

BOOK REVIEW

Pétrologie des Latérites et des Sols Tropicaux (Petrology of Laterites and Tropical Soils), by Yves Tardy. Masson, 120 Boulevard Saint-Germain 75280, Paris Cedex 06, France (1993). 459 pages. Softcover (ISBN 2-225-84176-4).

This book provides a comprehensive account of the structure, distribution and genesis of laterites and tropical soils. A wealth of information is clearly and logically presented. Background data were collected from a large number of studies, many of which have been performed over the past 20 years at the Centre de Sédimentologie et de Géochimie de la Surface, which is associated with l'Université Louis-Pasteur de Strasbourg. The Centre has been known as a world leading research organization for the study of laterites and tropical soils. In close collaboration with ORSTOM (Office de la Recherche Scientifique et Technique Outre-Mer), the Centre has conducted a wide range of studies on laterites and tropical soils mainly from African and South American continents. Thereby the book deals extensively with those from these two continents, although brief references are given to other areas such as Australia and South Asia.

The author, who is a professor of geochemistry at l'Université Louis-Pasteur de Strasbourg and Research Director of ORSTOM, is evidently qualified and experienced in this subject. The book is dedicated to the late Professor Emeritus Georges Millot in his memory. Professor Millot was the founder of the Centre as well as the author's mentor and patron. The book contains 13 chapters which are grouped into four parts. The last chapter is exclusively allotted to concluding remarks.

The first part (Chapters 1, 2) discusses parent rocks and the extent of various alterations by which the parent rocks have been affected. It then discusses coarse saprolites and various origins of lateritic profiles without climatic significations.

The second part (Chapters 3–5) deals with major features of ferricrete profiles with the following sequences: kaolinitic lithomarges (fine saprolites), formation of mottled zones by pedogenic processes, the accumulation of iron and the formation of loose soil horizon at surface which result in formation of lateritic duricrusts and ferricretes. And at the end of this part geochemical assessment of the ferricrete formation is discussed.

The third part (Chapters 6–10) provides case studies to show how geomorphological and climatic conditions affect the shaping of ferricrete landscapes. These include studies on four tropical regions in Africa: Gaoua of Burkina Faso, Banankaro of Mali, Odienné region of Ivory Coast, and Haut-M'bomou of Central African Republic. The first two are situated in dry regions and the latter two in humid regions all with seasonal contrasts. A special emphasis on geochemical and geophysical accounts is given to the ferricrete formations in the regions. A theory for the formation of ferricrete is presented at the last chapter of this part.

The fourth part (Chapters 11, 12) discusses bauxites and soft laterites. Chapter 11 is devoted to the classification, mineralogy and occurrence of bauxites. Bauxites are classified into three groups; orthobauxites, metabauxites, and cryptobauxites. Conakrytes are ferruginous analogues of orthobauxites. In orthobauxites, gibbsite is the most essential mineral while

minerals such as quartz, kaolinite, goethite and hematite are also present but their quantities vary with depth of profile. Boehmite is generally absent in orthobauxites. A conakryte from New Caledonia contains 79% Fe₂O₃ and its most dominant constituent mineral is goethite. Conakrytes occur in profiles primarily developed on ultrabasic rocks as in New Caledonia. Metabauxites are more aluminous and less ferruginous than orthobauxites, and contain a significant amount of boehmite having pisolitic texture. They occur in northern Australia, western Africa and north-western India. Cryptobauxites, as seen in an Amazon region, designate bauxites occurring in bauxitic formations which are buried under pedologic loose materials. Chapter 12 describes protobauxites and unconsolidated lateritic materials of relatively young age, some of which are considered to be precursors of bauxites.

In the conclusion, Chapter 13, the author emphasizes the importance of hydration and dehydration in the process of lateritization. The efficacy of these actions is differently influenced by climatic, topographic and geologic conditions under which regions are situated. As temperature, precipitation, water-table level, permeability, dynamics of underground meteoric water circulation and mineral composition of parent rocks are regarded as critical factors controlling hydration and dehydration, a multidisciplinary approach is indispensable to achieve a meaningful study on laterites. At the end, the book also contains a bibliography, a glossary and an alphabetical subject index. Many of the figures and tables appear to have been prepared for the book, besides those reproduced from cited papers.

I was fascinated by the author's ability to synthesize accounts from a wide variety of observations in macroscopic to microscopic scales, such as landscape characteristics, differences between horizons, variations within a horizon, mineral distribution and paragenesis in an aggregate, variations in the mineral composition within a particle, ionic substitutions in mineral structures (in particular, Al for goethite and hematite, Fe for gibbsite), crystallite size, crystallinity and crystal morphology. From my personal experience through the study on paleosols in Canada in which gibbsite and kaolinite are present, the book gave an insight into the fact that the formation of those minerals followed universal physicochemical rules, regardless of whether regions are tropical or not.

The author states in the Preface "... that for a book to make a point in a discipline, it sometimes comes down to accepting an inventory of facts that masks a vital lead (le fil conducteur) and an author's inspiration becomes secondary to the collection of ideas expressed by others. On the other hand, for a book to hold an original breath and contribute to the renewal of a discipline sometimes comes down to accepting the fact that the synthesis of former work is evaded by the profit of new discoveries. I would like to see this book meet two points; a look at the considerable acquisition to date and an opening toward new horizons." In my opinion, his intention is successfully accomplished.

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