THE ORIGIN OF THE DICKS CREEK TRACHYANDESITE IN THE GUFFEY VOLCANIC CENTER, COLORADO: A STRATIGRAPHIC, PETROGRAPHIC, AND GEOCHEMICAL STUDY

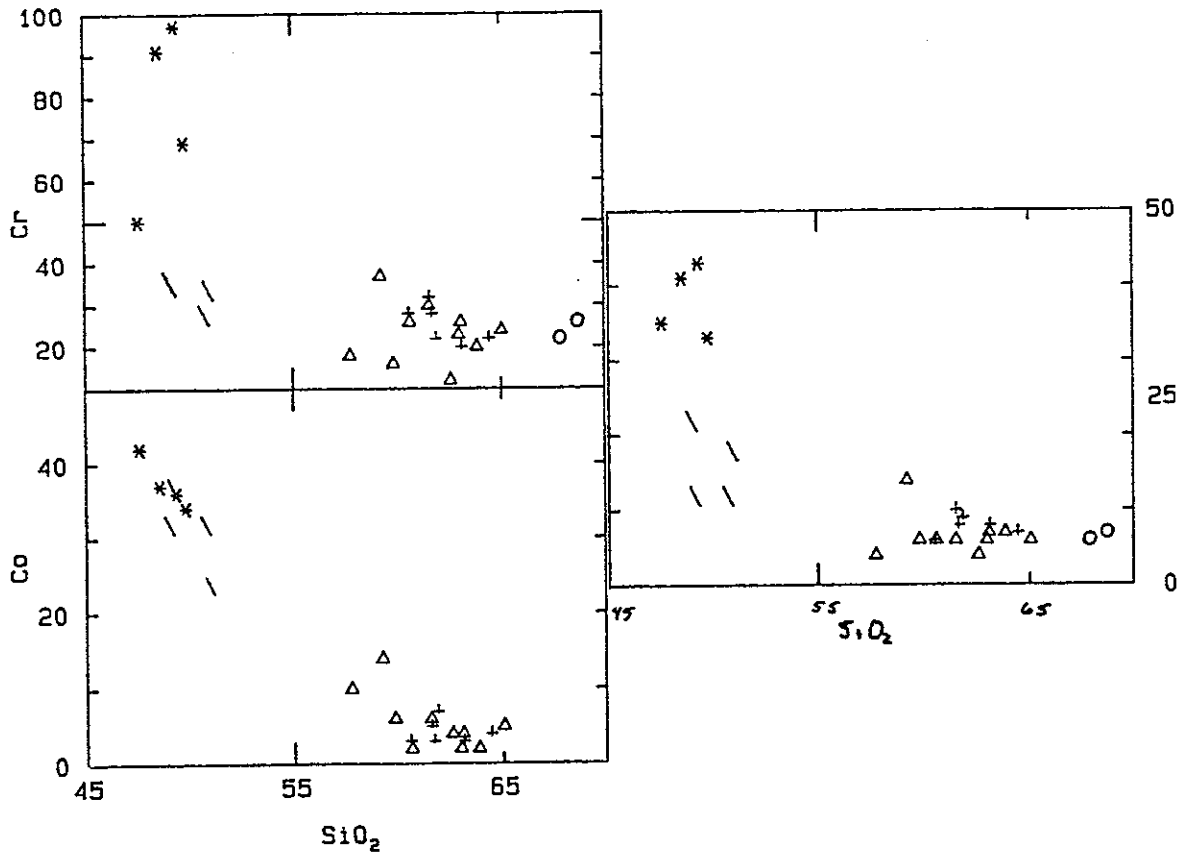
Gordon N. Keating

ABSTRACT

The Dicks Creek Area, lying within the Oligocene-aged Guffey Center of the Thirtynine Mile Volcanic Field, south-central Colorado, can be characterized by lithology as multiple hornblende-biotite trachyandesite and biotite trachyte flows and intrusions, extruded and emplaced during the laharic eruptions of the voluminous Lower Andesite of the Thirtynine Mile field. In this study, I reclassify these units according to new geochemical data and, through extensive petrographic description and preliminary geochemical analysis, establish a broad-based characterization as a foundation for future study in this area.

Distinguishing trends observed in the chemical data include high potassium levels among the major oxides, a near-logarithmic depletion of mantle-compatible trace elements, and tightly clustered, uniform plots of the Rare Earth Elements. The former two trends imply a fractional crystallization model for magma evolution in the area, but the unfractionated REE plots contradict this model and may even imply partial melting of a mantle peridotite source instead.

Stratigraphic and chemical trends in general suggest early- to middle-stage intermediate magmatism in the Guffey Center, followed, after a temporal and compositional gap, by late-stage mafic activity. These trends, along with the strong evidence for cogenesis from the REE plots, imply possible complex magma chamber geometry and multiple repenishement from a common source.



\ = BASALTIC TRACHYANDESITE DIKES

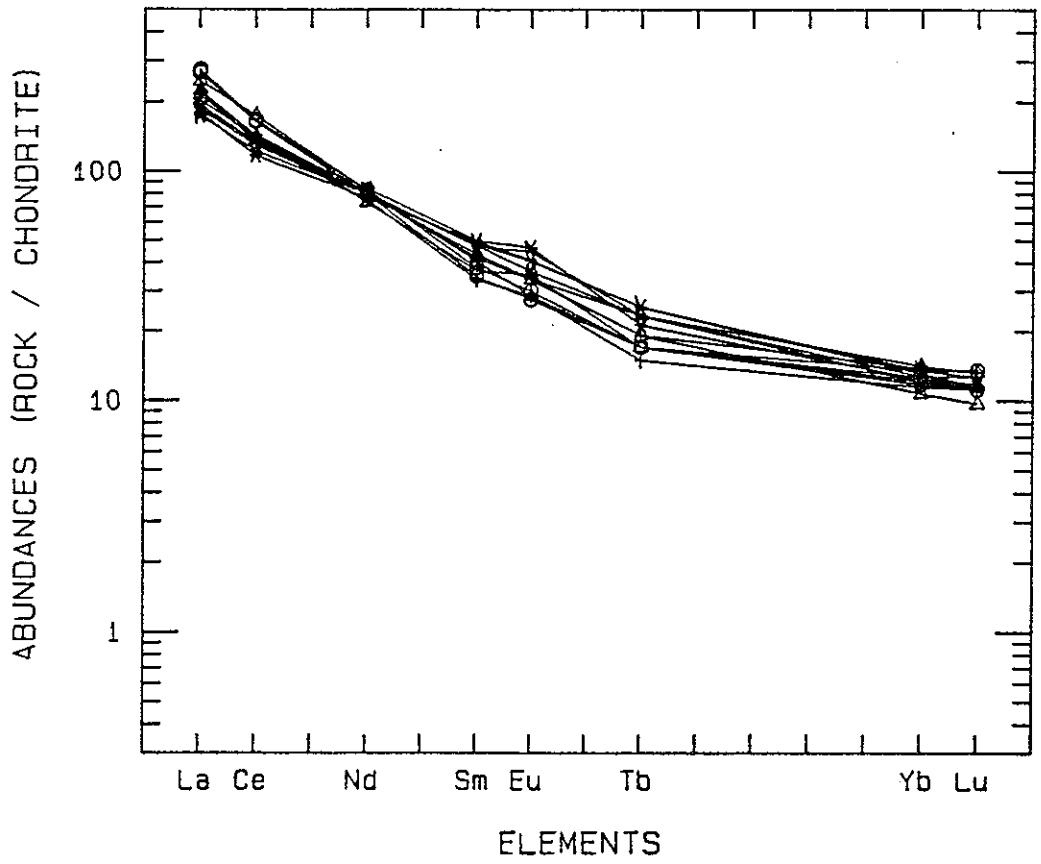
O = SADDLE MOUNTAIN RHYOLITE

+ = SADDLE MOUNTAIN TRACHYAND-TRACHYTE

* = SADDLE MOUNTAIN TRACHYBASALT

Δ = DICKS CREEK TRACHYANDESITE

Figure 33: Plot of selected Guffey suite trace element data versus silica differentiation index.



\ = BASALTIC TRACHYANDESITE DIKES

O = SADDLE MOUNTAIN RHYOLITE

\+ = SADDLE MOUNTAIN TRACHYAND-TRACHYTE

* = SADDLE MOUNTAIN TRACHYBASALT

Δ = DICKS CREEK TRACHYANDESITE

Figure 37: Chondrite-normalized Rare Earth Element (REE) data for the Guffey suite; see text for discussion.

THE PETROLOGY AND STRUCTURE OF THE HAMMOND-BALDY RIDGE, MID-TERTIARY THIRTYNINE MILE VOLCANIC FIELD, CENTRAL COLORADO.

David W. Mochel
Williams College
Williamstown, MA 01267

The east-west ridge containing Baldy and Hammond Peaks is located in the southwestern portion of the Guffey volcanic center (fig 1), within the mid-Tertiary Thirtynine Mile volcanic field of central Colorado. The Hammond-Baldy area is a somewhat unique part of the volcanic field in being comprised largely of intrusive (subvolcanic) rocks of intermediate composition. The geology of the ridge was previously described only briefly by Buchanan (1967) and Morris (1969), students of Rudy Epis at Colorado School of Mines, in their Master's thesis studies of more extensive areas within the Thirtynine Mile field.

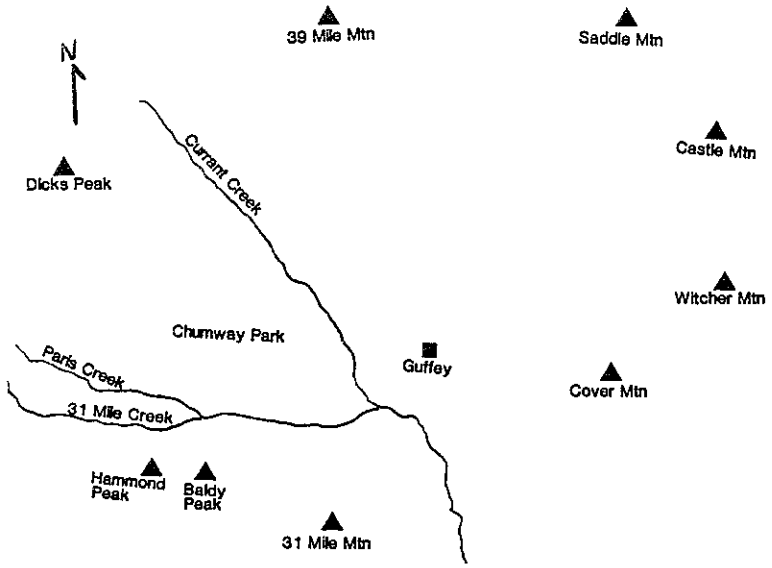


Figure 1. Index map of the Guffey Volcanic Center. The Hammond-Baldy study area is in the southwest corner. Scale: 1 inch = 3 miles.

The area of this study is underlain by a thick sequence of laharic breccias and interlayered flows of trachyte, latite and basalt that were mapped by Epis and his students as the lower member of the Thirtynine Mile Andesite. These flows are Oligocene in age and are found throughout the Guffey area. Intruding the flows in the study area are several large dikes and irregularly shaped bodies which have previously been mapped as biotite andesite and diorite (Morris, 1969; and Buchanan, 1967). They are reclassified here as trachyte and monzonite, respectively.

The lahars and flows are more than 350 meters thick beneath most of Hammond Peak and they also cap Baldy Peak. The lahars appear as dark, disintegrating, rubbly outcrops with the flows forming more resistant, laterally discontinuous outcrops. Baldy is also surrounded by basaltic flows from the Thirtyone Mile volcanic center, immediately to the southeast (Epis and Chapin, 1968), which are very similar at outcrop scale to those of the lower member of the Thirtynine Mile Andesite. The highest ridge of Hammond Peak is composed of two distinct intrusive phases of monzonite that form a very large (150 meters by 40 meters) east-west trending composite dike. The older of these monzonites is grayish green, medium grained and equigranular to porphyritic. The second (younger) phase is much finer grained and clearly intrudes the medium grained variety. The trachyte is a light gray to white rock with phenocrysts of biotite; it intrudes the flows on the north and east flanks of Hammond, the summit of Baldy, and all of the intervening hill.

There is a large amount of dark silicified breccia surrounding the monzonite dikes of Hammond Peak with clasts that are derived from the lahars and from the trachytic intrusions. The trachyte on the top and south flank of the hill between Hammond and Baldy appears to be highly silicified and a large portion of it is brecciated as well. A breccia containing a variety of clasts, most unidentifiable but some of Precambrian granite, occurs immediately below the