STRATIGRAPHY OF THE LOWER DIEGO HERNANDEZ CALDERA WALL

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INTRO

Objectives

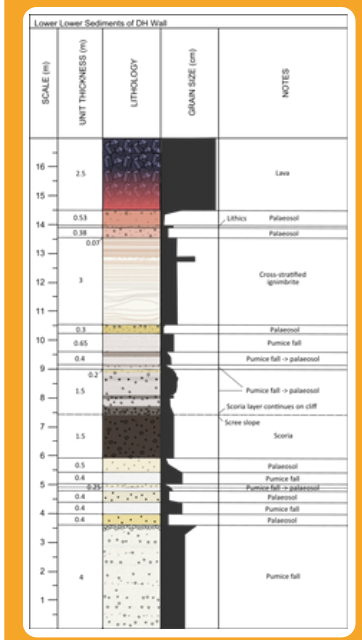
- Build a complete stratigraphic record of past eruptions on Tenerife
- Improve understanding of size and frequency of past eruptions

Geologic Context

- Tenerife is a geologically oceanic island formed >12 million years ago by hotspot volcanism
- Initially a basaltic shield volcano
- Followed by more evolved eruptions, forming Las Cañadas Caldera since ~1.7 million years
- Since 175 thousand years, Teide and Picio Viejo stratovolcanoes have grown, whilst basaltic eruptions persist on island flanks

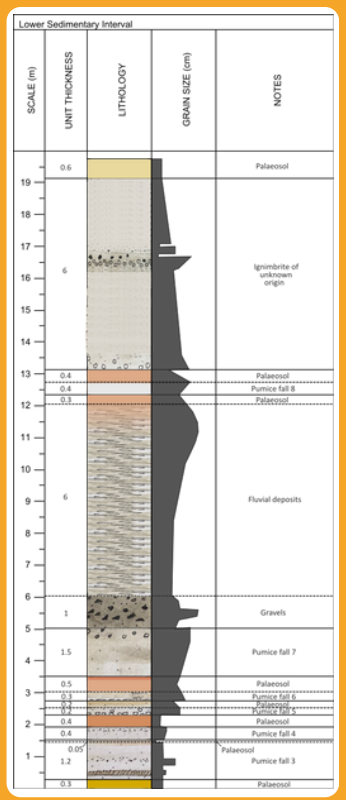
CALDERA WALL DESCRIPTION

BASAL SEDIMENTARY INTERVAL



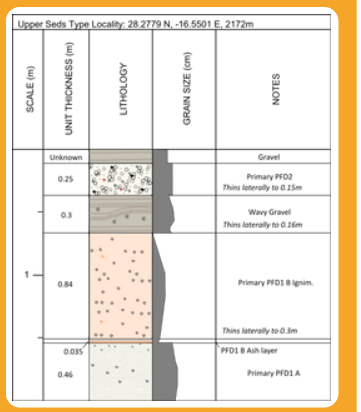
- *Older than Lower Sedimentary Interval, visible due to upward faulting in caldera wall*
- ***Eight previously unidentified PFDs** (Pumice Fall Deposits) **and one flow deposit***
- ***New discoveries extend into the suggested hiatus in volcanic activity** between the DH (Diego Hernandez) and Guajara groups (Cas et al. 2022 and references therein)*
- *Challenge: **any record of older PFDs within the caldera is likely buried by younger caldera fill material***

LOWER SEDIMENTARY INTERVAL



- *Older than Upper Sedimentary Interval*
- *Laterally untraceable due to DH sector wall structure*

UPPER SEDIMENTARY INTERVAL



- *Older than suspected Aldea formation above*
- *PFD1, PFD2, and the ignimbrite **do not appear to correlate to previous descriptions** below the Aldea formation by Edgar et al. (2007; Roque and Fortaleza members)*
- ***Deposits tend to pinch out** over short distances*
- *Difficult to correlate stratigraphy*
- ***Imply a more complex history of the caldera** than previously identified*
- ***Lateral discontinuity of the ignimbrite could be due to infilling of palaeotopography***

*We propose **two models** for **the offset in the DH sector wall structure**:*

- ***The Caldera subsidence model**: removal of less competent stratigraphy via subsidence or landslides led to offsetting of stratigraphy*
- ***The Dyke intrusion model**: caused by a late occurring magmatic dyke intrusion which upheaved the hanging wall stratigraphy*

KEY POINTS

- One new section of volcanic deposits discovered in caldera wall, with nine undocumented sub-plinian eruptions
  - Possibly during the activity hiatus between Guajara and DH
  - Explosive eruption activity occurring at higher frequency than previously thought
- Lateral discontinuity makes correlation difficult but implies complex history of caldera structure

REFS & QR CODE

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Full report:

Cas, R.A., Wolff, J.A., Martí, J., Olin, P.H., Edgar, C.J., Pittari, A. and Simmons, J.M., 2022. Tenerife, a complex end member of basaltic oceanic island volcanoes, with explosive polygenetic phonolitic calderas, and phonolitic-basaltic stratovolcanoes. *Earth-Science Reviews*, *230*, p.103990.

Edgar, C.J., Wolff, J.A., Olin, P.H., Nichols, H.J., Pittari, A., Cas, R.A.F., Reiners, P.W., Spell, T.L. and Martí, J., 2007. The late Quaternary Diego Hernandez Formation, Tenerife: Volcanology of a complex cycle of voluminous explosive phonolitic eruptions. *Journal of Volcanology and Geothermal Research*, *160*(1-2), pp.59-85.

LEGEND

- Basal Sedimentary Outcrop Location
- Lower Sedimentary Outcrop Location
- Upper Sedimentary Outcrop Location
- F — Fasnia Ignimbrite
- A — Aldea Ignimbrite
- S.C. — Scoria Cone
- Dyke