

Petrology of the Santiago Peak Volcanics, San Diego County, California

Jerehme Acosta

Abstract

The Santiago Peak Volcanics (SPV) is exposed discontinuously in a belt along the western side of the Peninsular Ranges batholith in southern and Baja California. The SPV is intruded by ~125-100 Ma intrusions of the batholith and unconformably overlain by Late Cretaceous forearc basin strata of the Rosario Group. The SPV has been interpreted as the volcanic cover of the batholith and is one of the best places anywhere that genetically related volcanic and plutonic assemblages of a convergent margin arc can be studied together.

This study provides reconnaissance whole rock major and trace element data from SPV samples in areas of southern San Diego County where there is little or no data. The goal is to better constrain the nature of the volcanic arc represented by the SPV.

Twelve samples of SPV were collected from the La Mesa area to Otay Mountain near the US-Mexico border. The samples are volcanic flow rocks and lapilli tuff breccia typical of the SPV. Although original textures are visible in hand specimens, the rocks have experienced greenschist facies metamorphic overprinting.

Whole rock chemical analyses were obtained from fresh outcrop samples initially breaking up the rocks with the hydraulic RockLabs splitter/crusher to facilitate selection of approximately 90-100g of freshest homogeneous rock fragments. This material was then reduced to a fine powder using a tungsten carbide ring mill. The rock powder was used to make both a pressed pellet (for trace element analysis) and a fused disc (for major element analysis) which were analyzed using the Phillips XRF spectrometer in the Department of Geological Sciences.

The samples are strongly subalkaline and range in SiO₂ from ~61 to 74 wt% which indicates they are andesite, dacite and rhyolite. The SiO₂ versus K₂O plot indicate the rocks are arc tholeiite or calc-alkaline in character consistent with a volcanic arc origin. The SiO₂ versus FeO^T/MgO also indicated calc-alkaline and tholeiite affinities as well as the Nb/Y versus Zr/Ti plot. The composition and nature of the samples suggest derivation from nearby stratovolcanoes and/or possible caldera complexes.