HYPERSPECTRAL MAPPING OF AN ANCIENT HYDROTHERMAL SYSTEM

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Hydrothermal deposits have been suggested as locations of high importance in the search for fossilized forms of ancient biota on Earth (Farmer and Des Marais, 1999;Walter and Des Marais, 1993). They occur where spatially confined warm (50^{O}) to hot (500^{O}) fluids are in disequilibrium with their host rocks (Pirajno, 1992). By the action of such a system, solutes can be concentrated to form ores at certain horizons within or on the surface of a rock body. Such concentrations may be developed where a drop in temperature, pressure, or alteration of the permeability or chemistry of the host rocks created conditions suitable for the solute to be precipitated from the hot fluid.

Hydrothermal vents at mid ocean ridges have been found to harbour a stunningly wide variety of life. The energy available due to the chemical disequilibrium around such sites has caused many scientists to wonder whether such deep sea vents may have been the 'cradle of life' (Macleod*, et al.*, 1994) on Earth.

Economic geologists and remote sensing specialists have long been interested in hydrothermal deposits for their valuable ore deposits. The distinctive alteration minerals that come about through hot water reacting with rock are easily detectable by satellites or aircraft carrying infrared spectrometers such as the Australian built HyMap or PIMA II field spectrometer (Thompson*, et al.*, 1999). Such an instrument is proposed to fly with the ESA ExoMars mission in 2009. As part of the preliminary investigation proving the usefulness of this technology at suitable Earth Analogues, an investigation has been carried out at the North Pole Dome in the Pilbara region of north western Australia, site of many famous stromatolitic horizons (Hoffman*, et al.*, 1999). Preliminary results of this study will be presented, detailing the range of information available and its applicability to the discovery of suitable habitats for life on Mars.

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