A catastrophic flood caused by the 5 ka Numazawako ignimbrite eruption, northeast Japan: impacts on the Jomon period inhabitation

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Numazawa volcano, Fukushima Prefecture, northeast Japan, erupted most recently at about 5 ka and emplaced 4 km^3 of non-welded ignimbrite (Numazawako eruption) in the Tadami river gorge. This ignimbrite blocked the Tadami River resulting in temporary impoundment of more than 1.6 km^3 of damlake water before breakout and catastrophic release (Numazawa flood: Kataoka et al., 2008). Post-eruptive resedimented pyroclastic materials (flood deposits) are widely distributed along the Tadami and Agano rivers, and the coastal Niigata Plain more than 150 km downstream of the eruptive center.

Geomorphologic and sedimentary evidence for a single flood event found along the rivers includes: 1) fine-grained thinly laminated lacustrine deposits in the upstream of Numazawa volcano along the Tadami River and upstream spillway features; 2) 30 m thick, pumiceous debris flow and hyperconcentrated flow deposits showing continuous aggradation; 3) fine-grained slackwater deposits at tributary river mouths; 4) large flood boulders forming lags on stripped ignimbrite surfaces or outcropping within hyperconcentrated flow deposits and on younger terrace surfaces; and 5) high water marks along downstream reaches.

Paleohydraulic reconstructions of the flood by different techniques estimate a peak breach discharge of 10000s of cumecs. Burial of Neolithic Jomon archeological occupation sites by the flood deposits at distal locations (Takahashi et al., 2006) indicates that catastrophic volcano-hydrologic hazards impacted contemporary human life. Most of the buried archeological sites were located on terrace surface at the eruption time and were capable to avoid usual meteorological floods, although they were inundated by the Numazawa flood. Also, the sites were not directly affected by the ignimbrite eruption and/or pyroclastic fall. The flood history implies that secondary volcano-hydrologic hazards can have an extensive and more sustained reach than the better-known primary impacts of volcanic eruptions.