Supplementary online material 1

Previous geographical and archaeological open-air research in the Southeastern Coastal Hinterland of KwaZulu-Natal

Research on the formation of Quaternary sediments and dongas in the area has been performed since Watson et al.'s (1984) paleoenvironmental interpretation of colluvial sediments and paleosols, an extension of studies by Price-Williams et al. (1982) in Eswatini. They recorded sediments associated with the Late Pleistocene Hypothermal (LPH, 30-12 ka) and reconstructed semi-arid conditions prevailing in the LGM in eastern southern Africa, at sites such as Nolonka, Rorke's Drift, Isandhlwana, Sikhunyana, Hlomohlomo and Zimbutu in KZN. During the 1990s, Quaternary sediments of northern KZN came into focus at sites such as Hazeldene, Jojosi, Masotcheni, Matatana, Nquthu, St Paul's, the Aloes, and Voordrag. With the help of dating methods such as radiocarbon dating, optically and thermally stimulated luminescence, and the correlation of buried palaeosol stratigraphy between these sites, it was possible to create a regional timeframe and characterise the known temporal extent of palaeo-gully cut-and-fill (Botha et al.1994) and colluviation (Wintle et al. 1995) processes during the entire Late Pleistocene and Holocene. Previous scientific documentation of Quaternary sediments provides a regionally correlatable stratigraphic reference framework supported by several geochronological techniques. Geomorphological mechanistic models have been proposed for the sedimentary and pedogenetic development at selected sites. At the regional scale, the impact of many potential driving factors and the synchronicity of processes remains debated.

The donga near St Paul's Mission is particularly noteworthy as it exposes the complete succession of the Masotcheni Formation stratigraphic units and with the succession being described as reference stratotype site (Botha & Fedoroff 1995). At the unique Voordrag locality, Botha et al. (1992) studied the palynology and stable isotopes of paleosols and observed vegetation changes during the LPH consistent with earlier work by Price-Williams et al. (1982). Clarke et al. (2003) further investigated the differentiated accumulation of colluvia and formation of paleosols under hydromorphic conditions. At this site they described the hydroclimate as the dominant land surface process factor, and the erosion of soil mantles on upper slopes with transport of sandy colluvial sediments onto the bedrock step below during arid phases, while the paleosols formed under humid conditions. Colarossi et al. (2020) note however, that the results from Clarke et al. (2003) underestimate the age, due to fading, and that some of the previously presented radiocarbon ages are also giving too young ages. Botha (1996) compiled the most comprehensive description of the Quaternary sediments in northern KZN and contains references to additional sites like Dinganstaad, Mkhondvo Valley, Matatana, Menteith, Nsekweni and Zungwini in areas marginal to the most densely gully-eroded region. In the Okhombe River valley below the Great Escarpment towards the west, Temme et al. (2008) applied Optically Stimulated Luminescence (OSL) dating to describe 11 phases of sediment deposition and used this information to simulate past landscape development with a computational Landscape Evolution Model (Temme et al. 2009). Recent (Sonneveld et al. 2009) and future (Temme et al. 2009) landscape dynamics were also investigated at this site. In the upper Blood River catchment, Lyons et

al. (2013) studied the colluvial and donga erosion dynamics from before 22 ka until modern times, with interesting insights on erosion episodes associated with natural and anthropogenic influences in historical time frames. In the upper Mkomazi river catchment, Bosino et al. (2021) correlated multiple outcrops with the sediments exposed at the donga of KwaThunzi. Here, sediment ages up to 60 ka were measured with multiple episodes of donga erosion, colluviation, and soil formation. This site was also studied intensively with methods of predictive modelling for soil erosion (Bernini et al. 2021) and computational Donga Erosion Models (Omran et al. 2022, Khan et al. 2023). Earlier studies with a geoscientific focus on the Jojosi site by Botha (1996) and Botha et al. (1994) describe several unconformity-bounded depositional units and illustrate multiple phases of cut-and-fill sediment bodies. However, the nature of the dolerite-derived sediment that dominates the Jojosi basin precludes a direct correlation of palaeosols or sedimentary units here with those described from the surrounding region. A unique hardpan calcrete profile interbedded within the Jojosi sedimentary succession yielded radiocarbon ages of ~37 ka and ~28 ka (Pta-5759, Pta-4927/4975), which allows a tentative chronological correlation with buried palaeosols exposed in the St Paul's, Nquthu and Menteith localities.

In summary, the scientific documentation of Quaternary sediments in northern KZN provides a regionally correlatable stratigraphic reference framework supported by several geochronological techniques. Geomorphological mechanistic models have been proposed for the sedimentary and pedogenetic development at selected sites. At the regional scale, the impact of many potential driving factors and the synchronicity of processes remains debated. Concerning the complex Jojosi palaeo-donga cut-and-infill succession, the question arises as to how this succession can be correlated directly with the luminescence chronology framework at surrounding locations. Successful dating of the landscape cyclicity inherent in the Jojosi colluvial succession will permit stratified archaeological finds to contribute to an enhanced understanding of the role of Stone Age cultures in the context of the long-term Masotcheni Formation accretion using chronostratigraphic indexing, and derived paleoenvironmental insights.

Most modern Stone Age archaeological work in the interior of KZN has been focused on the Thukela basin catchment area, best known from numerous excavated LSA sequences in rock shelters by A. Mazel in the 1980s (e.g., Mazel 1989). Further north of the Thukela, the few documented Stone Age occurrences derive mostly from the first half of the 20th century. Sheltered locations are known from the Natal Spa rock shelter near Paulpietersburg with an LSA sequence excavated in 1949 and surface MSA artefacts found on river terraces and nearby donga sediments (Davies 1949; 1952). Among the rare open-air site descriptions, the earliest reports come from the pioneer phase of South African archaeology, originating in the collection of individual artefacts in dongas around Newcastle and Rorke's Drift during military marches in the Anglo-Zulu war (Feilden 1884). Larger-scale surveys and unsystematic field work in dongas at around a dozen spots in the area around Nquthu (close to the Mangeni Falls), Vryheid, and Dundee found artefacts from the ESA, MSA, and LSA (Lebzelter & Schmidt 1926; Lebzelter 1930; for more information and a critical contextualisation see Sarreiter 2019). Further brief survey activities in the area's donga sediments found

more surface Stone Age material (van Riet Lowe 1947). Finds from Sandspruit near Utrecht derive from a collection of surface material within river gravels (Malan 1948). The assemblage is a taphonomic palimpsest but can typologically be associated with the (later) MSA in being dominated by unifacial points manufactured on blade blanks, splintered pieces, and Levallois cores (Malan 1948: 89–93). Davies (1949, 1951) reports on MSA surface finds and occasional handaxes from dongas near Dalry, Hazaldene, Masotsheni, and Nquthu but provides little further description. Typical of the region's MSA record, he notes that as "nearly all of it [the archaeological material] has been washed out onto the donga floors it is seldom possible to determine from which particular stratum it is derived" (Davies 1949: 90). Closest to Jojosi, excavations at Nquthu rock shelter yielded stratified LSA artefacts, and MSA stone tools were noted on the surface of nearby dongas (Davies 1949; 1952).

The area of the Jojosi Valley was initially described during the systematic mapping and geological investigations by G.A. Botha during the late 1980s. He was the first to notice the unique archaeological potential of the Jojosi Donga complex (see Botha 1996, Appendix 7.1). Based on his assessment, a site excavation project headed by A. Mazel (Natal Museum) performed the first and so-far only documented excavation of an open-air locality in KZN during a short campaign in 1991. This investigation was, in part, motivated by the endangered situation of the buried artefact assemblage sites due to active erosion. Field notes and comprehensive photographic records by Mazel report distinct artefact concentrations eroding out of the side walls of the dongas from lenticular-shaped features (Mazel 1991). They excavated four of these features, which we now call Jojosi 1–4, to preserve the potentially undisturbed lithic material from further erosion. All excavated material, addressed as MSA stone tools, remains stored in the KZN Museum. The lithic assemblages were never studied in detail and the results of the excavations were not published except for a newspaper article (Natal Witness, 3/10/1991) and a note (Botha 1996, Appendix 7.1). The nature of these stone tools and the sedimentary context, geographical extent, and age of the purported MSA occurrences remained unknown.

To sum up, previous work in the northern interior of KZN has provided ample evidence of ESA, MSA, and some LSA artefacts in surface contexts scattered over wide areas. These stone tools are predominantly associated with well-developed and well-studied sheetwash and alluvial sediments and the material is commonly located on the erosional donga surfaces in large numbers. In fact, the earliest reports of Stone Age artefacts in KZN appear to go back to dongas (e.g., Feilden 1884). The few excavations in northern KZN conducted in sheltered sites have provided ample LSA material in their occupation sequences, with potential MSA occupations at their base remaining unexplored (see e.g., Mazel 1996). Among all known sites and based on previous work by Mazel and Botha, the Jojosi Dongas possess the highest potential for uncovering *in situ* material in stratified sediments from both the MSA and an open-air context, though their extent and nature remain unknown.

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