

Utility of High-Altitude Infrared Spectral Data in Mineral Exploration: Application to Northern Patagonia Mountains, Arizona

BYRON R. BERGER,[†] TRUDE V. V. KING, LAURIE C. MORATH, AND JEFFREY D. PHILLIPS

U.S. Geological Survey, Denver Federal Center, MS 964, Denver, Colorado 80225-0046

Abstract

Synoptic views of hydrothermal alteration assemblages are of considerable utility in regional-scale minerals exploration. Recent advances in data acquisition and analysis technologies have greatly enhanced the usefulness of remotely sensed imaging spectroscopy for reliable alteration mineral assemblage mapping. Using NASA's Airborne Visible Infrared Imaging Spectrometer (AVIRIS) sensor, this study mapped large areas of advanced argillic and phyllic-argillic alteration assemblages in the southeastern Santa Rita and northern Patagonia mountains, Arizona. Two concealed porphyry copper deposits have been identified during past exploration, the Red Mountain and Sunnyside deposits, and related published hydrothermal alteration zoning studies allow the comparison of the results obtained from AVIRIS data to the more traditional field mapping approaches. The AVIRIS mapping compares favorably with field-based studies. An analysis of iron-bearing oxide minerals above a concealed supergene chalcocite deposit at Red Mountain also indicates that remotely sensed data can be of value in the interpretation of leached caps above porphyry copper deposits. In conjunction with other types of geophysical data, AVIRIS mineral maps can be used to discriminate different exploration targets within a region.

[†] Corresponding author: e-mail, bberger@usgs.gov