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Carbon supply into the deep-sea Japan Trench associated with the 2011 Tohoku-oki earthquake

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The role of earthquakes on carbon cycling in deep-sea trenches along plate subduction margins is poorly constraint. The giant (Magnitude 9) Tohoku-oki earthquake in 2011 has been documented to remobilize a wide area of fine-grained surface sediment enriched in organic matter, redistributing from the slope into the deepest part of the $>$ 7 km deep Japan Trench. Yet, little is known about how and where the sediment remobilized by the 2011 earthquake had settled in the trench. In this study, we used high-resolution subbottom profilers (SBPs) acquired by Parasound and Topas systems from research cruises during 2012–2016, to image and spatially map the extensive transparent, up to $\sim$ 5 m thick event-deposits. The SBP-to-core correlation and radio-nuclide dating on the youngest event deposit allowed for ground-truth of the mapped bodies to be related to the 2011 events. We quantified a total remobilized sediment volume of 0.2 km^3 over the southern and central Japan Trench (36°N–39.5°N). The mapped sediment volume was then used for estimation of mass of organic carbon contained in the 2011 event deposits by measuring total organic carbon. The preliminary estimation suggests that the 2011 earthquake had triggered redistribution and eventual delivery of $> 1 \times 10^{12}$ g carbon to the trench by a single tectonic event. The finding sheds new light on dynamic impact of large earthquakes on carbon cycling in the deep-sea.