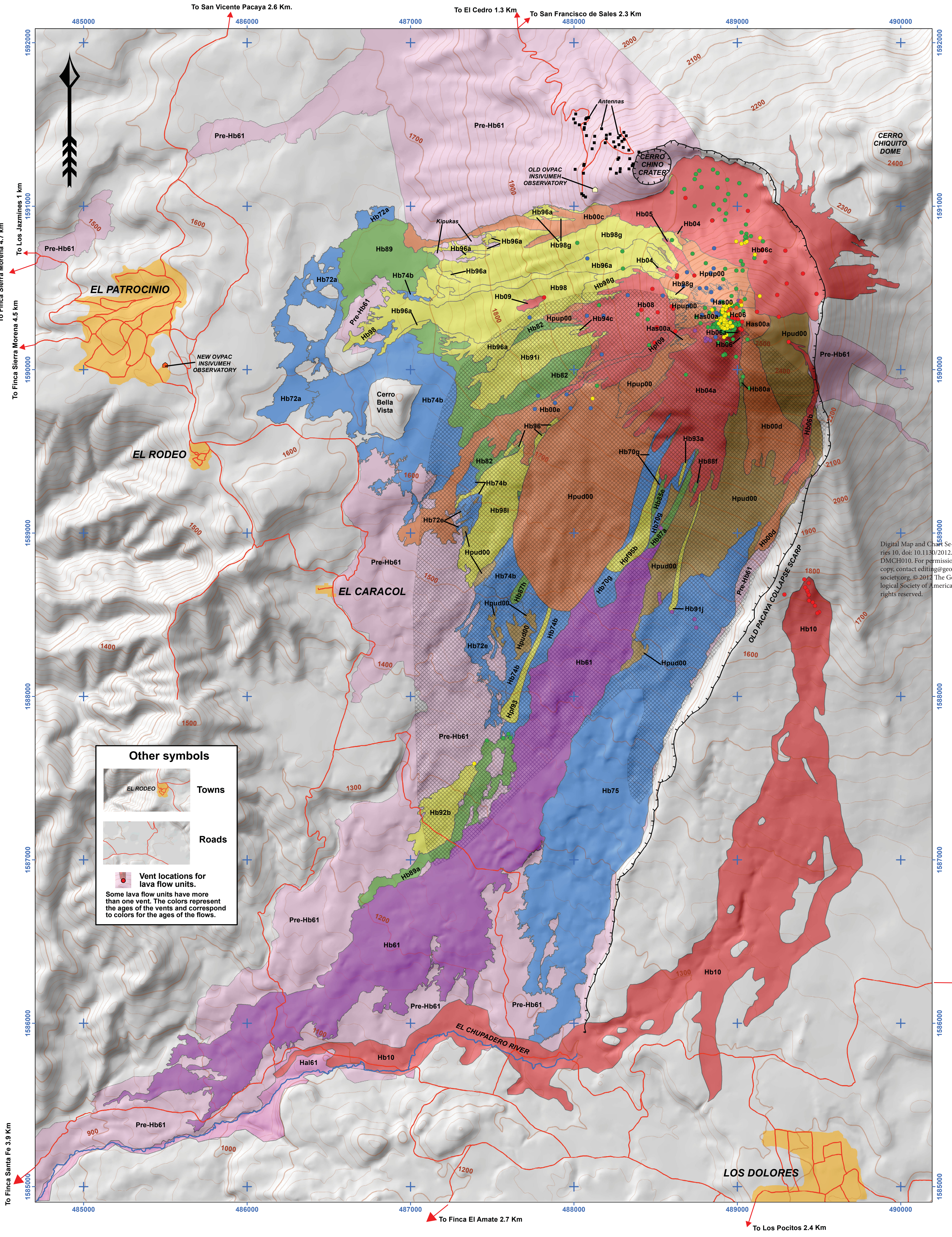


VOLCANOLOGICAL MAP OF THE 1961-2010 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matías Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.



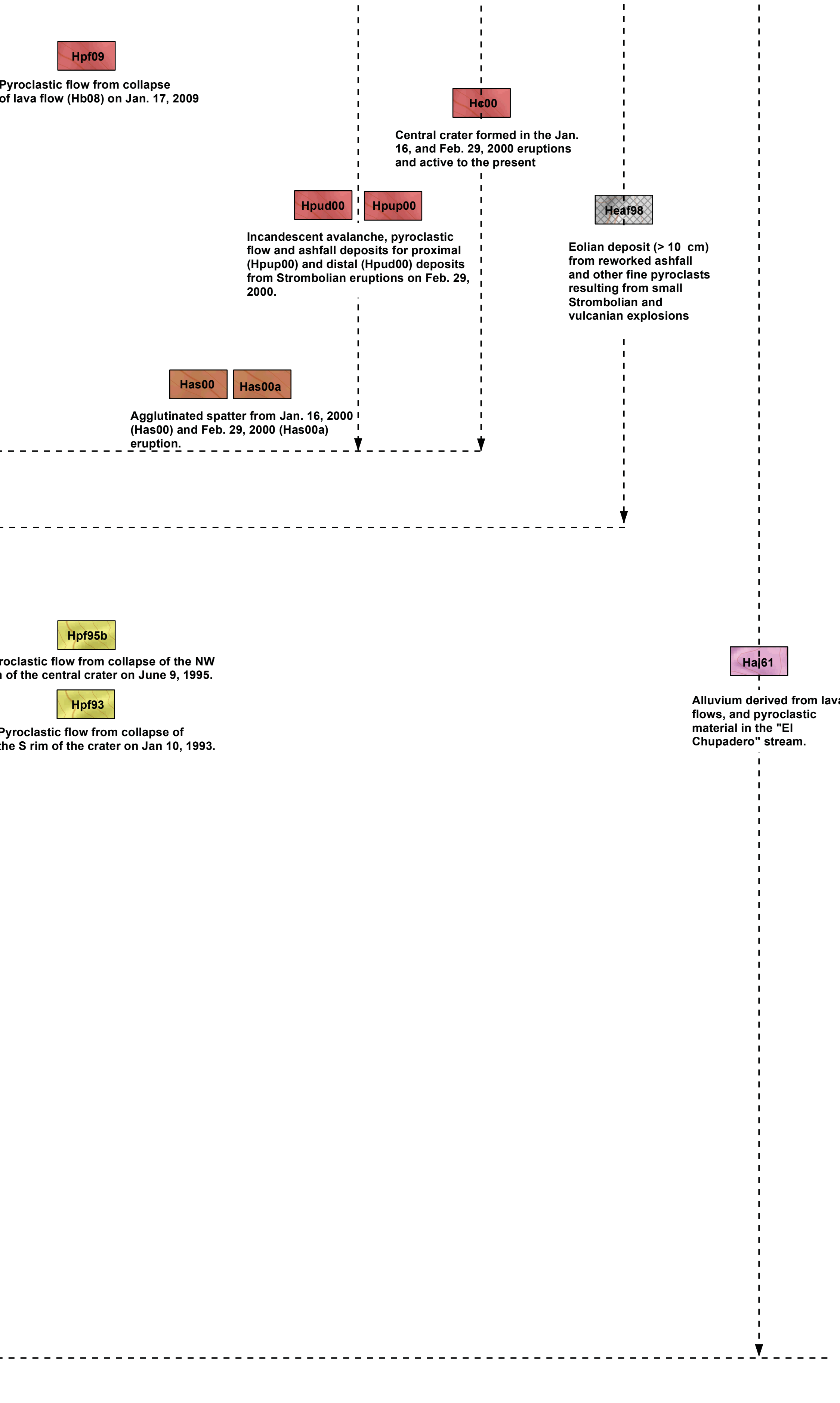
Geologic units

The map follows conventions used by Eggers (1971). All deposits of Pacaya are porphyritic basalt, and are mapped with prefix H for "historic". The main unit group codes are: "Hb" corresponds to basaltic lava flow; "Hpf" corresponds to pyroclastic flows; "Has" corresponds to spatter and scoria; "Hpu" and "Hpu0" correspond to undivided pyroclastic deposits in the proximal and distal reaches of the active vent, respectively; "Hc" corresponds to the active crater; "Haf" corresponds to aeolian deposits; and "Hal" corresponds to alluvial deposits. The year of emplacement of the units is added as a two digit number after the main unit group code (e.g. Hb61 for a lava flow emplaced in 1961). In cases where several subunits emplaced during the same year were mapped, a suffix letter is added at the end of the unit name, progressing in alphabetical order from the oldest to the youngest, but leaving the first unit without a suffix and adding the first suffix (i.e. the letter "a") to the second unit in the sequence, and so on. E.g. the units Hb06, Hb06a, and Hb06b are lava flow units emplaced during the same year, with the oldest one being Hb06 and the youngest one being Hb06b. Missing letters in the sequence occur when older units are covered by younger units.

Pahoehoe and Aa lava flows

- Hb10** May 30 to June, 2010. Lava flow from a vent on the SE flank of the Pacaya volcano.
- Hb09** Jan. 24, 2009 to Jan. 30, 2009. Lava flow from a vent at base of the W flank of the Pacaya volcano.
- Hb08** Jul. 23, 2008 to Feb. 18, 2009. Numerous lava flows in SW flank that form a discrete mound. The effusion happened from several vents that still were active in Dec. 2009.
- Hb06c** Apr. 13, 2006 to Jun. 30, 2008. Numerous lava flows from several vents along the rim of the scarp on the N flank.
- Hb06b** Apr. 4, 2006 to Apr. 7, 2006. Lava flow from a lateral vent but associated with explosive eruption of the summit crater of the Mackenney cone.
- Hb06a** Apr. 1, 2006 to Apr. 4, 2006. Lava flow from the summit crater of the Mackenney cone associated with strong Strombolian activity.
- Hb06** Apr. 1, 2006 to Apr. 4, 2006. Lava flow from the summit crater of the Mackenney cone associated with strong Strombolian activity.
- Hb05** May 8, 2005 to May 15, 2005. Lava flow from a lateral vent located on the NW flank of Mackenney cone.
- Hb04a** Dec. 23, 2004 to Aug. 17, 2005. Lava flows from the summit crater of the Mackenney cone.
- Hb04** Jun. 12, 2004 to Jun. 15, 2004. Several lava flows from the summit crater of the Mackenney cone.
- Hb00d** Jan. 22, 2000 to Jan. 25, 2000. Lava flow from the summit crater of the Mackenney cone.
- Hb00c** Jan. 16, 2000. Spatter-fed flow from an eruption in the summit crater of the Mackenney cone.
- Hb98i** Sept. 18, 1998 to Sept. 19, 1998. Lava flow from an eruption in the summit crater of Mackenney cone.
- Hb98g** Sept. 18, 1998 to Sept. 19, 1998. Lava flow from an eruption in the summit crater of Mackenney cone.
- Hb98** May 20, 1998. Lava flow from an eruption in the summit crater of the Mackenney cone.
- Hb96a** Nov. 11, 1996 to Nov. 12, 1996. Lava flow from an eruption in the summit crater of the Mackenney cone.
- Hb96** Oct. 10, 1996 to Oct. 12, 1996. Lava flow from an eruption from the summit crater of the Mackenney cone.
- Hb94c** Oct. 12, 1994 to Oct. 17, 1994. Lava flow from the summit crater of the Mackenney cone.
- Hb93a** Jan. 11, 1993. Lava flow following explosive eruption of Jan. 10, 1993.
- Hb92b** May 6, 1992 to May 7, 1992. Lava flow from a lateral vent during an eruption in the summit crater of the Mackenney cone.
- Hb91j** Nov. 10, 1991 to Nov. 18, 1991. Lava flow from the summit crater of the Mackenney cone.
- Hb91i** Oct. 27, 1991 to Jan. 8, 1992. Lava flows from the summit crater of the Mackenney cone.
- Hb89a** Mar. 7, 1989 to Mar. 11, 1989. Lava flows from an eruption in the summit crater of the Mackenney cone.
- Hb89** Mar. 7, 1989 to Mar. 11, 1989. Lava flow from an eruption in the summit crater of the Mackenney cone.
- Hb88f** Mar. 1, 1988 to Mar. 22, 1988. Lava flows from the summit crater associated with weak Strombolian activity.
- Hb87h** Jun. 14, 1987 to Jun. 17, 1987. Lava flow from an eruption of the summit crater of the Mackenney cone.
- Hb87a** Jan. 25, 1987. Lava flow from an eruption of the summit crater of the Mackenney cone.
- Hb85e** Feb. 24, 1985 to Mar. 23, 1985. Lava flows from the summit crater of the Mackenney cone.
- Hb82** Feb. 14, 1982 to Feb. 6, 1983. Lava flows from a vent located on the WNW flank.
- Hb80a** Nov. 2, 1980. Lava flows from a lateral vent in upper S flank associated with moderate-strong Strombolian activity in the summit crater.
- Hb75** Jul. 16, 1975 to Sept. 10, 1975. Lava flows from a vent called "La Peña del Coyote".
- Hb74b** Feb. 24, 1974 to Jul. 7, 1974. Lava flow from a lateral vent on the SW flank of Pacaya.
- Hb72e** Oct. 22, 1972 to Jul. 8, 1973. Lava flows from lateral vents on the N flank of the Mackenney cone.
- Hb72a** Feb. 2, 1972 to Feb. 27, 1972. Lava flows from vents located on the S flank of El Cerro Chino cinder cone.
- Hb70g** Dec. 12, 1970 to May 9, 1971. Lava flows from a vent located near the S rim of the summit crater of the Mackenney cone.
- Hb61** Mar. 10, 1961 to Apr. 30, 1961. Lava flow extruded from a vent on the lower SW flank of Pacaya. Previously identified as "Cachajinas flow" (Eggers, 1971).
- Pre-Hb61** Cerro Chino cinder cone and Pacaya composite cone with undivided lava flows.

Pyroclastic flows Spatter and scoria Undivided deposits Active crater Aeolian deposits Alluvium

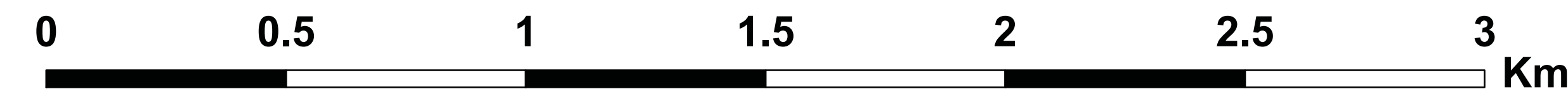


Time AD (Not to scale)

Geospatial reference:
Coordinate system: Guatemala Transverse Mercator (GTM).
Projection parameters: False Easting 500000. False Northing 0. Central Meridian -90.5. Scale Factor 0.9998. Latitude of Origin 0. Datum: WGS 1984.
Elevation contours: Labeled contour interval 100 m. Intermediate contour interval 20 m. Elevation values in meters above sea level.

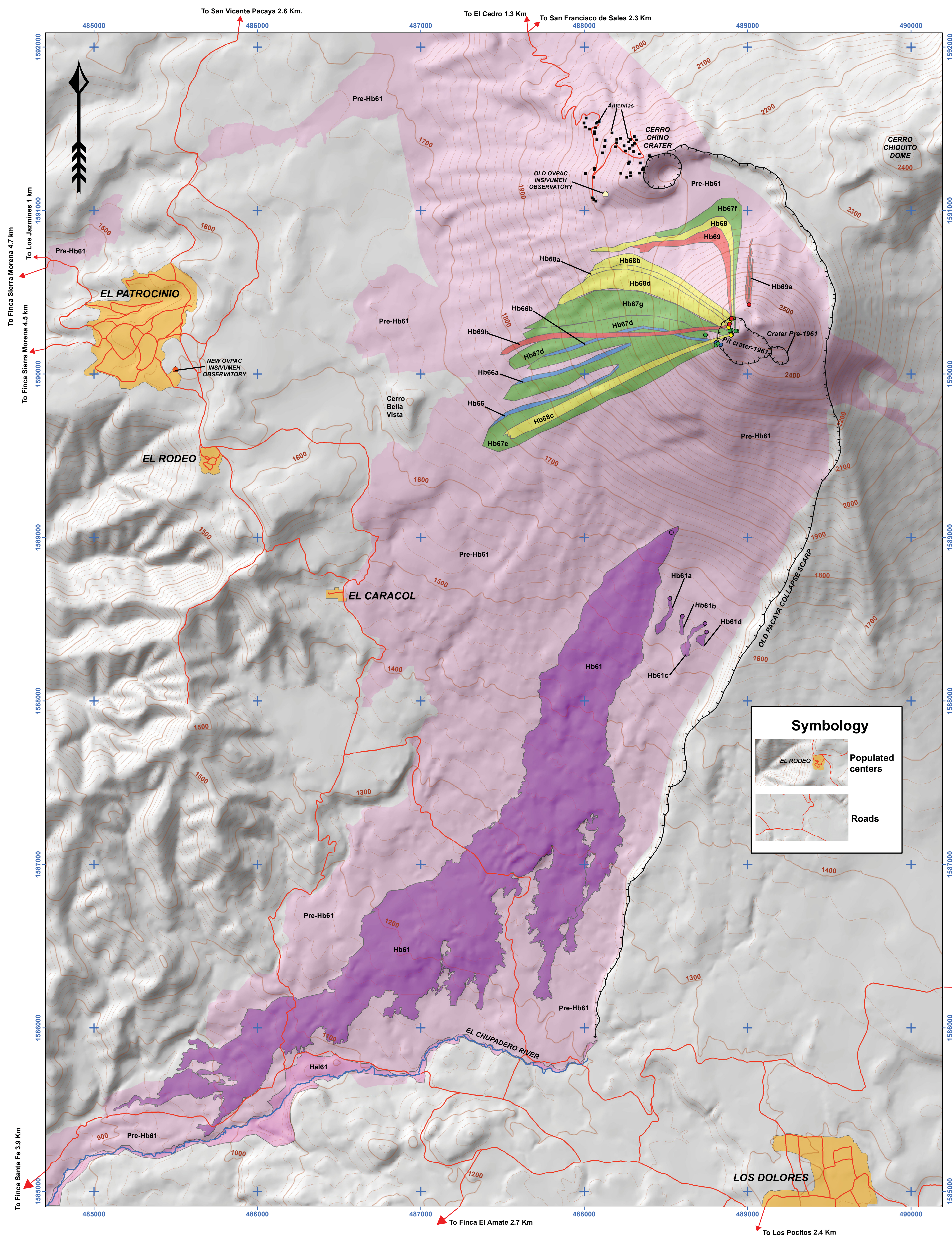
Sources of information:
Compiled from high resolution (0.5 m pixel) color aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired between November 2005 and April 2006 by the Instituto Geográfico Nacional de Guatemala (IGN), high resolution (2.5 m pixel) black and white aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired in 2001 by the Instituto Geográfico Nacional de Guatemala (IGN) in cooperation with the Japanese International Cooperation Agency (JICA) (JICA et al., 2003), and aerial photographs from 1982 (1:25,000), 1981 (1:30,000), 1982 (1:40,000), 1981 (1:7,000), and 1954 (1:40,000) obtained from the IGN. Delineation and dating of units was partially done using Landsat satellite images from Jan 25, 2001; Jan 23, 2000; Mar 24, 1996; Feb 21, 1996; Mar 22, 1995; Oct 29, 1994; Apr 4, 1994; Dec 13, 1993; Feb 12, 1993; Oct 23, 1992; May 8, 1992; Jan 19, 1990; Nov 5, 1988; Apr 14, 1986; June 11, 2010; and July 29, 2010. Unpublished fieldnotes, sketches and maps kindly provided by Dr. Alfredo Mackenney were used to delineate, identify and date units emplaced between 1961 and 1985. Maps published by Eggers (1971), and Wunderman (1982) were used to identify and date units. Information from the Monthly Bulletin of Global Volcanism Network was used to delineate, identify and date some units emplaced between 1975 and 2009. Information from the Informes Vulcanológicos Diarios of the Observatorio Vulcanológico Pacaya (OVPAC) from the Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH) in Guatemala, was used to delineate, identify and date some units emplaced between 1987 and 2009. Unpublished field notes and reports by the authors were used as well. Localization of vents of the June 2010 lava flow field was done by K. Brill and J. Richardson. Elevation level contours and the shaded relief image were generated from elevation data published by Japanese International Cooperation Agency and IGN (JICA et al., 2003), generated by photogrammetric methods of aerial photography acquired in 2000. The main roads and towns in the map area were digitized from the 2005-2006 aerial orthophotos set.

References:
Eggers, A., 1971. The Geology and Petrology of the Amatitlán Quadrangle, Guatemala. Dartmouth College, New Hampshire.
Japanese International Development Agency (JICA), Instituto Geográfico Nacional (IGN), Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH) and Secretaría de Planificación y Programación de la Presidencia (SEGEPLAN). 2003. Estudio del establecimiento de los mapas básicos y mapas de amenaza para el Sistema de Información Geográfica de la República de Guatemala. Final report.
Wunderman, R., 1982. Amatitlán, an active resurgent caldera immediately south of Guatemala City, Guatemala. Ms Thesis. Michigan Technological University. Houghton, Michigan, USA.



VOLCANOLOGICAL MAP OF THE 1961-1969 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matías Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.



Geologic units

The map follows conventions used by Eggers (1971). All deposits of Pacaya are porphyritic basalt, and are mapped with prefix H for "historic". The main unit group codes are: "Hb" corresponds to basaltic lava flow; "Hpf" corresponds to pyroclastic flows; "Hps" corresponds to spatter and scoria. "Hpu" and "Hpu" correspond to undivided pyroclastic deposits in the proximal and distal reaches of the active vent, respectively; "Hc" corresponds to the active crater; "Hae" corresponds to aeolian deposits; and "Hal" corresponds to alluvial deposits. The year of emplacement of the units is added as a two digit number after the main unit group code (e.g. Hb61 for a lava flow emplaced in 1961). In cases where several subunits emplaced during the same year were mapped, a suffix letter is added at the end of the unit name, progressing in alphabetical order from the oldest to the youngest, but leaving the first unit without a suffix and adding the first suffix (i.e. the letter "a") to the second unit in the sequence, and so on. E.g. the units Hb06, Hb06a, and Hb06b are lava flow units emplaced during the same year, with the oldest one being Hb06 and the youngest one being Hb06b. Missing letters in the sequence occur when older units are covered by younger units.

Pahoehoe and Aa lava flows

- Hb69b** Nov. 24, 1969 to Feb. 6, 1970. Lava flow from the west base of the Mackenney cone.
- Hb69a** Oct. 14, 1969 to Oct. 21, 1969. Lava flow from north base of the Mackenney cone.
- Hb69** Jun. 7, 1969. Lava flow related to an eruption in the summit crater of the Mackenney cone.
- Hb68d** Nov. 24, 1968. Lava flow from the summit crater of the Mackenney cone.
- Hb68c** Oct. 20, 1968 to Oct. 27, 1968. Lava flow from the summit crater of the Mackenney cone.
- Hb68b** Feb. 11, 1968 to Feb. 22, 1968. Lava flow from the summit crater of the Mackenney cone.
- Hb68a** Jan. 3, 1968. Lava flow related to a eruption from the summit crater of the Mackenney cone.
- Hb68** Jan. 1, 1968 to Mar. 3, 1968. Lava flows from the summit crater of the Mackenney cone.
- Hb67g** Nov. 30, 1967 to Dec. 1, 1967. Lava flow from the western edge of the pit crater that ended with a vertical explosive eruption.
- Hb67f** Sept. 2, 1967 to Dec 31, 1967. Lava flow from the summit crater of the spatter cone.
- Hb67e** Jul. 2, 1967 to Nov. 14, 1967. Lava flow from the western edge of the pit crater (Jun. 10, 1962).
- Hb67d** Apr. 9, 1967. Lava flow from the summit crater of the spatter cone.
- Hb66b** May. 21, 1966 to May 22, 1966. Lava flow the western edge of the pit crater (Jun. 10, 1962).
- Hb66a** Apr. 26, 1966 to Apr. 27, 1966. Lava flow from the western edge of the pit crater (Jun. 10, 1962).
- Hb66** Jan. 9, 1966 to Jan 10, 1966. Lava flow from the western edge of the pit crater (Jun. 10, 1962).
- Hb61d** Mar. 10, 1961. Lava flow extruded from a vent on the lower SW flank of Pacaya. Previously identified as "Cachajinas flow" (Eggers, 1971).
- Hb61c** Mar. 10, 1961. Lava flow extruded from a vent on the lower SW flank of Pacaya. Previously identified as "Cachajinas flow" (Eggers, 1971).
- Hb61b** Mar. 10, 1961. Lava flow extruded from a vent on the lower SW flank of Pacaya. Previously identified as "Cachajinas flow" (Eggers, 1971).
- Hb61a** Mar. 10, 1961. Lava flow extruded from a vent on the lower SW flank of Pacaya. Previously identified as "Cachajinas flow" (Eggers, 1971).
- Hb61** Mar. 10, 1961 to Apr. 30, 1961. Flow extruded from a vent on the lower SE flank of Pacaya. Previously identified as "Cachajinas flow" (Eggers, 1971).

- Pre-Hb61** Historic 1565?-1846? Cerro Chino cinder cone and Pacaya composite cone and undivided lava flows.
- Hal61** Alluvium derived from lava flows, and pyroclastic material in the "El Chupadero" stream.
- Vent location for lava flow unit.** Some lava flow units have more than one vent. Colors of the vent symbols correspond to the colors of the lava flows that were erupted from those vents.

Time AD (Not to scale)

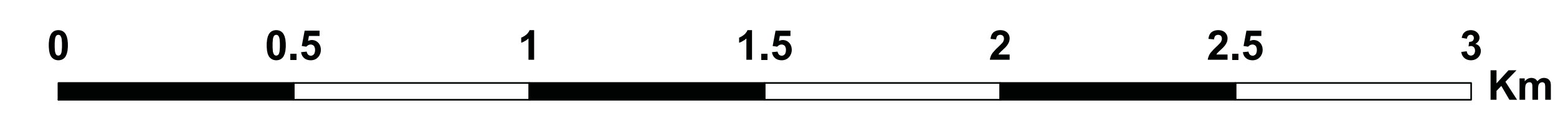
Symbology

- Populated centers
- Roads

Geospatial reference:
Coordinate system: Guatemala Transverse Mercator (GTM).
Projection parameters: False Easting 500000. False Northing 0. Central Meridian -90.5. Scale Factor 0.9998. Latitude of Origin 0. Datum: WGS 1984.
Elevation contours: Labeled contour interval 100 m. Intermediate contour interval 20 m. Elevation values in meters above sea level.

Sources of information:
Compiled from high resolution (0.5 m pixel) color aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired between November 2005 and April 2006 by the Instituto Geográfico Nacional de Guatemala (IGN), high resolution (2.5 m pixel) black and white aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired in 2001 by the Instituto Geográfico Nacional de Guatemala (IGN) in cooperation with the Japanese International Cooperation Agency (JICA) (JICA et al. 2003), and aerial photographs from 1982 (1:25,000), 1981 (1:30,000), 1982 (1:40,000), 1961 (1:10,000), and 1954 (1:40,000) obtained from the IGN. Delineation and dating of units was partially done using Landsat satellite images from Jan 25, 2001; Jan 23, 2000; Mar 24, 1996; Feb 21, 1996; Mar 22, 1995; Oct 29, 1994; Apr 4, 1994; Dec 13, 1993; Feb 12, 1993; Oct 23, 1992; May 8, 1992; Jan 19, 1990; Nov 5, 1988; and Apr 14, 1986. Unpublished fieldnotes, sketches and maps kindly provided by Dr. Alfredo Mackenney were used to delineate, identify and date units emplaced between 1961 and 1965. Maps published by Eggers (1971), and Wunderman (1982) were used to identify and date units. Information from the Monthly Bulletin of Global Volcanism Network was used to delineate, identify and date some units emplaced between 1975 and 2009. Information from the Informes Vulcanológicos Diarios of the Observatorio Vulcanológico Pacaya (OVPA) from the Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH) in Guatemala, was used to delineate, identify and date some units emplaced between 1987 and 2009. Unpublished field notes and reports by the author were used as well. Elevation level contours and the shaded relief image were generated from elevation data published by Japanese International Cooperation Agency and IGN (JICA et al., 2003), generated by photogrammetric methods of aerial photography acquired in 2000. The main roads and towns in the map area were digitized from the 2005-2006 aerial orthophotos set.

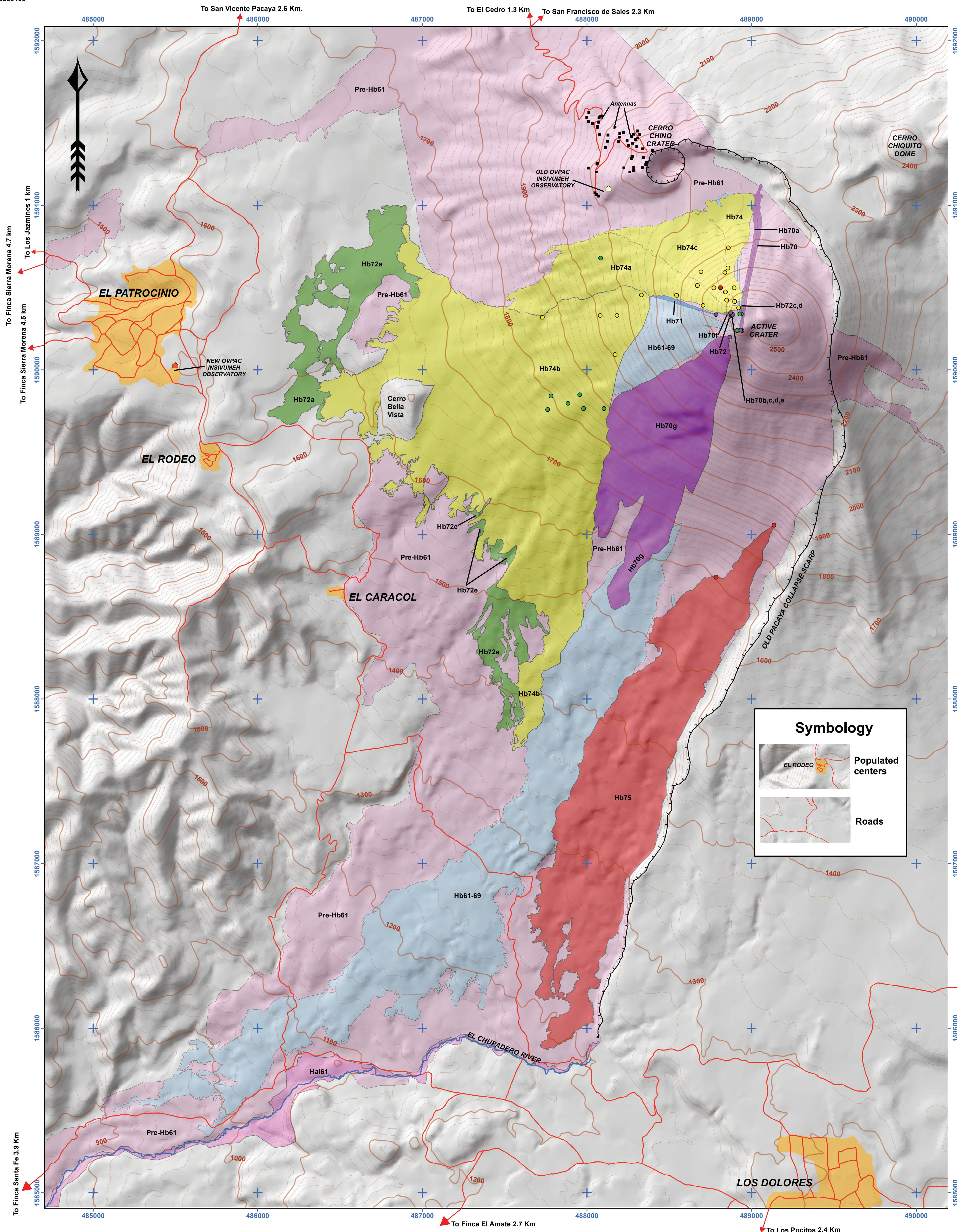
References:
Eggers, 1971. The Geology and Petrology of the Amatitlán Quadrangle, Guatemala. Dartmouth College, New Hampshire.
Japanese International Development Agency (JICA), Instituto Geográfico Nacional (IGN), Instituto Nacional de Sismología, Vulcanología, Meteorología, e Hidrología (INSIVUMEH) and Secretaría de Planificación y Programación de la Presidencia (SEGEPLAN). 2003. Estudio del establecimiento de los mapas básicos y mapas de amenaza para el sistema de información geográfica de la República de Guatemala. Final report.
Wunderman, R., 1982. Amatitlán, an active resurgent caldera immediately south of Guatemala City, Guatemala. Ms Thesis. Michigan Technological University, Houghton, Michigan, USA.



VOLCANOLOGICAL MAP OF THE 1970-1979 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matías Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.

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Geologic units

The map follows conventions used by Eggers (1971). All deposits of Pacaya are porphyritic basalt, and are mapped with prefix H for "historic". The main unit group codes are: "Hb" corresponds to basaltic lava flow; "Hpf" corresponds to pyroclastic flows; "Hps" corresponds to spatter and scoria; "Hpu" and "Hpucl" correspond to undivided pyroclastic deposits in the proximal and distal reaches of the active vent, respectively; "Hc" corresponds to the active crater; "Hae" corresponds to aeolian deposits; and "Hal" corresponds to alluvial deposits. The year of emplacement of the units is added as a two digit number after the main unit group code (e. g. Hb61 for a lava flow emplaced during the same year were mapped, a suffix letter is added at the end of the unit name, progressing in alphabetical order from the oldest to the youngest, but leaving the first unit without a suffix and adding the first suffix (i. e. the letter "a") to the second unit in the sequence, and so on. E. g. the units Hb06, Hb06a, and Hb06b are lava flow units emplaced during the same year, with the oldest one being Hb06 and the youngest one being Hb06b. Missing letters in the sequence occur when older units are covered by younger units.

Pahoehoe and Aa lava flows

- Hb75** Jul. 18, 1975 to Sept. 10, 1975. Lava flow from lateral vents named "La Peña del Coyote".
- Hb74c** Nov. 10, 1974 to Jun. 28, 1975. Lava flows from the N base of the Mackenney cone.
- Hb74b** Feb. 24, 1974 to Jul. 7, 1974. Lava flow from lateral vents of Pacaya.
- Hb74a** Feb. 9, 1974 to Jul. 14, 1974. Lava flows from the summit crater and the NW base of the Mackenney cone.
- Hb74** Jan. 20, 1974 to Jun. 30, 1975. Lava flows from the summit crater and N flank of the Mackenney cone.
- Hb72e** Oct. 22, 1972 to Jul. 8, 1973. Lava flows from lateral vents located in the SW flank of the Pacaya cone. Partly covered by younger units.
- Hb72d** Oct. 6, 1972 to Oct. 15, 1972. Lava flow from the base of the Mackenney cone. Covered by younger units.
- Hb72c** Oct. 6, 1972 to Oct. 15, 1972. Lava flow from the base of the Mackenney cone. Covered by younger units.
- Hb72b** Mar. 6, 1972. Lava flow within the summit crater of Mackenney cone. Covered by younger units.
- Hb72a** Feb. 2, 1972 to Feb. 27, 1972. Lava flow from the S flank of the Cerro Chino Cinder cone. Partly covered by younger flows.
- Hb72** Jan. 2, 1972 to Feb. 2, 1972. Lava flow from the base of the Mackenney cone. Partly covered by younger flows.
- Hb71** Nov. 14, 1971 to Nov. 17, 1971. Lava flow from the base of the Mackenney cone. Partly covered by younger flows.
- Hb70g** Dec. 12, 1970 to May 9, 1971. Lava flow from a vent on the S flank below the summit crater of the Mackenney cone.
- Hb70f** Sept. 6, 1970 to Sept. 15, 1970. Lava flow from the base of the Mackenney cone. Mostly covered by younger flows.
- Hb70e** Sept. 6, 1970 to Sept. 15, 1970. Lava flow from the base of the Mackenney cone. Mostly covered by younger flows.
- Hb70d** Sept. 6, 1970 to Sept. 15, 1970. Lava flow from the base of the Mackenney cone. Mostly covered by younger flows.
- Hb70c** Sept. 6, 1970 to Sept. 15, 1970. Lava flow from the base of the Mackenney cone. Mostly covered by younger flows.
- Hb70b** Sept. 6, 1970 to Sept. 15, 1970. Lava flow from the base of the Mackenney cone. Mostly covered by younger flows.
- Hb70a** Sept. 6, 1970 to Sept. 15, 1970. Lava flow from the summit crater of the Mackenney cone.
- Hb70** Sept. 6, 1970 to Sept. 15, 1970. Lava flow from the summit crater of the Mackenney cone.

Time AD (Not to scale)

Alluvium

- Hal61** Alluvium derived from lava flows, and pyroclastic material in the "El Chupadero" stream.

Symbology

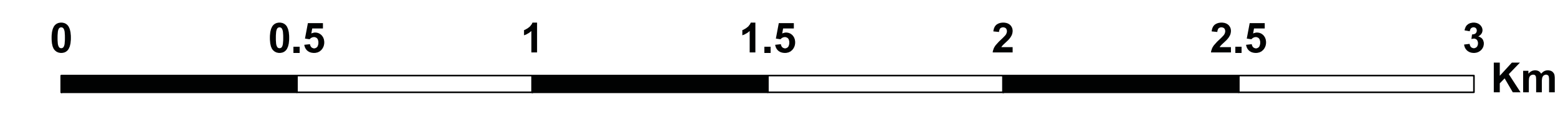
Populated centers

Roads

Geospatial reference:
 Coordinate system: Guatemala Transverse Mercator (GTM).
 Projection parameters: False Easting 500000. False Northing 0. Central Meridian -90.5. Scale Factor 0.9998. Latitude of Origin 0. Datum: WGS 1984.
 Elevation contours: Labeled contour interval 100 m. Intermediate contour interval 20 m. Elevation values in meters above sea level.

Sources of information:
 Compiled from high resolution (0.5 m pixel) color aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired between November 2005 and April 2006 by the Instituto Geográfico Nacional de Guatemala (IGN), high resolution (2.5 m pixel) black and white aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired in 2001 by the Instituto Geográfico Nacional de Guatemala (IGN) in cooperation with the Japanese International Cooperation Agency (JICA) (JICA et al. 2003), and aerial photographs from 1982 (1:25,000), 1981 (1:30,000), 1982 (1:40,000), 1961 (1:10,000), and 1954 (1:40,000) obtained from the IGN. Delineation and dating of units was partially done using Landsat satellite images from Jan 25, 2001; Jan 23, 2000; Mar 24, 1996; Feb 21, 1996; Mar 22, 1995; Oct 29, 1994; Apr 4, 1994; Dec 13, 1993; Feb 12, 1993; Oct 23, 1992; May 8, 1992; Jan 19, 1990; Nov 5, 1988; and Apr 14, 1986. Unpublished fieldnotes, sketches and maps kindly provided by Dr. Alfredo Mackenney were used to delineate, identify and date units emplaced between 1961 and 1985. Maps published by Eggers (1971), and Wunderman (1982) were used to identify and date units. Information from the Monthly Bulletin of Global Volcanism Network was used to delineate, identify and date some units emplaced between 1975 and 2009. Information from the Informes Vulcanológicos Diarios of the Observatorio Vulcanológico Pacaya (OVPA) from the Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH) in Guatemala, was used to delineate, identify and date some units emplaced between 1987 and 2009. Unpublished field notes and reports by the authors were used as well. Elevation level contours and the shaded relief image were generated from elevation data published by Japanese International Cooperation Agency and IGN (JICA et al., 2003), generated by photogrammetric methods of aerial photography acquired in 2000. The main roads and towns in the map area were digitized from the 2005-2006 aerial orthophotos set.

References:
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 Wunderman, R., 1982. Amatitlán, an active resurgent caldera immediately south of Guatemala City, Guatemala. Ms Thesis. Michigan Technological University, Houghton, Michigan, USA.

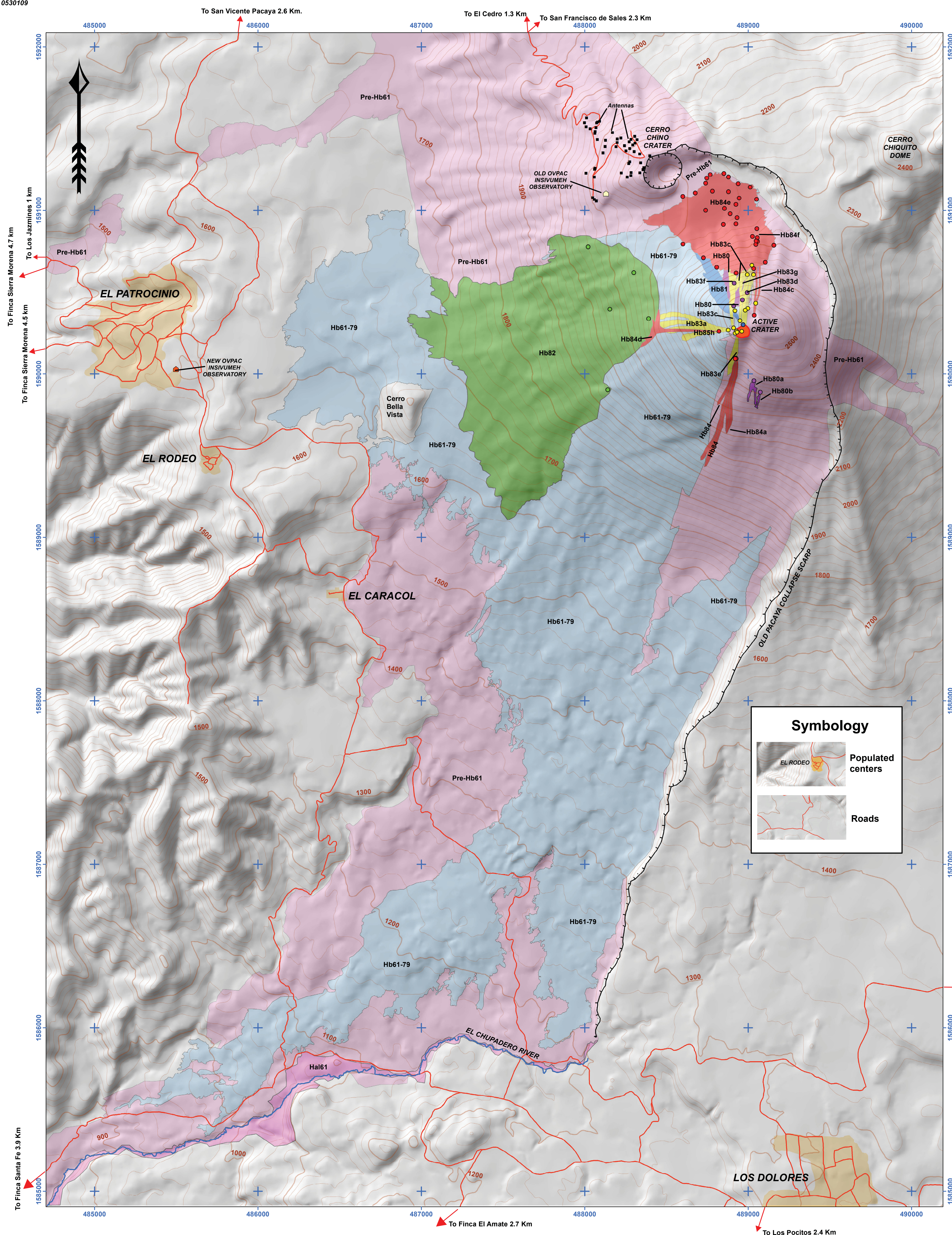


NOTE: The electronic image file for this map is formatted for printing at a 1 : 10,000 scale for a paper printing size A0 (841 mm X 1189 mm).

VOLCANOLOGICAL MAP OF THE 1980-1984 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matías Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.

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Geologic units

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Pahoehoe and Aa lava flows

Unit Code	Description	Active Crater	Alluvium
Hb84f	Dec. 19, 1984 to Jan. 20, 1985. Lava flows from the N flank of Mackenney cone, forming a Hornito.		
Hb84e	May 25, 1984 to Feb. 6, 1985. Lava flows from numerous vents that form a mound at the N base of Mackenney cone.		
Hb84d	May 9, 1984 to May 16, 1984. Lava flow from the W base of the Mackenney cone.		
Hb84c	Mar. 23, 1984 to Apr. 29, 1984. Lava flow from the N base of the Mackenney cone. Partly covered by younger flow.		
Hb84a	Mar. 11, 1984 to Mar. 24, 1984. Lava flow from S base of the Mackenney cone.		
Hb84	Mar. 3, 1984 to Mar. 11, 1984. Lava flow from the S base of the Mackenney cone. Partly covered by younger flow.		
Hb83g	Dec. 4, 1983 to Feb. 26, 1983. Lava flows from the summit crater of the Mackenney cone.		
Hb83f	Nov. 20, 1983. Lava flow from the N base of the Mackenney cone.		
Hb83e	Sept. 22, 1983 to Sept. 30, 1983. Lava flow from the summit crater of the Mackenney cone.		
Hb83d	Sept. 22, 1983 to Sept. 30, 1983. Lava flow from the summit crater of the Mackenney cone. Partly covered by younger flows.		
Hb83c	Sept. 15, 1983 to Sept. 22, 1983. Lava flow from the summit crater of the Mackenney cone. Partly covered by younger flows.		
Hb83b	Sept. 11, 1983 to Sept. 24, 1983. Lava flow within the summit crater of the Mackenney cone. Covered by younger flows.		
Hb83a	Sept. 11, 1983 to Sept. 24, 1983. Lava flow from W flank of the Mackenney cone.		
Hb82	Feb. 14, 1982 to Feb. 6, 1983. Lava flow from multiple western lateral vents.		
Hb81	Oct. 9, 1981 to Oct. 20, 1981. Lava flow from the upper N-NW flank of Mackenney cone.		
Hb80b	Nov. 2, 1980. Lava flow from a vent on the S flank of the Mackenney cone.		
Hb80a	Nov. 2, 1980. Lava flow from a vent on the S flank of the Mackenney cone.		
Hb80	Oct. 5, 1980 to Jun. 10, 1981. Lava flow from N edge of the summit crater of the Mackenney cone. Largely covered by later flows.		
Hb61-79	Undivided lava flow units from 1961 to 1979.		
Pre-Hb61	Historic 15657-1846? Cerro Chino cinder cone and Pacaya composite cone and undivided lava flows.		
Hc82	Active Crater		
Hal61	Alluvium derived from lava flows, and pyroclastic material in the "El Chupadero" stream.		

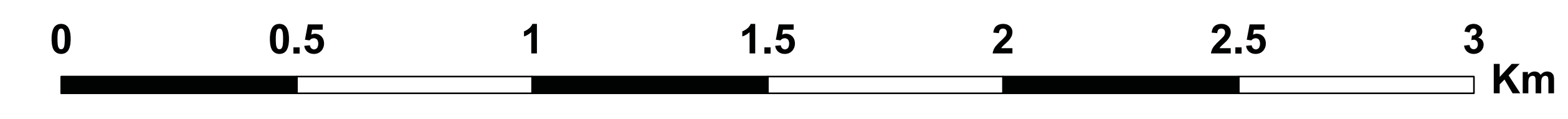
Symbology

- Populated centers
- Roads

Geospatial reference:
Coordinate system: Guatemala Transverse Mercator (GTM).
Projection parameters: False Easting 500000. False Northing 0. Central Meridian -90.5. Scale Factor 0.9998. Latitude of Origin 0. Datum: WGS 1984.
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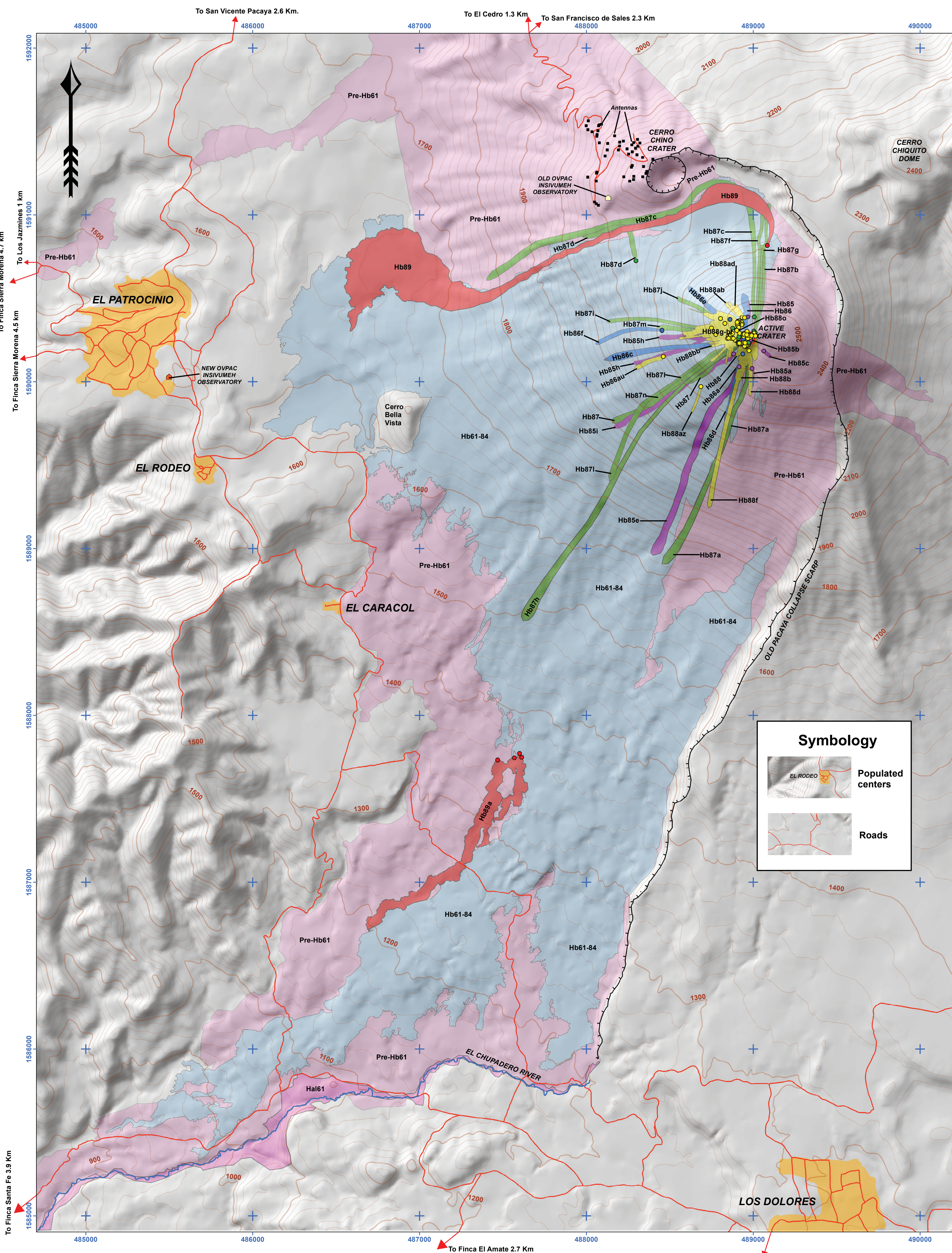


NOTE: The electronic image file for this map is formatted for printing at a 1 : 10,000 scale for a paper printing size A0 (841 mm X 1189 mm).

Contact information: Comments or questions can be directed to Rüdiger Escobar-Wolf. Email address: rpecoba@mtu.edu

VOLCANOLOGICAL MAP OF THE 1985-1989 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matias Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.



Geologic units

The map follows conventions used by Eggers (1971). All deposits of Pacaya are porphyritic basalt, and are mapped with prefix H for "historic". The main unit group codes are: "Hb" corresponds to basaltic lava flow; "Hpf" corresponds to pyroclastic flows; "Has" corresponds to spatter and scoria, "Hrup" and "Hrud" correspond to undivided pyroclastic deposits in the proximal and distal reaches of the active vent, respectively; "Hc" corresponds to the active crater; "Haf" corresponds to aeolian deposits; and "Hal" corresponds to alluvial deposits. The year of emplacement of the units is added as a two digit number after the main unit group code (e. g. Hb61 for a lava flow emplaced in 1961). In cases where several subunits emplaced during the same year were mapped, a suffix letter is added at the end of the unit name, progressing in alphabetical order from the oldest to the youngest, but leaving the first unit without a suffix (i. e. the letter "a") to the second unit in the sequence, and so on. E. g. the units Hb06, Hb06a, and Hb06b are lava flow units emplaced during the same year, with the oldest one being Hb06 and the youngest one being Hb06b. Missing letters in the sequence occur when older units are covered by younger units.

Pahoehoe and Aa lava flows

Unit	Description
Hb89a	Mar. 7, 1989 to Mar. 11, 1989. Lava flow from vents located between ~1330-1360 masl along the S base of Pacaya volcano.
Hb89	Mar. 7, 1989 to Mar. 11, 1989. Lava flow from vent on the N flank and associated with an explosive eruption of Mackenney cone.
Hb88bb	Nov. 5, 1988. Lava flow from the S edge of the summit crater of the Mackenney cone.
Hb88az	Oct. 12, 1988 to Oct. 14, 1988. Lava flow from a lateral vent on the SW flank of the Mackenney cone.
Hb88au	Oct. 5, 1988. Lava flow from a lateral vent of the Mackenney cone.
Hb88ad	Jun. 23, 1988. Lava flow from the summit crater of the Mackenney cone.
Hb88ab	Jun. 19, 1988 to Jun. 23, 1988. Lava flow from the summit crater of the Mackenney cone.
Hb88g-bl	Mar. 2, 1988 to Dec. 31, 1988. Sixty-one undivided short (30-312 m long) lava flows that were erupted 90% from the summit and about 10% from separate vents or lava tubes from the summit crater and associated with Strombolian eruptions.
Hb88f	Mar. 1, 1988 to Mar. 22, 1988. Lava flow from the S edge of the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb88d	Feb. 1, 1988 to Feb. 21, 1988. Lava flow from the S edge of the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb88b	Jan. 28, 1988 to Feb. 29, 1988. Lava flow from the SSW edge of the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb88	Jan. 2, 1988 to Jan. 6, 1988. Lava flow from the SSW edge of the summit crater of the Mackenney cone. Mostly covered by younger lava.
Hb87o	Dec. 1, 1987 to Jan. 2, 1988. Lava flow from the WNW edge of the summit crater of the Mackenney cone. Covered by younger lava.
Hb87m	Sept. 2, 1987 to Nov. 5, 1987. Lava flow from the summit crater toward SW flank of the Mackenney cone. Partly covered by younger lava.
Hb87n	Aug. 27, 1987 to Sept. 2, 1987. Lava flow from the summit crater toward W flank of the Mackenney cone. Partly covered by younger lava.
Hb87l	Aug. 21, 1987 to Nov. 11, 1987. Lava flow from the summit crater toward W flank of the Mackenney cone. Partly covered by younger lava.
Hb87j	Aug. 6, 1987 to Aug. 12, 1987. Lava flow from the W base of the Mackenney cone. Partly covered by younger lava.
Hb87i	Jul. 26, 1987 to Aug. 9, 1987. Lava flow from the summit crater and associated with a Strombolian eruption. Partly covered by younger lava.
Hb87h	Jun. 14, 1987 to Jun. 17, 1987. Lava flow from the summit crater and related to an explosive eruption. Partly covered by younger lava.
Hb87g	Jun. 5, 1987 to Jun. 10, 1987. Lava flow from the summit crater of Mackenney cone. Partly covered by younger lava.
Hb87f	Jun. 5, 1987 to Jun. 10, 1987. Lava flow from the summit crater of Mackenney cone. Partly covered by younger lava.
Hb87d	May 18, 1987. Lava flow from NW flank of the Mackenney cone. Partly covered by younger lava.
Hb87c	May 5, 1987 to May 31, 1987. Lava flow from NNE base of the Mackenney cone. Partly covered by younger lava.
Hb87b	May 4, 1987 to Jun. 10, 1987. Lava flow from the summit crater and associated with explosive eruption.
Hb87a	Jan. 25, 1987. Lava flow from the summit crater and associated with explosive eruption. Partly covered by younger lava.
Hb87	Jan. 21, 1987. Lava flow from the summit crater associated with explosive eruption. Partly covered by younger lava.
Hb86f	Nov. 16, 1986 to Nov. 23, 1986. Lava flow from a vent in the middle W flank of the Mackenney cone
Hb86e	Mar. 9, 1986. Lava flow from NW flank of the Mackenney cone. Partly covered by younger lava.
Hb86d	Mar. 2, 1986 to Mar. 7, 1986. Lava flow from S edge of the summit crater of the Mackenney cone. Largely covered by younger lava.
Hb86c	Feb. 2, 1986 to Feb. 5, 1986. Lava flow from the W edge of the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb86a	Jan. 16, 1986 to Jan. 19, 1986. Lava flow from S edge of the summit crater of the Mackenney cone. Largely covered by younger lava.
Hb86	Jan. 16, 1986 to Jan. 19, 1986. Lava flow from the summit crater of the Mackenney cone.
Hb85i	Jul. 28, 1985 to Aug. 6, 1985. Lava flow from the S flank of the summit crater of the Mackenney cone. Partly covered by younger flows.
Hb85h	Jan. 19, 1985 to Jan. 26, 1985. Lava flow from the W flank of the summit crater of the Mackenney cone. Partly covered by younger flows.
Hb85e	Jan. 19, 1985 to Jan. 26, 1985. Lava flow from the S flank of the summit crater of the Mackenney cone. Partly covered by younger lava flow.
Hb85c	Jan. 19, 1985 to Jan. 26, 1985. Lava flow from the SSE flank of the summit crater of the Mackenney cone.
Hb85b	Jan. 19, 1985 to Jan. 26, 1985. Intracateric lava flow from the summit of the Mackenney cone. Largely covered by younger deposits.
Hb85a	Jan. 19, 1985 to Jan. 26, 1985. Lava flow from the S base of the summit crater of the Mackenney cone. Partly covered by younger flow.
Hb85	Jan. 19, 1985 to Jan. 26, 1985. Lava flow from the W base of the summit crater of the Mackenney cone. Partly covered by younger flow.
Hb61-84	Undivided lava flow units from 1961-1984.
Pre-Hb61	Historic 1565?-1846? Cerro Chino cinder cone and Pacaya composite cone and undivided lava flows.
Hal61	Alluvium derived from lava flows, and pyroclastic material in the "El Chupadero" stream.
Red circle	Vent location of a lava flow. Some lava flows have more than one vent. Colors of the vent symbols correspond to the colors of the lava flows that were erupted from those vents.

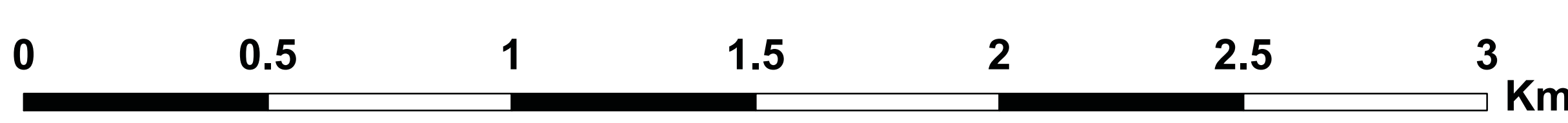
Symbology

- Populated centers
- Roads

Geospatial reference:
Coordinate system: Guatemala Transverse Mercator (GTM).
Projection parameters: False Easting 500000. False Northing 0. Central Meridian -90.5. Scale Factor 0.9998. Latitude of Origin 0. Datum: WGS 1984.
Elevation contours: Labeled contour interval 100 m. Intermediate contour interval 20 m. Elevation values in meters above sea level.

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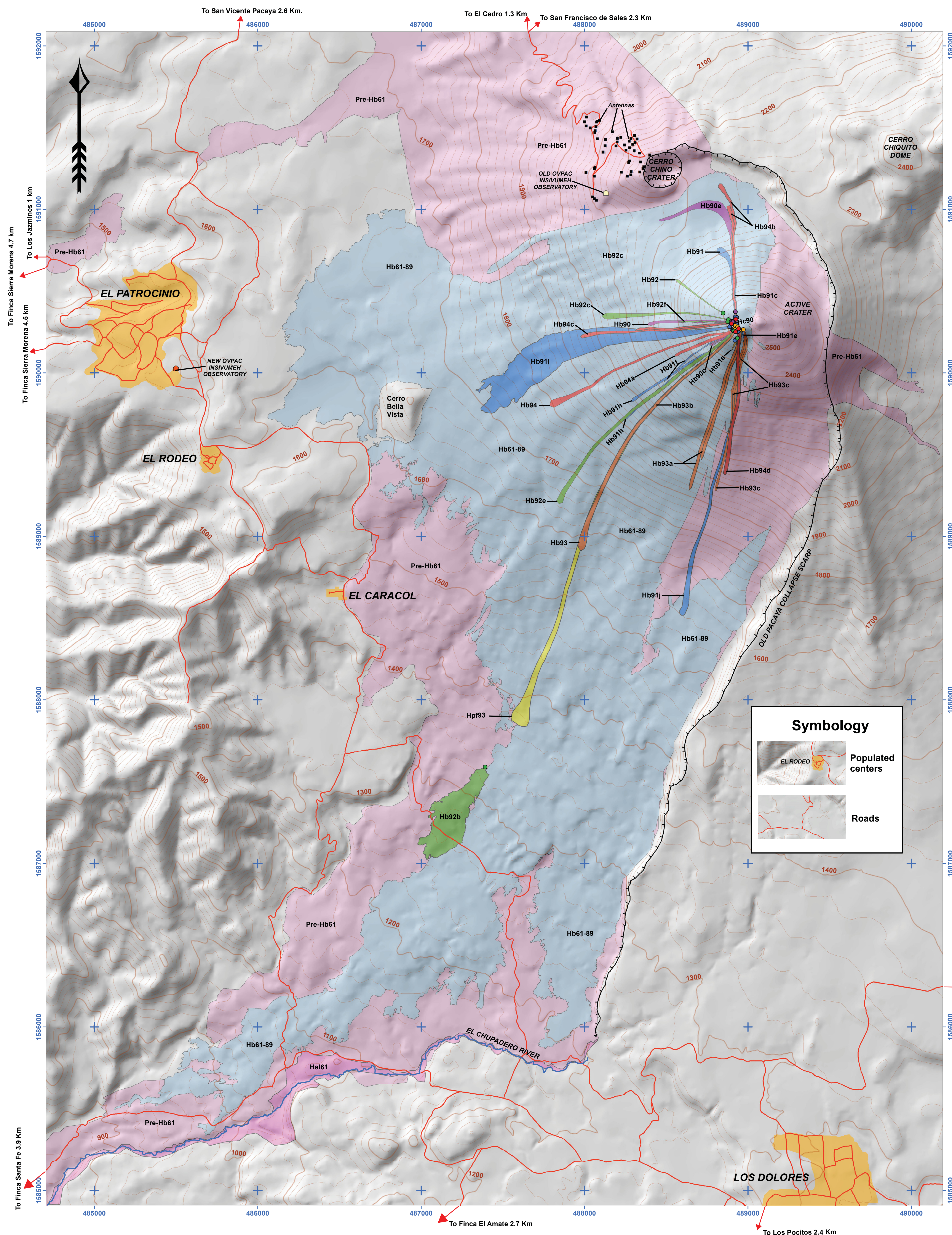
References:
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Wunderman, R., 1982. Amatitlán, an active resurgent caldera immediately south of Guatemala City, Guatemala. Ms Thesis. Michigan Technological University, Houghton, Michigan, USA.



NOTE: The electronic image file for this map is formatted for printing at a 1 : 10,000 scale for a paper printing size A0 (841 mm X 1189 mm).

VOLCANOLOGICAL MAP OF THE 1990-1994 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matías Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.



Geologic units

The map follows conventions used by Eggers (1971). All deposits of Pacaya are porphyritic basalt, and are mapped with prefix H for "historic". The main unit group codes are: "Hb" corresponds to basaltic lava flow; "Hpf" corresponds to pyroclastic flows; "Hsa" corresponds to spatter and scoria; "Hpu" and "Hpuu" correspond to undivided pyroclastic deposits in the proximal and distal reaches of the active vent, respectively; "Hc" corresponds to the active crater; "Hae" corresponds to aeolian deposits; and "Hal" corresponds to alluvial deposits. The year of emplacement of the units is added as a two digit number after the main unit group code (e. g. Hb61 for a lava flow emplaced during the same year were mapped, a suffix letter is added at the end of the unit name, progressing in alphabetical order from the oldest to the youngest, but leaving the first unit without a suffix and adding the first suffix (i. e. the letter "a") to the second unit in the sequence, and so on. E. g. the units Hb06, Hb06a, and Hb06b are lava flow units emplaced during the same year, with the oldest one being Hb06 and the youngest one being Hb06b. Missing letters in the sequence occur when older units are covered by younger units.

Pahoehoe and Aa lava flows

Unit Code	Date	Description
Hb94d	Oct. 12, 1994 to Oct. 17, 1994.	Lava flow from the summit crater of the Mackenney cone.
Hb94c	Oct. 12, 1994 to Oct. 17, 1994.	Lava flow from the summit crater of the Mackenney cone.
Hb94b	Oct. 12, 1994 to Oct. 17, 1994.	Lava flow from the summit crater of the Mackenney cone.
Hb94a	Mar. 16, 1994.	Lava flow from the summit crater of the Mackenney cone.
Hb94	Feb. 5, 1994 to Feb. 12, 1994.	Lava flow from a vent on the SW flank of the Mackenney cone.
Hb93c	Nov. 8, 1993.	Lava flow from the summit crater of the Mackenney cone.
Hb93b	Sept. 21, 1993.	Lava flow from the summit crater and associated with an explosive eruption.
Hb93a	Jan. 11, 1993 to Jan. 12, 1993.	Lava flow from the summit crater and associated with an explosive eruption.
Hb93	Jan. 10, 1993 to Jan. 11, 1993.	Lava flow from the summit crater and related to an explosive eruption. Covered in part by Hb93b.
Hb92f	Sept. 6, 1992 to Sept. 15, 1992.	Flow from the summit crater of the Mackenney cone. Mostly covered by younger lava.
Hb92e	Sept. 6, 1992 to Sept. 15, 1992.	Lava flow from the summit crater of the Mackenney cone.
Hb92c	Aug. 22, 1992 to Aug. 23, 1992.	Lava flow from the summit crater of the Mackenney cone.
Hb92b	May 6, 1992 to May 7, 1992.	Lava flow from a distal vent on the S flank and associated with explosive eruption in the summit crater of the Mackenney cone.
Hb92	May 1, 1992 to May 7, 1992.	Lava flow from vent just NW of summit crater of the Mackenney cone.
Hb91j	Nov. 10, 1991 to Nov. 18, 1991.	Lava flow from the summit crater of Mackenney cone. Partly covered by younger lava.
Hb91i	Oct. 27, 1991 to Jan. 8, 1992.	Lava flow from the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb91h	Jul. 27, 1991 to Jul. 31, 1991.	Lava flow from the summit crater and associated with an explosive eruption. Partly covered by younger lava.
Hb91f	Jun. 11, 1991 to Jun. 16, 1991.	Lava flow from the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb91e	May 11, 1991 to May 15, 1991.	Lava flow from the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb91c	Jan. 4, 1991 to Jan. 15, 1991.	Lava flow from the summit crater of the Mackenney cone.
Hb91	Jan. 4, 1991 to Jan. 15, 1991.	Lava flow from the summit crater of the Mackenney cone. Partly covered by younger lava.
Hb90e	Nov. 3, 1990 to Apr. 10, 1991.	Lava flow from a vent near the N edge of the summit crater of Mackenney cone. Partly covered by younger lava.
Hb90c	Aug. 20, 1990.	Lava flow from the summit and associated with an explosive eruption of the Mackenney cone. Partly covered by younger lava.
Hb90	Apr. 2, 1990.	Lava flow from the summit crater and associated with an explosive eruption of the Mackenney cone.
Hb61-89	Undivided lava flow units from 1961 to 1989.	
Pre-Hb61	Historic 1565?-1846? Cerro Chino Cinder cone and Pacaya composite cone with undivided lava flows.	
Hc90-94	Active crater	
Hal61	Alluvium derived from lava flows, and pyroclastic material in the "El Chupadero" stream.	

Time AD (Not to scale)

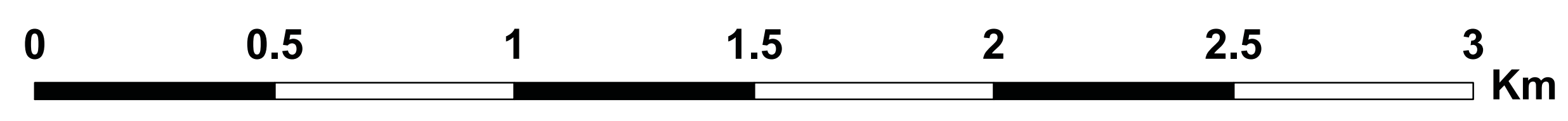
Symbology

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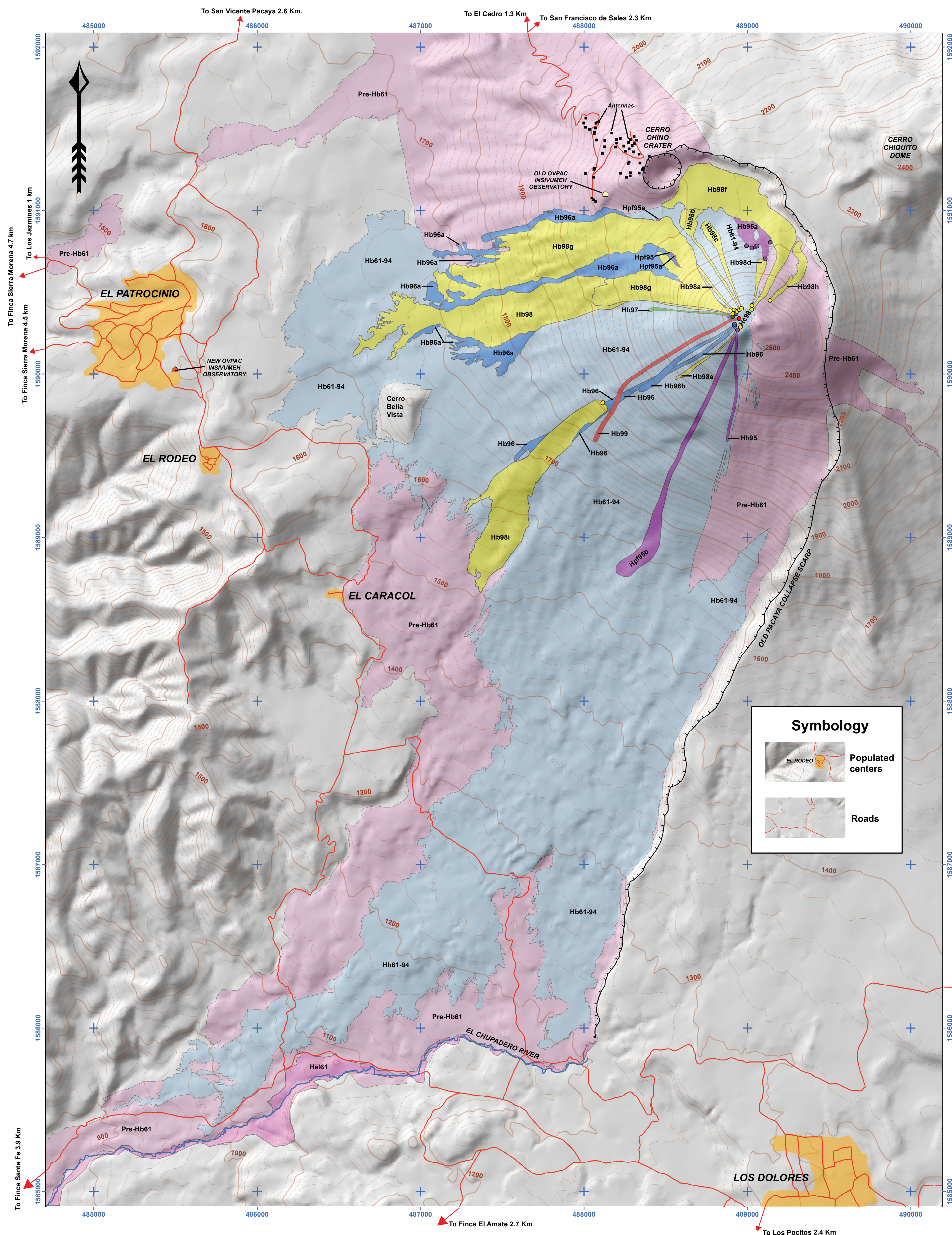
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VOLCANOLOGICAL MAP OF THE 1995-1999 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matías Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.

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Geologic units

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Pahoehoe and Aa lava flows

Pyroclastic flows

Active crater

Alluvium

Hb99	Dec. 23, 1999 to Dec. 31, 1999. Lava flow from the summit crater and associated with an explosive eruption.
Hb98i	Sept. 18, 1998 to Sept. 19, 1998. Lava flow a flank vent and associated with an explosive eruption.
Hb98h	Sept. 18, 1998 to Sept. 19, 1998. Lava flow from a flank vent and associated with an explosive eruption.
Hb98g	Sept. 18, 1998 to Sept. 19, 1998. Lava flow from the summit crater and associated with an explosive eruption.
Hb98f	Sept. 18, 1998 to Sept. 19, 1998. Lava flow from the summit crater and associated with an explosive eruption.
Hb98e	May 20, 1998. Lava flow from the summit crater and associated with an explosive eruption.
Hb98d	May 20, 1998. Lava flow from the summit crater and associated with an explosive eruption.
Hb98c	May 20, 1998. Lava flow from the summit crater and associated with an explosive eruption.
Hb98b	May 20, 1998. Lava flow from the summit crater and associated with an explosive eruption. Partly covered by younger lava.
Hb98a	May 20, 1998. Lava flow from the summit crater and associated with an explosive eruption. Partly covered by younger lava.
Hb98	May 20, 1998. Lava flow from the summit crater and associated with an explosive eruption. Partly covered by younger lava.
Hb97	Jul. 30, 1997 to Aug. 4, 1997. Lava flow from the summit crater of the Mackenney cone.
Hb96b	Nov. 12, 1996. Lava low from the summit crater and associated with an explosive eruption.
Hb96a	Nov. 11, 1996 to Nov. 12, 1996. Lava flow from the summit crater and associated with an explosive eruption. Partly covered by younger lava.
Hb96	Oct. 10, 1996 to Oct. 12, 1996. Lava flow from the summit crater and associated with an explosive eruption. Partly covered by younger lava.
Hb95a	Jun. 21, 1995 to Sept. 8, 1995. Lava flow from vents on the N flank of the Mackenney cone. Partly covered by younger lava.
Hb95	Jun. 14, 1995. Lava flow from the summit crater of the Mackenney cone.
Hpf95b	Jun. 9, 1995. Pyroclastic flow from collapse of the S edge of the summit crater and associated with strong Strombolian activity of the Mackenney cone.
Hpf95a	Jun. 7, 1995. Pyroclastic flow from collapse of the W rim of the summit crater and associated with strong Strombolian activity of the Mackenney cone. Mostly covered by younger flows.
Hpf95	Jun. 1, 1995. Pyroclastic flow from collapse of the WNW rim of the summit crater and associated with strong Strombolian activity of the Mackenney cone. Mostly covered by younger flows.
Hb61-94	Undivided lava flow units erupted from 1961 to 1994.
Pre-Hb61	Historic 15657-18467 Cerro Chino cinder cone and Pacaya composite cone and undivided lava flows.
	Vent location for lava flow unit. Some lava flow units have more than one vent. Colors of the vent symbols correspond to the colors of the lava flows that were erupted from those vents.

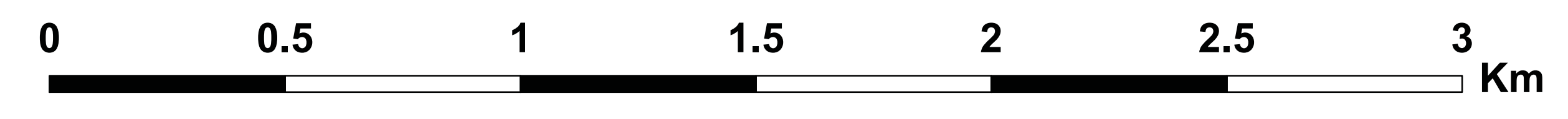
Symbology

- Populated centers
- Roads

Geospatial reference:
Coordinate system: Guatemala Transverse Mercator (GTM).
Projection parameters: False Easting 500000. False Northing 0. Central Meridian -90.5. Scale Factor 0.9998. Latitude of Origin 0. Datum: WGS 1984.
Elevation contours: Labeled contour interval 100 m. Intermediate contour interval 20 m. Elevation values in meters above sea level.

Sources of information:
Compiled from high resolution (0.5 m pixel) color aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired between November 2005 and April 2006 by the Instituto Geográfico Nacional de Guatemala (IGN), high resolution (2.5 m pixel) black and white aerial orthophotos 2052-II-18, 2052-II-19, 2052-II-23 and 2052-II-24, acquired in 2001 by the Instituto Geográfico Nacional de Guatemala (IGN) in cooperation with the Japanese International Cooperation Agency (JICA) (JICA et al., 2003), and aerial photographs from 1982 (1:25,000), 1981 (1:30,000), 1982 (1:40,000), 1961 (1:10,000), and 1954 (1:40,000) obtained from the IGN. Delineation and dating of units was partially done using Landsat satellite images from Jan 25, 2001; Jan 23, 2000; Mar 24, 1996; Feb 21, 1996; Mar 22, 1995; Oct 29, 1994; Apr 4, 1994; Dec 13, 1993; Feb 12, 1993; Oct 23, 1992; May 8, 1992; Jan 19, 1990; Nov 5, 1988; and Apr 14, 1986. Unpublished fieldnotes, sketches and maps kindly provided by Dr. Alfredo Mackenney were used to delineate, identify and date units emplaced between 1961 and 1985. Maps published by Eggers (1971) and Wunderman (1982) were used to identify and date units. Information from the Monthly Bulletin of Global Volcanism Network was used to delineate, identify and date some units emplaced between 1975 and 2009. Information from the Reportes Vulcanológicos Diarios of the Observatorio Vulcanológico Pacaya (OVPA) from the Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH) in Guatemala, were used to delineate, identify and date some units emplaced between 1987 and 2009. Unpublished field notes and reports by the author were used as well. Elevation level contours and the shaded relief image were generated from elevation data published by Japanese International Cooperation Agency and IGN (JICA et al., 2003), generated by photogrammetric methods of aerial photography acquired in 2000. The main roads and towns in the map area were digitized from the 2005-2006 aerial orthophotos set.

References:
Eggers, 1971. The Geology and Petrology of the Amatián Quadrangle, Guatemala. Dartmouth College, New Hampshire.
Japanese International Development Agency (JICA), Instituto Geográfico Nacional (IGN), Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH) and Secretaría de Planificación y Programación de la Presidencia (SEGEPLAN), 2003. Estudio del establecimiento de los mapas básicos y mapas de amenaza para el sistema de información geográfica de la República de Guatemala. Final report.
Wunderman, R., 1982. Amatián, an active resurgent caldera immediately south of Guatemala City, Guatemala. Ms Thesis. Michigan Technological University, Houghton, Michigan, USA.

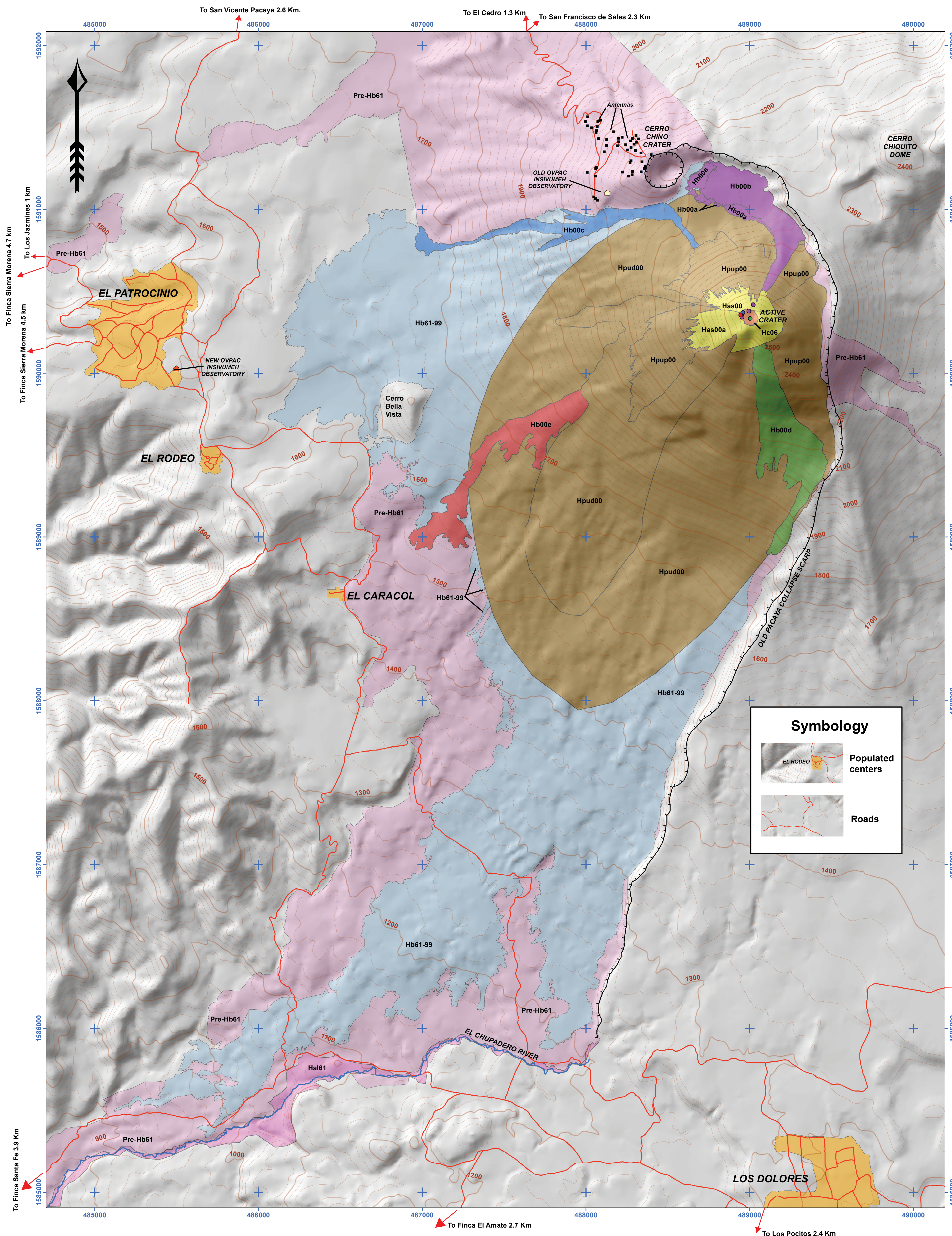


NOTE: The electronic image file for this map is formatted for printing at a 1 : 10,000 scale for a paper printing size A0 (841 mm X 1189 mm).

Contact information: Comments or questions can be directed to Rüdiger Escobar-Wolf. Email address: rpecoba@mtu.edu

VOLCANOLOGICAL MAP OF THE 2000 ERUPTION OF PACAYA VOLCANO, GUATEMALA

Rubén Otoniel Matías Gómez, William I. Rose, José Luis Palma, and Rüdiger Escobar-Wolf. Department of Geological and Mining Engineering and Sciences. Michigan Technological University. December, 2010.



Symbology

- Populated centers
- Roads

Geologic units

The map follows conventions used by Eggers (1971). All deposits of Pacaya are porphyritic basalt, and are mapped with prefix H for "historic". The main unit group codes are: "Hb" corresponds to basaltic lava flow; "Hpr" corresponds to pyroclastic flows; "Has" corresponds to spatter and scoria; "Hpu" and "Hpu0" correspond to undivided pyroclastic deposits in the proximal and distal reaches of the active vent, respectively; "Hc" corresponds to the active crater; "Hal" corresponds to aeolian deposits; and "Hal" corresponds to alluvial deposits. The year of emplacement of the units is added as a two digit number after the main unit group code (e. g. Hb61 for a lava flow emplaced in 1961). In cases where several subunits emplaced during the same year were mapped, a suffix letter is added at the end of the unit name, progressing in alphabetical order from the oldest to the youngest, but leaving the first unit without a suffix and adding the first suffix (i. e. the letter "a") to the second unit in the sequence, and so on. E. g. the units Hb06, Hb06a, and Hb06b are lava flow units emplaced during the same year, with the oldest one being Hb06 and the youngest one being Hb06b. Missing letters in the sequence occur when older units are covered by younger units.

Pahoehoe and Aa lava flows

Hb00e Feb. 29, 2000. Lava flow from the summit crater and associated with Strombolian eruptions.

Hb00d Feb. 29, 2000. Lava flow from the summit crater and associated with Strombolian eruptions.

Hb00c Jan. 22, 2000 to Jan. 25, 2000. Lava flow from the summit crater of the Mackenney cone.

Hb00b Jan. 16, 2000. Lava flow from the summit crater and associated with Strombolian eruptions.

Hb00a Jan. 10, 2000 to Jan. 16, 2000. Lava flow from the summit crater and associated with Strombolian explosions. Partly covered by younger lava.

Hb61-99 Undivided lava flow units erupted from 1961-1999.

Pre-Hb61 Historic 15657-1846? Cerro Chino cinder cone and the Pacaya composite cone with undivided lava flows.

Vent location for lava flow unit. Some lava flow units have more than one vent. Colors of the vent symbols correspond to the colors of the lava flows that were erupted from those vents.

Spatter and scoria Undivided deposits Active crater Alluvium

Has00 Agglutinated spatter from Jan. 16, 2000 (Has00) and Feb. 29, 2000 (Has00a) eruption.

Has00a

Hpu00 Incandescent avalanche, pyroclastic flow and ashfall deposits for proximal (Hpu00) and distal (Hpu00) deposits from Strombolian eruptions on Jan. 16 and Feb. 29, 2000.

Hpu00

Hc00 Central crater formed in the Jan. 16 and Feb. 29, 2000 eruptions.

Hal61 Alluvium derived from lava flows, and pyroclastic material in the "El Chupadero" stream.

Time AD (Not to scale)

Geospatial reference:
Coordinate system: Guatemala Transverse Mercator (GTM).
Projection parameters: False Easting 500000. False Northing 0. Central Meridian -90.5. Scale Factor 0.9998. Latitude of Origin 0. Datum: WGS 1984.
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References:
Eggers, 1971. The Geology and Petrology of the Amatitlán Quadrangle, Guatemala. Dartmouth College, New Hampshire.
Japanese International Development Agency (JICA), Instituto Geográfico Nacional (IGN), Instituto Nacional de Sismología, Vulcanología, Meteorología e Hidrología (INSIVUMEH) and Secretaría de Planificación y Programación de la Presidencia (SEGEPLAN). 2003. Estudio del establecimiento de los mapas básicos y mapas de amenaza para el sistema de información geográfica de la República de Guatemala. Final report.
Wunderman, R., 1982. Amatitlán, an active resurgent caldera immediately south of Guatemala City, Guatemala. Ms Thesis. Michigan Technological University, Houghton, Michigan, USA.

