The explosive activity of Popocatépetl volcano is a threat to the surrounding densely populated areas and it is therefore important to recognize indicators of change in eruptive style (explosive to dome building) within a short period of time. In this study we present results of vesicle size distributions (VSDs) and compositional analysis of matrix glass in pumice from the 5 main plinian eruptions of Popocatépetl (ca 23-1.2ka), pumice from the 2001 pyroclastic flow and ashes from 2 vulcanian eruptions in May and June 1997; the aim being to have a good representation of the whole stratigraphic sequence.

Major element analysis of matrix glass (EPMA) allowed us to estimate the depth from which the erupted magma went into disequilibrium, by calculating the equilibrium pressure using the quartz-albite-orthoclase ternary system of Blundy and Cashman (2001). Quantitative interpretation of texture in tephra via VSD analysis was used to link physical changes experienced by magma during ascent, with conditions responsible for eruptions. The extent and style of vesiculation in tephras could also be related to eruption style and duration and has specifically allowed us to recognise changes in the tephra texture that represent changes from explosive to dome building activity.

This study highlights a more complicated story in terms of magma storage and interaction, than that previously accepted for the Popocatépetl volcanic system and is an important contribution to ongoing research at the volcano.