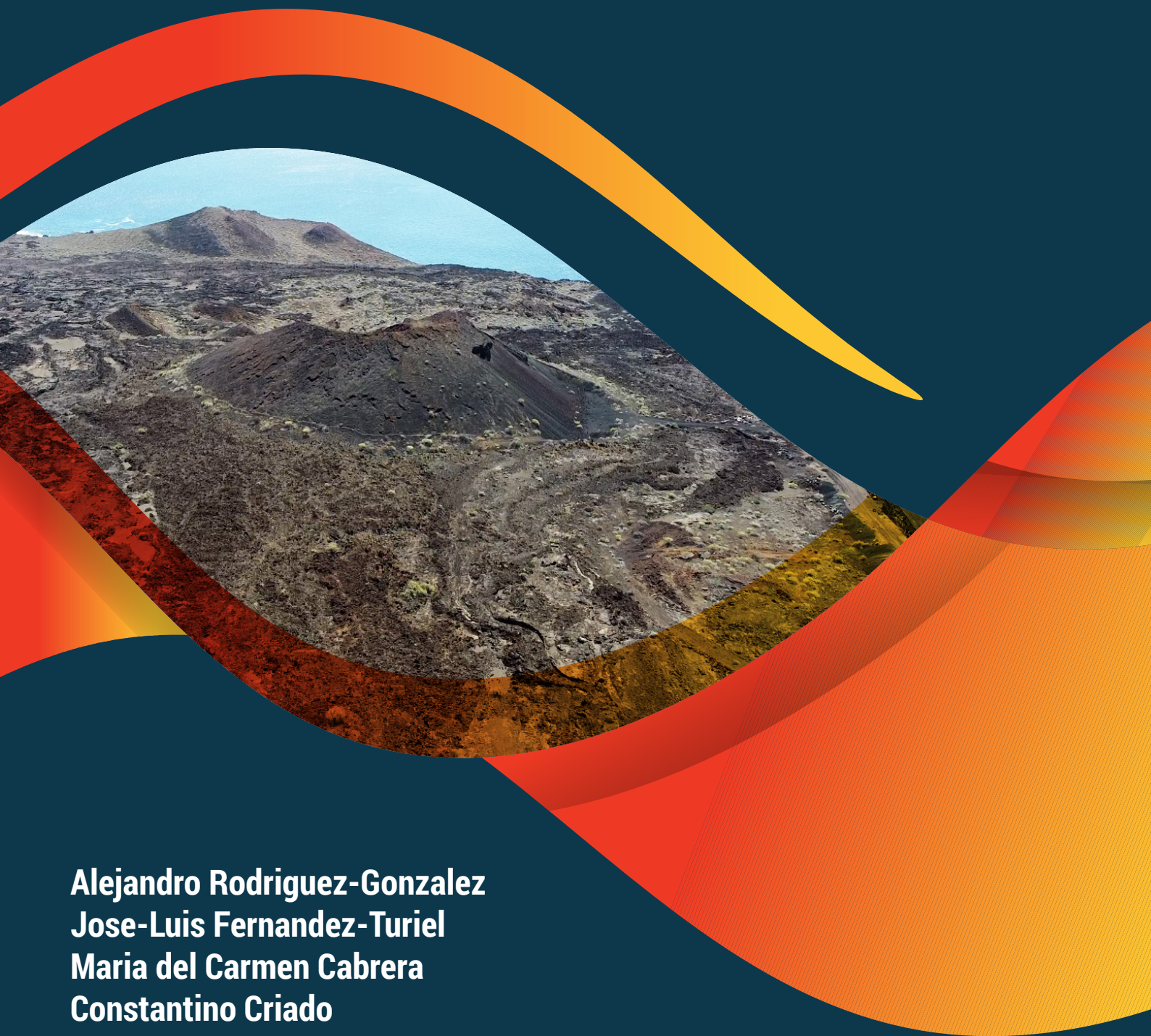


Image dataset of the Holocene volcanism on the island of El Hierro (Canary Island, Spain): stratigraphic relationships



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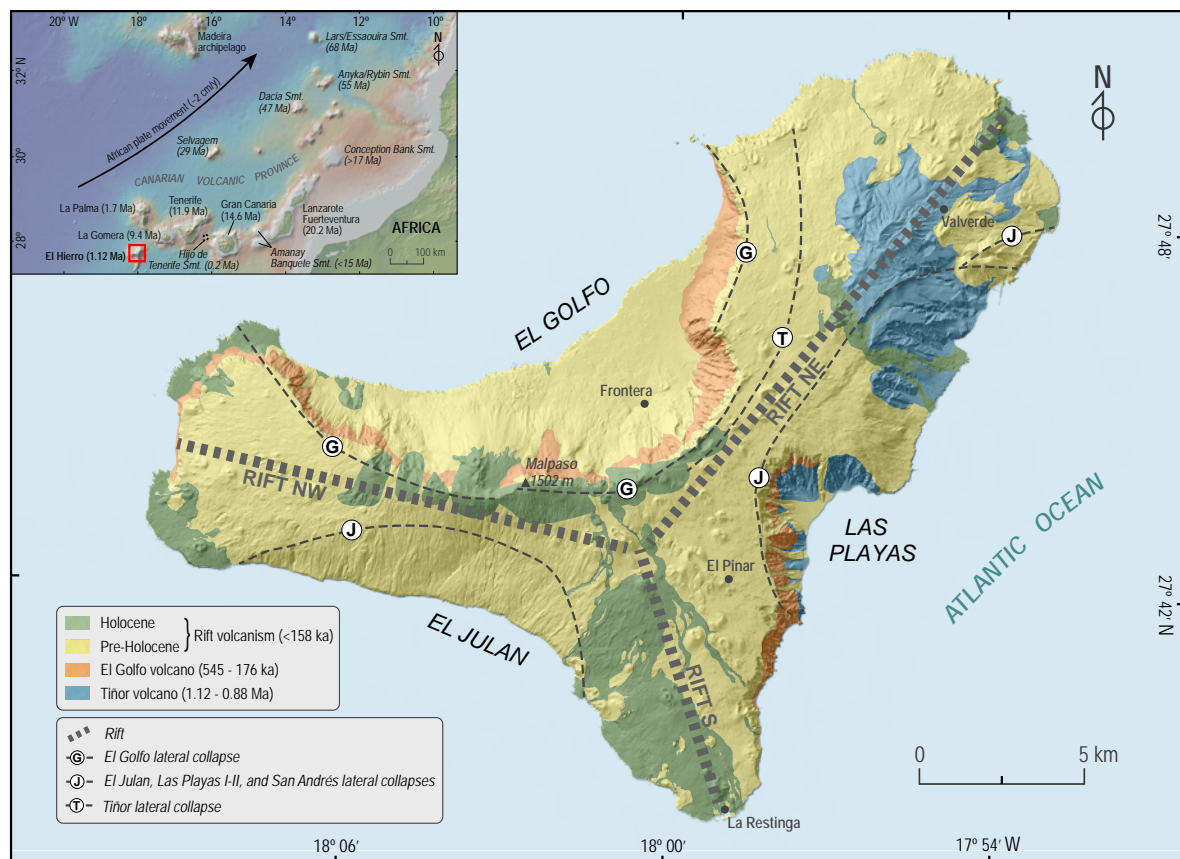
<https://doi.org/10.20420/1770.2024.695>

ediciones

Geological setting

The Canary Islands archipelago comprises seven main islands and several islets and, with several seamounts, make up the Canary Islands Volcanic Province (CVP), a volcanic belt 800 km long and 400 km wide. The CVP developed on the African plate, near the passive African continental margin, formed by a Jurassic oceanic lithosphere (old, cold, thick, and rigid crust). The age of the CVP volcanism decreases from NE to SW. This age progression is due to the relatively slow movement of the African plate (~2 cm/year) over a mantle plume (e.g., Carracedo and Troll, 2016, 2021).

El Hierro is the youngest and westernmost island in the Canarian archipelago. The island comprises three large overlapping volcanic edifices (e.g., Carracedo *et al.*, 2001): The Tiñor volcano edifice (1.12-0.88 Ma), the El Golfo volcano edifice (545-176 ka) and finally, the current rift volcanism (<158 ka). The rapid and unstable growth of the island promoted five giant gravitational landslides: Tiñor (<880 ka), Las Playas I (545–176 ka), Las Playas II (176–145 ka), El Julan (>158 ka), El Golfo (87-39 ka), and Punta del Norte (unknown age) (e.g., Carracedo *et al.*, 2001; Longpré *et al.*, 2011). The most characteristic feature of El Hierro is its tetrahedral shape, with the three ridges (rift zones) at ~120° and separated by wide embayments associated with giant landslides (e.g., Guillou *et al.*, 1996; Carracedo *et al.*, 2001; Carracedo and Troll, 2016, 2021).



Simplified geological map of the El Hierro island (adapted from Carracedo *et al.*, 2001; Balcells Herrera *et al.*, 2010a, 2010b; Gómez Sainz de Aja *et al.*, 2010a, 2010b). Inset: the location of the El Hierro island in the Canarian archipelago.

Dataset information

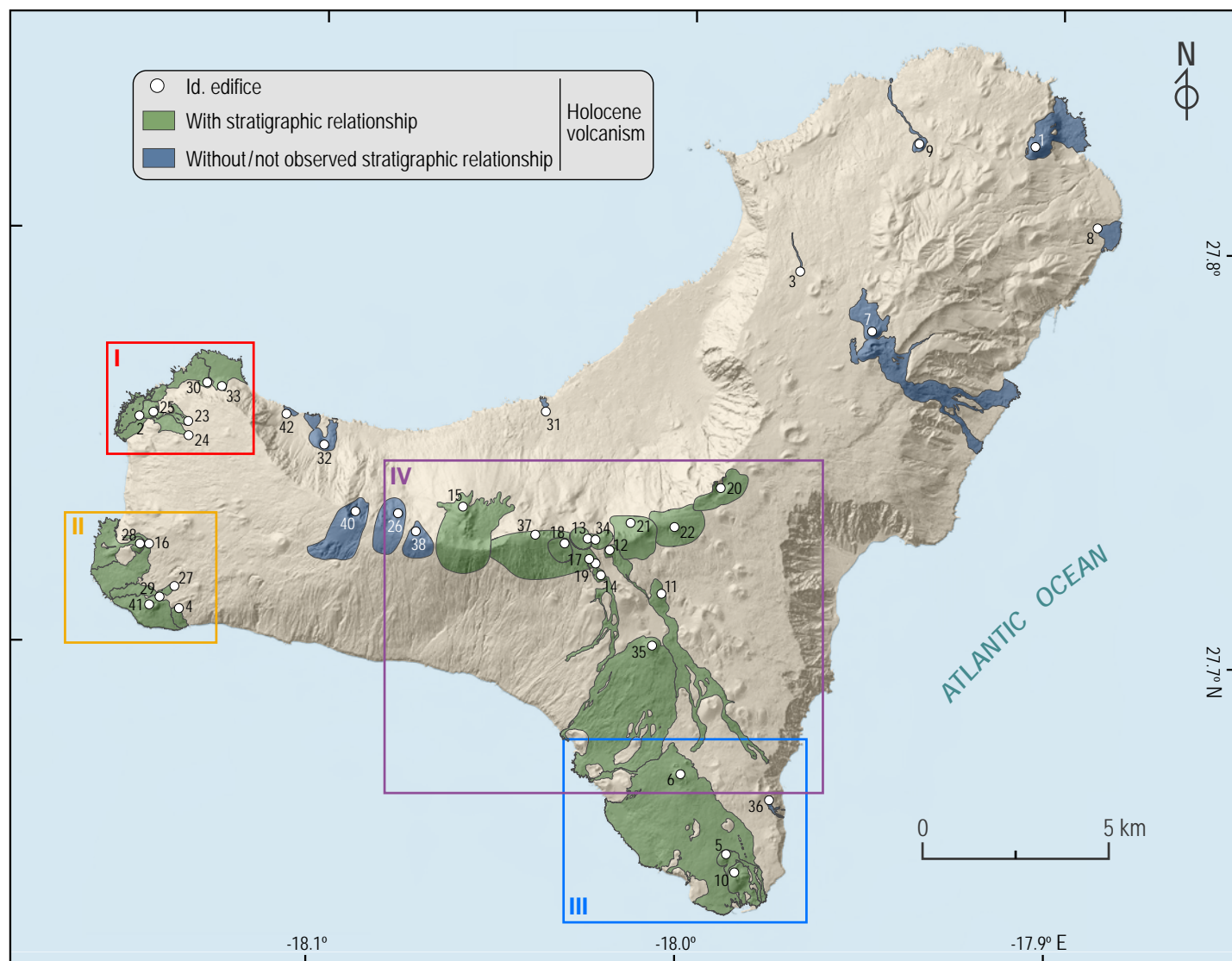
This dataset includes 28 photographs illustrating the stratigraphic relationships among the 27 eruptions out of 42 Holocene eruptions on the island of El Hierro (Canary Islands), investigated within the LAJIAL Project (PGC2018-101027-B-I00). The Project was developed at the University of Las Palmas de Gran Canaria, the GEO3BCN (CSIC), the University of Barcelona, and the University of La Laguna. Within the same Project, we delivered a previous dataset focused on the petrographic features of the Holocene volcanism of El Hierro island (Prieto-Torrell *et al.*, 2024a).

The stratigraphic relationships among the Holocene eruptions are based on field observations, applying stratigraphic and geomorphological criteria as the overlapping of lava flows from different eruptions or the surroundings of lava flows to previous volcanic cones and lava fields. For the isolated eruptions or not observed stratigraphic relationships (12 eruptions), the chronostratigraphic control is limited for radiometric ages or the formation of coastal lava deltas (Carracedo *et al.*, 2001; Rodriguez-Gonzalez *et al.*, 2022).

A simplified geological map introduces the main features of El Hierro Island, whereas a second map (page 3) shows the four detail areas used to organize the images. The identification numbers (ID) and names of eruptions are according to Prieto-Torrell *et al.* (2024b). Each of these detail areas contains a link that leads to the corresponding detail map, with which the section of its images begins. Similarly, the detail maps incorporate a clicking button that returns to the general map of page 3.

Inside the detailed maps are located icons of a photo camera (with the orientation in which the photographs were taken) linked to the corresponding photograph that illustrates a specific stratigraphic relationship. Each photograph incorporates a clicking button that returns to the corresponding detail map. The coordinates of the point where the photograph was taken are indicated on each photo. Furthermore, contacts are marked with dashed lines, and the flow direction of lava flows is indicated with arrows. Each photo is accompanied by a brief explanation denoting the eruptions involved.

Link to locate area (click on the boxes)



1 - Montaña del Tesoro

2 - Lomo Negro

3 - Montaña del Cascajo

4 - Montañita Negra

5 - Montaña de Prim

6 - Lajjal

7 - Montaña Chamuscada

8 - La Caleta

9 - Montaña de Aguaríjo

10 - La Restinga

11 - Cueva del Mocán

12 - Montaña del Cepón

13 - Monumento al Campesino Herreño

14 - Montañita del Guanche de Abajo

15 - Tanganasoga

16 - El Meridiano

17 - El Brezal

18 - Pino Verde

19 - Morro de las Sanjoras

20 - Hoya de Fireba

21 - Pico Tenerife

22 - Pico de los Marrubios

23 - Montaña de Marcos

24 - Montaña de los Guirres

25 - Hoya del Verodal

26 - Monte Grande

27 - El Estacadero

28 - Montaña de las Calcosas

29 - La Hoya del Faro

30 - Roque de Basco

31 - Charco Azul

32 - Sabinosa

33 - Arenas Blancas

34 - Cruz de los Reyes

35 - Montaña de la Empalizada

36 - Calderetones

37 - Malpaso 1

38 - Picos de la Peña del Agua

39 - Malpaso 2 (not visible in map)

40 - Montaña de los Humilladeros

41 - Montaña de Orchilla

42 - Lomo Cabras

I - Rift NW

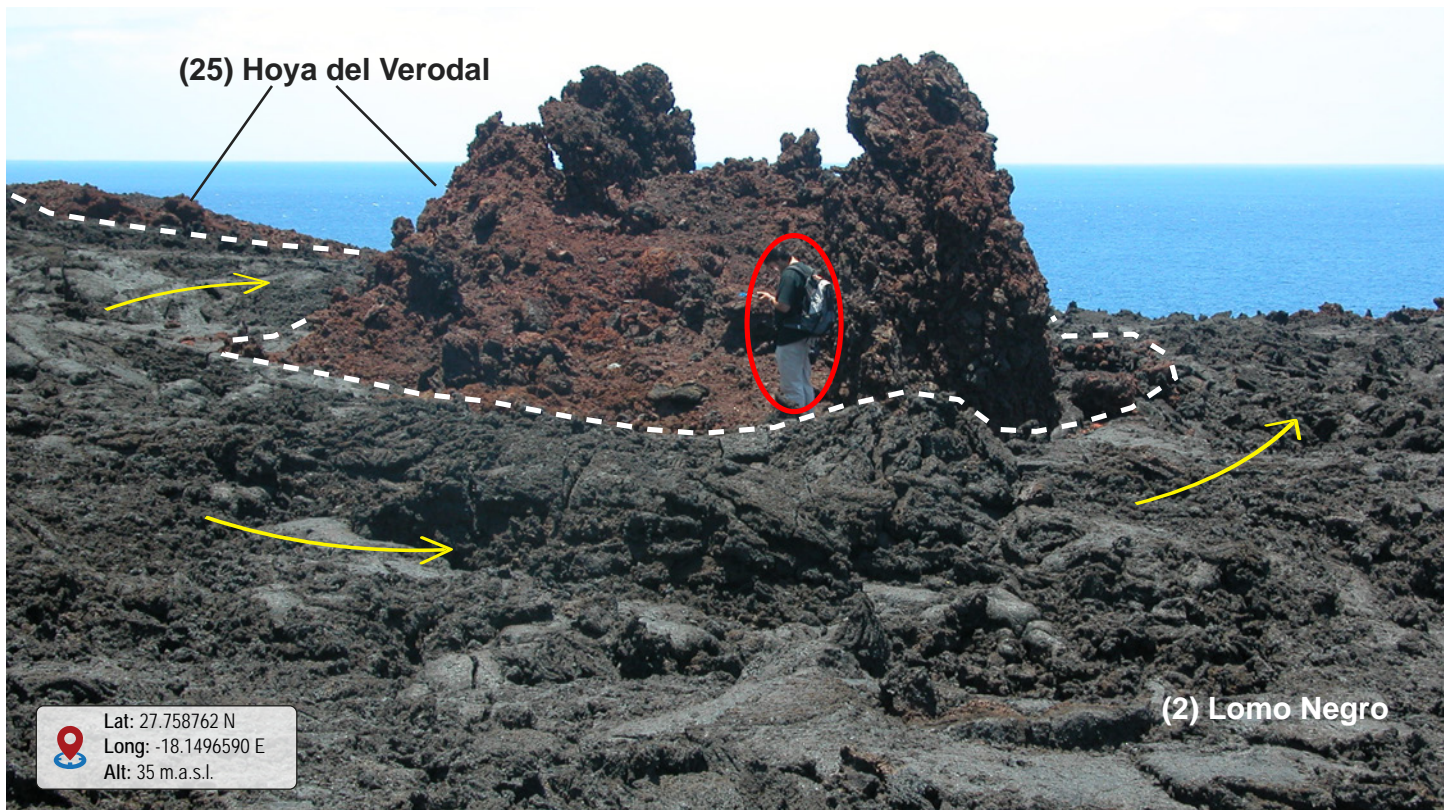
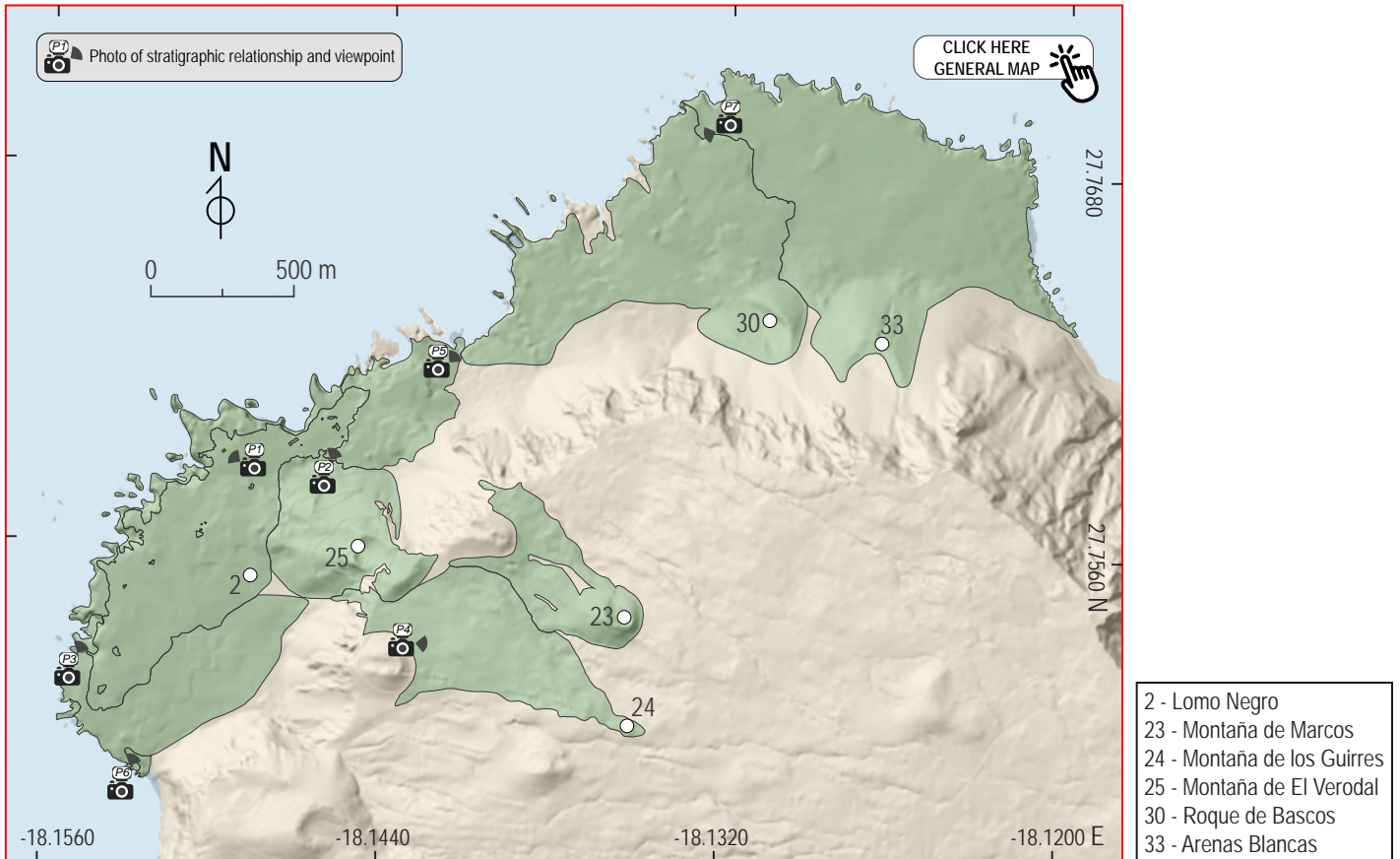


Photo P1. Pahoehoe lava flows from the (2) Lomo Negro eruption (yellow arrows) that flowed over the previous lava delta of the (25) Hoya del Verodal eruption. Sometimes, there are remains of the scoriaceous roof of the (25) Hoya del Verodal lavas that emerge as "kipukas" (contact indicated by a white dashed line). A red ellipse surrounds a person as a scale.

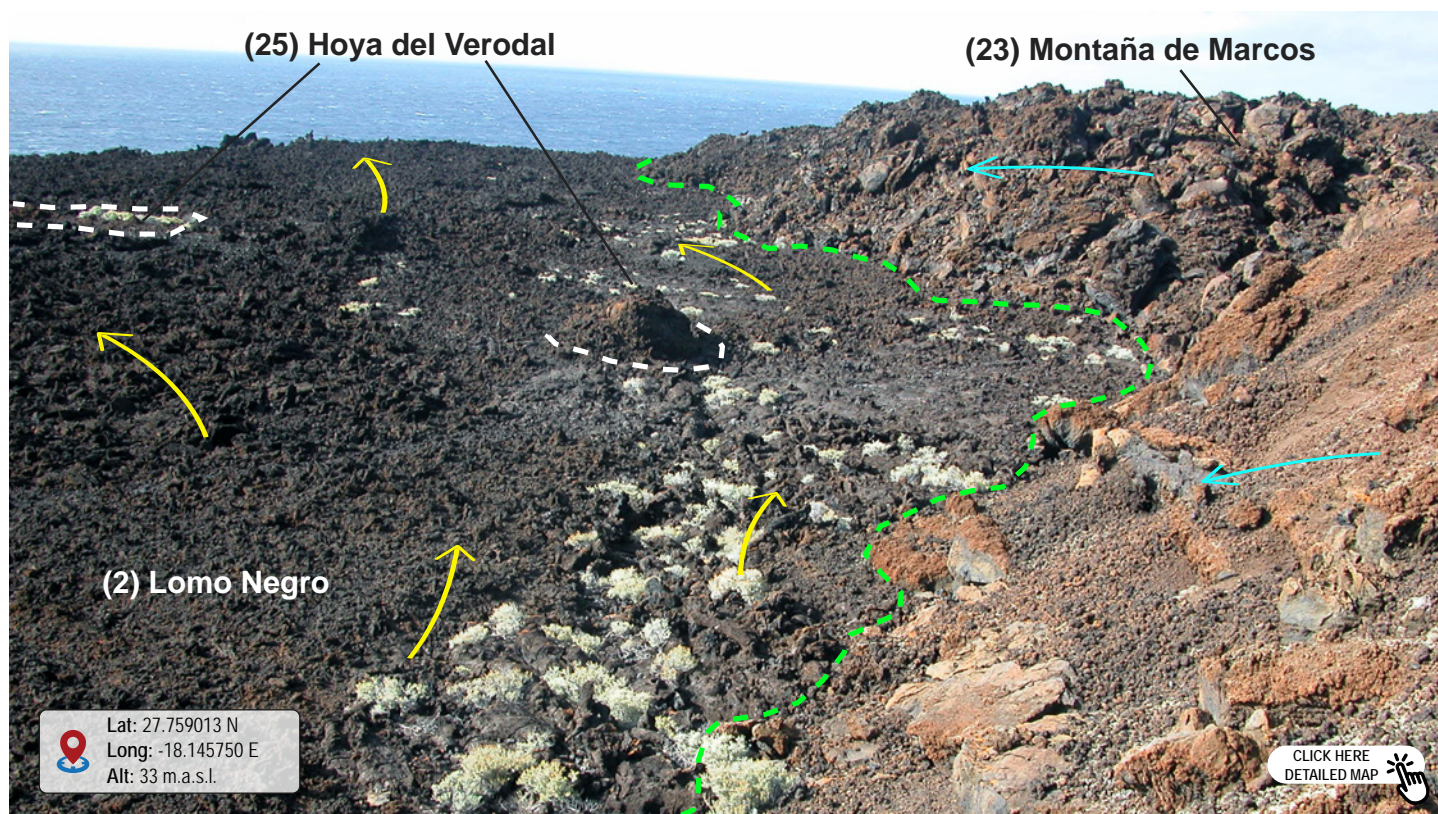


Photo P2. Pahoehoe lava flows from the (2) Lomo Negro eruption (yellow arrows) flowed over the previous lava delta of the (25) Hoya del Verodal eruption and adapted (contact marked with a green dashed line) to the previous lava front from the (23) Montaña de Marcos eruption (blue arrows). Remains of the scoriaceous roof of the (25) Hoya del Verodal lavas emerge as “kipukas” (contact marked with a white dashed line).

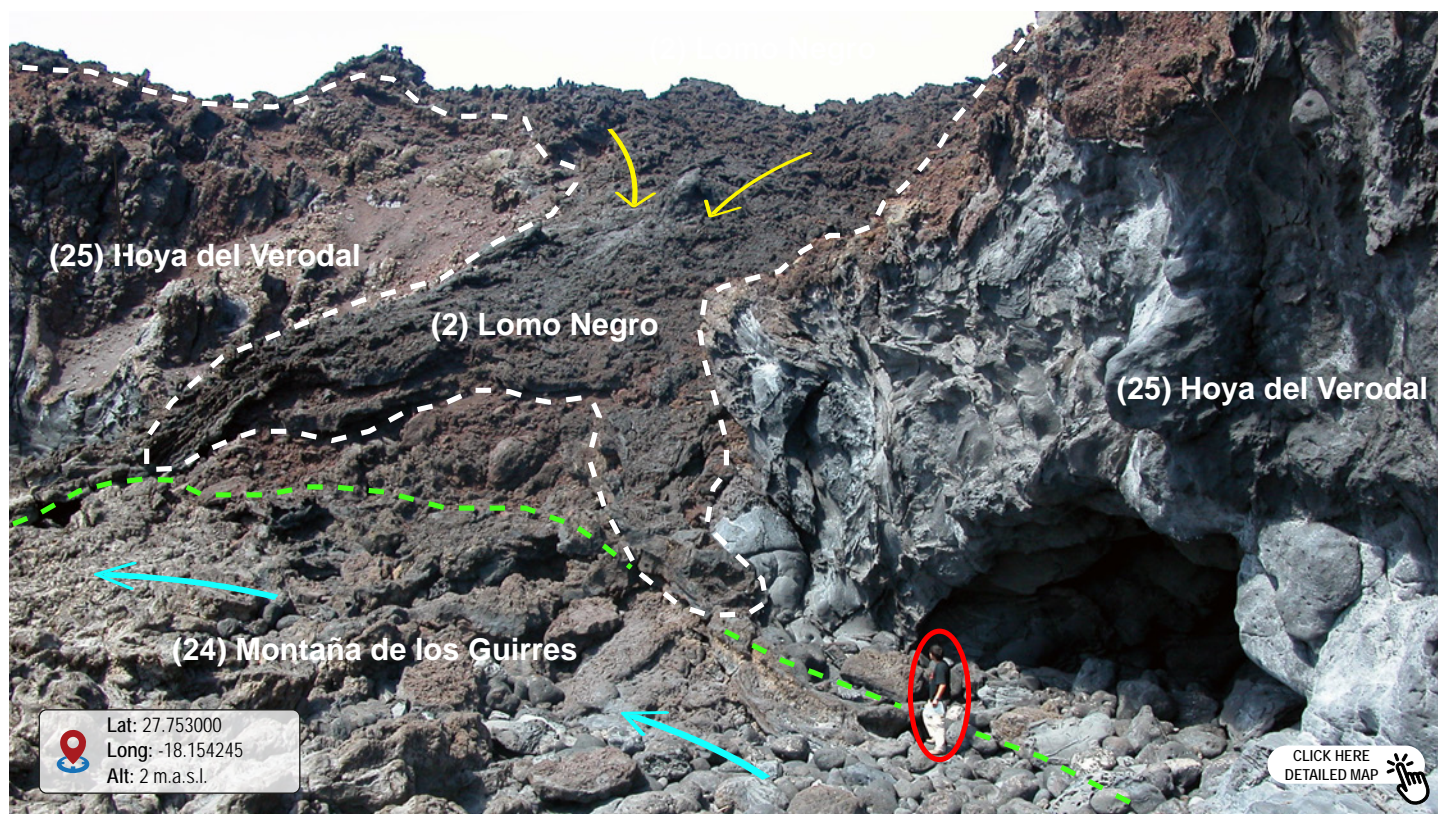


Photo P3. Pahoehoe lava flows from the (2) Lomo Negro eruption (yellow arrows) cascading over the paleocliff (contact indicated by a white dashed line) created in the lava delta from the (25) Hoya del Verodal eruption, and overlapping the lava delta from the (24) Montaña de los Guirres eruption (a dashed green line marks the contact). The lava flows from this last eruption (arrows in blue) bordered the paleocliff carved in the lavas from the (25) Hoya del Verodal eruption. A red ellipse surrounds a person as a scale.

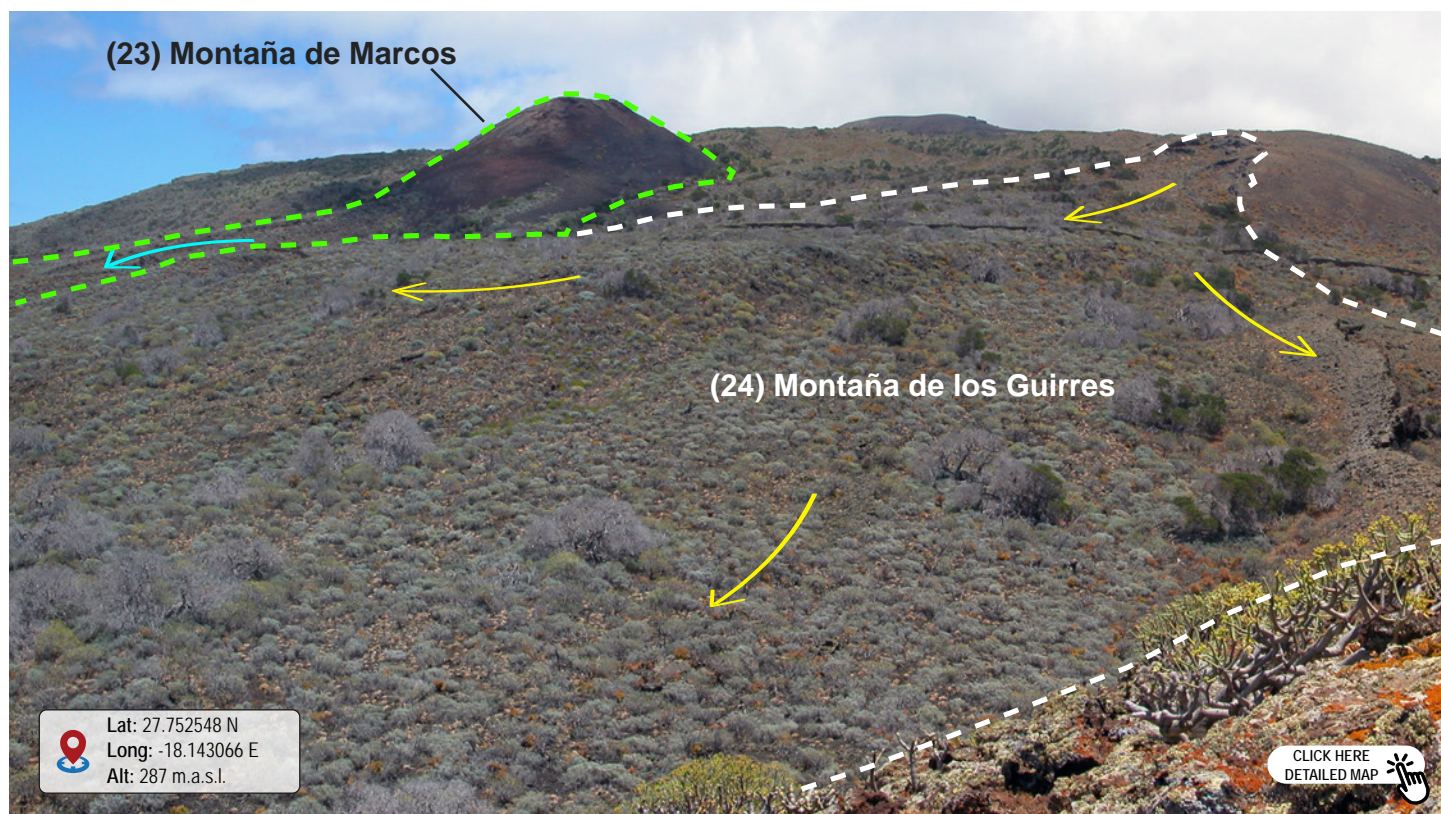


Photo P4. Cone and lava flow of (23) Montaña de Marcos eruption (contact indicated by a green dashed line and lava flow direction with a blue arrow) border the lava flows from the fissure of the (24) Montaña de los Guirres eruption (dashed line in white and arrows in yellow).



Photo P5. Lava flows from the (23) Montaña de Marcos eruption (yellow arrows) formed a small lava delta when they reached the sea. These flows bordered the paleocliff carved in the lavas from the (30) Roque de Bascos eruption (contact marked with a white dashed line). A red ellipse surrounds a person as a scale.

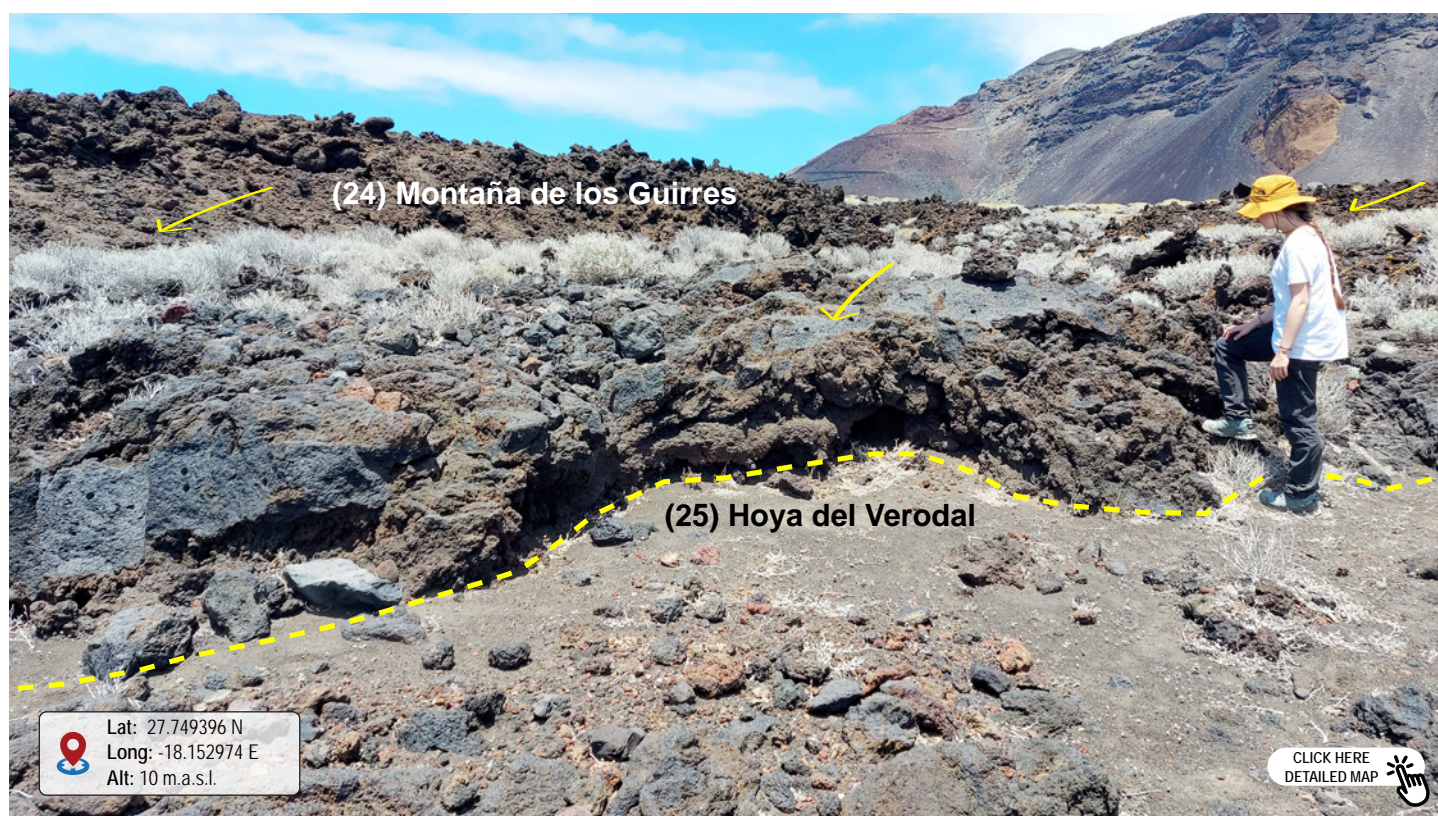


Photo P6. Lava flows from the (24) Montaña de los Guirres eruption (yellow arrows) flowed over the lava delta formed by the (25) Hoya del Verodal eruption (contact indicated by a yellow dashed line).

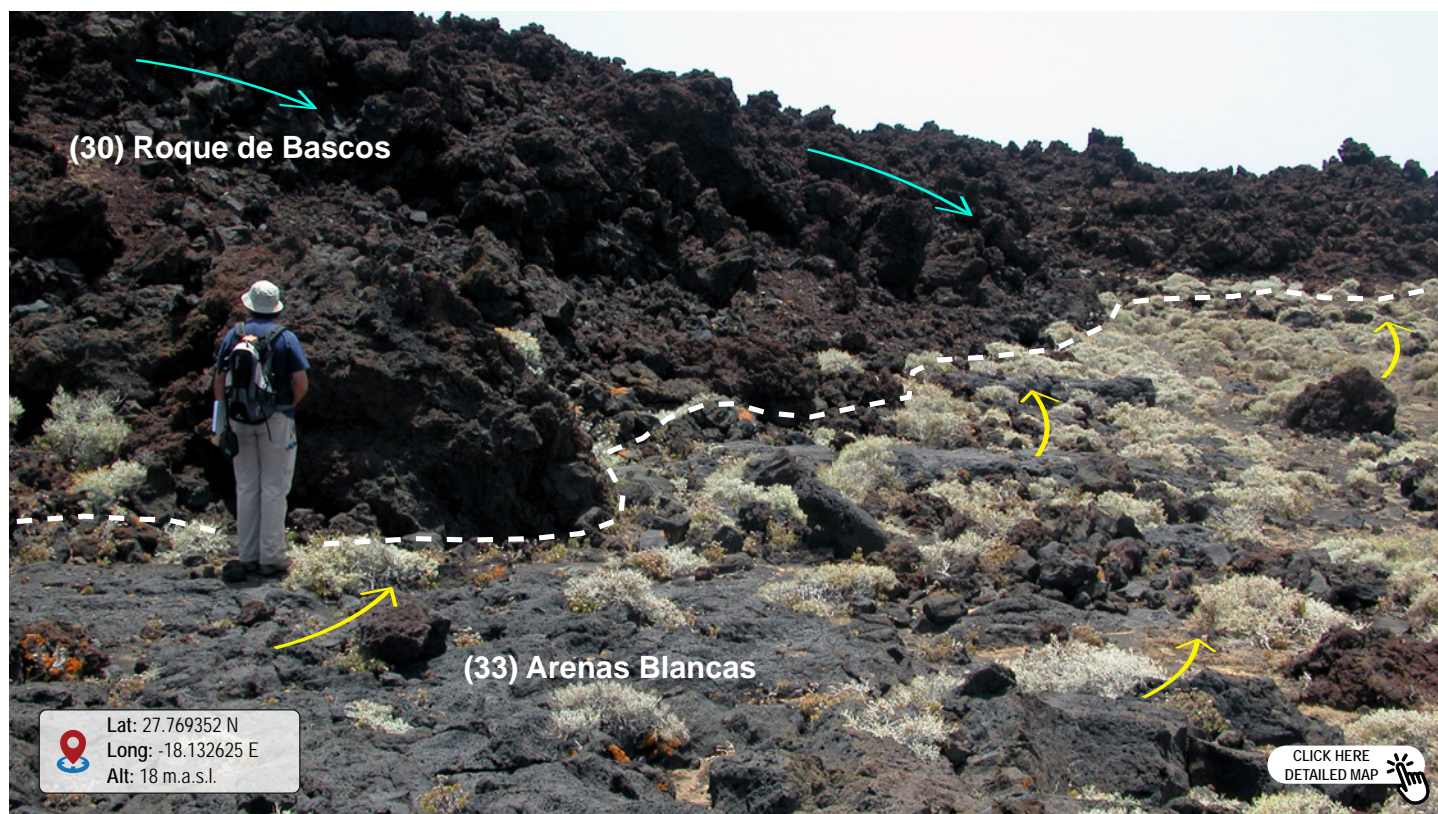


Photo P7. Lateral margin of 'a'ā lava flows from the (30) Roque de Bascos eruption (blue arrows) that ran over the previous lava delta formed by the (33) Arenas Blancas eruption (yellow arrows). A white dashed line indicates the contact between both lava flows.

II - Rift NW

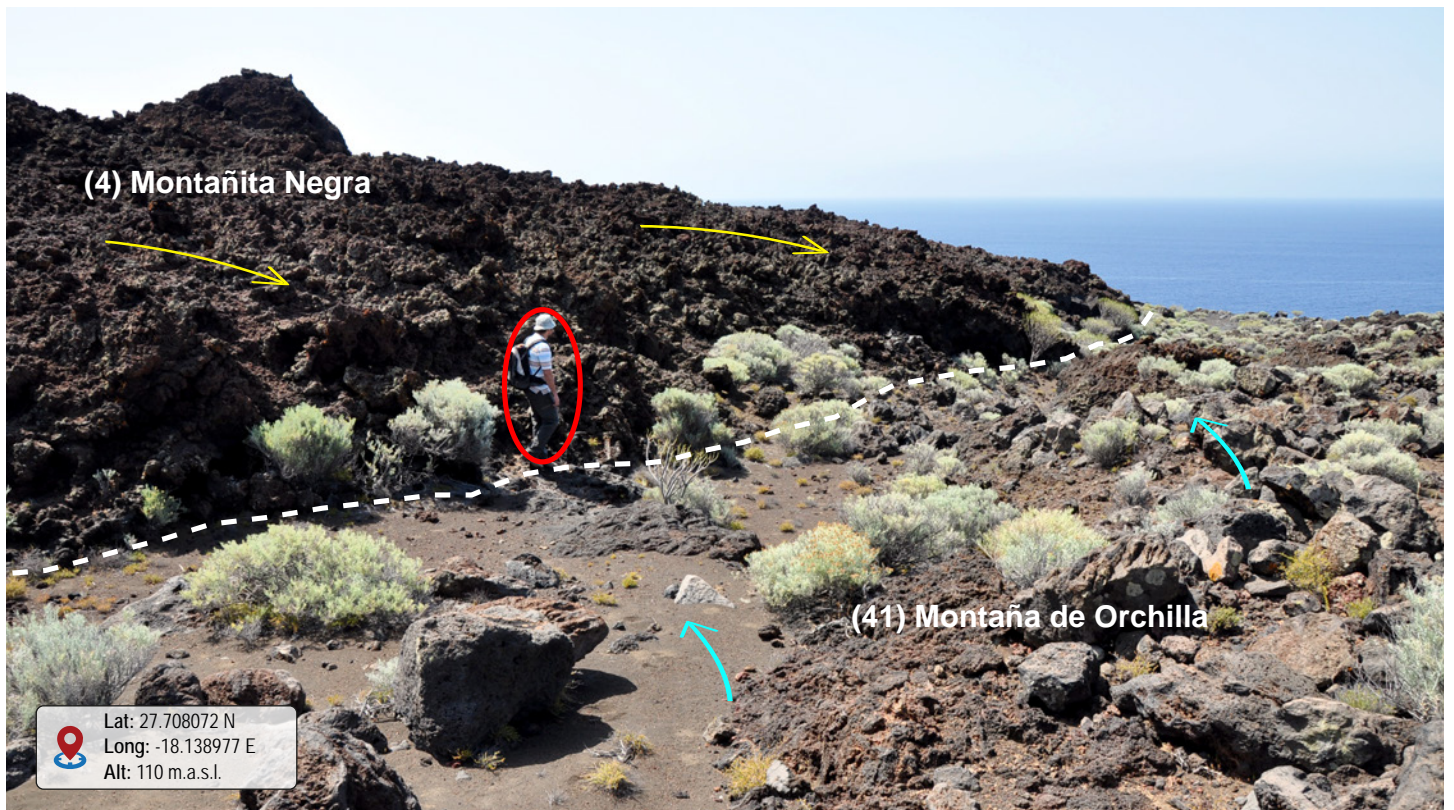
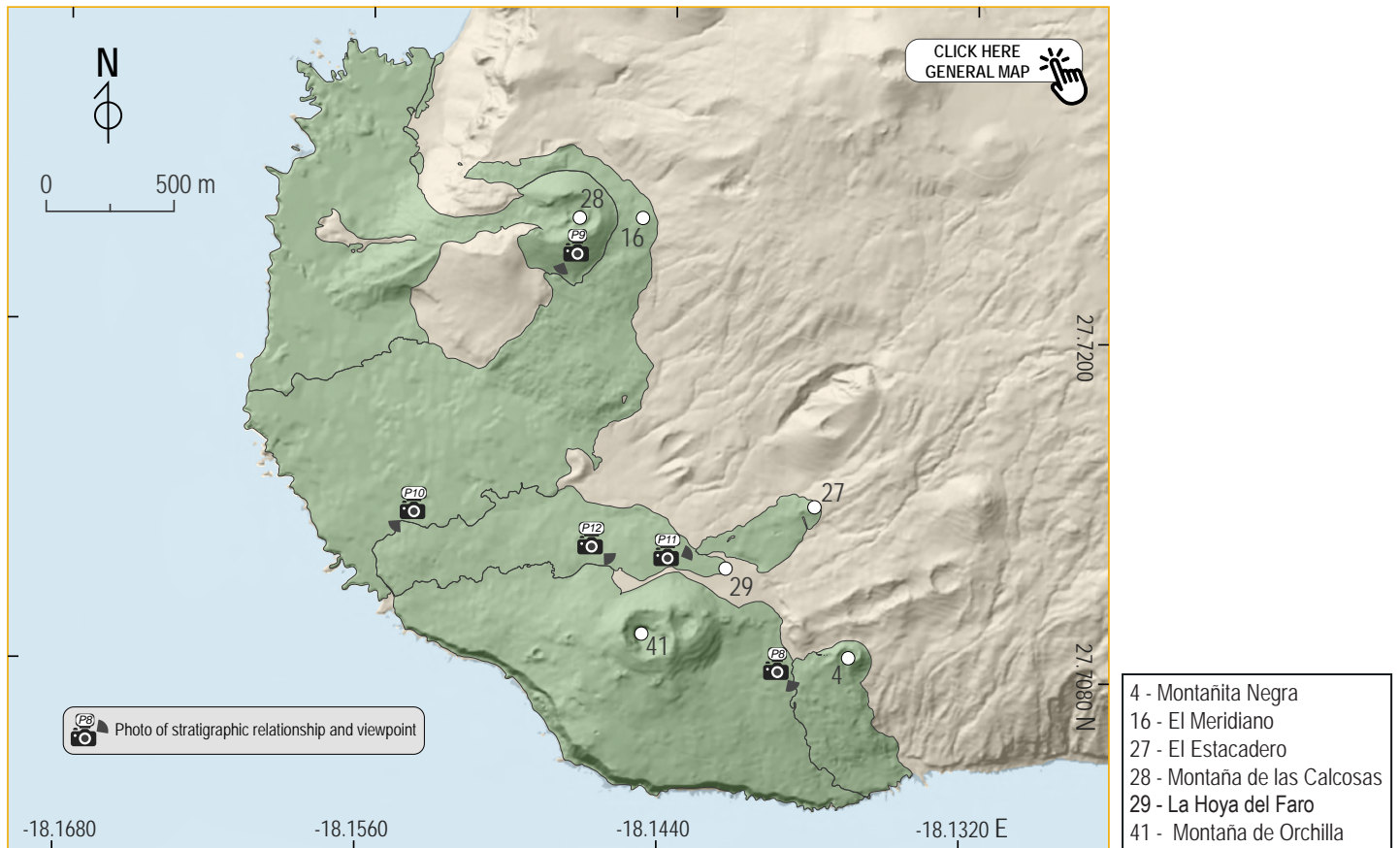


Photo P8. Western edge of the 'a' lava field from the (4) Montañita Negra eruption (yellow arrows). These lavas flowed over previous lava flows from the (41) Montaña de Orchilla eruption (blue arrows). The contact is indicated with a white dashed line. A red ellipse surrounds a person as a scale.

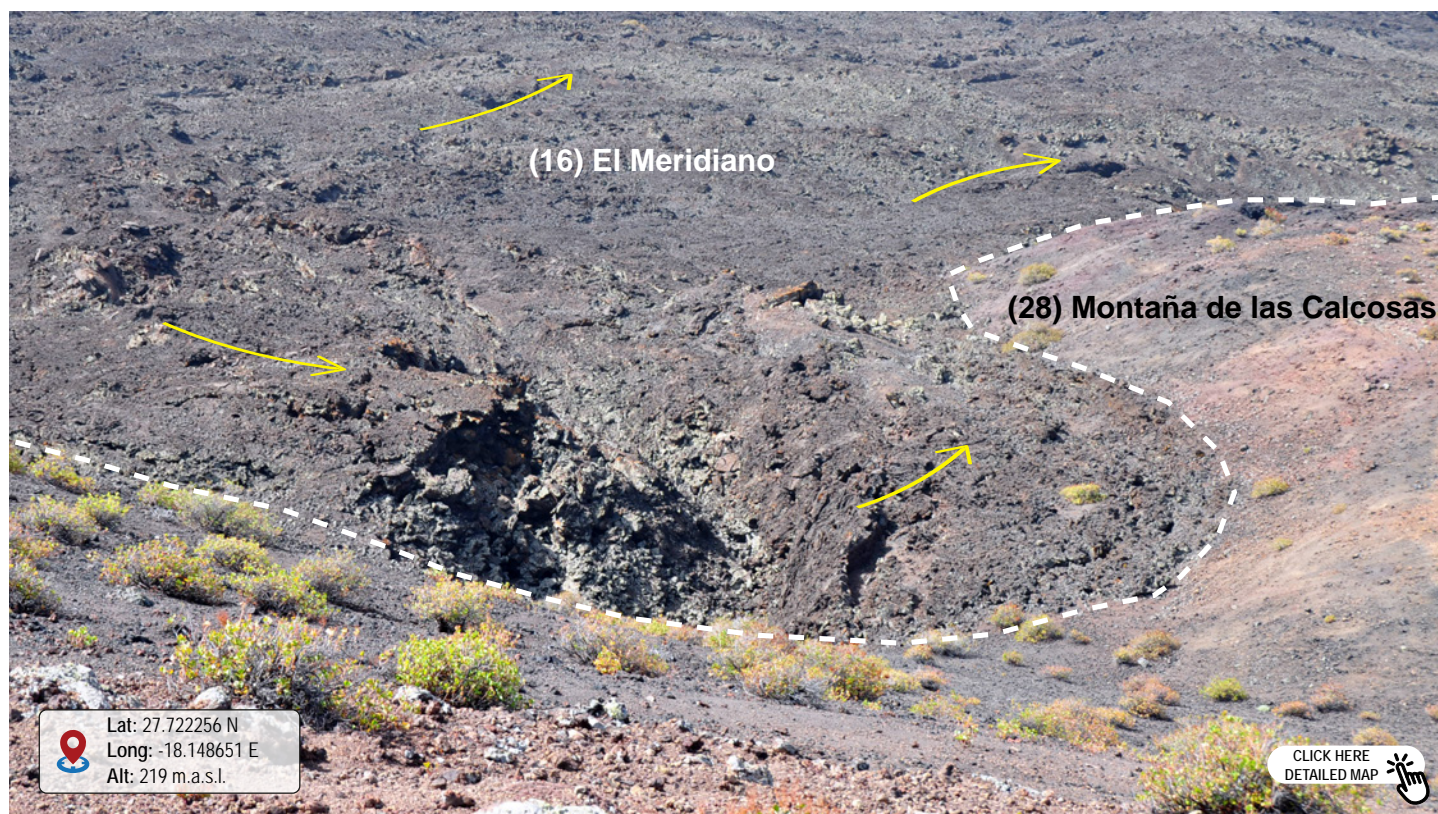


Photo P9. Pahoehoe and 'a'ā lava flows (yellow arrows) from the (16) El Meridiano eruption adapted to the southern flank of the cone of the (28) Montaña de las Calcosas eruption. A white dashed line indicates the contact.

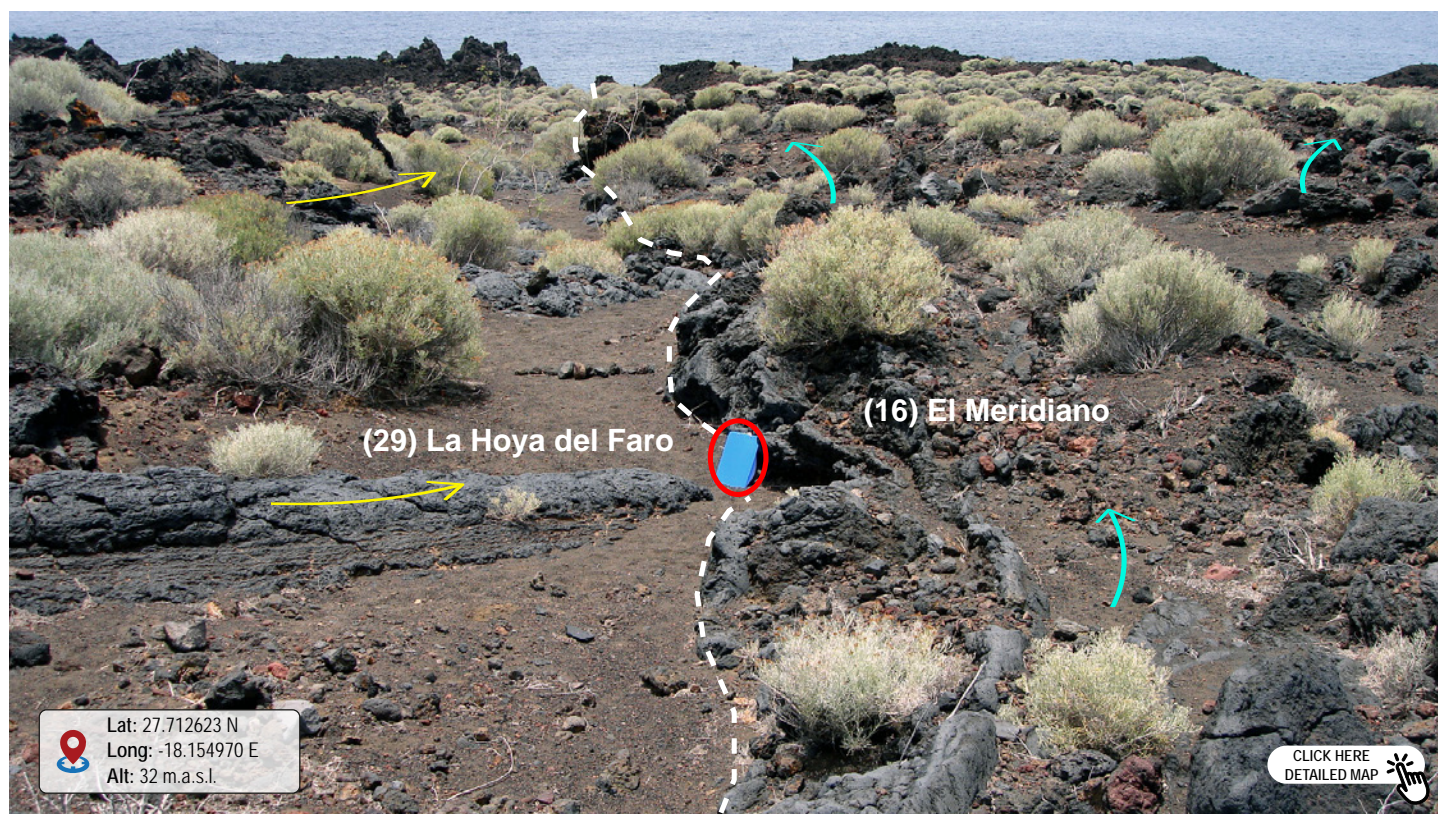


Photo P10. Contact between lava flows from the (16) El Meridiano eruption and the (29) La Hoya del Faro eruption (a white dashed line indicates the contact). It is observed that some lava flows from the (16) El Meridiano eruption (blue arrows) flowed perpendicular to the previous lava flows from the (29) Hoya del Faro eruption (yellow arrows). A red ellipse surrounds a folder as a scale.

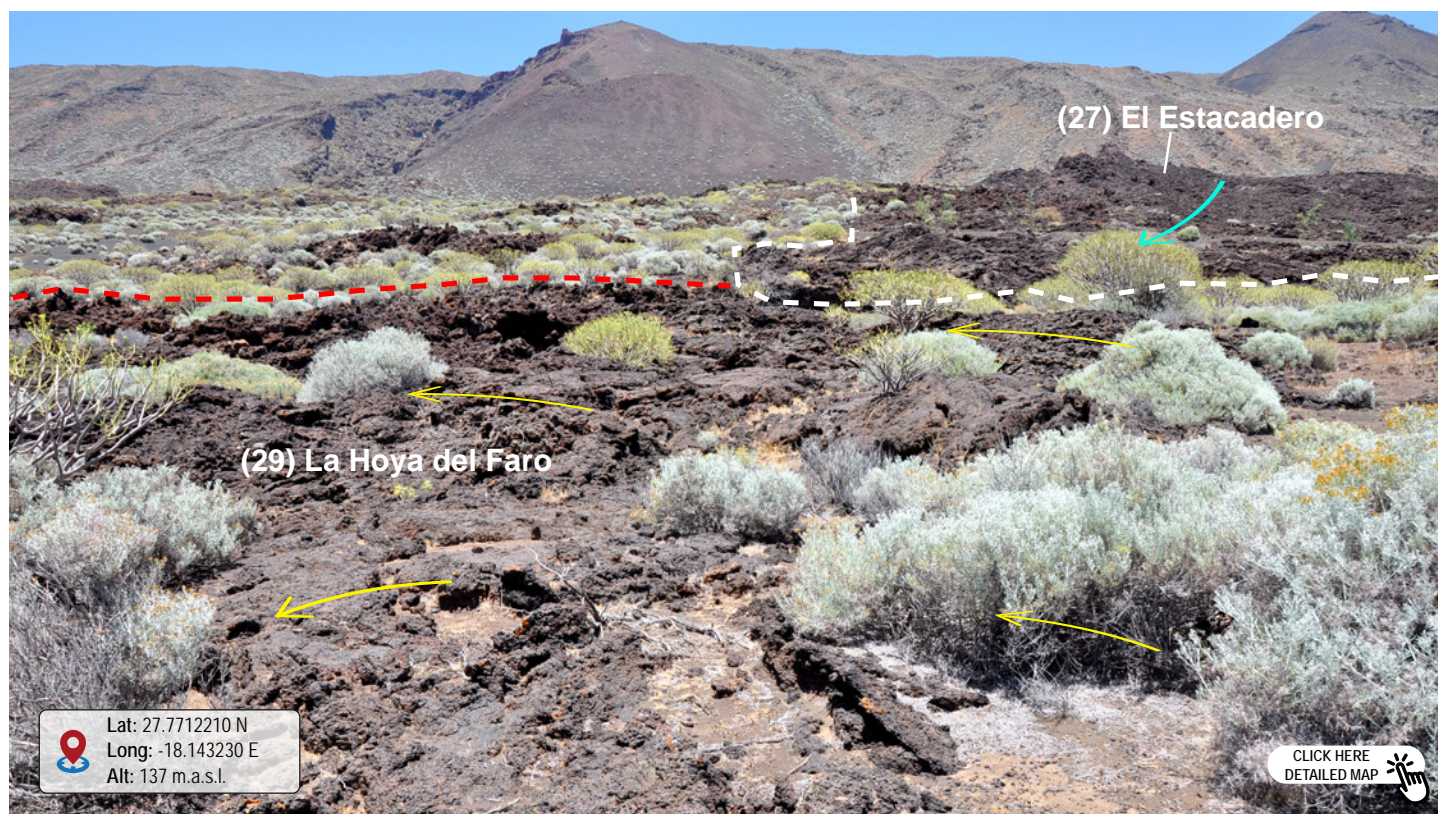


Photo P11. The front of the lava flows from the (27) El Estacadero eruption (a dashed white line marks the contact, and a blue arrow indicates the flow direction) partially covered the pahoehoe lava flows from the (29) La Hoya del Faro eruption (yellow arrows). The red dashed line indicates the lateral edge of the lava field from the (29) La Hoya del Faro eruption.



Photo P12. Pahoehoe lava flows from the (29) La Hoya del Faro eruption (blue arrow) overlapped lava flows from the (41) Montaña de Orchilla eruption (yellow arrows). The contact is indicated with a white dashed line.

III - Rift S

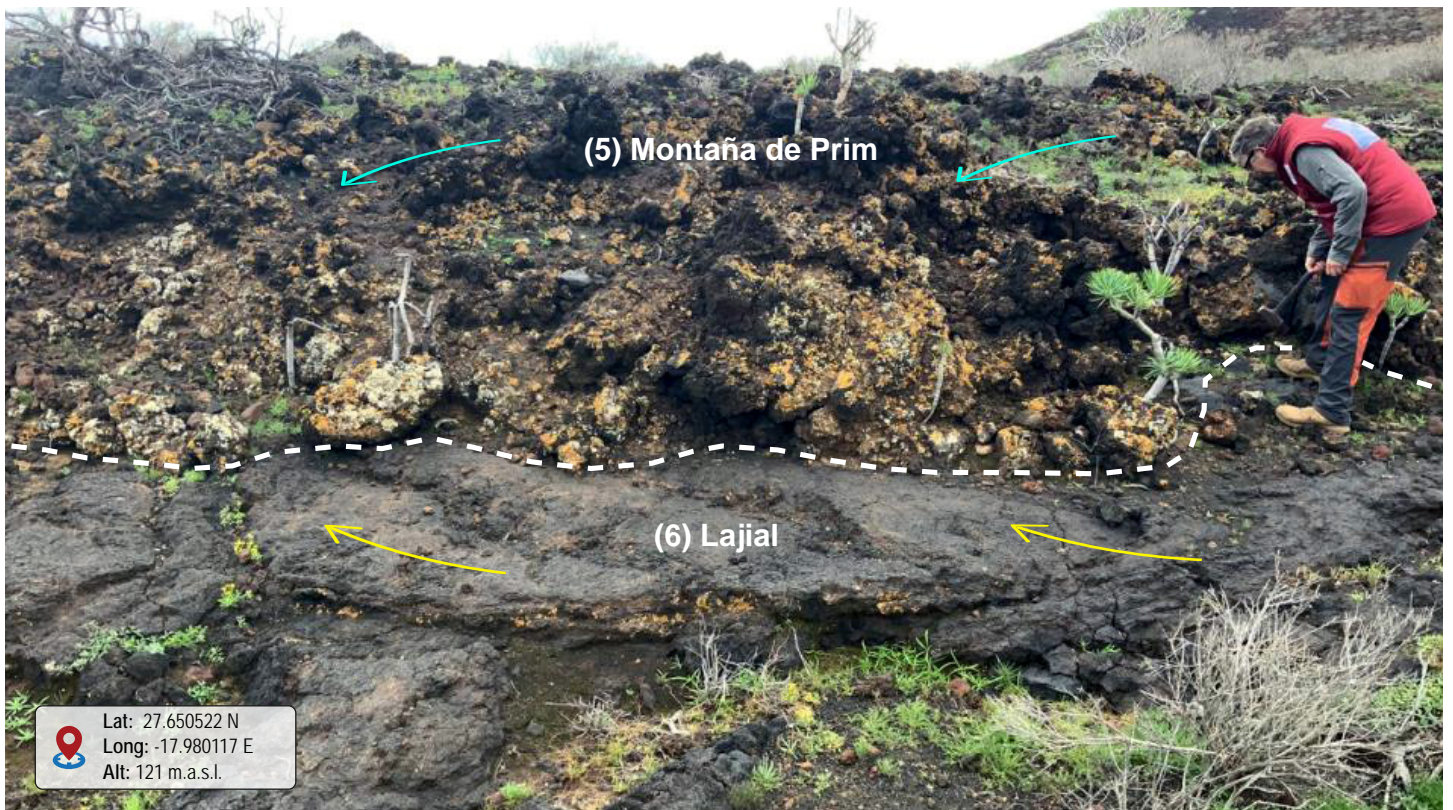
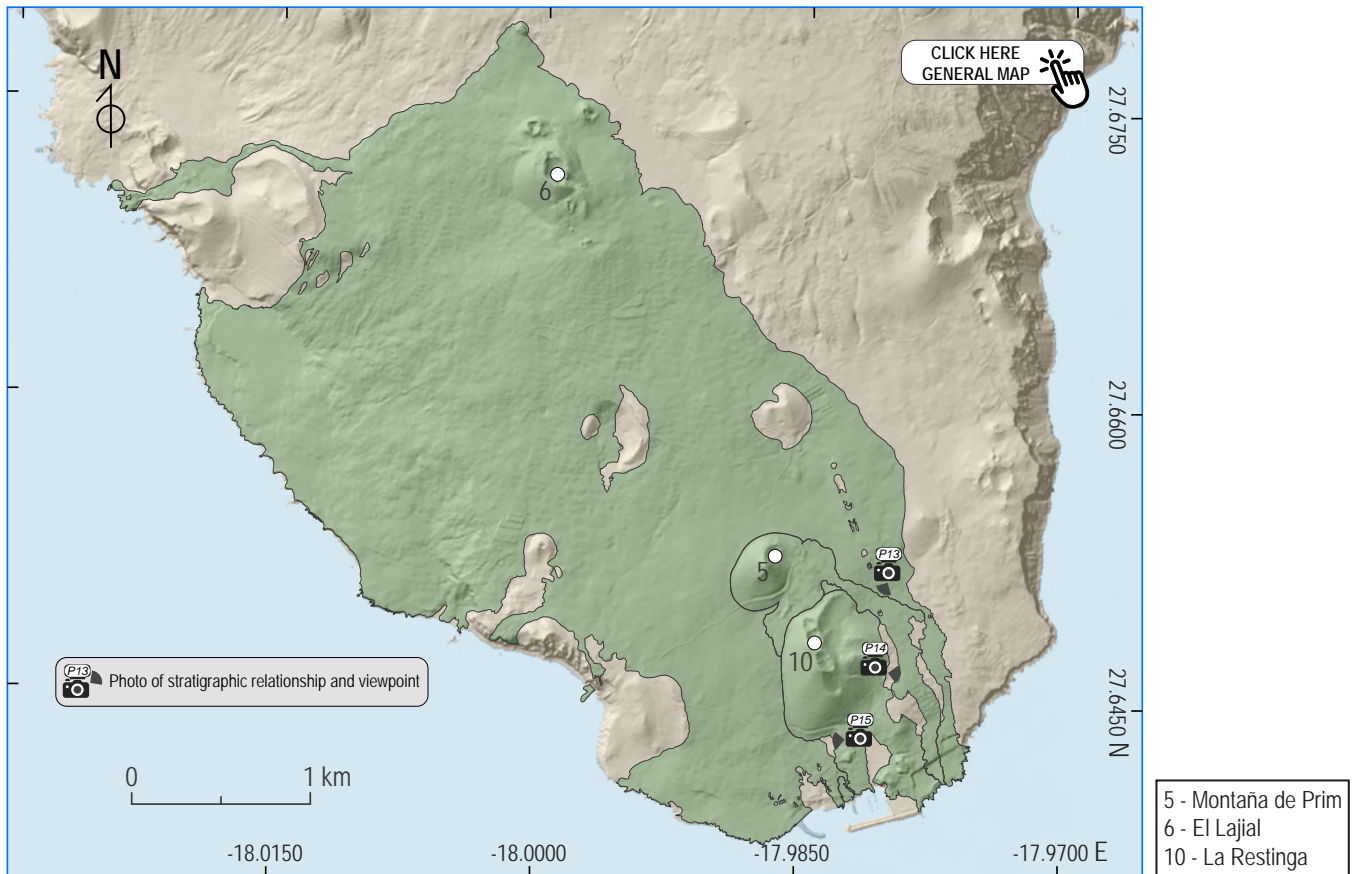


Photo P13. 'A'ā lava flows from the (5) Montaña de Prim eruption (blue arrows) partially covered the pahoehoe lava flows from the (6) El Lajial eruption (yellow arrows). A white dashed line indicates the contact.



Photo P14. Stratigraphic sequence in a small quarry showing the overlapping of the 'a'ā lava flows from the (5) Montaña de Prim eruption above (10) La Restinga lava flows. The contact is indicated with a white dashed line. A red ellipse surrounds a hammer as a scale.



Photo P15. Pahoe-hoe lava flows (yellow arrows) from the (6) El Lajial eruption adapted to the southern flank of the (10) La Restinga eruption cone (a white dashed line indicates the contact).

IV - Rifts NW / NE / S

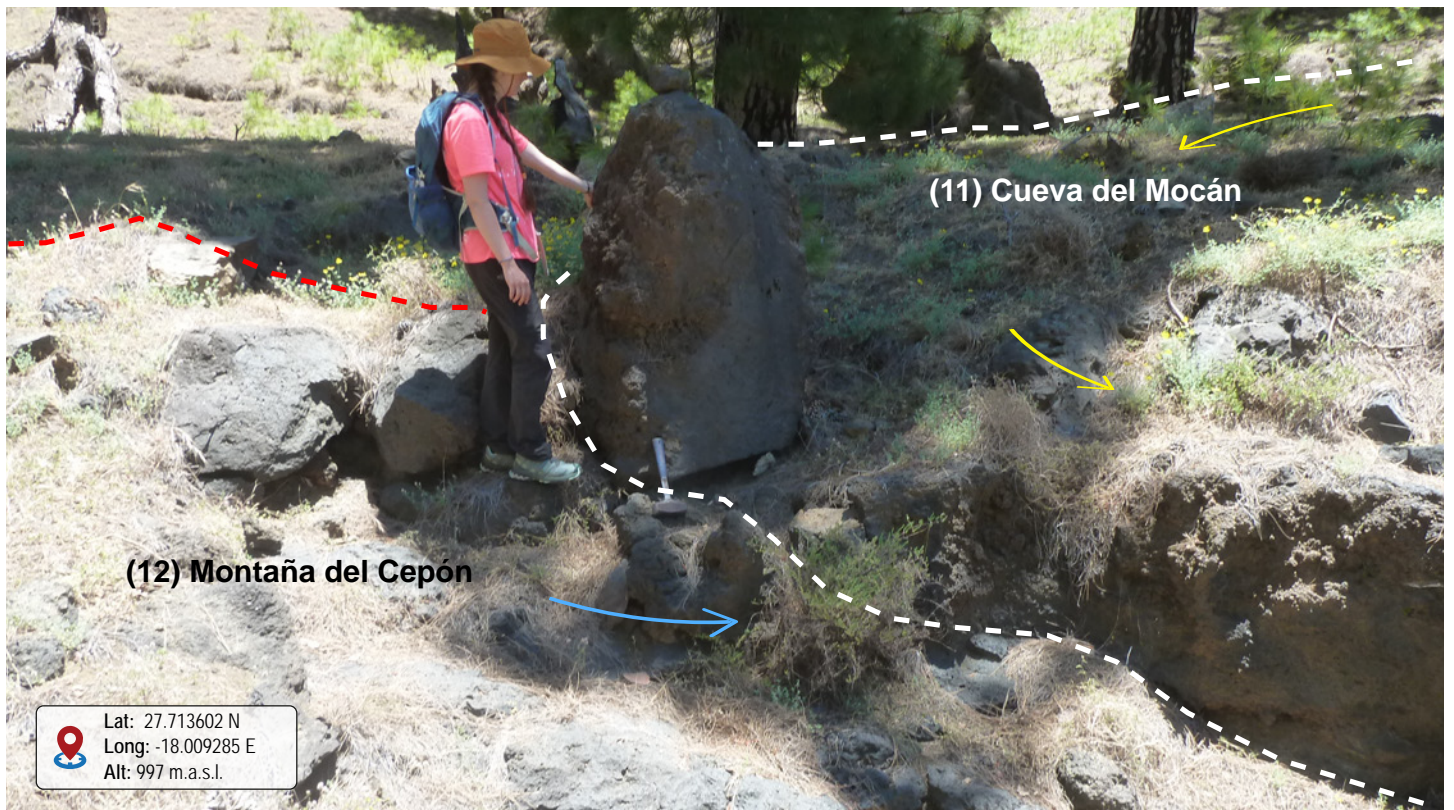
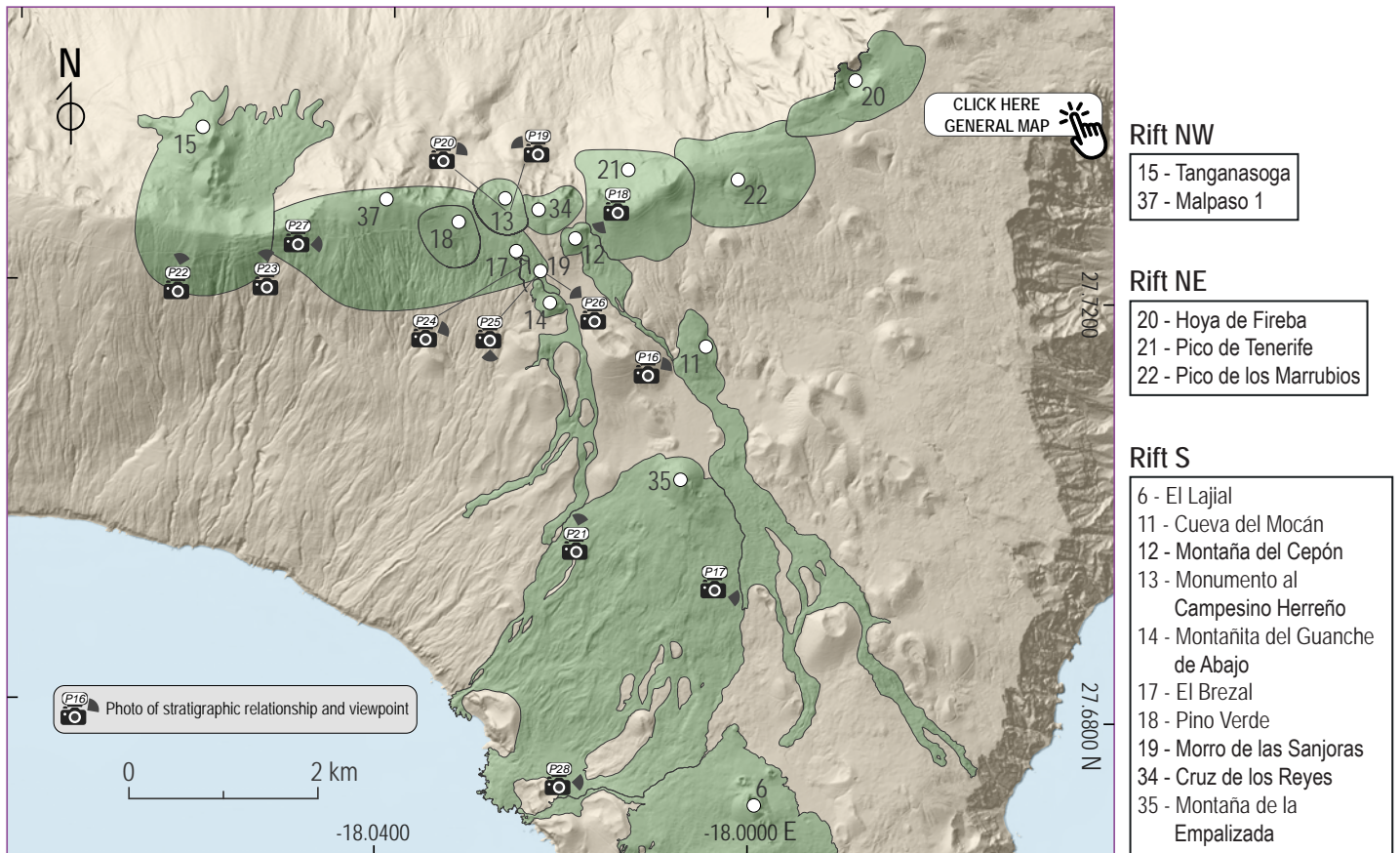


Photo P16. Lava flows from the (11) Cueva del Mocán eruption (yellow arrows) overlapped the lava front of the (12) Montaña del Cepón eruption (blue arrow). A white dashed line indicates the contact.

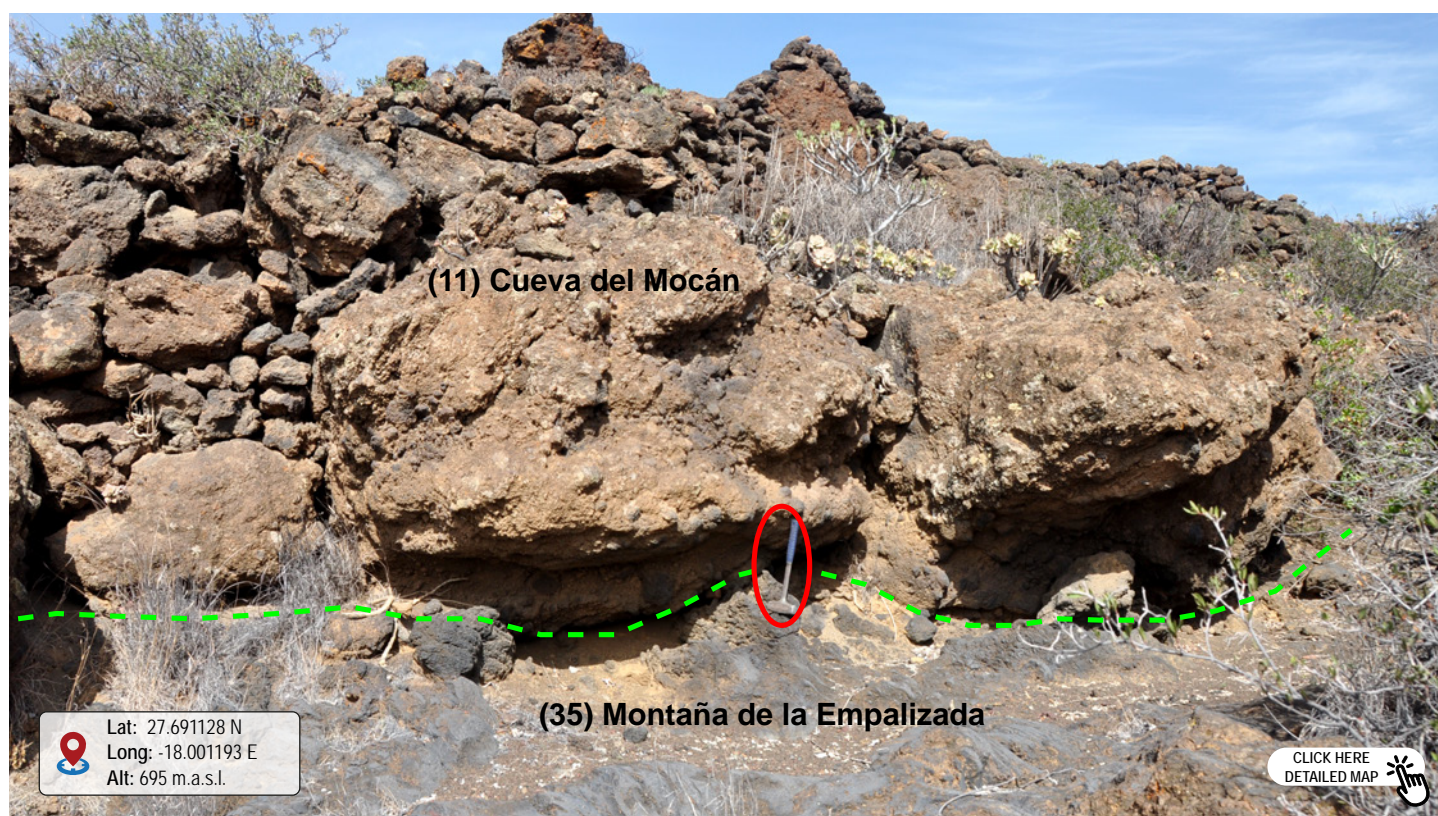


Photo P17. Lateral edge of 'a'ā lava flow from the (11) Cueva del Mocán eruption on previous lava flows of the (35) Montaña de la Empalizada eruption (contact indicated by a dashed green line). The original scoriaceous roof of the lava flows from the (35) Montaña de la Empalizada eruption was partially eroded by alluvial processes. A red ellipse surrounds a hammer as a scale.



Photo P18. 'A'ā lava flows from the (12) Montaña del Cepón eruption (yellow arrows) flowed over the pyroclastic fall deposits of the (21) Pico Tenerife eruption (contact indicated by a white dashed line).



Photo P19. Pyroclastic fall deposits from the (13) Monumento al Campesino Herreño eruption covering the previous pyroclastic fall deposits from the (34) Cruz de los Reyes eruption. The contact between both pyroclastic deposits is indicated with a white dashed line.

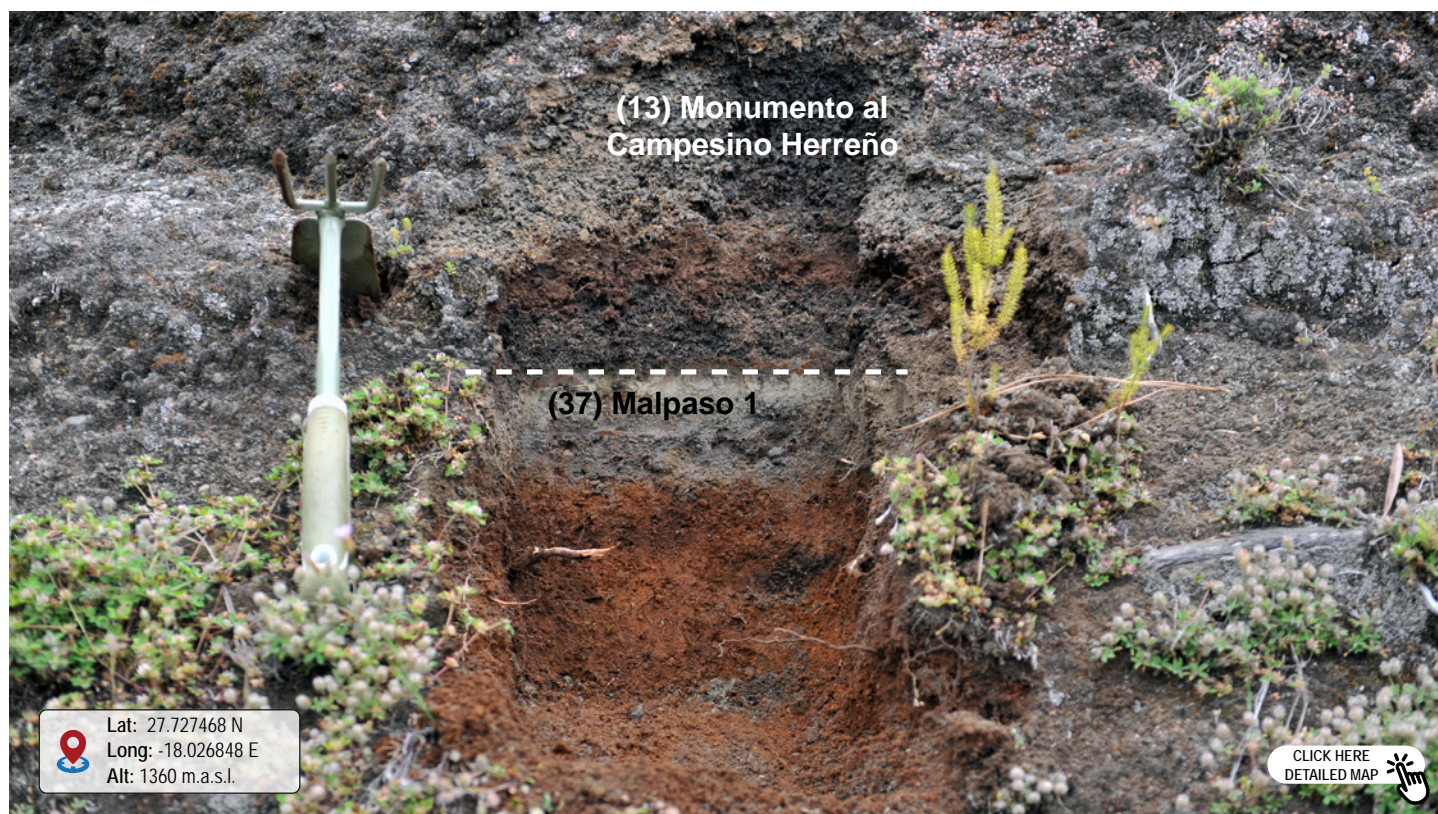


Photo P20. Pyroclastic fall deposits from the (13) Monumento al Campesino Herreño eruption covering the stratigraphic guide level of the white ash deposit from the (37) Malpaso 1 eruption. The contact between both pyroclastic deposits is indicated with a white dashed line.

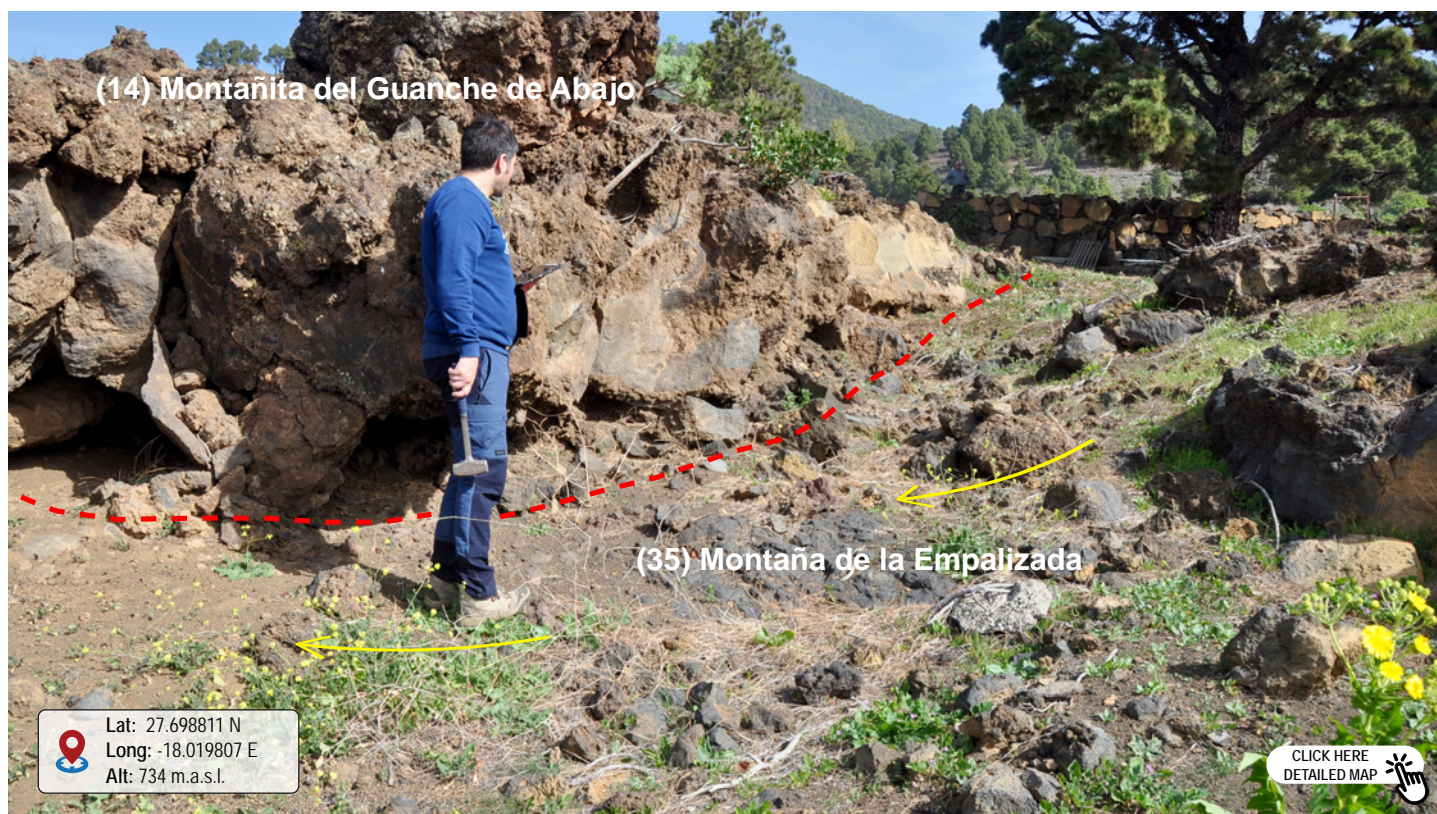


Photo P21. The lava front from the (14) Montañita del Guanche de Abajo eruption over previous lava flows from the (35) Montaña de la Empalizada eruption (yellow arrows). The red dashed line indicates the contact. The original scoriaceous roof of the lava flows from the (35) Montaña de la Empalizada eruption was partially eroded by alluvial processes.

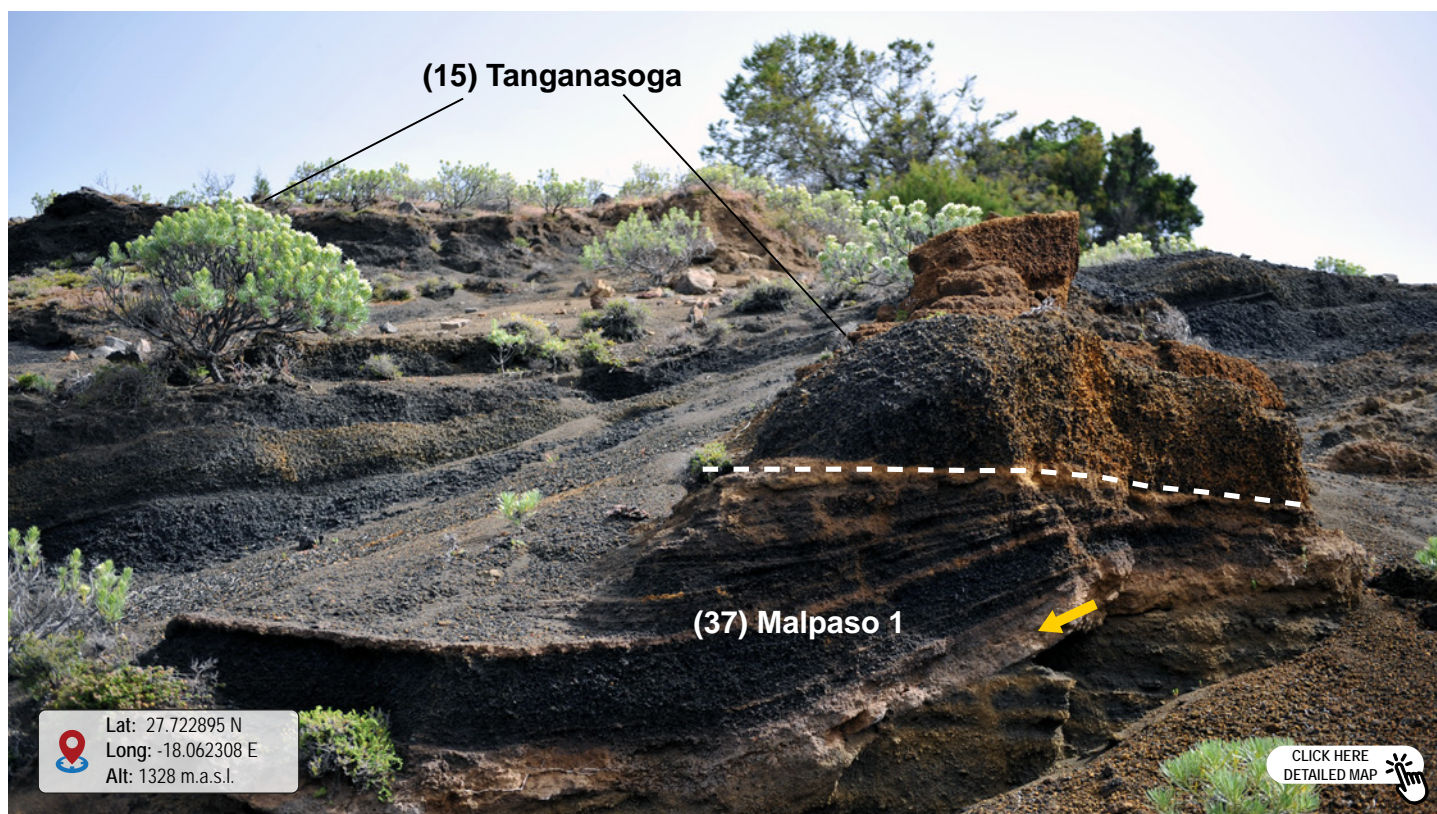


Photo P22. Pyroclastic fall deposits from the (15) Tanganasoga eruption overlapping the pyroclastic sequence from the (37) Malpaso 1 eruption (contact indicated by a white dashed line). The yellow arrow marks the location of the white ash tephra guide level belonging to the (37) Malpaso 1 eruption.



Photo P23. Strombolian pyroclastic fall deposits from the (15) Tanganasoga eruption over a whitish pumice level from the (39) Malpaso 2 eruption. The white dashed line marks the contact between both deposits.



Photo P24. Lateral edge of a 'a'ā lava flow from the (17) El Brezal eruption over the pyroclastic fall sequence of the (37) Malpaso 1 eruption (contact indicated by the white dashed line).



Photo P25. Pyroclastic fall deposits from the (19) Morro de las Sanjoras over the pyroclastic sequence of the (37) Malpaso 1 eruption. The yellow arrow marks the location of the white ash tephra guide level belonging to the (37) Malpaso 1 eruption (contact indicated by the white dashed line). A red ellipse surrounds a small shovel as a scale.

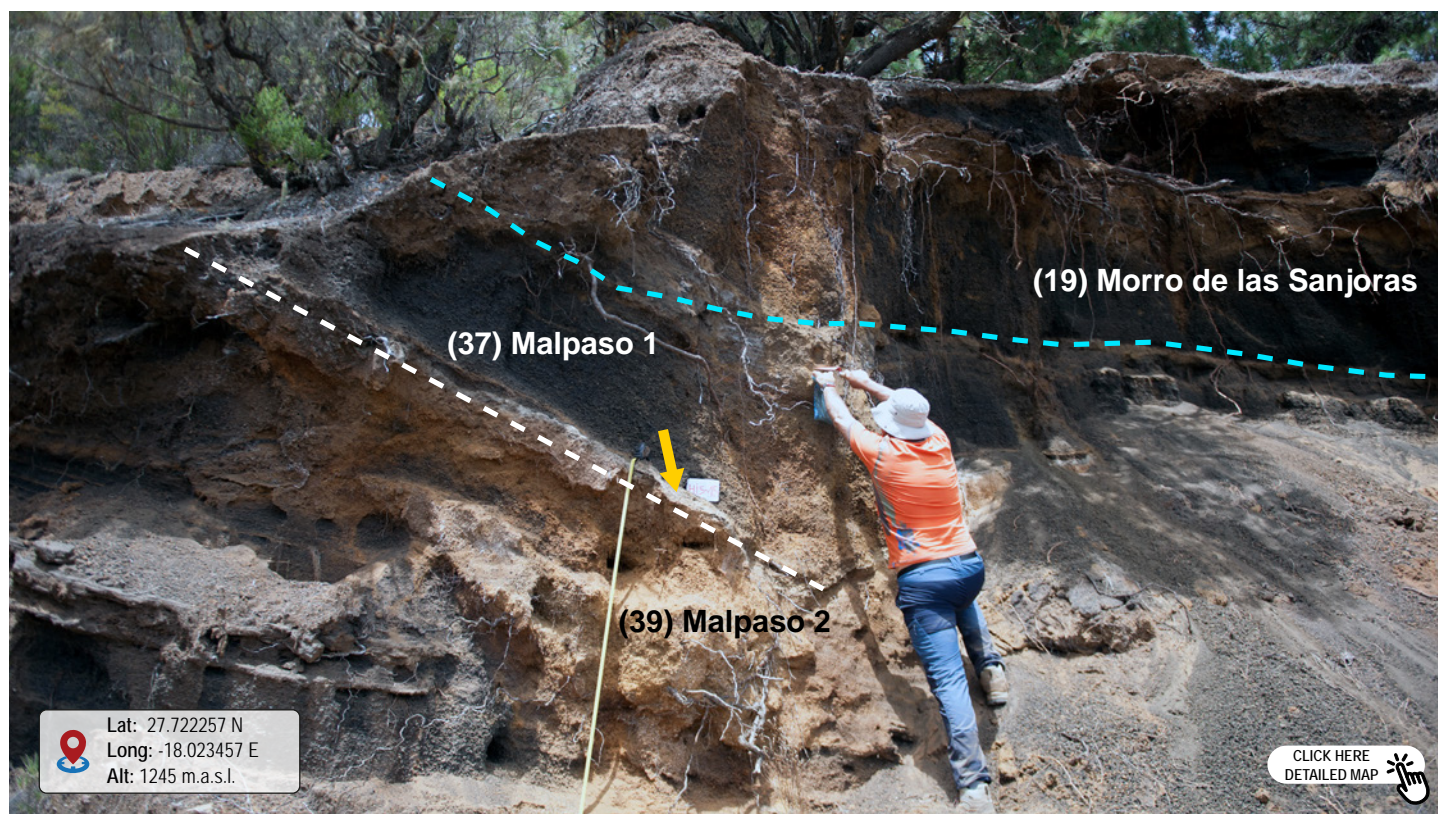


Photo P26. Stratigraphic sequence formed, from base to roof, by the pumice deposit from the (39) Malpaso 2 eruption, the pyroclastic deposits from the (37) Malpaso 1 eruption (a white dashed line marks the contact between both), and the pyroclastic fall deposits from the (19) Morro de las Sanjoras eruption (a dashed cyan line marks the contact between the latter). The location of the white ash tephra guide level, which is distinctive of the Malpaso 1 eruption, is indicated by a yellow arrow.

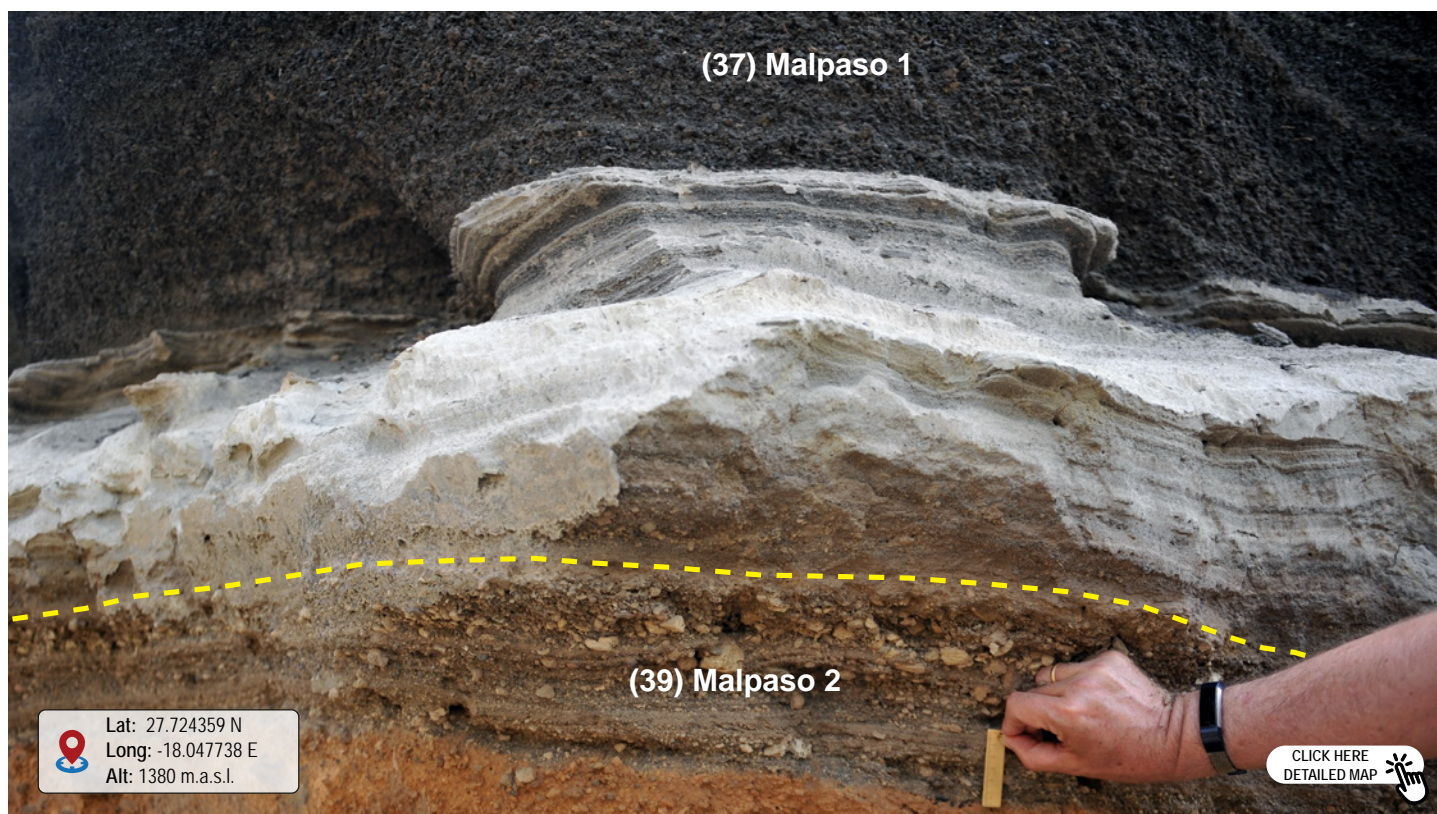


Photo P27. The pyroclastic sequence from the (37) Malpaso 1 eruption, with its white ash tephra guide level at the base, covered the whitish pumice deposit from the (39) Malpaso 2 eruption. The yellow dashed line marks the contact between both deposits.

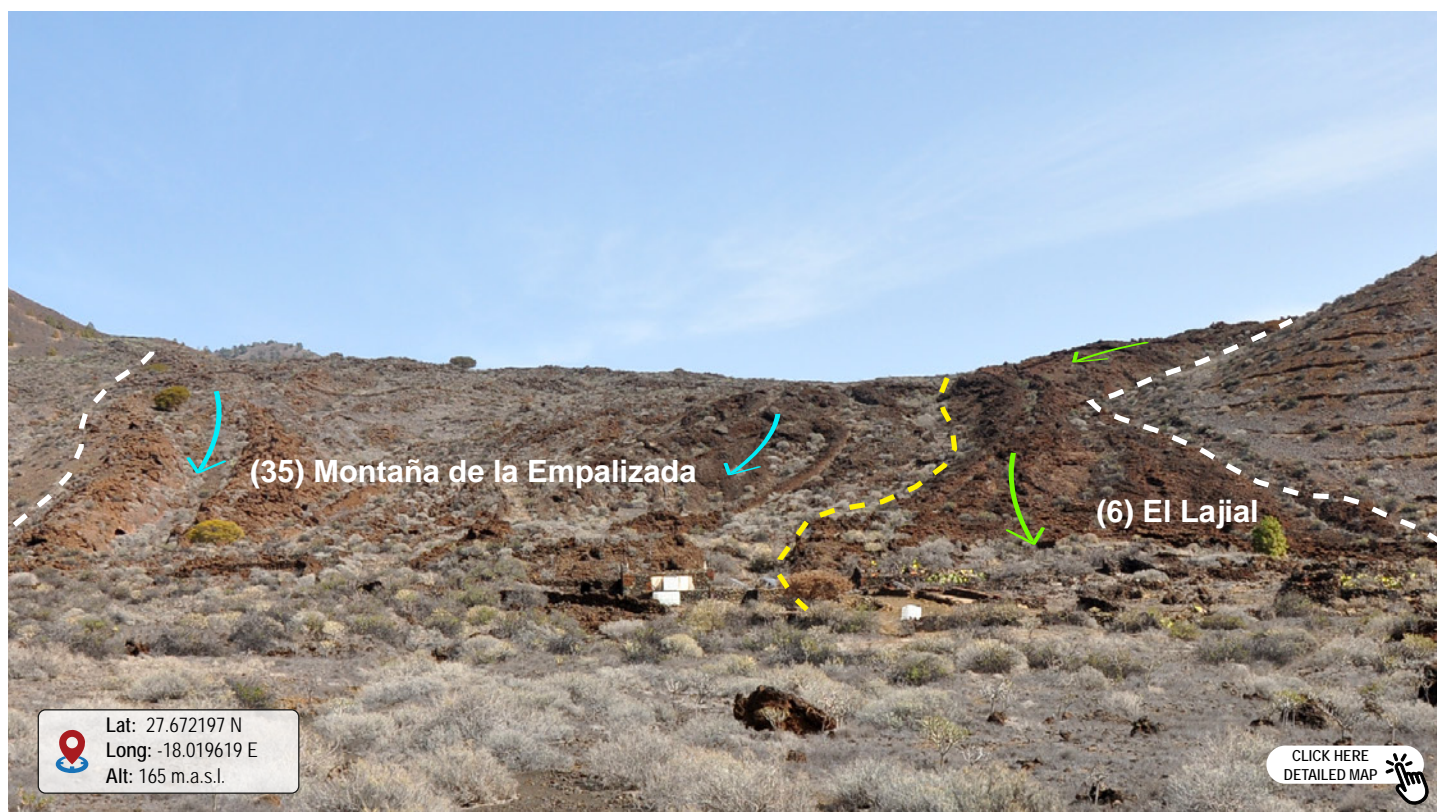


Photo P28. Contact between lava flows from the eruptions of (6) El Lajial and (35) Montaña de la Empalizada (yellow dashed line). Note how the (6) El Lajial lava flows (green arrows) overlapping the previous lava flows from the (35) Montaña de la Empalizada eruption (blue arrows). The white dashed lines mark the contact of both lava flows with pre-Holocene volcanic cones.

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