about 2 kilometers of dextral offset between 18.6 and 18.0 Ma. Extension to the southwest of this segment of the boundary, in the Goldfield Mountains, was moderate to extreme. South of the cauldron, the boundary zone turns sharply to the east and extends into the Globe-Miami area. Extension to the south of this boundary was weak to moderate but distributed over a larger area than in the Goldfield Mountains.

The sharp turn in the boundary zone at the Superstition cauldron coincides regionally with the hypothetical southwesterly continuation of the Jemez Lineament, a prominent northwest-trending zone of Neogene magmatism that extends across New Mexico and eastern Arizona. The turn also coincides with an abrupt change in the dip of the detachment faults that bound the core-complexes in the Basin and Range province. To the west, detachment faults dip to the northeast, and to the south they dip to the southwest. Directly southwest of the Superstition volcanic field the absence of core-complexes is conspicuous.

The nearest core complex, in the South Mountains directly to the west, had a long-lived history (~25-17 Ma) of exhumation involving Tertiary granitoids significantly older than the volcanics of the Superstition volcanic field. Along strike to the southeast from the South Mountains a low-angle, northeast-dipping normal fault in the Santan Mountains, which lie directly southwest of the Superstition volcanic field, is overlapped by a flat-lying outlier of the Apache Leap Tuff.

FINSTICK, SUE A.,

Determining the influence of surface water on Six Mile Spring, Parawan, Utah.

Six Mile Spring has historically been the main source of culinary water for the City of Parowan, Utah, providing about 900 gpm year-round. Routine water sampling indicated a possible link with surface water. Tests were undertaken to determine the influence of surface water on the spring. The results of additional water sampling, as well as the results of a Hydrolab Datasonde 3 logger, a MicroParticulate Analysis (MPA) test, and a calcium chloride tracer test, were inconclusive. A dye tracer test (Fluorescent FWT Red) proved conclusively that Six Mile Spring is under the direct influence of surface water. Geologic mapping indicates that the spring is fault-controlled. However the surface water influence is likely a result of solution channels within the Tertiary (Eocene and Paleocene?) Claron Formation limestone. Future plans call for similar testing on other springs in the area.

HACKER, DAVID B.

Geologic evolution of the Pine Valley Mountains, Basin and Range – Colorado Plateau transition zone, southwest Utah.

Tertiary volcanic and hypabyssal intrusive rocks cover most of the Pine Valley Mountains in Washington and Iron Counties, Utah. The older (Oligocene and Miocene) part of the volcanic sequence consists mostly of regional calc-alkaline ash-flow tuffs derived from caldera sources (Indian Peak and Caliente caldera complexes) outside the area. These volcanic rocks rest on, or are interbedded near the top of, fluvial and lacustrine rocks of the Paleocene-Oligocene Claron Fm. The Claron rests unconformably on fluvial rocks of the Upper Cretaceous Iron Springs Fm. Beginning in the latest Cretaceous and ending in the Paleocene, the Iron Springs and underlying older Mesozoic rocks were folded during the Sevier orogeny, producing a NE-trending open fold, named here the Big Hollow syncline. The axial trend of the syncline is aligned parallel to the Virgin anticline to the east. The Virgin-Big Hollow fold system is interpreted to be younger than thrusting in the Iron Springs district to the north and therefore may represent the youngest structural feature of the orogenic belt in this part of southwest Utah.

During the early Miocene (22 to 20 Ma), an episode of igneous activity in the Pine Valley Mountains produced a series of shallow, calc-alkaline laccolithic intrusions with associated volcanics and gravity-slide structures. The intrusions of the Pine Valley Mountains are part of the larger (140 km long) NE-trending Iron Axis magmatic province, which includes more than a dozen-exposed intrusions consisting mostly of quartz monzonite. The gigantic 30 km long by 11 km wide Pine Valley laccolith (20.5 Ma) caps a large portion of the Pine Valley Mountains and has a remaining thickness of as much as 900 meters. The laccolith intruded beneath a thin cover (<200m of Claron and Tertiary volcanics) and most likely occupied an area of 600+km2, as delineated by erosional outliers to the south and subsurface extensions beneath domed country rocks to the north. Gravity-slide structures associated with intrusive doming of several laccoliths consist of allochthonous masses of brecciated Tertiary volcanic and sedimentary strata detached along low-angle faults from the growing uplifted flanks of the Pinto Peak, Stoddard Mountain, and Pine Valley intrusions as well as the Bull Valley-Big Mountain (BV-BM) intrusion to the west. The largest slide mass (from BV-BM) covers 170 km2, is as much as 670 m thick, and extends more than 20 km from its intrusive arch. Immediately following each sliding episode, each intrusion erupted ash flows and (or) lava flows that partially or totally covered the slide masses. Thus, the laccoliths of the Pine Valley Mountains each show continuous growth stages from (1) initial rapid sill emplacement to its full lateral extent within the Iron Springs or Claron Fms, (2) vertical growth and bending of the overburden as the sill thickened into a laccolith, (3) gravity sliding from the upturned roof as the intrusion continued its vertical growth, and (4) eruption of ash flows and (or) lava flows as a result of pressure release due to gravity sliding.

Following intrusive activity (post-20 Ma), the area again received regional ash-flow deposits from the Caliente caldera complex (Racer Canyon Tuff) followed by local bimodal magmatism that produced abundant basalt lava flows and minor dacitic domes. Numerous post-8 Ma NS-trending high-angle normal faults produced an overall extensional related fragmentation of the Pine Valley Mountains at this time related to Basin and Range tectonism. The location and alignment of the youngest volcanic centers are highly controlled by the presence of these faults.

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Tectonic evolution of the northern-most basement of the Colorado Plateau: Petrology and Thermochronology of the Santaquin metamorphic complex, southern Wasatch Range, Utah.