Gravity anomalies and isostasy deduced from new dense gravimetry around the Tsangpo Gorge, Tibet

Guangyu Fu and Yawen She

1. Institute of Earthquake Forecasting, Science, China Earthquake Administration, Beijing 100036, China
2. Institute of Geophysics, China Earthquake Administration, Beijing 100081, China
fugy@cea-ies.ac.cn

Abstract: We built the first dense gravity network including 107 stations around the Tsangpo Gorge, Tibet, one of the hardest places in the world to reach, and conducted a gravity and hybrid GPS observation campaign in 2016. We computed the Bouguer gravity anomalies (BGAs) and free-air gravity anomalies (FGAs), and increased the resolution of the FGAs by merging the in situ data with EIGEN-6C4 gravity model data. The BGAs around the Tsangpo Gorge are in general negative and gradually decrease from south (-360 mGal) to north (-480 mGal). They indicate a uniformly-dipping Moho around the Tsangpo Gorge that sinks from south to north at an angle of 12°. We introduced a method to compute the vertical tectonic stress of the lithosphere, a quantitative expression of isostasy, using BGA and terrain data and applied it to the area around the Tsangpo Gorge. We found that the lithosphere of the upstream of the Tsangpo Gorge is roughly in an isostatic state, but the lithosphere of the downstream exhibits vertical tectonic stress of ~50 MPa, which indicates the loss of a large amount of surface material.

Conclusion

1. Our dense gravity observations in situ reveals a uniformly-dipping Moho around the Tsangpo Gorge that sinks from south to north with an angle of 12 degree.
2. The lithosphere of the upstream of the Tsangpo Gorge is roughly in isostatic state, but the one of the downstream is in great imbalance.

Reference

Fu, G. and Y. She (2017), Gravity anomalies and isostasy deduced from new dense gravimetry around the Tsangpo Gorge, Tibet, Geophysical Research Letters, 44: 10233-10239.