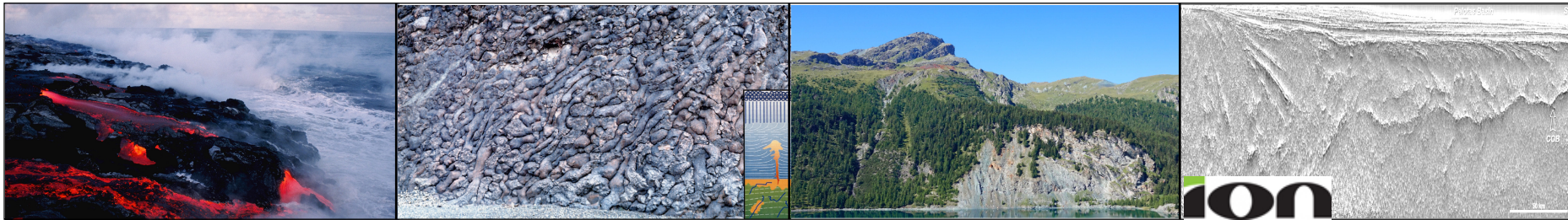


the record of continental breakup processes

Conveners: Nirrengarten M., Tugend J., Welford J.K., Magee C., Norcliffe J.

Tuesday, 5 May, 14:00-18:00

Magma at rifted margins: when, where and how much?



G. Manatschal¹, S.Tomasi¹, N.Kusznir², C.Zhang³, D.Sauter¹, P.Chao¹,
M.Ulrich¹, P.Chenin¹

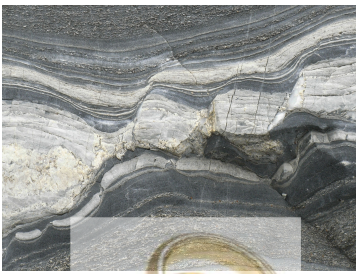
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E-mail
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Magma at rifted margins: first order observations

What controls rifting ?

Extension

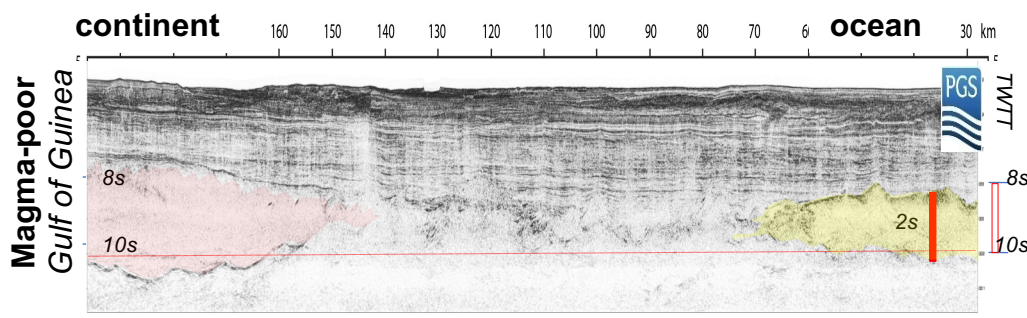
- mechanics/ rheology
- crust/lithosphere



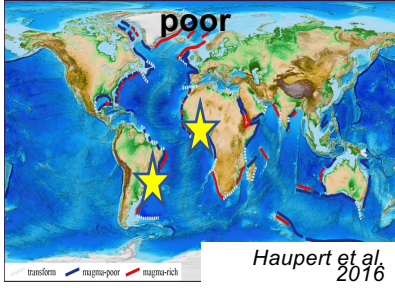
Magmatism

- petrology/ chemistry
- asthenosphere

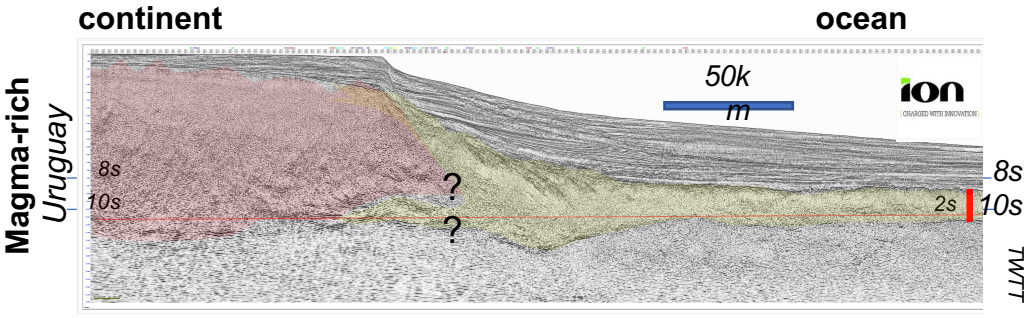
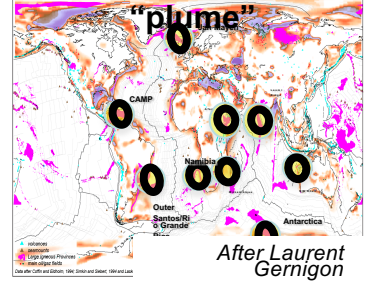
OBSERVATIONS



Magma-rich vs magma-poor



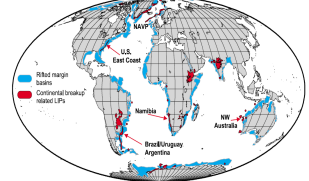
Break up related to "plume"



What controls magma production?

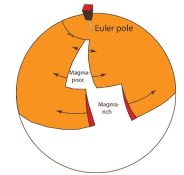
Plumes

thermal structure (e.g. Coffin and Eldholm 1994)



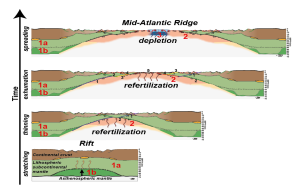
Stain rate

(e.g. Lundin et al 2014)



Inheritance

melt entrapment (e.g. Picazo et al. 2016)

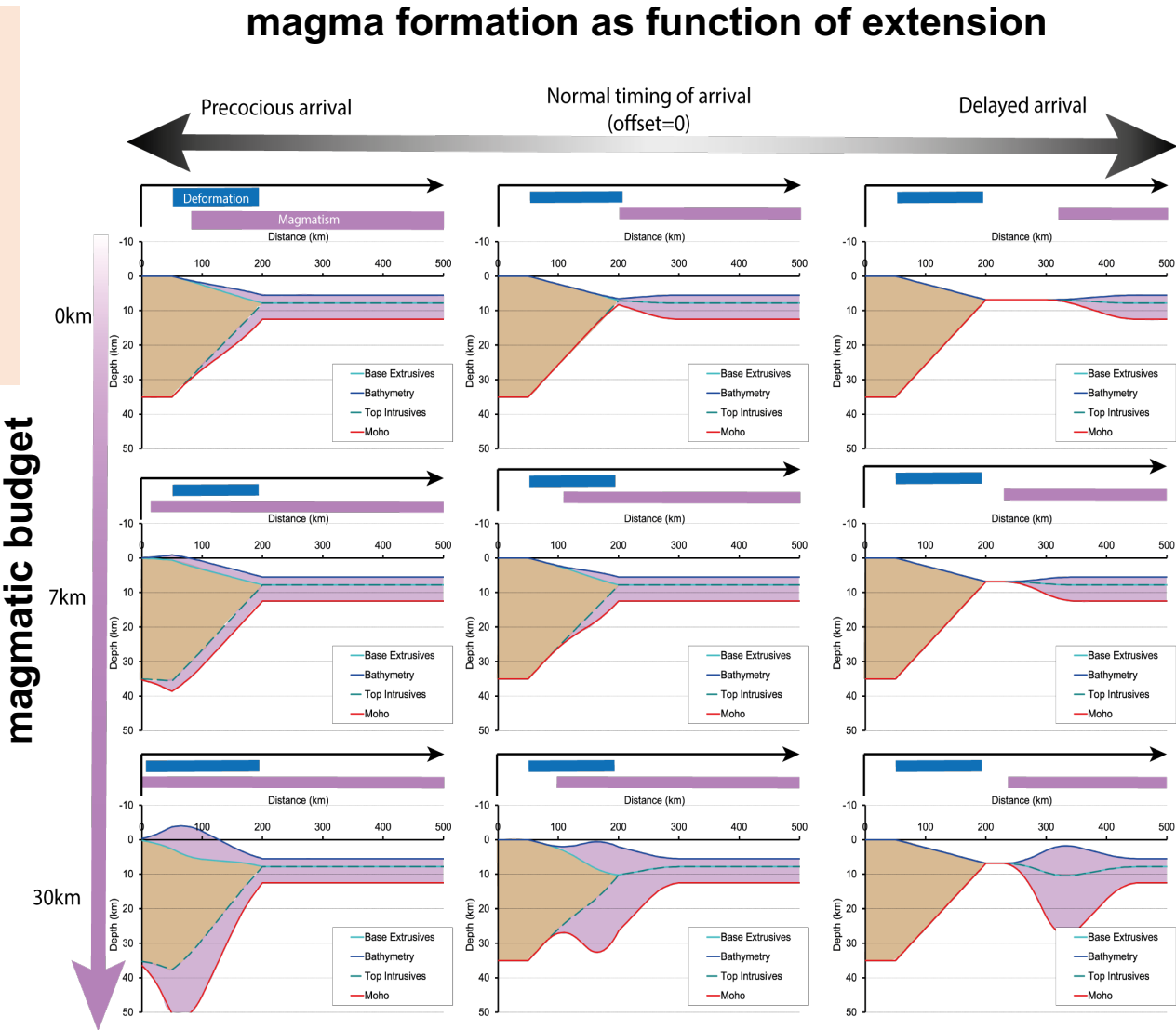
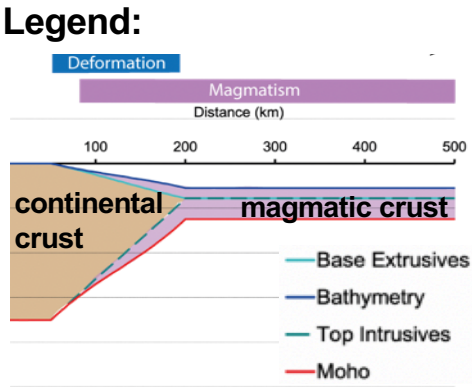


What are the key parameters necessary to describe rifted margins?

Key parameters to describe magmatism in a rift system

magma budget vs. relative timing of magma formation as a function of extension
(Tomasi, Kuszniir et al. in prep.)

- Main questions:
- When does first magma form?
 - Where does it form?
 - How much magma is produced?



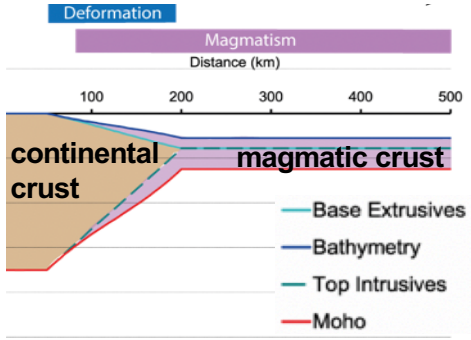
“Magma” in a “normal” rifted margin

magma budget vs. relative timing of magma formation as a function of extension
(Tomasi, Kuszniir et al. in prep.)

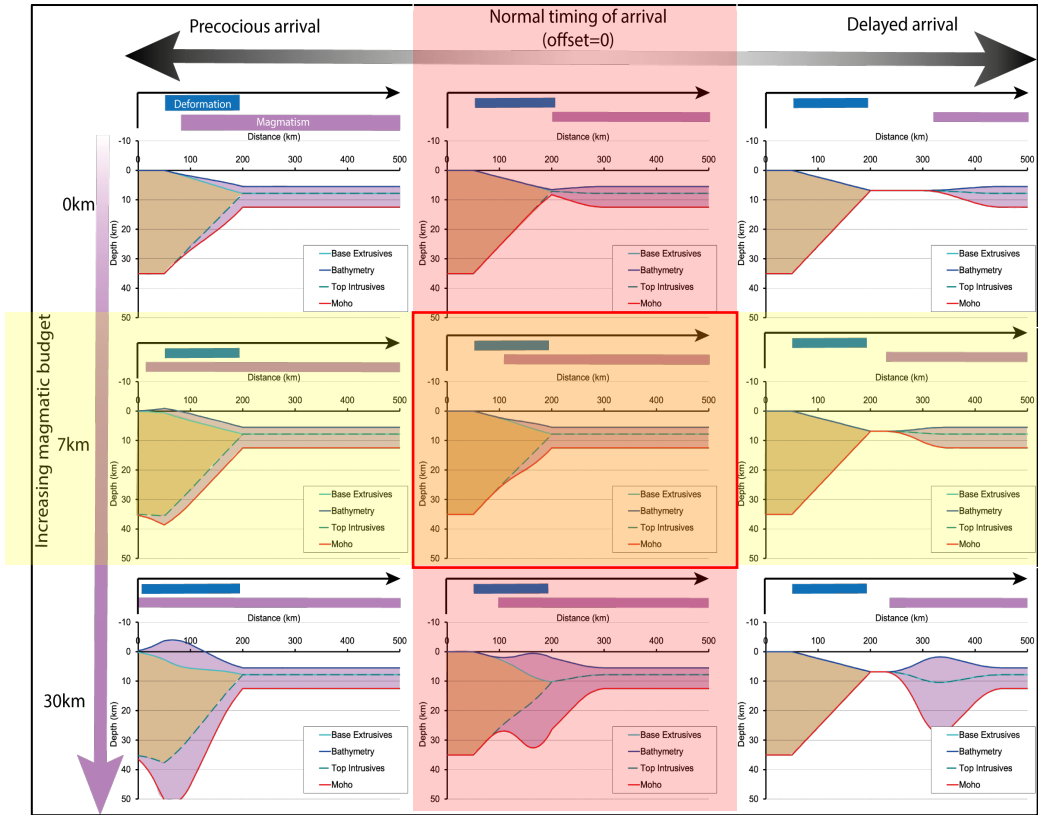
Main question:

- What is a “normal” rifted margin?

Legend:



Magma forms when asthenospheric mantle reaches solidus
(after $\beta=2$ in depth-uniform model)

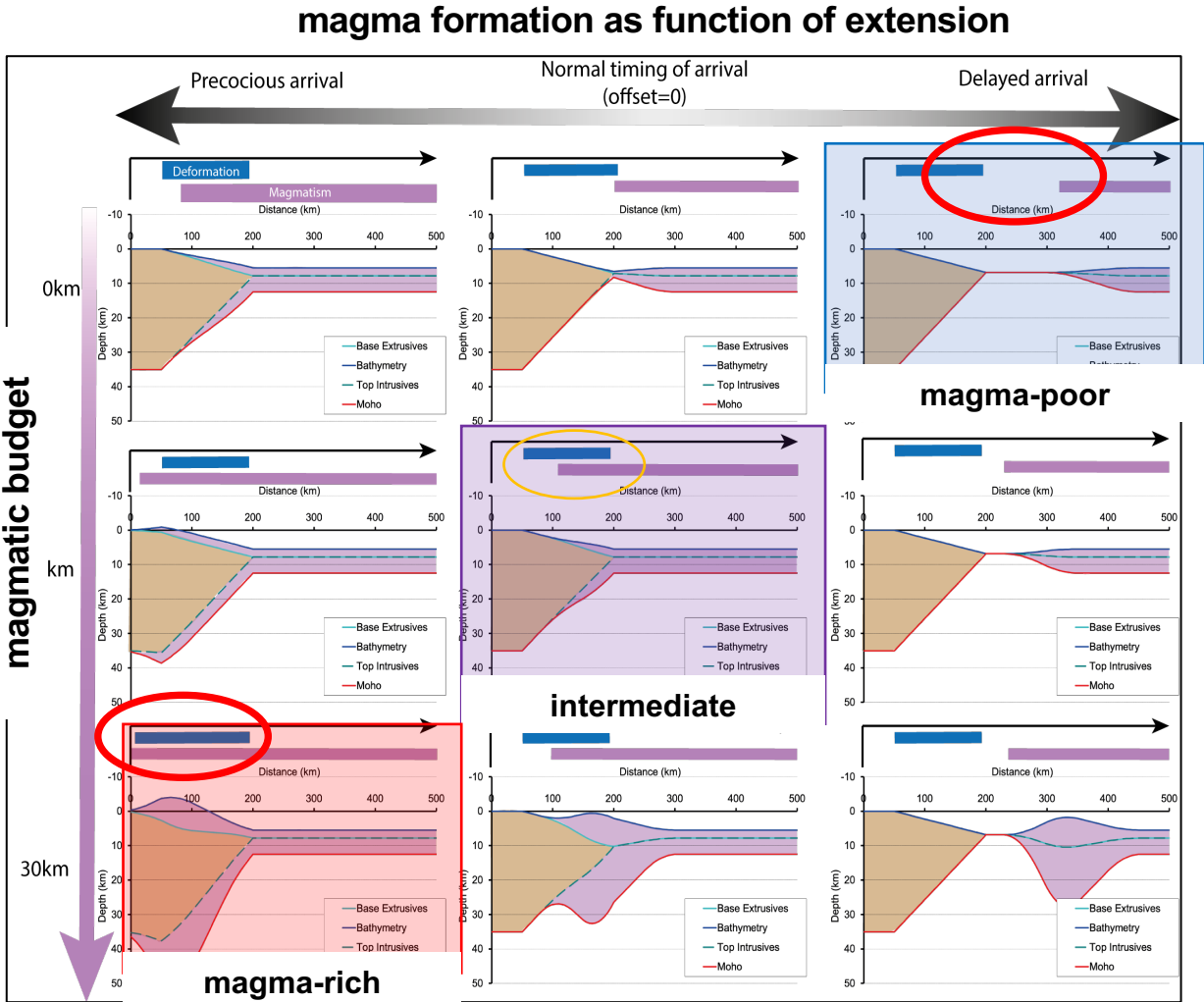
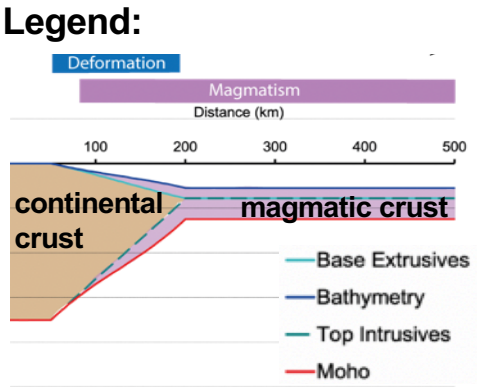


Full decompression can produce
6,5±1km of magma
(e.g. Oceanic Crust, Dick et al. 2003)

How to explain endmember type rifted margins

magma budget vs. relative timing of magma formation as a function of extension
(Tomasi, Kuszniir et al. in prep.)

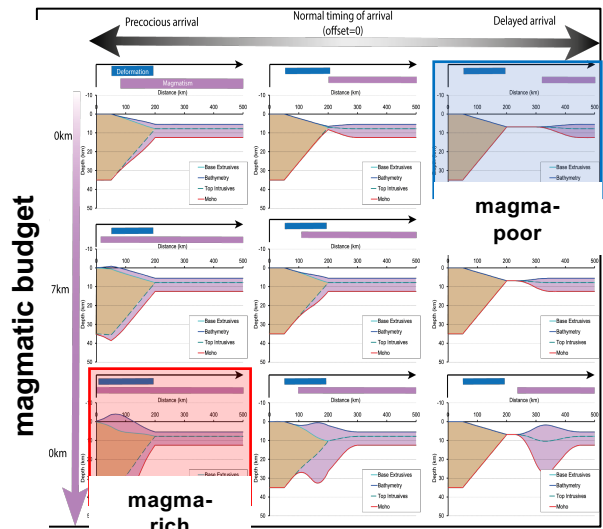
Main question:
• How to explain endmember margins?



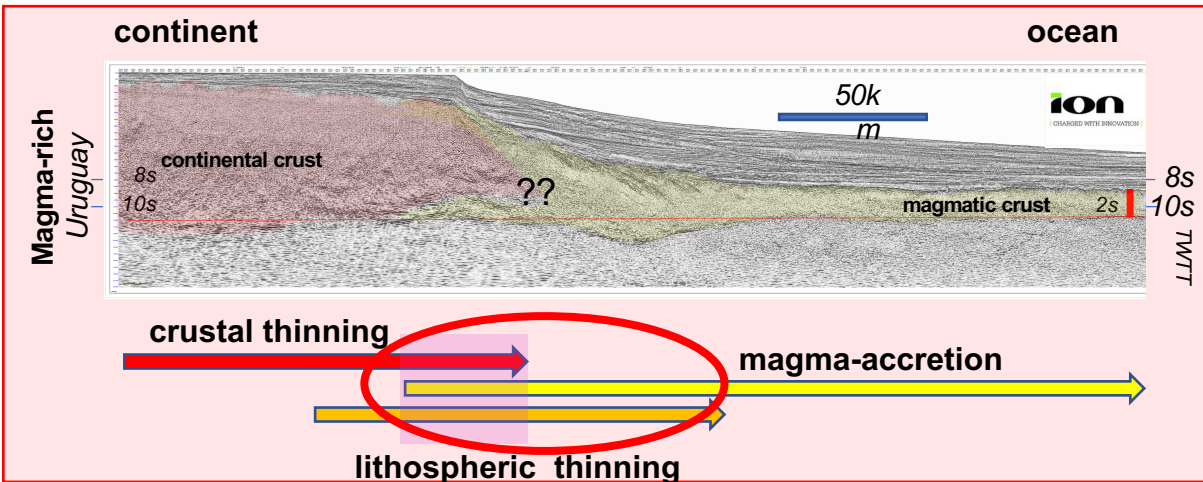
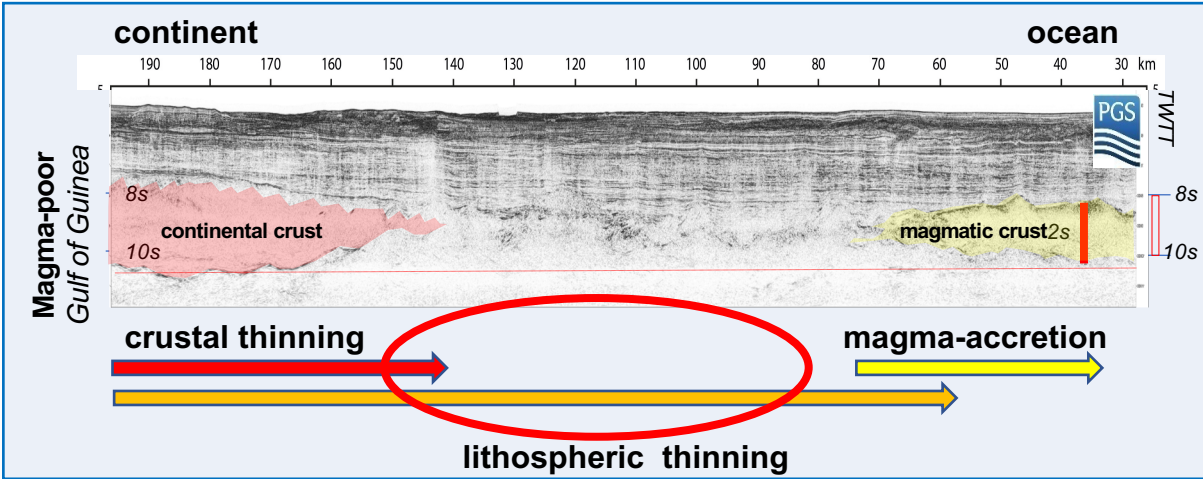
A “first” order description of rifted margins

magma budget vs. delay

magma formation as function of extension

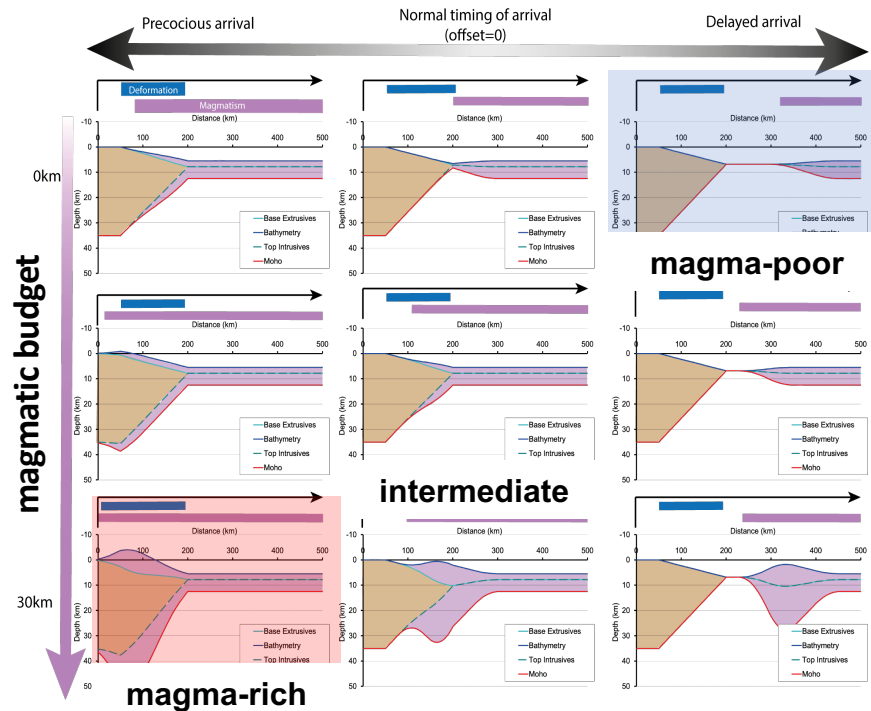


(Tomasi, Kusznir et al. in prep.)

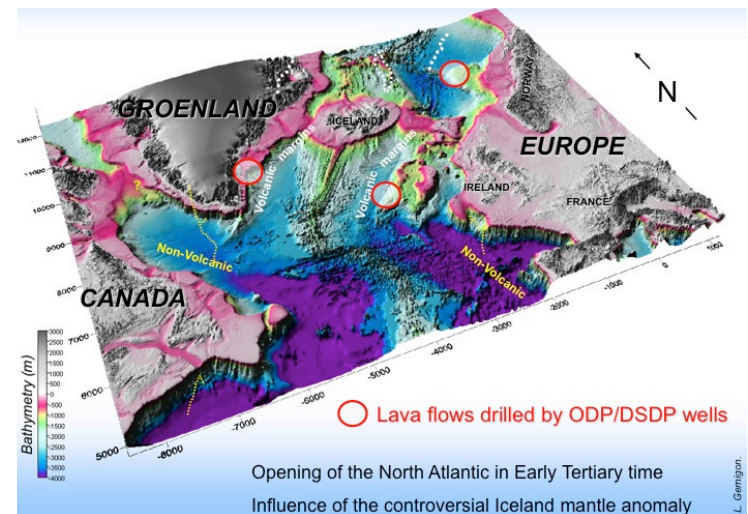
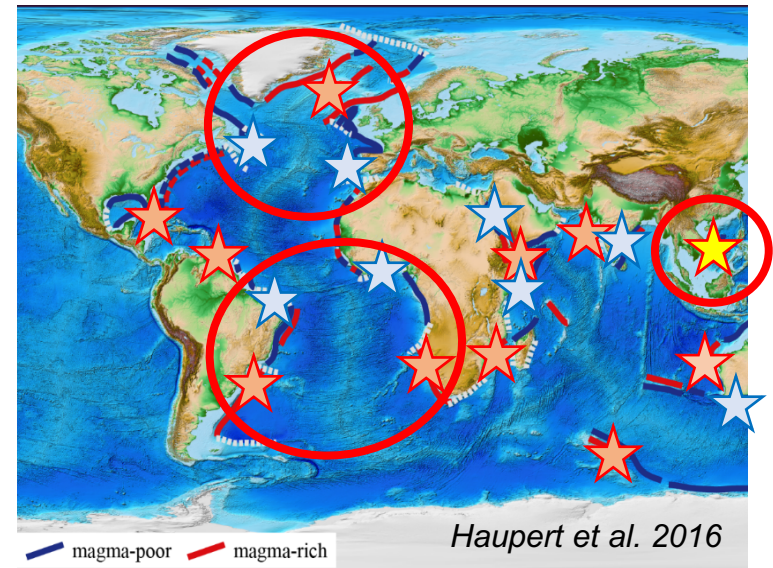


Future work

magma formation as function of extension



(Tomasi, Kuszniir et al. in prep.)



After Laurent Gernigson

Main questions:

- What controls the distribution of magma-rich & magma poor margins?
- What is the role of “plumes” and “inheritance”?
- How can we describe magmatic systems?