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How does the Tibetan Plateau Grow Laterally?

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The continued collision between the Indian and Eurasian continents in the past 50-70 Myr has caused the rise and lateral expansion of the Tibetan Plateau. Through the late Cenozoic, the plateau's rise and lateral expansion has been shaped in part by the rheological contrast of the plateau and its neighboring terranes, producing dramatically different styles of morphology and structural kinematics. The plateau's eastern margin is bounded by the rigid Sichuan basin over a sharp topographic and structural boundary. This boundary changes to a gradational topographic gradient over a broad zone of crustal deformation in the northeastern corner of the Tibetan plateau. Details of how crust and mantle deform along these margins are critical for testing the various models for the growth of the Tibetan Plateau, including 1) progressive propagation of crustal thickening, 2) middle-lower crustal flow within the plateau and into the surrounding crust, 3) lateral expansion of thrust wedges associated with underthrusting of the Indian plate and possibly slices of Asian continent, and 4) stepwise growth with a deformational front jumping over discrete oblique continental subduction zones. These models predict resolvable crustal and mantle structures that are amenable to seismic imaging and geodynamic modeling. We have been working with Chinese partners, including China's SinoProbe project, to image the crustal and lithospheric structures across the eastern and northeastern margins of the Tibetan Plateau in recent years, and scientists from a number of US institutions are now planning an integrated research to tie lithospheric imaging with geochronology and surficial processes to better understand the history and controlling mechanism of the Plateau's lateral growth. This US effort is complementary to and coordinated with a major effort by Chinese scientists who are planning an integrated study of lithospheric deformation and earthquakes along the northeastern margins of the Tibetan Plateau. This talk will introduce both the US and Chinese plans, present preliminary results, and seek for broader collaborations.

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