

## Preface

During the 1st and 2nd of June, 1985, a meeting was held devoted to Precambrian paleosols. Not knowing exactly what to expect before the meeting from the handful of abstracts circulated and news of difficulties in funding the meeting, I joked with my colleagues about the 'First International Symposium on Precambrian Paleosols, in Raleigh, North Carolina, ..... where all seven of us involved in this kind of research will chat about our work.' As it turned out, I was wrong about the attendance (there were 19 official participants and about a dozen others), but correct about the international flavor of the meeting (with representatives from India, West Germany, Finland and Canada, as well as expatriates from South Africa and Australia). The able organization of Michael Kimberley, working under the aegis of IGCP Project 157, made it a meeting more memorable than many other international ones I have attended. Perhaps there will be a second or third?

In a fledgling field of scientific endeavor, like paleopedology, there is a lot to learn, and the small informal nature of the meeting was ideal for this. Heinrich Holland (Harvard University) stressed features used for distinguishing fossil soils from other kinds of alteration with which they could be confused. David Grandstaff (Temple University) discussed interpretation of atmospheric oxidation from geochemical analyses of paleosols. Michael Kimberley (North Carolina State University) presented data on trace elements in paleosols. Elizabeth Zbinden (Harvard University) stressed petrographic changes due to ancient weathering. Hubert Wiggering (Essen University) presented results of experiments on weathering of basaltic rocks under different atmospheres. David Mossman (Mount Allison University) discussed possible geological effects of soil microbes. I tried to relate Precambrian paleosols to the geological history of soils. By popular demand Stanley Buol (the only 'soil scientist' present, from South Carolina State University) gave several presentations on modern soils and soil formation processes, relevant for interpreting the various Precambrian paleosols introduced; and there were quite a few of these. Overviews of Precambrian paleosols were presented for India (by Dhiraj Banerjee, University of Delhi) for Canada (by Gerry Ross, Washington University, and Alan Donalds, Carleton University) and for South Africa (by Noel Tyler, University of Texas at Austin). Individual paleosols also received detailed attention. A paleosol developed on top of the Hekpoort Basalt in South Africa stirred some controversy between Tyler, Holland and Retallack. A magnificent preserved sequence of caliche-bearing paleosols from northern Michigan was characterized by Jarmo Kalliokoski (Michigan Technological University). For sheer depth, degree of development, and detailed documentation it was hard to surpass the 2300 Ma old profile from Finland described by Jukka Marmo (Geological Survey of Finland). We were surprised to see t

we had opened an area of research, which like the contents of Pandora's box, already seemed to have a mind of its own.

At the end of the formal presentations, we attempted to harness ideas that we had unleashed by proposing promising future lines of research. Further documentary efforts are badly needed: few Precambrian paleosols are effectively described. Also needed are more experimental and computer simulations of Precambrian weathering. Among wider scientific questions, the origin and antiquity of life in soils received some attention. Microfossils, trace fossils, soil structure and distribution of metallic trace elements commonly complexed with organic matter, are all potential clues to form life in the soils. However, the most direct and simple approach would be to begin analyzing organic carbon in paleosols in a systematic way. I only know of one result for the whole Precambrian: small amounts of organic carbon in a paleosol 2400 Ma old!

Much more attention was devoted to the perennial question of Precambrian atmospheric composition. The calculations based on oxygen and acid consumption of paleosols proposed by Holland (1984) in his recent book 'Chemical Evolution of the Atmosphere and Ocean' need to be applied with special care for other soil forming factors, such as the past action of soil organisms, paleoclimate, time over which the soil formed and paleotopography. This latter factor was especially stressed. Until more sophisticated and effective weathering models are devised, Holland's calculations should be tested against more paleosols. Considering attention already paid to very early Precambrian paleosols, detailed study of late Precambrian and early Paleozoic paleosols are likely to give important early results documenting the rapidity of change from Archaean to modern levels of oxygenation.

Opinions were divided on whether to publish the results of the meeting. Most of us had come with more ideas than data, more enthusiasm than application. Some of us, however, have been very busy since, toiling to bring to a wider audience some of the ideas and excitement of our meeting. Each contribution presented here reveals a different approach and viewpoint, rather than a reformulation and stocktaking of research accomplishments. This is to be expected in an area with few research traditions. There is as yet no consensus on the scope and central concepts of Precambrian paleopedology. If there is a coherent message to this diverse collection of papers, it would have to be this: paleosols are out there in surprising abundance, and soon will be appearing in Precambrian rocks near you.

GREGORY J. RETALLA  
Department of Geology  
University of Oregon  
Eugene, OR 97403, U.S.A.