

OUTLINES OF THE MAFIC DYKE SWARM FROM LADIK AREA, NW KONYA/TURKEY

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ABSTRACT

The dyke swarm occurs in Ladik area, Central Turkey, exhibiting spectacular cross-cutting field relationships between its different generations. The metadolerit and metahornblend gabro dyke swarms intruded into Silurian-lower Carboniferous reefal complex metacarbonates, which was low-grade metamorphosed limestone, dolomitic limestone and dolomite, with metachert band and lenses. A Google Earth Image is used to establish the relative emplacement of dyke swarms while image analyses used by Klonk software to reveal the length and thickness of the dykes.

It has been determined existence of two set of mafic dyke swarms; trending in (i) ~E-W and (ii) ~N-S directions. Maximum length and thickness of the dykes are calculated to be 3078 m (i), and 73.11 m, respectively while the maximum length of fault can be traced as 743 m in the area. Cross-cutting field relations on the map suggest that majority of the E-W trending dyke swarms appears to be older than the N-S trending ones.

Keywords: Dike swarm, mafic, Ladik, Konya

INTRODUCTION

The study area is situated in Central Turkey, NW Konya, and the Afyon-Bolkardagi Zone [1] Kütahya–Bolkardağ belt [2] or Afyon zone [3], which is a thrust slice extending from western Anatolia to central Anatolia, with more than 600 km length (Figure 1a) .

Mafic dyke swarms are vertical dyke swarms in the similar orientation, representing the system of pre-formed stretched crustal fracture swarms in which the mafic magma is located [4] [5]. The dyke swarms also represent spreading structures and are commonly found on earth cratons (eg Canadian Shield, North China craton). In the study area, mafic dyke swarms were intruded into metacarbonates, and exhibit spectacular cross-cutting field relationships in the field. Google Earth Images and an image processing software (KLONK) are used to determine the length and thickness of the dykes and faults, and to establish the relative emplacement of dyke swarms.

GEOLOGICAL SETTING

Palaeozoic-Mesozoic metasedimentary and metaigneous rocks are exposed in northwest of Konya. The oldest formation exposed is the Silurian-Lower Permian (Sizma Group) rocks; the lower part of which is the middle Devonian and Early Carboniferous Bozdağ Formation (Figure 1b, Figure 2), which represents a reefal complex including low-grade metamorphosed limestone, dolomitic limestone and dolomite, with metachert and beds and chert lenses. It has also barite lenses and bands, with thickness of 10-40 cm. The Bozdağ Formation shows transition vertically and laterally

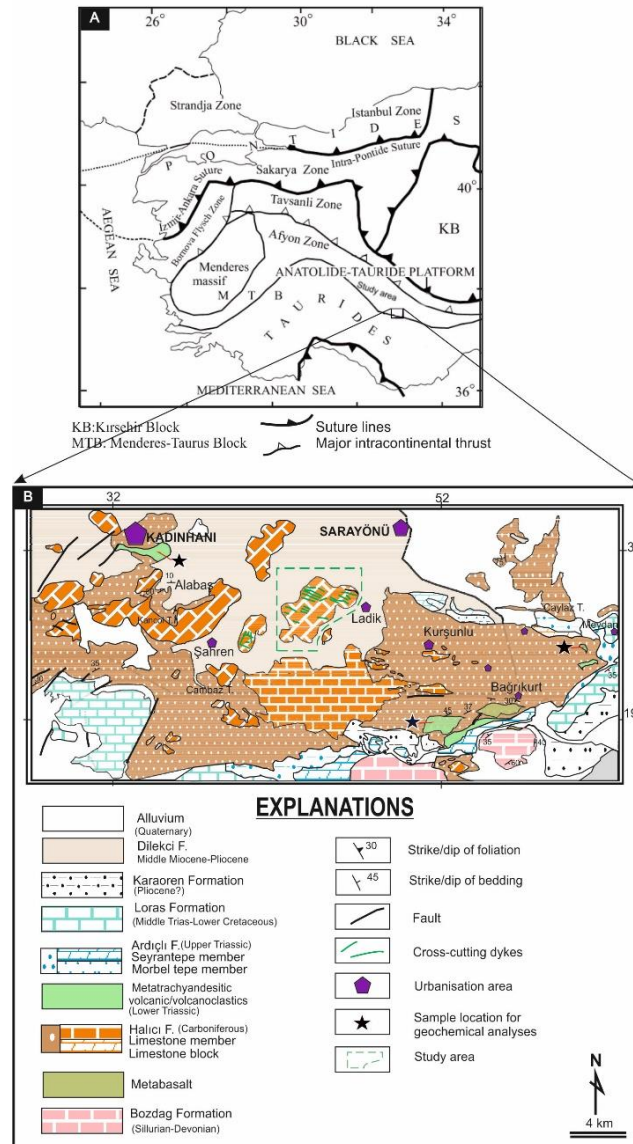


Figure 1. a) The location [6] and b) the geologic map of the study area, [7] [8].

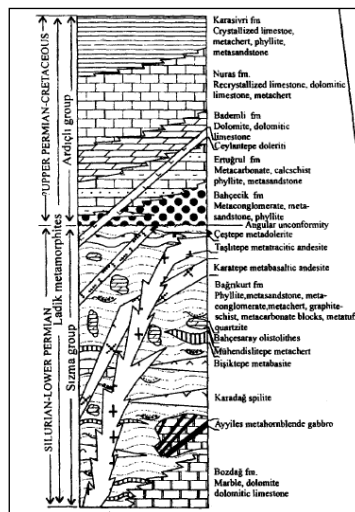


Figure 2. Generalized stratigraphic column of the area [9]

to Devonian-Lower Permian Bağrıkurt formation, which typically shows alternations of contains phyllite, graphite schist, metasandstone, metaconglomerate, and metachert layer, with some metacarbonate blocks as appearance of a wild-flysch. All these units were intruded by Kadinhani metamagmatic rocks including metagabbro, metadiabase, spilite and basaltic andesite [10] [11]. The transgressive Sizma Group unconformably overlain by the ?Upper Permian-Mesozoic continental metaclastics Ardiçlı Group, and undergone at least four phases of deformation by the Alpine orogeny [11]

The dyke has light-dark green colour, and mostly metadiabase in composition. In the field, it is generally covered by its alteration products with dark colour and plants, which makes difficult to get fresh samples, but let us recognize, particularly on a Google Map (Figure 3). Fresh samples is usually found in quarries and road-cuttings, in where it shows more or less developed foliation. The subvertical mafic dyke swarm was intruded into the metacarbonates of Bozdag formation, and has grain size decreasing towards its contact with host metacarbonates.

A “Google Earth” image with large scale of the study area was captured to trace the mafic dyke swarms and cutting faults by Corel Photo Paint. The linear structures in the field were measured accurately after being drawn with the help of the image processing technique (KLONK), (Figure 3). It has been determined the existence of two set dyke swarms in the area; (i) The dyke swarm with ~E-W (mostly WNW-EES, rarely WWS-EEN) usual trend has length and thickness, up to 3078 m and 73.11 m, respectively. (ii) ~N-S (mostly NE-SW, minor NNW-SSE) trending dyke swarm is relatively less traceable and smaller in length and thickness than the first group one. It has maximum length of 834 m and thickness of 21 m. Cross-cutting field relations on the map suggest that majority of the E-W trending dyke swarms appears to be older than the N-S trending ones. The faults with NE-SW general trend, have length usually <100m, however it can be traced as long as 743 m.

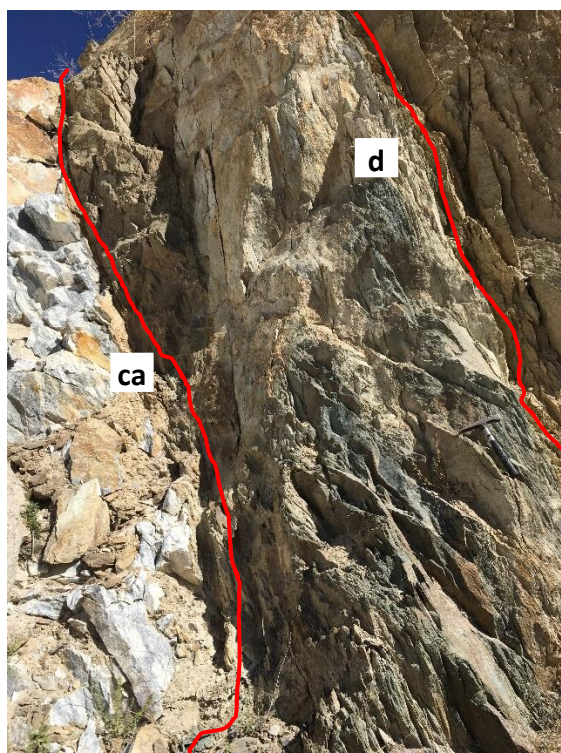


Figure 3. Subvertical mafic dyke (d) intruded into the metacarbonate (ca) of Bozdag formation. Hammer is scale.

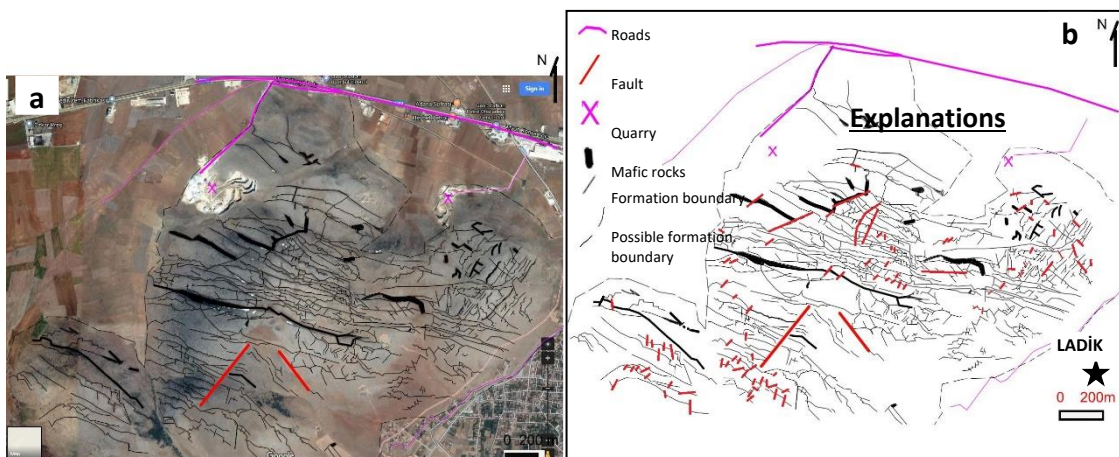


Figure 3: a) A “Google Earth” image of the study area.
b) A map showing dyke swarms and faults in the area.

CONCLUSIONS

Silurian-lower Carboniferous metacarbonates were intruded by two set of mafic dyke swarms, trending in (i) ~E-W and (ii) ~N-S directions. It has been determined by image processing software (KLONK) on Google Earth Images that maximum length and thickness of the dykes are 3078 m (i), and 73.11 m, respectively. Cross-cutting field relations on the map indicate that majority of the ~E-W trending dyke swarms are older than the ~N-S trending ones.

Acknowledgements

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