Braided river model and associated facies of lower Cambrian age in South Jordan

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Abstract - The lower Cambrian Salib Arkosic Sandstone Formation exposed in south Jordan is a 65 m-thick braided fluvial arkosic sand body with a basal conglomerate. The succession comprises five major, vertically-stacked fining-upward sequences, each sequence comprising an erosively based, pebbly, coarse-grained, trough cross-beded sandstone, grading up through fine-grained sandstone into silty-shale. Sandstone deposits are dominated by varying scales of cross-beded sets, with a unidirectional northwesterly palaeocurrent mode. Cross-bed thickness decreases systematically from the base to the top of each sequence, concomitant with a decrease in channel size and grain size. Cross-bed foresets show abundant conspicuous deformation and overturning. Deposition occurred on an unconfined braided plain, due to periodic shifting of the active part of the braided river system. The braided plain sloped NW away from the Arabian-Nubian Shield, located in the south and east of Jordan. The braided river system drained into the southern margins of the Tethys Sea. A transgressive event was recorded at the end of Salib times, as evidenced by the presence of Skolithos at the topmost part of the succession.

Key words: Jordan, Cambrian, Salib, braided rivers, Tethys

INTRODUCTION

The sand-dominated Salib Arkosic Sandstone Formation in the southern desert of Jordan (Fig. 1) is the lowermost formation of the continental Cambrian/Ordovician Ram Group that rests non-conformably on Precambrian granitoid basement (Aqaba Complex).

It is the first sedimentary stratum overlying the Aqaba Complex of the Granitoid Basement in the southern desert, and the volcanic Araba Complex, Saramuj Conglomerate, Umm Ghaddah and Haiyala Volcaniclastic Formations northwards in Wadi Araba (Table 1) (Bender, 1974; Selley, 1972; Powell, 1989; Amireh and Abed, 2000; McCourt and Ibrahim, 1990). These rocks are arkosic, cross-beded, pebbly, tabular yellowish brown sandstones. They are well bedded and exhibit a step-like weathering morphology (Abdelhamid, 1990; Powell, 1989).

The name which is derived from Qa Umm Salib near Quweira village in the southern desert of Jordan, was first given by Lloyd (1969). It is synonymous with the Bedded Arkose Sandstone of Bender (1974), the Lower Quweira Series (Quennell, 1951; Burdon, 1959), the Quweira Sandstone and Conglomerate (Wetzel and Morton, 1959), Powell (1989) formally defined the Salib Arkosic Sandstone Formation.

The formation and group names used in this paper are those adopted by the Natural Resources Authority, Geological Mapping Division (El-Hiyari, 1985; Powell, 1989). In the southern desert of Jordan, the Salib Arkosic Sandstone Formation (SB) is the lowermost formation of the Ram Sandstone Group, and is conformably overlain by the brown coloured, thick bedded, cavernous weathered late middle Cambrian Umm Ishrin Sandstone Formation (Table 1).

The formation ranges in thickness from about 20 m in the southeastern parts of Jordan to about 65 m in the vicinity of Qa Umm Salib (Abdelhamid, 1990). Northwards it locally overlies the volcanic (Araba Complex), where it reaches up to 200 m thick to the north of Feinan in