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Eruption of the Nuevo Mundo dacitic domes in the Los Frailes volcanic region (Eastern Bolivian Altiplano) triggered by glacier unloading at the end of the LGM

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Numerous studies have conjectured a strong effect of climatically-induced loading/unloading of the earth surface (by sea level or ice-sheet fluctuations) on the volcanic activity. If the impact of surface unloading on volcanism in continuously active volcanic areas, for instance in Iceland, is convincing, we may ask about the impact of surface unloading in less active areas or regions characterized by much more discontinuous volcanic activity.
We explore this question by considering the Cenozoic Volcanic region of the Eastern Cordillera of Bolivia, part of the Altiplano-Puna volcanic province. There, a large ignimbrite plateau, the Los Frailes complex, is the product of a prolonged period of volcanic activity: thick Miocene ignimbrites were followed by a volcanic activity characterized by several domes intrusion and tuff/ignimbrite deposits between 5.2 and 1.24 Ma (Jimenez and Lopez-Velasquez, 2008). The volcanic quiescence since the early Pleistocene was recently and surprisingly interrupted along the South-Western domain of the Los Frailes plateau by the extrusion of several domes or domes/coulées of dacite (the Nuevo Mundo summits), accompanied by ash and pumice effusive activity. These domes, which present a similar per-aluminous composition as the Pliocene Los Frailes ignimbrites and which were erupted along a N-S trending fault, clearly overlie LGM glacial landforms and moraines.
To understand the origin of this late dacitic activity, we precisely dated the northern dome by carrying out 10Be exposure ages on several blocks sampled along the top surface of the dome. Exposure ages display clustered values at ∼11.7 kyr, i.e. ∼3kyr after the rapid deglaciation that occurred in the region at the end of the Tauca period (16.5-14.5 kyr) (Blard et al., 2009). The 2-D modelling of the glacier extension indicates that a small ice-field (15x40 km) covered during the LGM the SW part of the Los Frailes plateau, with ice thickness locally exceeding 300m. The rapid glacier retreat at ∼14.5 kyr produced rapid unloading with a maximum pressure drop (∼5 bars at 10km depth) located right below the dacitic domes.
The observations and models strongly suggest that the dacitic domes extrusion has been triggered by the glacier unloading, which induced overpressure at depth in the magma chamber. Additionally, magma ascent might have been facilitated by a horizontal stress drop on the N-S fault along which the Late Pleistocene domes are aligned. The observed time lag between unloading and surface extrusion is in good agreement with Jellineck et al.'s (2003) model for silicic magmas. If so, the Nuevo Mundo domes may be issued from a magma chamber at shallow depth (5-10km ?) containing silicic magma, with sustained replenishment during the Pleistocene but without effusive activity, except when climate interaction push the system out of its steady cooling evolution at depth.