



Topographic base from Desert Peak, Arizona, quadrangle, Provisional edition 1988.  
Transverse Mercator projection, Universal Transverse Mercator grid; UTM Zone 12, 1927 North American Datum; Clark, 1866 spheroid.

# Geologic map of the Desert Peak 7 1/2 Quadrangle, southeastern Pinal County, Arizona

by  
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Arizona Geological Survey Digital Geologic Map 20

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## INTRODUCTION

This digital geologic map and report describes the bedrock and surficial geology of the Desert Peak 7 1/2 Quadrangle. The study area is located approximately 40 km northwest of the Tucson metropolitan area. It includes the extreme western edge of the Tortolita Mountains, Owl Head Buttes, and the piedmont areas extending west to, and including, the Desert Peak. Elevations in the study range from approximately 3100 feet in the Tortolita Mountains to 2000 feet on the western piedmonts. Land use in the area includes state trust lands, federal lands, ranches and, increasingly, single-family suburban homes. The rate of development in this area is increasing, underscoring the need to understand the geologic setting.

Mapping was conducted between October 2001 and May 2002 as part of continuing efforts by the Arizona Geological Survey (AGS) to map the geology of the Phoenix - Tucson urban corridor. This map is part of a concurrent effort encompassing several adjacent quadrangles including Fortified Peak (DGM 18), Durham Hills (DGM 19), Oro Valley (DGM 21), Chief Butte (DGM 22), North of Oracle (DGM 23), and the Tortolita Mountains including the northern portion of Ruelas Canyon (DGM 26). The primary product of this mapping is a 1:24,000 layout scale geologic map. Bedrock mapping consists almost entirely of new mapping but locally incorporates past mapping by Banks and others (1977). The surficial geologic mapping builds on and complements previous efforts in the Tucson area (Mokrisch, 1988; Jackson, 1989; Johnson, 1999; Peartree and others, 1992; Field and Peartree, 1993; Klawns and others, 1999; Peartree and Biggs, 1999; Skonicki, 1999; Peartree and Youberg, 2000; Skonicki, 2000; Youberg and Helms, 2001). This mapping is part of the STATEMAP Program of the U.S. Geological Survey, administered under contract #01HQAG0098, and jointly supported by the AGS and the U.S. Geological Survey National Cooperative Mapping Program.

Bedrock geology is dominated by the upper part of a detachment fault system, although the actual fault and shear zone are exposed only along the eastern edge of the map area. A pair of low-angle, southwest-striking normal faults offset a prominent mylonite shear zone, the Carpas Wash shear zone in the southern half of sections 19 and 20. Kinematic indicators along the shear zone and along the low-angle faults are consistently top-to-the-southwest directed. The hanging wall block consists of Proterozoic Crustal Granite and Pinal Schist overlain by at least 2 km of mafic to intermediate volcanic rocks. The volcanic rocks are preserved in a series of three oppositely dipping fault blocks, with the western edge of the westernmost (west-thick) block preserved in the northeast part of this

## MAP AREA

The large pedimented area in the north-central part of the map area is believed to be underlain by gently dipping volcanoclastic sedimentary rocks which are probably younger than the volcanic sequence. The footwall block is represented by a complex suite of Tertiary plutonic and metaplutonic rocks that are preserved at Desert Peak in the northwest and in the Tortolita Mountains in the southeast. The bounding Carpas Wash shear zone and associated low-angle normal faults are believed to track westward across the north half of the map area and then turn sharply to the north and northeast across the northwestern part of the map area and join with a north-to-northeast-striking, gently east-dipping detachment fault in the northernly adjacent Durham Hills quadrangle.

Two weather stations near the map area have operated during intervals over the past century and provide climatological data for the study area. The weather station at Red Rock (Red Rock 6 SW), west of the study site, has records from 1953 to 1973. The station at Cortaro (Cortaro 3 SW), south of the study site, has records from 1948 to 1976.

Throughout this report, most of the annual precipitation (50-60%) falls during the summer monsoon from June to September. Late summer rainfall occurs as heavy thunderstorms when moist air sweeps northwards from the Gulf of California and the Gulf of Mexico. Occasional intense late summer to early fall precipitation occurs in this region as a result of incursions of moist air derived from dissipating tropical storms in the Pacific Ocean. Winter precipitation generally is caused by cyclonic storms originating in the Pacific. It is usually less intense and may be more prolonged, and the water infiltrates into the soil more deeply than summer rainfall (summarized from Sellers and Hill, 1974). Freezing temperatures are common during most winters, but snow is uncommon and not persistent.

Climatic records from these stations illustrate the relatively warm and dry climate of the lower elevations in the Sonoran Desert. Cortaro, at about 2280 ft. a.s.l., has an average annual precipitation of 11.2 in. while Red Rock, at about

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## CLIMATE

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## LOCATION MAP FOR DGM-20

showing location of the Desert Peak 7 1/2 Quadrangle

DGM-19 DGM-22

Desert Peak (DGM-20)

MAP AREA

DGM-26

Scale

1:24,000

0 1000 2000 3000 4000 5000 6000 7000 8000 9000

Feet

0 100 200 300 400 500 600 700 800 900 1000

Meters

0 100 200 300 400 500 600 700 800 900 1000

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