

A New Map of Crustal Velocities in Myanmar from GPS: Understanding Strain Partitioning

Eric O. Lindsey¹, Rishav Mallick^{1,2}, Lujia Feng¹, Wang Yu³, Lin Thu Aung¹, Saw Myat Min^{4,5}, Win Pyae Htet⁴, Aung Moe⁶, Than Khaing⁶, Oo Than⁷, Myo Thant^{4,5}, Kyle Bradley², Roland Bürgmann⁸, Emma M. Hill^{1,2}

¹ Earth Observatory of Singapore, Nanyang Technological University, Singapore

² Asian School of the Environment, Nanyang Technological University, Singapore

³ National Taiwan University, Taipei, Taiwan

⁴ Myanmar Earthquake Committee, Yangon, Myanmar

⁵ Department of Geology, Yangon University, Yangon, Myanmar

⁶ Myanmar Survey Department, Nay Pyi Taw, Myanmar

⁷ Department of Meteorology and Hydrology, Nay Pyi Taw, Myanmar

⁸ Department of Earth and Planetary Science, University of California Berkeley, Berkeley, CA, USA

We present the first dense geodetic velocity map spanning the tectonically active Burma plate in central and western Myanmar. The results are based on GPS surveys of 113 geodetic benchmarks over the period 2016 to 2019. Half of the sites were first installed and surveyed by the Myanmar Survey Department between 2000 and 2003; these initial observations enable us to derive accurate long-term velocities as well as an improved estimate of the displacements caused by the 2004 Mw 9.2 Andaman-Aceh earthquake. We combine these observations with data from earlier published surveys and with new results from a continuous GPS network comprising 17 stations operated jointly by the Earth Observatory of Singapore, the Myanmar Earthquake Committee and the Myanmar Department of Meteorology and Hydrology to form a combined set of 90 newly estimated velocities.

We construct a three-dimensional block model constrained by these velocities and show that the Rakhine megathrust is highly coupled north of 18°N, representing a significant earthquake and tsunami hazard for the whole region. The data also indicate a partitioning of the total north-south motion between India and Sunda, with approximately half of the motion on the Sagaing fault. The remaining motion is accommodated by some combination of oblique slip on the Rakhine megathrust and strike-slip motion on the Sein Daung fault within the southern Indo-Burman ranges. Finally, we examine the geodetic data for indications of activity on smaller, oblique faults in the Ayeyarwady delta region and the Myanmar Central Basin.

