Surficial Geology of the Table Top Mountain Area, Pinal and Maricopa Counties, Arizona

by
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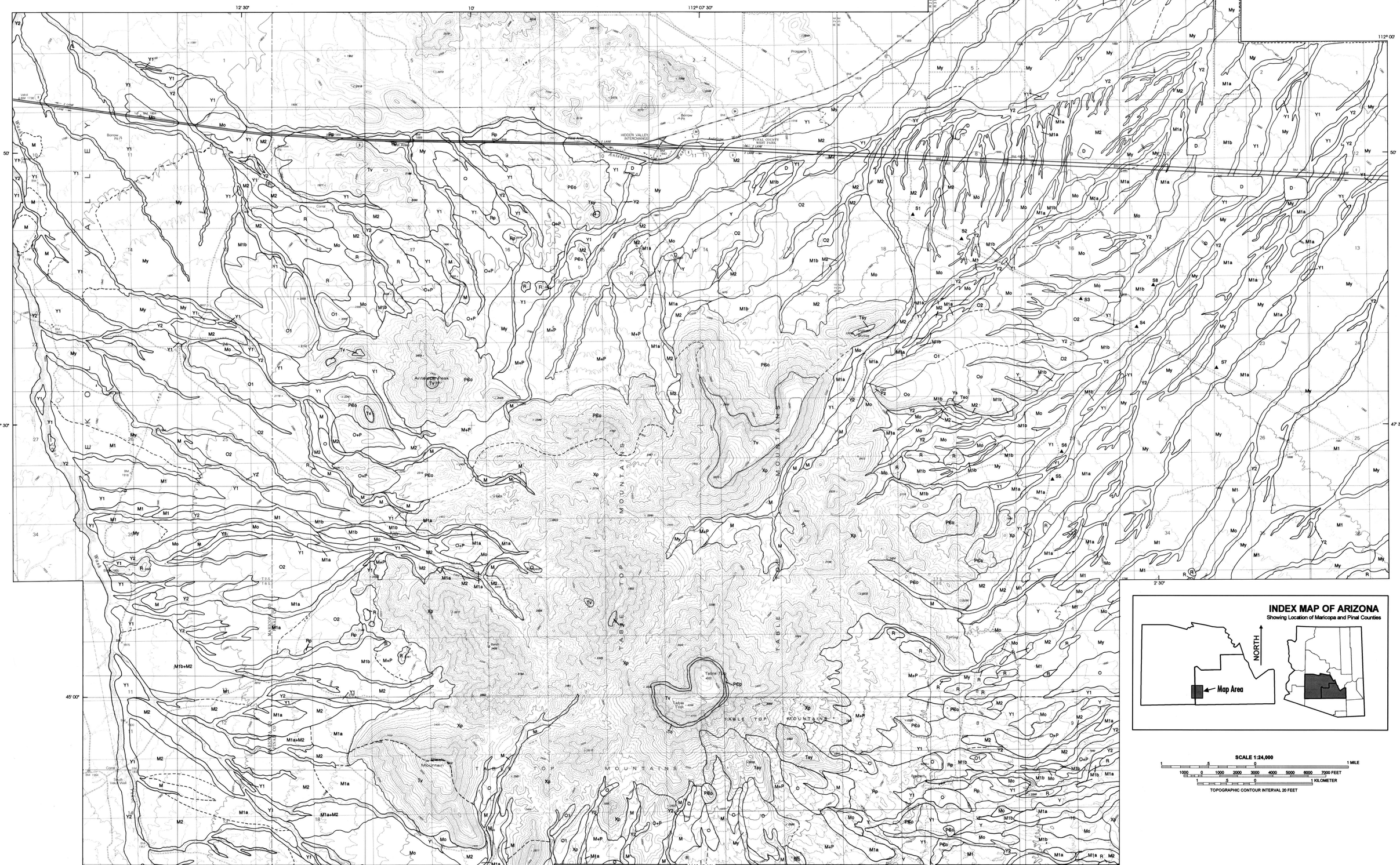

SCALE 1:24,000

1 0 1 2 3 4 5 6 7 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 0 1 KILOMETER

TOPOGRAPHIC CONTOUR INTERVAL 20 FEET

EXPLANATION

Generalized Bedrock Units

Xp	Pinal Schist (Early Proterozoic)
P-Ꞓo	Oracle Granite (Middle Proterozoic)
P-Ꞓp	Pioneer Formation (Middle Proterozoic)
Pz	Paleozoic sedimentary rocks, undifferentiated
Tv	Tertiary volcanic rocks
Tc	Tertiary coglomerate
R	Undifferentiated bedrock
RP	Rock pediment

Pre-Quaternary Alluvium

Tso (early Miocene?)
Medium to fine grained, moderately well sorted sandstone (strike and dip S 25° E 30° SW), poorly consolidated but lightly cemented in patches with calcium carbonate; composed of feldspars and quartz with some tuffaceous material, suggesting deposition contemporaneous with Early Miocene volcanism.

Tsy (Pliocene)
Poorly sorted, subangular to subrounded gravels, cobbles and boulders with subhorizontal bedding. Cemented from the surface to a depth of about 3 m with calcium carbonate. Dominant lithologies include schist, basalt, and Tertiary conglomerate. Thickness of this unit above bedrock is usually 3 m or less.

Plio-Pleistocene Alluvium

Oo (late Pliocene)
Oo units occupy the second highest topographic position of surficial units, after Tsy, about 100 m above active streams. Surfaces planar in longitudinal profile, but usually strongly convex in transverse profile ("ballena topography"). Drainage is deep (up to 25 m) and subparallel. Deposits are poorly sorted, sizes ranging from sand to boulders, with upward fining due to eolian accumulation. Thickness up to 100 m. Lithologies include schist, basalt, granite, sandstone, and limestone. Darkly to moderately varnished basalt boulders, interspersed with caliche, form a surficial lag. Soil development on the **Oo** surface is characterized by thin, light brown and calcareous A and B horizons at the surface that are formed from recently deposited eolian silts and contain abundant fragments of petrocalcic horizon. Calcium carbonate (Stage V, Machette, 1985) cements the deposits beneath surface horizons to at least 5 m.

O1 (late Pliocene)
O1 units are transitional between **Oo** and **O2** surfaces, and can usually only be distinguished where **Oo** and **O2** are present. **O1** surfaces may be more strongly eroded remnants of **Oo** deposits, as they tend to occur on edges of **Oo** units. The elevation difference between **Oo** and **O1** is about 5 m. **Oo** units slope down gradually to more or less planar **O1** surfaces. Soils and surficial characteristics are similar to those on **Oo** units.

O2 (early Pleistocene)
Surfaces are 10 to 30 m above active streams, fan-shaped and planar with rounded edges. Drainages are dendritic, deep (3 to 6 m) and not very abundant. Thickness less than about 10 m; in places a granitic bedrock pediment is exposed. Lithologies making up the poorly sorted gravels are similar to those in **Oo** units, and a basalt boulder lag, interspersed with caliche fragments, is characteristic of the surface. Basalt boulders are somewhat more darkly varnished than on the **Oo** surface. Soil development is characterized by a thin calcic horizon, developed in eolian silts, overlying several meters of gravelly, Stage V (Machette, 1985) petrocalcic horizons.

O+P
O+P units represent pedimented surfaces of various lithologies, covered in places with O-age alluvium or exposed. These pediment surfaces occur in higher landscape positions than those classed as **M+P**, but are lower than the eroded remnant of Indian Butte. The pediment surface slopes at an angle of 2-3 degrees, slightly greater than the angle of younger surfaces.

Pleistocene Alluvium

Mo (early to middle Pleistocene)
Surface elevation ranges from 3 m to 10 m above active wash bottoms. Drainage follows dendritic pattern. Deposit thickness ranges from 5-10 m and consists of poorly sorted gravels, cobbles, and sand, with basalt, schist, granite and sedimentary lithologies. Basalt (darkly varnished), quartz and caliche fragments are concentrated at the surface. A continuous desert pavement has probably been disrupted by erosion. Soil development on the Mo surface is similar to the **O2** surface, with calcic horizons overlying several meters of petrocalcic horizons.

M1 (middle to late Pleistocene)
M1 surfaces are distinguished from older and younger Pleistocene-age units by the presence of a reddish argillic horizon. The surfaces are up to 5 m above active stream channels. Deposits of this age are commonly stream terraces along major washes, but in some areas larger alluvial fans are extensive. Dissection occurs to a depth of 1 to 2 m, and the broad interfluve areas are flat and smooth. Deposits are probably up to 3 m thick, and consist of poorly sorted gravels. A well developed desert pavement is made up of interlocking quartz, granite, basalt, sandstone and limestone pebbles and cobbles. Basalt cobbles are usually darkly varnished. Soils have argillic, calcic, and Stage III to IV petrocalcic horizons. The **M1** surface is subdivided into **M1a** and **M1b** where possible.

M1a (middle to late Pleistocene)
This older **M1** unit occurs on higher landscape positions and has a greater degree of soil development than the **M1b** unit. The topography of **M1a** surfaces is flat and relatively undissected. Lithologies present at the surface include basalt and quartz; schist, granite and sandstone are present at depth. Soils have calcic, well-developed argillic and petrocalcic horizons.

M1b (late Pleistocene)
Elevation is 0.5 to 1 m lower than **M1a** units where the two are adjacent. Subsurface lithologies are similar to **M1a** units, but surface lithologies include schist and granite in addition to basalt and quartz. Desert pavement may be interlocking. Soils may have a moderately well developed argillic horizon, or may have a reddish cambic horizon in regions of granitic parent material. Calcic and Stage III petrocalcic horizons are present below argillic or cambic horizons.

M2 (latest Pleistocene)
Elevation is 1 to 3 m above active stream channels. Dissection by streams is common, to a depth of about 1 m, and bar and swale topography is evident in most interfluve areas. Schist is common on the surface and throughout the deposits, as are metaquartz, limestone, and sandstone; non-basalt volcanics are a minor component. Desert pavement of gravel-sized schist and quartz is incipient. Basalt boulders on bar tops are moderately to poorly varnished. Soil development on the M2 surfaces is moderate, with very weak argillic horizons, and Stage II calcic horizons.

MY (latest Pleistocene to Holocene)
MY units are mapped where the landscape is finely dissected by active streams but interfluve areas range in age from Holocene to late Pleistocene. **M1** and **M2** surfaces occur in areas that are too small to map individually, and may be adjacent to and at a similar elevation as **Y** (Holocene) age surfaces. A buried petrocalcic horizon may be present under broad areas of this surface. Areas of **M** age are distinguished by well to moderately well developed desert pavement and dark varnish; these often grade into **Y** age surfaces with an unvarnished pebble lag and obvious depositional features.

M+P
The **M+P** surfaces are pediments covered with a patchy, thin veneer of alluvium. When soil is present, its reddish color suggests a middle- to late-Pleistocene age. The pediment surface (top of the bedrock) is about 3 m above active channels, although surficial alluvium may be higher.

Holocene Alluvium

Y (Holocene)
Y units are a combination of Holocene stream terraces and alluvial fans (**Y1**) and recent channels and associated terraces (**Y2**). Mapped where separation of these groups is infeasible.

Y1 (early to middle Holocene)
Y1 units are present as stream terraces adjacent to the mountain front, and as larger fan surfaces in distal positions. Terrace and fan elevations are 1 m or less above active channels, and may be up to 2 m thick. A pebble lag covers the surface of gravelly deposits, but in the western portion of the mapping area near Vekol wash, Holocene deposits are sandy and a lag is absent. Holocene alluvium is primarily composed of poorly sorted schist gravel. Very lightly varnished basalt cobbles are present in most areas, and granite, limestone and sandstone are locally present. Soil development is minimal, with very weak cambic and calcic horizons. A buried petrocalcic horizon may be present below about 1m depth.

Y2 (late Holocene to present)
Active stream channels, usually braided, and associated very recent terraces. All older surfaces are dissected to some degree by active channels which were too narrow to be mapped. **Y2** channels represent the local base level of erosion, which varies aross the mapping area. In some cases, bedrock or caliche controls the base level of these washes. Terraces may or may not be vegetated, are less than 0.5 m above the channels, and have virtually no soil development.

Ys (Holocene)
Ys represents landslide deposits that have probably occurred during the late Holocene. They occur on steep slopes of old alluvial fans which are being undercut by stream action. Basalt boulders which were transported and fractured to produce fresh surfaces are lightly varnished, similar to the varnish on boulders on the youngest stream terraces. Thus, the slide areas appear light colored on aerial photographs.

▲ S1 Soil trench location

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