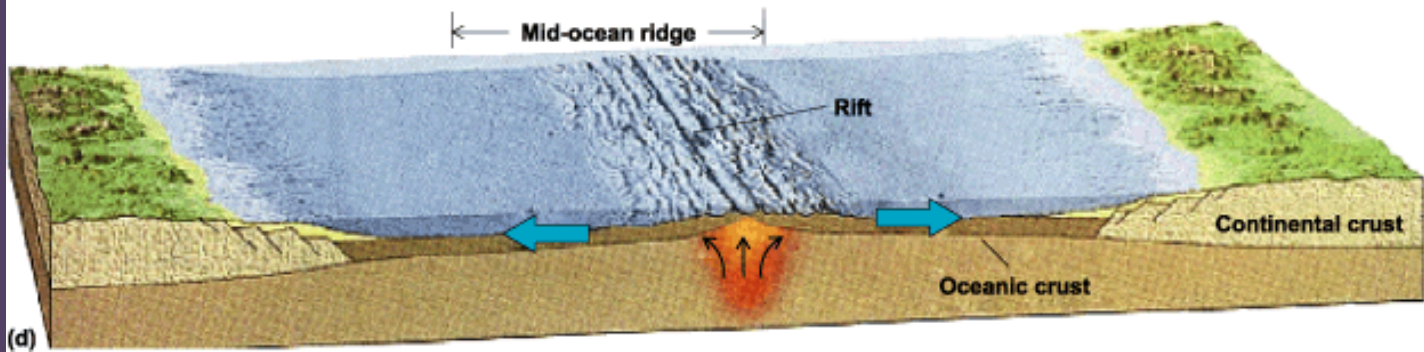
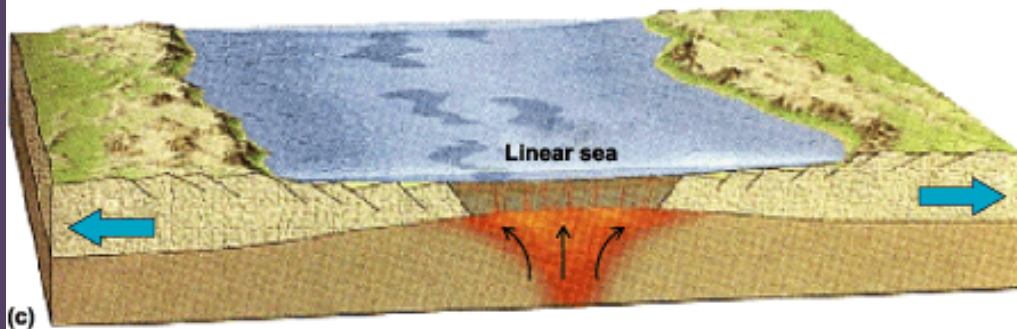
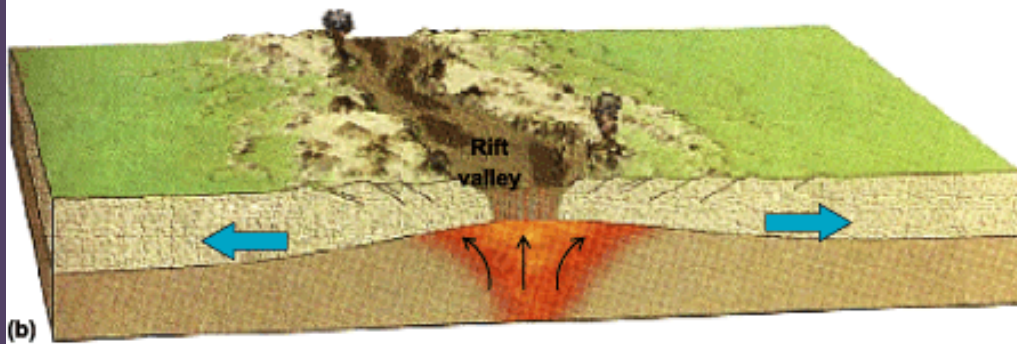
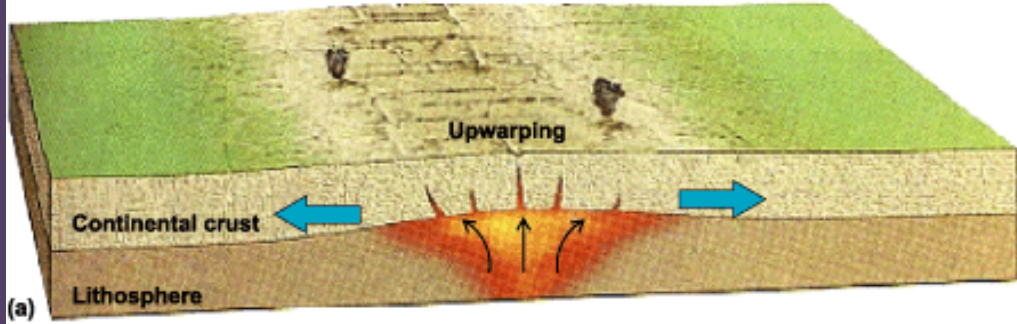


Strain scaling in the African Rift

R. Bendick, S. Fisseha, R. Reilinger, R. King,
S. McClusky, L. Flesch, Y. Birhanu

textbook rift models



Rift models

Table 1. Compilation of Results for Extensional Strain Scaling From Analog and Numerical Experiments^a

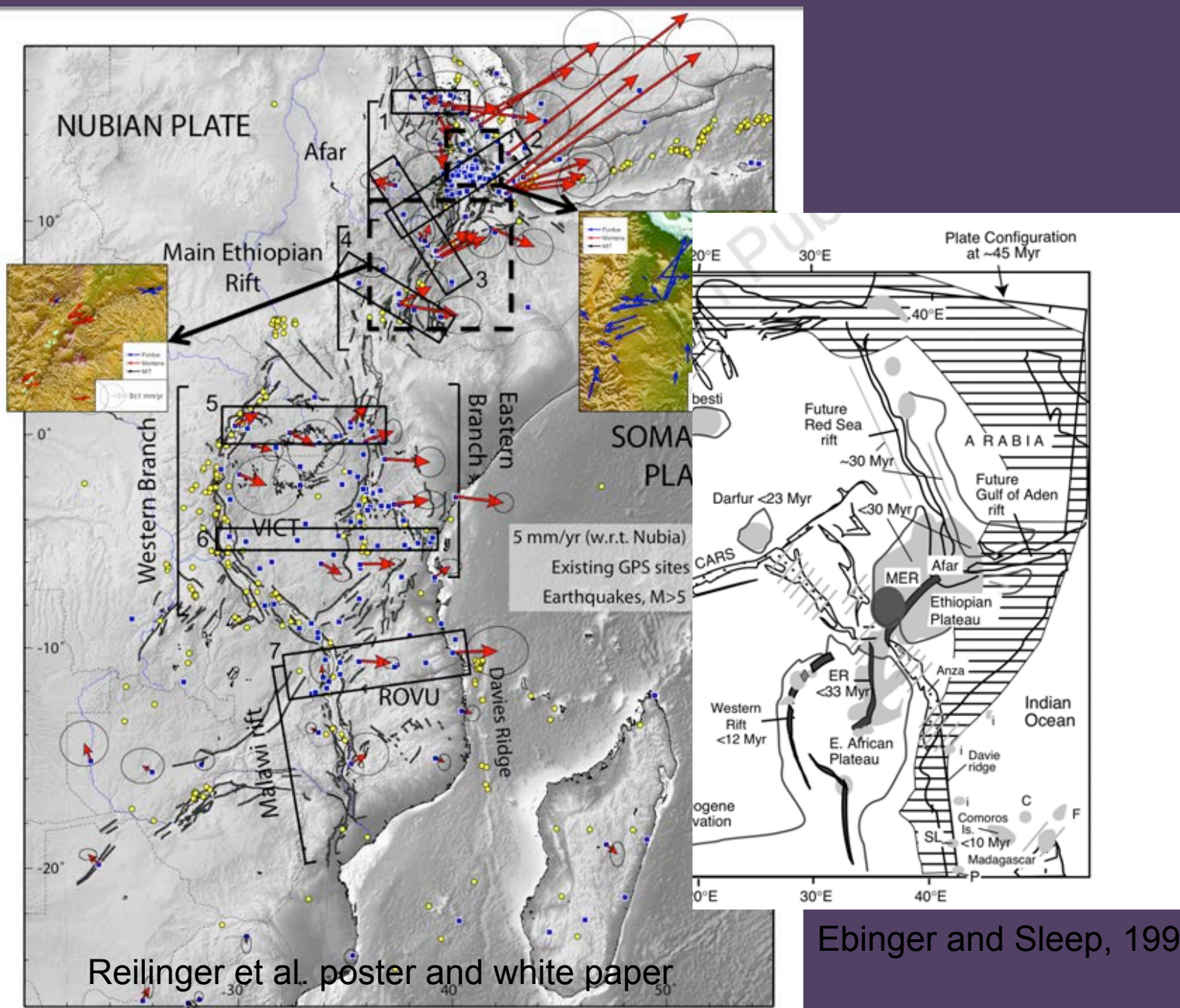
Strain Scaling in Continental Extension	
Delocalizing	Localizing
weak, thin or absent mantle lithosphere [<i>Sokoutis et al.</i> , 2007; <i>Huismans et al.</i> , 2001]	strong mantle lithosphere [<i>Sokoutis et al.</i> , 2007; <i>Buck</i> , 1991]
weak crust or crust-mantle decoupling [<i>Huismans et al.</i> , 2001; <i>Davis and Kuszniir</i> , 2004]	strong crust or crust-mantle coupling [<i>Burov and Poliakov</i> , 2001; <i>Corti et al.</i> , 2003]
distributed magmatism [<i>Corti et al.</i> , 2003]	localized magmatism [<i>Buck</i> , 1991; <i>Corti et al.</i> , 2003]
high strain rate [<i>Buck</i> , 1991; <i>Corti et al.</i> , 2003]	high strain rate [<i>Kuszniir and Park</i> , 1987; <i>Davis and Kuszniir</i> , 2004]
low strain rate [<i>Kuszniir and Park</i> , 1987; <i>Davis and Kuszniir</i> , 2004]	low strain rate [<i>Corti et al.</i> , 2003]
crustal necking [<i>Buck</i> , 1991; <i>Davis and Kuszniir</i> , 2004]	lithospheric necking [<i>Huismans et al.</i> , 2001; <i>Brun</i> , 1999; <i>Buck et al.</i> , 1999]
regional isostasy [<i>Buck</i> , 1991]	strong thermal buoyancy effects [<i>Davis and Kuszniir</i> , 2004]
	large total strain [<i>Buck et al.</i> , 1999]
	throughgoing crustal fault [<i>Buck</i> , 1991]

^aIn general, strong lithosphere excites localized strain and weak lithosphere excites distributed strain. Other correlations are more ambiguous, such as the relations among strain rate, total strain, and length scale. See the text for further discussion.

Basic mechanics



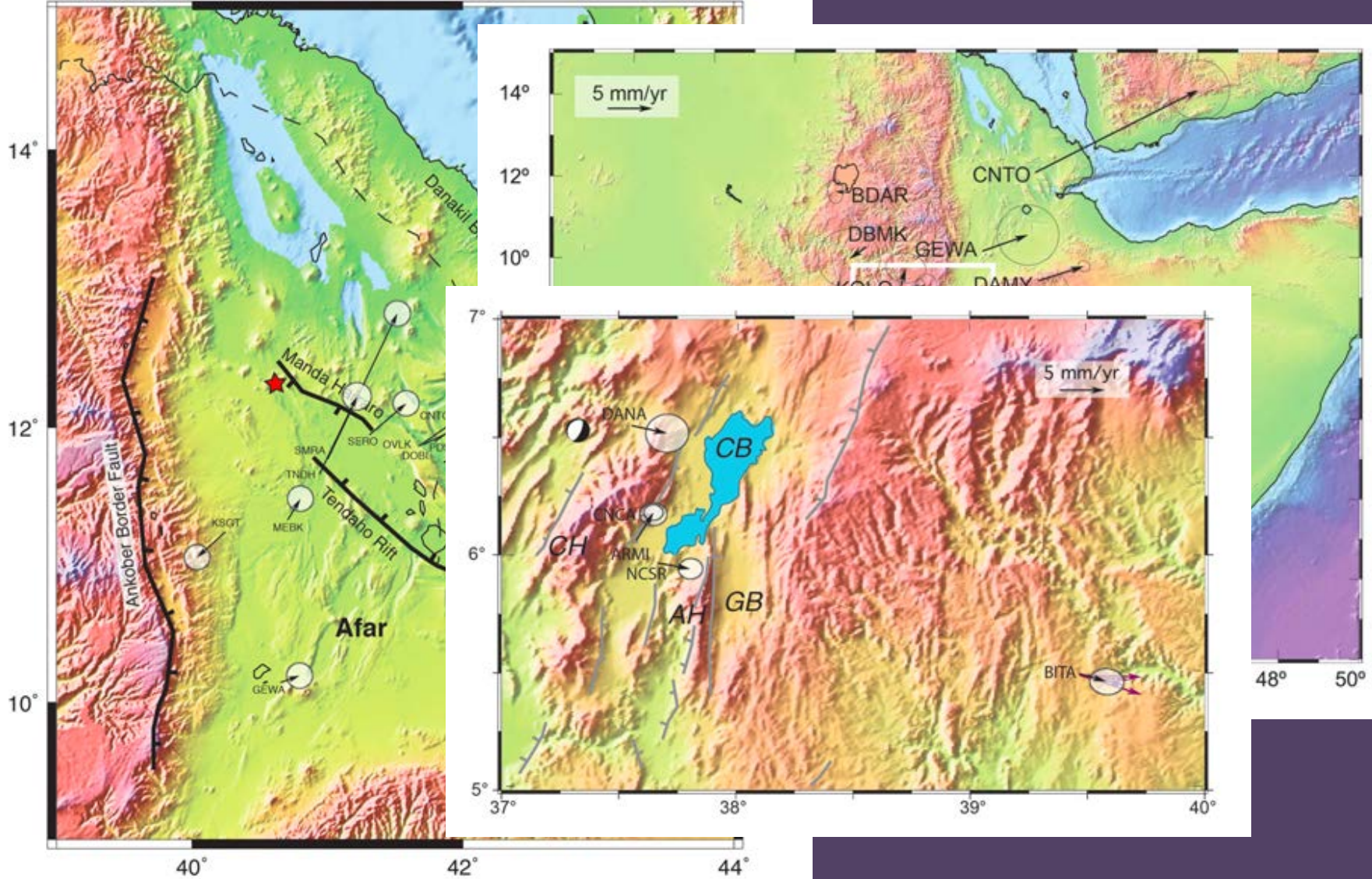
D for e, è or t in Africa



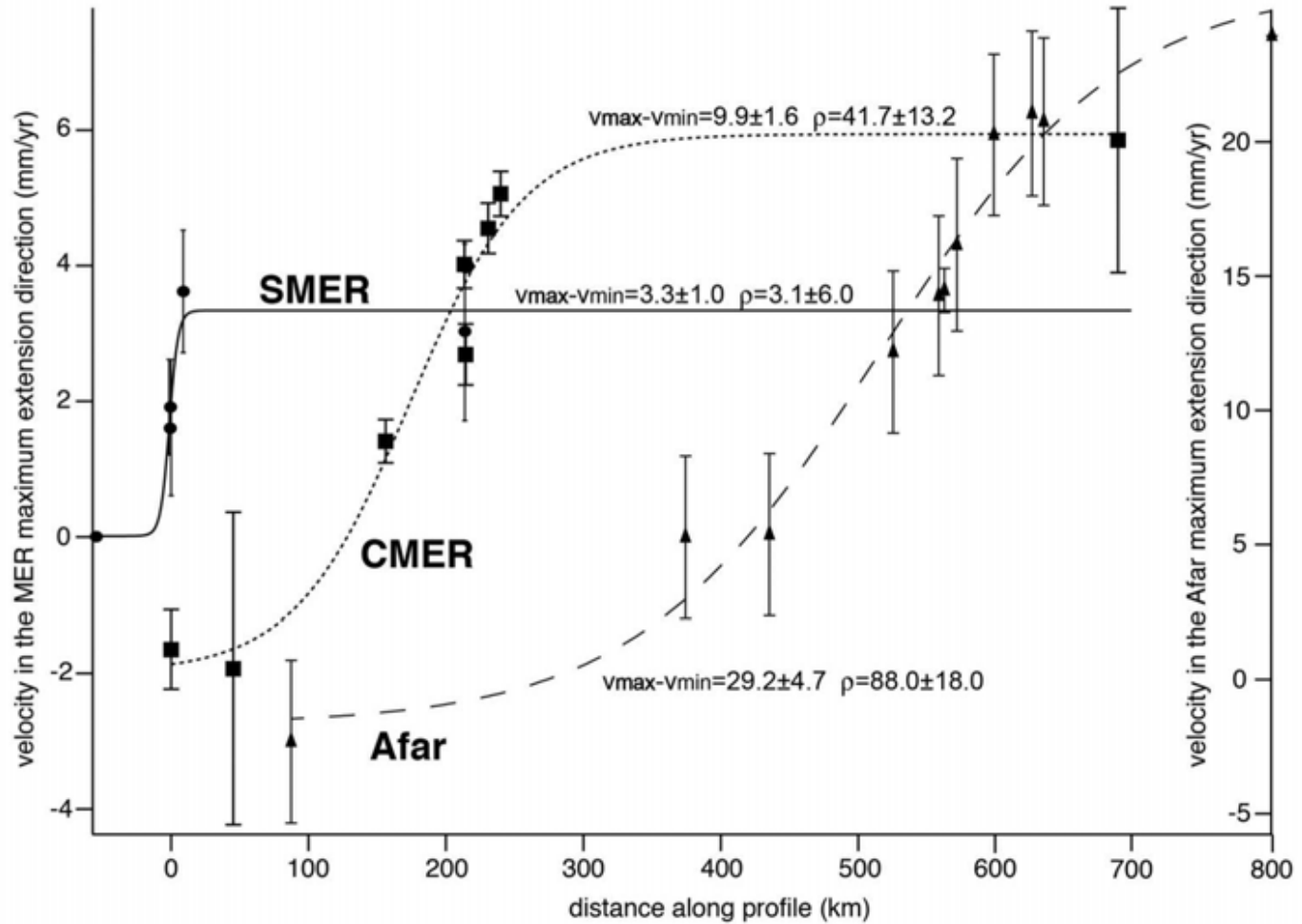
Reilinger et al. poster and white paper

Ebinger and Sleep, 1998

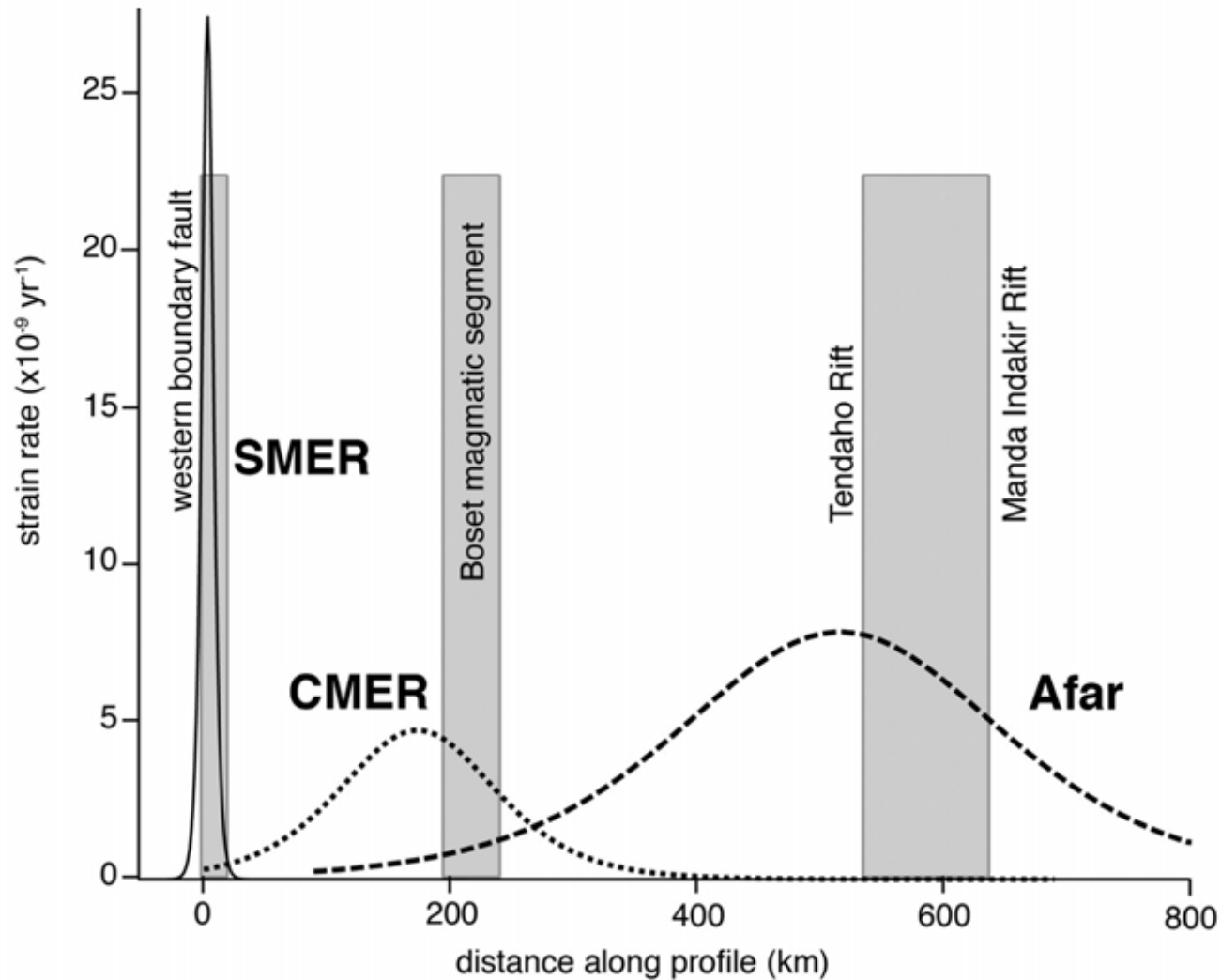
Ethiopian velocities



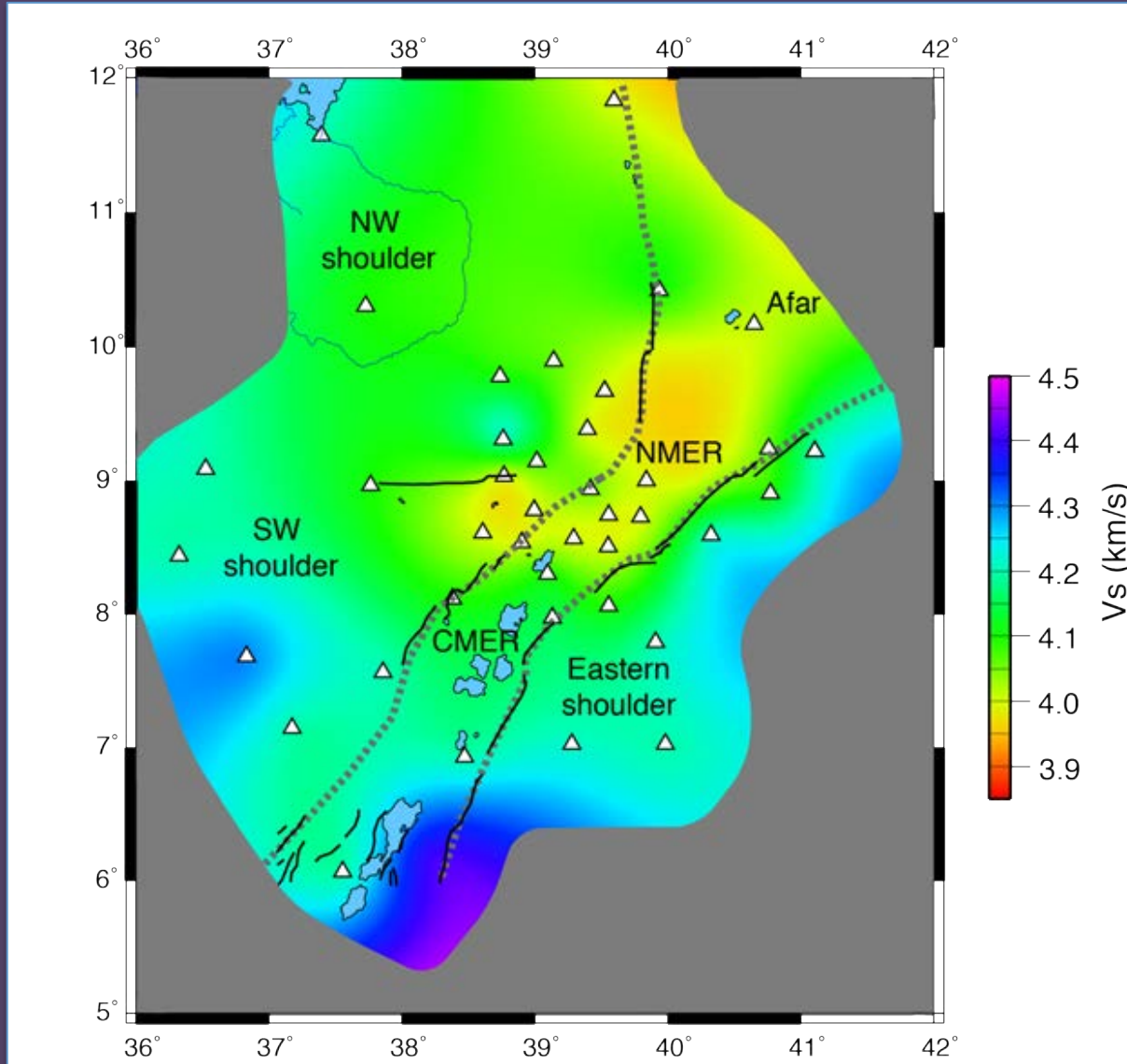
Velocity transects



Strain rate “transects”

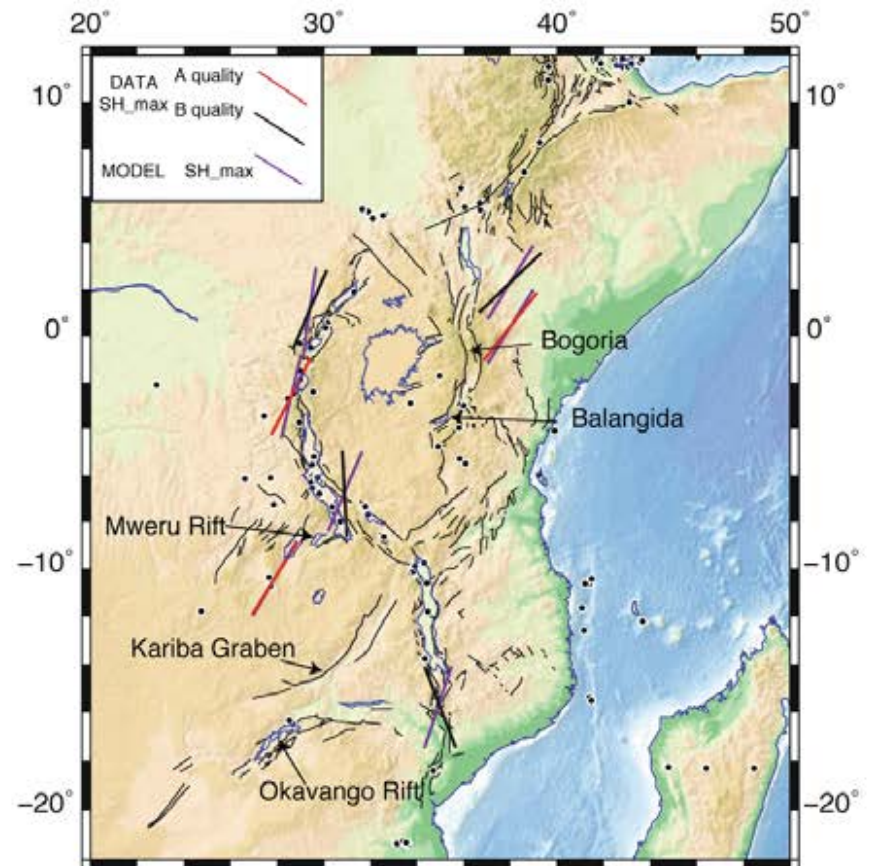
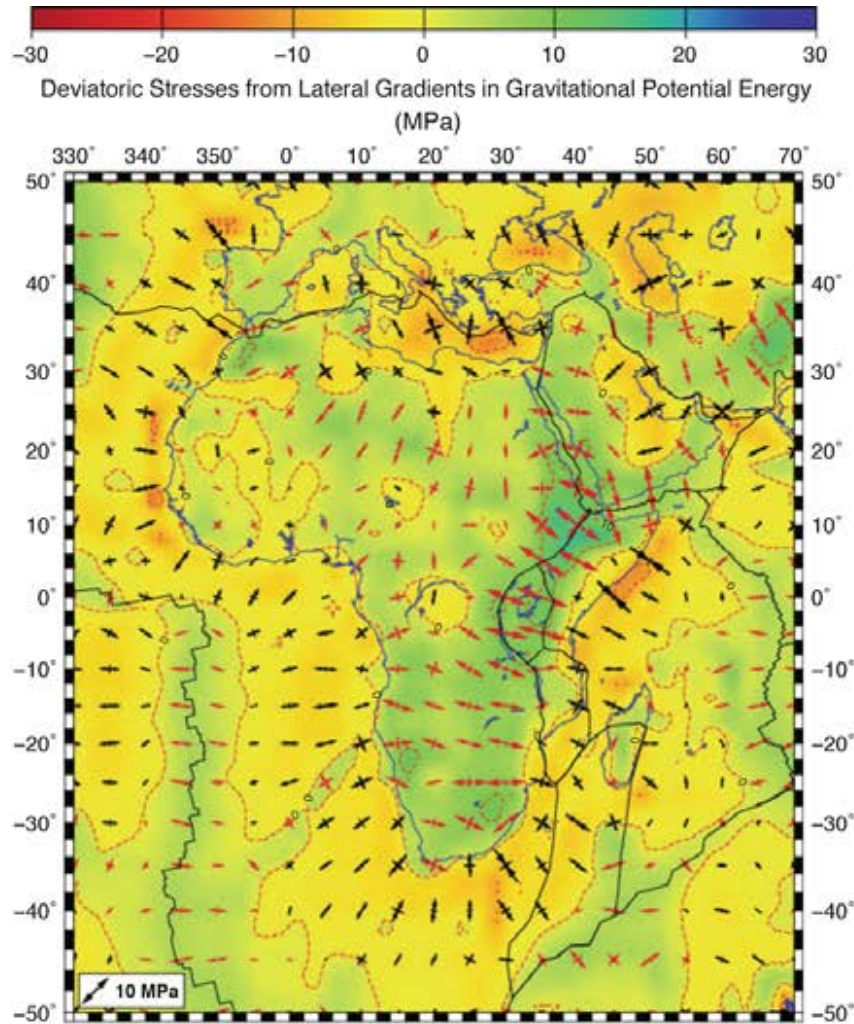


Other supporting evidence

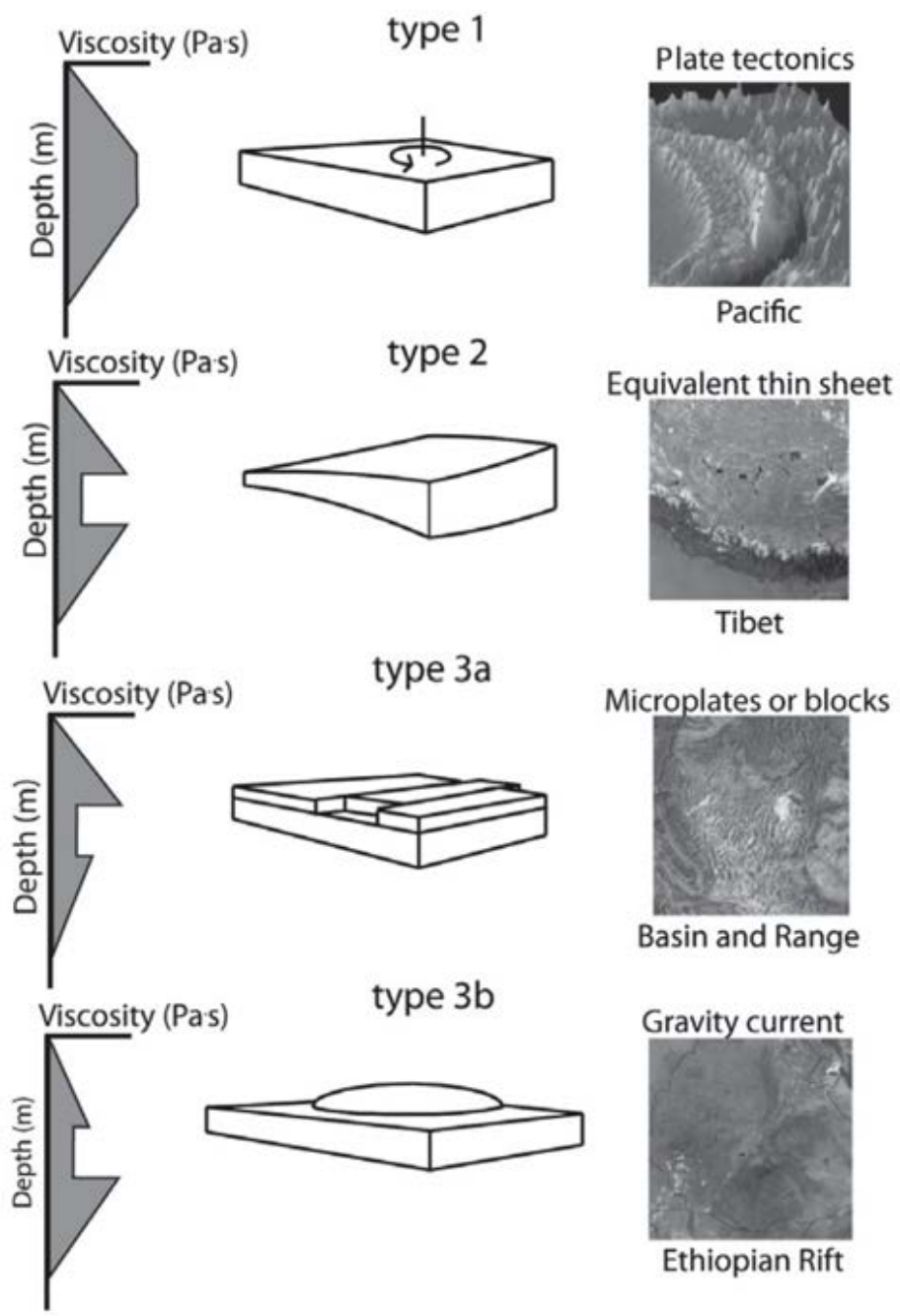


Keranen et al., 2010

Other supporting evidence



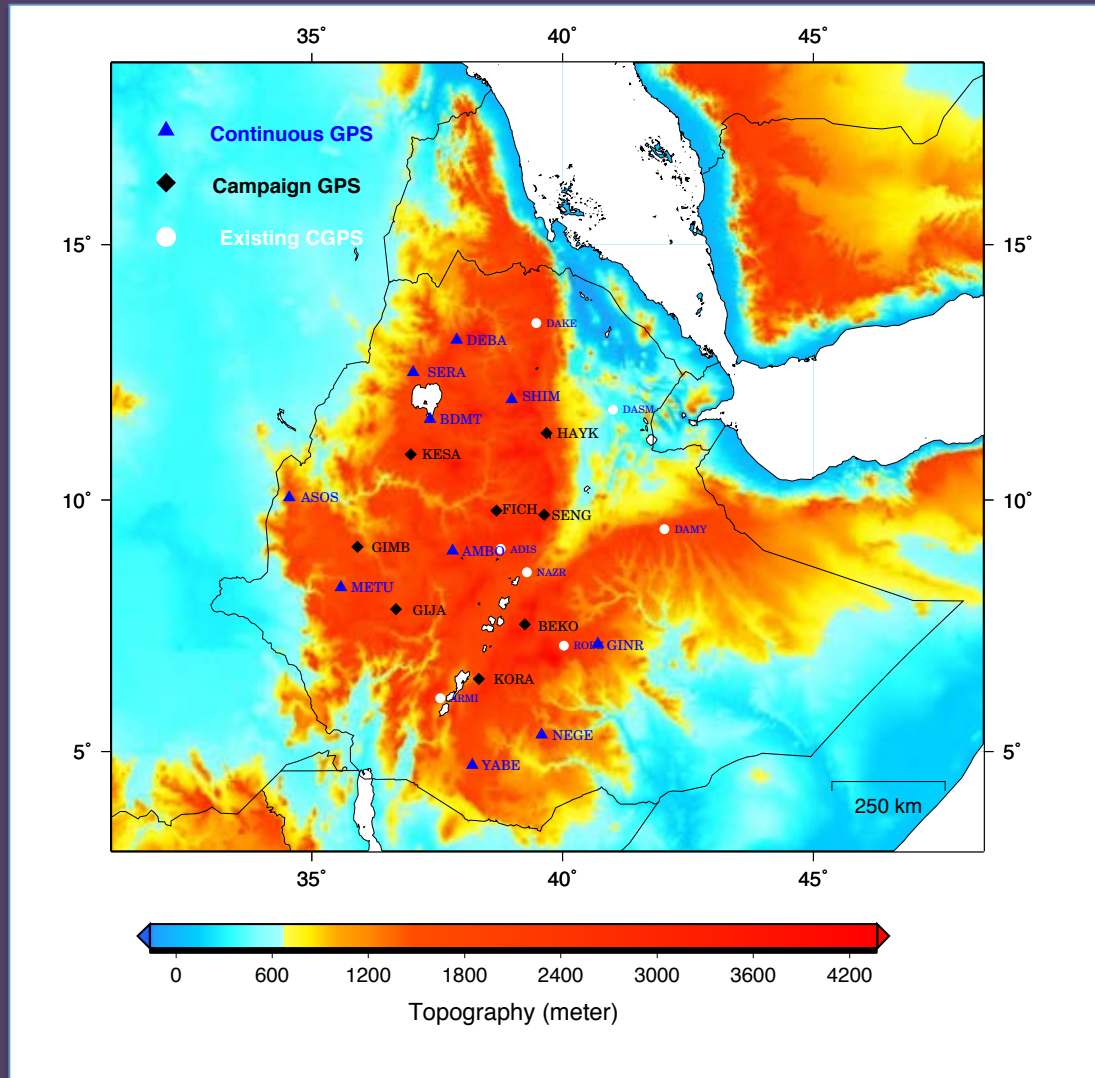
Heterogeneous simulations



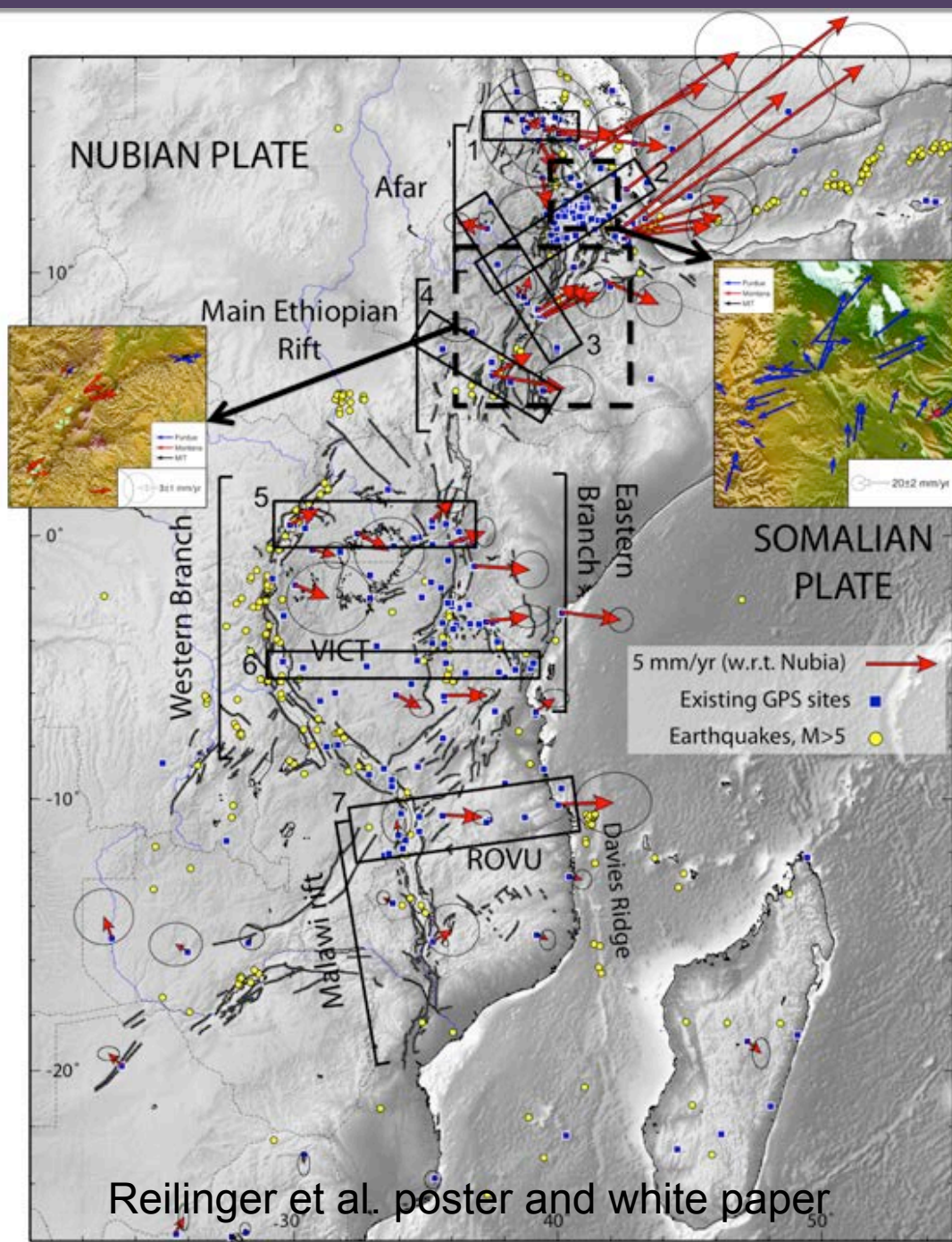
“narrow” vs. “wide” rifting



Work in progress



Urgent needs



Reilinger et al. poster and white paper

New (old) questions

- How do extensional structures evolve over time?
- How do continental extensional dynamics compare to convergent dynamics?
- What are the basic mechanical properties of continental lithosphere? How (and why) do these vary from place to place?