

The great 1950 Assam Earthquake revisited: field evidences of liquefaction and search for paleoseismic events

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Extensive field investigations were carried out for the first time in the meizoseismal area of the Great 1950 Assam earthquake aimed at exploring the paleoseismic history of NE Indian region through documentation of liquefaction features. The precondition for any liquefaction like the presence of shallow water table, unconsolidated sand and shear wave as triggering agent prevail at the studied sites in the Brahmaputra valley. In such potential seismic zone a large number of liquefaction sites were expected to exist. Contrary to this, our extensive field investigations in this meizoseismal area could unravel only a few sites with liquefaction features. Non-availability of liquefaction sites within the flood plains of Brahmaputra River could be attributed to either sediment erosion or deep burial during seasonal floods. However, the sites located inland or close to low energy flood environment are quite suitable for preservation of liquefaction features. Owing to this, we could locate the liquefaction features mainly along and adjoining areas of Burhi Dihing river, a major tributary of Brahmaputra, and a few locations in distal part of the alluvial fans. The liquefaction features, like sand blows, dykes and sills, crater, and associated soft sediment deformation features were observed

in trenches at different depths from the ground surface. The liquefaction sites namely Haldibari, Khawang, Sapakhoaghat, Zinimari, Nagaon, Kalolwa, and Borbaligaon are distributed in lower reaches of Burhi Dihing River, while Jiya Nala, and Kaliya Nala fall in the distal part of alluvial fans of Dibang River near Sadiya. In order to constrain the formation timing of the different liquefaction features and causative earthquakes, associated organic material samples (e.g. charcoal, wood, peat) were collected. Out of 12 features, one feature at Haldibari site dates Modern (≤ 50 yr) for its lower, upper and pencontemporaneous bounds, thus exclusively constraining the 1950 earthquake. For some of the sand dykes, we obtained lower bound ages of about 500 yr, which infer the features might have formed any time after 1370 AD (Figure 1). We might have documented the signatures of historically reported 1548 AD and 1697 AD seismic events, but were devoid of organic material for 14C dating. Thus the paleoseismic history dating back to ~ 500 yr BP documented through 14C chronology of the organic material associated with these features indicates the absence of a comparable magnitude earthquake of that of 1950 in the studied area.

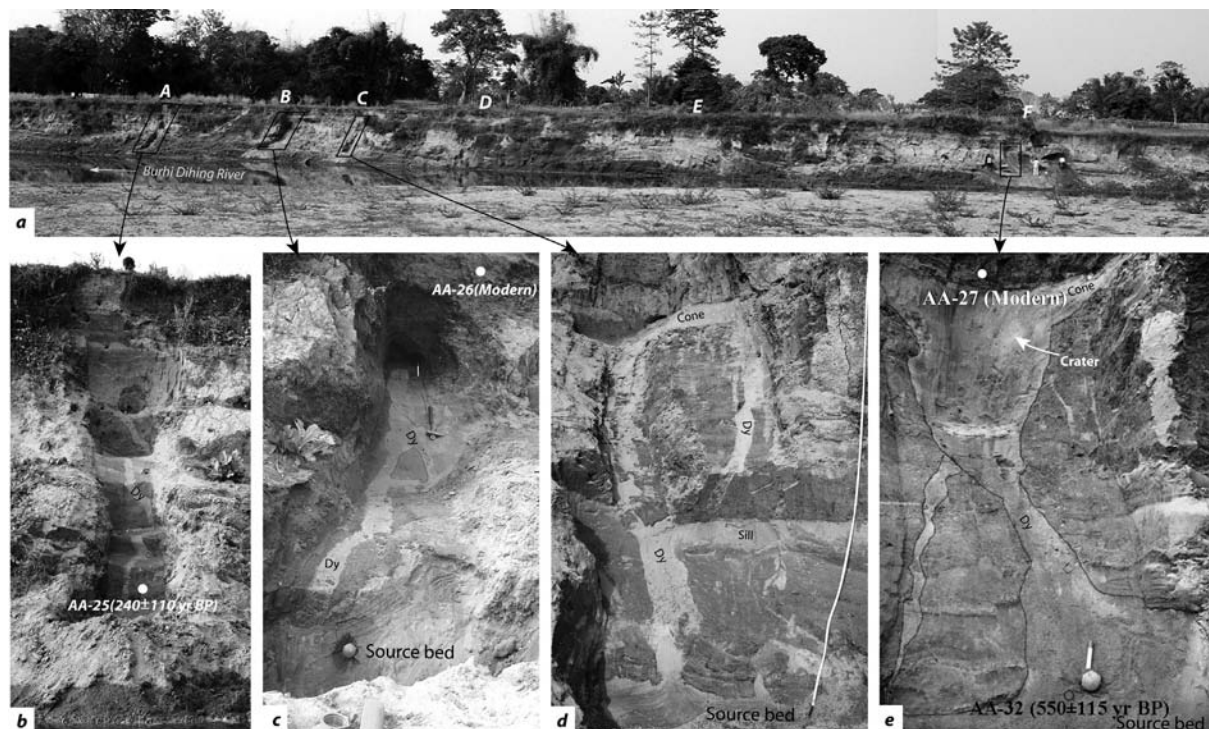


FIGURE 1. A series of dykes exposed in a 140 m long section in NW direction on the right bank of Burhi Dihing River at Nagaon. All the major dykes are numbered as A to F. Blow up of a few individual dykes along with the respective 14C ages are shown.