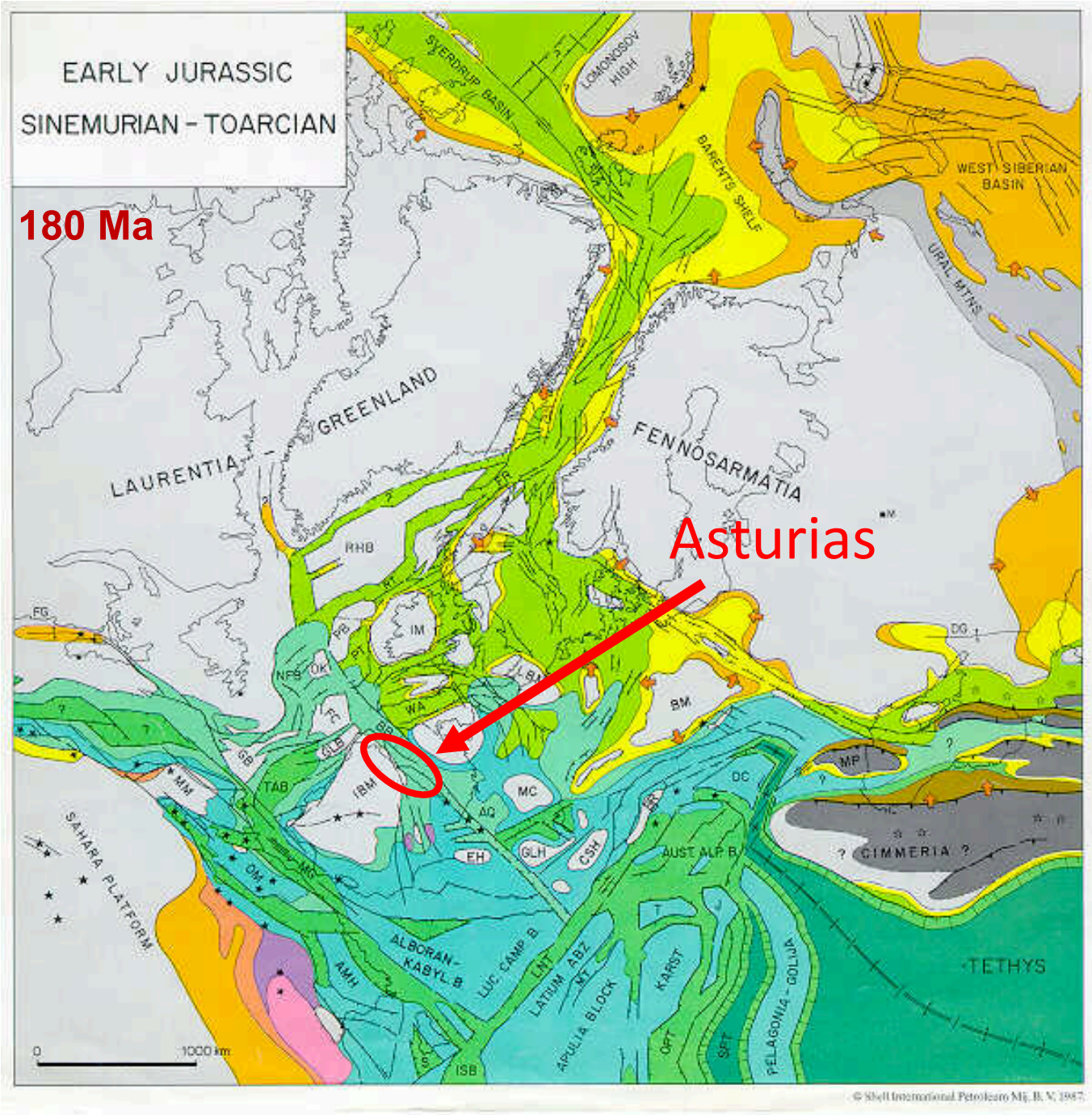


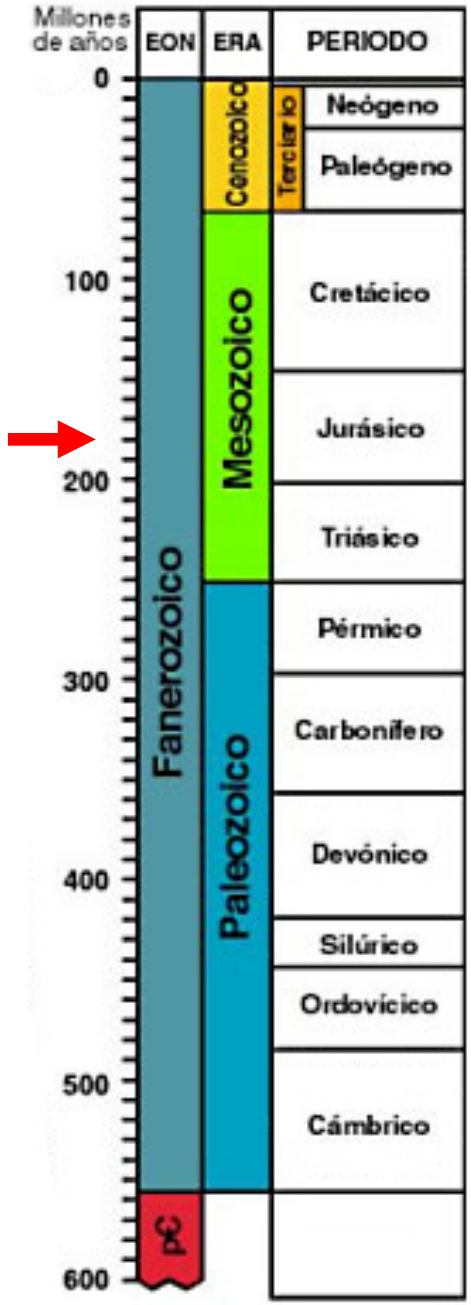




Ziegler (1999)

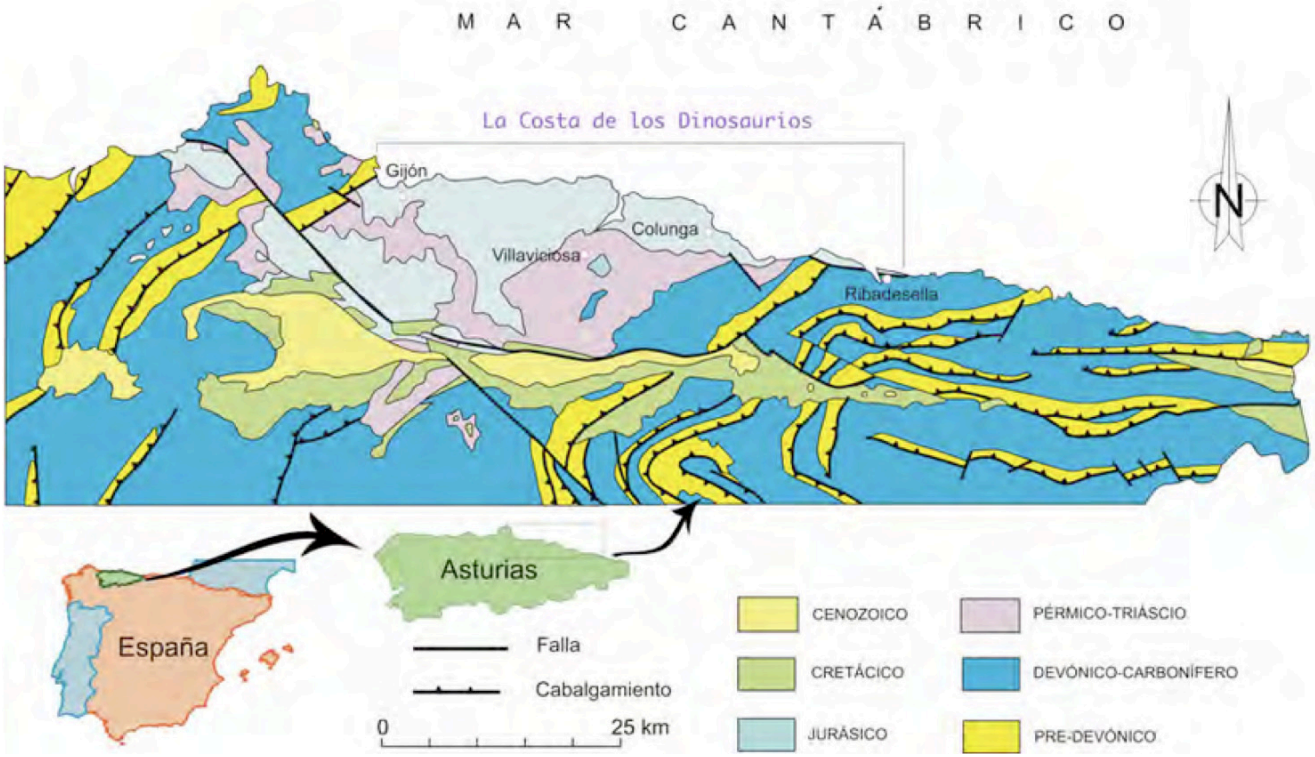
2. Etapa extensional Mesozoica: El desmembramiento de Pangea





Ziegler (1999)

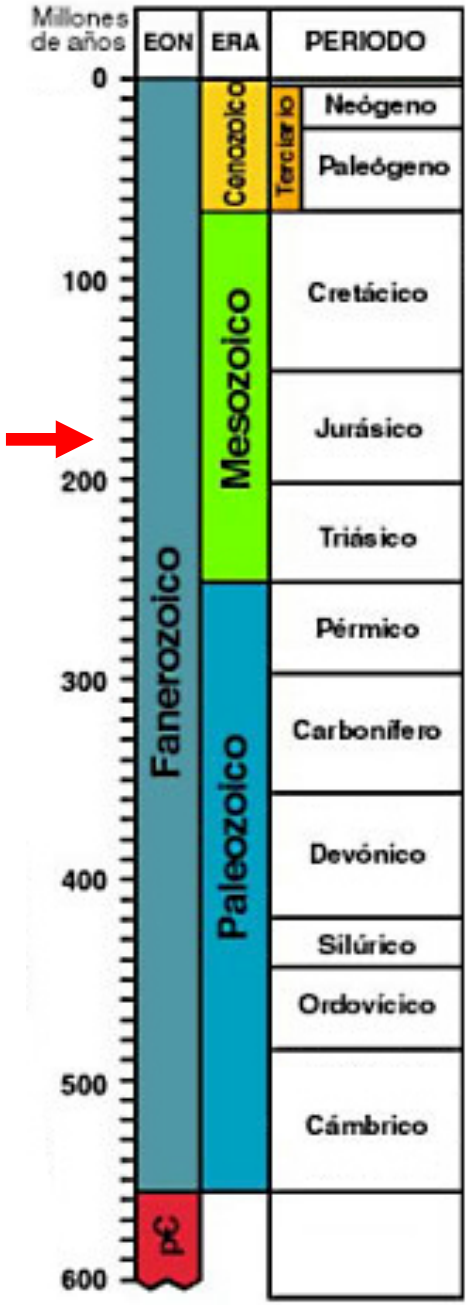
2. Etapa extensional Mesozoica: El desmembramiento de Pangea



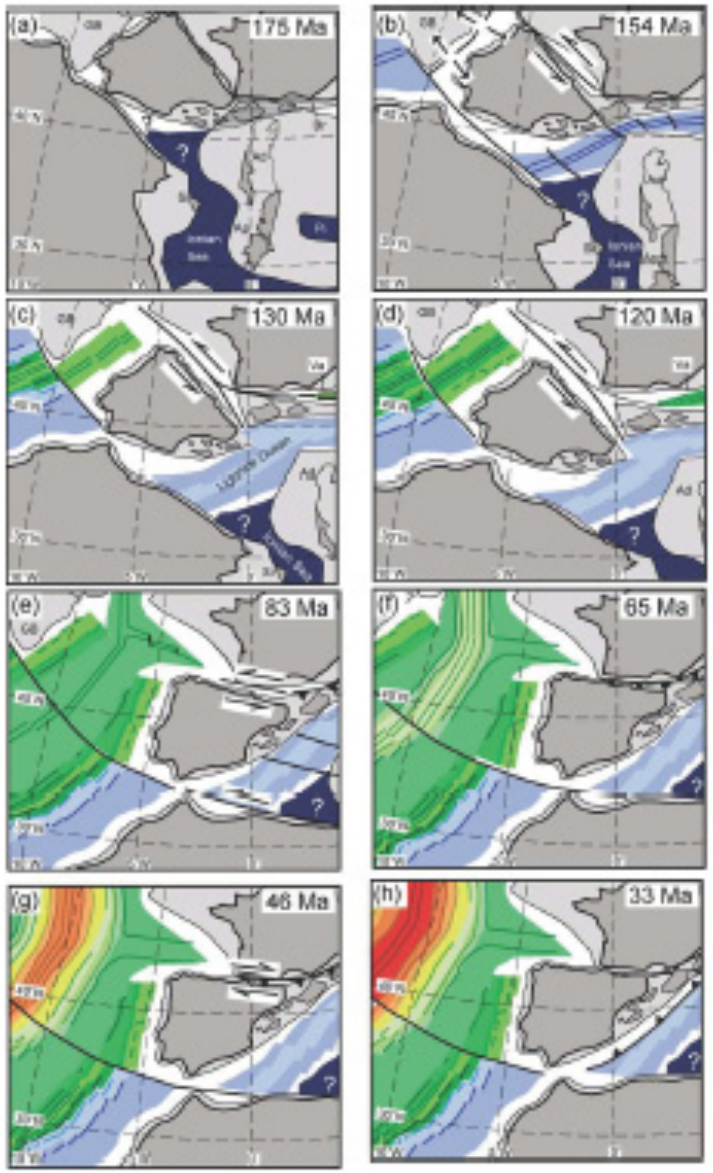
García-Ramos et al. (2008); García Ortiz de Landaluce et al. (2009)

Playa de la Vega (Ribadesella)

Sedimentos marinos someros a continentales del Jurásico de Asturias



La rotación de la Placa Ibérica en el Cretácico, y la apertura del Golfo de Vizcaya



Jurásico

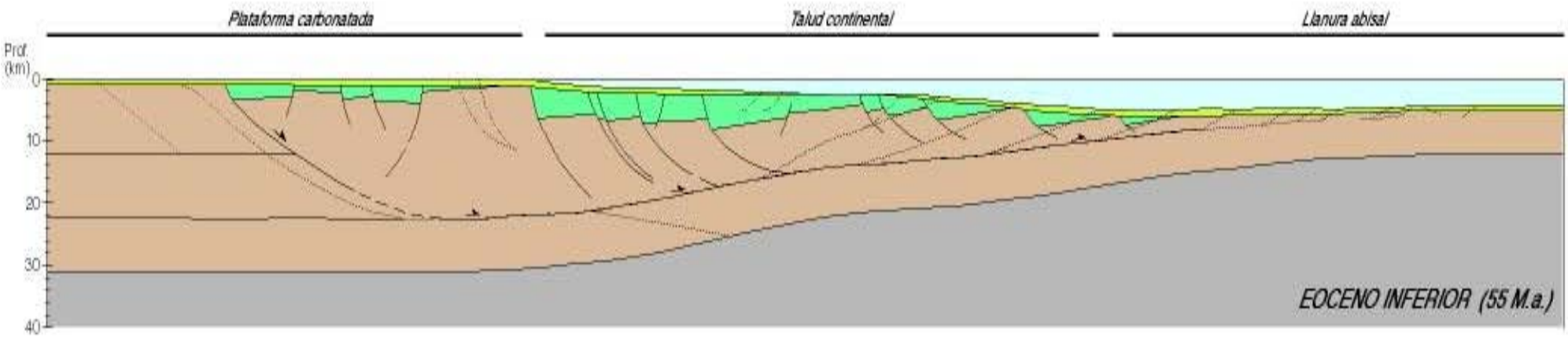
Cretácico Inferior

Cretácico Superior

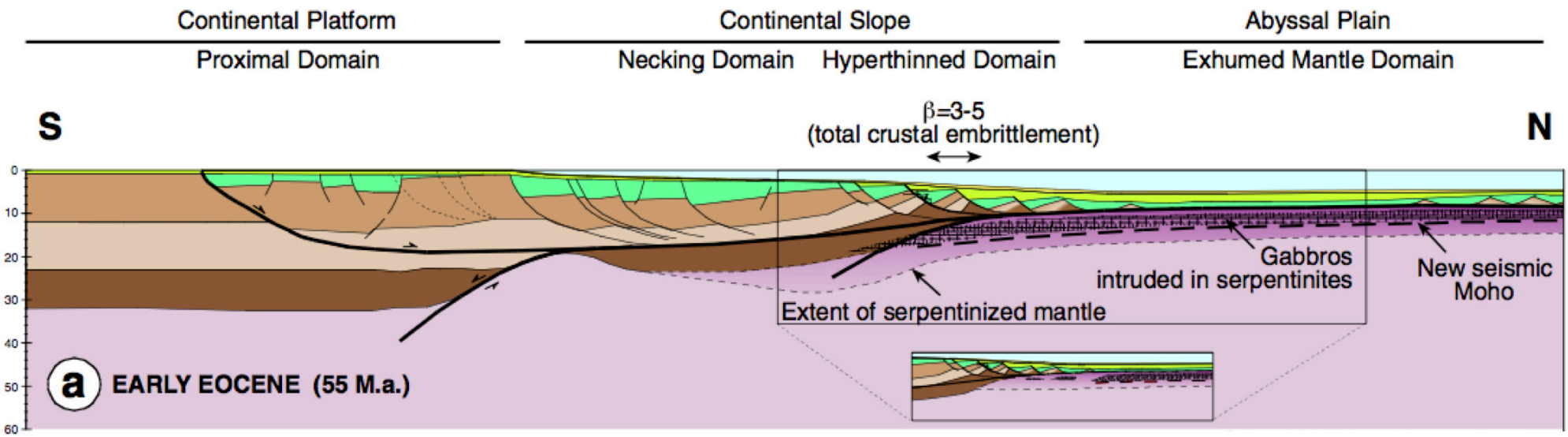
Eoceno

Rosenbaum et al. (2002)

La apertura del Golfo de Vizcaya: creación de un margen continental pasivo



Gallastegui (2000)

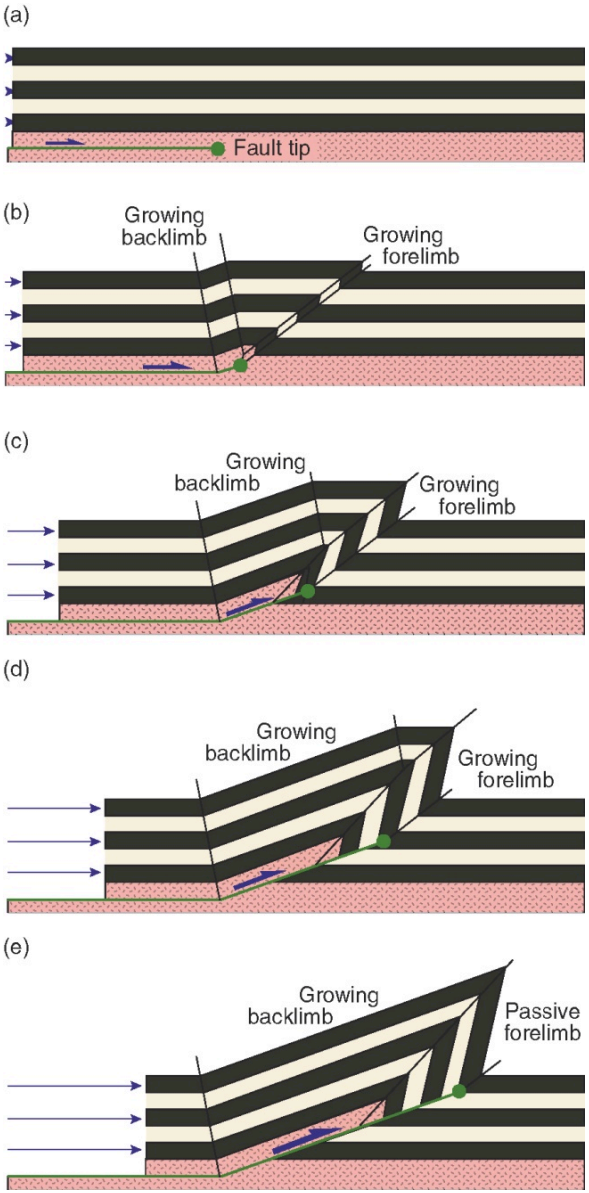


Pedreira et al. (2015)

3

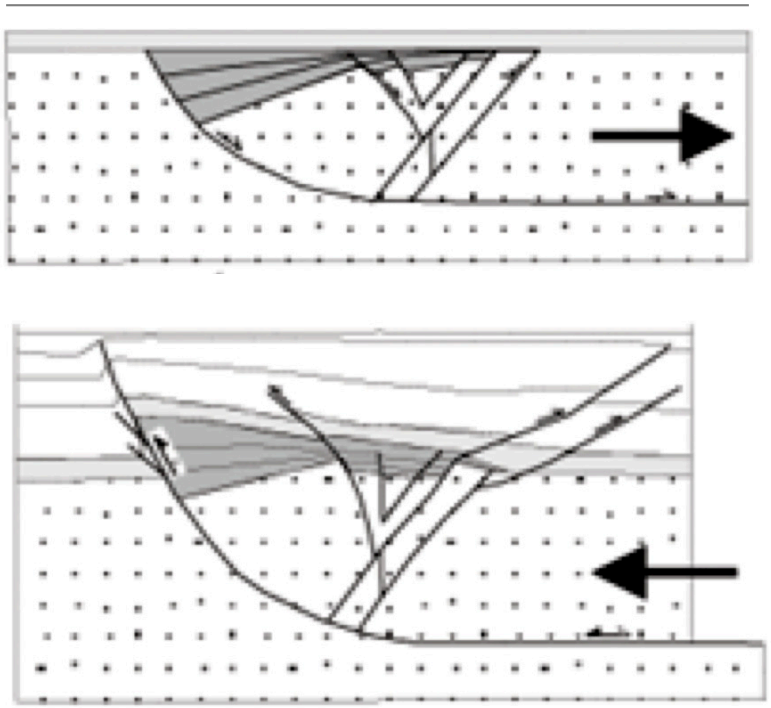
Etapa compresiva Cenozoica:
La orogenia Alpina

La compresión genera pliegues y cabalgamientos…



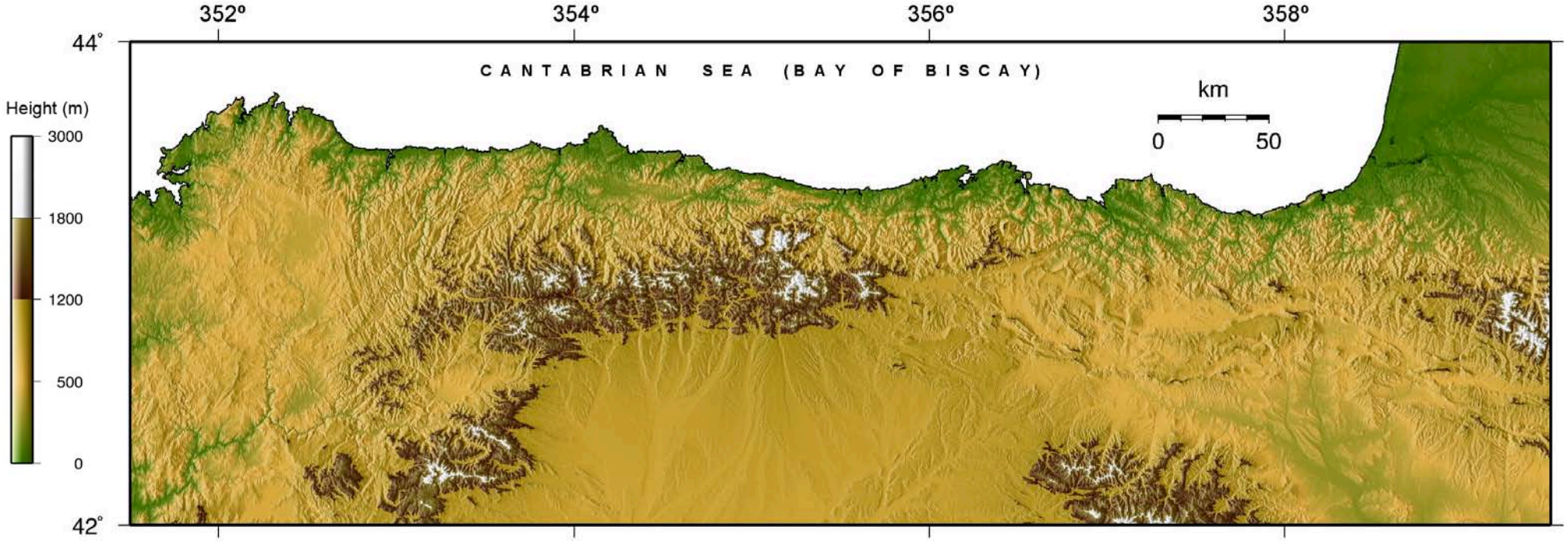
Fossen (2016)

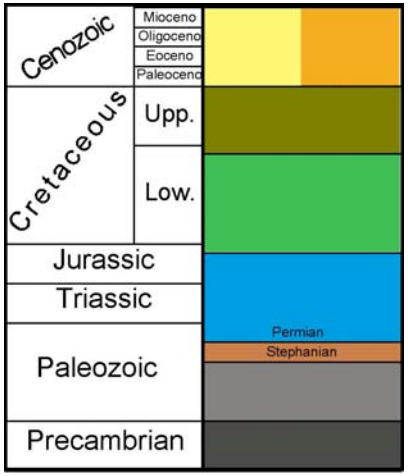
… y la inversión de las fallas normales previas

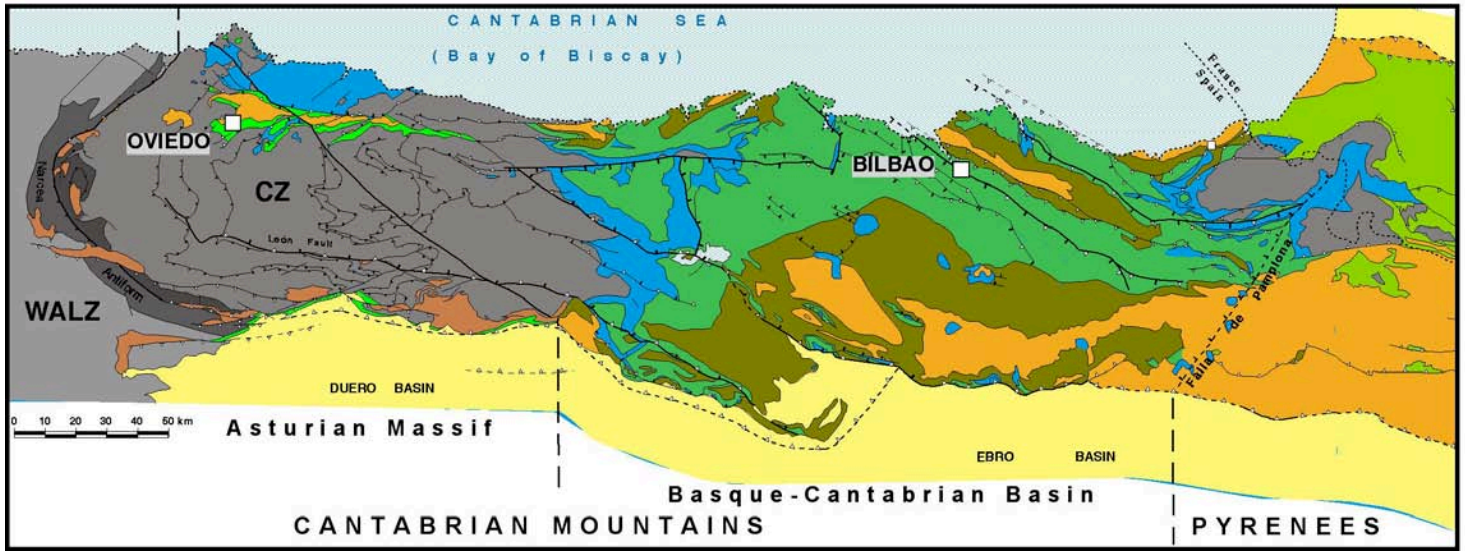


Modificado de Gomes et al. (2006)

3. Etapa compresiva Cenozoica: La orogenia Alpina

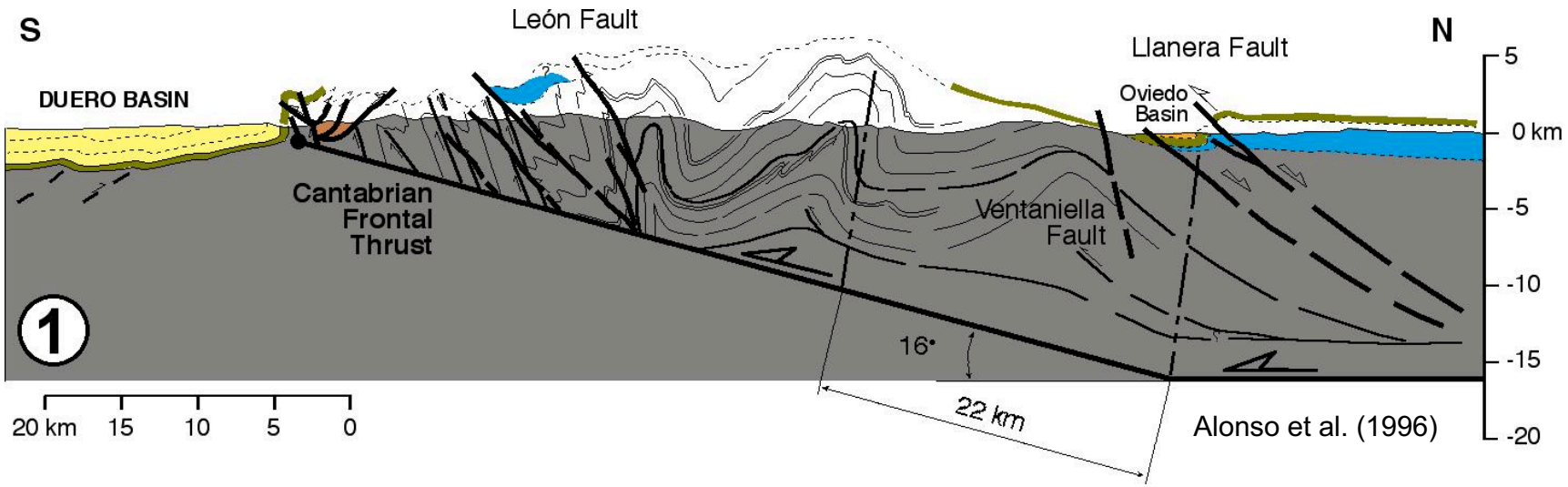




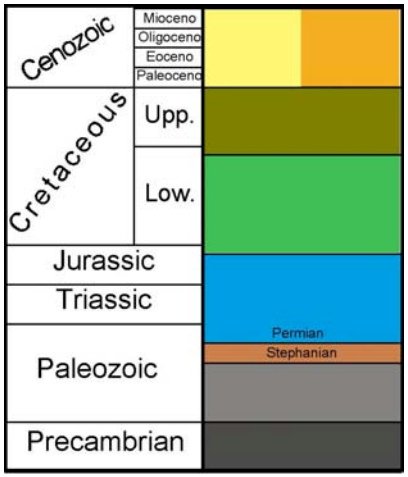


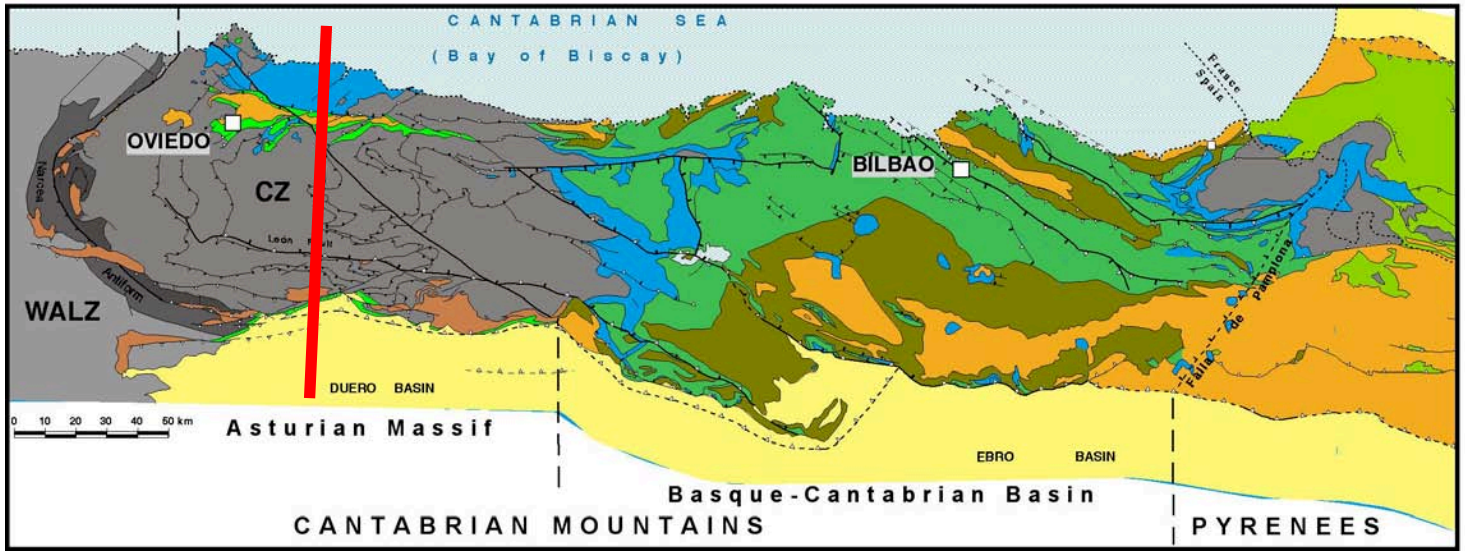
Alonso, Pulgar y Pedreira (2007). Síntesis de la región Vasco-Cantábrica según L. Quintana (inédito)

3. Etapa compresiva Cenozoica: La orogenia Alpina



Alonso et al. (1996)





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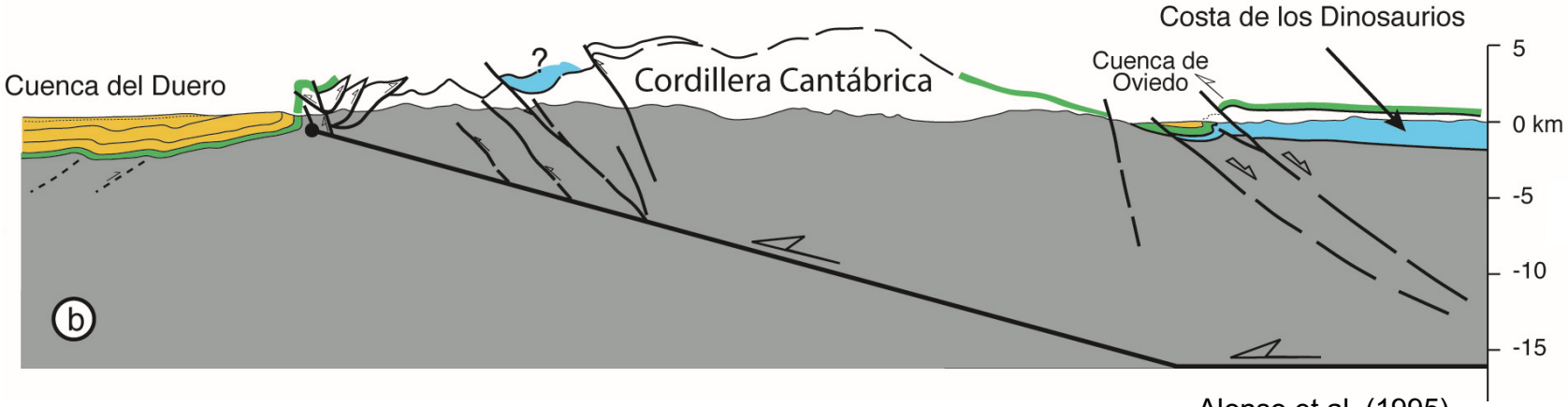
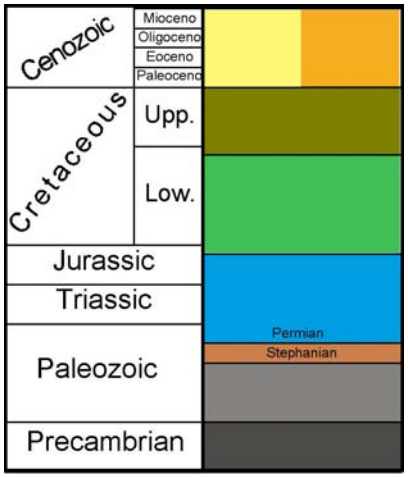
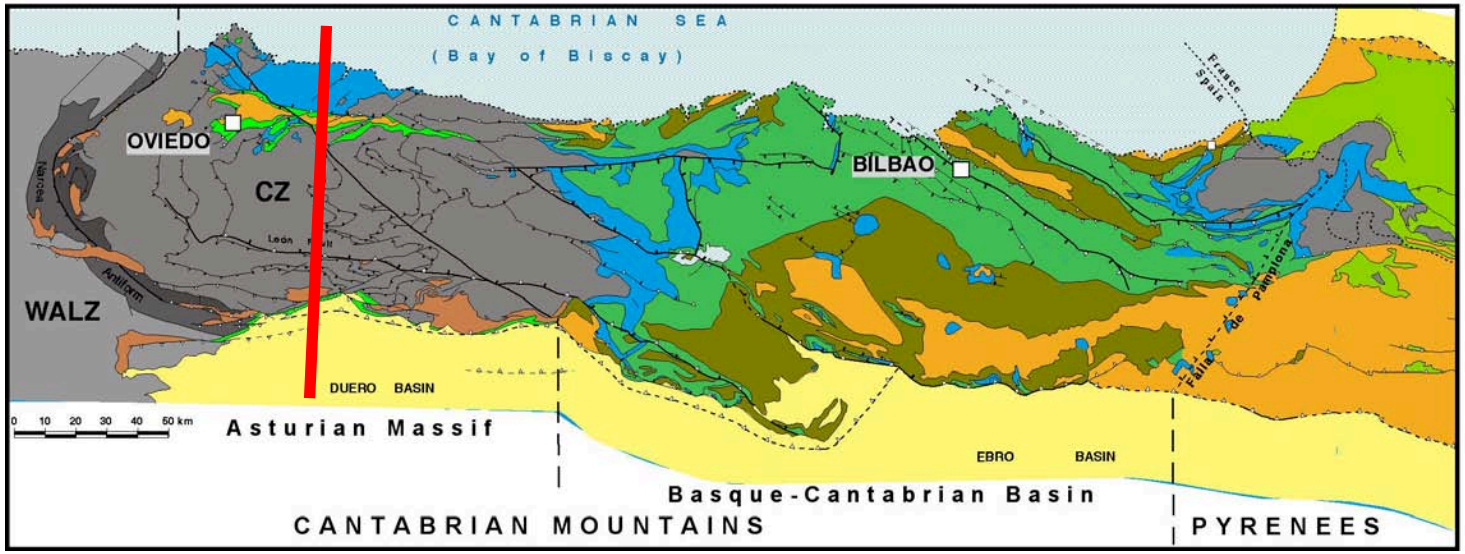
3. Etapa compresiva Cenozoica: La orogenia Alpina



Alonso et al. (1995)





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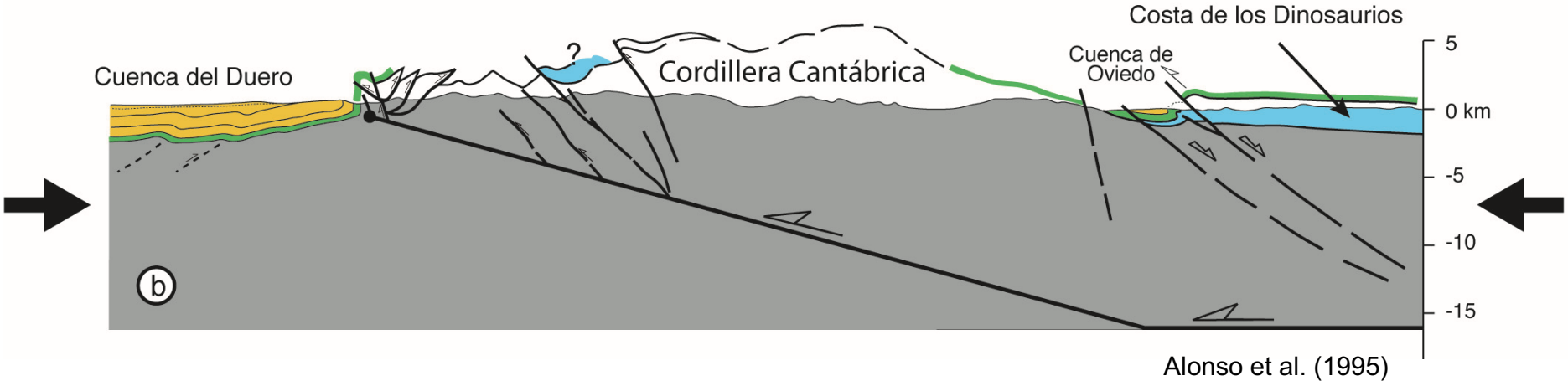
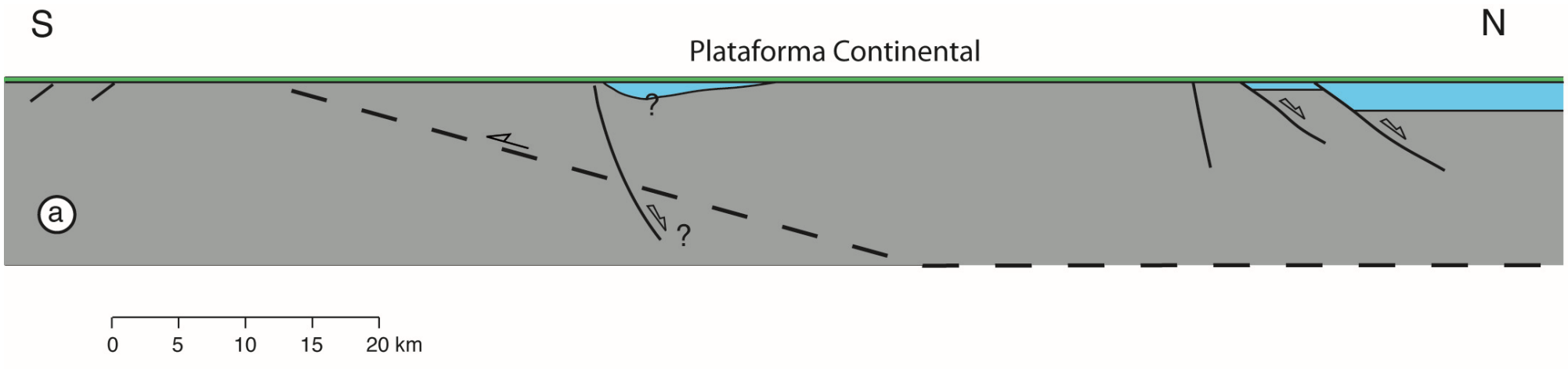
3. Etapa compresiva Cenozoica: La orogenia Alpina

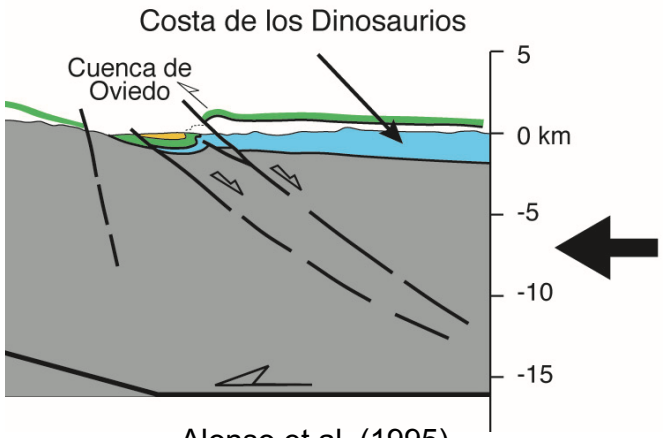


Alonso et al. (1995)

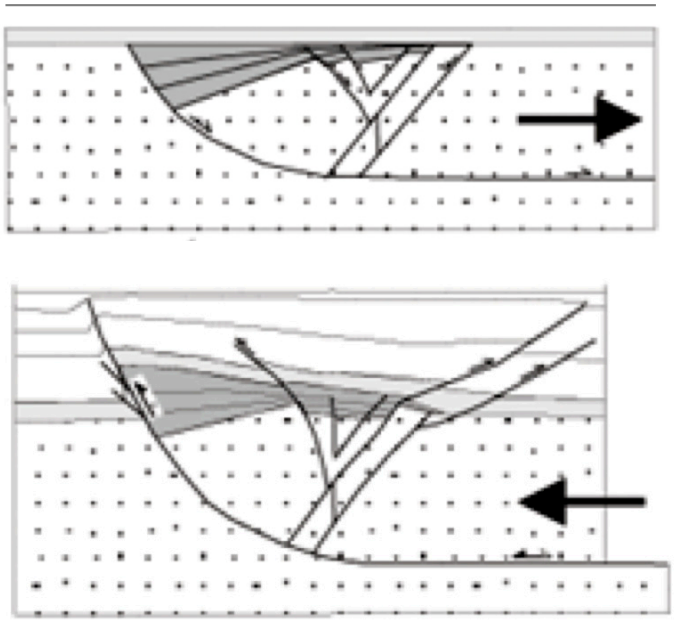


Falla de Llanera

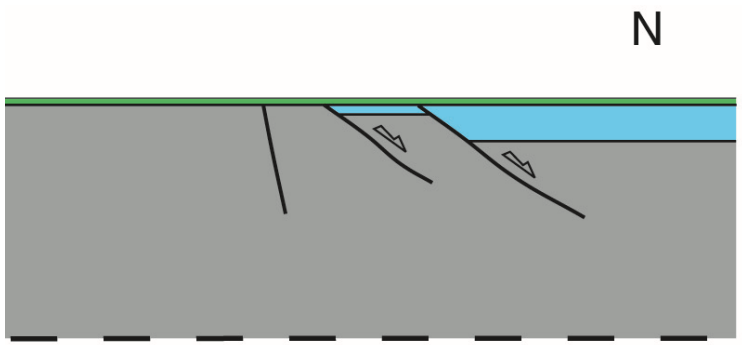
Alonso et al. (2009)



Alonso et al. (1995)



Modificado de Gomes et al. (2006)



3. Etapa compresiva Cenozoica: La orogenia Alpina

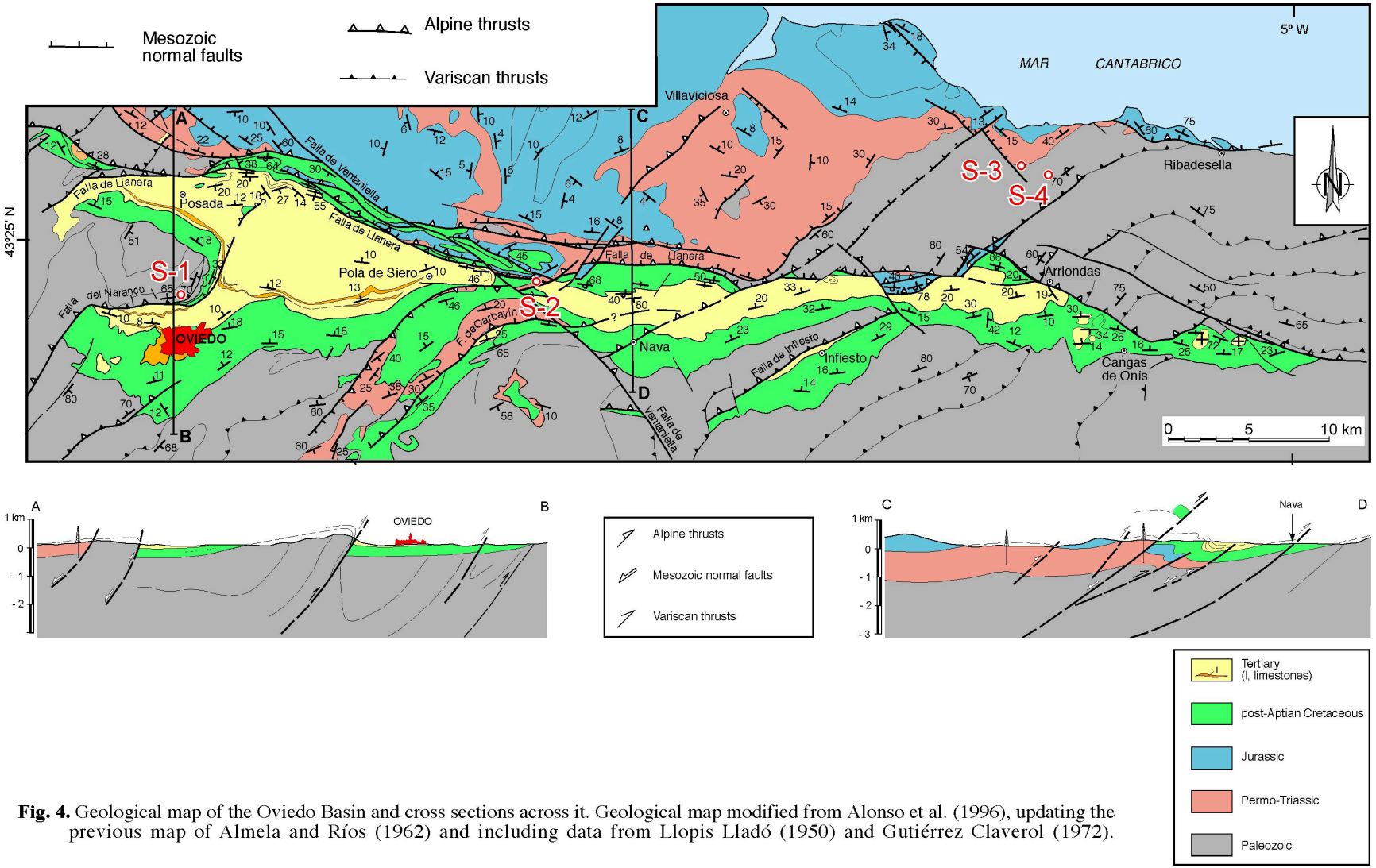
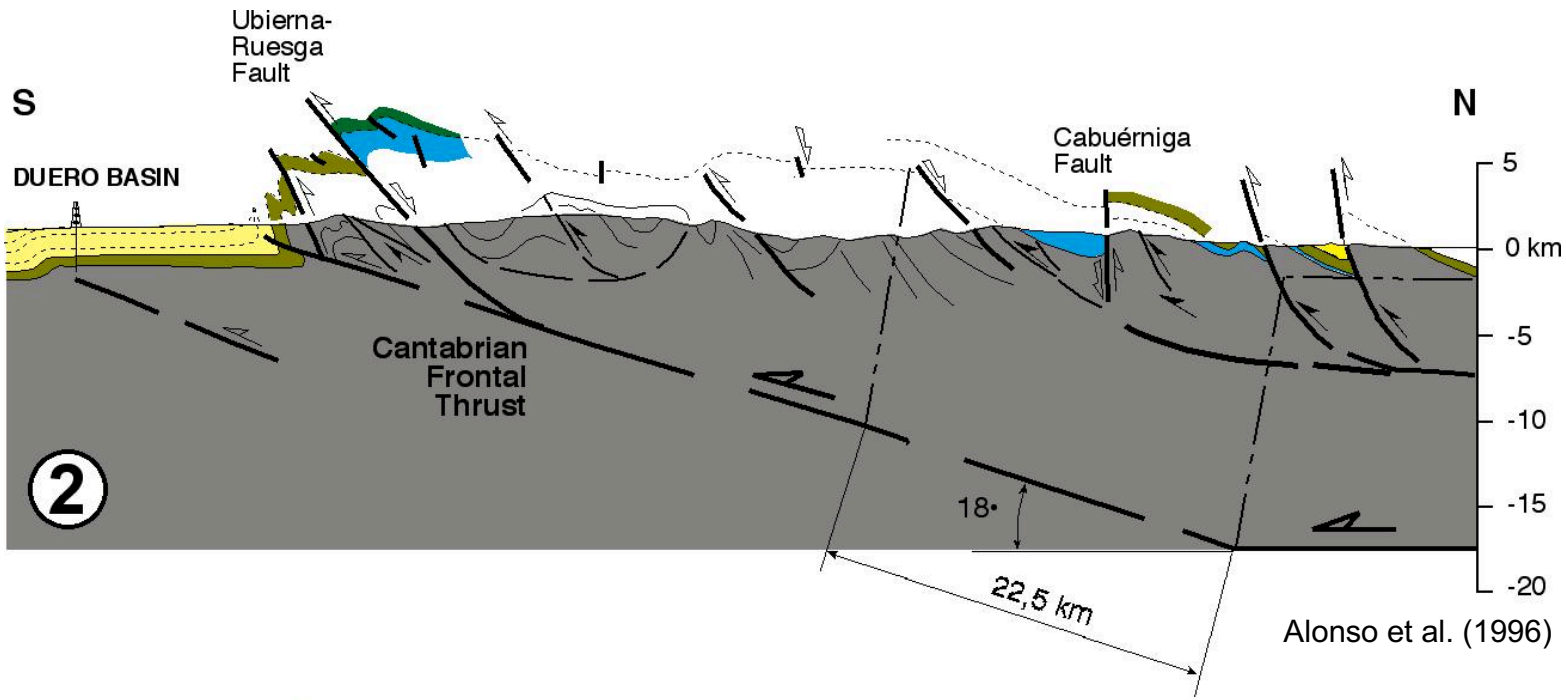


Fig. 4. Geological map of the Oviedo Basin and cross sections across it. Geological map modified from Alonso et al. (1996), updating the previous map of Almela and Ríos (1962) and including data from Llopis Lladó (1950) and Gutiérrez Claverol (1972).

Alonso et al. (2009)

3. Etapa compresiva Cenozoica: La orogenia Alpina



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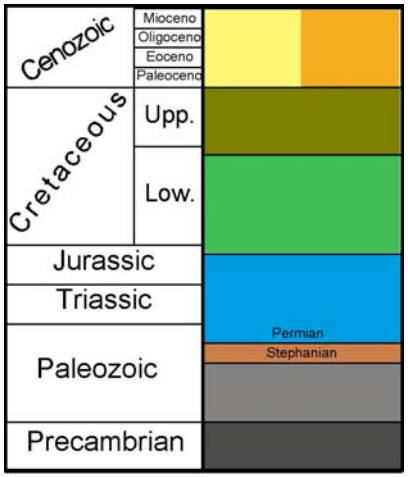
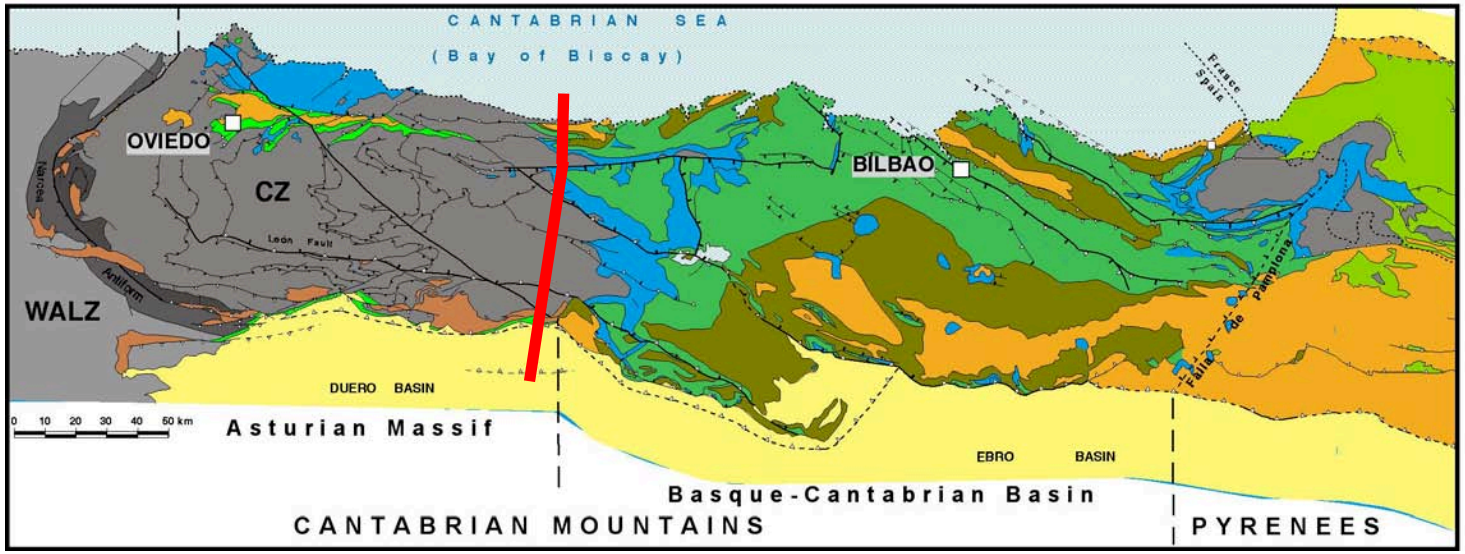
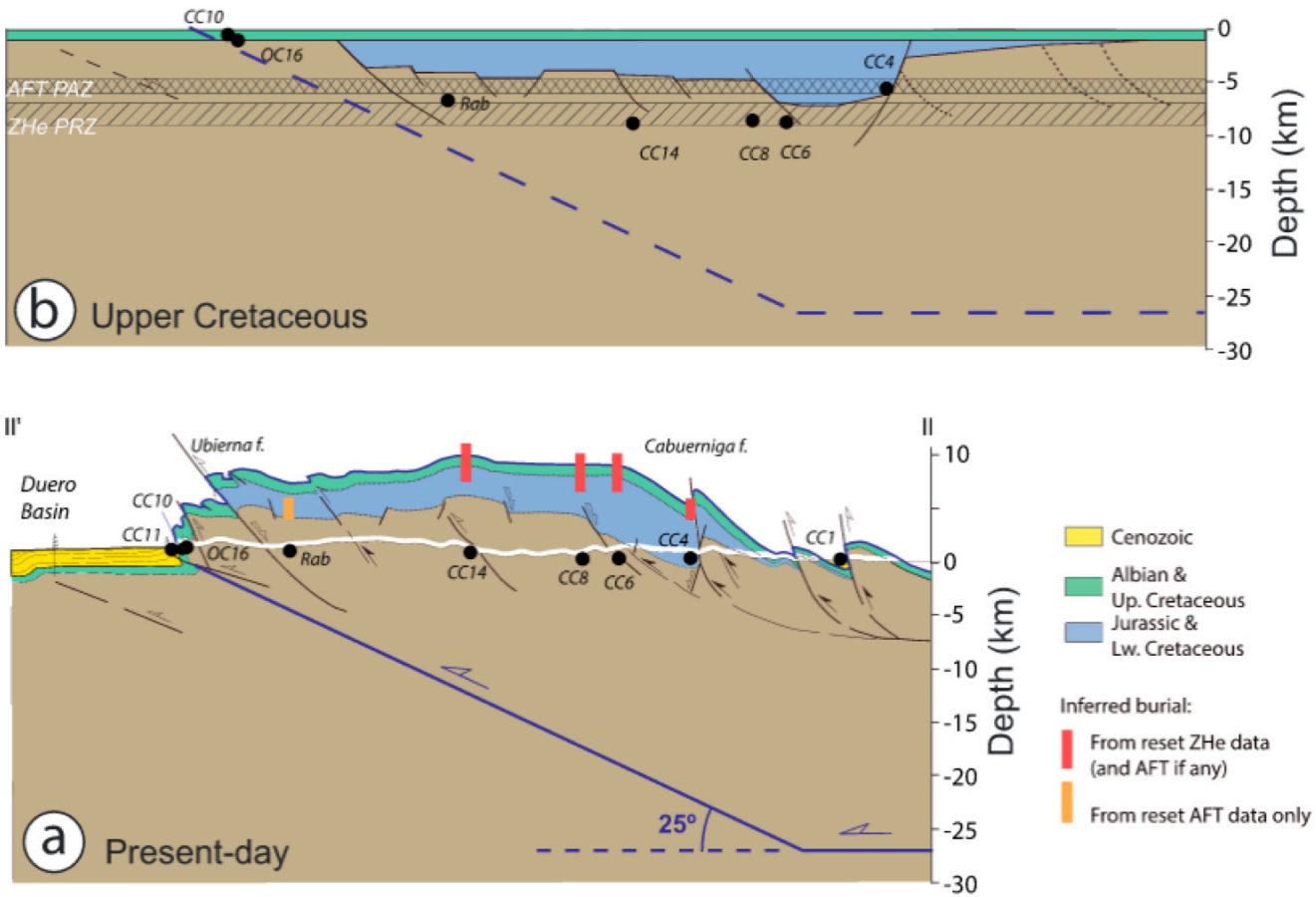
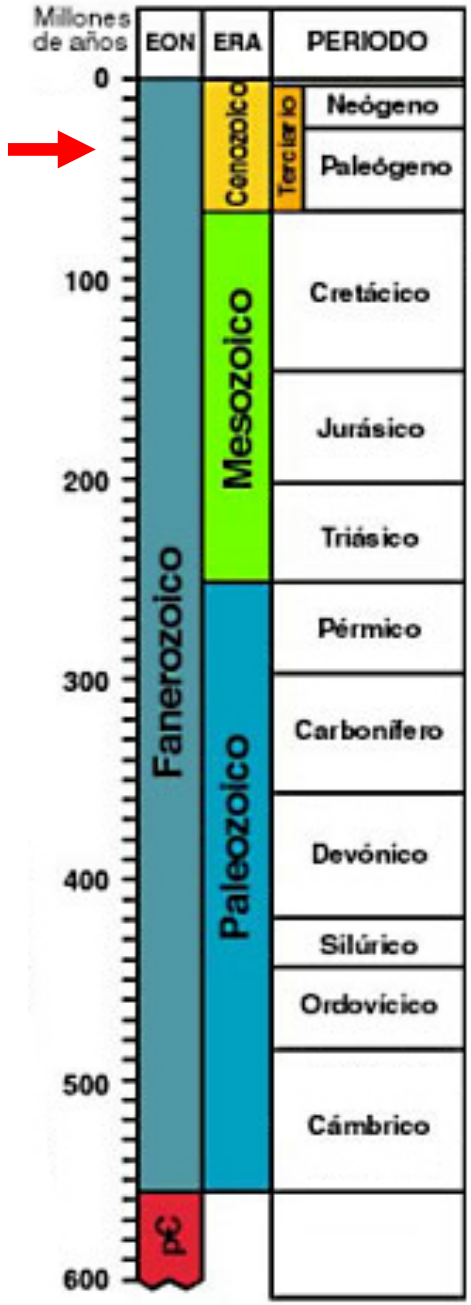




Alonso, Pulgar y Pedreira (2007). Síntesis de la región Vasco-Cantábrica según L. Quintana (inédito)

3. Etapa compresiva Cenozoica: La orogenia Alpina





Fillon et al. (2016)

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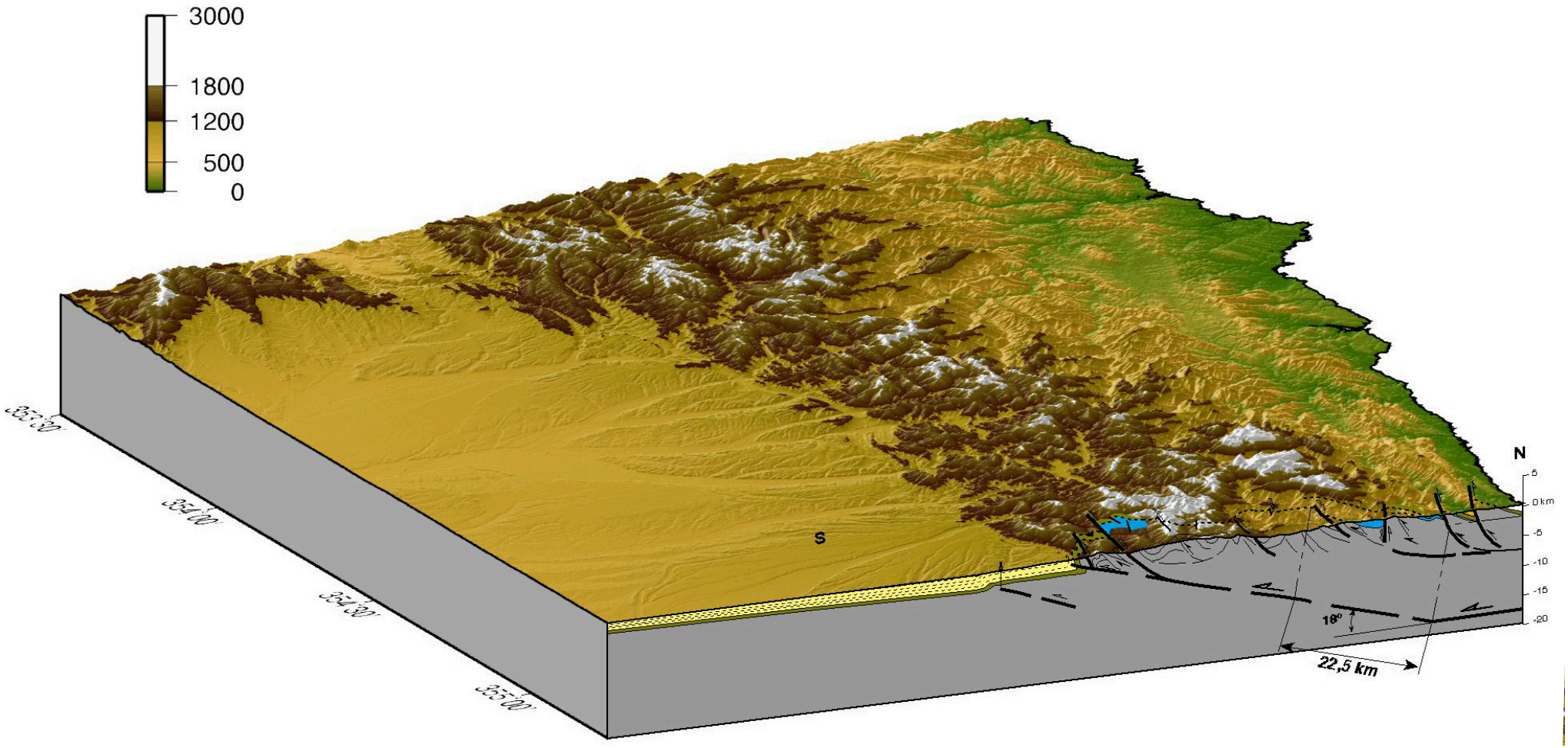
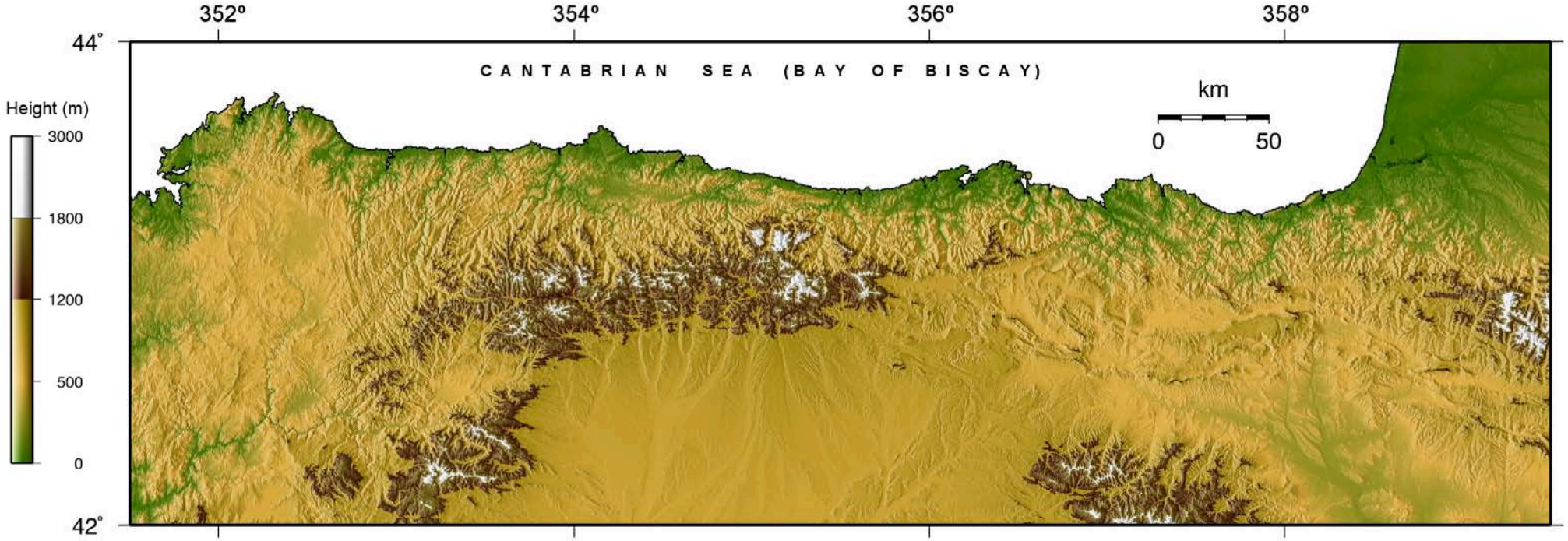
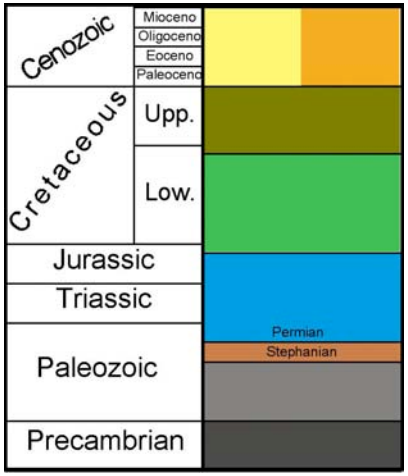
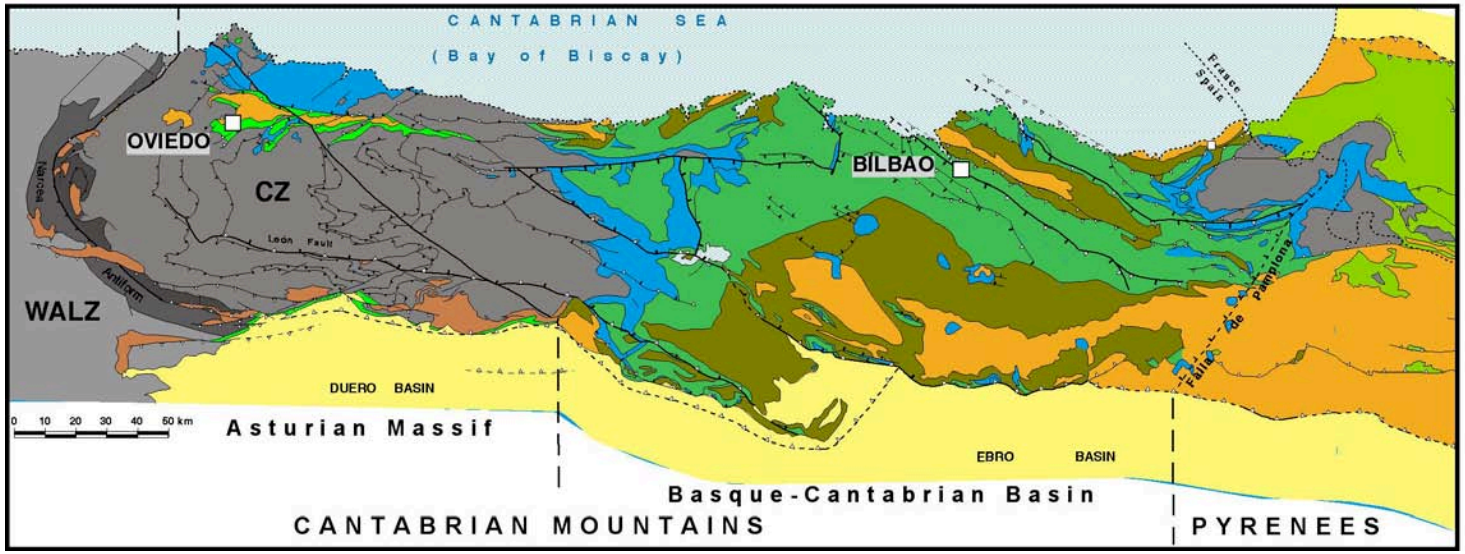


Alonso, Pulgar y Pedreira (2007)

3. Etapa compresiva Cenozoica: La orogenia Alpina







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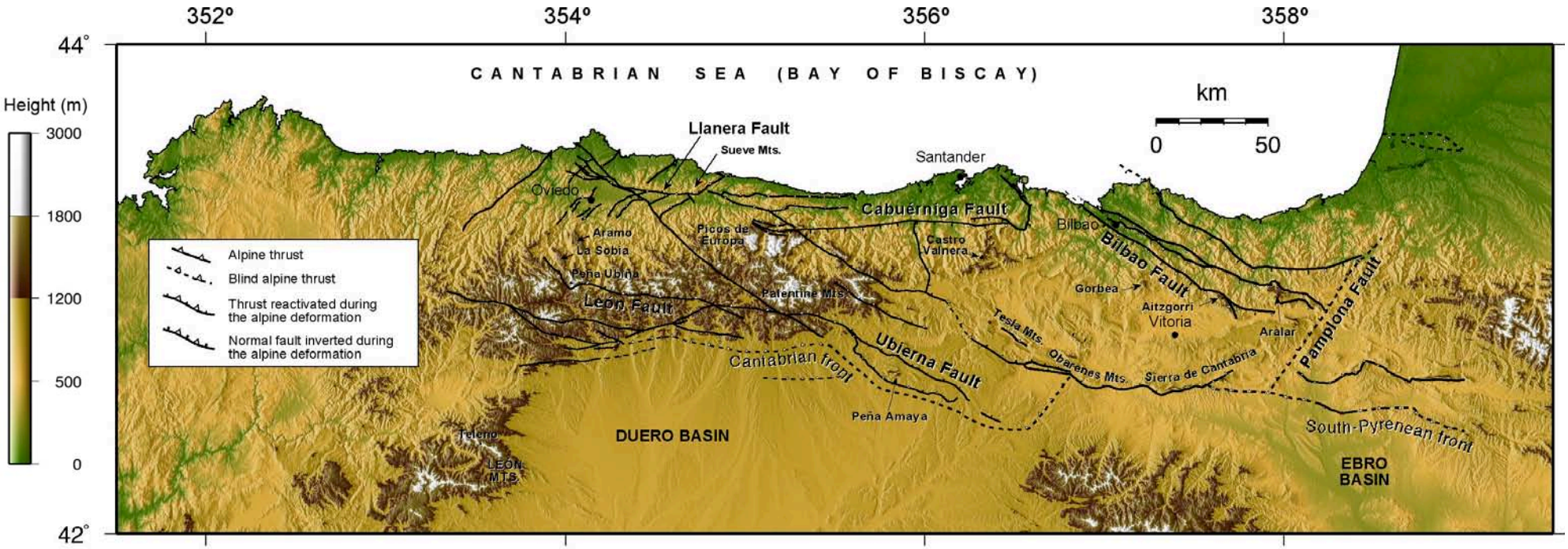

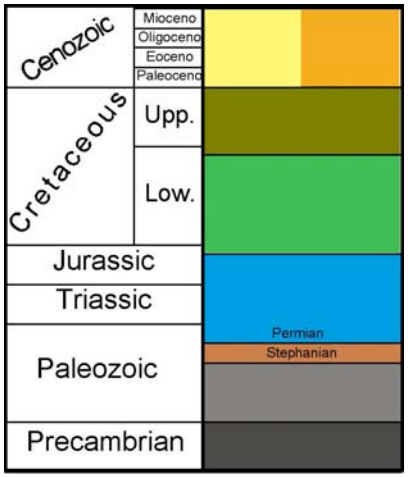

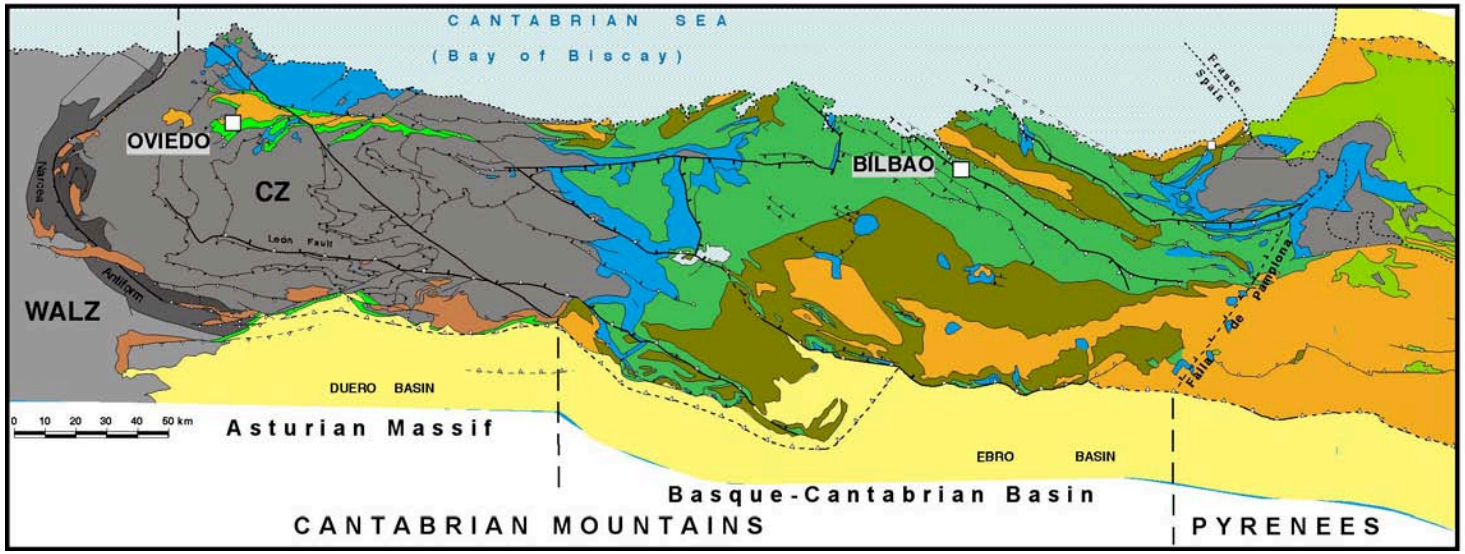

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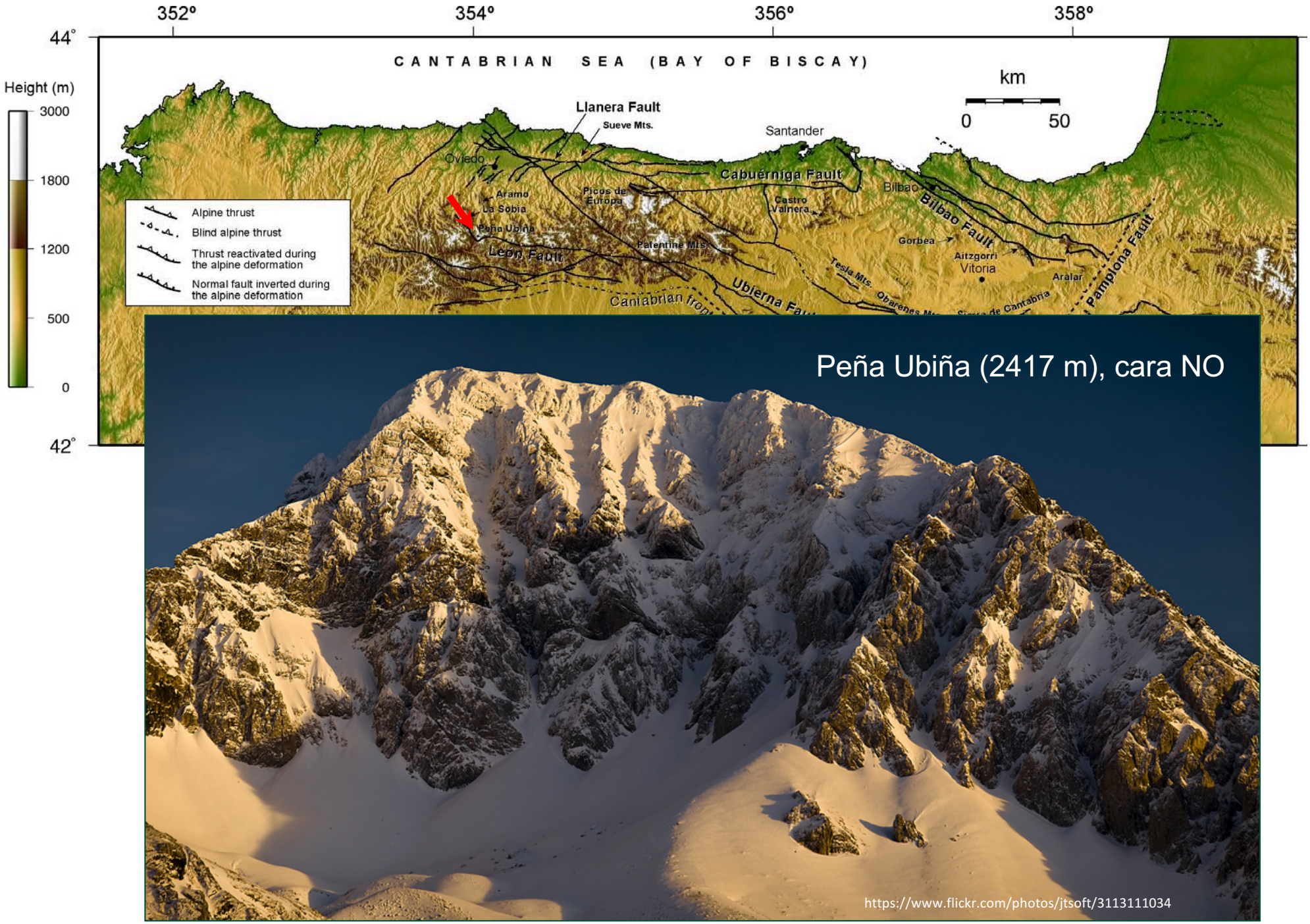
3. Etapa compresiva Cenozoica: La orogenia Alpina

https://bristolriche.wordpress.com/2007/11/05/rabbada-navarro-route-naranjo-de-bulnes/

http://fotosmundo.net/naranjo-bulnes-urriellu/

3. Etapa compresiva Cenozoica: La orogenia Alpina



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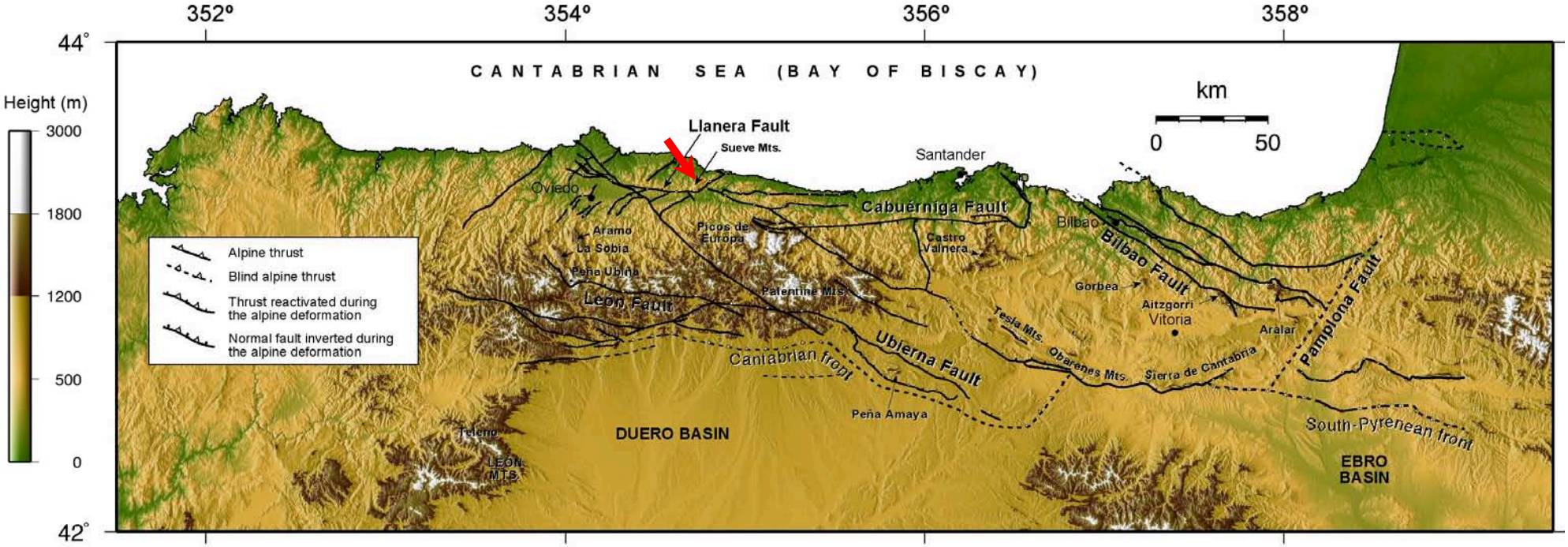

Montes del Sueve desde Picos de Europa

Costa Cantábrica desde el Sueve (1161 m)

3. Etapa compresiva Cenozoica: La orogenia Alpina

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Alonso, Pulgar y Pedreira (2007)

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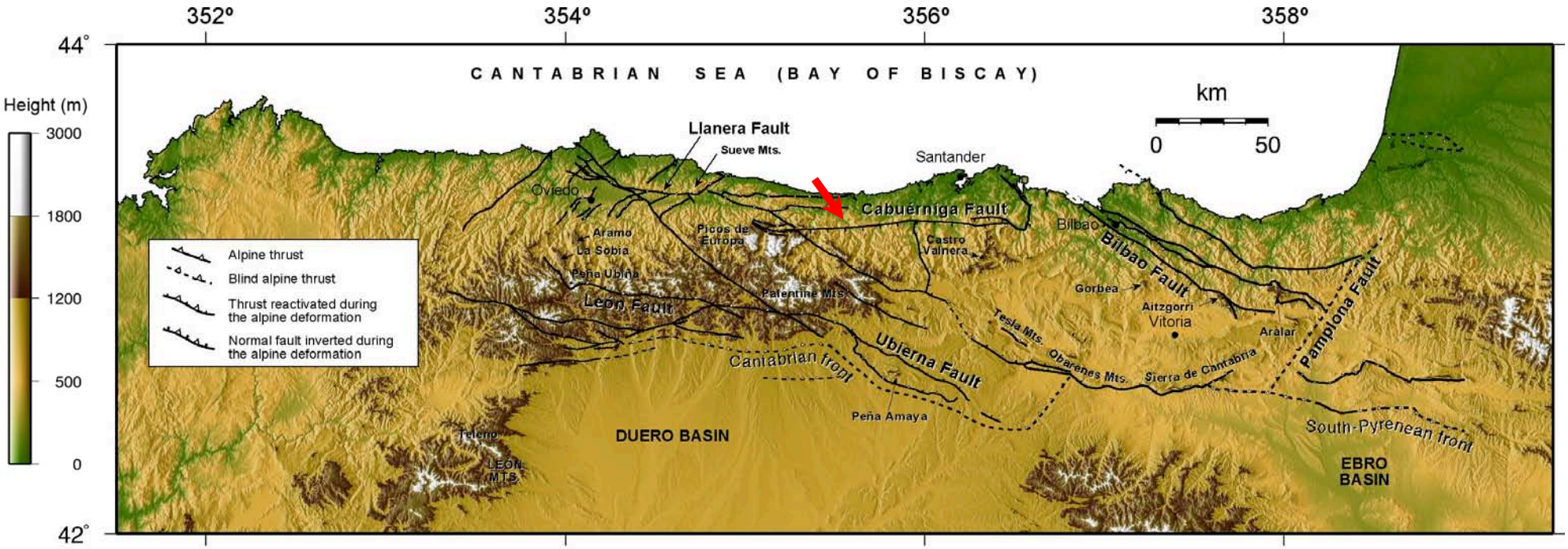
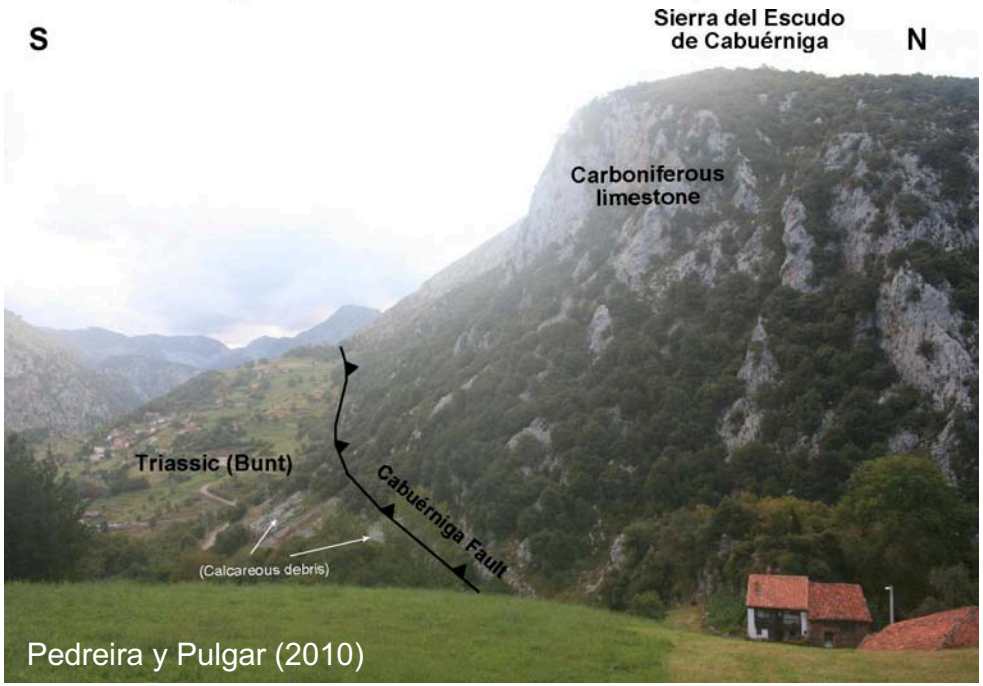
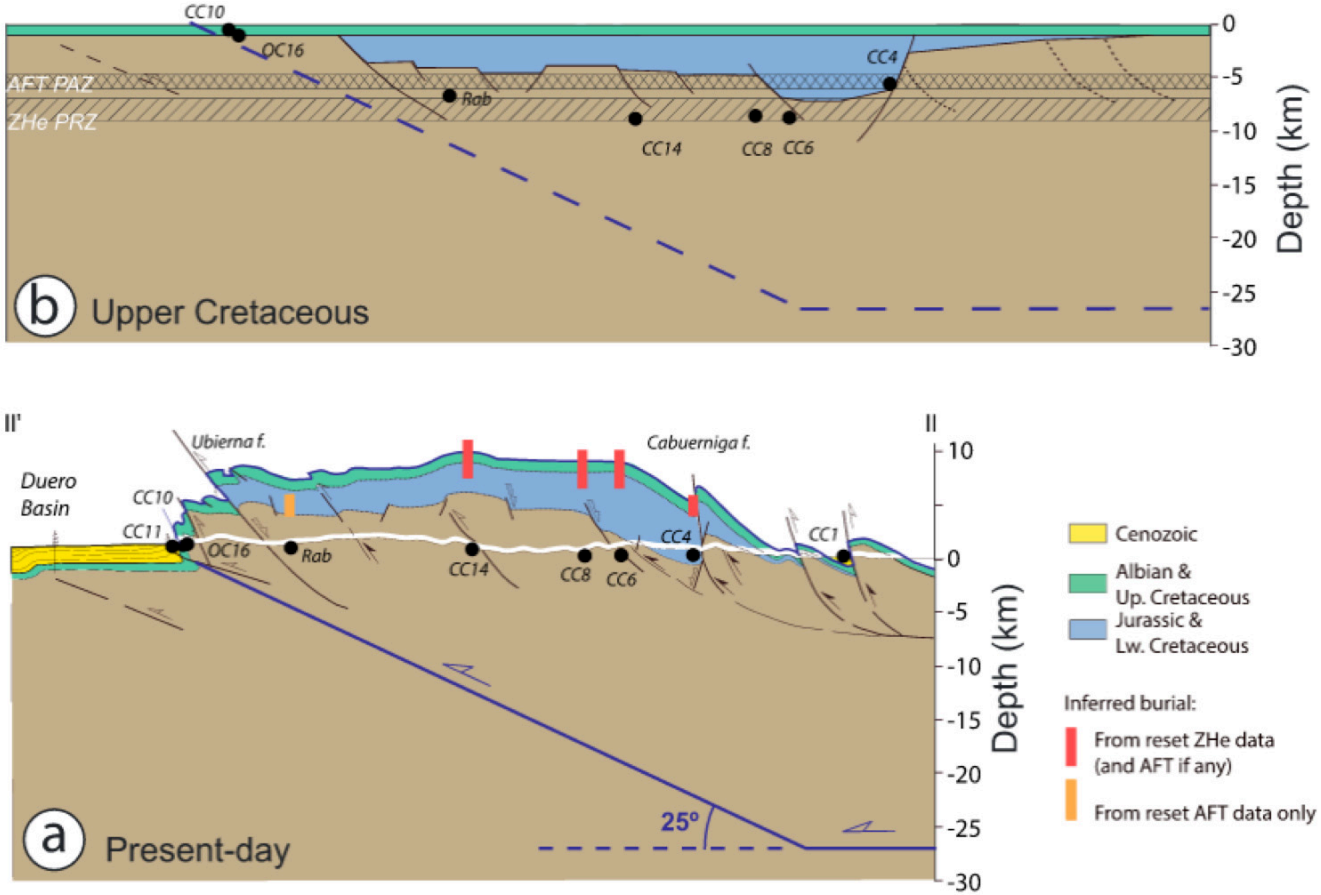


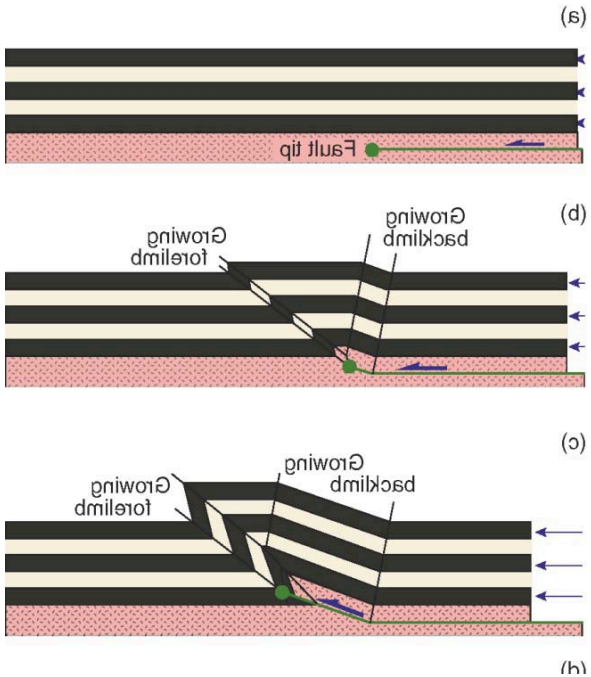


Pedreira y Pulgar (2010)

3. Etapa compresiva Cenozoica: La orogenia Alpina



Fillon et al. (2016)



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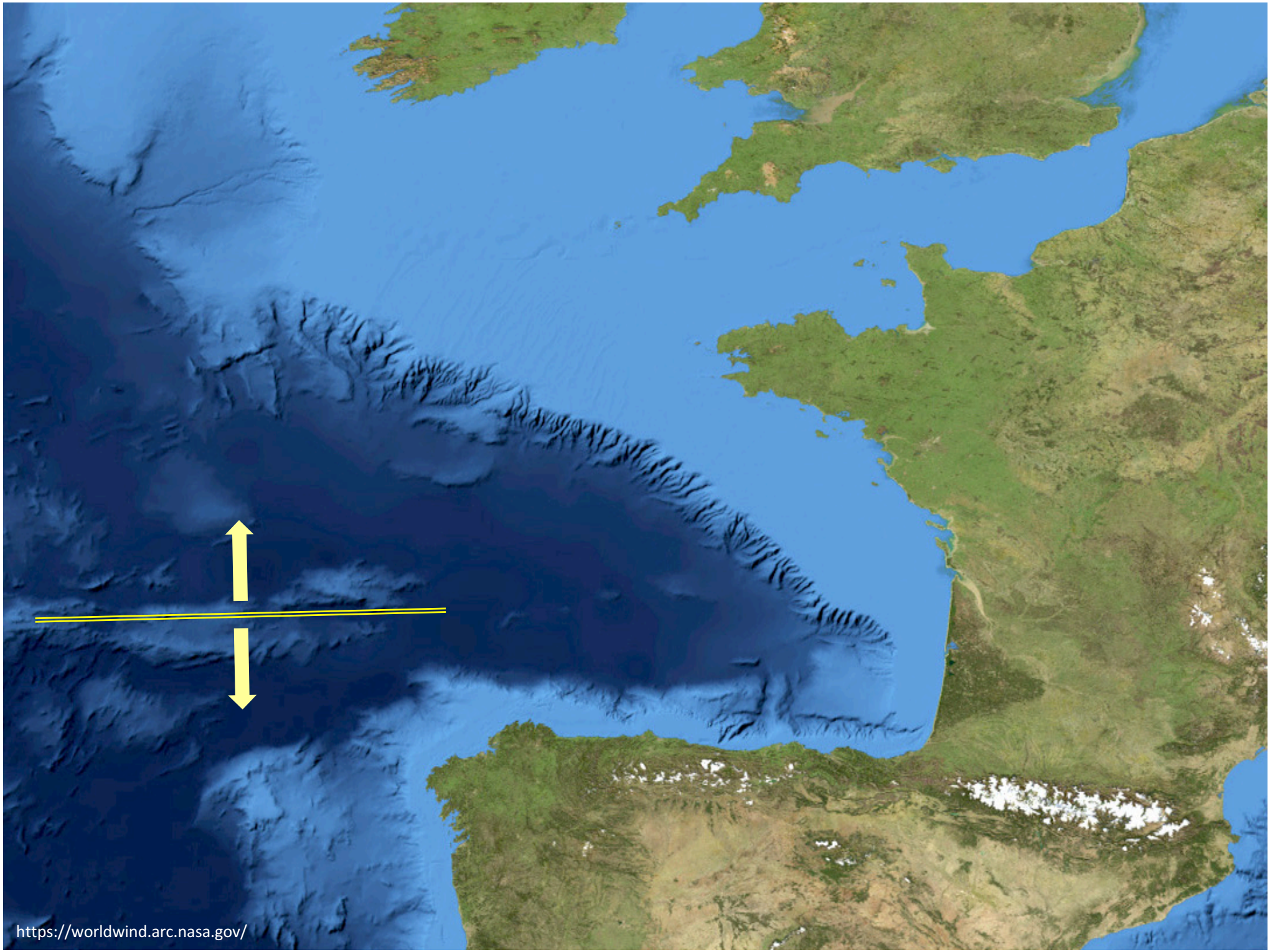
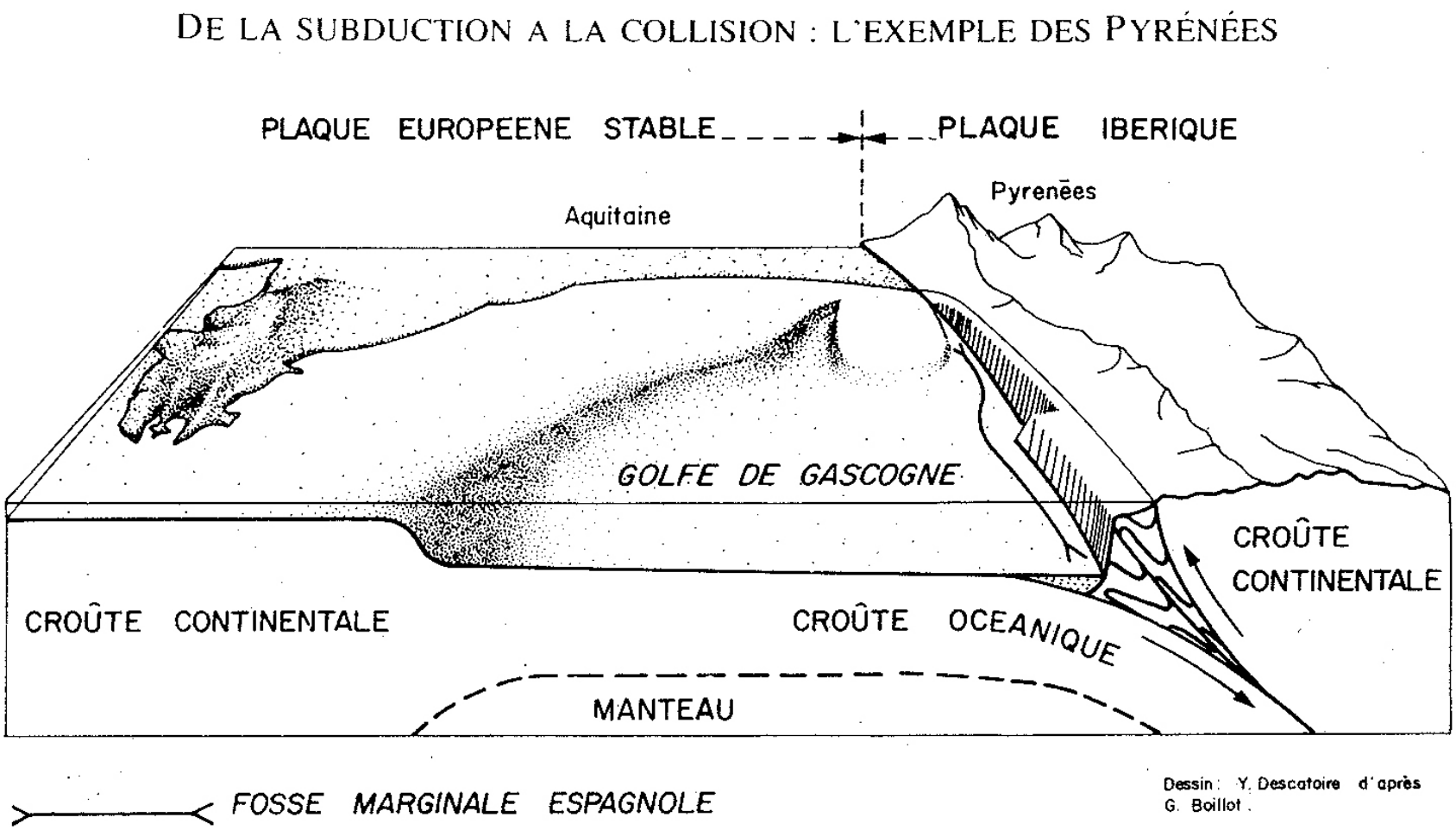
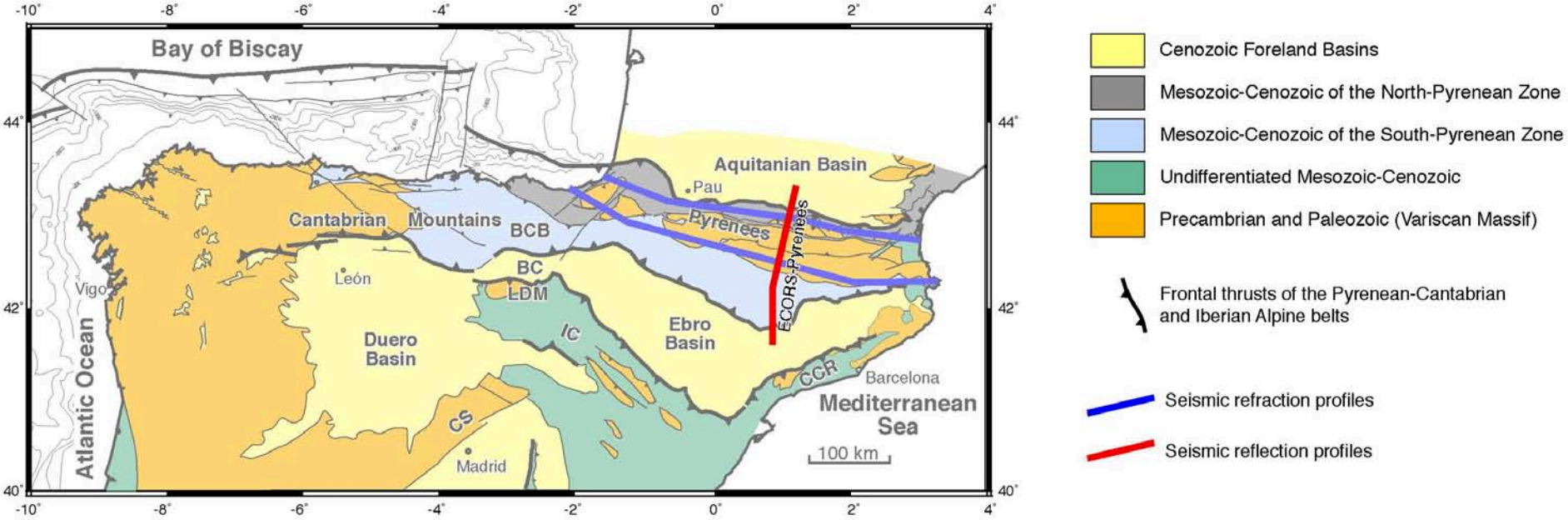

https://worldwind.arc.nasa.gov/

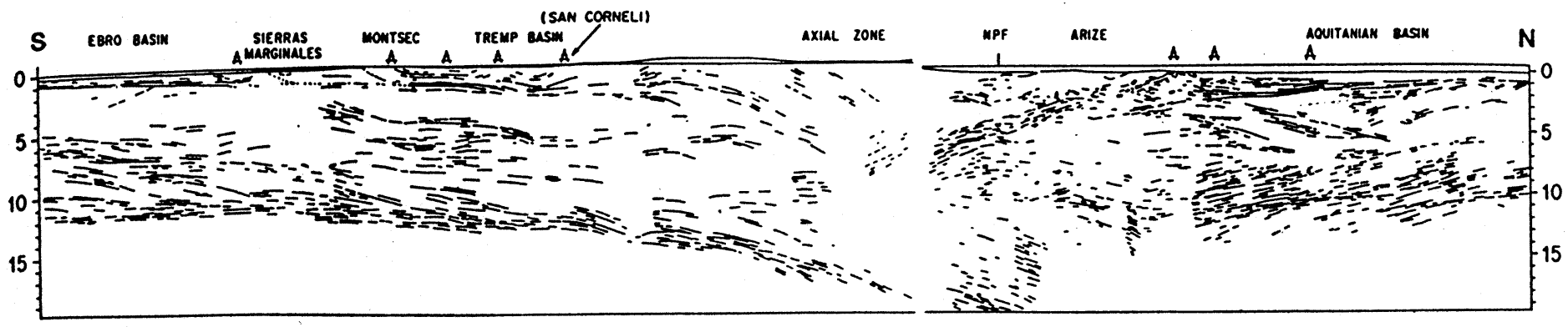


Boillot y Capdevila (1977)

3. Etapa compresiva Cenozoica: La orogenia Alpina

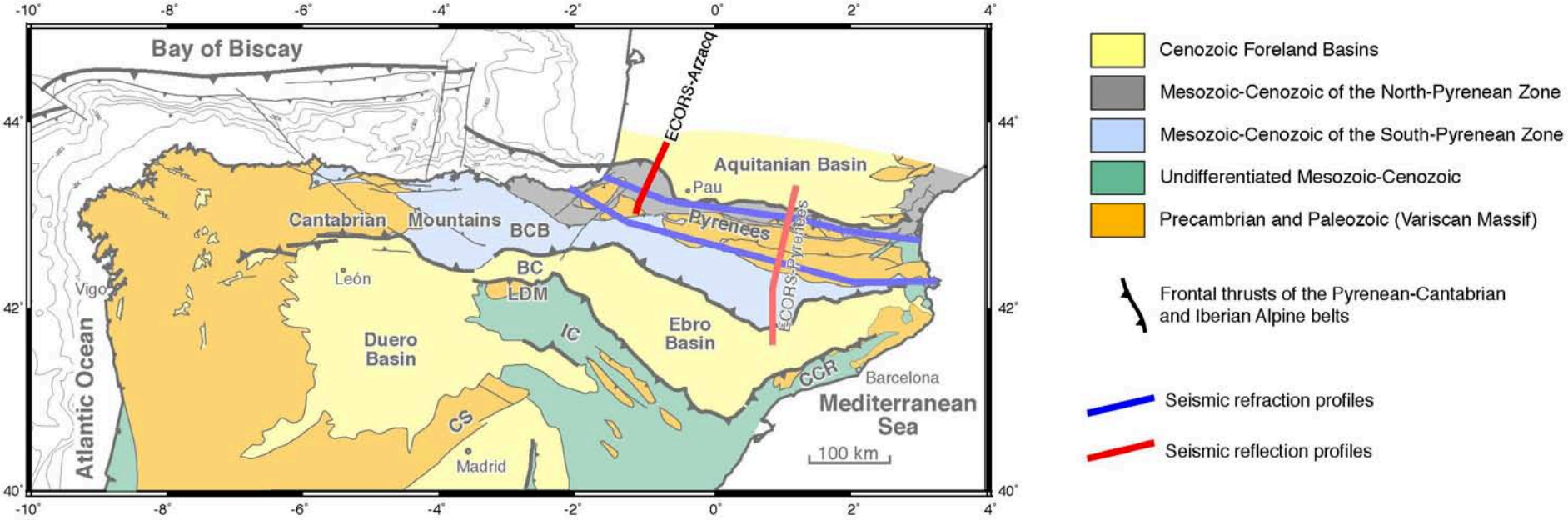


Perfil sísmico ECORS – Pirineos



ECORS-Pyrenees Team (1988)

3. Etapa compresiva Cenozoica: La orogenia Alpina



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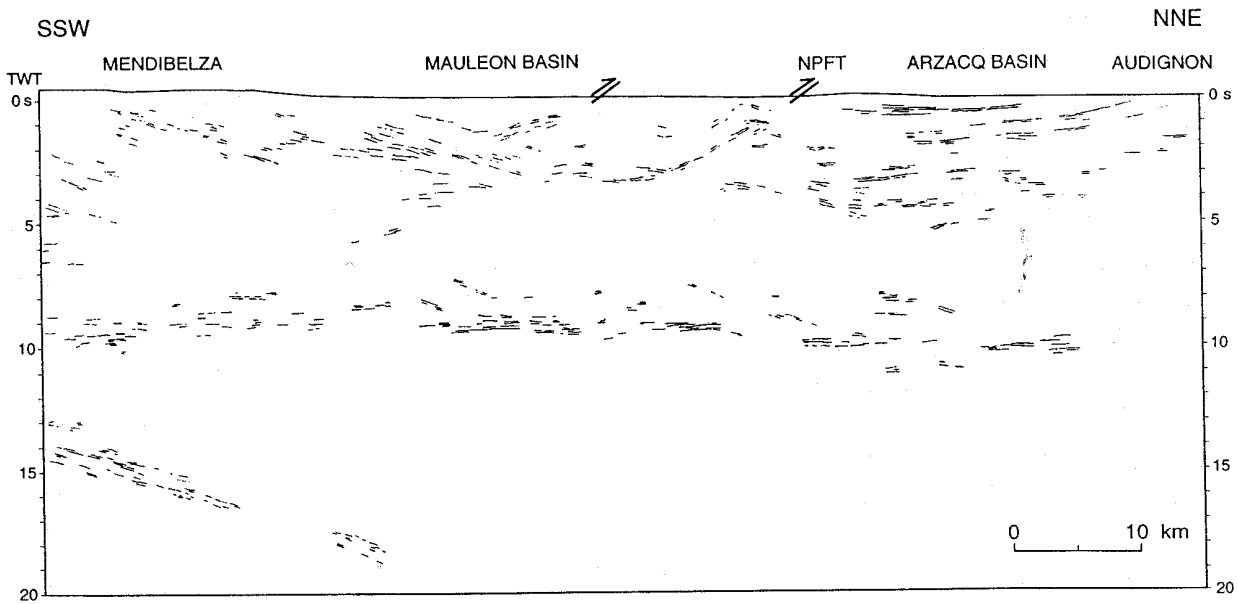

Teixell (1998)

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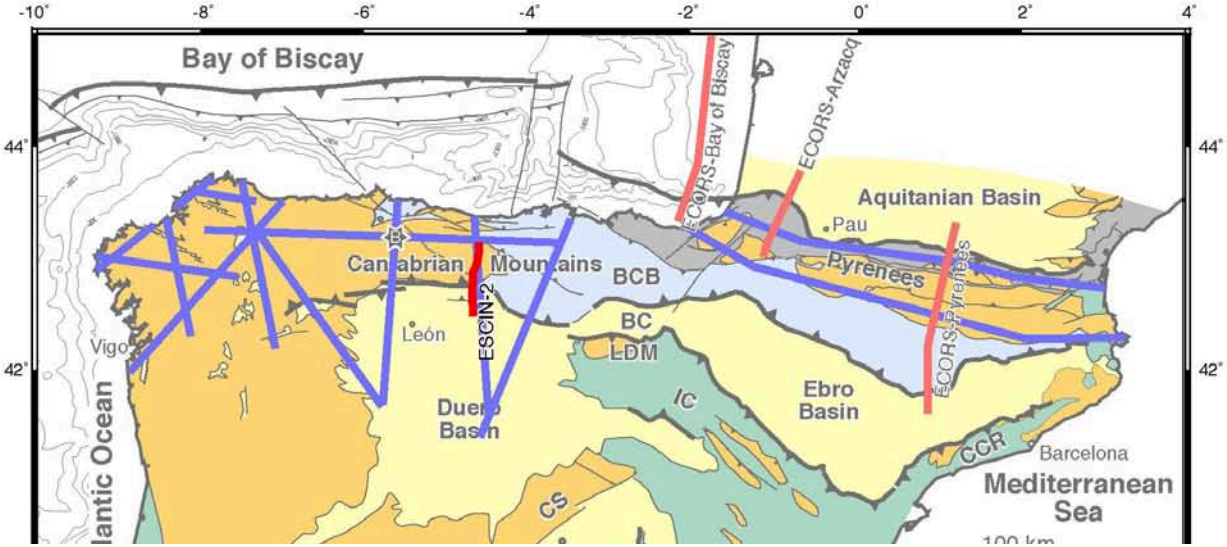

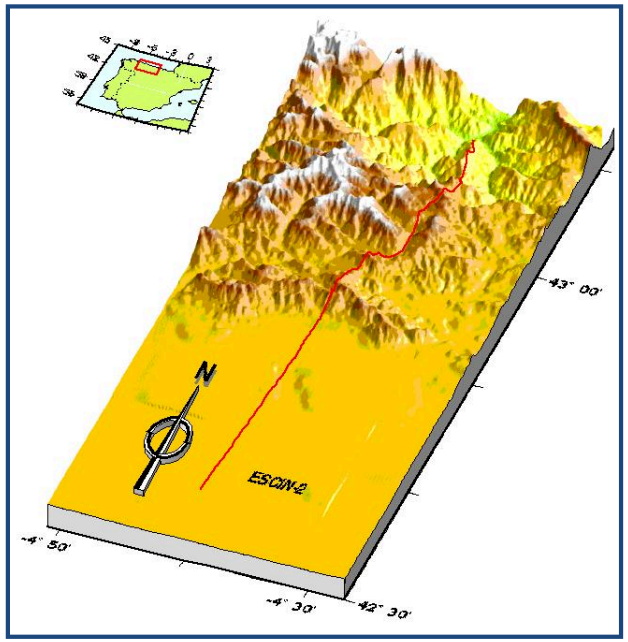

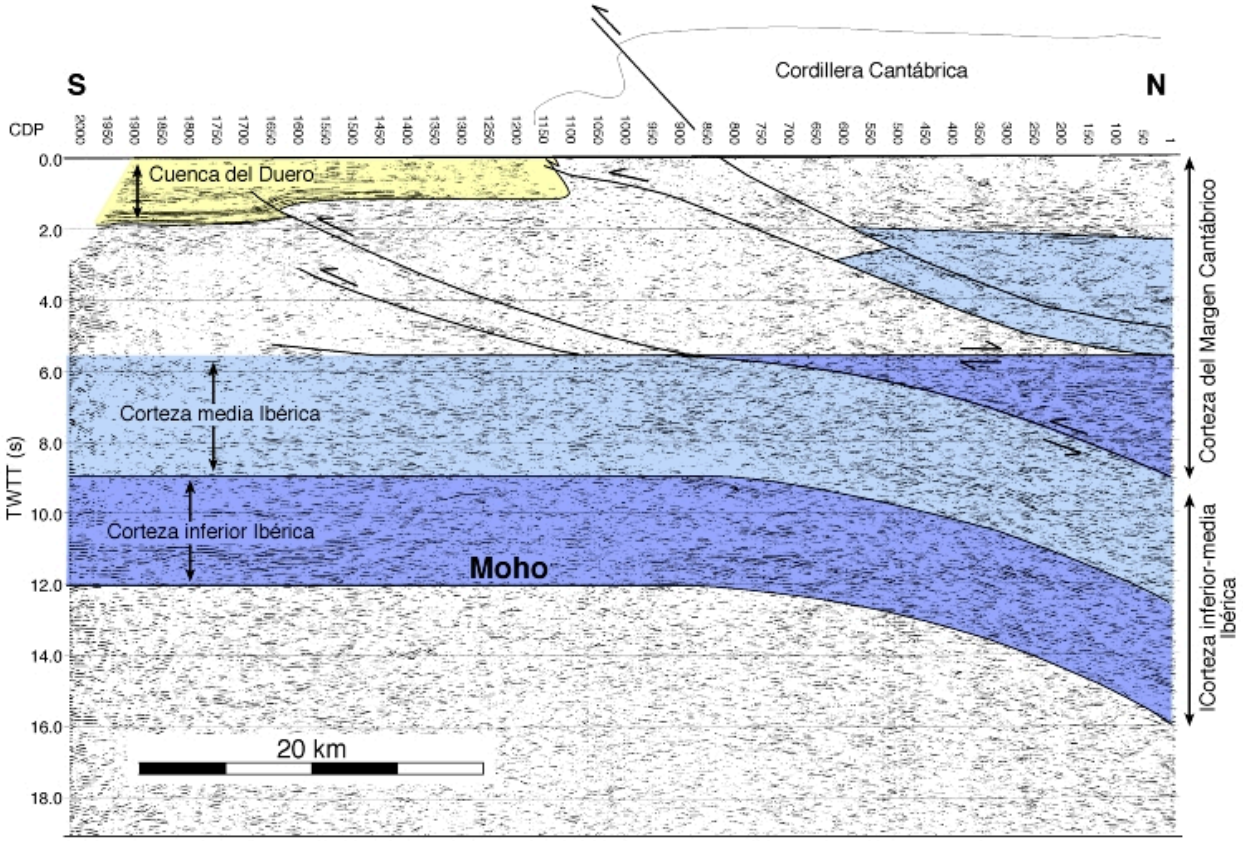

Pulgar et al. (1996)
Gallastegui (2000)

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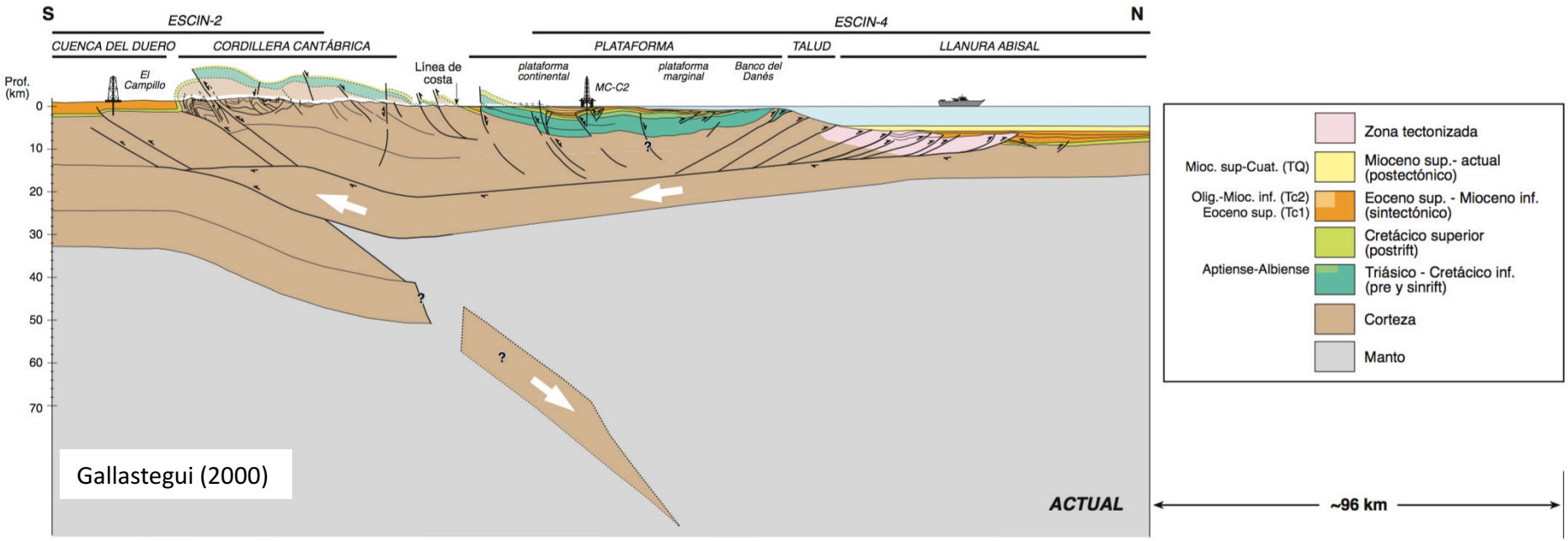
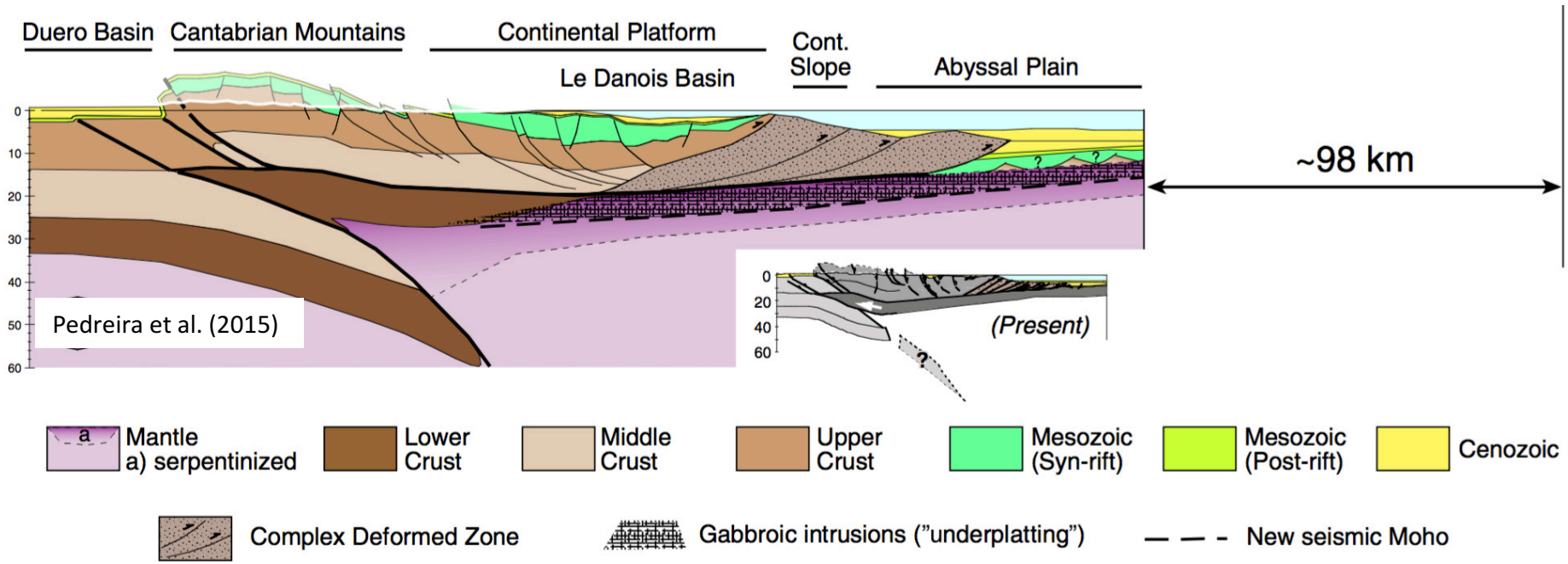
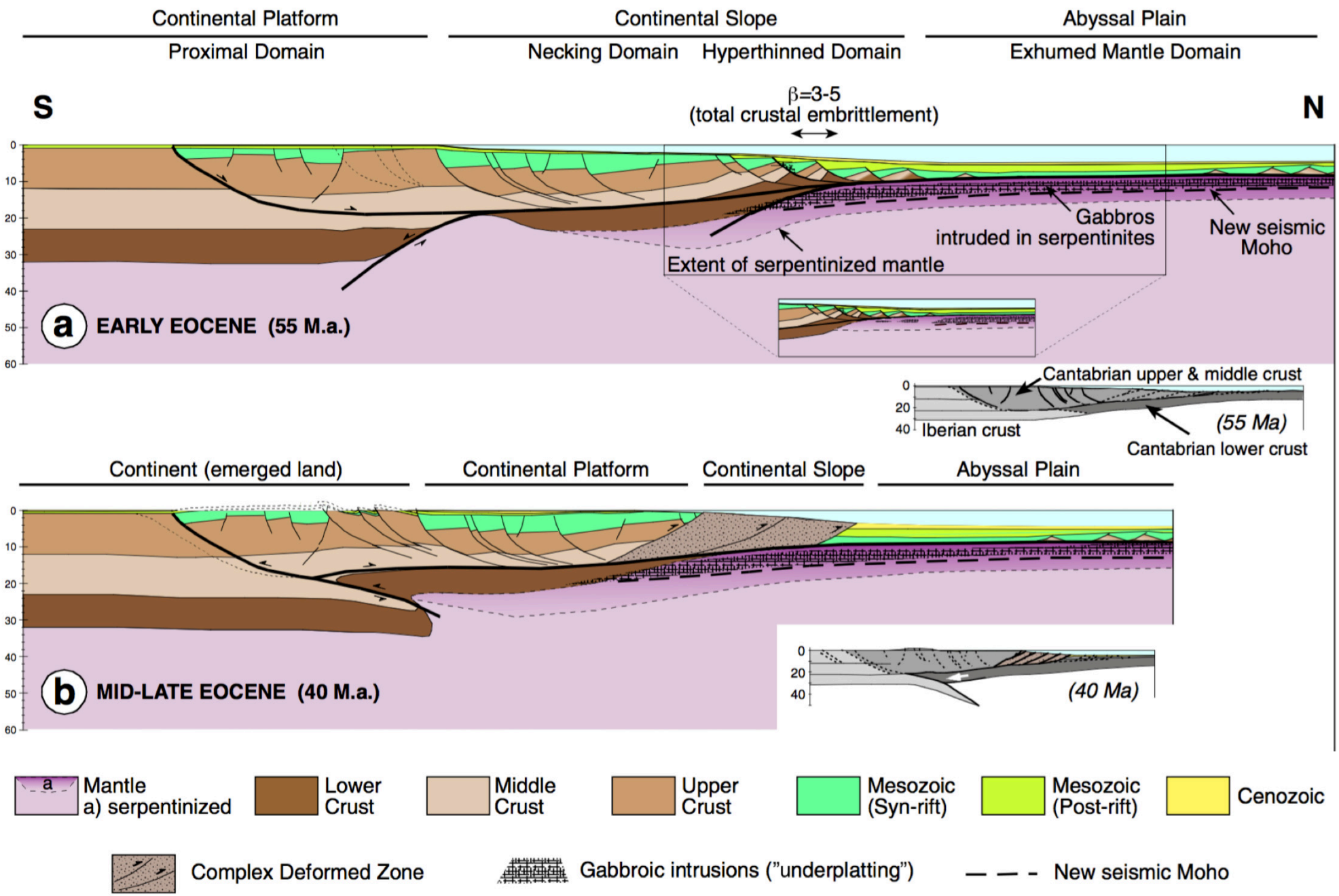


Gallastegui (2000)



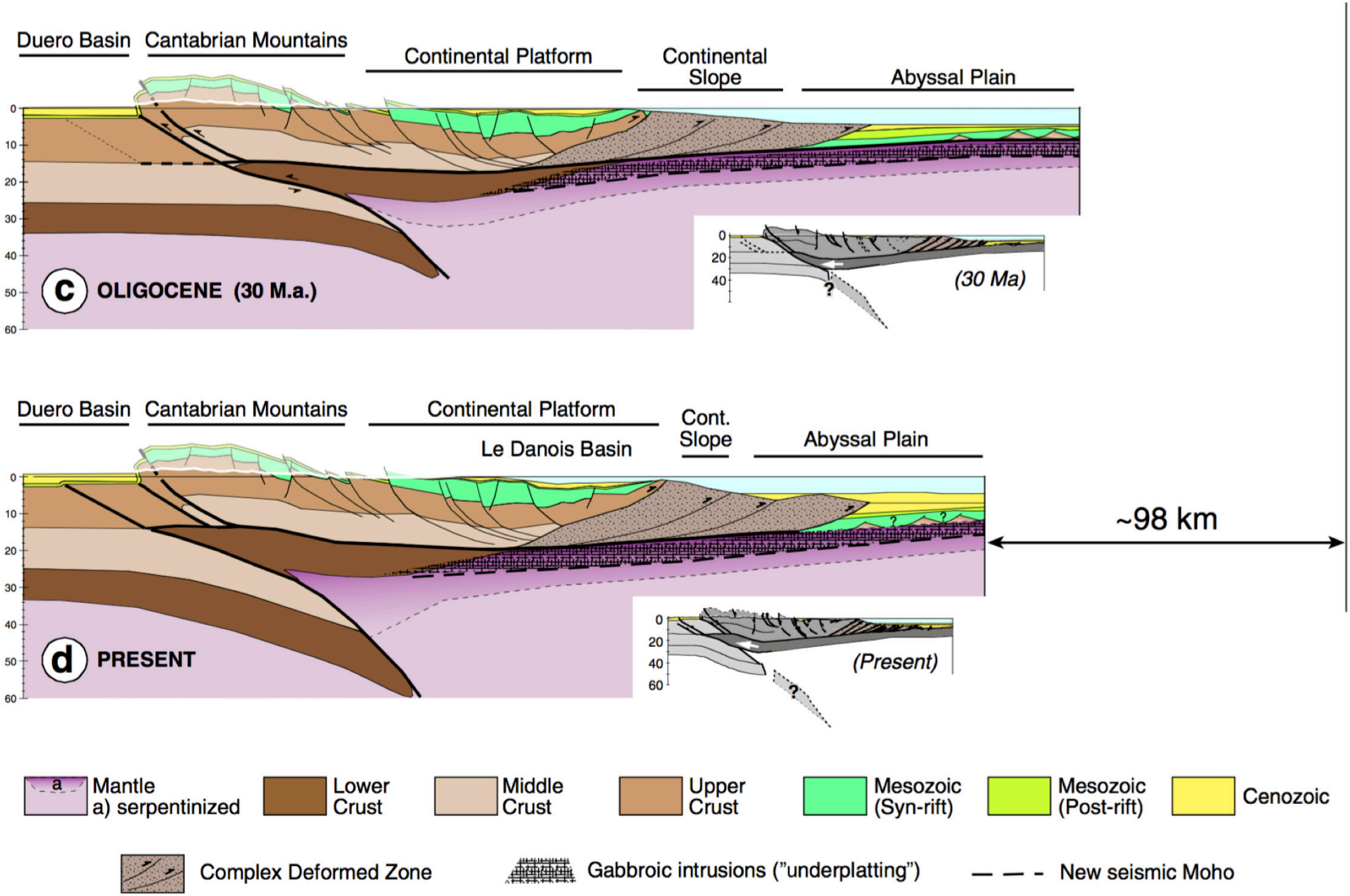
Pedreira et al. (2015)

3. Etapa compresiva Cenozoica: La orogenia Alpina



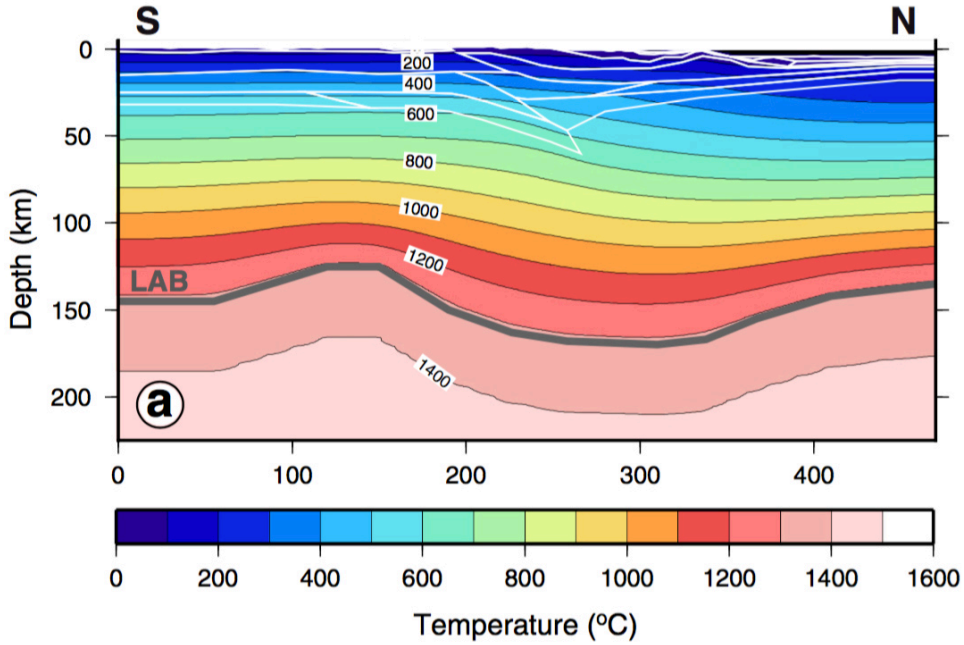
Pedreira et al. (2015)

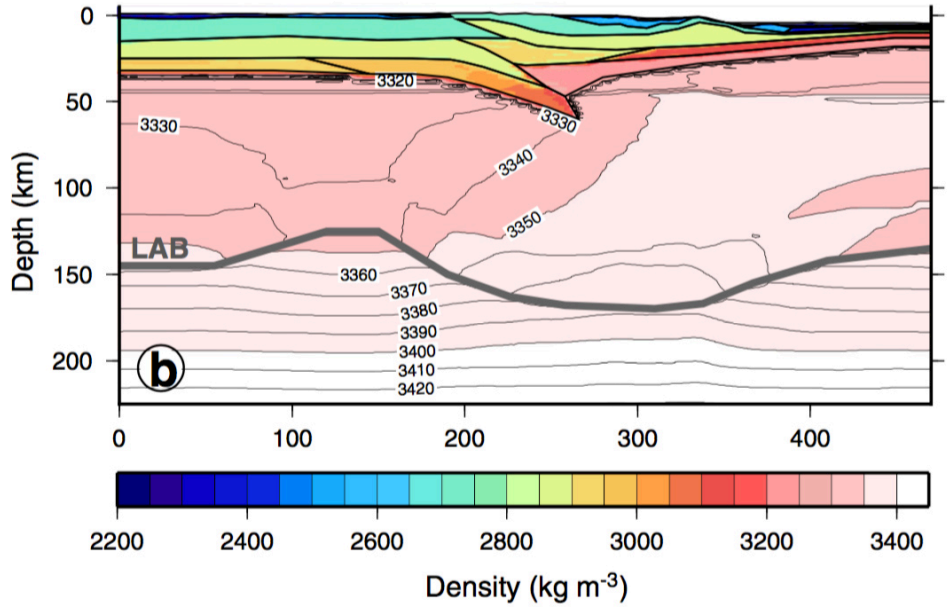
3. Etapa compresiva Cenozoica: La orogenia Alpina

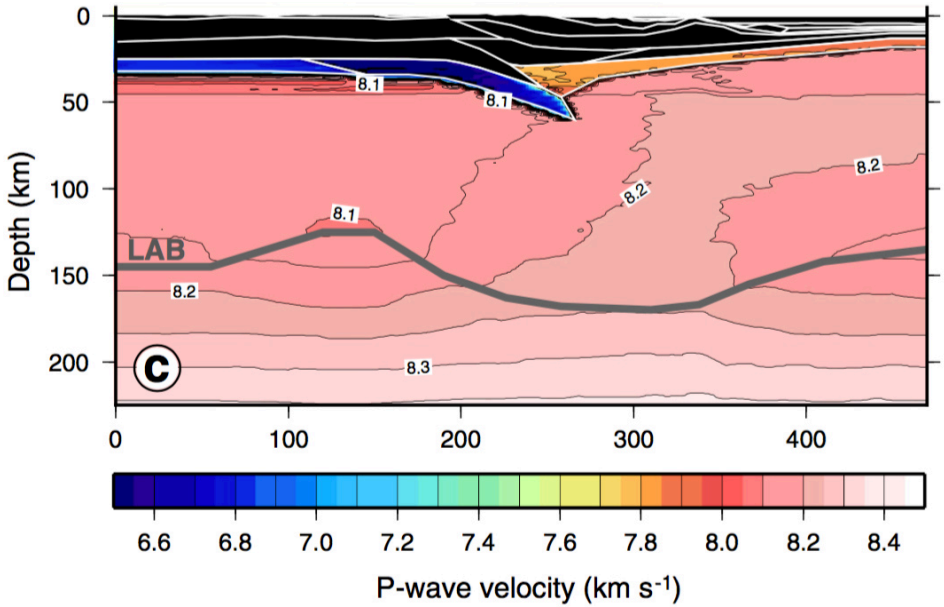


Pedreira et al. (2015)

La estructura alpina de la Cordillera Cantábrica a escala litosférica







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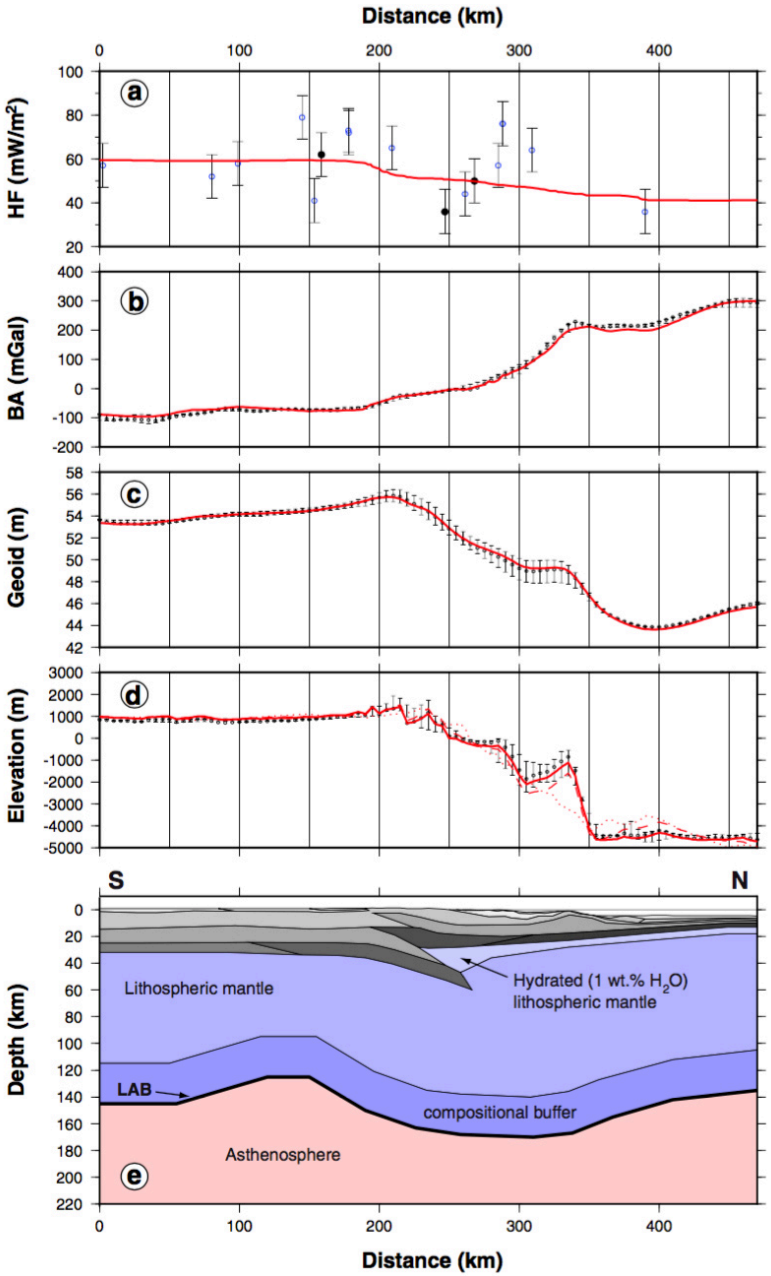

Pedreira et al. (2015)

¡ Muchas Gracias !

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