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THE AGE OF THE LATEST PRECAMBRIAN VOLCANISM IN SOUTHERN ISRAEL, NORTHEASTERN SINAI AND SOUTHWESTERN JORDAN – A RE-EVALUATION

AMIT SEGEV

Geological Survey of Israel, Jerusalem (Israel)

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Abstract

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By regrouping late Precambrian volcanic rocks, originally dated by Bielski in southern Israel and northeastern Sinai, and by Lenz et al. in southwestern Jordan, to individual sites, better Rb–Sr isochron ages, namely 535 ± 15 Ma to 523 ± 9 Ma, are obtained for the alkaline rhyolitic association. These are interpreted as the age of the volcanism, which is typified by significant high initial $^{87}Sr/^{86}Sr$ ratios of 0.7099 ± 0.0013 to 0.7132 ± 0.0032, which were probably caused by contamination with crustal material. The nearby rhyodacitic association yields an error-chron date of 548 ± 4 to 633 ± 14 Ma with a low initial ratio of $< 0.7035 \pm 0.0003$. This estimated age points to an older volcanic eruption.

Onlapping of the Lower Cambrian Timna Formation on the alkaline rhyolitic association rocks indicates 523 ± 9 Ma as the upper age limit for the Lower Cambrian section at the northern part of the Arabian-Nubian Massif.

Introduction

Late Precambrian volcanic rocks crop out in Har Amram, Hare Neshef, Nahal Shelomo and Wadi Tweibe (Fig. 1) in southern Israel and northeastern Sinai (Bentor, 1961; Garfunkel, 1970; Agron, 1977; Garfunkel, 1980; Agron and Bentor, 1981) and in much larger areas in southwestern Jordan (Lenz et al., 1972; Bender, 1974; Burgath et al., 1984). Bentor (1961) and others classified these different volcanic rocks, conglomerates and shallow magmatic intrusions such as quartz porphyries, rhyolites, ignimbrites and dacites in the 'Volcano-Conglomerate Complex' (Elat Volcanics). Bentor (1985) summarized the crustal evolution of the Arabo-Nubian Massif and related the alkaline volcanism to the alkaline batholithic phase IV, the Katharina Superprovince, which occurred during the last 30–50 Ma of the Precambrian.

The Lower Cambrian Amudei Shelomo and Timna formations and part of the Middle(?) Cambrian Shehoret Formation unconformably onlap, in places, a high paleorelief, comprised mainly of these alkaline volcanic rocks (Segev, 1984, 1986) while in other places the unconformity is rather flat (peneplain).

These relations have implications for the upper age limit of the Lower Cambrian section in this region and, in the light of the poor fit of the Rb–Sr isochrons as measured and interpreted by Bielski (1982a) and Lenz et al.

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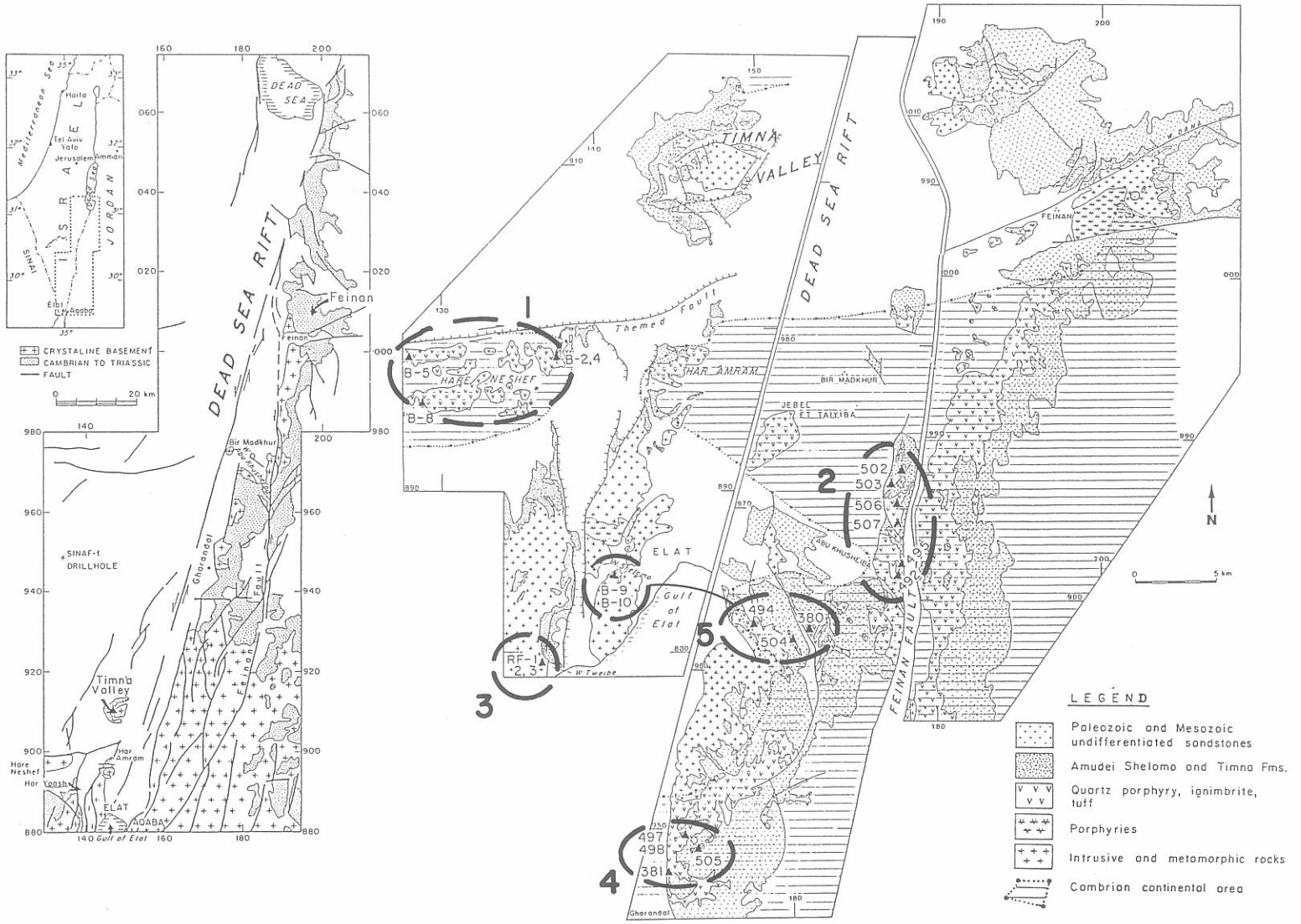

Fig. 1. Location map.
Fig. 2. Location of sample sites on the palaeogeographical map of the marine Cambrian (after Segev, 1984).