PRECAMBRIAN PALAEOSOLS

IGCP – 157 'Early Organic Evolution and Energy Resources' organized a conference on 'Precambrian Palaeosols' at Raleigh, North Carolina on June 1 and 2, 1985. Palaeosols are like fossil skeletons of animals, in the sense that both were once living and developing at the surface of the earth. Only their hard parts are commonly preserved, but from these remains much can be learned of the past. Twenty scientists from USA, Canada, India, Finland and Germany participated in two-day long seminar cum group discussion. The paper readings and discussion led to the conclusion that although the discipline of soil science has long been the preserve of agronomists, they had not devoted much attention to weathering in the Precambrian. Even geologists have refrained from applying pedological theories to the interpretation of Precambrian palaeoatmosphere. It was realized that the biggest problem is the identification of palaeopedological surfaces in Precambrian rock profiles. They could be identified by erosionally truncated surfaces. Below such a surface, weathered material should grade into unaltered parent rock. Colour, texture and grain size differences could be distinctive. Archaean and Proterozoic palaeosols developed on basalts or ultramafic rocks exhibit an unusual bright lime-green colour. Most participants agreed that all Precambrian palaeosols reflect major unconformities. Additional areas could come to light by interpreting existing geological maps. The participants agreed that in most cases where suspected palaeosols have been modified, chemical approach should be the basis for their identification. There was, however, disagreement as to how chemical analyses of Precambrian palaeosols should be presented and interpreted. A study of iron concentrations or the ferric/ferrous ratio within a palaeosol may indicate the oxidation state during its formation. It is believed that iron-depleted reduced palaeosols are common in early Precambrian rocks, but recent work has shown that some weakly oxidizing palaeosols date back to 3.1 Ga. Hence, existence of weakly oxidized early Precambrian palaeosols suggest that early Precambrian (Archaean) atmosphere did contain some free oxygen. The conference participants discussed hard to find an answer to aspects like nature of soil biota, the role of pedogenesis in creating ore deposits, palaeogeography, palaeotopography and interpretation of palaeoclimate and early atmospheric composition.

An important contribution was made by two young Germans from Essen, who explained their latest laboratory experiments for simulating Archaean atmosphere inside glass chambers and test-tubes, in order to observe the effects of this artificial atmosphere on various rocks and sediment types.

The conference was organised by Mike Kimberley with cooperation of Dick Holland, Manfred Schidlowski and G. J. Retallack.

The participants felt that palaeopedology may gradually become a 'respectable', subdiscipline of Earth Science, but today it is still only a delightful intellectual adventure for a few.

University of Delhi
Delhi

D. M. BANERJEE