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U-Pb SHRIMP dating of detrital zircons from Paleozoic and Mesozoic sandstone in Israel and Jordan

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Widespread sandstone sequences were deposited over North Africa and Arabia during the Paleozoic - Mesozoic time. The sedimentation began in the aftermath of Neoproterozoic Pan African orogeny and the amalgamation of Gondwana. This rock sequence forms a relatively thin sheet (0.5-4 km thick) composed of sedimentary material that was transported and deposited over a huge area. The sense of transport indicates that the great volume of detrital quartz issued from the unroofing of Gondwana terranes south of the sandstone outcrops but the exact provenance is not known.

In the present study U-Pb SHRIMP ages were measured on detrital zircons from Cambrian –Ordovician sandstone in Israel and Jordan, and from Cretaceous sandstone in southern Israel.

The Cambrian-Ordovician section contains an important contribution of individual zircons that yield concordant $^{206}Pb/^{238}U$ ages between 530-900 Ma (Pan-African ages). The majority of the zircons fall in the 550-650 Ma. The analyses also revealed the presence of a moderate proportion of pre-Pan-African zircons grouped at: 0.95-1.1, 1.8-1.9 and 2.65-2.7 Ga. The lowest units in Israel and Jordan are dominated by pebbly sub-arkoses and around 80% of theirs zircon population yield Pan-African ages. It is concluded that their zircon age distribution represents the composition of the ANS at the drainage basin from which the detrital material was derived. Upward in the section the proportions of pre Pan-African age zircons increase (up to 35%) indicating contribution from a more southern distal provenance. The results show that the main source areas changed with time: at the beginning of the deposition period the main

sources were Late Neoproterozoic Pan-African rocks, most probably from the ANS. The overlying sedimentary units contain a greater contribution from a source farther to the south.

The lower Cretaceous sandstone are dominated by late Neoproterozoic detrital zircons with additional age groups defined at 1-1.1 Ga, 1.8-2.0 Ga, and $\sim$2.6 Ga. The overall detrital zircon age pattern resembles that previously obtained for the Cambrian-Ordovician succession, indicating common source rocks. However the petrographic study of the lower Cretaceous sandstone reveals abundant indications that they are (at least) second cycle sediments. The main provenance of the Cretaceous sequence is therefore the recycling of the great Early Paleozoic quartz sandstone of north Gondwana.

Since the lower Cretaceous sandstones of the near East are a product of recycling of earlier Paleozoic sandstone, and since the lower Paleozoic derived from the Arabian-Nubian shield, the entire sandstone volume (Paleozoic-Mesozoic) in North Africa and Arabia represents basement denudation close to the cessation of Pan-African orogeny. Since then, the ensuing siliciclastics were repeatedly recycled throughout the Phanerozoic with little if any additional basement contribution.