Magnetic fabric evidence for rapid, characteristic changes in the dynamics of the 2011 Tohoku-oki tsunami

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Magnetic fabric (MF) and rock magnetic measurements were applied to sediments deposited by the 2011 Tohoku-oki tsunami to reveal the dynamics of the tsunami run-up and the character of the sedimentation along the Misawa coast, Aomori Prefecture, northern Japan. Two main types of sedimentary environment are described: a higher energy, tangential stress-dominated environment with imbrication and traction/rolling transportation and a calmer, post-peak wave environment ruled by gravitational stress. Rapid characteristic changes in the tsunami dynamics are also described. The tsunami began with erosion of the pre-tsunami surface caused by rapidly increasing energy. Bedload features such as ripple stratification were developed by the repeated accelerations and decelerations of the tsunami wave during run-up. The arrival of the peak wave was indicated by high-density flow, “slurry-like” sediments. Following the peak wave, the decreasing energy was marked by a change in MF.

Keywords: magnetic fabric , tsunami dynamics, 2011 Tohoku-oki tsunami

