

The >3700 km long Great Dyke of Atla Regio (GDAR), Venus: Longest continuously traced individual mafic dyke in the Solar System

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The Great Dyke of Atla Regio (GDAR) is traced for >3700 km on Venus, as surface graben interpreted to overlie a continuous, laterally-emplaced underlying mafic dyke (vertical magma-filled crack) [1]. The GDAR is part of a giant radiating graben/fissure/fracture system (dyke swarm) associated with the Ozza Mons volcano of the Atla Regio Superplume [2]. Based on our criteria for recognition and interpretation of dyke swarms on Venus, we suggest that the GDAR is the longest individually traced dyke so far recognized on Venus (and also in the Solar System). The GDAR is traced from an interpreted magma reservoir located ~600 km south of the Ozza Mons plume centre, which may have been fed initially from closer to the plume centre. A 50-degree counter-clockwise swing of the GDAR trend at 1200 km from the plume centre is consistent with 1200 km radius for the underlying Ozza Mons mantle plume head, and a stress link to the 10,000 km long Parga Chasmata rift system. Our discovery of the >3700 km long Great Dyke of Atla Regio, should spur the search for additional long continuous single dykes on Venus (and Earth), with implications for estimating plume head size, locating buffered magma reservoirs, mapping regional stress variation across large regions of Venus (and Earth) at a geological instant, and representing time markers that reveal relative ages (through cross-cutting relationships) over regional-scale distances.

References: [1] El Bilali, H., Ernst, R. E. (2024) *Nat. Commun.*, 15, 1759.

[2] El Bilali, H., Ernst, R.E., Buchan, K.L., Head, J.W. (2023) *Commun. Earth Environ.*, 4, 235.