

This supplementary material accompanies the article:

Rodríguez, F., Coldwell, B., Martín-Lorenzo, A., Andronico, D., Bonadonna, C., Del Bello, E., Pistolesi, M., Taddeucci, J., Biass, S., Romero, J. E., Voloschina, M., Scarlato, P., Hernández, W., D'Auria, L. and Pérez, N. M. (2024) "Towards rapid integrated data acquisition and management during a volcanic crisis: the 2021 Tajogaite eruption of Cumbre Vieja (La Palma, Canary Islands)", *Volcanica*, 7(2), pp. 891–905. doi: 10.30909/vol.07.02.891905.

Rodríguez et al. (2024) should be cited if these data are used.

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Supplementary tables:

- Table S1: Detailed chronological correlation of AS2 samples with key stratigraphic units.
- Table S2: Correlation of AS2 samples with principal stratigraphy.

AS2 sample names	Tephra characteristics	Sample collection duration	Stratigraphic layer correlation	Date (2021)	Chronology notes
CAN_TLP_022	Elongated, shiny, fine to coarse lapilli	93.5 hrs	LU2 base	25–29 September	LU1 duration is 8±2 days
CAN_TLP_042	Coarse ash to lapilli	27.5 hrs	LU2	5–6 October	LU2 duration is 13±2 days
CAN_TLP_057	Ash to coarse ash	29 hrs	LU2 to LU3 transition	8–9 October	LU3 duration is 2±2 days
CAN_TLP_060	Coarse ash to lapilli	23.5 hrs		9–10 October	LU total duration 23±1 day
CAN_TLP_073	Fine to coarse black ash	24 hrs	LU to MU transition	10–12 October	
CAN_TLP_085	Black ash with red lithics	26 hrs	MU1 to MU2 transition	14–16 October	MU1 duration is 4±2 days
CAN_TLP_099 CAN_TLP_108 CAN_TLP_114 CAN_TLP_118 CAN_TLP_128 CAN_TLP_133	Scattered red lithics in all samples		MU2 guide horizon	13–20 October	Red marker horizon
CAN_TLP_167 CAN_TLP_168	Coarser than previous. Fine to coarse lapilli	46.5 hrs	MU5	27–29 October	MU2–5 transition to MU6 estimated 1–3 November
CAN_TLP_333	Very fine to fine ash	23 hrs	End of MU6	22–23 November	MU6 duration is 24±2 days
CAN_TLP_316 CAN_TLP_340	Ash to fine lapilli		Transition of MU to UU	25–27 November	MU total duration 46±2 days
CAN_TLP_347	Coarse ash to lapilli, very elongated	28.5 hrs	UU1	27–28 November	
CAN_TLP_381 CAN_TLP_388	Ash to fine lapilli	51.5 hrs	UU2	3–5 December	
CAN_TLP_434	Ash to coarse lapilli	24.5 hrs	UU2, top of unit	11–12 December	UU total duration 17 ±1 days

**SUPPLEMENTARY TABLE 1:** Summary chronological correlation of samples collected from INVOLCANs permanent ash collection station AS2 (beneath the dominant plume direction, position X: 28.60652, Y: -17.88285) to the stratigraphic units defined in Fig. 4. The unit boundary dates are by multi-institutional agreement, with uncertainty given here. Tephra sample names reflect those in INVOLCANs open access Litoteca (by request).





14 December 2022	2.2																			
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**SUPPLEMENTARY TABLE S2:** Correlation of samples collected from permanent ash station AS2 (location in Fig.1), to date and to stratigraphic units defined here. Best estimate, minimum and maximum duration for the layers is shown based by multi-institutional agreement. Sample code shown as TLP\_XXX, which is abbreviation of CAN\_TLP\_XXX. \*Average height of tephra plumes as reported in the PEVOLCA reports (<https://www.gobiernodecanarias.org/infvolcanlapalma/pevolca/>).