

Supplementary Material

Mantle structure beneath the Macaronesian volcanic islands (Cape Verde, Canarys, Madeira and Azores): a review and future directions

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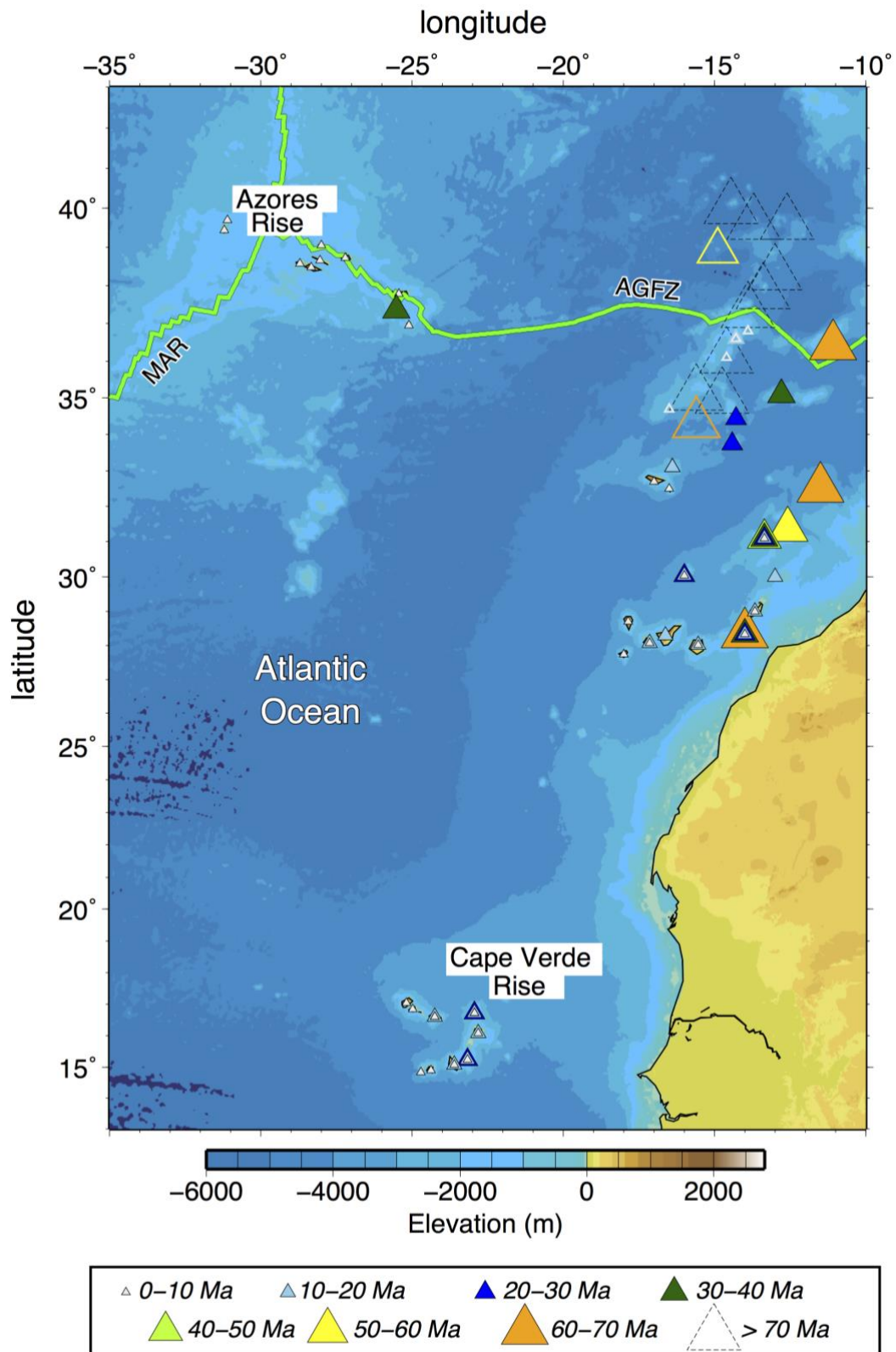


Figure S1. Distribution of the volcanic activity in the Macaronesian volcanic archipelagos. Triangles of different sizes and colors show the locations and ages (from Cretaceous to present) of basaltic volcanism. The compilation is taken from Holm et al. (2008), Piromallo et al. (2008), Samrock et al. (2019), Carracedo and Troll (2021) and Civiero et al. (2021). The Monaco Bank parallel to the MAR,

which is dated 39 Ma old from a single volcanic sample (Beier et al., 2015) is probably an old, off-axis eruptive feature not directly related to the Azores melting anomaly or rifting. The empty triangles in the Madeira Province mark the Madeira-Tore Rise volcanism, which is not discussed in this work.

Geophysical method/Study region	Cape Verde	Canaries	Madeira	Azores
Seismic tomography	LVA (100-200 km in diameter) in the upper mantle (Lodhia et al., 2018; Carvalho et al., 2019; Liu and Zhao, 2021)	LVA (150-200 km in diameter) in the upper mantle (Hoernle et al., 1995; Civiero et al., 2019; Celli et al., 2020)	LVA (100 km in diameter) in the shallow asthenosphere (Bonnin et al., 2014; Civiero, 2019)	LVA (200-500 km in diameter) in the asthenosphere (Montagner and Ritsema, 2001; Pilidou et al., 2004; Silveira et al., 2006; Yang et al., 2006)
SKS splitting/differential travel times	Non-radial pattern of anisotropy (Lodge and Helffrich, 2006)	Heterogeneous pattern of anisotropy (Schlaphorst et al., 2022)	Heterogeneous pattern of anisotropy (Schlaphorst et al., 2022)	No anisotropy (Kuo and Forsyth, 1992; Silveira et al., 2010)
Receiver functions/seismic precursors	Average MTZ thickness (Deuss, 2007; Helffrich et al., 2010); thinned MTZ (Gu et al., 2009; Vinnik et al., 2012; Saki et al., 2015)	Thinned MTZ (Deuss, 2007; Martinez-Arevalo et al., 2013; Saki et al., 2015)	Average MTZ thickness or slightly thinned MTZ (only global studies; Houser et al., 2008; Lawrence and Shearer, 2008; Deuss, 2009)	Average MTZ thickness (Li et al., 2003; Silveira et al., 2010)
Geodynamic mechanisms proposed	1) mantle plume; 2) edge-driven convection	1) mantle plume; 2) edge-driven convection; 3) tectonic-type processes; combination of 1) and 2); 4) combination of 1) and 3)	1) mantle plume detached from the MTZ	1) mantle plume; 2) tectonic-type processes; 3) mantle plume-ridge interaction

Table T1. Summary of the geophysical observations for each archipelago of the Macaronesia region and the proposed geodynamic mechanisms. MTZ: mantle transition zone; LVA: low-velocity anomaly.

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