



The Karibib region as an emerging gold district in the Damara Belt, Namibia: a review and regional interpretation of controls on mineralization

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Abstract

Recent discoveries around existing gold deposits and prospects demonstrate the significance of the Karibib region in the south Central Zone of the Pan-African Damara Belt in central Namibia as an emerging gold district. This paper aims to identify the underlying structural and lithological controls of the gold mineralization in individual deposits and prospects. Gold occurrences throughout the region are hosted by the lithologically heterogeneous, amphibolite-facies, carbonate-siliciclastic metasedimentary sequence of the Neoproterozoic Swakop Group. Gold is exclusively associated with quartz-vein systems and associated sulfides, primarily pyrrhotite, arsenopyrite, pyrite, and minor chalcopyrite. The geometry of the vein systems varies systematically between deposits and prospects but shows close relationships with the main generation of east-northeasterly trending folds and thrusts that formed during the main phase of northwest-southeast directed, subhorizontal shortening ($D_{2/3}$) between ca. 530–510 Ma. Sites of economic gold mineralization correspond to a combination of (1) contacts between rock types of distinctly contrasting rheology along which strain localization promoted fracturing and veining in more competent rocks, (2) high-strain zones that localized regional fluid flow, mainly along steep fold limbs of regional-scale folds, and (3) regional-scale deflections of wall-rock structures and jog-like geometries that resulted in either dilational or contractional structural sites. It is the combination and interplay of these factors that control the formation of auriferous quartz-vein systems in the Karibib region.

Keywords Damara belt · Orogenic gold · Wall-rock deflections · High-strain zones · Hypozonal · Amphibolite-facies

Introduction

The Karibib region in central Namibia is rapidly emerging as an important gold district. Gold deposits and prospects are hosted by amphibolite-facies rocks of the Neoproterozoic Damara Supergroup in the south Central Zone of the Pan-African Damara Belt. Established deposits such as the Navachab gold mine, the recently discovered Twin Hills

deposit, numerous historically mined prospects (Anomaly 16, Gecko, Onguati, Brown Mountains, Western Workings and Goldkuppe) and recently delineated prospects (e.g. Oasis and Wedge) testify to the high gold endowment (>7.6 Moz @ 1.1 g/t) of the area (Fig. 1). This has sparked a flurry of both exploration and research in recent years. Previous studies (e.g., Steven 1992; Nörtemann et al. 2000; Kisters 2005; Viljoen 2005; Kitt 2008; Dziggel et al. 2009a, b; Creus 2011; Slabbert 2013; Steven et al. 2014; Wulff et al. 2010, 2017; Wicker 2019; Shilunga and Kisters 2022, 2023) have focused on individual prospects and the deposit-scale geology. These studies identified a variety of mineralization controls, parallel or highly discordant to high-strain zones, in fold hinges or along fold limbs, or in rheologically more competent rock types that promoted fracturing and veining of the high-grade metamorphic rocks. Despite these variations, most studies agree with the broadly similar timing of fluid flow and mineralization

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