Bedrock Geologic Map of Sentinel Peak (A-Mountain) and Tumamoc Hill, Pima County, Arizona

Spencer, J.E., compiler and Moore, E.M. and Trapp, R.A., digital cartographers
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Scale 1:12,000

Introduction
Sentinel Peak and Tumamoc Hill form a group of hills at the western edge of Tucson in southern Arizona, and comprise a small part of the Tucson Mountains. Sentinel Peak, also known as A-Mountain, is a prominent landmark near downtown Tucson. The geology of Tumamoc and Sentinel Peak is dominated by 20 to 30 million year old (Ma) volcanic rocks, unlike most of the rest of the Tucson Mountains which are composed primarily of much older volcanic rocks that were largely produced during a single enormous eruption (Lupia et al., 1999; King, 2002).

This map is simplified from the map of Phillips (1976, University of Arizona M.S. thesis). It was created so that the geology of the Tumamoc and Sentinel Peak area can be readily discerned from an available color map, and includes a description of map units and their approximate ages.

Potassium-argon (K-Ar) radiometric dates are given with 1-sigma analytical uncertainty (one standard deviation). Dates from older analyses are recalculated by Reynolds et al. (1986) using newer decay and abundance constants.

Geologic Map Units

Tumamoc basaltic andesite (middle Tertiary; 22-24 Ma)
Basaltic andesite lava flows with total thickness of 7-10 m that form the top of Tumamoc Hill and Sentinel Peak (A-Mountain). Includes scoriaceous, vesicular, and brecciated basalt. Silica (SiO2) content is about 59% (one analysis from Eastwood, 1970). A sample of this rock yielded a whole-rock K-Ar date of 22.7 ± 0.6 Ma (Baker et al., 1985).

Tumamoc tuff (middle Tertiary; 26-28 Ma)
A 30 to 40 m thick tuff consisting of three members. Almost all of the tuff consists of the highest, gray, tuff member, which contains some volcanic and lithic fragments. The basal white tuff yielded a feldspar whole-rock K-Ar date of 27.4 ± 0.9 Ma, while the upper gray tuff yielded a sanidine K-Ar date of 26.4 ± 0.9 Ma (Baker et al., 1985).

Basaltic andesite (middle Tertiary; 28-29 Ma)
Basaltic andesite, with olivine phenocrysts, less vesicular than scoriaceous. Includes Chilota basaltic andesite, Grande basaltic andesite, and A-Mountain basaltic andesite as defined by Phillips (1976). The Grande basaltic andesite yields a K-Ar date of 27.6 ± 1.2 Ma (Baker and Daman, 1985). The A-Mountain basaltic andesite yielded a whole-rock K-Ar date of 24.2 ± 0.2 Ma (Baker et al., 1985). This tuff appears to be younger than the Tumamoc tuff and yielded two older dates. Silica (SiO2) content of the A-Mountain basaltic andesite was determined to be 55.5 ± 0.5 Ma (two samples from Eastwood, 1970).

Conglomerate (middle Tertiary; 26-28 Ma)
Pebble to cobble conglomerate, locally with boulders up to 70 cm in diameter. Grains consist primarily of mafic volcanic rocks and could all be locally sourced.

Turkey Track andesite (middle Tertiary; 27-28 Ma)
Unit contains abundant, large (1-3 cm) plagioclase phenocrysts, sparse pyroxene, and rare olivine phenocrysts. Presumed to consist of lava flows; total thickness > 45 m. A sample of this unit yielded a plagioclase K-Ar date of 28.6 ± 2.7 Ma (Baker and Daman, 1985). The weighted mean of three dates of an identical-appearing rock unit in the Del Boc Hills, located 12 km to the south, is 27.5 ± 0.5 Ma (1-sigma weighted analytical uncertainty; see Long and Rippel (1974) for calculation method; data from Percival, 1969), which is interpreted as the middle age of this unit at Sentinel Peak.

Mafic volcanic rocks (early Tertiary or late Cretaceous)
Includes three map units defined by Phillips (1976). 1) Tumamoc andesite, massive, with euhedral plagioclase phenocrysts (An45), estimated thickness 12 m. 2) Short's Ranch andesite, estimated thickness > 30 m. Phenocrysts consist of plagioclase (An45) and biotite and possibly rare quartz (Brown, 1939). Biotite from Short's Ranch andesite yielded a K-Ar date of 55 ± 1.7 Ma (Baker and Daman, 1985).

Tuff (early Tertiary or late Cretaceous)
Tuff with < 6 mm thick, contains abundant plagioclase phenocrysts (An45), minor biotite, sparse lithic fragments, and melt glass shards. Unit overlies Greenesand andesite of map unit Tg1 and is overlain by Tumamoc andesite of map unit Tm3 and Turkey Track andesite.

Greenesand andesite (early Tertiary or late Cretaceous)
Anandesite, < 10 m thick, with plagioclase (An45) and pyroxene phenocrysts, overlies sandstone of Anklem Formation.

Mission Road Tuff (early Tertiary or late Cretaceous)
Tuff containing biotite and plagioclase, sparse volcanic (lithic) fragments, and melt glass shards. Estimated thickness is 5 m.

Fine-grained, silty sandstone and tuffaceous sandstone (early Tertiary or late Cretaceous)
Unit correlated by Phillips (1976) with the Anklem Formation of Baker et al. (1986). Includes a small exposure of Mission Road andesite at the south foot of Sentinel Peak.

References cited