Arizona Geological Survey Contributed Report CR-22-C

Geologic Map and Geochronology of the Picacho, Picacho NW, Picacho SW, and Hidden Valley 7.5-Minute Quadrangles, Arizona and California

This publication includes a geologic map, in pdf and ArcGIS format, and a report describing the geology of the map area and environs. An Excel spreadsheet is also supplied, which includes the tables within the report and a supplementary analytical data table.

The files are available at http://repository.azgs.az.gov/facets/results/og%3A219. They consist of:

1. Map Sheet in PDF Format (CR-22-C_Map_Sheet.pdf)

Geologic map with list of map units and symbols; correlation chart of geologic units; map showing place names within the map area and locations of radiometric samples within and adjacent to the map area; and table of radiometric ages for samples within and adjacent to the map area. Scale is 1:50,000; map projection is UTM Zone 11, NAD 1983.

The map sheet layout was composed in Adobe Illustrator. Most features of the geologic map within the sheet were derived directly from the ArcGIS database described below and underwent little or no editing in Illustrator. They will thus appear essentially identical in both the GIS and the map sheet. Such features include the contacts and faults, solid-fill polygons of geologic units, attitude symbols, traces of axial surfaces of folds, geochronology sample locations, shear zones, and labels for most of the above. Other features, however, were modified to varying degrees upon import into Illustrator or were created directly within Illustrator, including:

- Topographic contours – the 1:50,000 scale of the pdf map sheet is not well suited for using the USGS 1:24,000 quadrangle maps (digital raster graphs) as a topographic base. Instead, we created vector contour lines at 100-foot intervals from digital elevation data (USGS 1/3 arc-second n34w115 1x1-degree geotiff) using Global Mapper, v. 20. Numerous small hillocks resulted in many closed contours of small areal extent, leading to visual clutter. These contours were removed from the dataset by selecting for areas enclosed and then deleting small-area contours sequentially until reaching a reasonable concentration for viewing. (Smallest 448 m^2, and only seven encompass less than 1,000 m^2.)

- Map unit pattern overlays – overlay patterns, which are used to denote some geologic units, did not export well from ArcGIS. They came across as complex entities which were difficult to manipulate in Illustrator and which led to large file size. We thus created overlays for these units directly in Illustrator. The consequence is that the scale of the overlay patterns, and in some cases even the pattern type, differs between the GIS and pdf versions of the map.

- Dikes – The line styles of some dikes were altered in Illustrator to enhance visibility.

- Traces of major side tributaries (washes) to the Colorado River – these features are included in the pdf map sheet but not in the GIS.

All items on the map sheet outside the geologic map neatline were added in Illustrator, including the scale bar, north arrow, explanation of map units and symbols, etc. These features are not contained in the GIS. The only exception are geochronology sample points that fall just outside the southern neatline, and which are part of the GIS.

2. GIS Database (CR-22-C_GIS.zip)

The GIS includes:

- An mxd file for ArcMap 10.6 (AZGS_CR22C_Picacho_geologic_map.mxd). As noted above, the formatting is similar, but not identical, to that of the pdf map sheet. Map projection is UTM Zone 11, NAD 1983. The mxd file requires the included geodatabase (pcho.gdb).

- An ArcGIS Pro 2.8.2 project file (AZGS_CR22C_Picacho_geologic_map.aprx). Created by importing the above mxd file into ArcGIS Pro. References the same geodatabase (pcho.gdb) as the mxd file. The Pro version has not been extensively tested.

- The geodatabase (pcho.gdb) used by the mxd and aprx files.

- Style files for use with ArcMap (PicachoGeo.style) or ArcGIS Pro (PicachoGeo.stylx). Needed only by those who edit the map or wish to import layers from the geodatabase into a different GIS.

- FGDC TrueType (.ttf) font files in the folder *FGDC fonts*. You must have these installed for various symbols in the GIS to display correctly. For more information about FGDC cartography standards, see National Geologic Map Database (usgs.gov).

- A toolbox file (AZGS_CR22C_Picacho_geologic_map.tbx) generated automatically by ArcGIS Pro upon creation of the project file. Many users will not need to explicitly reference this file, but it should be kept in the same folder as the aprx file and geodatabase.

The geologic map units in the GIS version of the map are represented by two separate layers. One includes all the map unit polygons and is symbolized using solid-color fills. The other layer includes polygons for only those units that are represented by an overlay pattern in addition to a solid fill. As alluded to in the section on the pdf map sheet, this separation was made partly to assist in exporting the map to Illustrator. However, representing the geologic units by two layers can also be useful within the GIS. At least on some computer systems, the overlay patterns greatly increase the time to refresh the screen during zooming and panning. This problem can be avoided by turning off the overlays when they are not essential to the task at hand. (Only 15% of polygons have an overlay, and almost 60% of all polygons are labeled with the unit symbol, so

most units can be recognized even with the overlays turned off.) The solid-fill and overlay layers are included within a single group layer named "Geologic units."

The layer of map unit points was used to label the map unit polygons when they were created from the contacts and faults layer with the Feature to Polygon Tool in ArcMap. It is included, (although turned off by default) in both the mxd and aprx files in case the user wishes to edit the contacts and faults layer and recreate the polygons. A new polygon feature class can be symbolized with the included style file.

The layers for the tectonostratigraphic units (TSUs), turned off by default in the mxd and aprx files, were created from the map unit polygon layer by selecting the geologic units within each TSU and dissolving the boundaries between them. The geologic units included within each TSU are denoted on the pdf map sheet and in Figure 5 of the report.

The GIS version of the map includes the layer of topographic contours described above for the pdf map sheet, which may be useful in some circumstances. In ArcMap, the elevations of the contours can be displayed using the Labels tab of the Layer Properties dialog box with ELEV_NUMBER selected as the Label Field. In ArcGIS Pro, use the checkbox (Label Features In This Class) in the Labeling tab of the ribbon to turn the labels on. The labels, however, add significant clutter and should generally be turned off. Alternative base maps are available through ArcGIS Online; e.g., *USA Topo Maps* and *USGS Topo Maps (Map Service)*.

3. Report (CR-22-C_Report.pdf)

The report summarizing the geology of the map area and environs.

4. Excel Versions of Tables (CR-22-C_Suppl_Tables.xlsx)

Excel versions of Tables 1 through 3 in the report and a supplemental data table for the $^{40}Ar/^{39}Ar$ analysis of sample RC16-CM-184 of the basalt of Black Mountain. Table 1 is suppled as two worksheets, one with formatting similar to that in the report and one with the cells organized for easy plotting in mapping programs. Both latitude and longitude and UTM coordinates (zone 11) are included. Datum for both coordinate sets is NAD83/WGS84.