

Links Between Lithospheric Structure and Topography, Southeastern Tibet

Anne Meltzer¹, Stephane Sol¹, Brian Zurek¹, Amanda Ault¹, Peter Zeitler¹, Liu Yuping², Jianlong Zhang

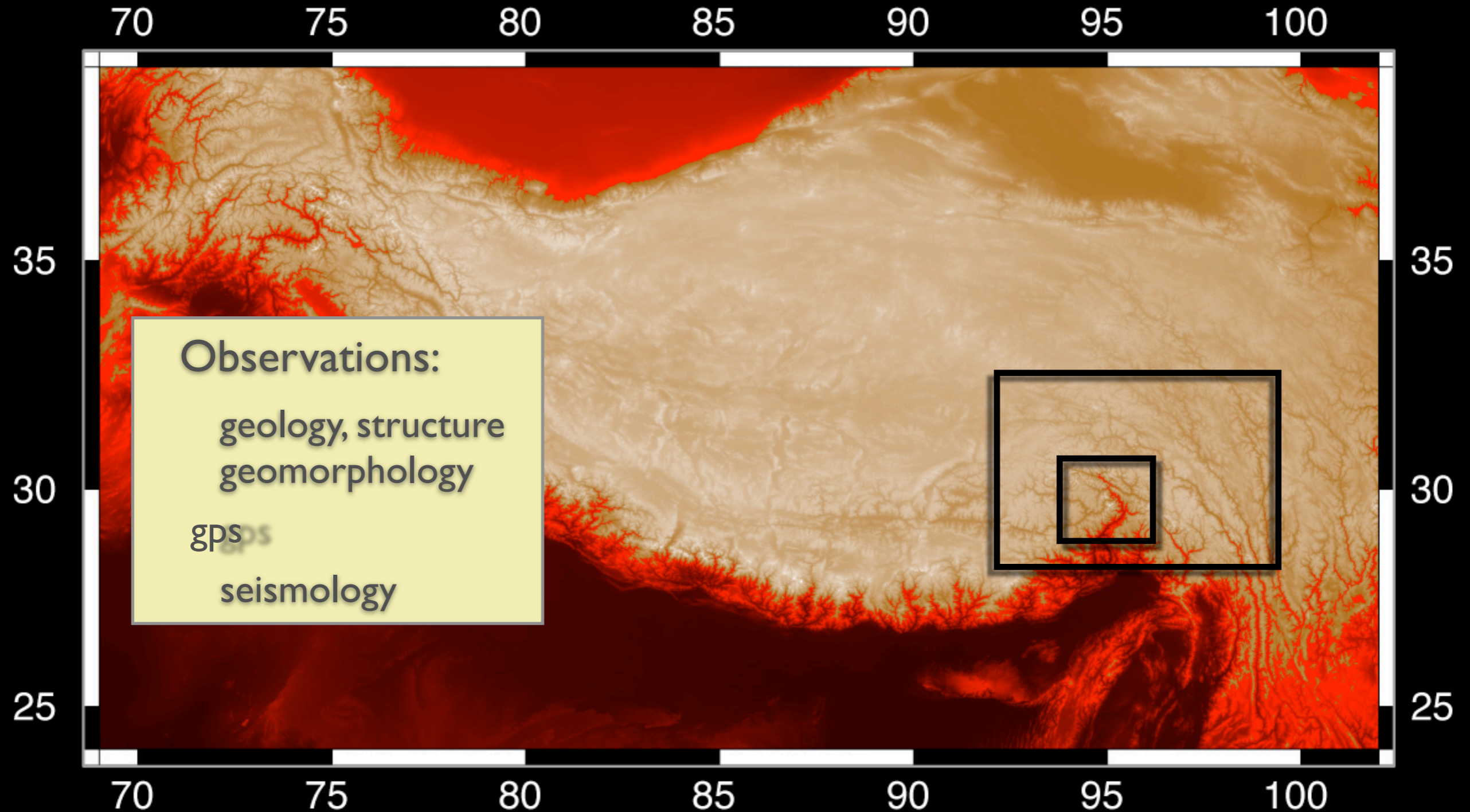
¹Lehigh University ²Chengdu Institute of Geology and Mineral Resources



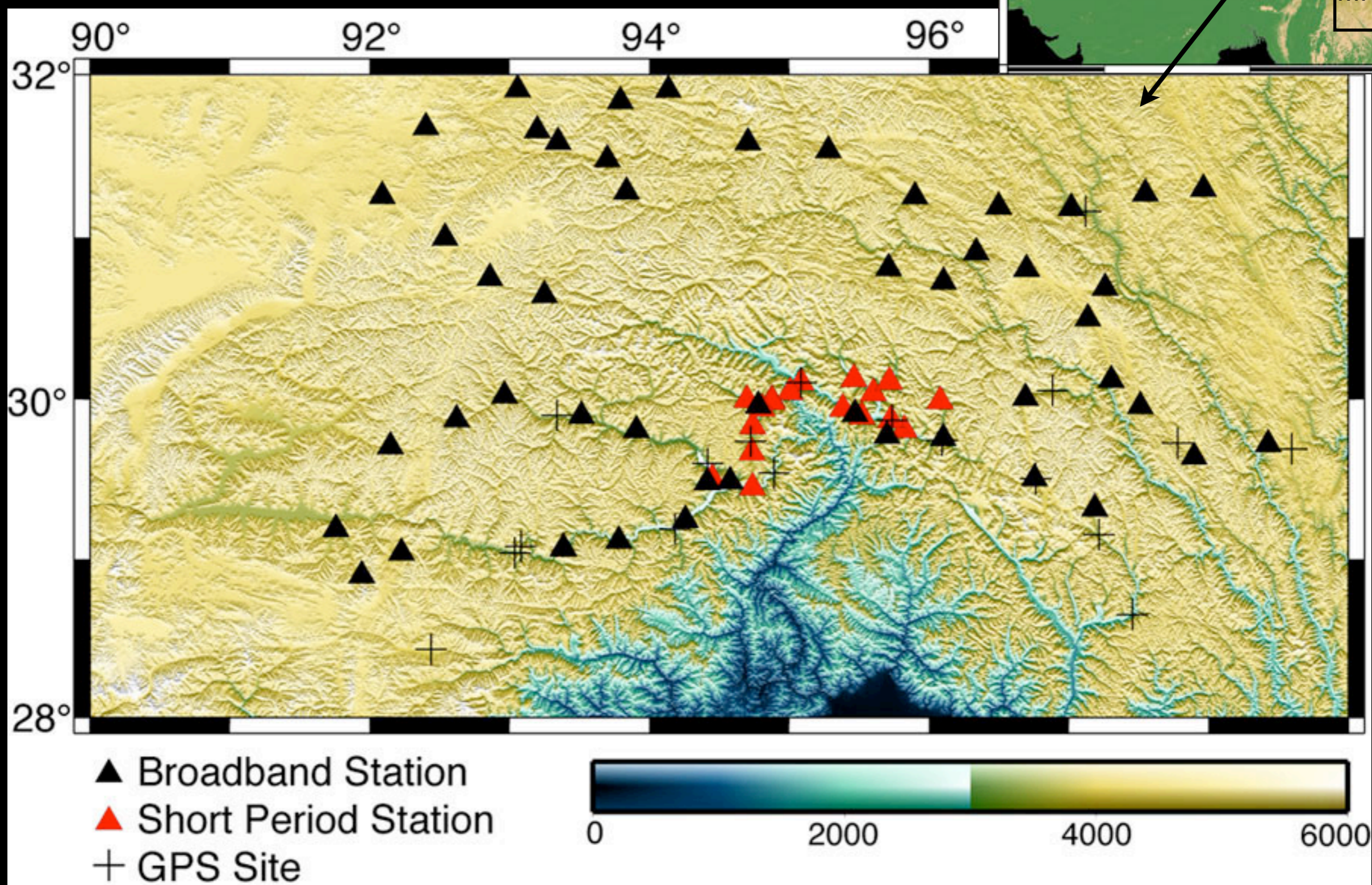
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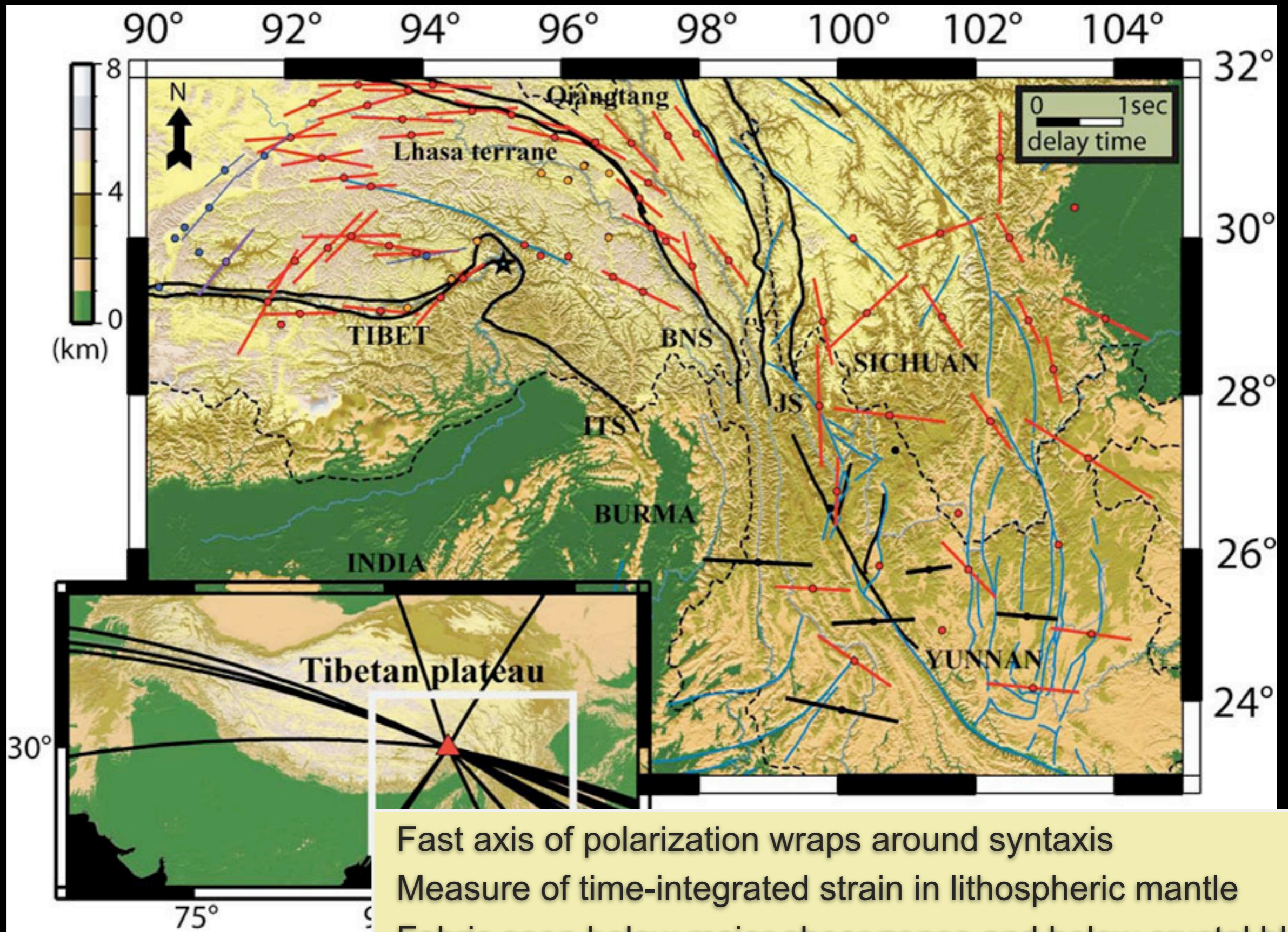
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Temporary seismic array - GPS sites

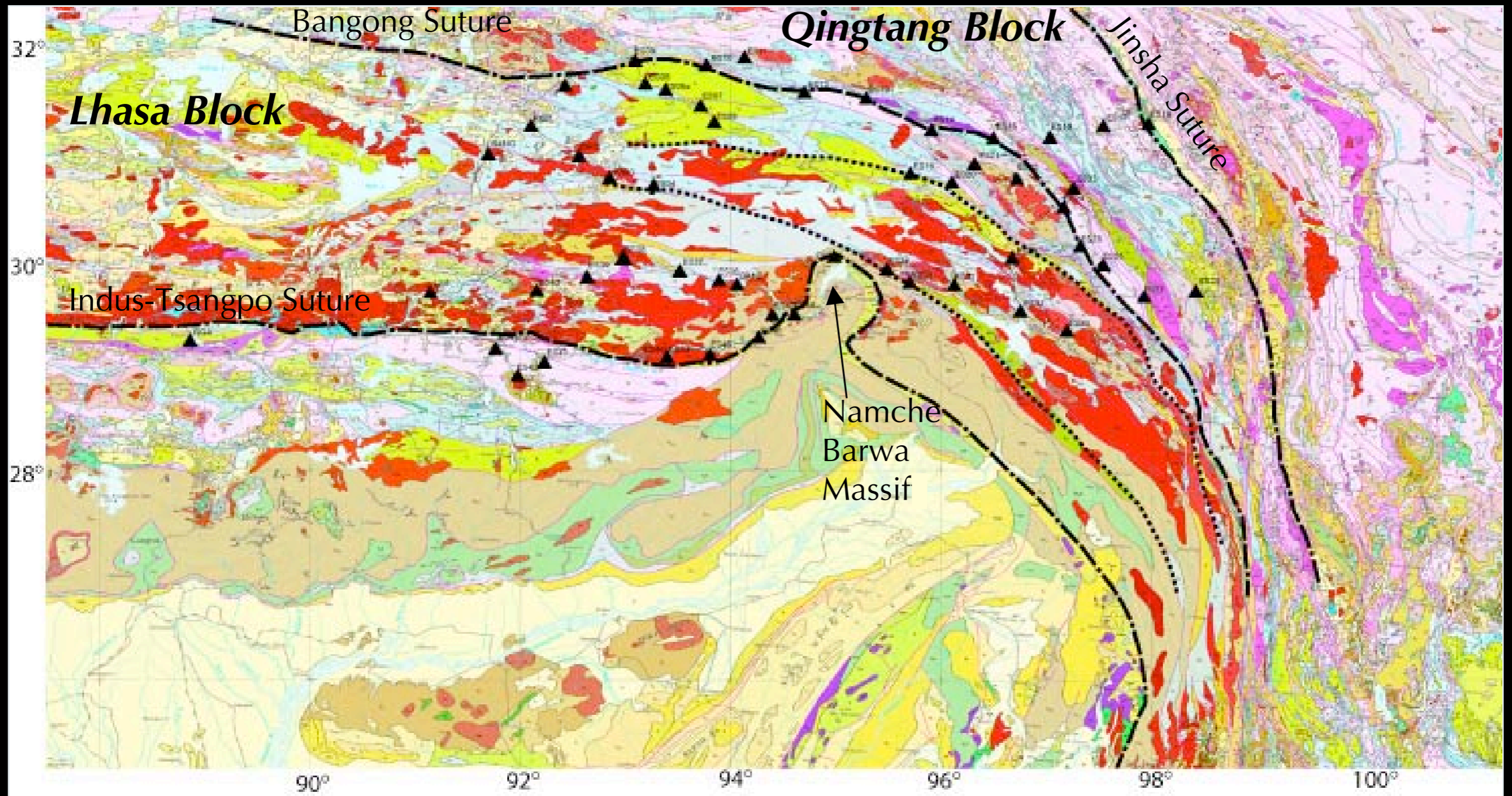


Shear-wave splitting results



Fast axis of polarization wraps around syntaxis
Measure of time-integrated strain in lithospheric mantle
Fabric seen below major shear zones and below crustal blocks
Transition to east-west orientation south of 26°

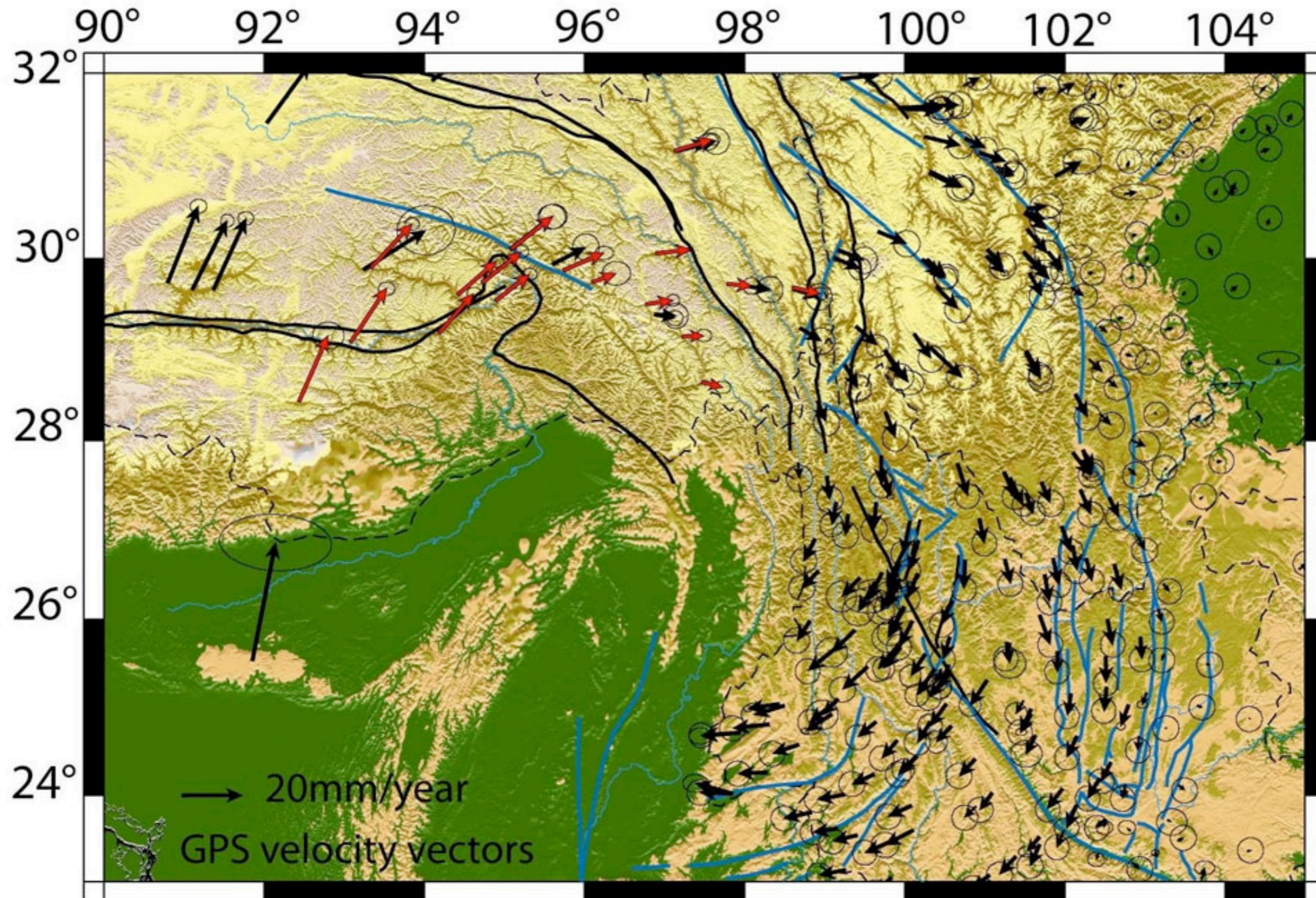
Geology and Structure



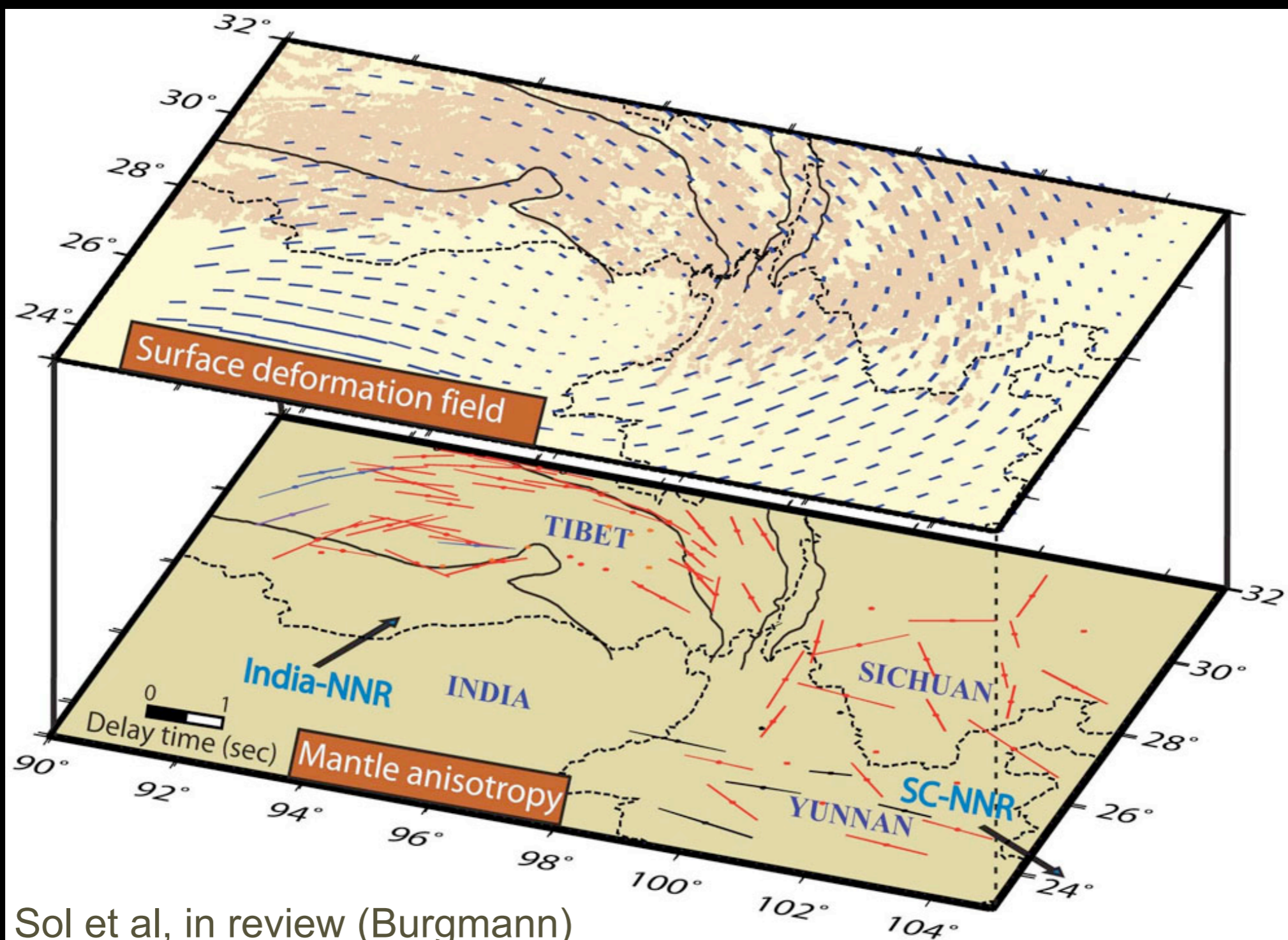
Crustal fabric wraps around and defines syntaxis
Measure of time-integrated strain in the crust

GPS Results

Velocity field wraps around syntaxis
east component emerges at $\sim 90-92^\circ$
north component ~ 0 at 97°
turns west south of $\sim 26^\circ$



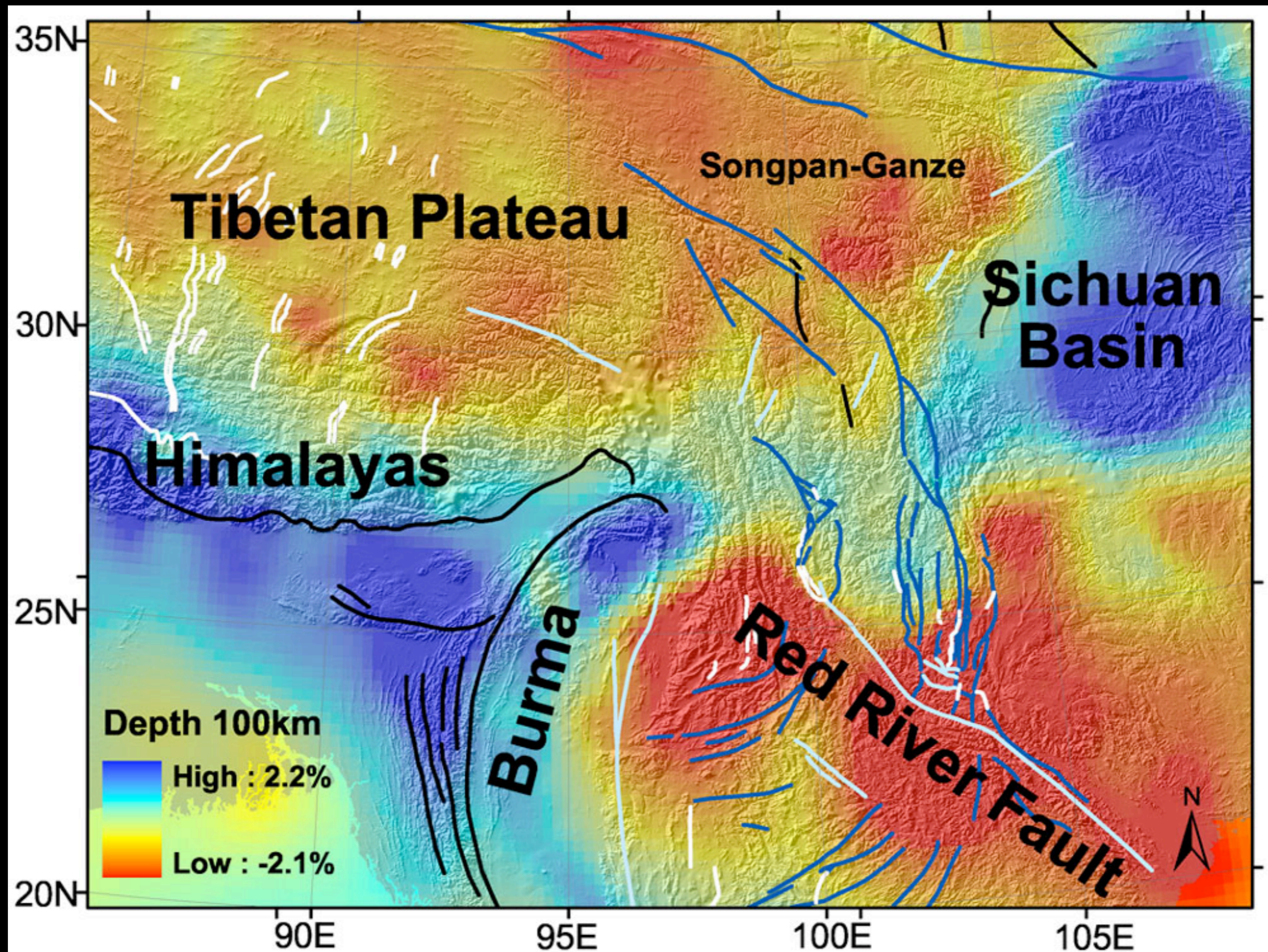
Comparison of surface and mantle



Sol et al, in review (Burgmann)

Crustal strain derived from GPS
consistent with shear-wave splitting

P-wave tomography at 100 km depth

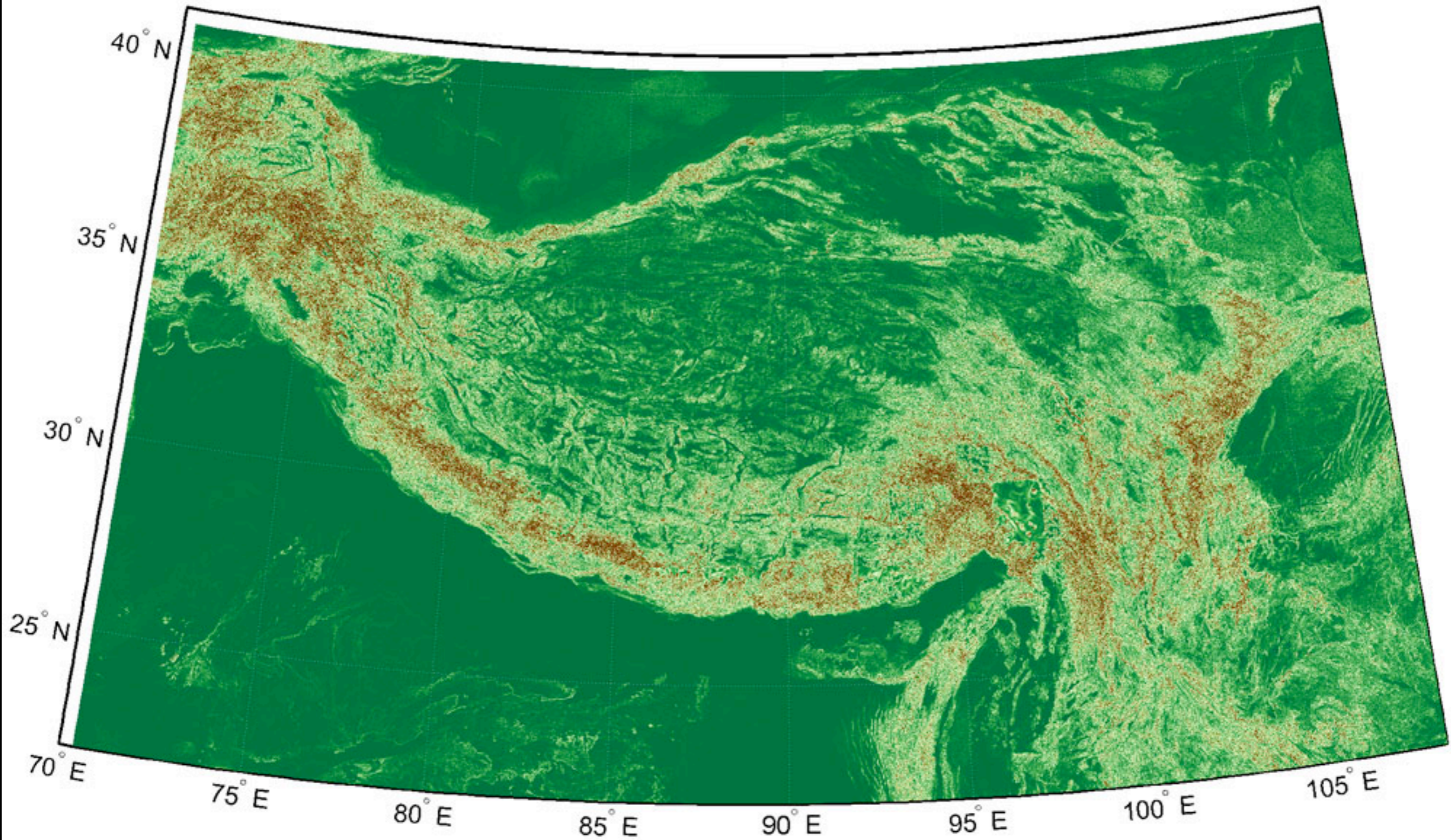


Li and van der Hilst

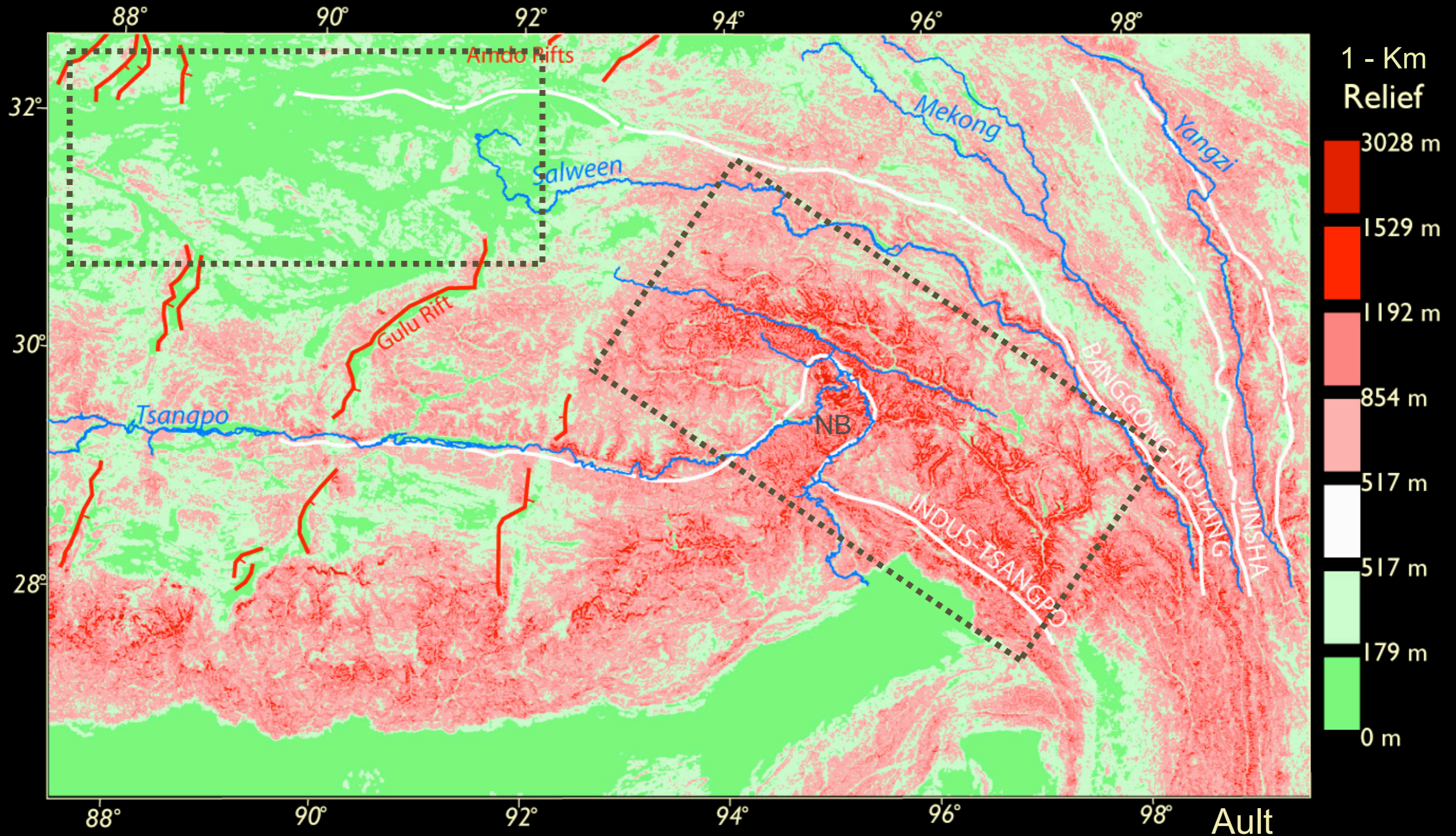
High velocity lithosphere restricted to south of Indus-Tsangpo suture

Gradient in Topography

Steep gradients at Himalayan front
Steep gradients at eastern syntaxis
Steep gradients at eastern margin



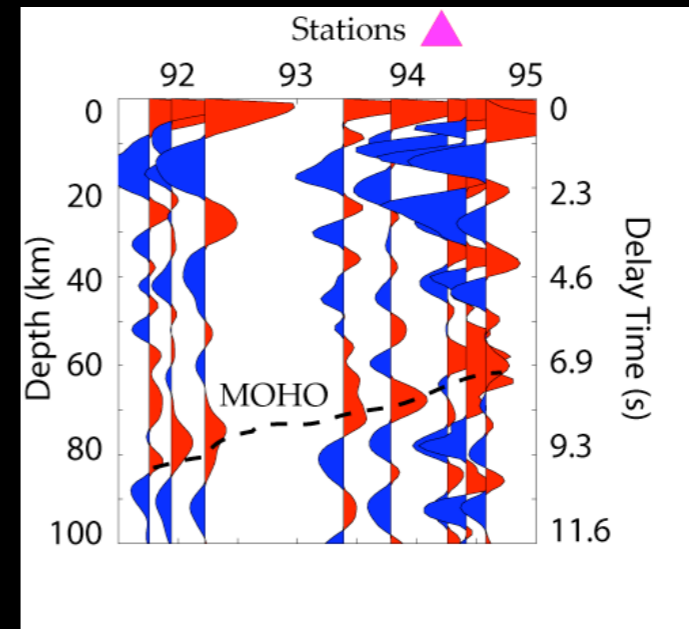
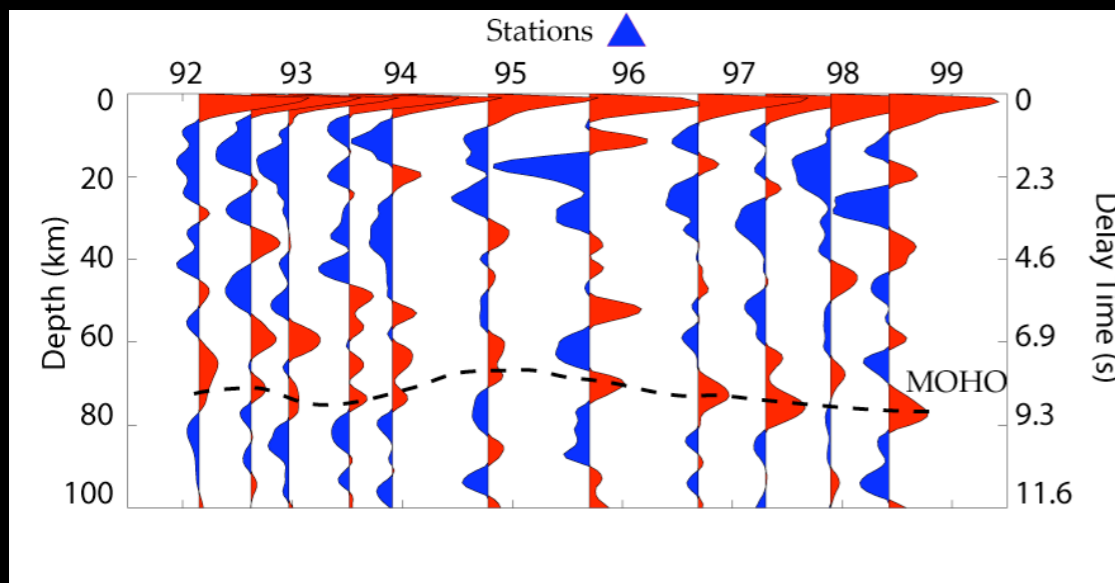
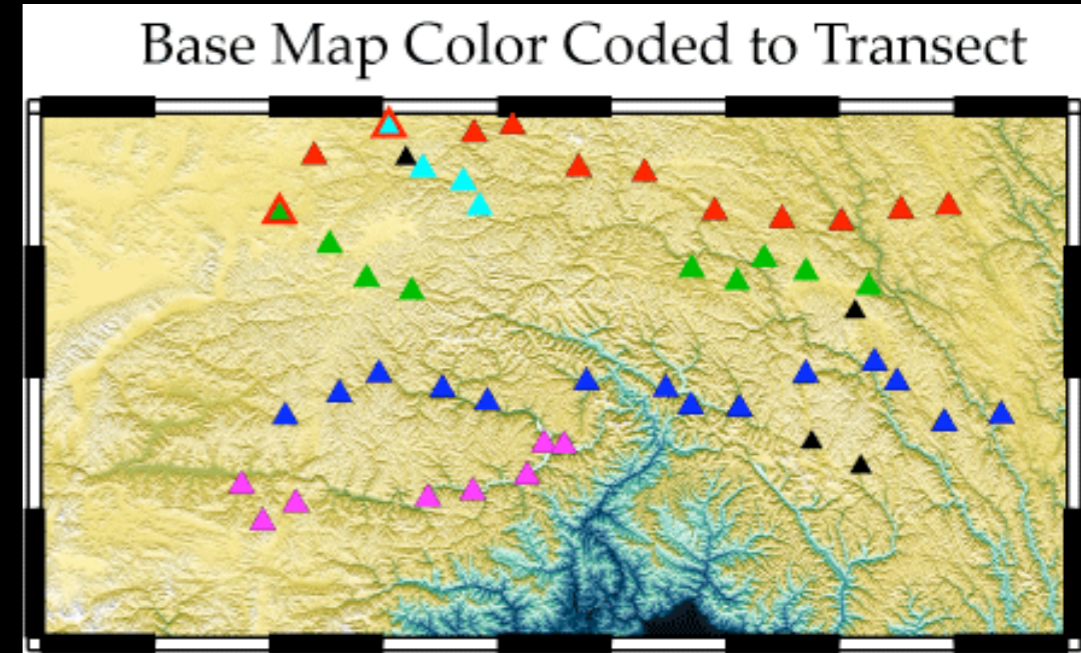
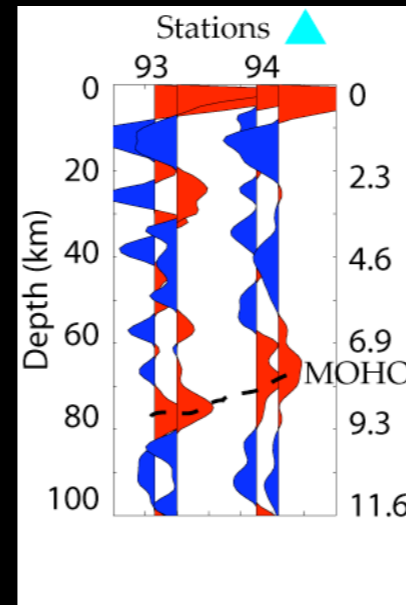
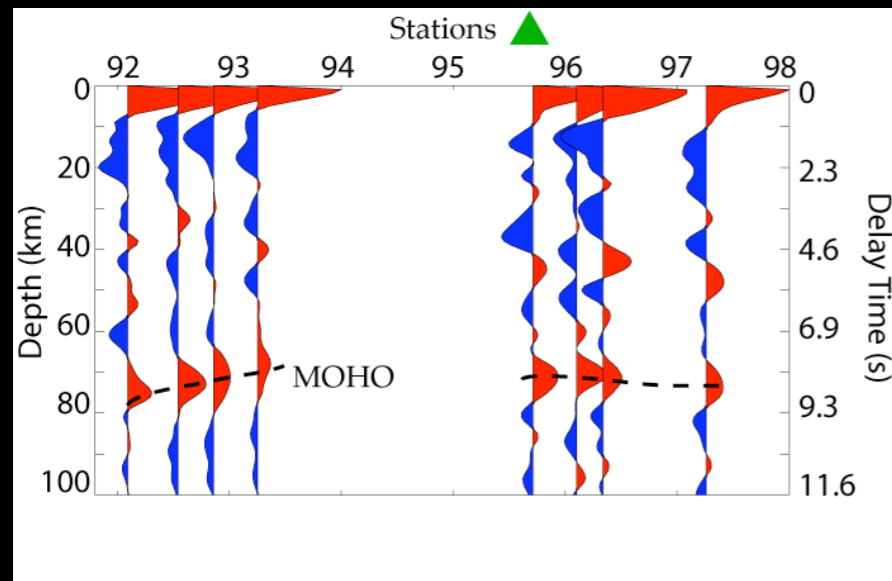
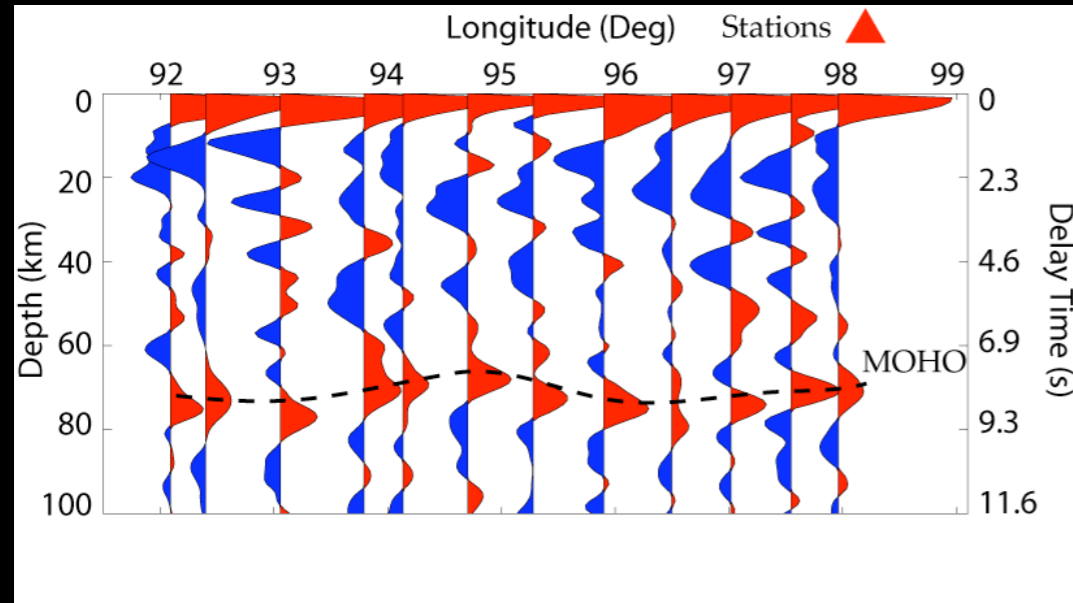
Southeastern Tibetan landscape



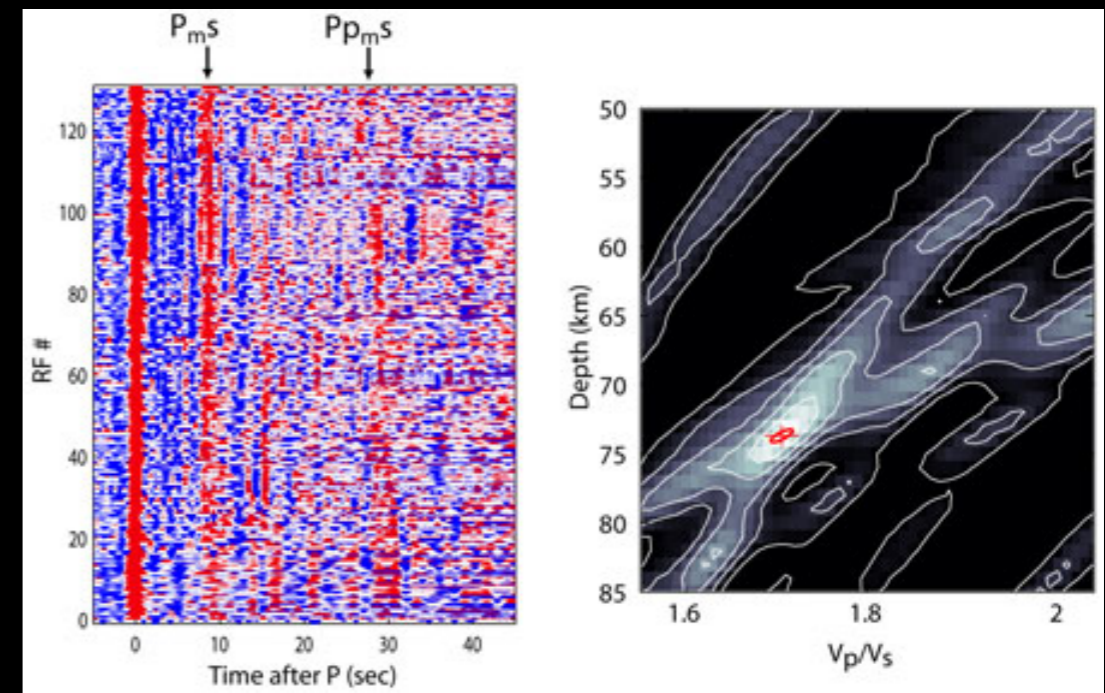
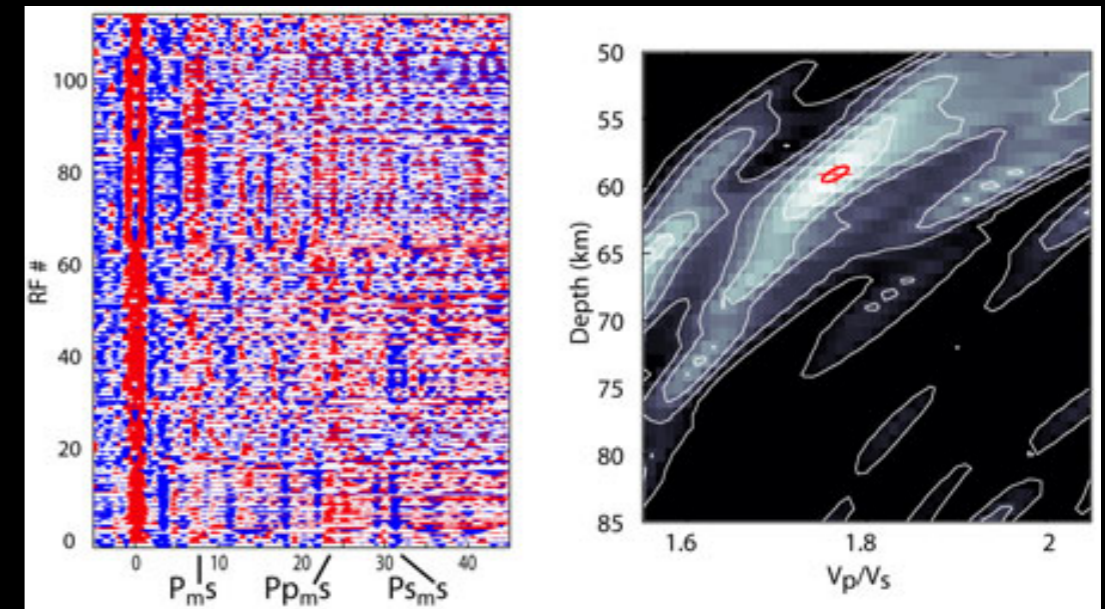
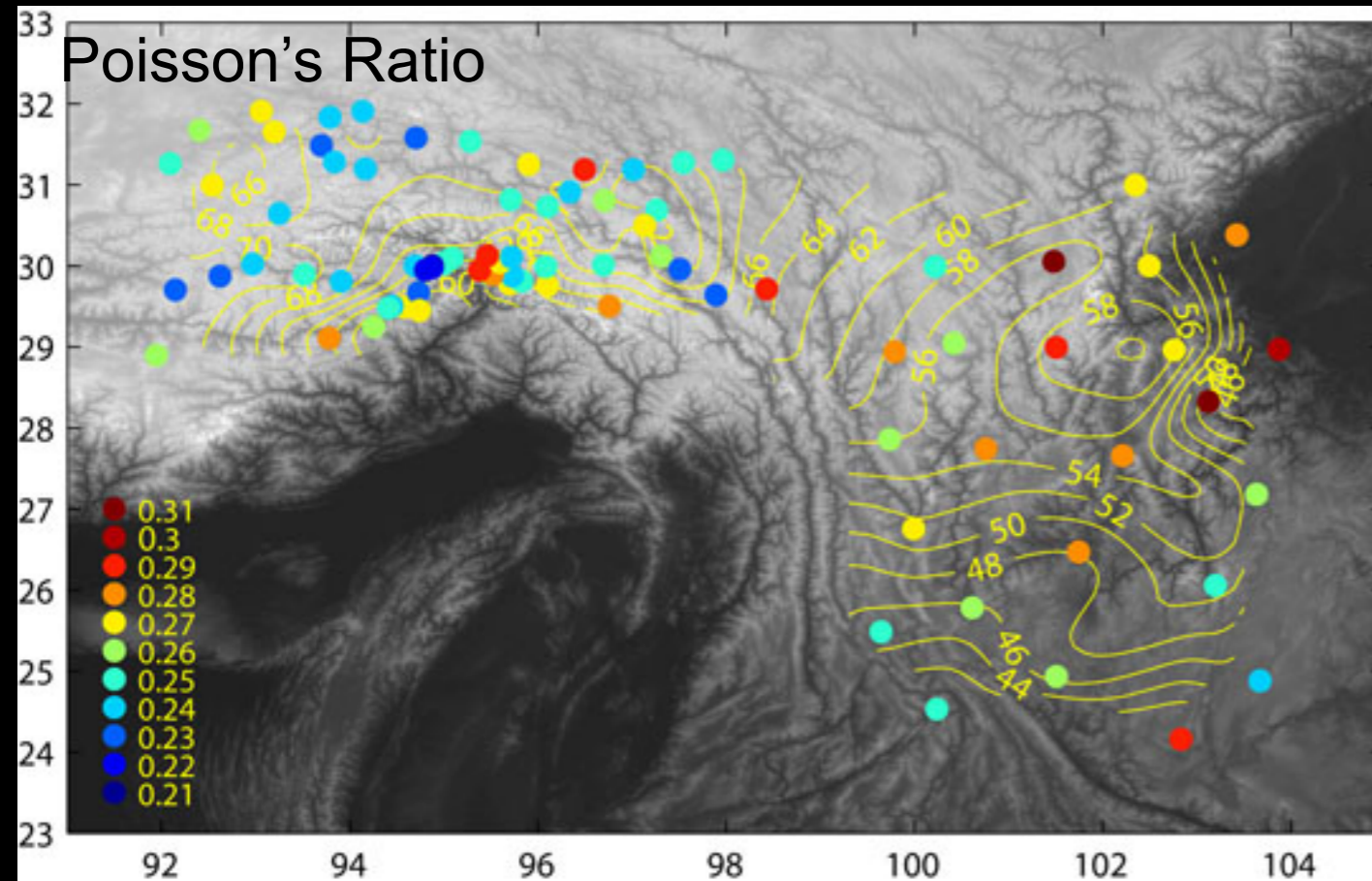
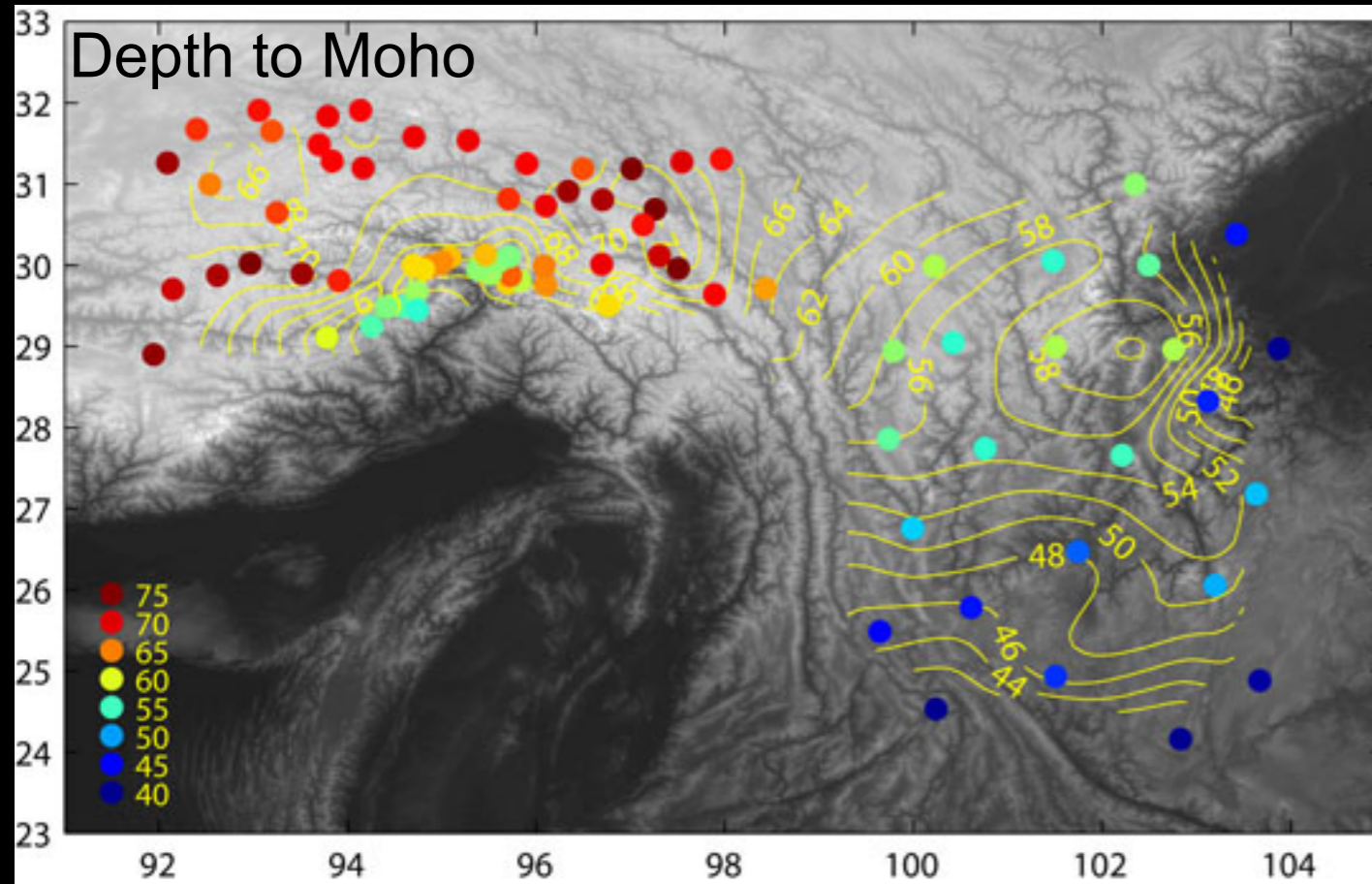
Strong fluvial incision, steep slopes
Transition at easternmost rift

Receiver function results

Substantial Moho topography
Substantial lateral variation

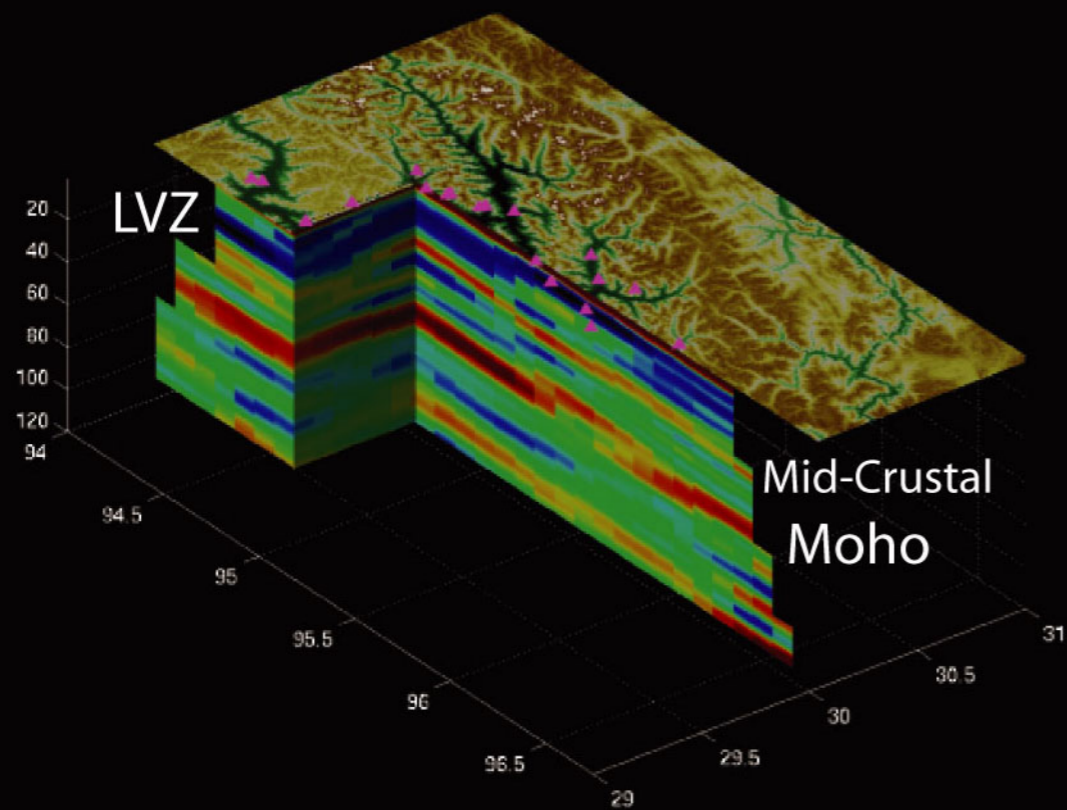
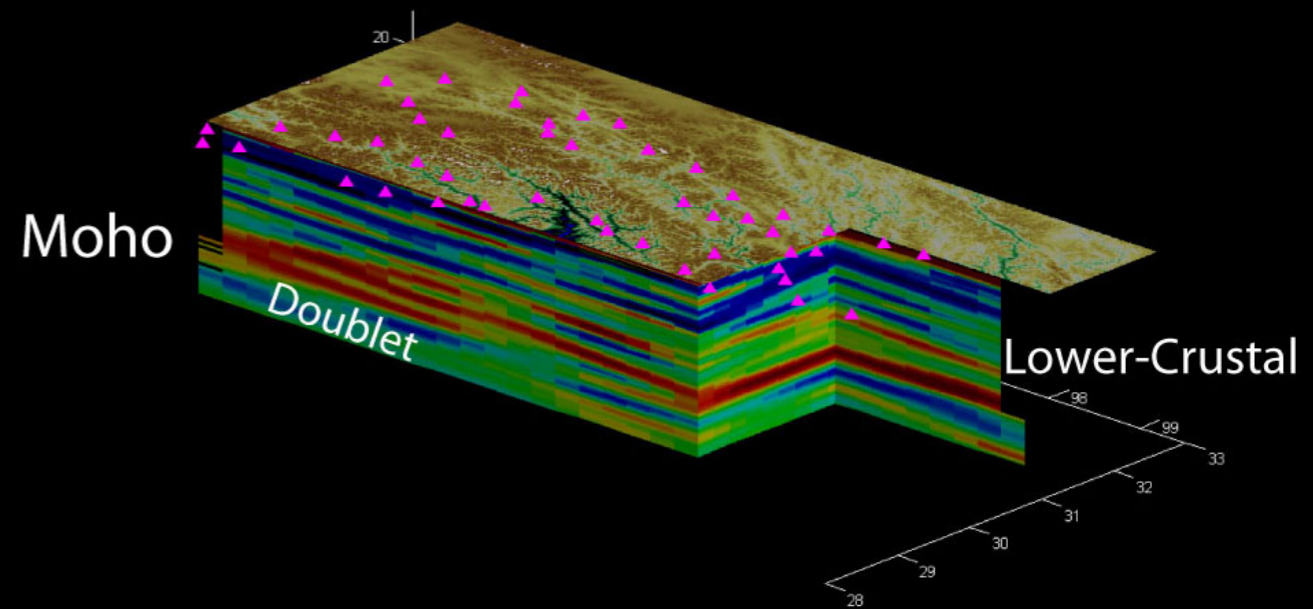
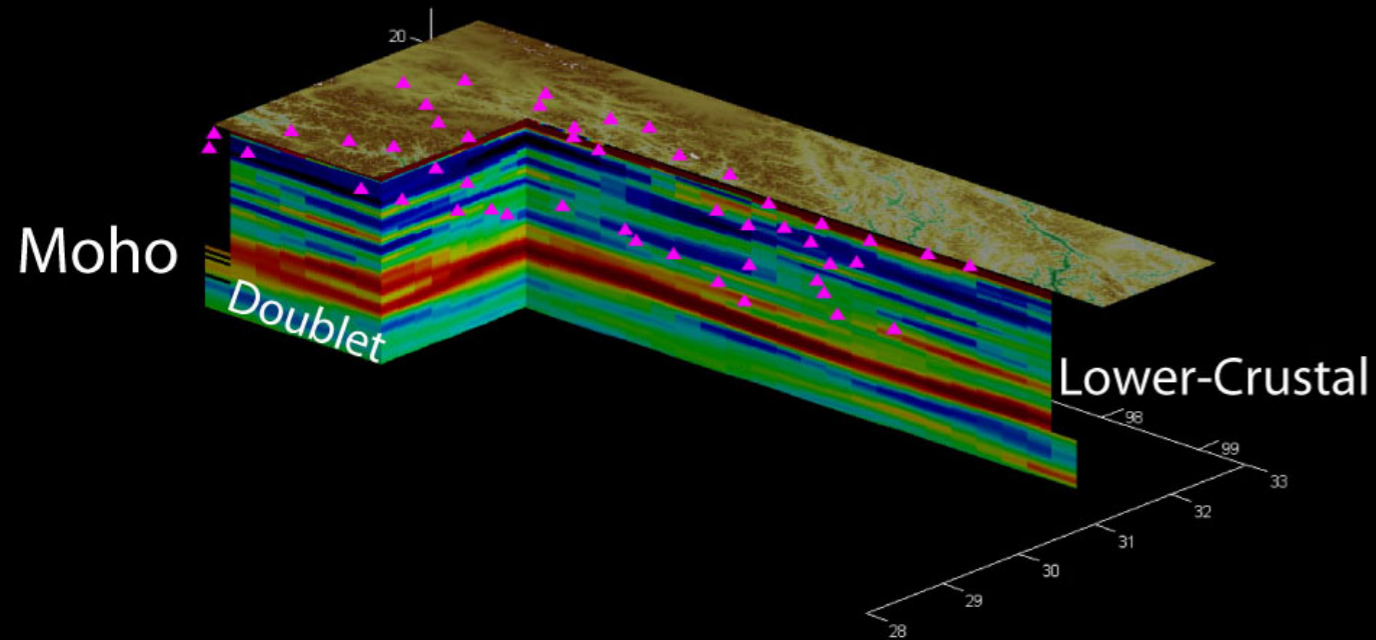


Receiver function results



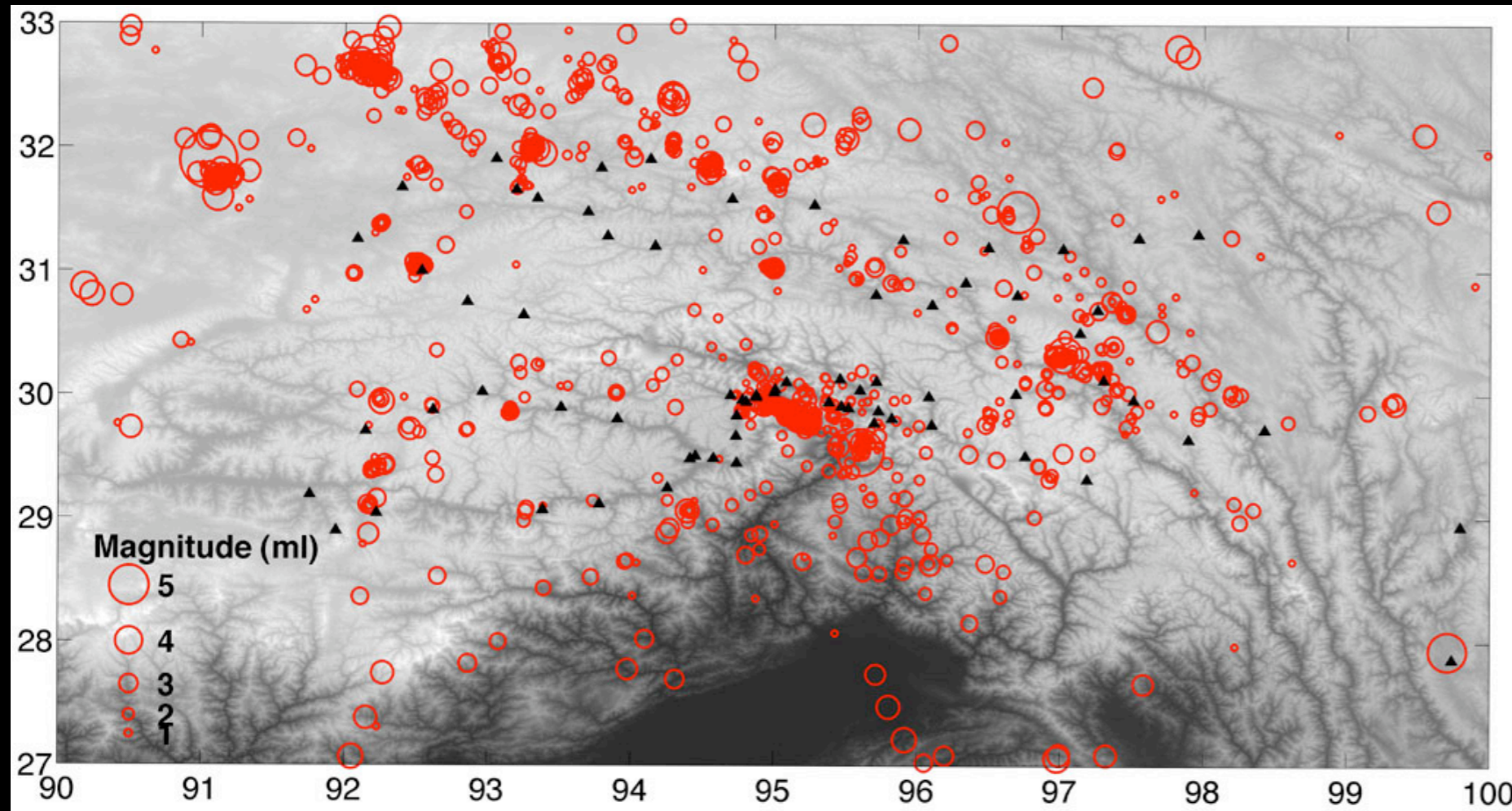
Substantial Moho topography
 Crustal thickness decreases eastward, correlates with topography
 Poisson's Ratio low in Tibet: felsic crust, no pervasive melt
 Poisson's Ratio increases eastward

Receiver function results

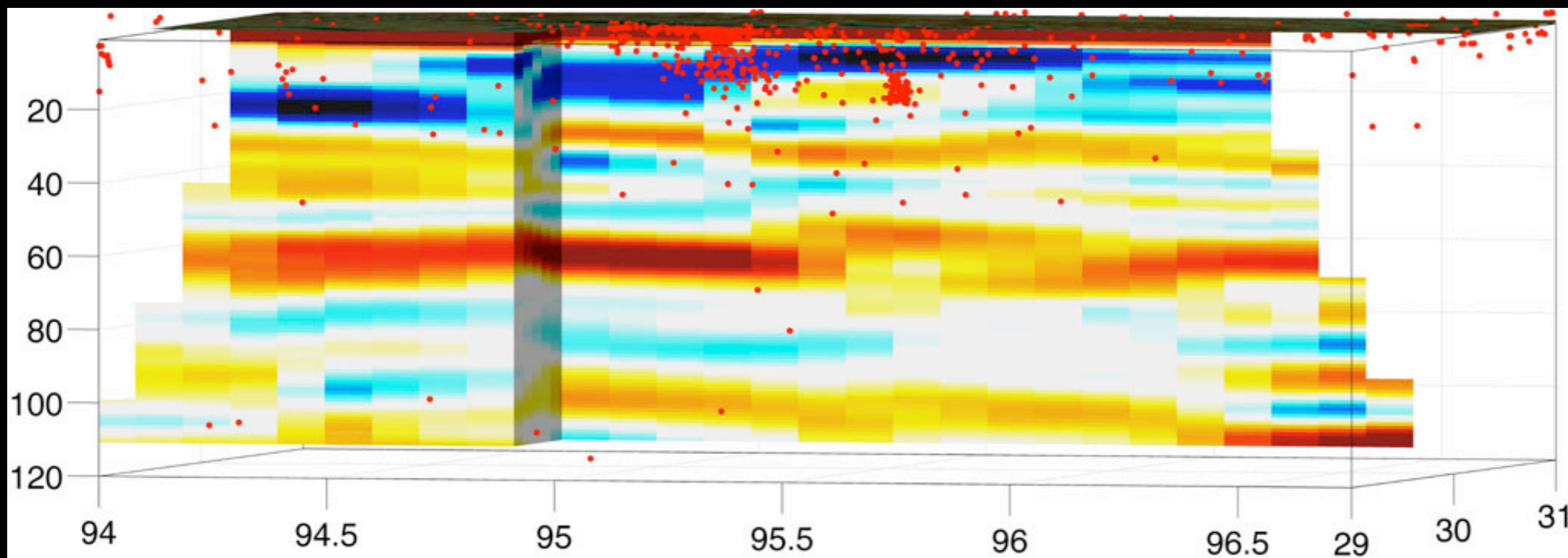


Change in Moho reflectivity from west to east
Variation laterally in crustal reflectivity
Offset in Moho across Jali fault

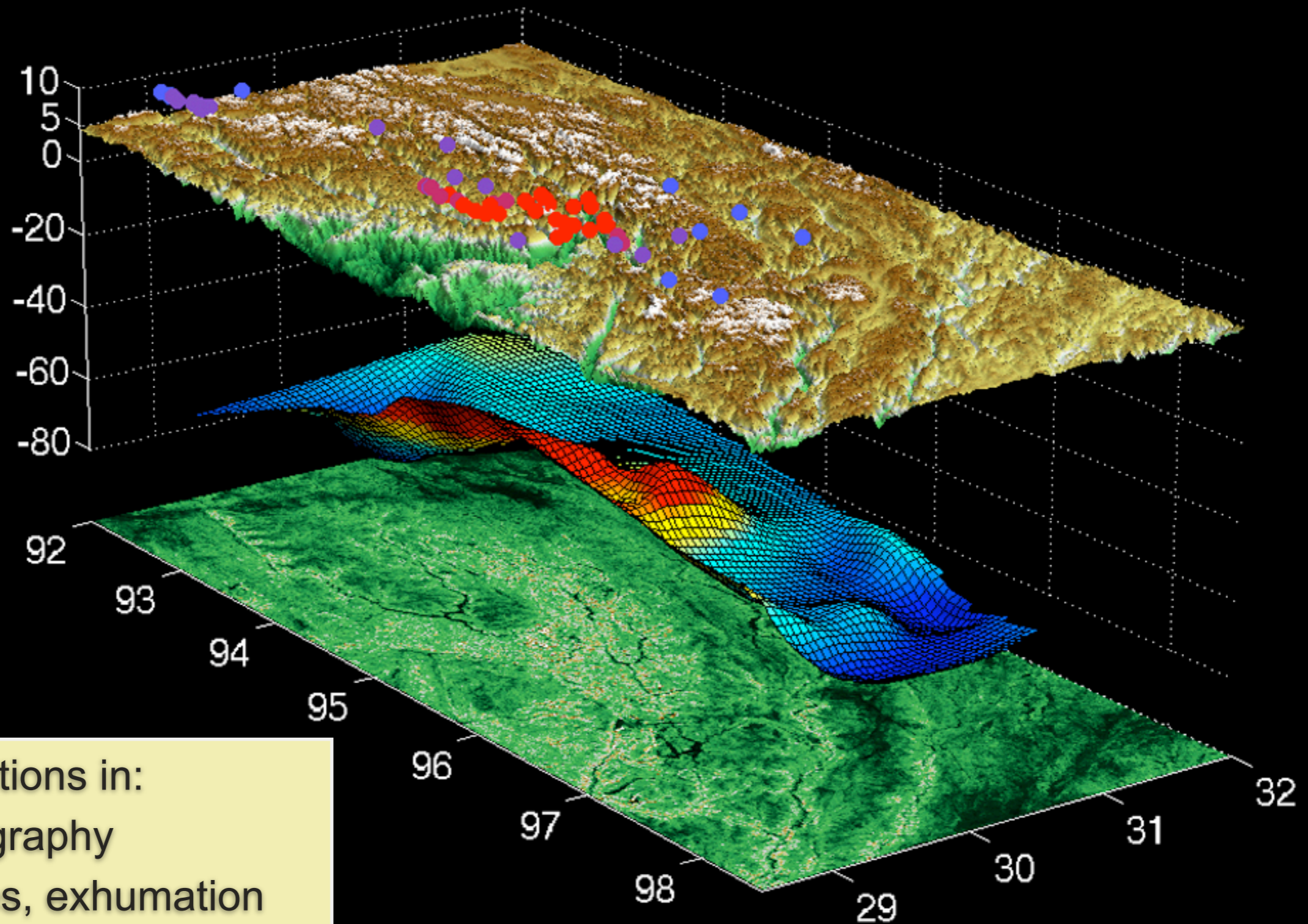
Earthquake locations



Namche Barwa
massif active
Eastern rift active
Majority of
hypocenters above
20 km depth



Comparison of data sets



Spatial correlations in:
Moho topography
cooling ages, exhumation
fluvial dissection, relief,

Southeastern Tibet

vertically coherent deformation

mechanical coupling between crust and mantle lithosphere

lateral variation in geodynamic boundary conditions and lithospheric properties

