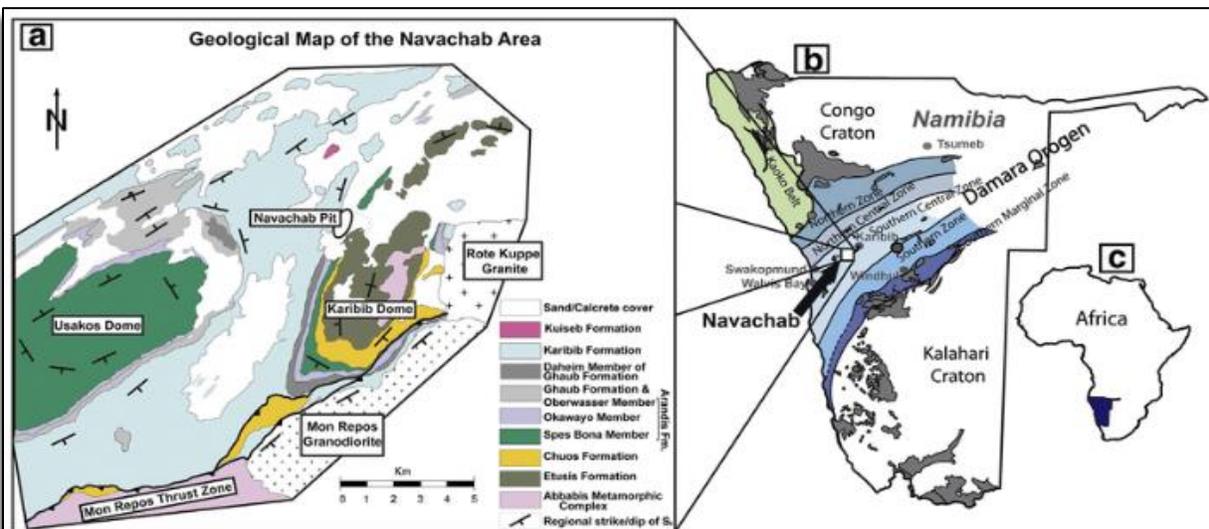


Geology of the Navachab Gold Deposit – Theory on Ore Genesis:

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The Navachab gold deposit is situated in the Pan-African Damara Orogeny trending NE-SW in the South Central Zone (CSZ) of the Damaran Orogeny. The deposit showed some unique characteristics that distinguished it from most other gold deposits worldwide (mainly Archean hosted), before discovery of another gold deposit in the same Orogenic belt, namely the Otjikoto gold deposit. (1) The Navachab deposit was the only known structurally-controlled gold deposit hosted by carbonate-bearing shelf sediments of amphibolite facies metamorphic grade; (2) It was the only known gold mine in the extensive system of Pan-African orogenic belts in Southern Africa for some time until recent other discoveries. The deposit is hosted by a sequence of metamorphosed shelf sediments, comprising Biotite-schists, marbles and calc-silicate rocks. Based on detailed structural investigations, the gold mineralisation at Navachab is classified as syn-orogenic, attributed to four progressive deformational events (D1- D4) related to the SE-NW vergence, during continental collision of the Congo and Kalahari Cratons, with the later subducting underneath the former craton, forming typical subduction zone type area in the CSZ of the Orogeny. Due to its occurrence in carbonatic host rocks and the development of a prominent calc-silicate alteration associated with the gold mineralisation, other previous workers had interpreted the Navachab gold deposit as a skarn deposit, the occurrence of the Rote Kuppe granitic intrusion within 5km radius of the Navachab Gold Mine had given strength to classical skarn deposit theory. However, as the gold mineralisation at Navachab could not later be directly related to an intrusion, the classification remained mainly in a descriptive sense. The deposit seem to have nothing to do with a classical skarn mineralisation at the contact with magmatic intrusions. As in orogenic gold deposits, the mineralisation occurred syn-tectonically, and the mineralised structures (i.e. veins and replacement style ore bodies) are shown to have formed during regional compressive deformation. In contrast, “replacement style” ore bodies with calc-silicate (“skarn type”) alteration in strongly layered carbonate-rich host rocks, and a generally strong lithological control on alteration are rather typical of skarn deposits. However, in contrast to other orogenic gold deposits, there is no indication that the gold mineralisation at Navachab is related to a major shear zone, but rather in extensional veins, sulphide veins and sulphide lenses, pointing the deposit to a mineralizing fluid origin. A recent C-H-O isotopic composition study, constrains the source of the mineralizing fluid for the Navachab deposit, to a metamorphic source; the dehydration of meta-pelitic turbidites of the continental shelf, indicating a mesothermal origin of the deposit.



a) Geological map of the Navachab area modified after Kisters et al. (2004). b) The Namibia map on the right is showing the tectono-stratigraphic zones of the Damara Orogen defined by Miller (1983). The grey areas on this map show outcrops of pre-Damara basement.