

## USGS NSF GRIP Opportunity

- **USGS Center:** Volcano Science Center
- **Project Title:** Magmatism during Tectonic Transition: Platoro Caldera and the Platoro-Dulce Dike Swarm (Colorado - New Mexico)
- **Project Hypothesis or Objectives:**

Limited existing data and new reconnaissance field mapping suggest compositionally diverse magmatic dikes that radiate outward from Platoro caldera, source of five voluminous ignimbrite sheets (30-26.6 Ma) in Colorado's Southern Rocky Mountain volcanic field, merge in structural trend, composition, and age with the spectacular, but virtually unstudied, Dulce dike swarm that trends south-southwest for more than 100 km along the eastern margin of the Colorado Plateau.

Although no detailed descriptions of the Dulce swarm have been published, as many as 100 dikes are depicted on various regional maps. Some dikes, despite being only ~1 m thick, are traceable on Google Earth images for 20 km or more. Many are dark and fine grained; some have coarser micaceous interiors that should be especially suitable for high-precision dating. Whole rock analyses and 1980-vintage K-Ar dates on two Dulce dikes suggest intrusion of trachybasaltic magma between 25 and 20 Ma, well within the range of late-erupted lavas and dacite-to-andesite dikes proximal to the west side of Platoro caldera (recent  $^{40}\text{Ar}/^{39}\text{Ar}$  ages from 28.5 to 20 Ma).

The Platoro and Dulce dikes may thus record the combined effects of (1) centralized uplift associated with prolonged, late-stage solidification of a granitoid batholith, concurrent with (2) weak regional extension of the Colorado Plateau, satellitic to initiation of the Rio Grande rift zone to the east.

If this hypothesis can be validated, the Platoro-Dulce dike system would provide an exceptional and rare example of intertwined tectonic and magmatic connections on a vast scale during the transition from continental arc volcanism to regional extension, with implications for interpreting continental structural evolution and geologic hazards.

<b>Duration:</b>	10 weeks to 12 months
<b>Internship Location:</b>	Menlo Park CA
<b>Area of Discipline:</b>	Geologic Mapping, Tectonics, Volcanology, Rock Mechanics Igneous Petrology, Geochronology
<b>Expected Outcome:</b>	<p>Even for shorter-duration participation in fieldwork during the 2016 summer, the intern would become involved with one of the world's classic volcanic provinces, the Southern Rocky Mountain volcanic field (SRMVF), in collaboration with a widely recognized expert for this complex region. In addition, the intern would accompany a week-long "dry run" for the planned 2017 IAVCEI (International Association of Volcanology and Chemistry of the Earth's Interior) field excursion through the Rio Grande rift zone and the SRMVF. If a longer-term internship were undertaken, the intern would have an opportunity to undertake one or more of the multidisciplinary methods needed to interpret the origin of the Platoro-Dulce dike system.</p> <p>For the USGS, participation of the intern would support the needed summer 2016 fieldwork, would augment rate of progress in subsequent lab and office work, and could lead to novel insights into possibly geologically rapid magmato-tectonic processes, with implications for volcanic and seismic hazards during the transition from volcanic arc to regional extension in a Cordilleran setting.</p>
<b>Special skills/training Required:</b>	Completion of a bachelors or masters degree in an earth-sciences related discipline, with a strong background in igneous geology, tectonics, and/or geochemistry. Applicant must be physically capable of sustained fieldwork in rugged mountainous terrain at elevations of 8000 to 12,000 ft.
<b>Duties/Responsibilities:</b>	Fieldwork participation in dike mapping and sampling, especially along the critical transition zone of compositionally diverse dikes that radiate to the SW from the Platoro area and the S-trending Dulce swam of mafic alkalic dikes. In office, compile maps, prepare samples for analysis, and undertake preliminary petrologic studies. Depending on duration of the internship and interests of the intern, studies of the dikes utilizing one or more of the additional applicable disciplines listed above could be undertaken (perhaps providing the basis for a graduate dissertation?).
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