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Coastal boulder fields and tsunami hazards of East Java, Indonesia

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Coastal boulder deposits are records of unusually powerful wave action events associated with either storms or tsunamis. Our 2016 paleotsunami survey of the southeastern Java coast led to the discovery of five coastal boulder fields near Pacitan, Indonesia, possibly dating to the mid-to-late 19th century or prior, and two similar fields at Pantai Papuma and Pantai Pasir Putih that were tsunami-emplaced during the 1994 7.9 Mw event in East Java. Both multiyear photogrammetry and hydrodynamic wave height reconstructions of the accumulations near Pacitan suggest the boulders were likely tsunami rather than storm-wave emplaced. We evaluate the boulders as an inverse problem, using reconstructed wave heights and ComMIT tsunami modelling to suggest a minimum 8.4 Mw earthquake necessary to dislodge and emplace the largest boulders near Pacitan assuming they were all deposited during a single seismic event and that the rupture source was located along the Java Trench, some 200 km south of Pacitan.