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Mapping the Dyke Swarms of the Eastern Desert, Egypt

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The Eastern Desert of Egypt hosts numerous undeformed to slightly deformed mafic dyke swarms which have previously been poorly characterized. Systematic use of full resolution Google Earth™ images yields an initial map of the dyke swarms. The dykes occur in sub-parallel sets of a variety of trends (N-, NE-, E- and NNW-) which are inferred to represent separate swarms of likely distinct ages. The largest swarms are up to 60 km long and 20 km wide. Four swarms are identified. The thickness of individual dykes ranges from 3 to 70 m, but there is tendency for each swarm to have a characteristic thickness. For instance, dykes of the NE- trending swarm tend to have thicknesses of ~7 to 50 m. Age constraints on some swarms are available from crosscutting relationship with host rocks of known ages. Isotope geochronology of the Eastern Desert swarms is scarce, but from crosscutting relationships and field observations the following swarm

ages are inferred: N-trending swarm (assumed to be younger than 660 Ma), NE- trending dykes (Rb—Sr age of ~590 Ma), E- trending dykes, and NNW- dykes (c. 25 Ma). The latter is assumed to coincide with the Red Sea opening (~25 Ma), which was originated as an Oligocene continental rift impacted by left-lateral wrenching. Limited geochemistry is available for the swarms, and broadly indicates tholeiitic to calc alkaline compositions. Similar to the country basement rocks, these dyke swarms show a progressive younging to the north. These swarms are at least in part complementary to mantle delamination events, and four regional extensional to transtensional tectonic regimes in the Late Neoproterozoic, that terminated in the Oligocene. The largest swarm (NE-trending) may belong to igneous activities related to the Najd Fault System, while the youngest swarm (NNW-trending) is linked to Cenozoic rift tectonics.

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