Determination of mineral abundance in beach sands using spectroscopic data and traditional methods of sand composition and grain size analysis

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Remote sensing is rapidly becoming an invaluable tool in the field of geology, particularly for mineral identification and exploration. Sand grain composition analysis is a necessary but time-intensive component in sedimentological investigations; spectral reflectance data can shorten and streamline this process. Benefits of spectroscopy over traditional sedimentological methods include minimum sample preparation steps and smaller sample amounts (<30 g). Spectral indices and band ratios, traditionally used to compute mineral abundances in imagery, can be applied to spectroscopic reflectance data to determine mineral abundances in sands. In this study, over 100 samples were analyzed through traditional microscopic methods and compared to spectral reflectance collected via an ASD Spectroradiometer. Many minerals show diagnostic overtone and combination bands in the 350-2500 nm window; to take advantage of these properties, three methods were chosen to compare spectroscopic data to sand composition and grain size: 1) spectral indices, 2) continuum removal techniques, and 3) derivative analysis. Correlation was found to be increased when methods were combined, and also when sands of similar colors and compositions were grouped.