The Great Sanriku-oki earthquake of 2 March 1933: Source Characterization Based Regional and Far Field Information and Implications for Off-Trench Normal Faulting Tsunami Sources in Japan and Elsewhere

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Three investigations of the great off-trench earthquake of 2 March 1933 have been completed (Uchida and five others GJI Submitted 2015; Okal, Kirby, and Kaligaris, GJI Submitted, 2016; Kirby, Hino, and Nishizawa, in preparation). Analyses of contemporary data from the early 1930's have revealed new details of this seismic source that caused the devastating tsunami waves that struck the Sanriku coast that led to more than 3,000 dead or missing. The source region of this remarkable event was in the off-trench of a sector of the Japan Trench characterized by large off-trench gravity and bathymetric anomalies and relatively long and straight normal fault scarps parallel to the relevant trench. These conditions are satisfied in Japan in the Hokkaido-Kurile Trench system south of Hokkaido Island and the southern Kurile Islands and in some sectors of the Bonin and Marianas subduction systems. Analysis of fault scarps and curvature changes in the off-trench seafloor and plate convergence rates suggest that recurrence times for great off-trench normal-faulting range from about 1,000 to 10,000 years, roughly 10 times those for interplate thrust earthquake sources.

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