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The historical (218 ± 14 aBP) explosive eruption of Tutupaca volcano (Southern Peru)

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The little known Tutupaca volcano (17°01' S, 70°21' W), located at the southern end of the Peruvian arc, is a dacitic dome complex that experienced a large explosive eruption during historical times. Based on historic chronicles and our radiometric data, this eruption occurred 218 ± 14 aBP, probably between 1787-1802 AD. This eruption was characterised by a large sector collapse that triggered a small debris avalanche (<1 km3) and an associated pyroclastic eruption whose bulk volume was 6.5-7.5 x 107 m3. Both units were emplaced synchronously and spread onto the plain situated to the northeast of Tutupaca volcano. The spatial and temporal relationship between the debris avalanche and the pyroclastic density current deposits, coupled with the petrological similarity between the juvenile fragments in the debris avalanche, the pyroclastic density current deposits and the pre-avalanche domes, indicate that juvenile magma was involved in the sector collapse. Based on a detailed petrological study (Manrique et al., this meeting), the triggering mechanism of this eruption was the emplacement of a primitive magma below the dacitic reservoir that induced remobilization of the dacitic magma. Thus, the ascent of this dacitic magma, coupled with the fact that the Tutupaca dome complex was constructed on top of an older, altered volcanic sequence, probably induced the destabilisation of the hydrothermally active edifice, producing the debris avalanche and its related pyroclastic density currents. This eruption probably represents the youngest debris avalanche in the Andes and was accompanied by one of the larger explosive events to have occurred in Southern Peru during historical times.