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Geoscientists Document 20,000-Year History of Debris Flows in the Santa Catalina Mountains, Tucson, Arizona (www.azgs.az.gov/catalinadebrisflows)

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Tucson -- Should Catalina Foothills residents be concerned about more than floods? According to a new report by Arizona Geological Survey, the mountain canyons and subjacent foothills of southern Arizona are home to a rare but dangerous geologic hazard, debris flows.

The report, "Geologic mapping of the debris-flow deposits in the Santa Catalina Mountains, Pima County, Arizona", documents a nearly 20,000-year history of debris flow activity in the canyons of the Santa Catalina Mountains near Tucson, Arizona.

The Pima County Regional Flood Control District funded the research, which involved both AZGS and US Geological Survey geoscientists, as part of their effort to accurately assess debris flow hazards at the mouths of canyons in the Foothills.

Debris flows are sediment-rich slurries that can transport large boulders and travel down steep mountain canyons at up to tens of miles per hour. In July 2006, five consecutive days of heavy rain culminated in at least 433 hillslope failures in the Santa Catalina Mountains. In 5 canyons, including the popular Sabino and Bear Canyons, a host of debris-flows formed and rushed headlong toward the canyon mouths below.

No injuries were attributed to the 2006 debris flows, but some roads, outbuildings and hiking trails were badly damaged. The 2006 debris-flows were much larger than any that had occurred historically in the Santa Catalina Mountains, and they raised new concerns about the potential for damage to roads and homes near many canyon mouths in the Catalina Foothills.

Mapping by Ann Youberg and her team shows that numerous boulder-rich debris-flow deposits were emplaced during the past 10,000 to 20,000 years at the mouths of each of the canyons. Fortunately, field relationships of debris flow deposits, soil development, and surface-exposure dates on boulders suggest that large debris flows like those of 2006 are rare occurrences in individual canyons, occurring on average only once in a thousand years or more.

"Debris flows have occurred before and will occur again at the canyon mouths of the Catalina Foothills; fortunately, they have been rare events and the areas that are likely to be affected by them are quite limited", said co-author Phil Pearthree.

But Pearthree warns, "Increasing fire frequency on the steep slopes of the Santa Catalina Mountains due to invasive species like buffleggrass may result in greater runoff, and possibly increased debris flow frequency, in the coming decades."

Accompanying the report are 11 map sheets that show the distribution of debris flow deposits near the mouths of 15 canyons, from Linda Vista in the west to Molino, La Milagrosa and Agua Caliente in the east. The high resolution, 1:6,000-scale maps are constructed on a color aerial photographic base (at 1:6,000-scale, one inch on the map equals 500 feet on the ground).

The report, with digital versions of 11 map sheets on CD-ROM, is available for \$20.00 from the State Map and Bookstore at 416 W. Congress, Tucson, AZ, and at Explore Arizona: Outdoor Information Center, One North Central, Phoenix. Printed copies of individual maps are also available; contact the Arizona Geological Survey for prices.

For additional information and images of the debris flows in the Santa Catalina Mountains see:

- 1) www.azgs.az.gov/catalinadebrisflows (shows an example of the newly published debris flow maps)
- 2) www.azgs.az.gov/Fall06.pdf "Arizona Geology", v. 36, no. 3, "Recent Debris Flows and Floods in Southern Arizona".

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