9 Ancient placer gold deposits
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9.1 Introduction

In this chapter, ancient placers refer to deposits of Archaean and early Proterozoic age. Because each deposit may cover hundreds of square kilometres, they present economically attractive exploration targets. Individual ancient placer deposits like the Steyn/Basal placer in the Welkom goldfield of South Africa have produced in excess of 4500 t (metric tons) of gold from heavy mineral concentrates distributed over a palaeosurface area of 170 km$^2$ (Minter et al., 1986). This amounts to about 26 t of gold/km$^2$. Another important deposit, the Vaal placer, which lies in the adjacent Klerksdorp goldfield, extracts about 32 t of gold/km$^2$. Production figures from the well-known Witwatersrand Supergroup placers illustrate their productivity relative to other types of gold deposits (Figure 9.1).

![Figure 9.1](image)

Figure 9.1 Histogram illustrating: (A) the annual amount of ancient placer ore mined from the Witwatersrand Supergroup during the past ten years in metric tons; (B) the number of metric tons of gold produced annually from this ore compared with total gold production in the western world.

Although the ancient Witwatersrand Supergroup placers are the best-known examples in this class of gold deposit, they are not unique. Elsewhere on the Kaapvaal Craton, the Pongola, Dominion, Ventersdorp and Transvaal Supergroups also contain placer deposits that have been identified and mined. They range in age from 3.0 to 2.3 Ga. Other areas in Gondwana that had cratonized prior to 2.0 Ga also contain ancient placers. For instance, the shield that extended from Central Africa across to Brazil, in the 150 Ma reconstruction of Gondwana (Figure 9.2), encompassed the São Francisco
Craton on which the Jacobina and Moeda placers, dated at about 2.6 Ga, are located. These, and the Tarkwa placers on the West African Craton in Ghana, dated at 2.0 Ga, have all had a long history of exploration.

Figure 9.2 Distribution of some of Gondwana’s crustal domains which had cratonized by about 2.0 Ga. The boundaries of these cratonic regions are schematic, in that they may have been subsequently tectonothermally overprinted. Other, smaller cratonic areas of this age are omitted. The distribution of these cratons in this Gondwana framework (at about 150 Ma) does not necessarily imply that this was their relative geographic distribution at 2.0 Ga. Placer localities: T – Tarkwa, R – Roraima, J – Jacobina, M – Moeda, W – Witwatersrand, P – Pongola. (After de Wit et al., 1988.)

9.2 Geological setting

9.2.1 Pongola

The Pongola Supergroup, which outcrops south of Mbabane in Swaziland (Figure 9.3(a)) and to the north and south of Vryheid in Natal (South Africa), developed on a stabilized basement between 3.1 and 2.9 Ga. Evidence of palaeosols preserved on granitic bedrock (Button and Tyler, 1981) and a thick basal unit of fluvial sandstones and conglomerates indicate a continental environment. Altered Nsuze volcanics of uncertain magma type, but with tholeiitic affinities, dominate the lower part of the 5000-m sequence. They have a bimodal silica content, contain pillow lavas, and are associated with some of the oldest known shelf stromatolites. They are believed to have erupted in a volcanic arc setting (Tankard, 1982).

Pongola Supergroup placer deposits occur on an unconformity at the base of the Mozaan Group where they are associated with oligomict conglomerates in a fluvial sequence that is up to 90 m thick. Overlying this are intertidal and subtidal sandstones