Ocean break-up and related mountain rise controlled by a continental crustal root

Australian National University

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& Benoit Tauzin, Hrvoje Tkalcic, Meghan Miller, Hans Thybo

What causes mountains to exist at the coast far away from active plate boundaries?

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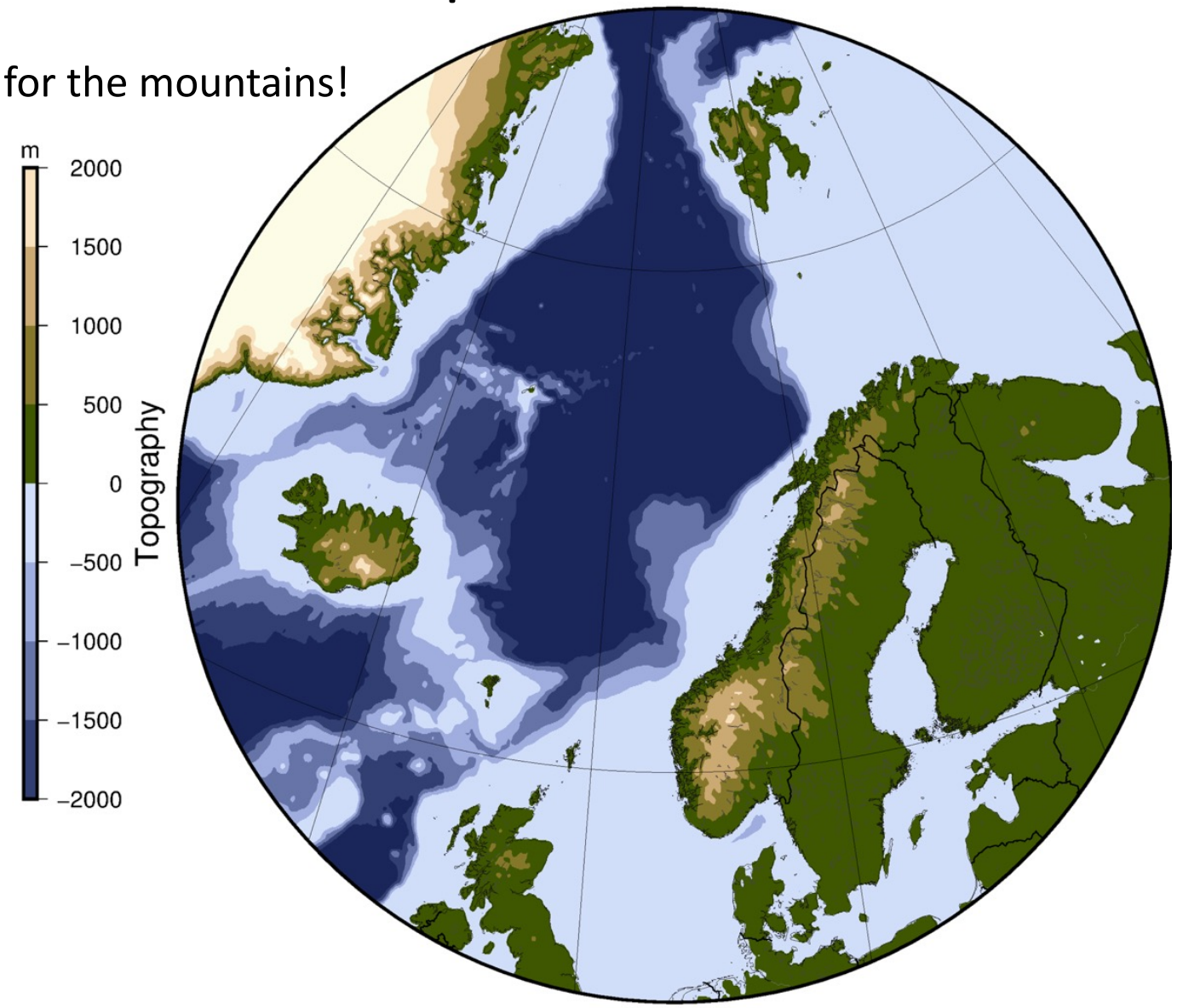
There is no obvious support for the mountains!



Moho discontinuity in Scandinavia

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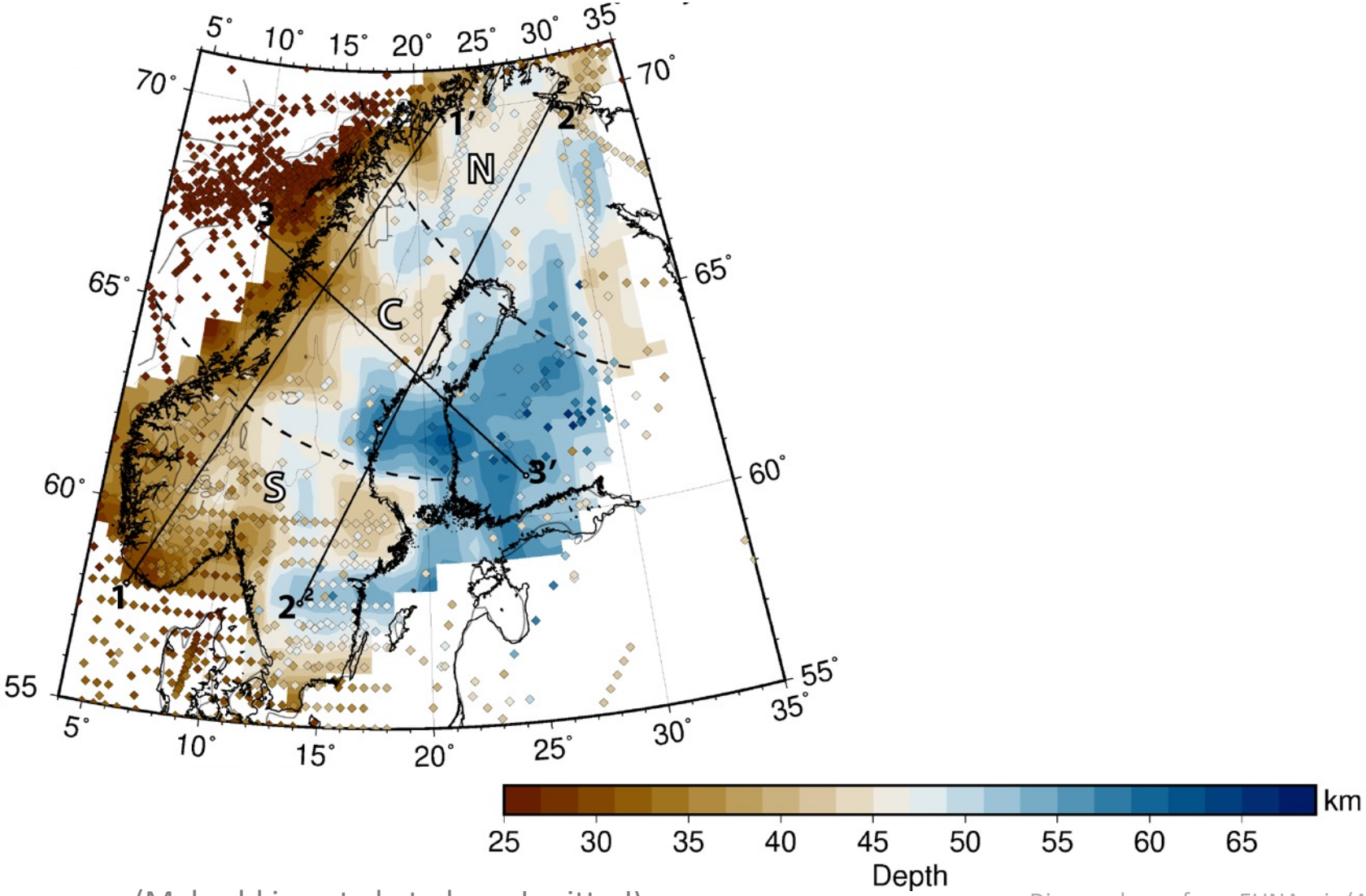
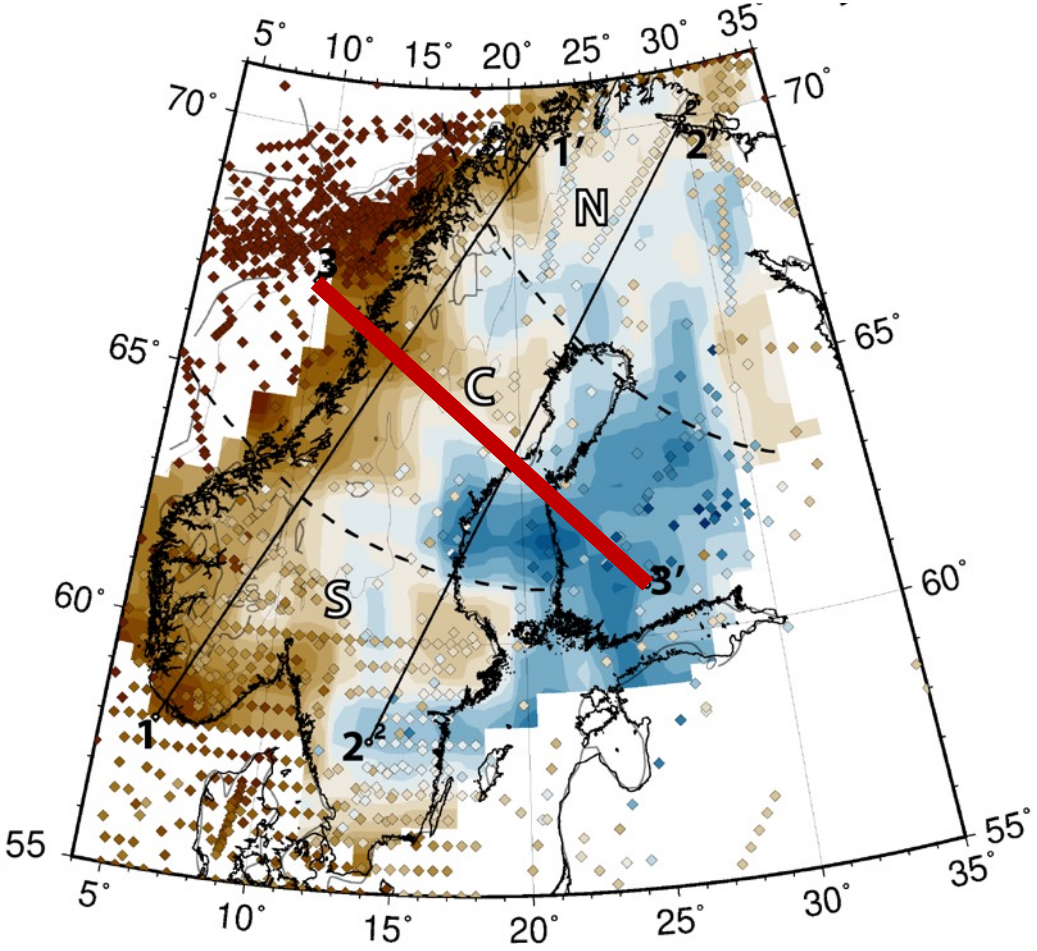
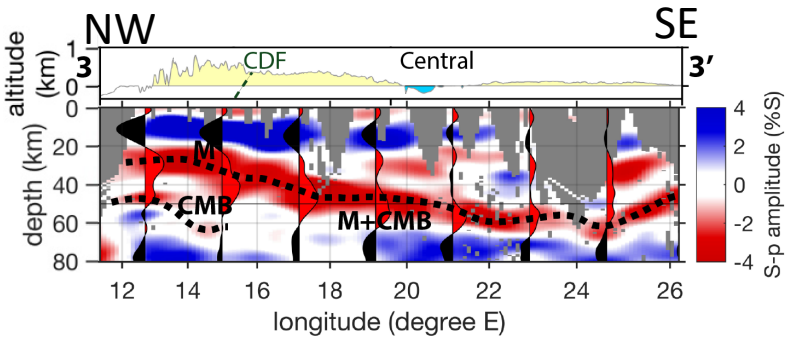


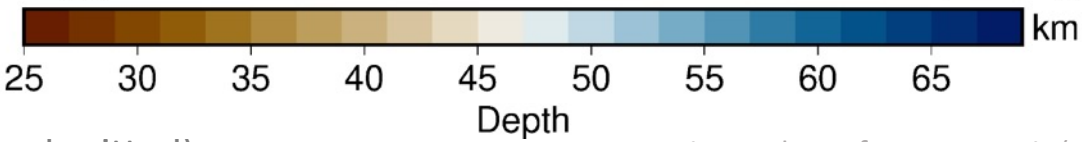
(Makushkina et al., to be submitted)

Diamonds are from EUNAseis (Artemieva & Thybo 2013)

Moho discontinuity in Scandinavia







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Diamonds are from EUNAseis (Artemieva & Thybo 2013)

Newly discovered discontinuity beneath mid-Norwegian margin

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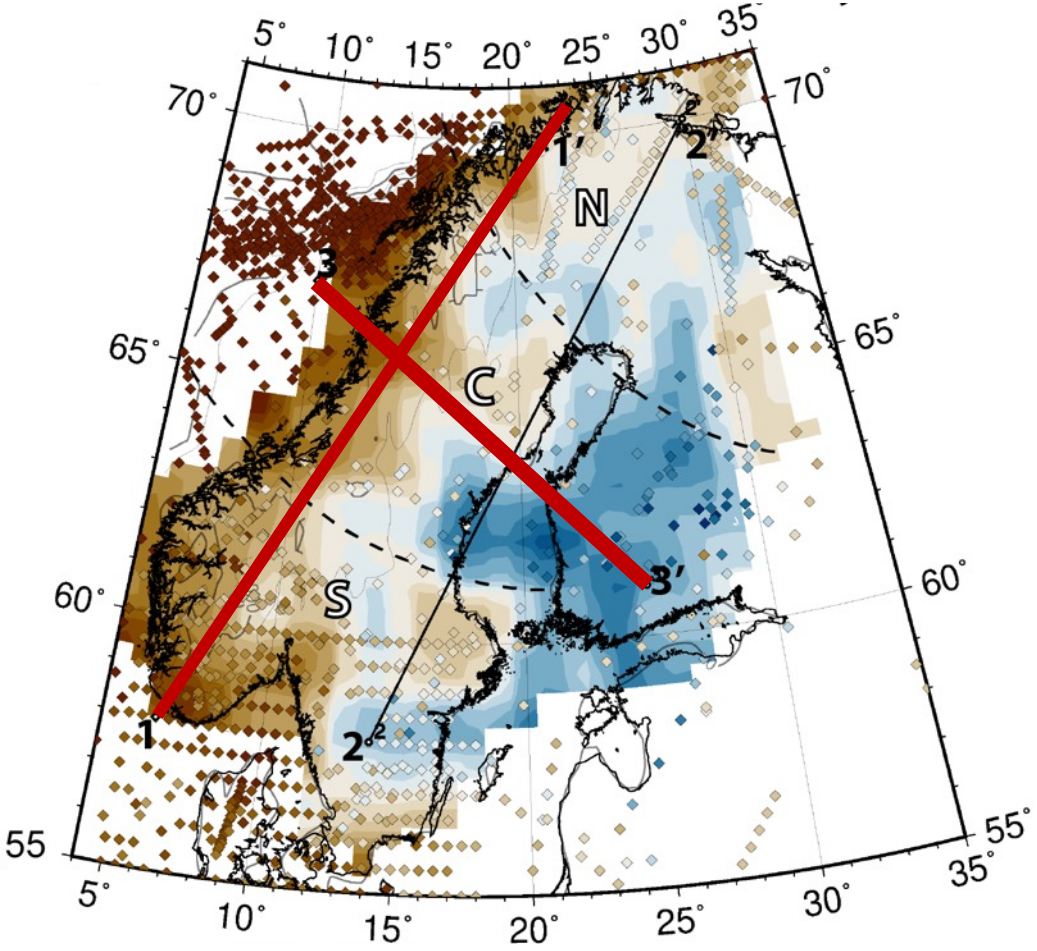

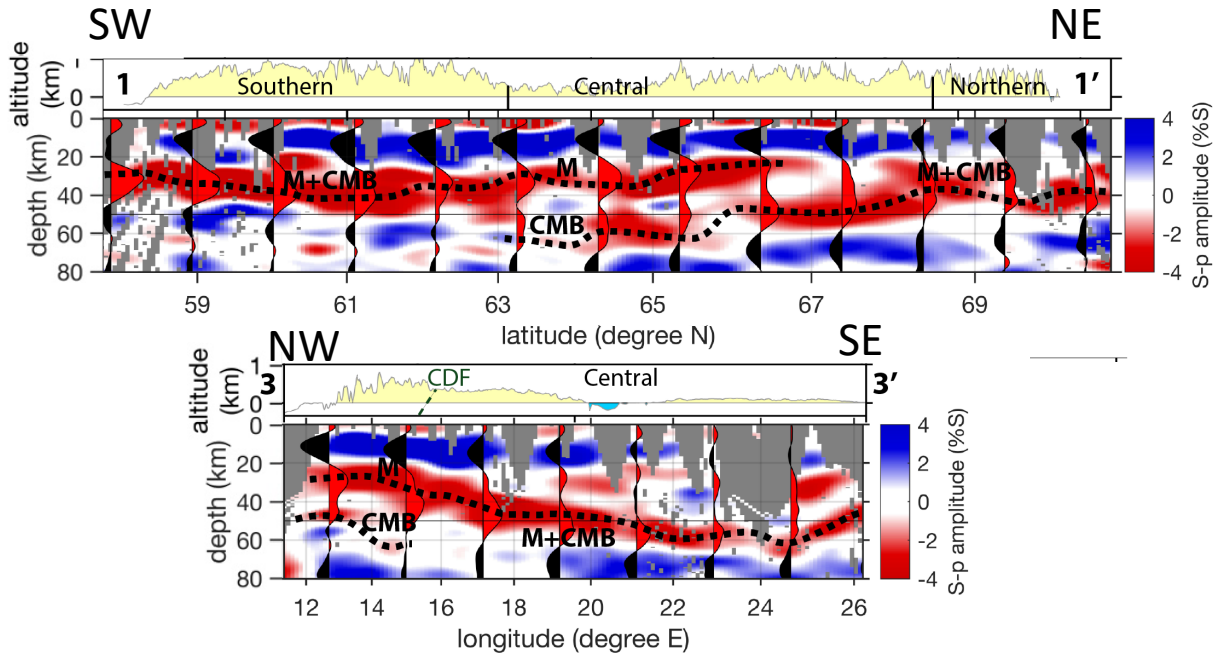

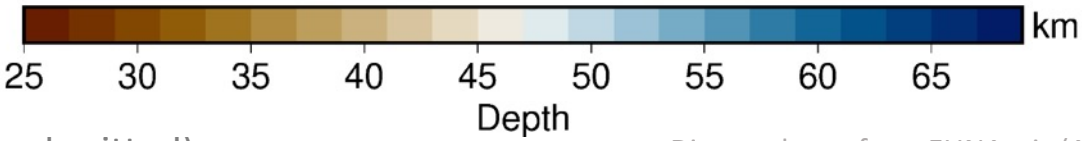

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The stacked crusts caused spreading ridge to jump away from mid-Norwegian margin

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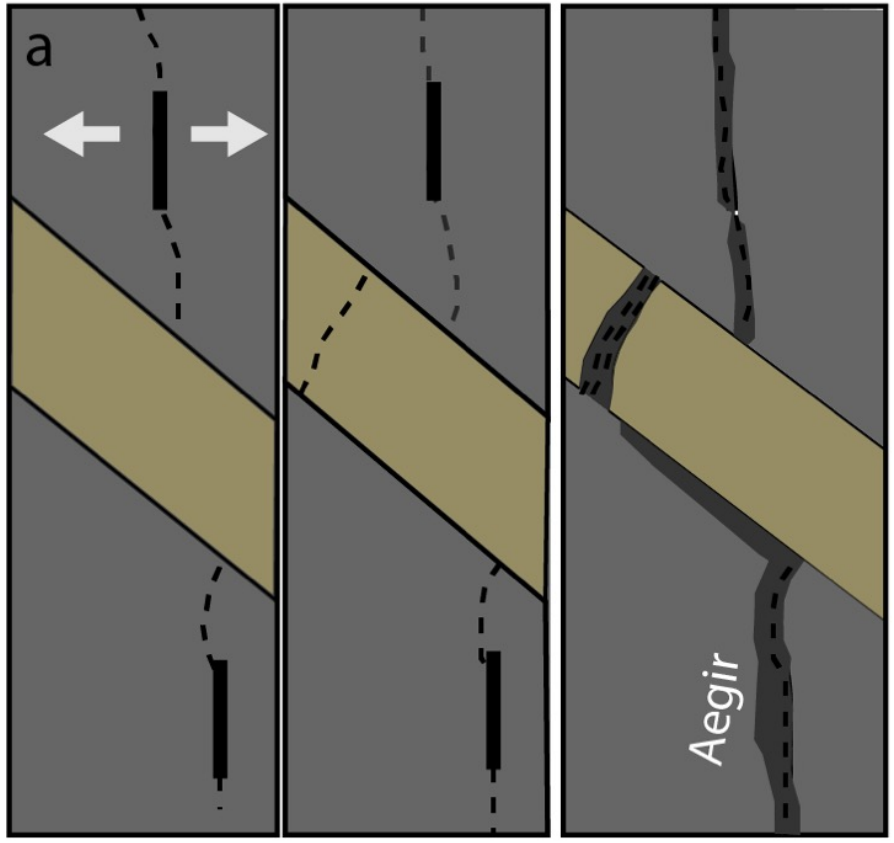

strong crust
normal crust
new crust
fissure

*based on analogue wax-type model from
(Makushkina, 2015 Msc thesis; Grokholskii & Dubinin, 2006)

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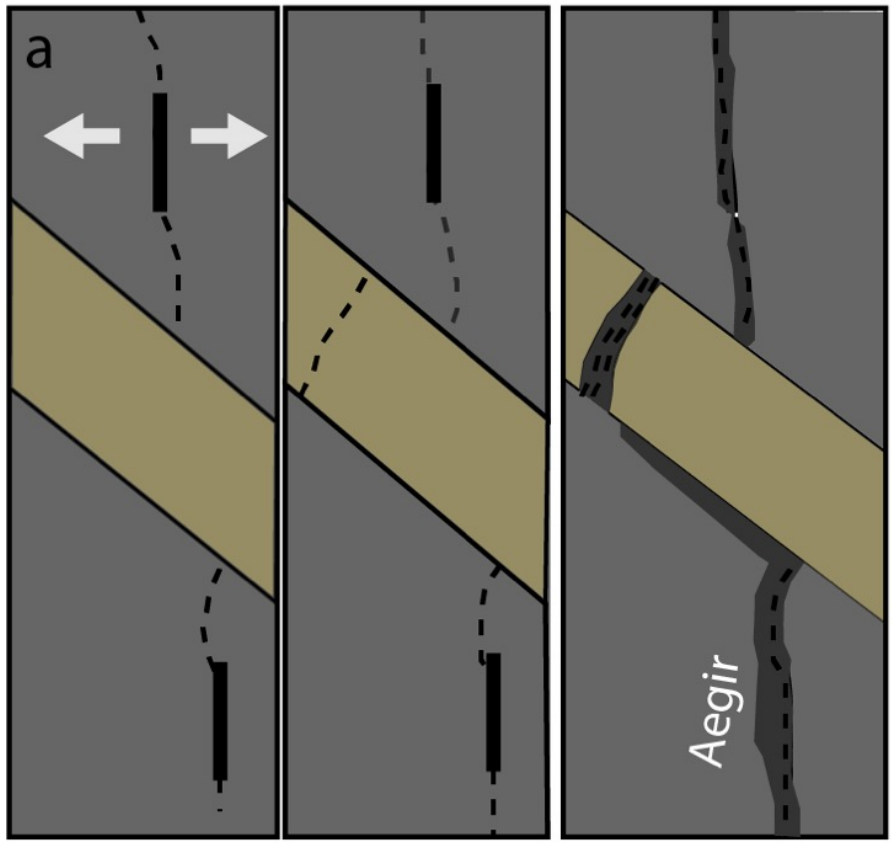

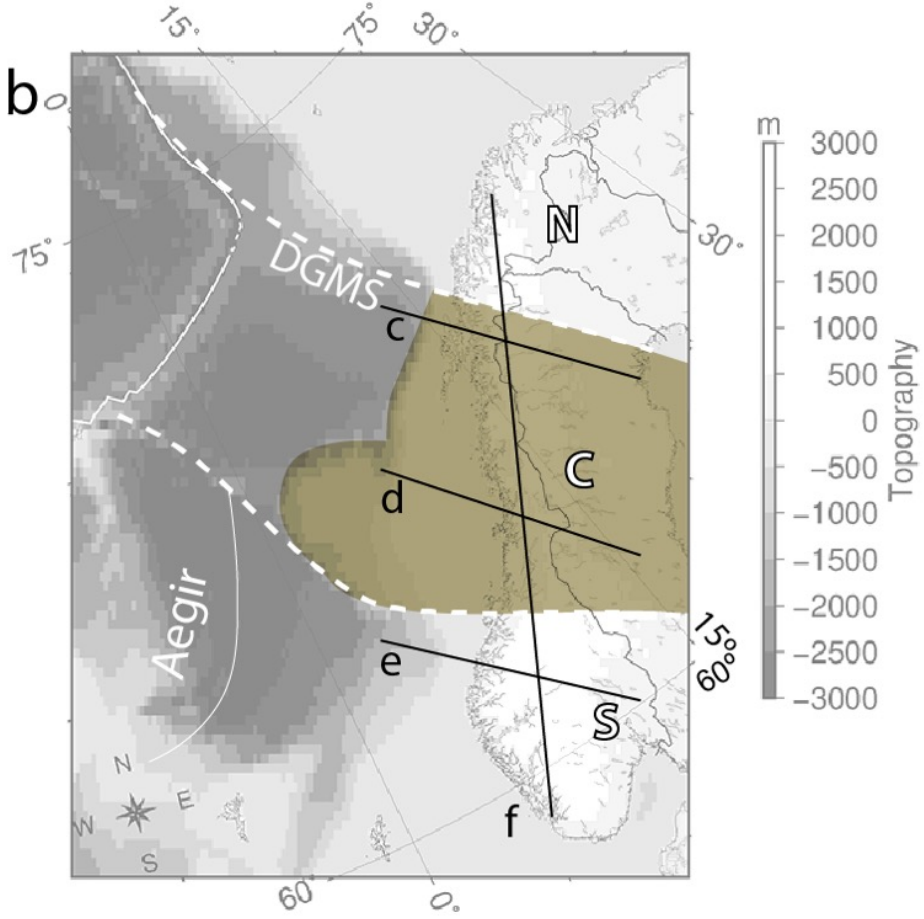

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Boundaries of the stacked crust coincide with transform faults

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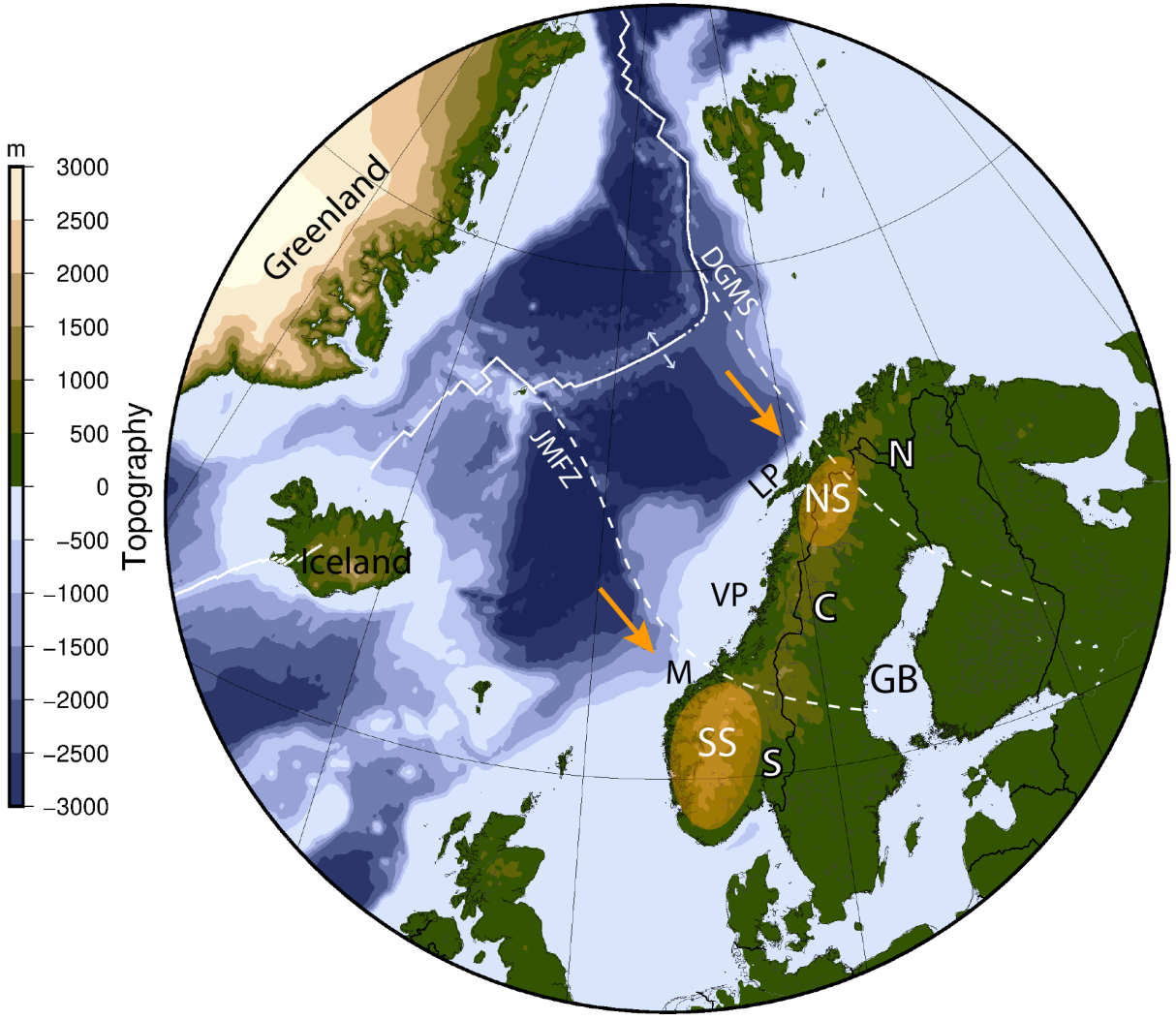

Narrower shelf - steeper lithosphere-asthenosphere boundary

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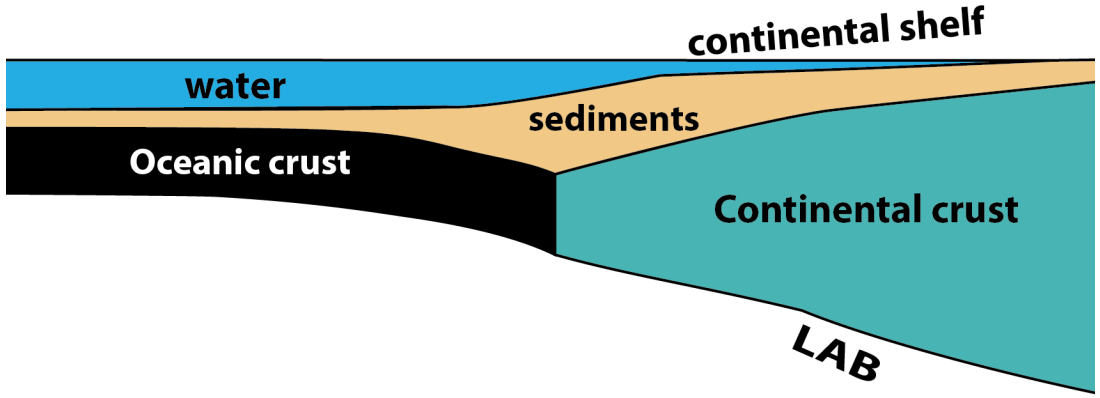

Steep LAB promotes edge-driven convection that causes the mountains

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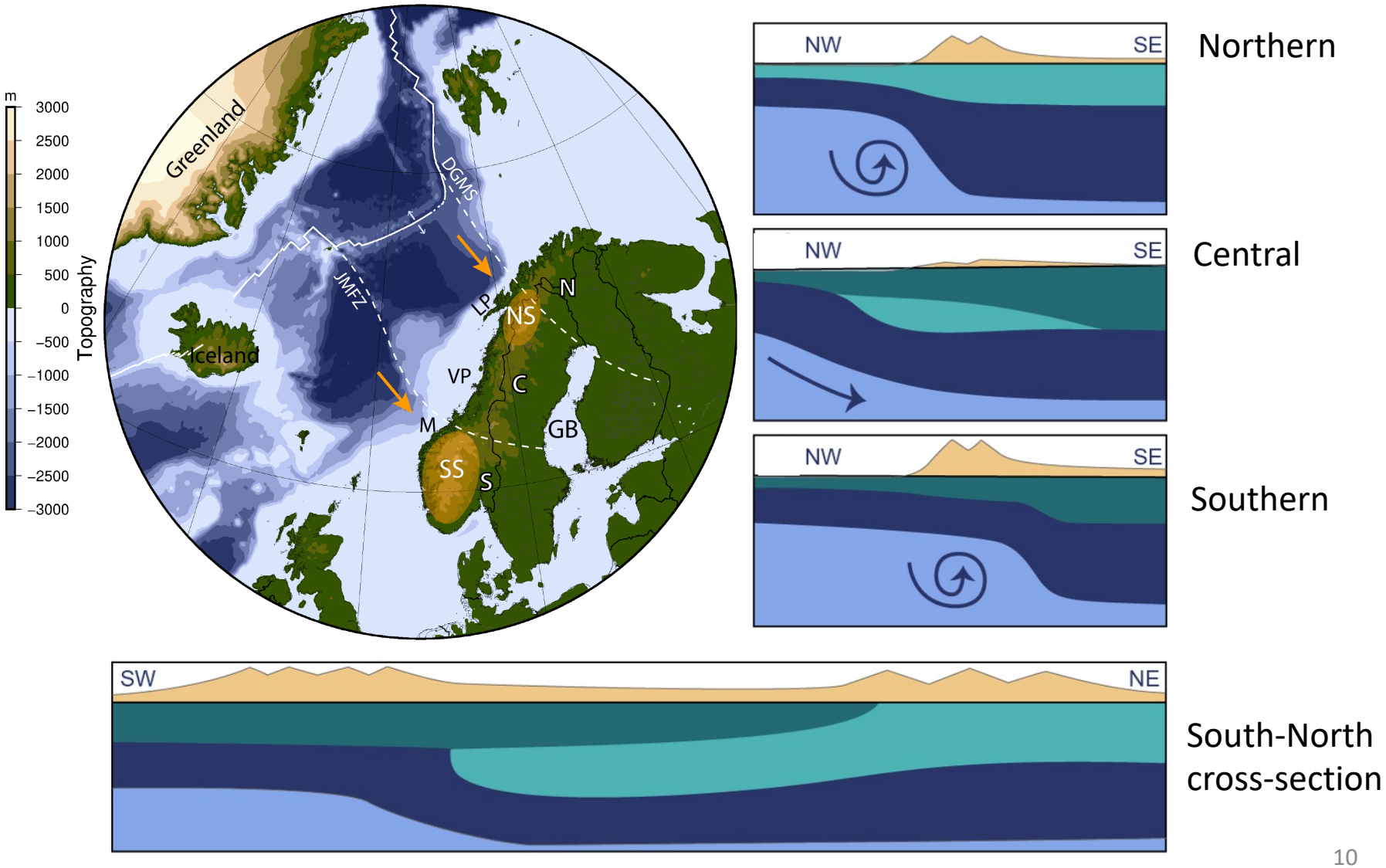

(Makushkina et al., to be submitted)

Take home message

1. Precambrian ~55-km thick stacked crust is observed at mid-Norwegian margin

2. This thick feature affected geometry of the North Atlantic break up

3. The areas of steep LAB create conditions for edge-driven convection that may support the Scandinavian mountains

Questions? Contact me at anna.makushkina@anu.edu.au

Thanks for you attention!

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