

A 2 Ma widespread tephra associated with a large scale pyroclastic flow, Sengan geothermal area, northeast Japan

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A widespread tephra referred to here as Tamagawa- R4 Tephra (Tmg-R4) is newly recognized. Tmg-R4, derived from the Pre-Yakeyama caldera located in the Sengan geothermal area, northern Honshu Island of northeast Japan, covers the area from Tohoku to Kanto, northeast of Honshu Island. At the type locality in the proximal area, Tmg-R4 comprises a non-welded ignimbrite and an immediately overlying welded ignimbrite. The fine vitric ash nature of the distal ash-fall deposits of Tmg-R4 suggests that they are co-ignimbrite ash-fall deposits. Tmg-R4 was identified using a combination of refractive indices and chemical compositions of major and rare earth elements of glass shards, mineral content, refractive indices of hornblende. On the basis of these properties, Tmg-R4 was identified in Boso and Oga peninsulas and in the core drilled on Musashino upland around 500 km south of the source. Stratigraphic positions in Boso Peninsula and paleomagnetic direction and many radiometric ages determined in the proximal area by previous studies indicate that the age of Tmg-R4 is c. 2.0 Ma, positioned in around beginning of Olduvai event. As a key marker horizon in this age, the widespread occurrence of Tmg-R4 providing a tie line between many different sections over a distance of 500 km. This tephra gives a time control point of c. 2.0 Ma to the volcanostratigraphy of northeast Japan. The distribution of Tmg-R4 showing emplacement of co-ignimbrite ash-fall deposits in the area 500 km south of the source, emphasizes the upwind transport direction relative to the prevailing westerly winds, as the same as a few co-ignimbrite ash-fall deposits derived from calderas in northeast Japan.