

REMOTE DETECTION OF FOSSILS USING INFRARED SPECTROSCOPY

The field of geology has broadened its horizons outside our planet with the Mars rovers Spirit and Opportunity spending the last year doing autonomous analysis of that planet's mineralogy. With the detection of geologic processes indicating water once flowed on Mars, the next step would be detecting life in the form of fossils. Robot geologists must run autonomously and make decisions based on pre-programmed software. The Mars rovers utilize a thermal emission spectrometer to look for and characterize infrared spectral signatures and are able to automatically identify minerals at distances from tens to hundreds of meters. Libraries of Earth based mineral spectra exist and the rovers have now compiled a library of Mars mineral signatures, but no corresponding library of fossil spectra exists. This work represents the first step and looks to see if indeed fossils exhibit characteristic signatures in the infrared and if they are sufficiently distinct to allow for automated follow up observations. Material from the Cretaceous and Eocene are spectroscopically examined in the mid-infrared to determine their characteristics. The potential for discrimination from the background matrix is discussed. This work may have applications for identifying fossils in the field as the next generation of spectrometers become more portable and sensitive.