Evidence for Polyphase Deformation in the Cachar Fold-Thrust Belt of Lower Assam, India: Implications for State of Stress in the Area

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The Cachar fold-thrust belt (FTB), a part of the Assam-Arakan Orogen, is characterized by a series of approximately symmetric detachment folds, involving a thick, predominantly clastic, Tertiary stratigraphic sequence. North of Cachar Hills and Barak River, the Shillong Plateau, interpreted as a crustal scale pop-up structure bound by two reverse faults, abruptly truncates the structures of the Cachar FTB. The Miocene strike slip Dauki fault is postulated to have nucleated dip slip faulting as the region approached the Himalaya during Pliocene. Seismic and structural data have been integrated to construct balanced cross-sections, which indicate the following stages of structural development: 1: Evolution of approximately symmetric detachment folds due to Late Miocene east-west compression. 2: Continued Late Miocene east-west compression resulting in the formation of out-of-syncline fore-thrusts (e.g. Srikona thrust) and back-thrusts (Badarpur system). 3: An episode of north-south compression (Pliocene), related to reverse fault movement along the Dauki fault, resulting in the development of a series of generally low amplitude east-west trending detachment folds in its footwall. The most significant fold to develop was the Barak River syncline. Haflong thrust, basal detachment for the up-turned North Cachar Hills FTB itself, is folded and consequently exposed south of the Shillong Plateau. Re-folding of the existing structures due to north-south compression has resulted in the development of Type-1 interference structures in the area studied. Evidence for north-south compression also comes from earthquake focal solutions, GPS-geodetic and borehole breakout data. An extremely complicated tectonic stress field exists within the sedimentary prism of the Cachar FTB. A comprehensive study of geologic and neo-tectonic structures, and geophysical data indicate how the stress field in the area evolved through geologic time.