Stratigraphy of the post-caldera explosive volcanism of the *Primavera Caldera Volcanic Complex, México*

Delphine Sourisseau[1], José Luis Macias[1,2], Denis Avellan[1], Felipe Garcia Tenorio[1] and Juan Pablo Uruchurtu[3]

[1] *Departamento de Peligros y Riesgos, UNAM, México* [2] *UNAM, México, México* [3] *Centro de Geociencias, UNAM, Juriquilla, México*

Abstract

The Primavera Caldera Volcanic Complex (PCVC) is a Quaternary rhyolitic complex located in the western part of the Trans-Mexican-Volcanic-Belt (TMVB) formed 95 ky ago with the eruption that produced the ignimbrite called Toba Tala [1, 2]. After the collapse, an internal lake formed along with several domes and stratovolcanoes that were emplaced along the ring-fault, inside, and outside the caldera. The activity of these volcanoes produced a complex set of pyroclastic deposits that was poorly understood. To define the Primavera post-caldera explosive activity, extensive fieldwork was performed to define the stratigraphy of pyroclastic deposits and their relationship with their lavas and domes from which they were vented. This detailed correlation was assisted by granulometry, componentry, whole-rock chemistry, and U/Th dating in zircons. With this information we have characterized at least eight subplinian to plinian eruptions separated by paleosols or lahar deposits that have been dated between 90 and 40 ky. Distribution of air-fall deposits and deposits of pyroclastic density currents indicate that these eruptions were sourced at three different sites (Nejahuete, San Miguel and Planillas).
Therefore, a new evolution model of the PCVC is under construction based on all the new evidence gathered in this study and other parallel projects of the P15 geothermal project CeMIE Geo (Centro Mexicano de Innovación en Energía Geotermica).

Key words: Primavera Caldera Volcanic Complex, Stratigraphy, Plinian and subplinian eruptions, Pumices, U/Th dating.

Introduction

The PCVC :

- Late Pleistocene rhyolitic center
- In the TMVB close to the SMO
- Caused by the subduction of the Rivera and Cocos plates beneath the North American plate
- 50km north of the triple point formed by the Colima, Chapala and Tepic Zacoalco grabens

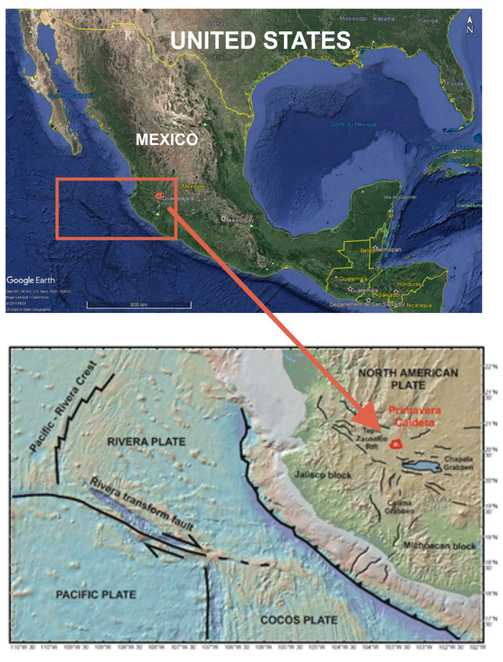

Figure 1. Location of the Primavera caldera in Mexico.

Objectives

- Age, source, distribution of explosive pyroclastic activity
- Correlation of explosive pyroclastic activity with domes

Methods

- Deposit description
- Mapping
- Stratigraphic correlation
- Laboratory analyses (componentry, chemistry, radiometry)

Results

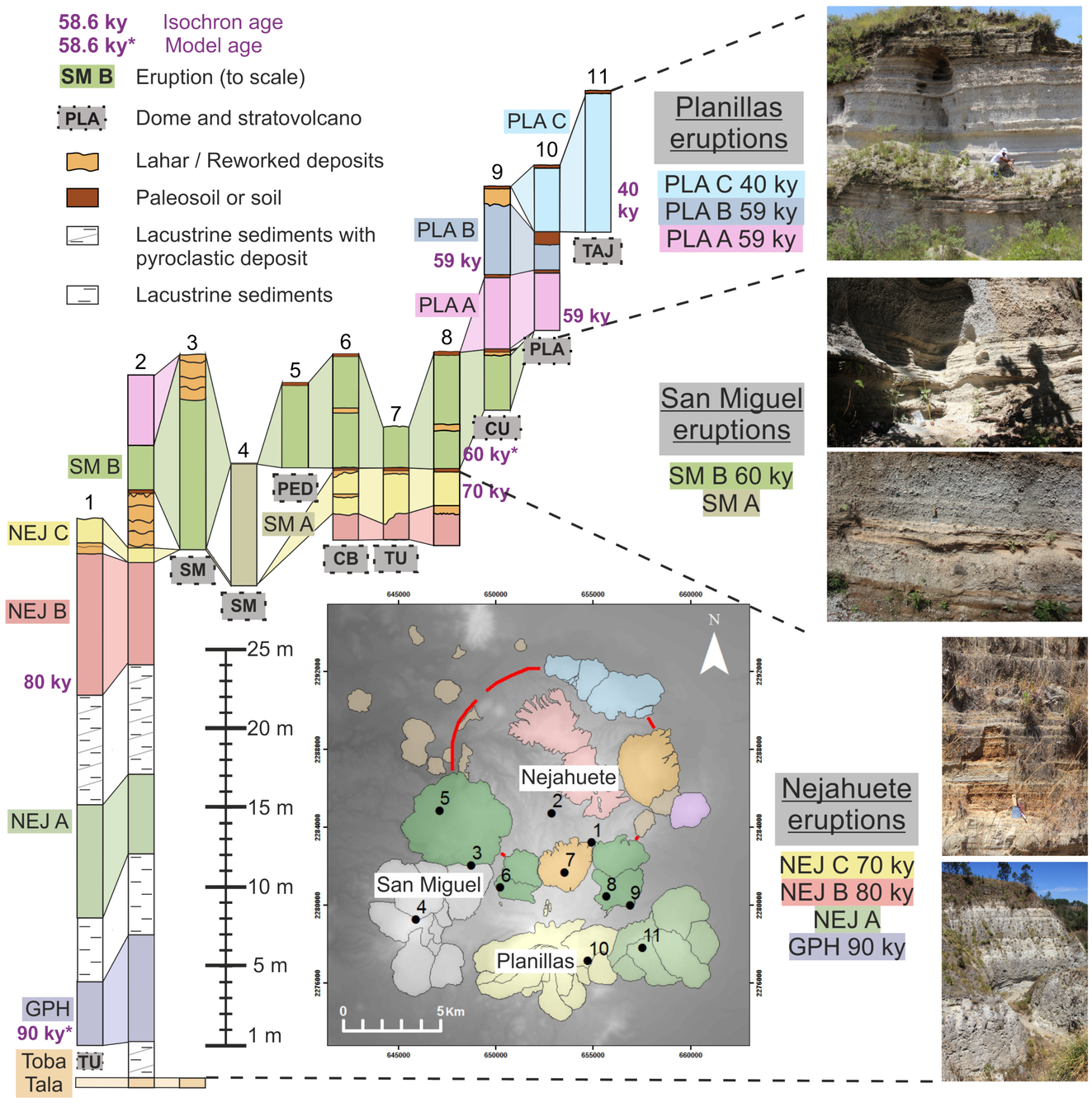

Figure 2. Left side: Stratigraphic correlation of the Primavera Caldera pyroclastic activity with domes. Right side: Pictures from the Planillas, San Miguel and Nejahuete deposits.

Conclusion

At least eight plinian to subplinian eruptions occurred after the formation of the Primavera Caldera 95 ky ago.

- Nejahuete Dome : Three eruptions between 90 and 70 ky
- Planillas Stratovolcano : Three eruptions between 60 and 40 ky
- San Miguel Volcanic Complex : Two eruptions between 80 and 60 ky

Acknowledgements

This project was supported by the P15 CeMIE Geo project.
Special thanks to all members of the Instituto de Geofísica, UNAM Morelia.

References

[1] G. A. Mahood. Geological evolution of a pleistocene rhyolitic center — sierra la primavera, jalisco, méxico. *Journal of Volcanology and Geothermal Research*, 8(2–4):199 – 230, 1980.

[2] G. A. Mahood. A summary of the geology and petrology of the sierra la primavera, jalisco, mexico. *Journal of Geophysical Research: Solid Earth*, 86(B11):10137–10152, 1981.