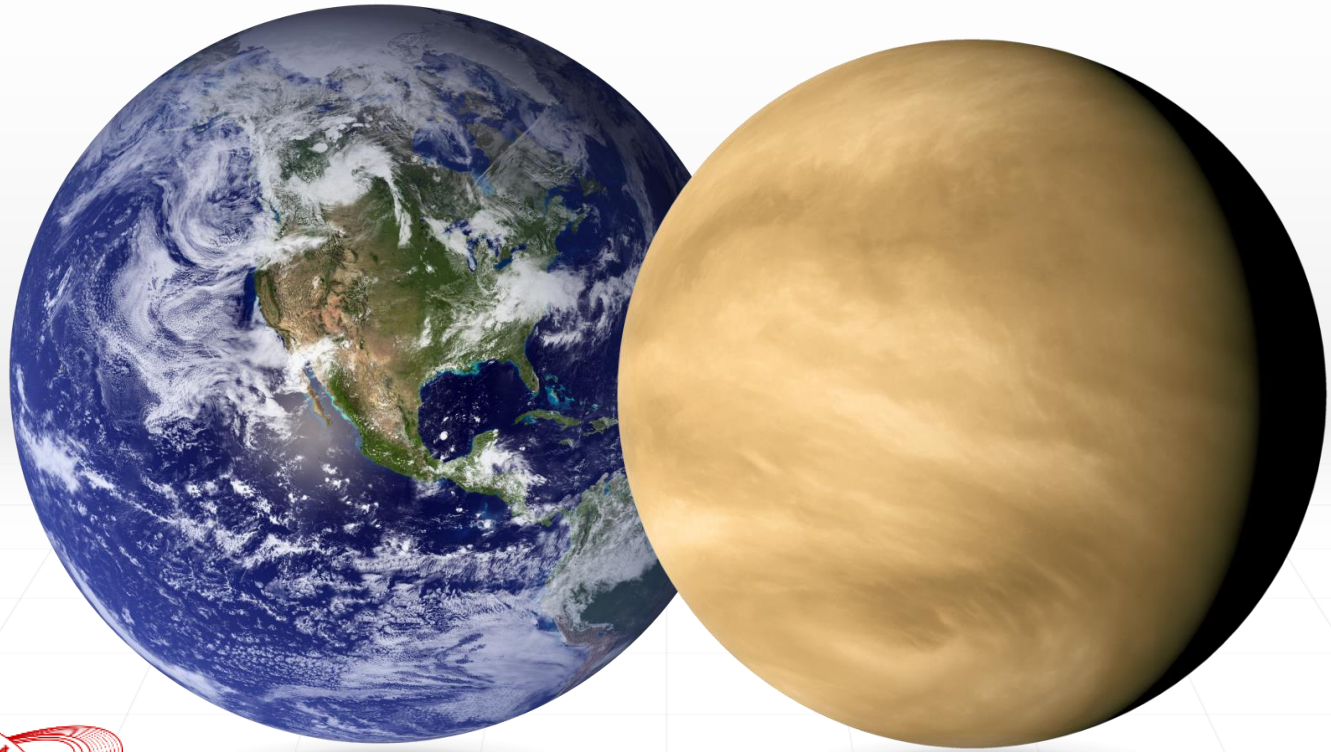
SIMILARITIES IN

large-scale tectonic deformation

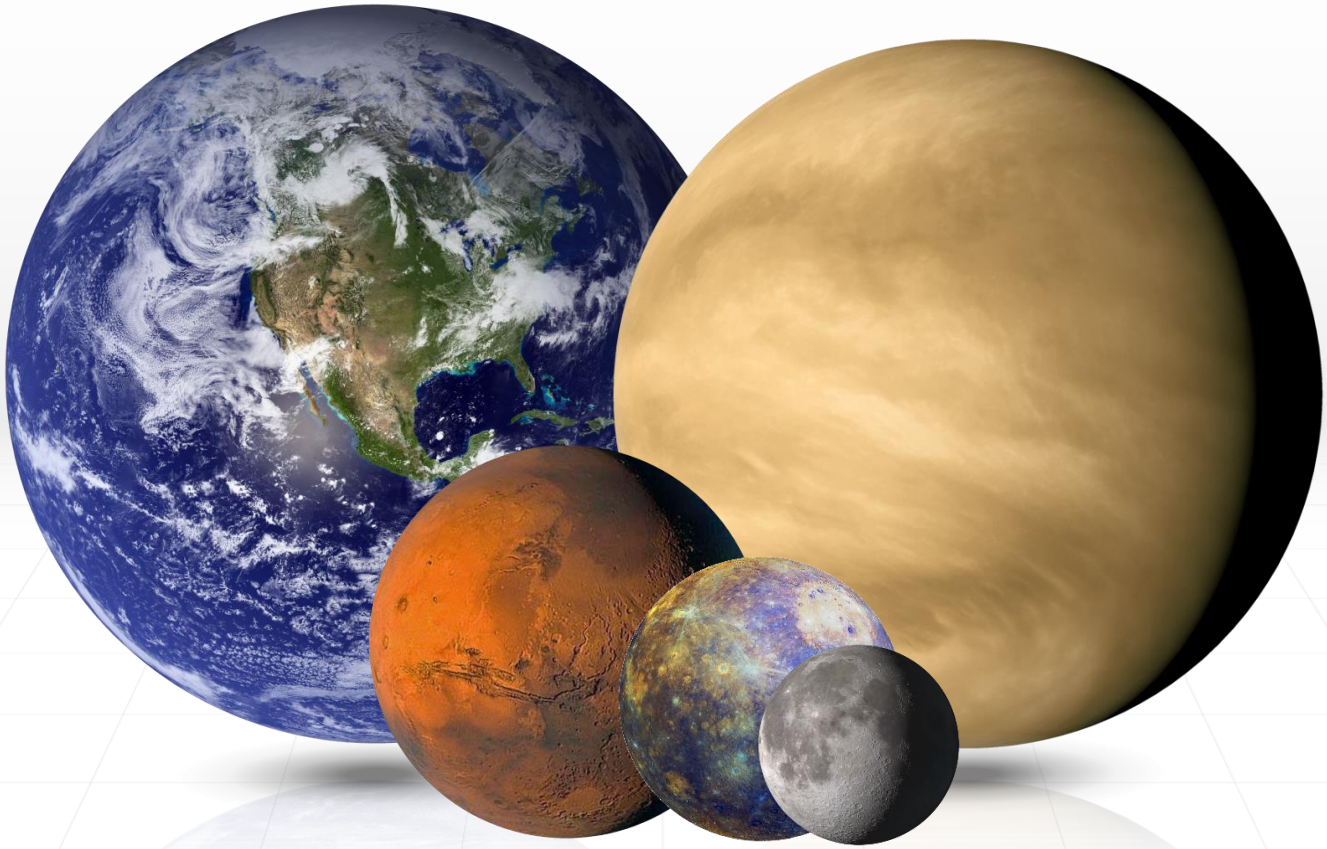
ON VENUS AND EARTH



BYRNE | KLIMCZAK | SENGÖR | SOLOMON

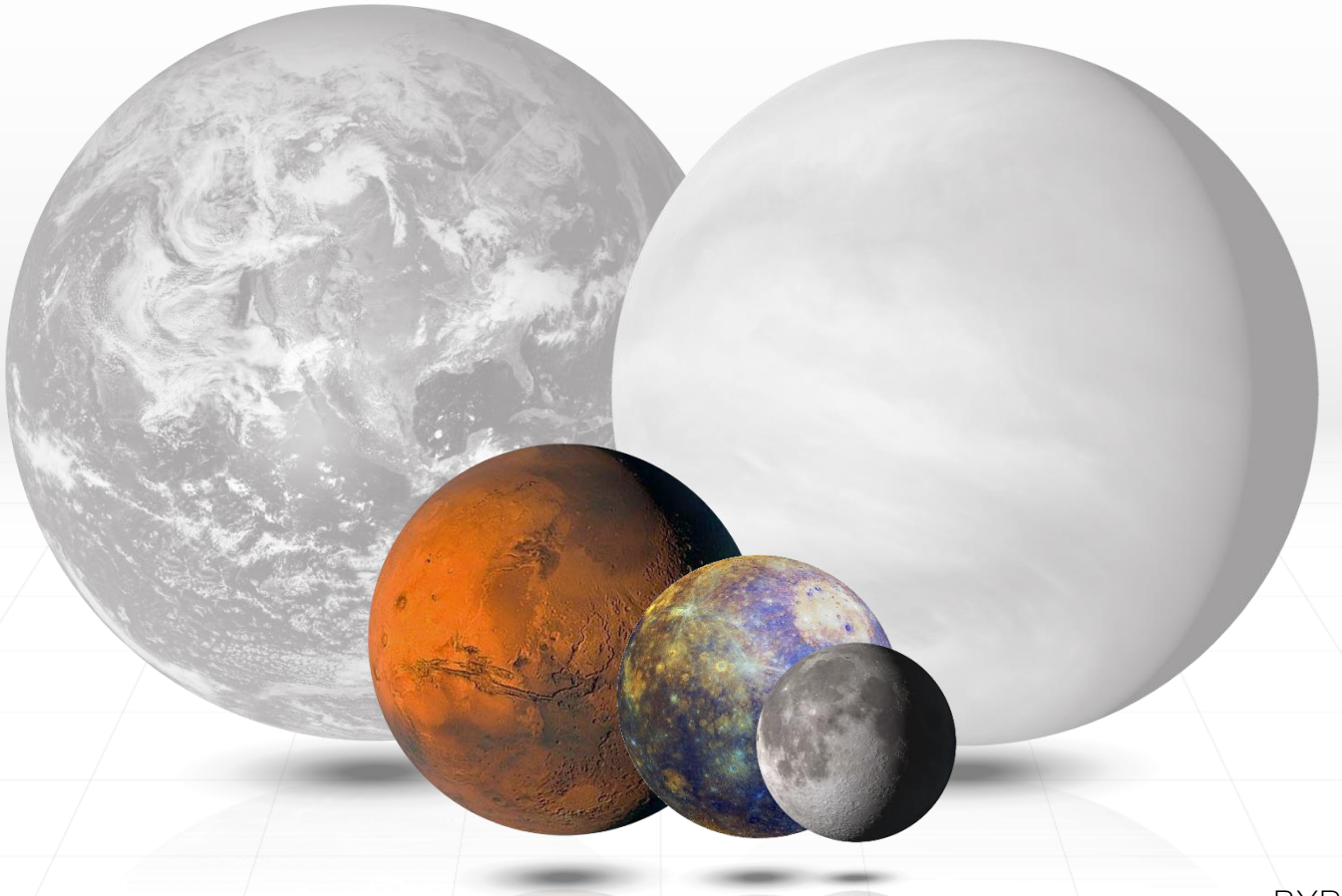
label

All these bodies show large-scale tectonic deformation



label

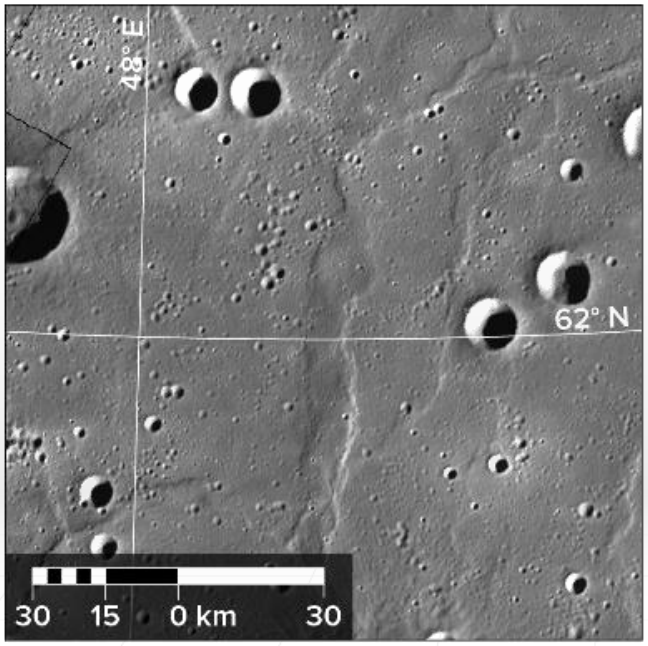
But the *style* of this deformation is not consistent



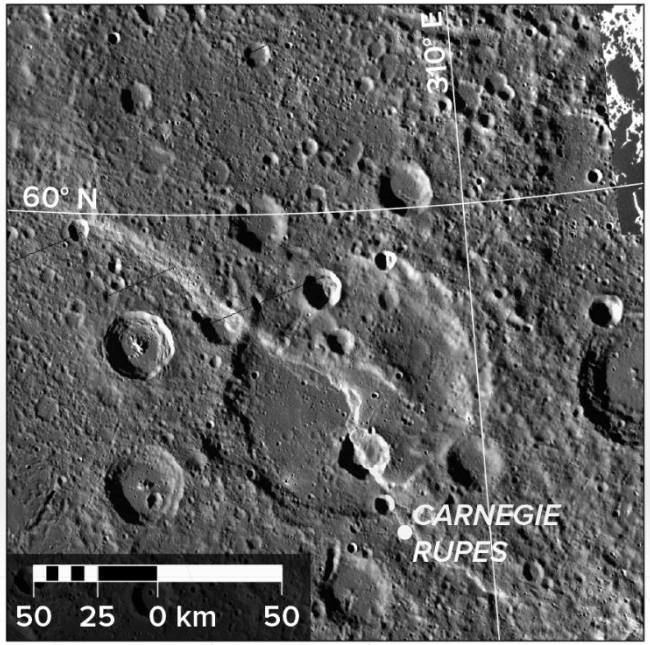
label

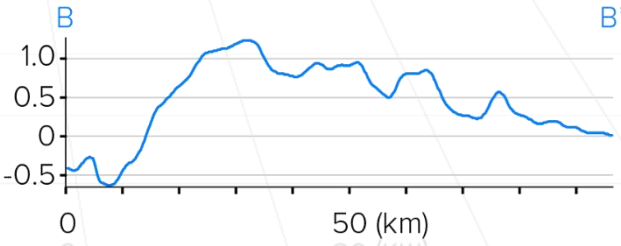
Shortening structures on Mercury, the Moon, and Mars

“wrinkle ridge”



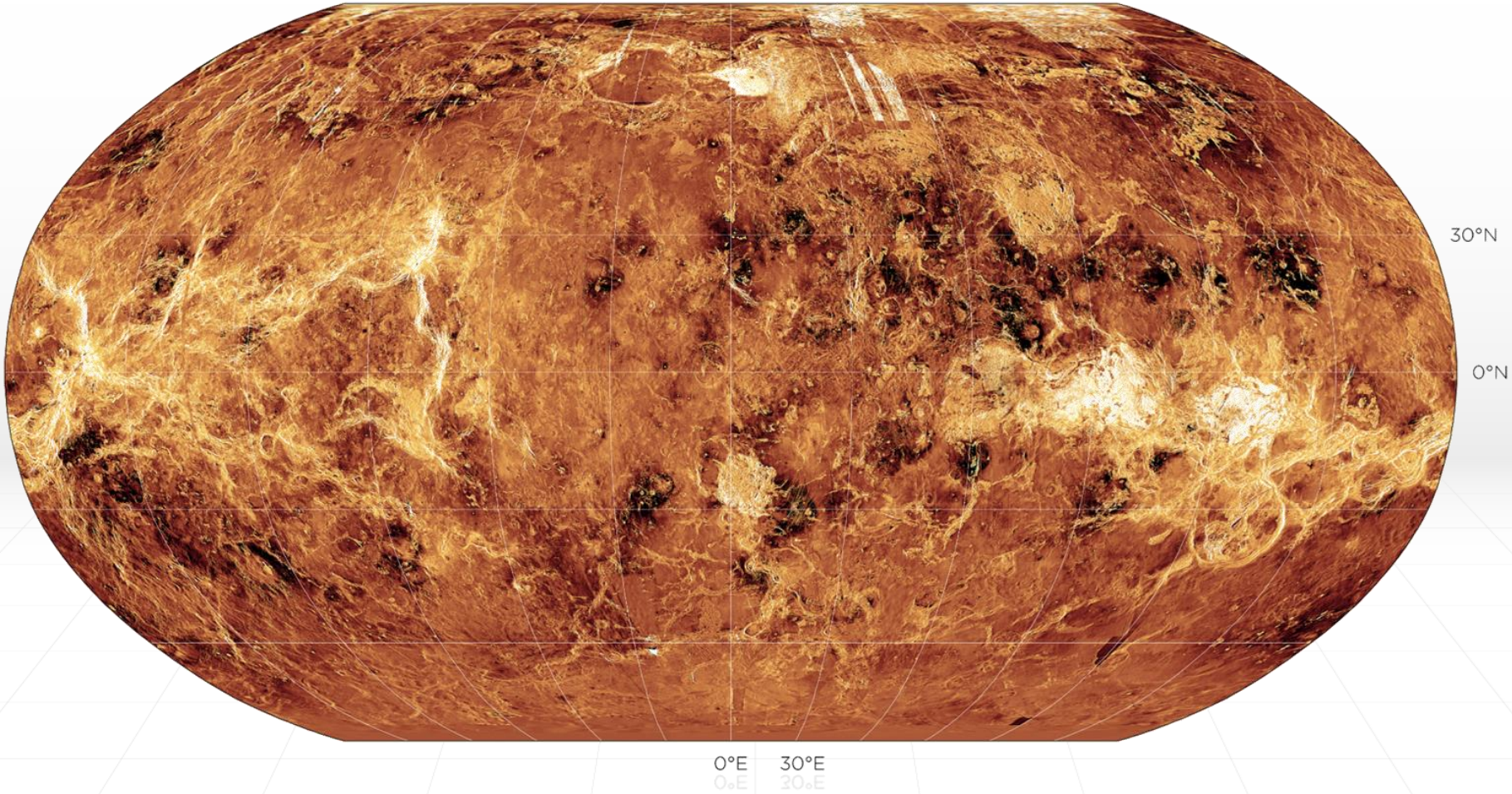
“lobate scarp”



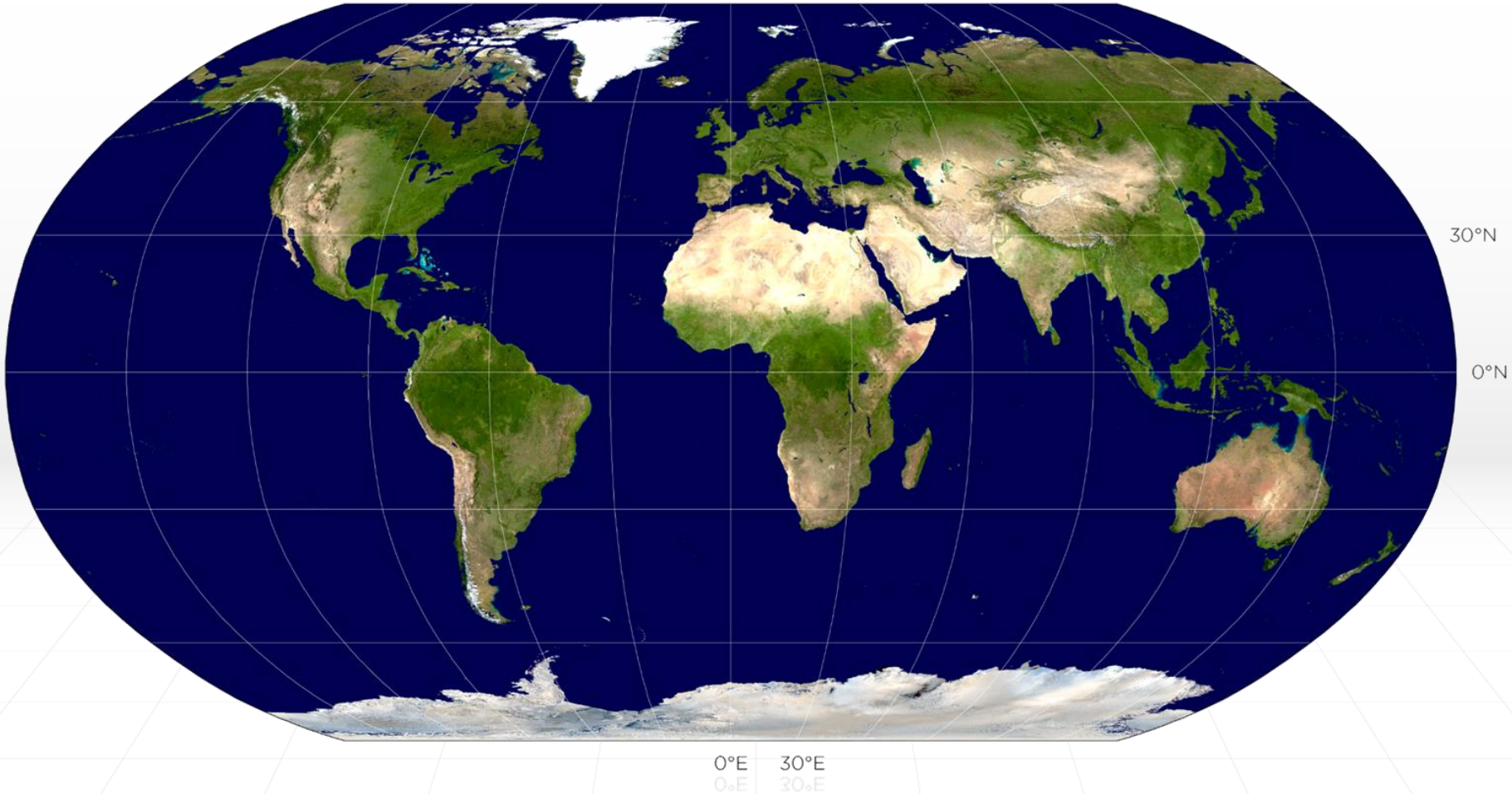


Byrne et al., 2014

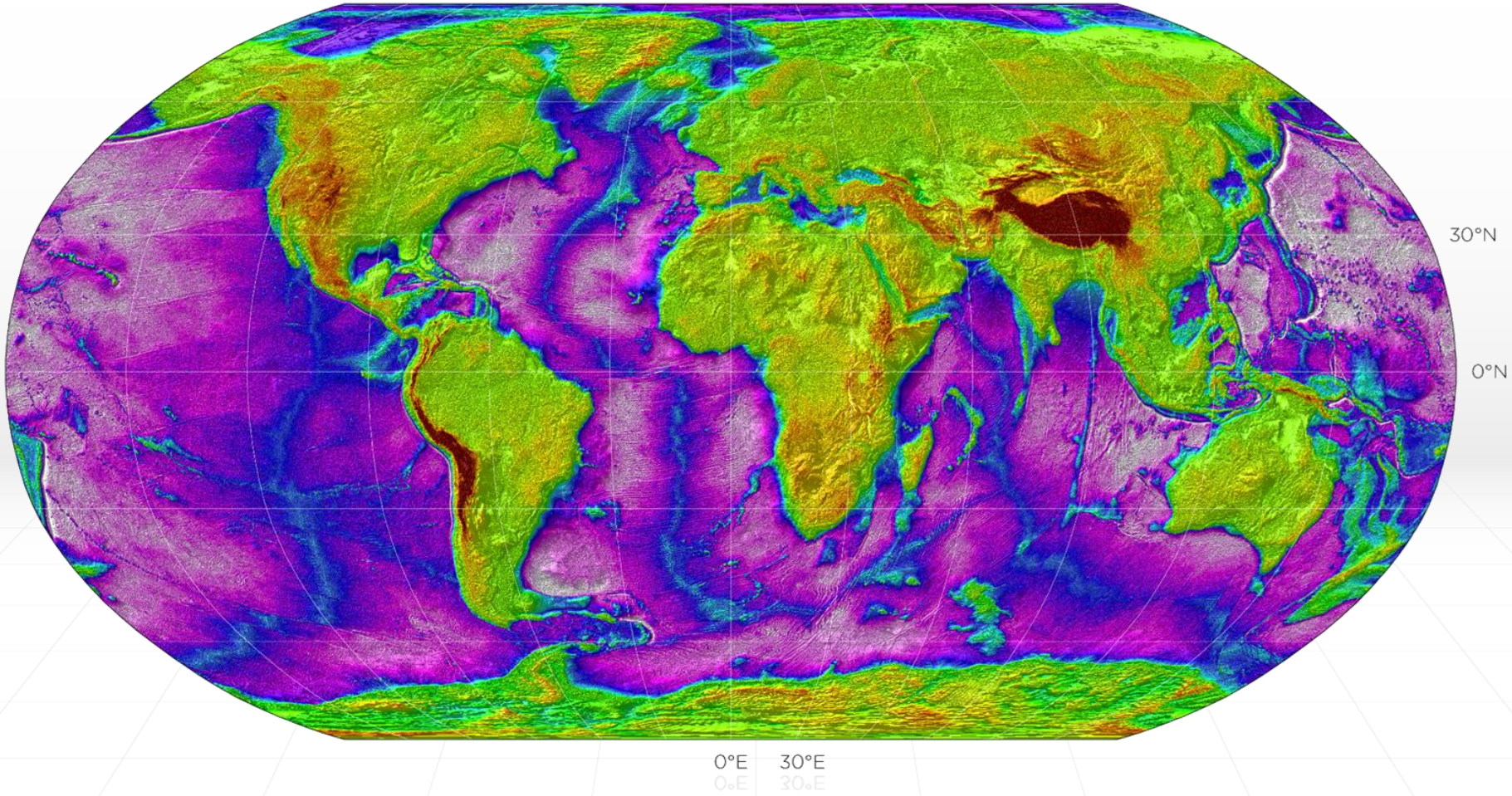
do not fully resemble those on Venus



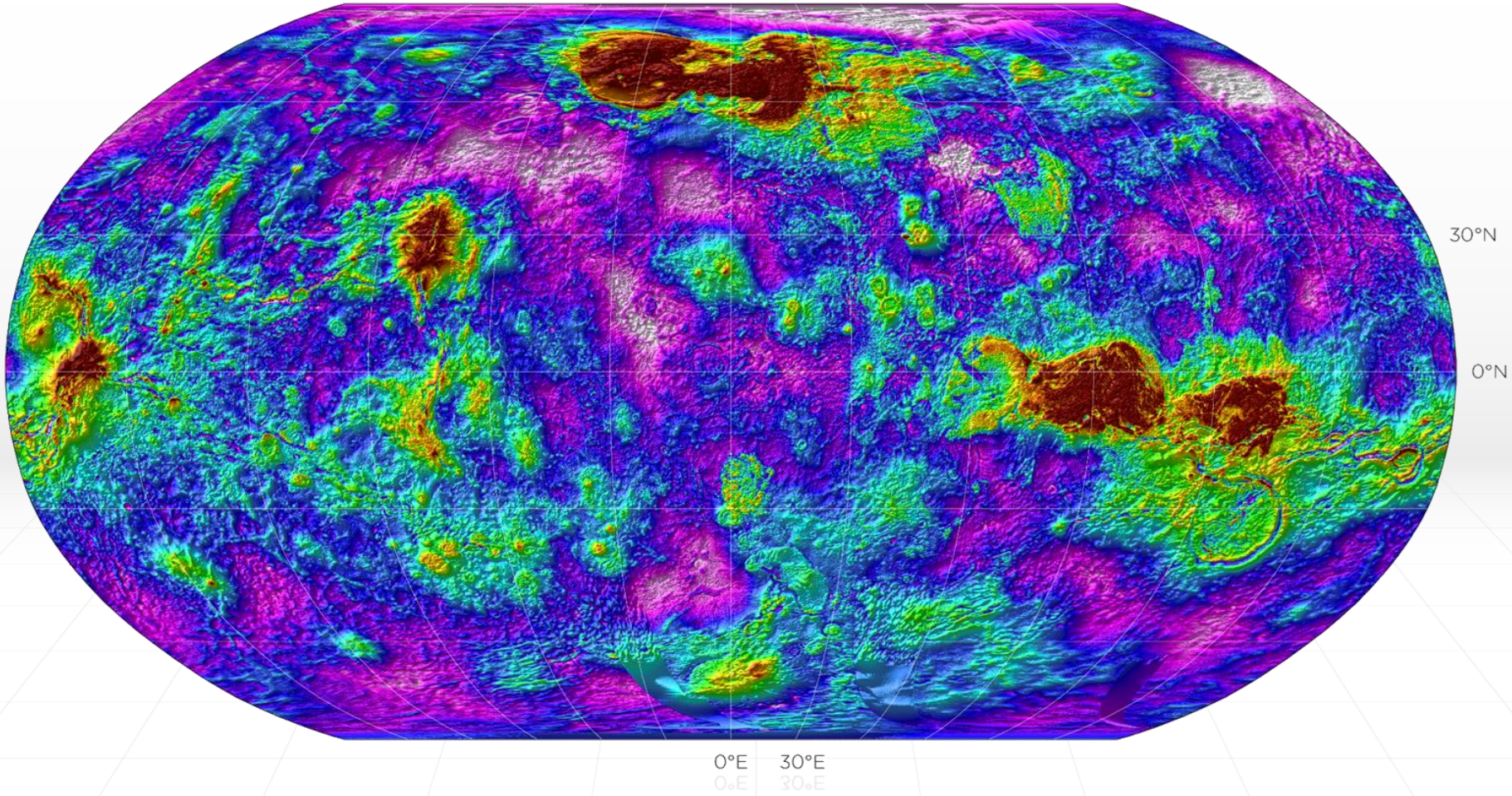
What then of comparing Venus to Earth?



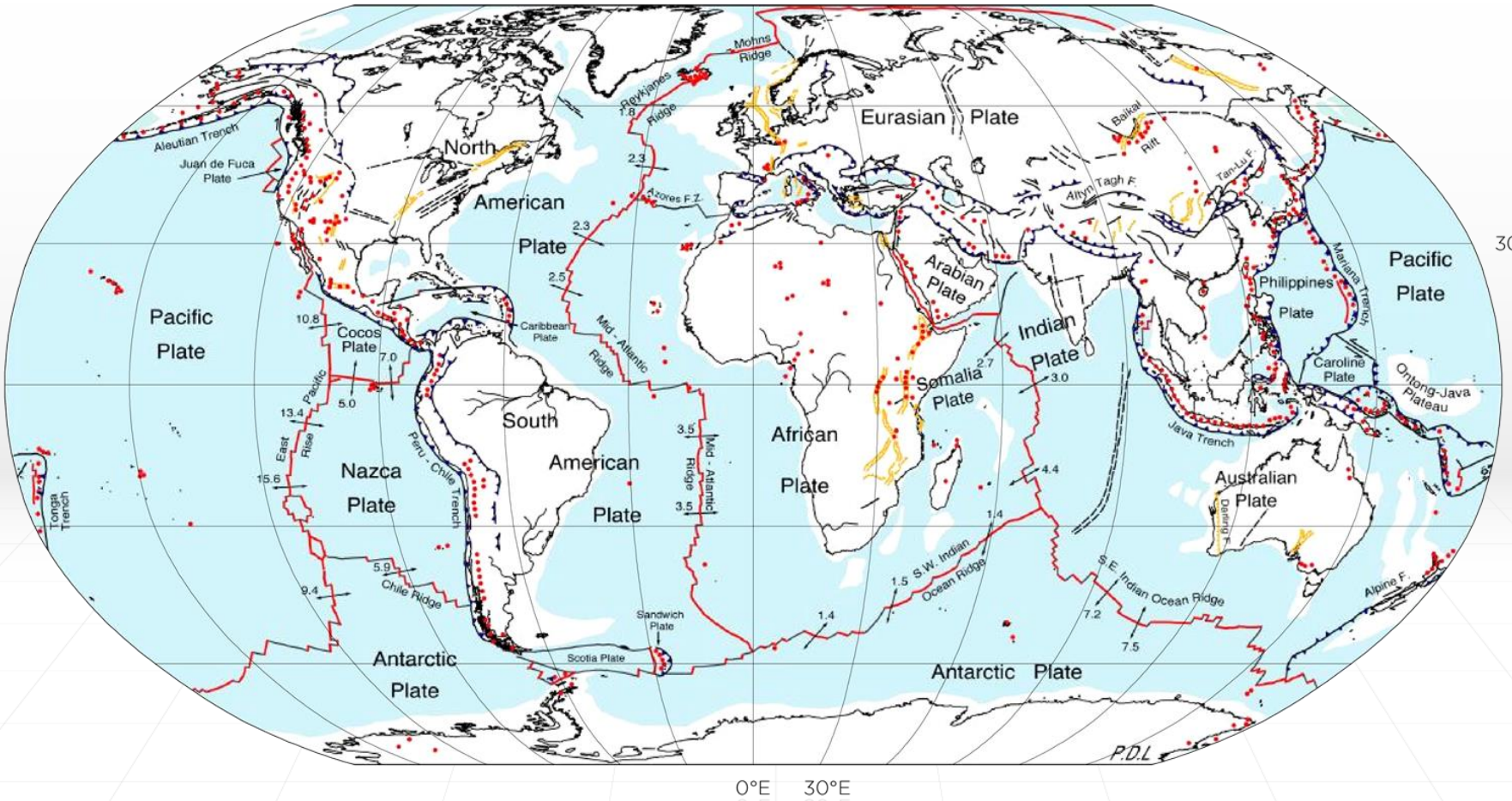
Earth’s tectonics are dominated by plate motion…



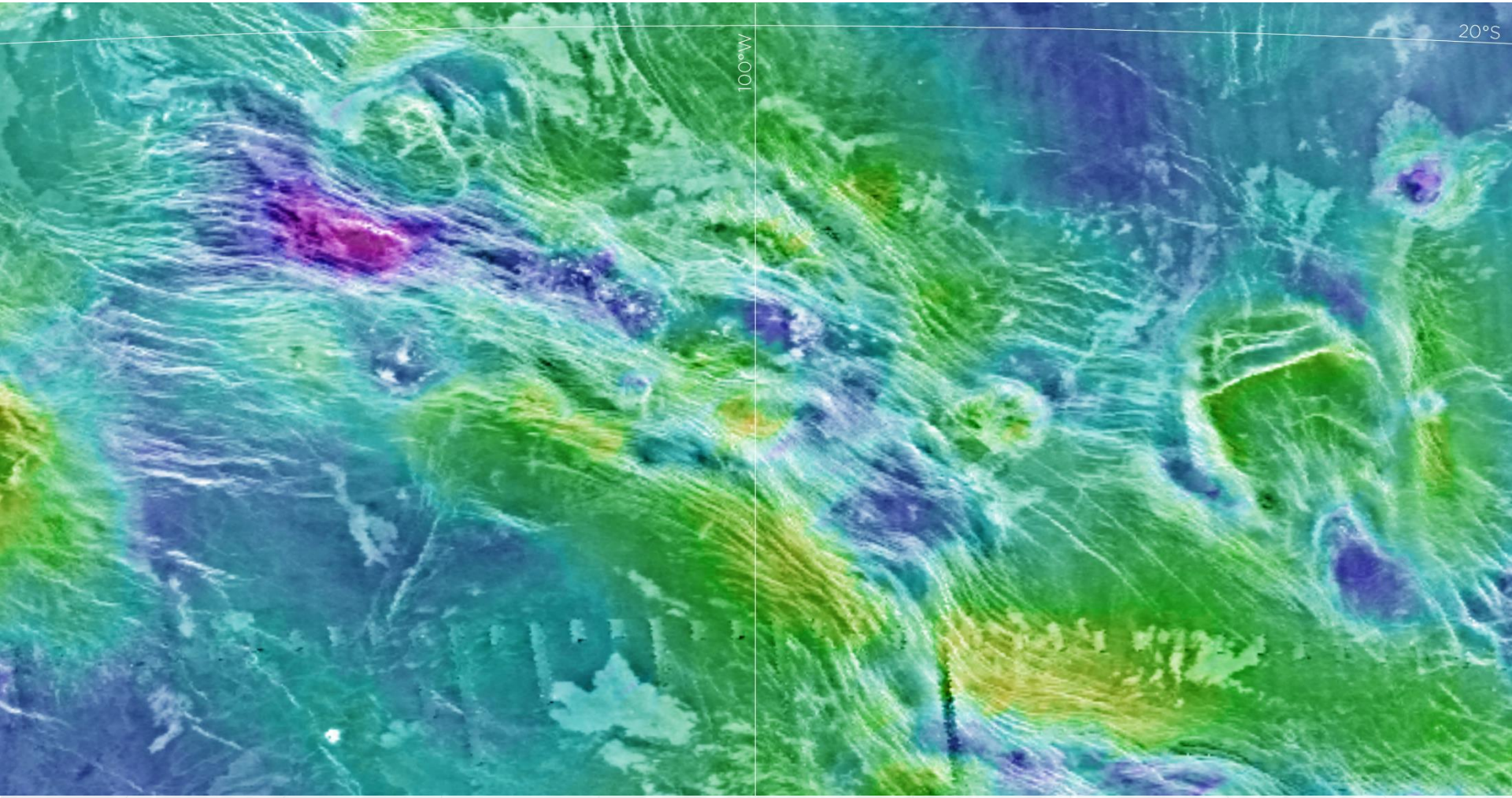
...which is not the case for Venus



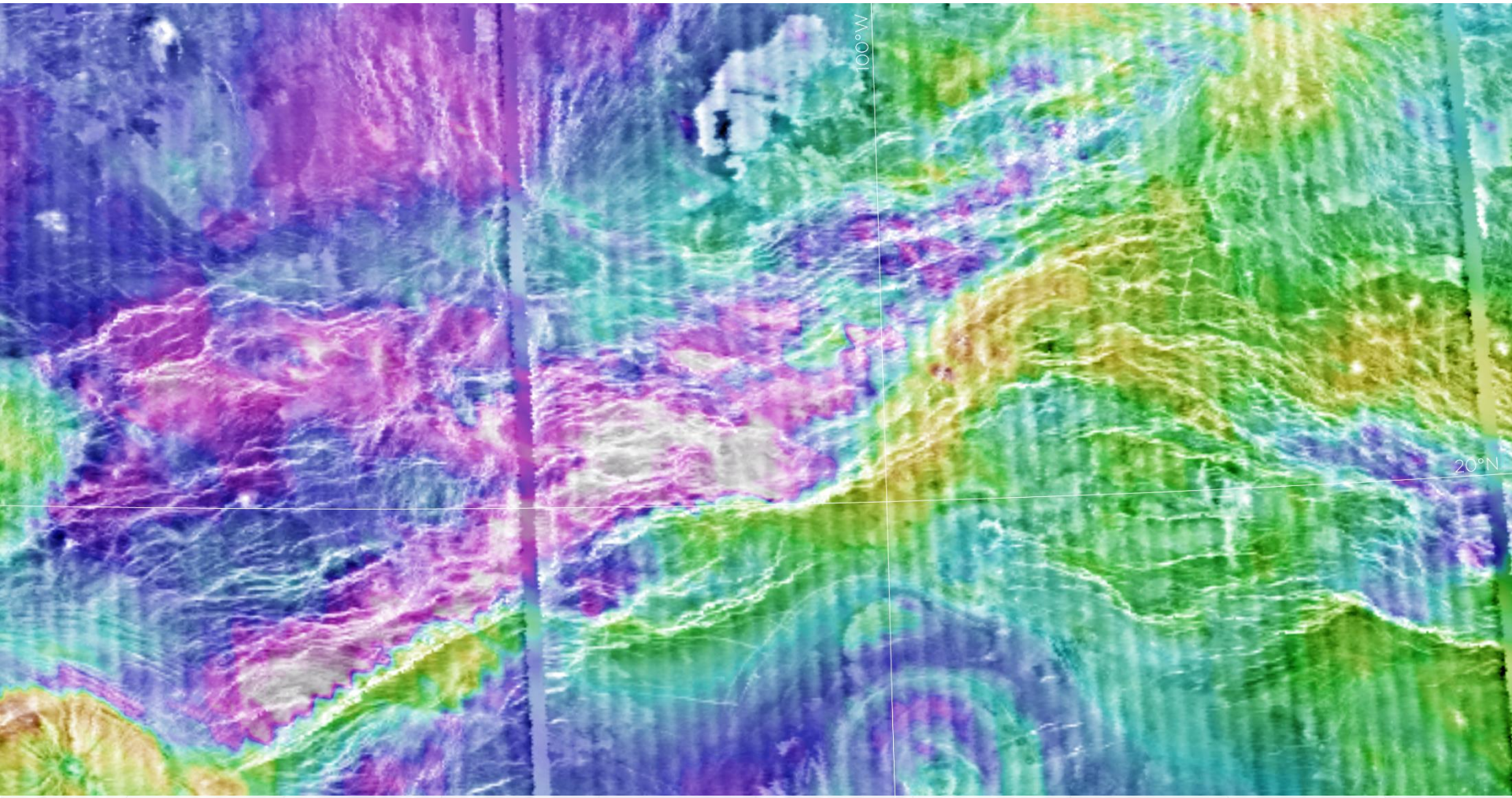
Yet Earth boasts substantial deformation *within* plates



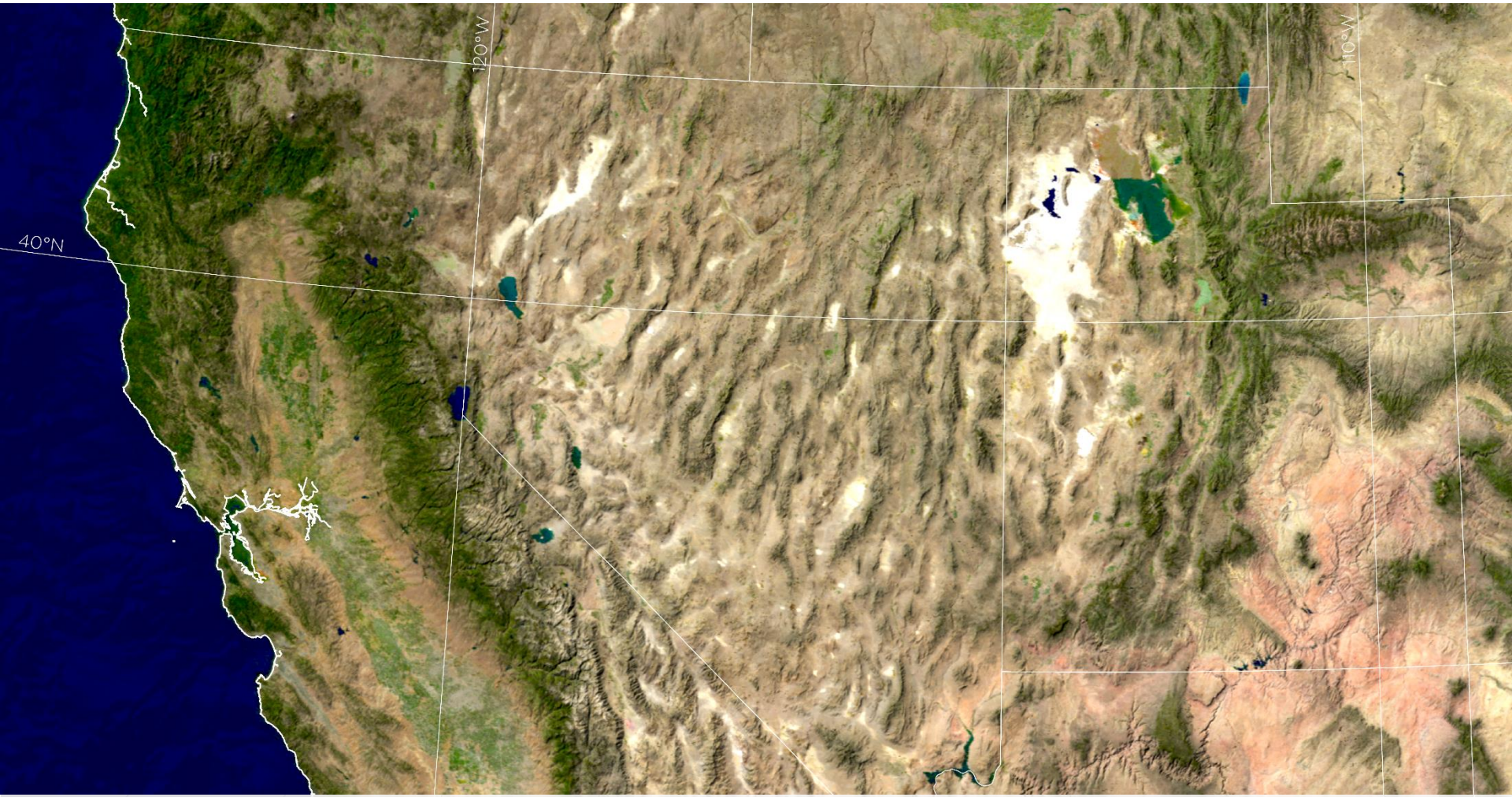
Parga Chasma



Hecate Chasma

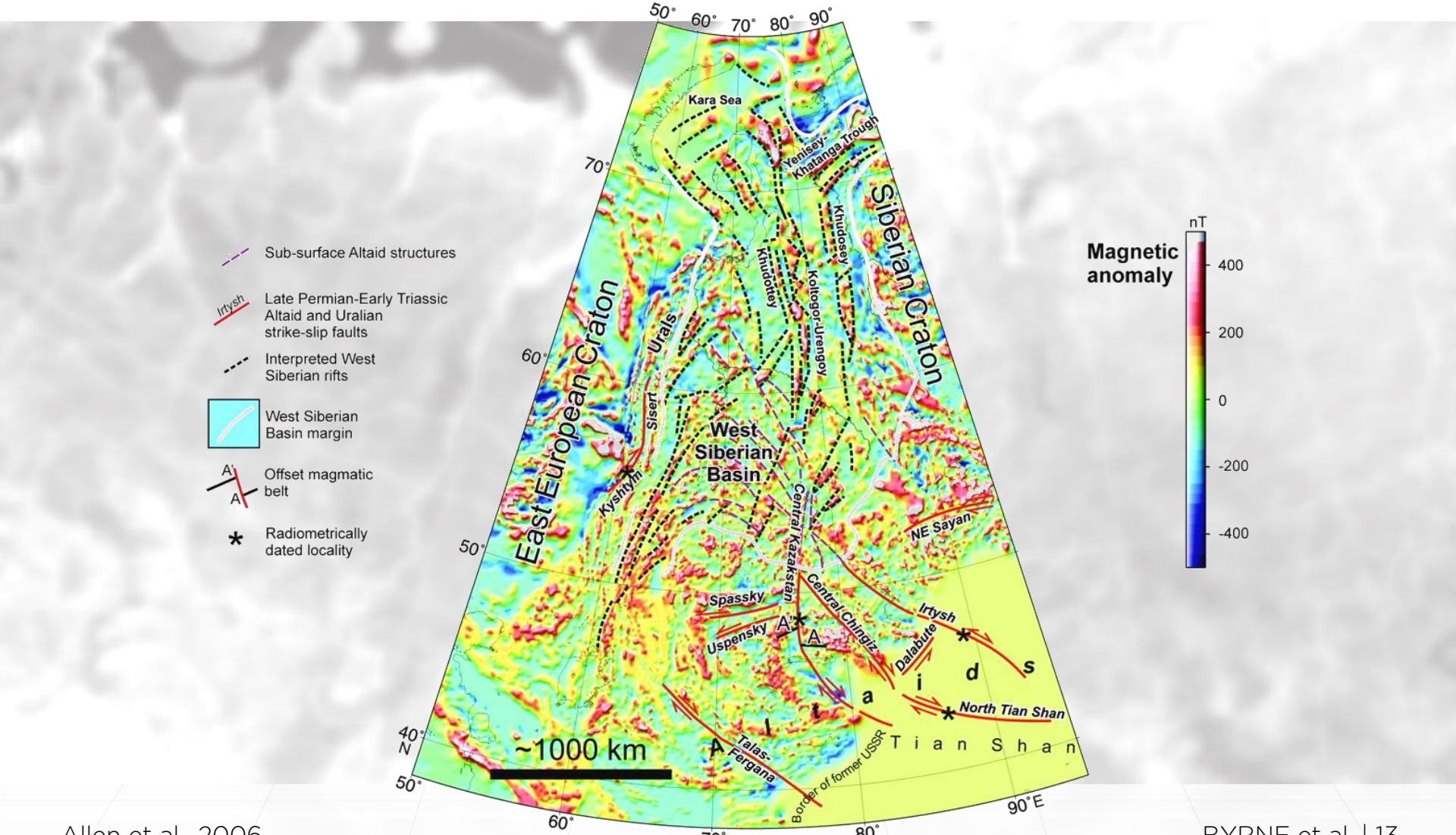


Basin and range (USA)



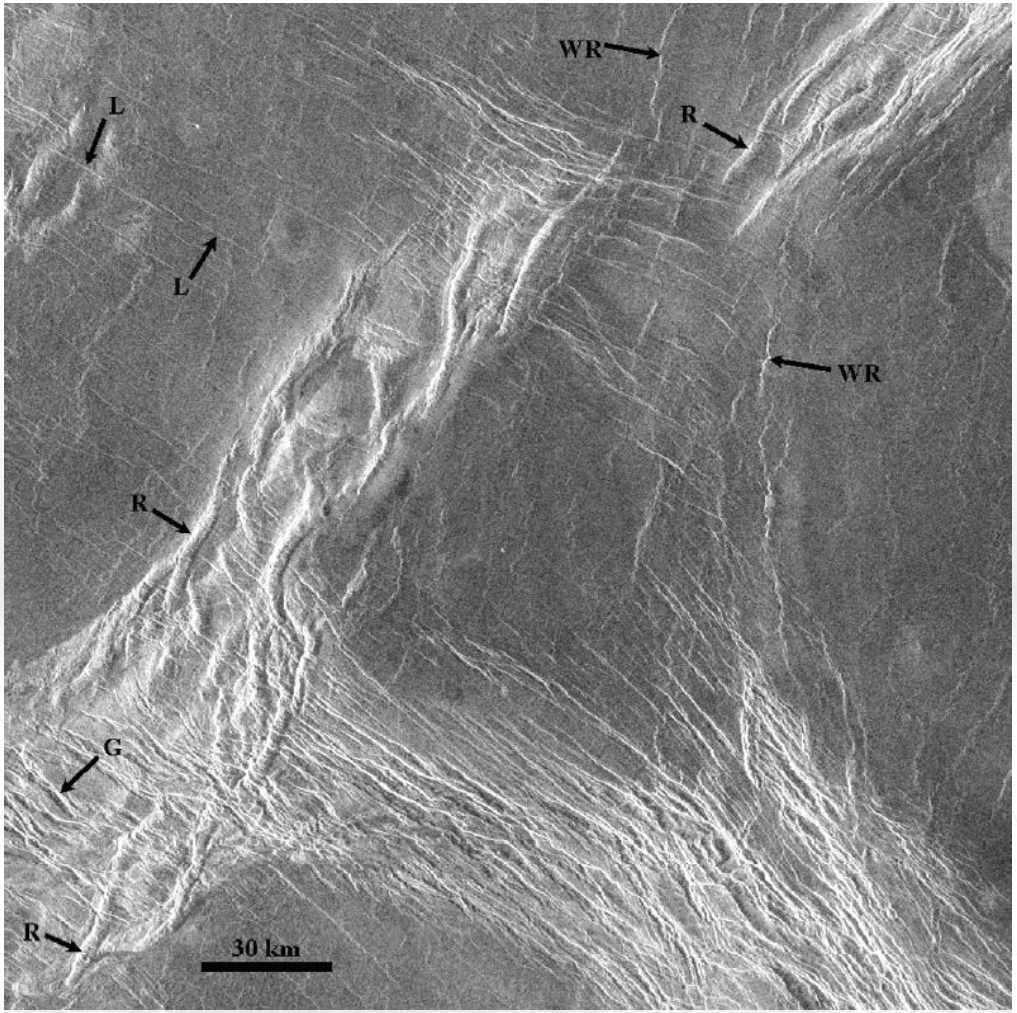
West Siberian basin (Russia)

West Siberian basin, Russia



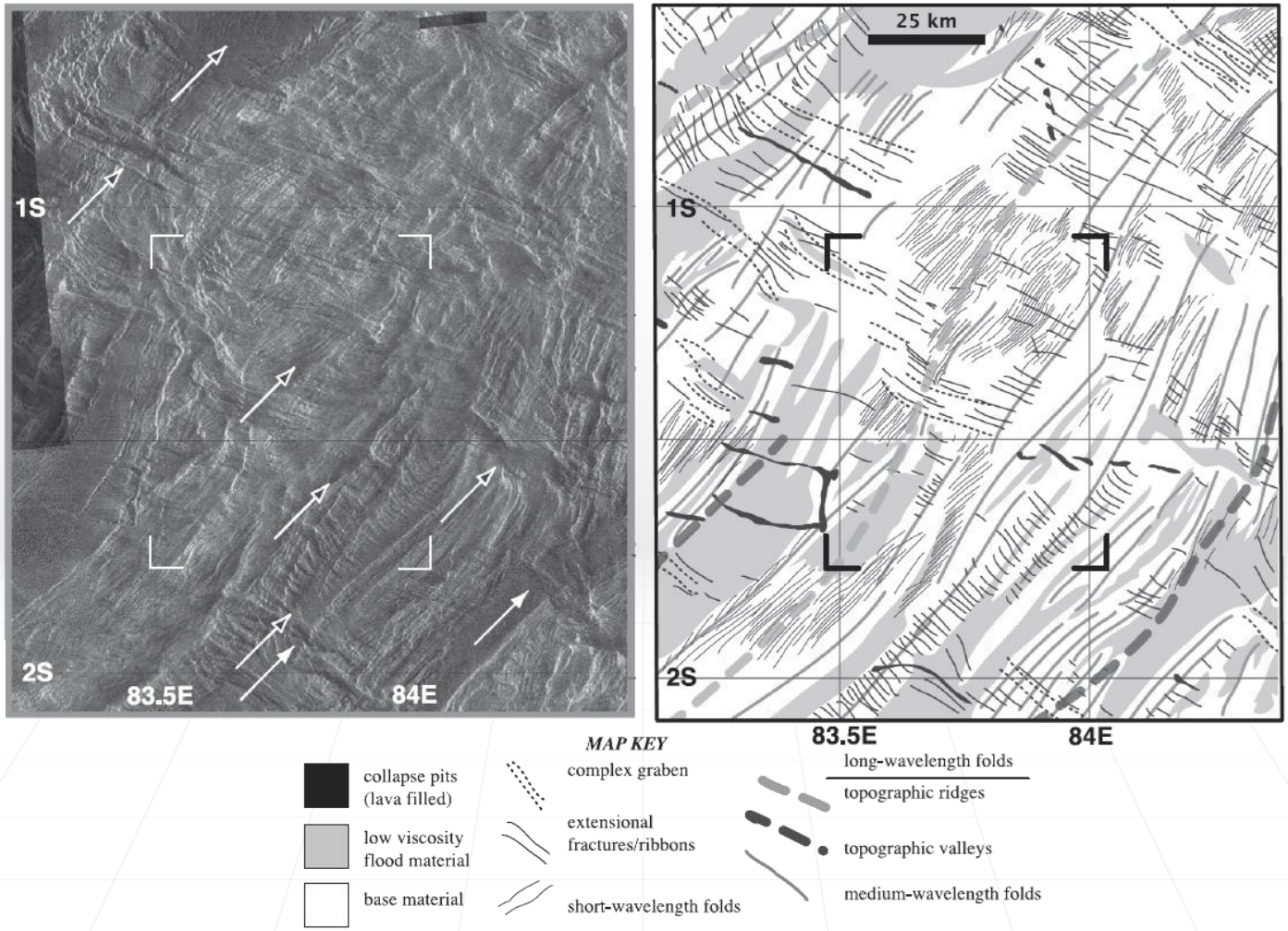
Allen et al., 2006

Ridge belt in Lavinia Planitia



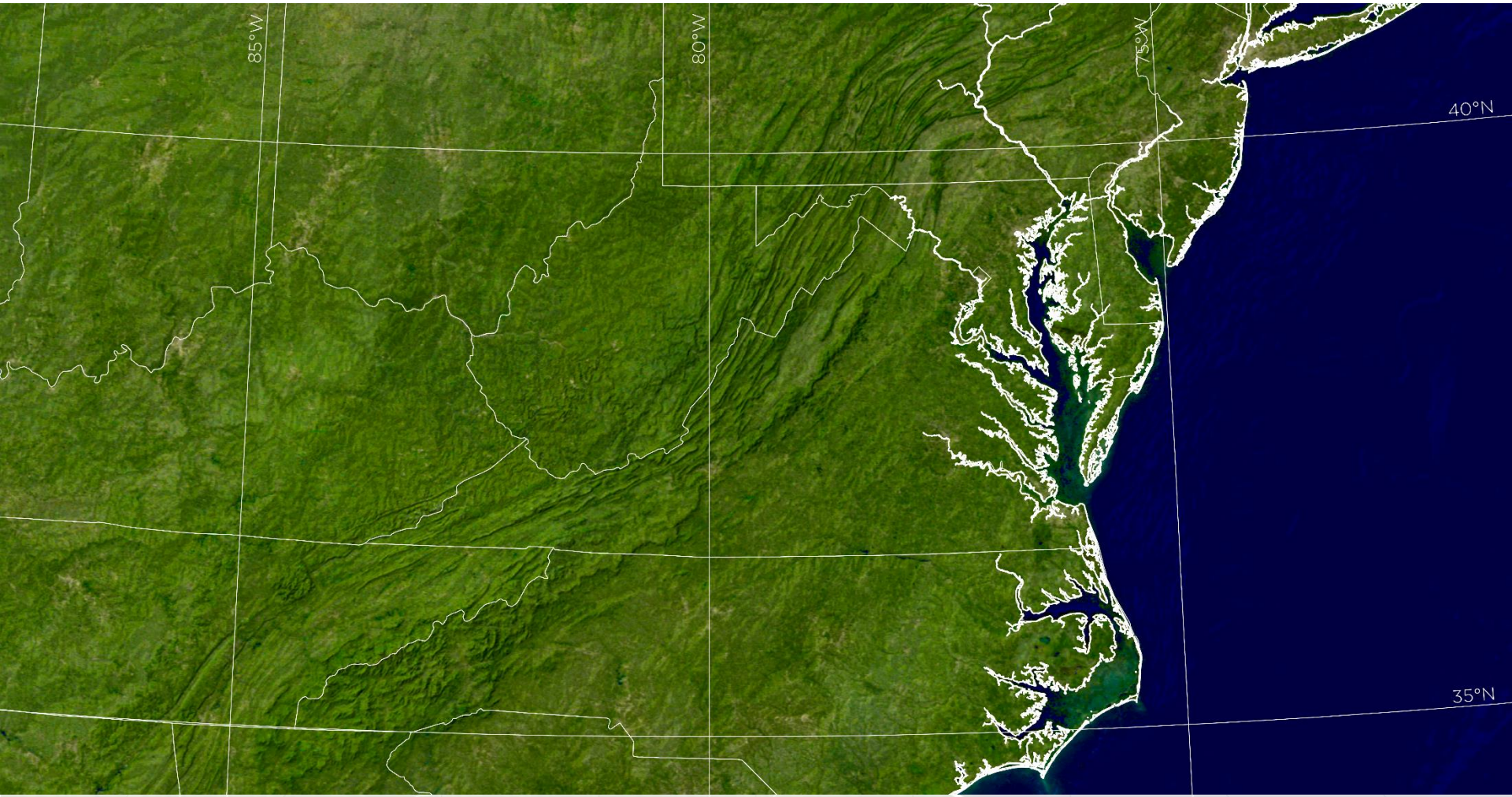
McGill et al., 2010

Ridge belt in northern Ovda Regio

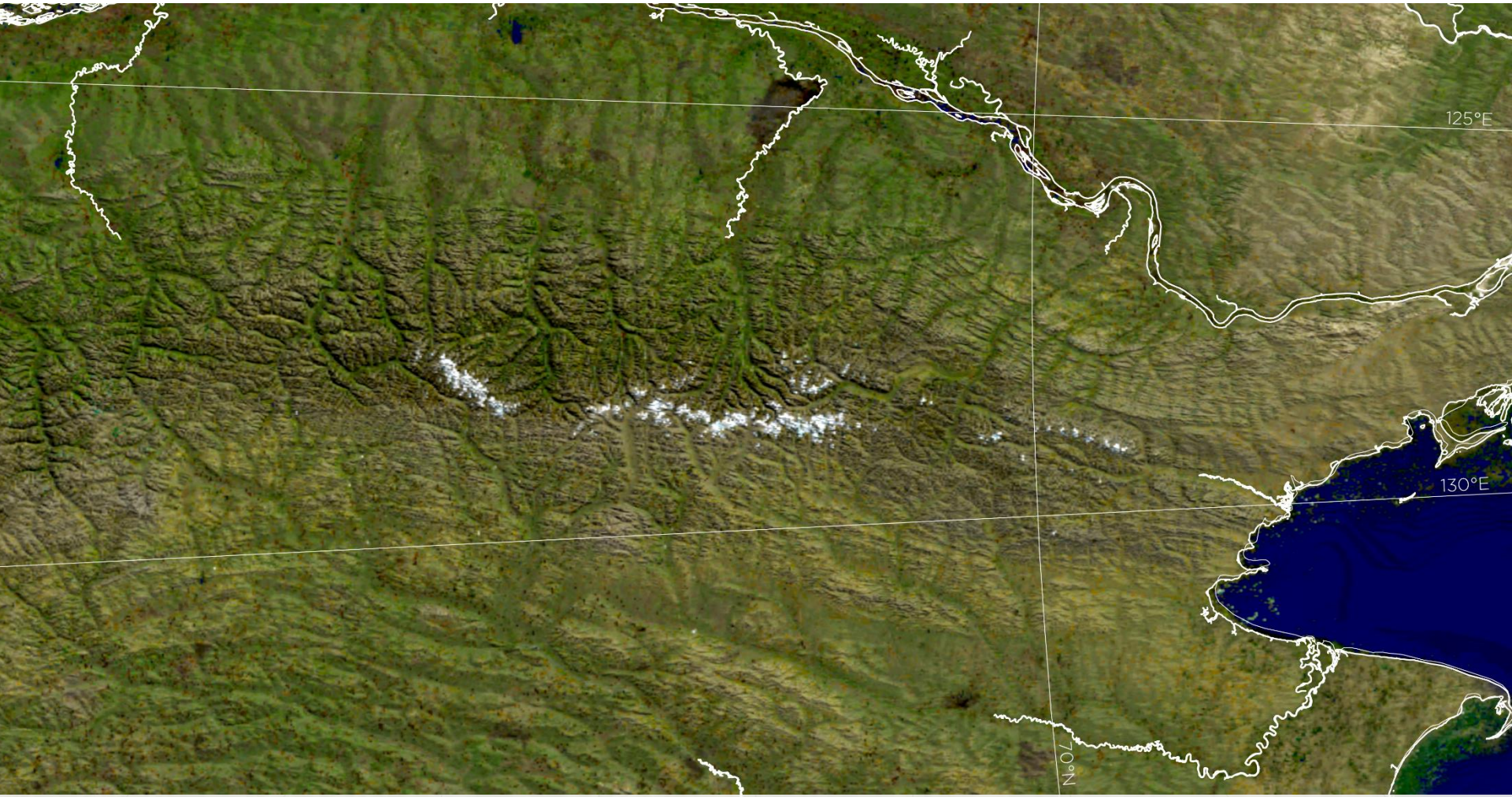


Hansen, 2006

Appalachian Valley and Ridge (USA)



Verkhoyansk belt (Russia)



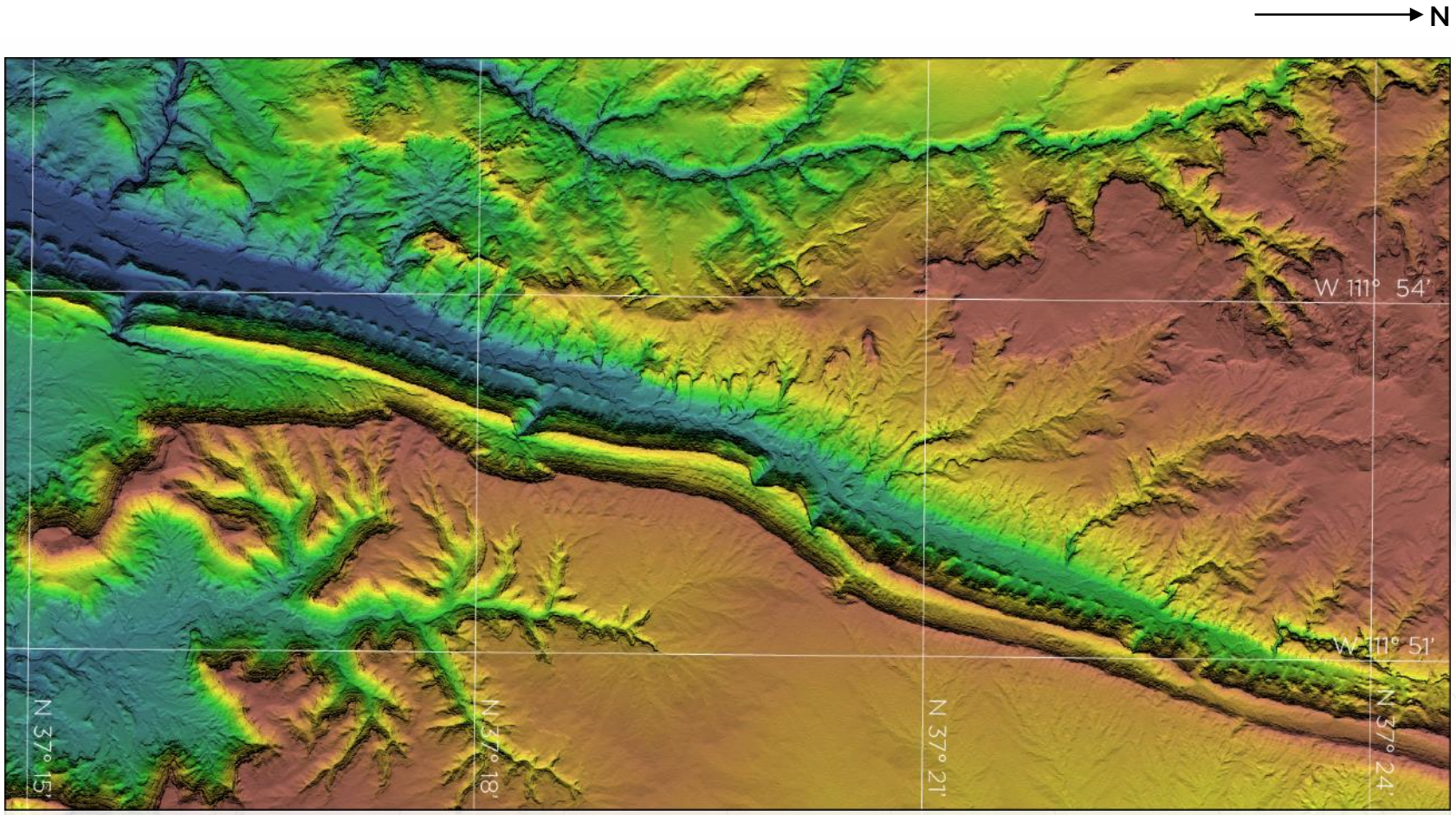
We must be mindful of erosion:

W E

We must be mindful of erosion:

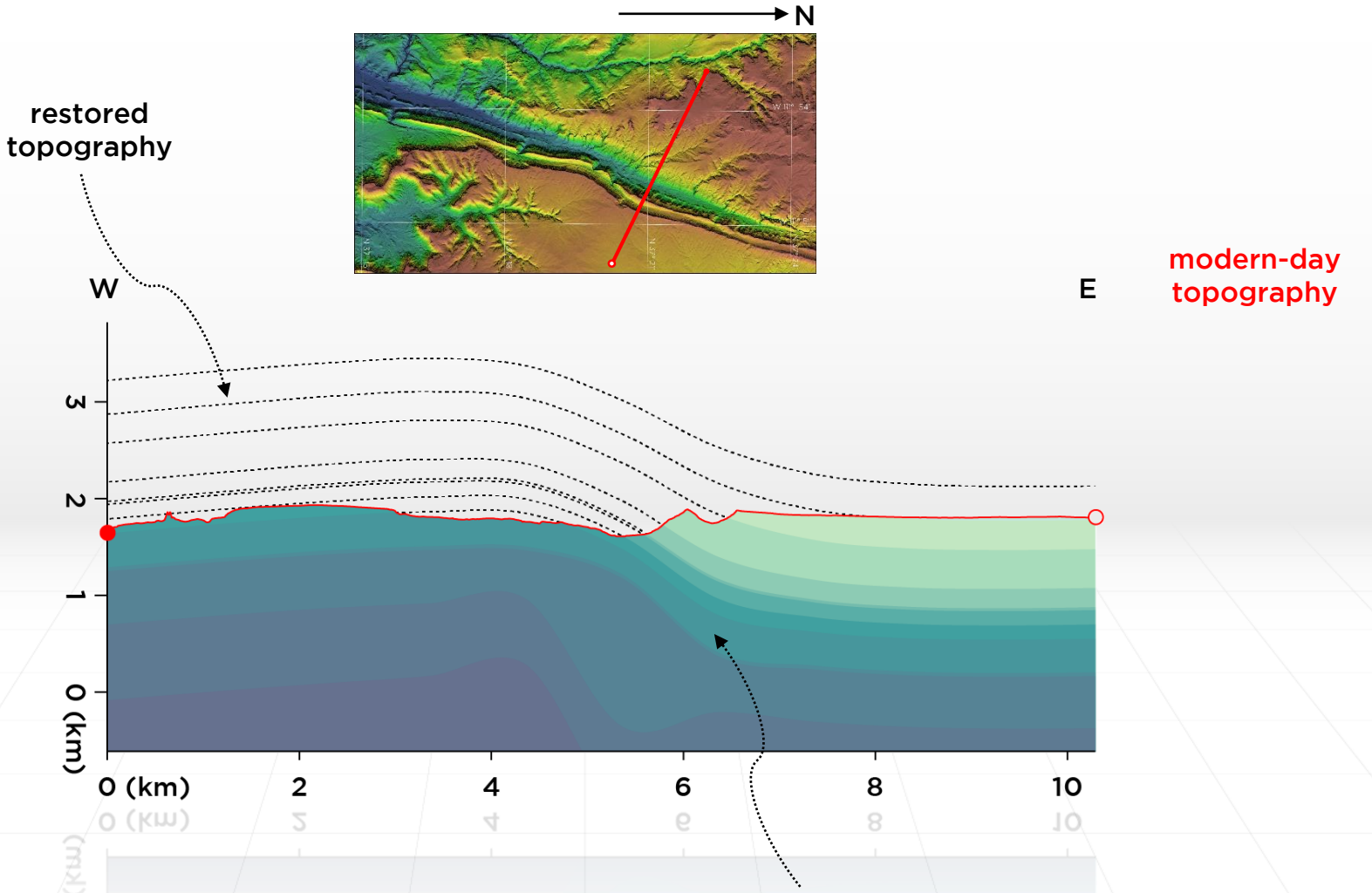
E **W**

The East Kaibab monocline in Utah is heavily eroded...



Byrne et al., 2016

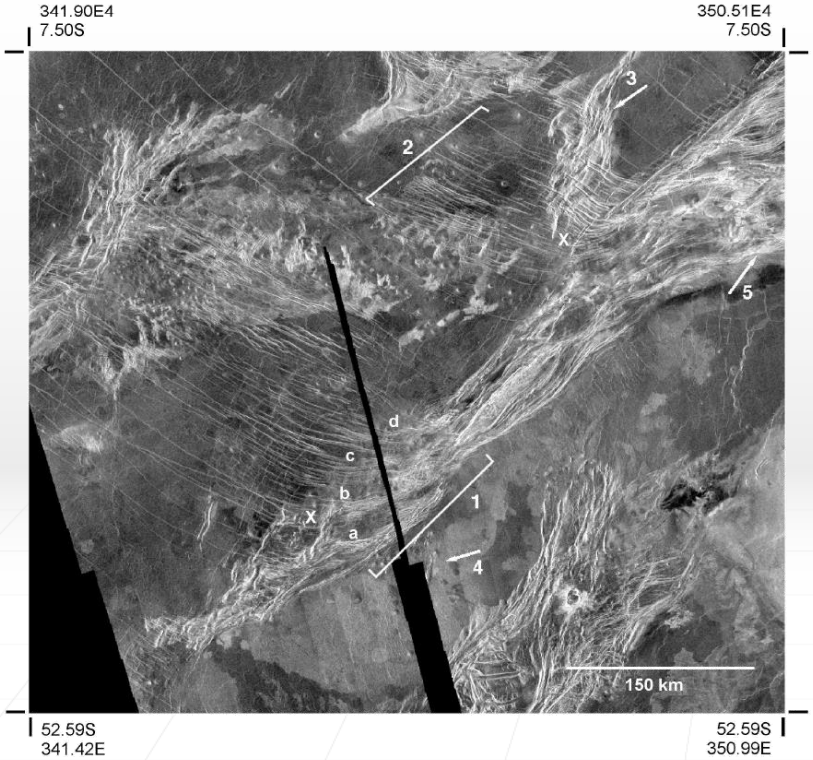
...but when restored resembles a “lobate scarp”

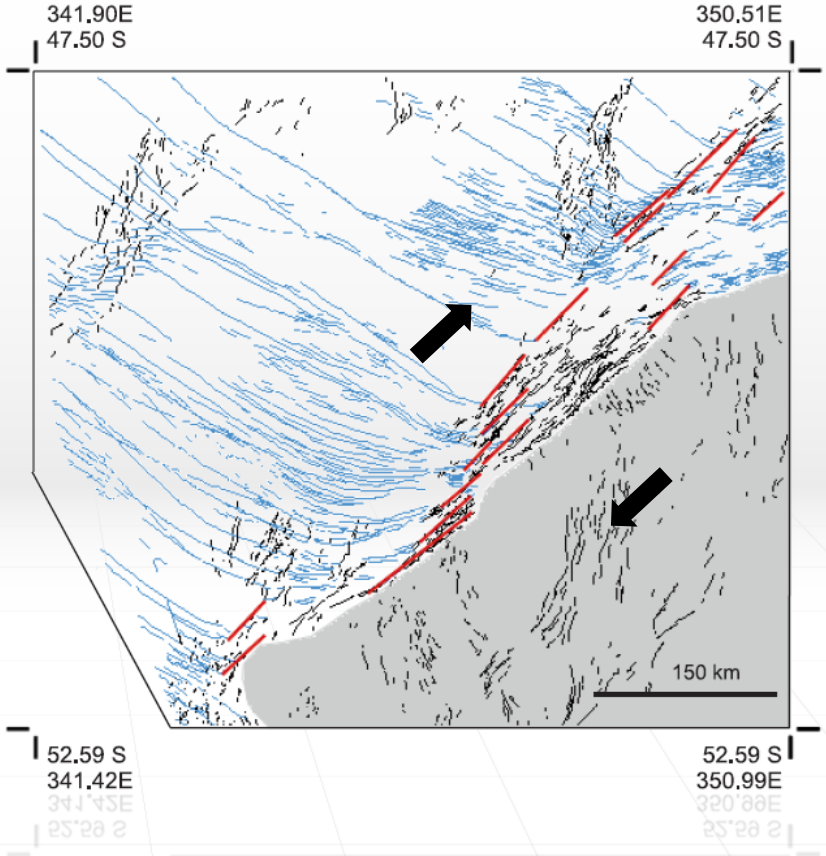


Byrne et al., 2016

strike-slip tectonics have also been reported on Venus

Lavinia Planitia

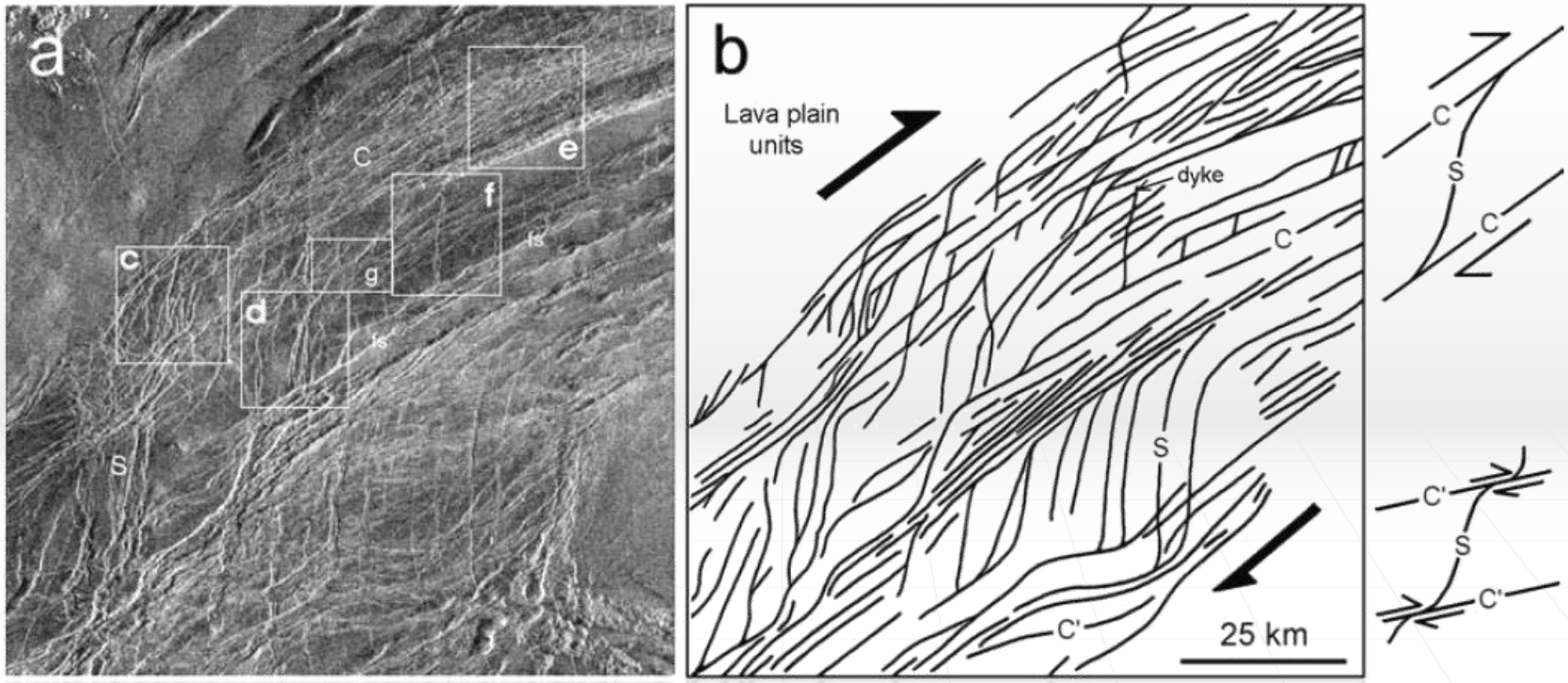




Koenig and Aydin, 1998

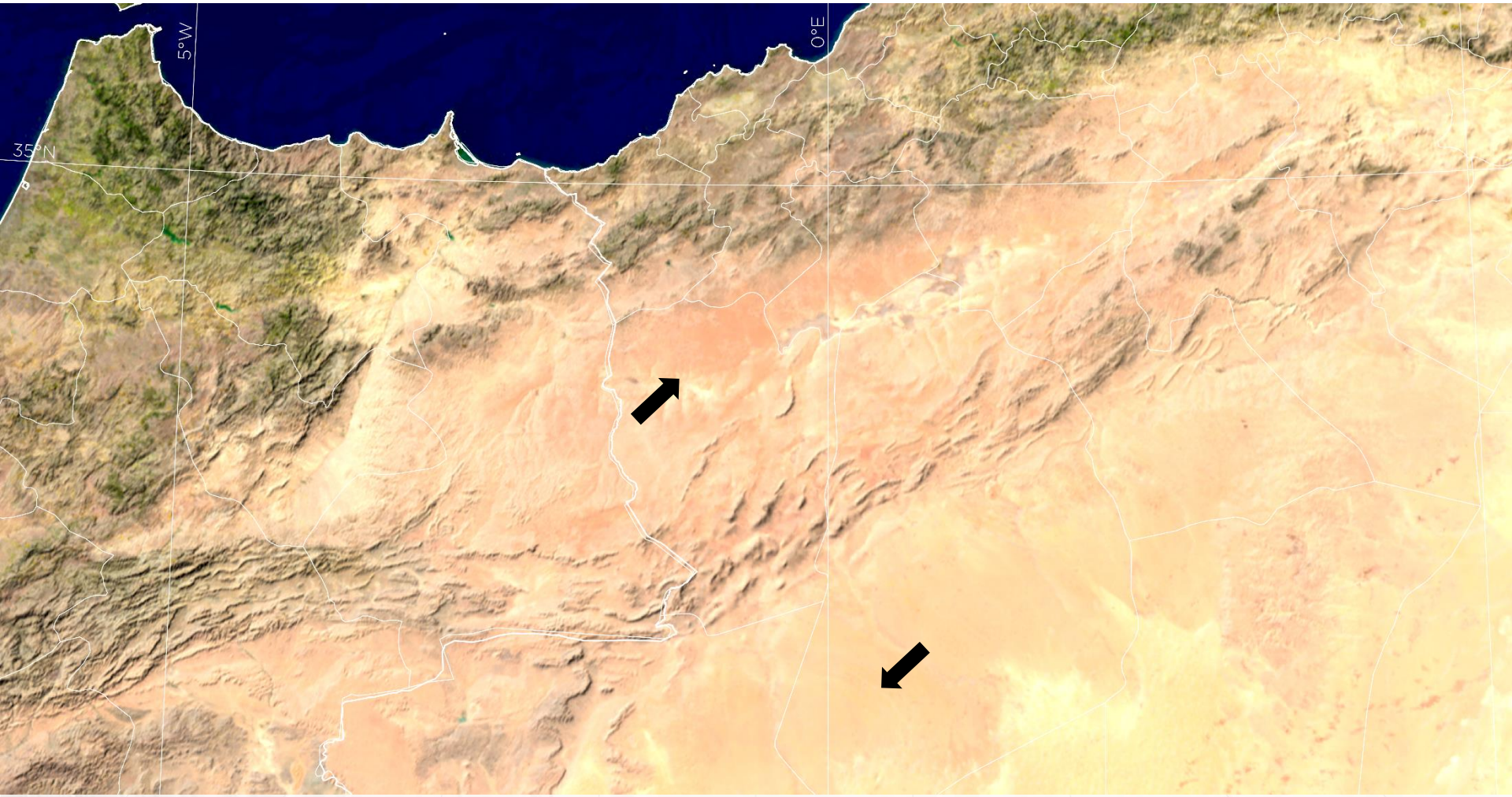
strike-slip tectonics have also been reported on Venus

“Thetis Boundary shear zone”



Kumar, 2005

Saharan Atlas mountains (Morocco/Algeria/Tunisia)



Ellero et al., 2012

concluding remarks

Intraplate extension and shortening on Earth results in long belts of linear to curvilinear structures, which narrow and widen along strike

These systems bear strong geometric similarities to such systems on Venus

This similarity holds true for both large-scale extensional and shortening systems on both worlds, with and without transpression/transtension

It may be useful to consider further Venus' chasmata, ridge belts, and even tesserae in this light

There is a profound need for new (radar) image, topography, crustal thickness, gravity, etc. data for Venus—with which we could test these inferences