Information about sample locations, Little Devil's Postpile

Overview. Little Devil's Postpile is a small ~80 meter basalt intrusion into the Cathedral Peak Granodiorite, cropping out across the Tuolumne River in Yosemite National Park (**Figure 1**). Our NSF-sponsored project used the ~8 Ma basalt intrusion into the ~89 Ma granodiorite as a laboratory to investigate how different thermochronological systems behaved in the contact aureole of the basalt intrusion. Our sampling was dictated by an earlier study and the specifics of the outcrops available.

Here we make general comments about the geometry of the intrusion and how this relates to the transect and sample locations we report. We also share several field images to locate the transects and provide context for the contact setting.

Transect Locations: **Figures 2 and 3** shows the starting points for the two sampling transects, their approximate locations, and the setting of the Postpile intrusion.

Two notes. First, we also report reset U-Th/He apatite and zircon ages from another locality, a re-entrant located on the south side of the basalt intrusion (**Figure 4**). Sampled by Greg Stock of the National Park Service and dated by Danny Stockli (University of Texas at Austin), these ages are from within 10 cm of the contact. Second, we also provide a sample-location spreadsheet file that provides location information for the transect starting points, and detailed information about sample location relative to the contact and one another. In general, the samples were too closely spaced for GPS data to be helpful.

Transect distances. The "nominal" transect distances we report are not ideal for looking at age changes versus distance, or for comparing dating results with thermal modeling. This is because the intrusion is not regular in shape, and likely dips to the west as an irregular tabular body as suggested by 2.5 D magnetic data (J. Schmidt, 2018, unpublished Ph.D. dissertation, Lehigh University).

For transect LDP10, which follows the Tuolumne River to the west, it is possible that true contact-orthogonal sample distances are considerably less than the nominal distances owing to westward dip of the intrusion. Moreover, the granodiorite-basalt contact is not well exposed and there could be 1-2 meters of uncertainty in the nominal distances themselves. However, overall the nominal distances should scale linearly to whatever the true orthogonal distances are.

For transect LDP12, the exact contact was identified in the bed of the Tuolumne River (**Figure 5)**, and here, for some 10 meters along strike, the granodiorite occurs as a wall that well-defines the contact trend. However, to get a range of sample distances, it was necessary to sample horizontally away from the contact near the river, then up the steep wall, and then along a sloping granodiorite surface (**Figure 6**). Thus, for transect LDP12, the nominal distances do not map in a simple linear fashion into orthogonal distances, and the orthogonal distances we report were calculated using transect details and the assumption that the relevant part of

the contact was vertical and of sufficient vertical extent that simple horizontal projection orthogonal to the local strike of the contact gives adequate distances.

We feel that the samples for transect LDP 12 are much better located with respect to the contact than samples from transect LDP10. That said, it is clear that the granodiorite joint planes that define the wall near the LDP12 contact are mildly arcuate and likely scalloped (**Figure 7**). Additionally, it is of course not possible to know how much basalt was present above current exposures. Thus, for samples located close to the contact, where higher-temperature systems were partially reset, the thermal field might have been complex in 3D. Thermal modeling shows how for such proximal samples, it makes a large difference whether the samples were in the middle of a tall vertical wall, or near a corner of the intrusion. Samples located farther away, 10 or more meters (mostly relevant to U-Th/He apatite resetting) feel this effect much less owing to the smoothing nature of the temperature potential field.

Figure 1. View of Little Devil's Postpile basalt intrusion, looking towards south.

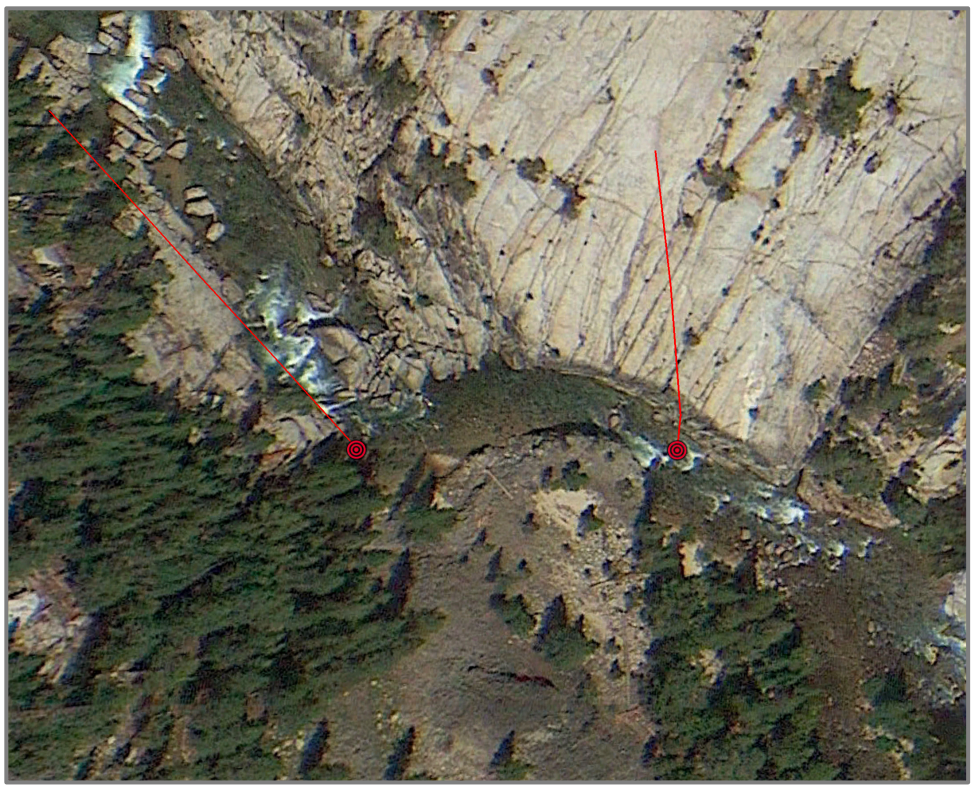

Figure 2. Google Earth image showing starting points and approximate locations of sampling transects into the Cathedral Peak Granodiorite (image orientation: vertical, north to top). LDP10, left; LDP12, right.

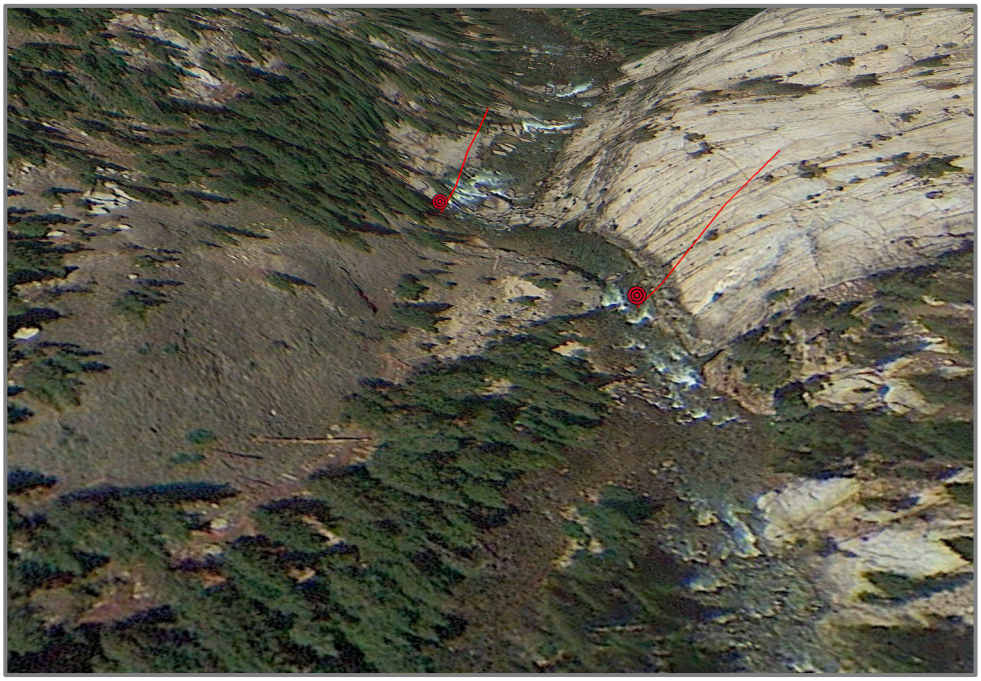

Figure 3. Google Earth image showing starting points and approximate locations of transects into the granodiorite (image orientation: oblique, northwest to top). LDP10, left; LDP12, right.

Figure 4. Closeup image of granodiorite re-entrant in basalt intrusion, like the one for which we report reset contact AHe and ZHe ages analyzed by Danny Stockli.

Figure 5. Starting point of LDP12 transect. Sharp contact between basalt and granodiorite occurs in the bed of the Tuolumne River, at right hand of person in stream (Hayden Miller, Caltech). Note quasi-ductile sheared fabric on granodiorite at base of wall. Other personnel shown: Kendra Murray, David Shuster, and Marissa Tremblay.

Figure 6. Start of LDP12 transect, which extends horizontally from contact to granodiorite wall, then rises steeply onto the granodiorite surface at top. This shows why the projected orthogonal transect distances are better than the nominal uncorrected distances. View to NNE.

Figure 7. View east along Tuolumne River, of granodiorite – basalt contact. While the contact has a consistent trend, locally it is scalloped. Peter Reiners (University of Arizona) gives scale.