

Whole-lithosphere shear during oblique rifting

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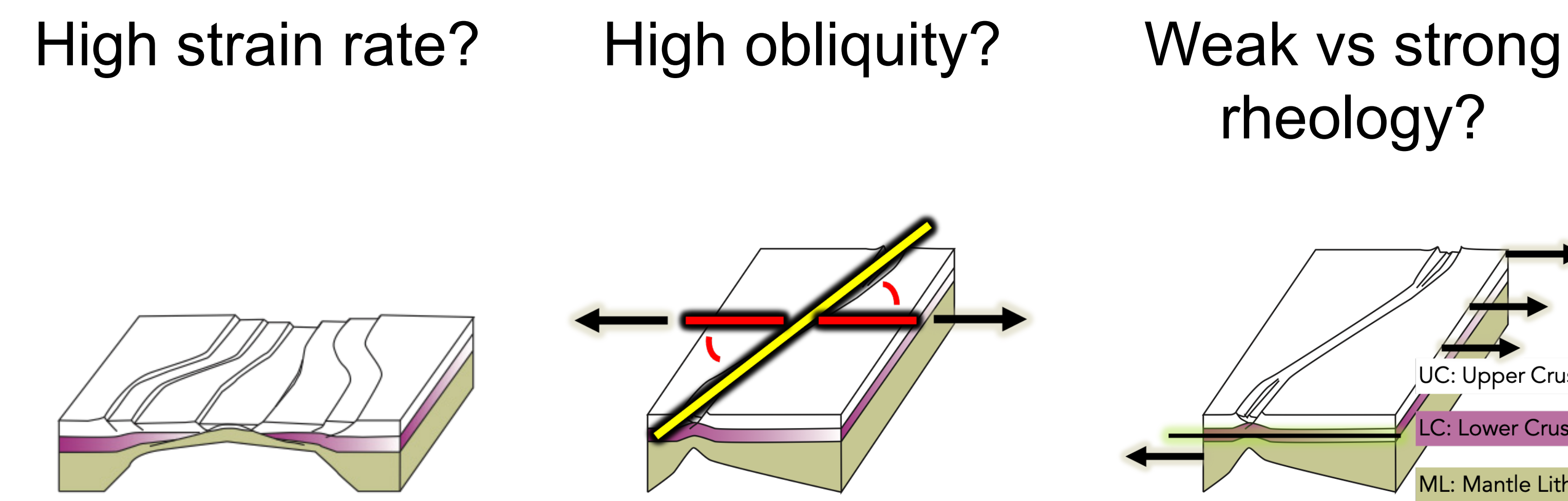
Adapted from paper in revision to be re-submitted to *Geology*

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Kinematic reconstruction (view at BrandonLutzGeology.com) generated using open source GPLates software

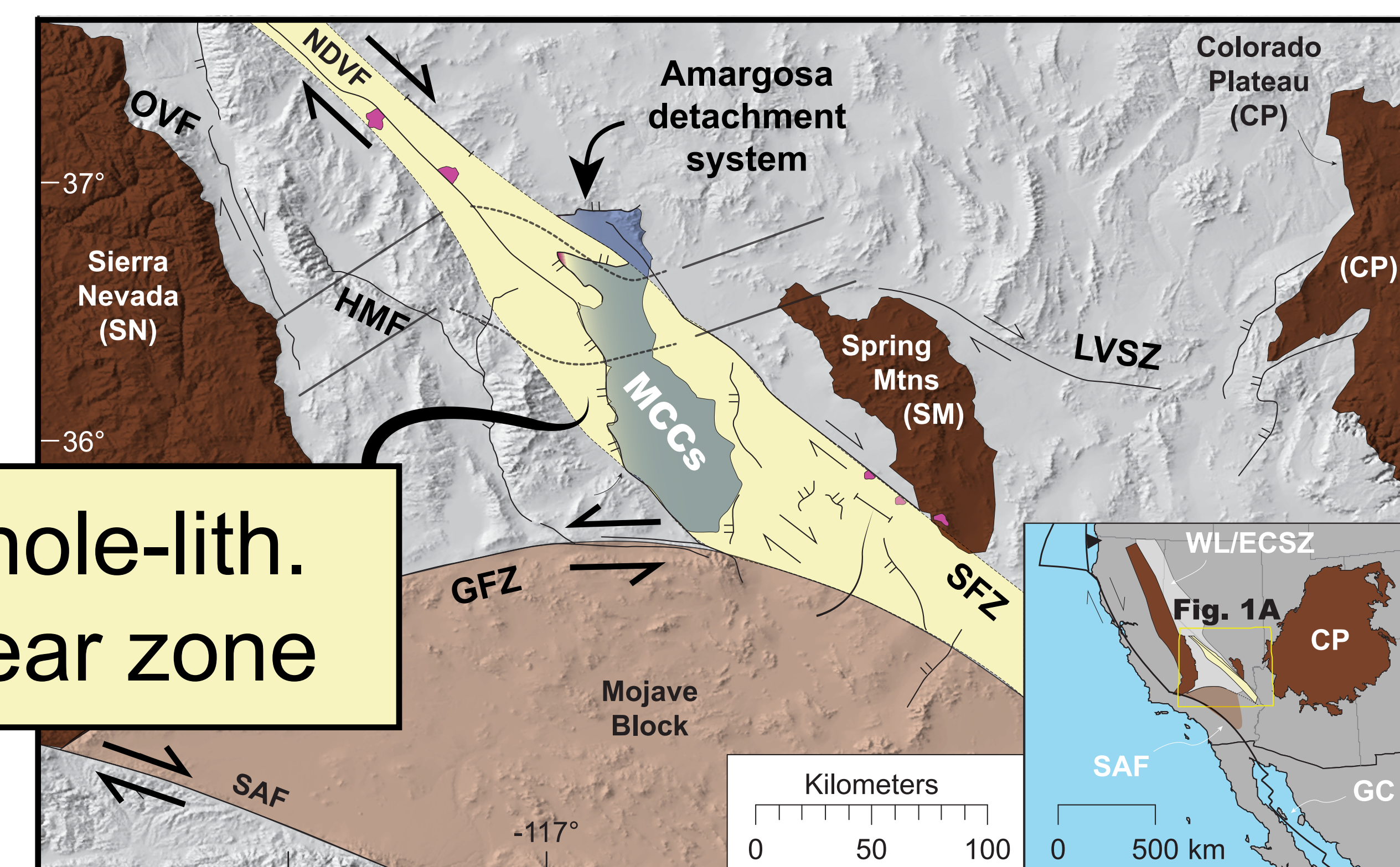
References: DeMets, C., and Morhous, S., 2016. High-resolution reconstructions of Pacific-North America plate motion 20 Ma to present. *Geophysical Journal International*, v. 207, no. 2, p. 741-773. doi: 10.1093/gjg/ggw005. Gaudin, S., Nanni, R., Clavier, R., Dumas, M., Jones, C.H., Molnar, P.H., and Nanni, H.A., 2009. Stable fault system: A new component of the Mojave Crustal Eastern California shear zone. *Geological Society of America Bulletin*, v. 119, no. 11-12, p. 1337-1347. doi: 10.1130/B3070071.1193.37. Larson, A., and Miller, M.S., 2012. Evolutionary aspects of the Pacific-North American plate boundary: A kinematic reconstruction of the western United States. *Geophysical Research Letters*, v. 39, no. 7, p. 10.1029/2011GL048456. Lutz, B., Karthaus, R., Axen, G., Brune, S., and Miller, M.S., 2015. The Walker Lane system: A kinematic reconstruction of the Walker Lane system, California. *Geophysical Research Letters*, v. 42, no. 2, p. 10.1029/2014GL061000. Miller, M.S., and Brune, S., 2011. A new perspective on the Walker Lane system: A kinematic reconstruction of the Walker Lane system, California. *Geophysical Research Letters*, v. 38, no. 2, p. 10.1029/2010GL045000. Wernicke, B., 1985. Cenozoic extensional tectonics of the U.S. Cordillera. In: *Plate Tectonics*, ed. R. S. Stein, p. 351-381. Copyright © 1985 by John Wiley & Sons, Inc.

How to rupture a continent?



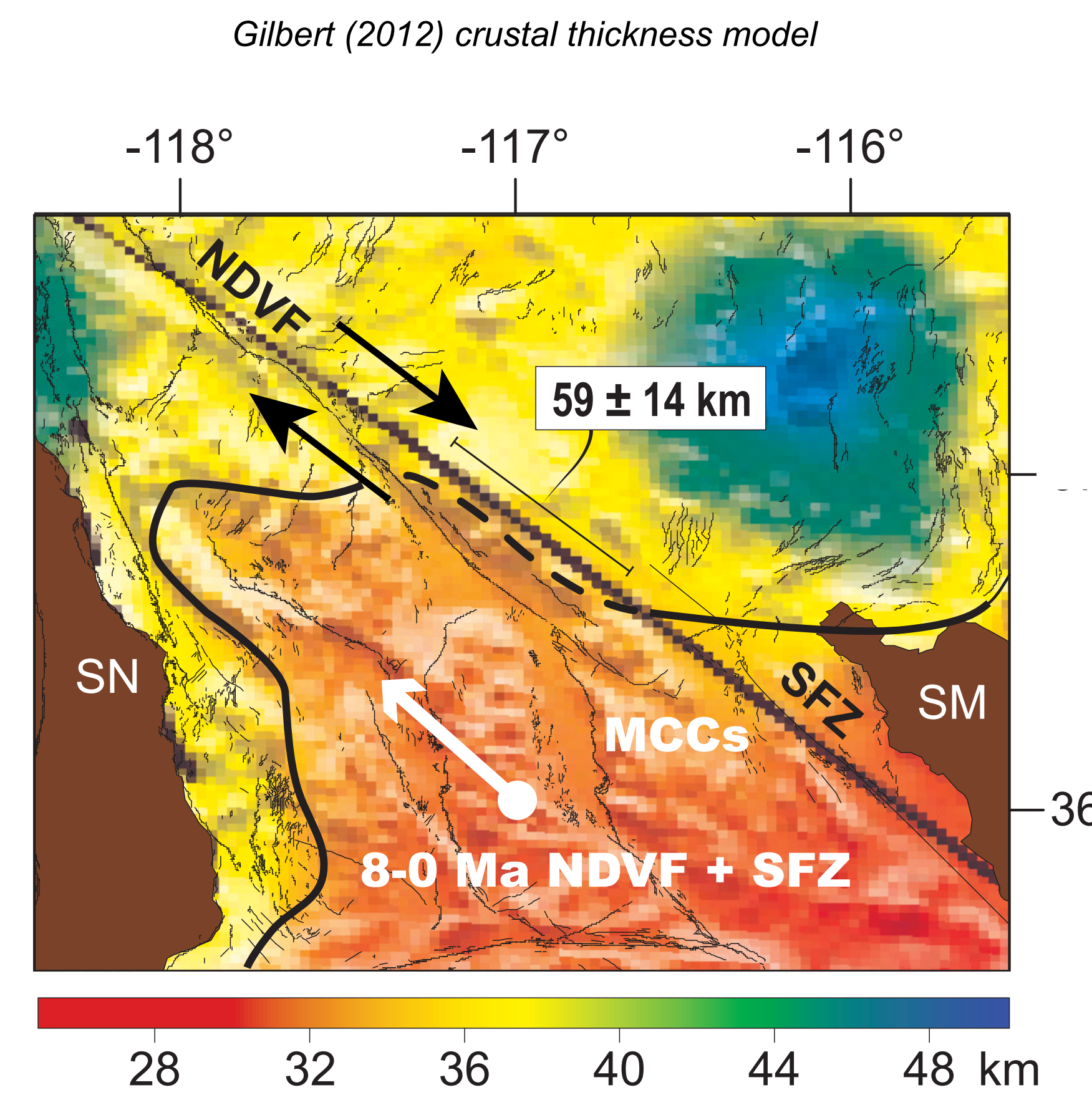
ECSZ / Basin & Range

Shear zone co-located with MCCs



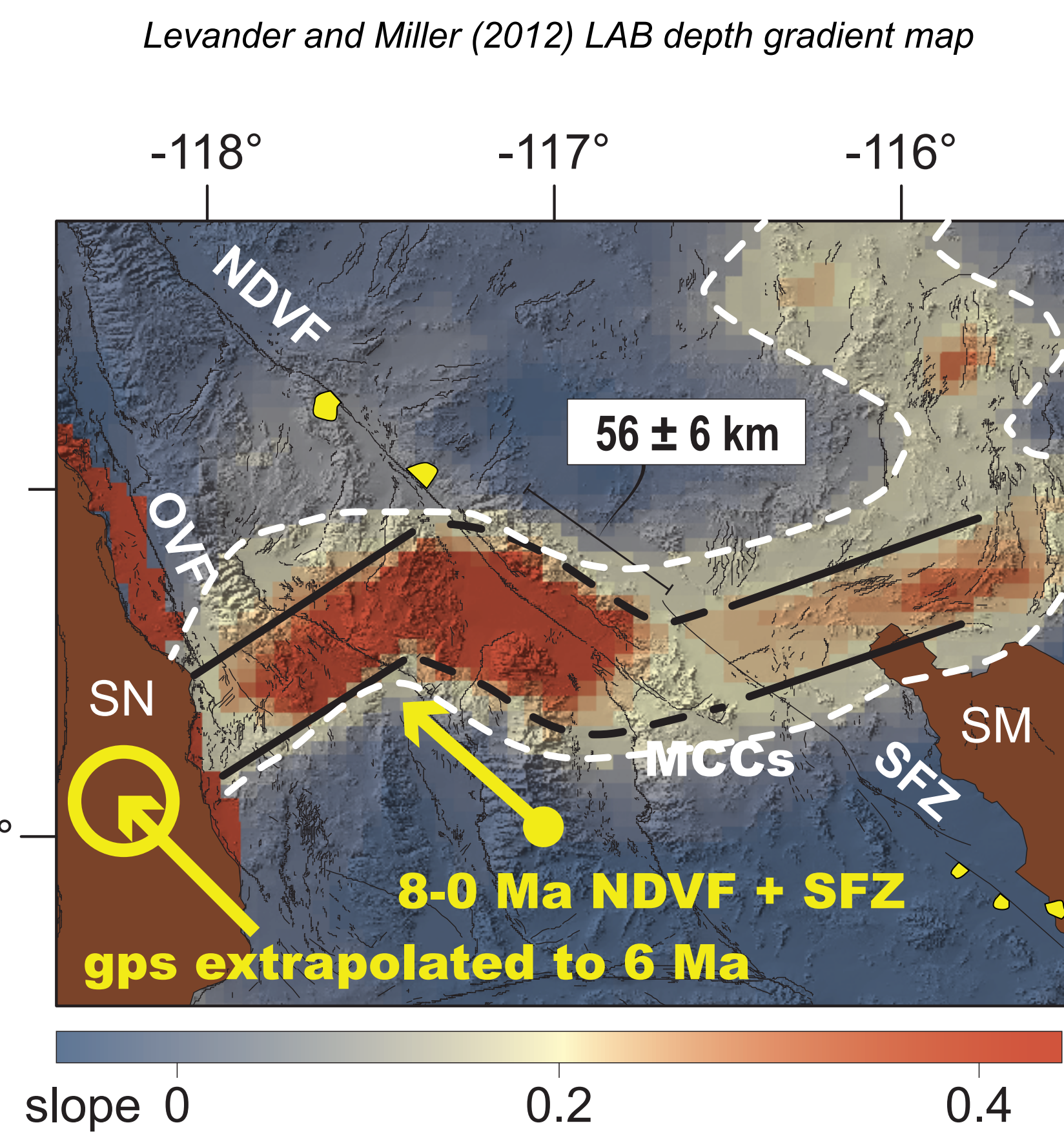
GC: Gulf of California. GFZ: Garlock fault zone. HMF: Hunter Mountain fault zone. LVSZ: Las Vegas Valley shear zone. MCC: Metamorphic core complex. NDVF: Northern Death Valley fault zone. OVF: Owens Valley fault zone. SAF: San Andreas fault. SFZ: Stataline fault zone. WL/ECSZ: Walker Lane Belt/Eastern California Shear Zone.

Moho Reconstruction

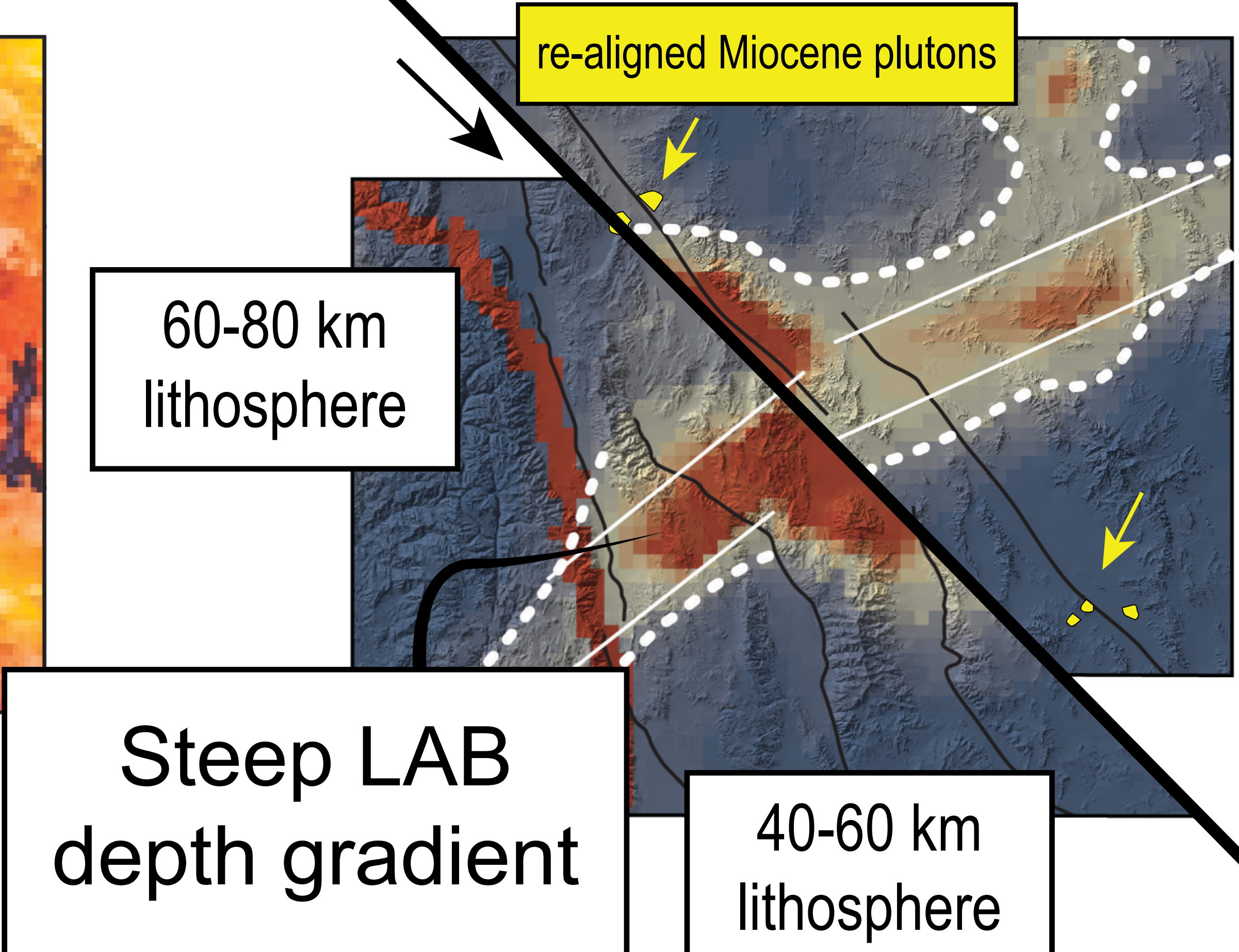


Reconstruction using 36 km contour yields ~70 km dextral shear

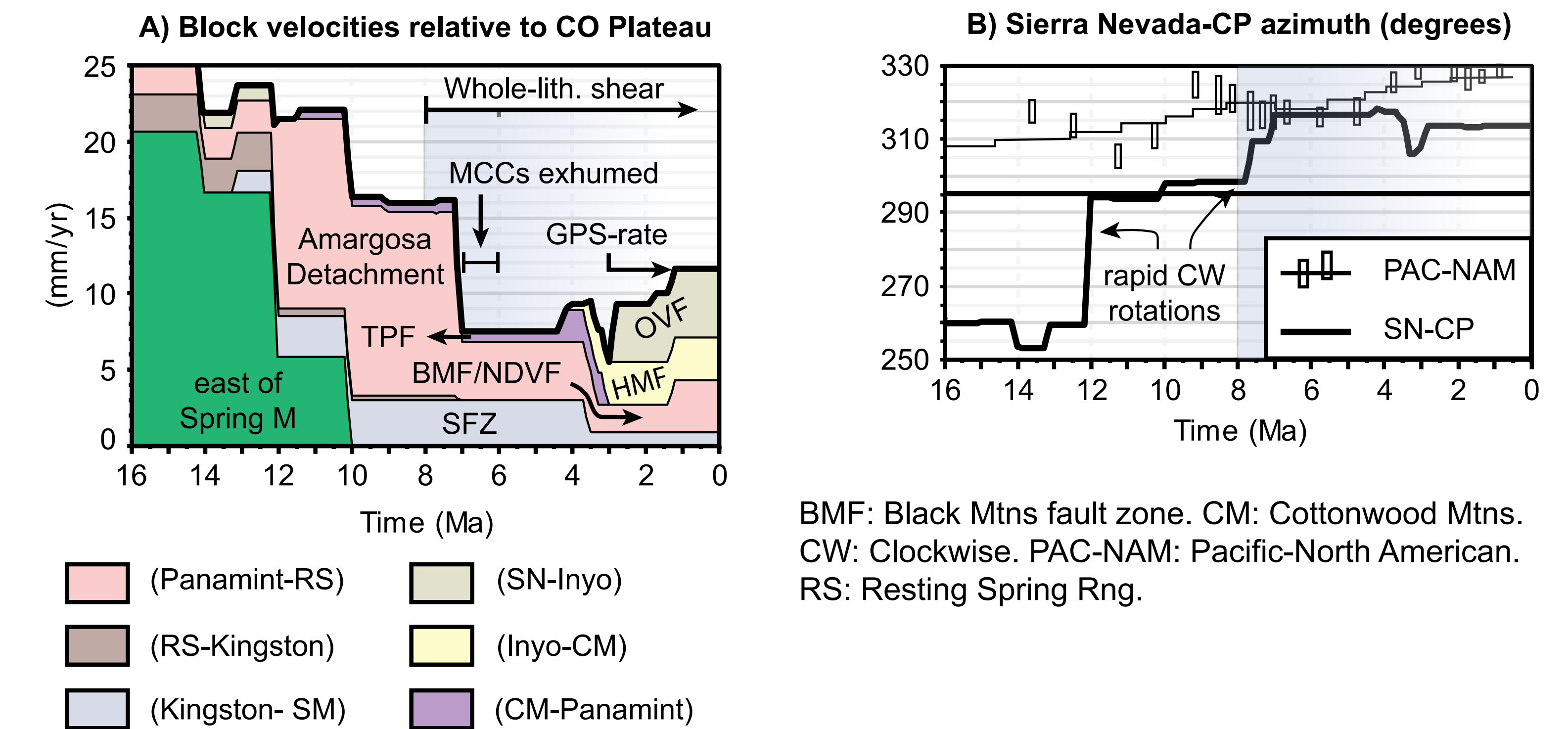
LAB Reconstruction



Reconstruction of LAB depth gradient yields ~60 km dextral shear



Upper Crustal Kinematics



Conclusions

