

The Legacy of Parícutin

Mexico's Most Spectacular Recent Geologic Event Offers Unprecedented Opportunities for Scientific Observation

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Editor's Note: The following article about Mexico's world-famous Parícutin Volcano was written from the *Guidebook for a Geologic Excursion to Parícutin Volcano, State of Michoacán, Mexico (Libro-Guía de la Excursion Geologica al Volcan Parícutin, Estado de Michoacán, Mexico)* by S. Rodriguez-Elizarraras, J.C. Komorowski, V. Jimenez and C. Siebe. The booklet was prepared in 1993 (in both Spanish and English) "...as a contribution to the Commemorative International Reunion in honor of the 50th anniversary of the birth of Parícutin Volcano, organized by the Institute of Geography of the UNAM." **Parícutin is the destination of a Geothermal Resources Council (GRC) 2003 Annual Meeting Field Trip, which will be conducted from Morelia, Michoacán on Saturday, October 11. The excursion will feature a visit to the village of Angahuan, the Parícutin lava flow and the ruins of the San Juan Parangaricutiro church. More details can be found in the registration brochure for the event (to be mailed worldwide in mid-August), and on the GRC web site at: www.geothermal.org.**

As the world waged war in 1943, the fiery birth of Mexico's Parícutin Volcano created social and environmental havoc in a remote area of Michoacán State, yet it offered an unprecedented opportunity for scientists to witness the birth and growth of a new volcano. It remains as the youngest such feature in Mexico, and is typified as the most unusual and spectacular event in the country's recent geologic history.

Parícutin Volcano is located 320 km west of Mexico City. It is part of the extensive (40,000 km²) Michoacán-Guanajuato Volcanic Field, which claims more than 1,000 Quaternary volcanic structures. The field lies in the western part of the Mexican Volcanic Belt, which transects the country from east to west. The entire geologic region is related to a subduction zone along the Mesoamerican Trench, where the Cocos, Rivera and North American plates meet.

Feb. 20, 1943 was a fateful day in the history of western Michoacán, and especially for the villages of San Juan Parangaricutiro and Parícutin. At approximately 4:00 p.m., farmer Dionisio Pulido and his family witnessed a rare geologic event, as the first gasps of the new volcano emerged from the earth. Strong seismic activity rumbled through the area during the two weeks preceding the volcano's birth, measuring from 3.2 to 4.5 on Richter scale.



Now a popular tourist attraction, the ruins of the church of San Juan Parangaricutiro (with Parícutin in the background) are surrounded up to 15 meters by basaltic lava that flowed from vents and fissures to the northwest (Sapichu vent) and southwest (Taqi and Ahuan vents) of Mexico's Parícutin Volcano.

As they gazed at the spectacle, massive quantities of gases, ash, scoria and volcanic bombs spewed from a relatively small depression (1.5 m deep and 4 m in diameter) in Pulido's mountain cornfield. Only 12 hours after its first manifestations, the Parícutin Volcano had built a cinder cone 8 m high. By the third day of its formation, the cone had grown to 60 m, with a horseshoe-shaped crater. At the same time, the volcano released its first basaltic flow. By March 6, the Parícutin cinder cone measured 200 m in height. Though the cone grew close to its final height in less than a year (365 m by Nov. 3, 1943), the intensity and diversity of the volcano's eruptive phenomena continued for another 9 years.

The initial 2.5 years of the Parícutin Volcano's growth is divided into three periods named after their respective eruptive

vents. The first period—Quitzocho, from Feb. 20 to Oct. 19, 1943—was characterized by repeated construction of the cone and frequent landslides. During the second period—Sapichu, from Oct. 19, 1943 to Jan. 8, 1944—a parasitic eruptive vent was born, with lava emission northeast of the original cone. The third period—Taqui, from Jan. 8, 1944 to August 1945—was characterized by the termination of the Sapichu flow as lava emanated from two new vents—Taqui and Ahuan—respectively located to the west and south of the Parícutin cone. During this time, lava flows persisted but explosive activity diminished.

Though lava outpouring continued without interruption until January 1947, Parícutin's flow area reached its maximum extension of 24.8 km² by the end of 1944, forming the new "Mesa de los Hornitos" plateau. Intermittent lava flows continued, but only increased the thickness and volume of lava-covered areas. On Feb. 25, 1952—after 9 years and 5 days of uninterrupted activity—lava and ash emissions stopped, leaving the new Parícutin Volcano in a state of fumarolic activity that persists to this day.

At the end of 1945 and in early 1946, scientists measured the physical properties of Parícutin's lava. Its maximum temperature was 1,070°C, with an average velocity of 60 m/min (3.6 km/h). Viscosity was 10⁵ to 10⁶ poises, with an eruption rate between 100,000 and 300,000 m³ per day. The total weight of pyroclastic and effusive products from the volcano between 1943 and 1952 was estimated at 4.56 million metric tonnes.

Initial lava emitted by Parícutin was classified chemically and mineralogically as basaltic andesite with olivine. SiO₂ content was 55 percent, slowly increasing to 60 percent at the end of the eruption in 1952, when orthopyroxene andesite was emitted. Xenoliths (rock fragments foreign to the basaltic flow) of granite, quartz



"Dr. Atl" (Gerardo Murrillo) paints the eruption of Parícutin in August 1943. Despite his age of 68, he painted and describe this unique event while living in precarious conditions. Atl (1875-1964) was not only an artist, but a writer, controversial politician and tireless traveler who was captivated with a passion for volcanoes.

monzonite and dacitic tuff are common, picked up by the lava from underlying basement rock formations.

The Parícutin eruption temporarily devastated the environment and society of the surrounding region, as hundreds of people witnessed the destruction of their hard-won lands and cherished belongings. In July 1944, the villages of San Juan Parangaricutiro (population 1,895) and Parícutin (population 733) were completely destroyed by lava flows up to 20 m deep. Both villages were evacuated and relocated as the towns of Nuevo San Juan Parangaricutiro and Calzontzin. As noted above, the volcano's lava flow covered 24.8 km² of

land, and 233 km² was coated with a 0.25 cm layer of ash.

Founded between 1530 and 1540, the village of San Juan Parangaricutiro was famous for its manufacture of diverse textile products. On the origin of the village, Cuara-Amezcuá wrote: "*Parangaricutiro*," from the Purhembe, which translated to the Spanish idiom meaning, "water canoe laid in a wall or plateau" in reference to a cool and beautiful canyon of spring-like lushness where linnets and sparrows trilled and a spring of the purest waters filtered from a wall in the manner of a colored rainbow giving life to a variety of spring flowers. The water fell in the form of great crystalline drops which had like a rain of pearls sculpted a sort of artificial canoe within the canyon floor.

On May 13, 1944, the people of the village—guided by the statue of The Lord of the Miracles—founded Nuevo San Juan Parangaricutiro in the "Valley of the Rabbits," approximately 15 km away from its original site. Now a popular tourist attraction, the ruins of the old church of San Juan Parangaricutiro are surrounded by lava up to 15 meters deep that first emerged from vents and fissures to the northwest of the Parícutin Volcano (Sapichu), and later from the southwest (Taqui and Ahuan).

Though the birth of the Parícutin Volcano significantly impacted the local population and ecology, it also captivated scores of scientists, artists and tourists from around the world. The eruption attracted artists like Diego Rivera and Gerardo Murrillo (pseudonym, "Dr. Atl") who revealed their inspiration in vivid color and abstraction. The spectacular phenomenon conjured a legacy that is now an enduring part of the history and culture of this magnificent region of south-central Mexico. (TJC/GRC)