

SYNOPSIS

PETROGRAPHY, CHEMISTRY AND EVOLUTION OF SOILS FROM TWO CONTRASTING ENVIRONMENTS

Study of weathering processes and products under two contrasting climatic conditions i.e. tropical humid (Neyyar Basin-NB, Kerala) and semi-arid (Tambraparni Basin-TB, Tamil Nadu) is the primary objective of this research work. In these basins, chiefly metamorphic rocks underlie physiographic domains like lowland, midland and highland. Different master horizons/sub-horizons in 18 soil profiles in NB and 19 soil profiles in TB, exposed in newly dug well sections/quarries/road sections have been studied and sampled. The climatic variance between the basins has given an explicit upshot in development of soil horizons and profiles.

Analogous parent rock is a common attribute in the two basins. Profiles with charnockite and GBG as bedrock, representing midland and highland in each basin were identified for detailed studies, viz., textural, mineralogic and geochemical aspects, which provide crucial signatures on the stages, magnitudes and intensities of mineral transformations from bedrock to topsoil. The difference in weathering pattern in NB and TB in terms of the above aspects has been documented, and the role of contrasting climate (humid in NB vs. semi-arid in TB) in developing this differential weathering scenarios has been established.

Different indices of weathering viz., Leaching Factor (LF), Product Index (PI), Weathering Index (WI), modified Weathering Potential Index (MWPI), Chemical Index of Alteration (CIA), and Chemical Index of Weathering (CIW) have been applied to differentiate the degree of weathering in NB and TB. A new index of weathering is proposed based on the relative loss of bases.

This thesis is presented in seven chapters. The first chapter gives introduction, review of literature on weathering, objectives of the study, description of the study area, summary of materials and methods used as well as a survey of previous work. The second chapter illustrates specifics of physiography, climate and geological setting of the study area. The third chapter speaks on role of physiography (altitude, slope and relative relief), lithology and climate on development of weathering profiles. Textural features of soil/weathered material in different horizons of weathering profiles are described in the fourth chapter. Fifth chapter deals with mineralogy and an overview of petrography of materials in different select horizons. Geochemical characteristics of materials studied are given in sixth chapter. Seventh chapter summarizes the vital outcome of this research.
