Compilation Bedrock Geologic Map of Cemetery Ridge, La Paz and Yuma Counties, southwest Arizona

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scale 1:48,000

Introduction

Cemetery Ridge is a northwest-trending group of low-relief hills in a remote area in southwest Arizona. Geological mapping by Grubensky and Demsey (1991) and Gilbert and Spencer (1992) identified the basic rock types and structure of the Ridge. Haxel et al. (2015, 2018, 2022) and Jacobson et al. (2017) subsequently found that quartzofeldspathic schist at Cemetery Ridge is part of the Orocopia Schist, a Late Cretaceous low-angle subduction complex that underlies much of southern California and southwest Arizona. They also found that the Orocopia Schist at Cemetery Ridge contains tectonic blocks of oceanic peridotite, chiefly harzburgite and serpentinite, unique in southwest Arizona and probably transported from western California. This compilation geologic map is intended to provide geologic context for the Orocopia Schist at Cemetery Ridge and to facilitate further research toward understanding tectonic processes whereby this subduction complex rose into the upper crust and was exposed at the surface.

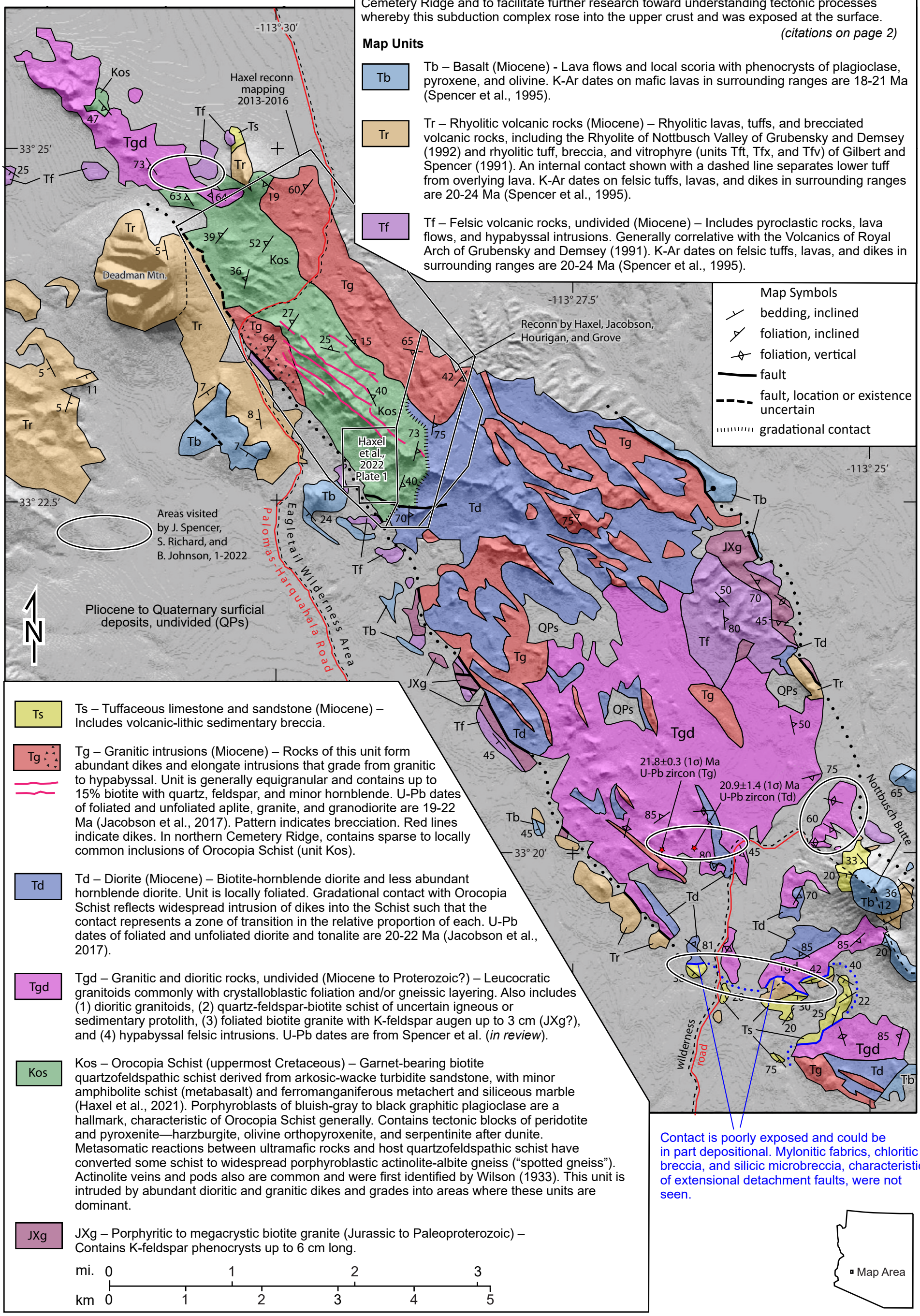
(citations on page 2)

Map Units

Tb – Tb – Basalt (Miocene) - Lava flows and local scoria with phenocrysts of plagioclase, pyroxene, and olivine. K-Ar dates on mafic lavas in surrounding ranges are 18-21 Ma (Spencer et al., 1995).

Tr – Tr – Rhyolitic volcanic rocks (Miocene) – Rhyolitic lavas, tuffs, and brecciated volcanic rocks, including the Rhyolite of Nottbusch Valley of Grubensky and Demsey (1992) and rhyolitic tuff, breccia, and vitrophyre (units Tft, Tfx, and Tfv) of Gilbert and Spencer (1991). An internal contact shown with a dashed line separates lower tuff from overlying lava. K-Ar dates on felsic tuffs, lavas, and dikes in surrounding ranges are 20-24 Ma (Spencer et al., 1995).

Tf – Tf – Felsic volcanic rocks, undivided (Miocene) – Includes pyroclastic rocks, lava flows, and hypabyssal intrusions. Generally correlative with the Volcanics of Royal Arch of Grubensky and Demsey (1991). K-Ar dates on felsic tuffs, lavas, and dikes in surrounding ranges are 20-24 Ma (Spencer et al., 1995).



Ts – Ts – Tuffaceous limestone and sandstone (Miocene) – Includes volcanic-lithic sedimentary breccia.

Tg – Tg – Granitic intrusions (Miocene) – Rocks of this unit form abundant dikes and elongate intrusions that grade from granitic to hypabyssal. Unit is generally equigranular and contains up to 15% biotite with quartz, feldspar, and minor hornblende. U-Pb dates of foliated and unfoliated aplite, granite, and granodiorite are 19-22 Ma (Jacobson et al., 2017). Pattern indicates brecciation. Red lines indicate dikes. In northern Cemetery Ridge, contains sparse to locally common inclusions of Orocopia Schist (unit Kos).

Td – Td – Diorite (Miocene) – Biotite-hornblende diorite and less abundant hornblende diorite. Unit is locally foliated. Gradational contact with Orocopia Schist reflects widespread intrusion of dikes into the Schist such that the contact represents a zone of transition in the relative proportion of each. U-Pb dates of foliated and unfoliated diorite and tonalite are 20-22 Ma (Jacobson et al., 2017).

Tgd – Tgd – Granitic and dioritic rocks, undivided (Miocene to Proterozoic?) – Leucocratic granitoids commonly with crystalloblastic foliation and/or gneissic layering. Also includes (1) dioritic granitoids, (2) quartz-feldspar-biotite schist of uncertain igneous or sedimentary protolith, (3) foliated biotite granite with K-feldspar augen up to 3 cm (JXg?), and (4) hypabyssal felsic intrusions. U-Pb dates are from Spencer et al. (*in review*).

Kos – Kos – Orocopia Schist (uppermost Cretaceous) – Garnet-bearing biotite quartzofeldspathic schist derived from arkosic-wacke turbidite sandstone, with minor amphibolite schist (metabasalt) and ferromanganiferous metachert and siliceous marble (Haxel et al., 2021). Porphyroblasts of bluish-gray to black graphitic plagioclase are a hallmark, characteristic of Orocopia Schist generally. Contains tectonic blocks of peridotite and pyroxenite—harzburgite, olivine orthopyroxenite, and serpentinite after dunite. Metasomatic reactions between ultramafic rocks and host quartzofeldspathic schist have converted some schist to widespread porphyroblastic actinolite-albite gneiss (“spotted gneiss”). Actinolite veins and pods also are common and were first identified by Wilson (1933). This unit is intruded by abundant dioritic and granitic dikes and grades into areas where these units are dominant.

JXg – JXg – Porphyritic to megacrystic biotite granite (Jurassic to Paleoproterozoic) – Contains K-feldspar phenocrysts up to 6 cm long.

mi. 0 1 2 3
km 0 1 2 3 4 5

Contact is poorly exposed and could be in part depositional. Mylonitic fabrics, chloritic breccia, and silicic microbreccia, characteristic of extensional detachment faults, were not seen.