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Volcanic Rocks and Kindred Sediments of the Ophiolite Belt of Indo-Myanmar Ranges of Northeast India and Implications on the Tectonic Setting of the Continental Margin Basin

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The Ophiolite Belt in Manipur and Nagaland states of the Indo-Myanmar Ranges (IMR) of North-east India consists predominantly of tectonic slices representing various units of ancient ocean-floor rocks that include the ultramafic body (main ophiolite suite), mafic dykes and sills, pillow lavas, kindred rocks and pelagic sediments in a jumbled manner. The assembly of these different tectonic slices/blocks of the whole range of the litho-units, possibly of a hyper-extended ocean-continent-transition basin, constitute the Ophiolite Mélange Zone/Belt. The ultramafics, having sporadic diabasic dykes cutting across them, are found to have been sandwiched with pelagic shale and generally occupy the central portion of the belt, and host very limited exotic rocks in this horizon. The ultramafic horizon is flanked at the western and eastern margins by the hosts of pelagic sediments that are infested with various exotic rocks. The host pelagic sediments, particularly shale and cherty shale, generally have small igneous (mafic) intrusions in the form of dykes and sills. The associated exotic rocks include a number of blocks of variable dimensions of diabasic dyke, pillow lava and rocks kindred with lava extrusion, chert, conglomerate and gritty sandstone. Since all the litho-units are tectonically jumbled, and no two consecutive litho-units are preserved intact in the field, establishing the correct order of the sequence is a big challenge. Careful geological mapping and analysis of the disposition of the litho-units, and mode of association of the intrusives with the then ocean floor rocks and associated sediments was done in the field. In corroboration with petrological and geochemical fingerprints, and also considering the concept of modern hyper-extended ocean-continent-transition basin characteristics, a generalized and simplified stratigraphic sequence of the Ophiolite Mélange Zone of the IMR of Northeast India is worked out.

The Manipur and Nagaland Ophiolite Belt is found to have exotic blocks of spilitic carbonatite, a rock which is mostly made up of calcite and quartz. Other kindred volcanoclastic types of sediments are also found exposed sporadically as exotic blocks having variable dimensions. One kind of such sediments from which the latent petrogenetic information are uncoded to give the picture of the environment of the pillow lava extrusion is the chert blocks in which irregular tongues of extrusion related phases of calcite are included. Some exotic blocks comprising brecciated pieces of earlier formed fine grained chert enclosed by the later crystallized coarse grains of quartz are also found. Consequently the volcanoclastic and kindred sediments of pillow lavas of the Ophiolite Belt are used as tools for deciphering the environment of the hyper-extended continental margin basin contended by Soibam et al. [1]. In addition to these volcanoclastic sediments, evidence from the inter-pillow material within the individual blocks of pillow lavas and a kind of pillow lava in which pieces of calcite are enclosed, are also considered in deciphering the geologic environment and mechanism of pillow lava extrusion. The field setting, petrology and geochemistry of mafic intrusive and pillow lavas suggest a thin oceanic rock sub-

stratum, which could have been generated in an ultra slow spreading regime. Studies on the vesicle size and specific gravity of the pillow lavas reveal that the depth of the hyper-extended continental margin basin, in which the sediments of the IMR deposited, could have been about 2000-3000m.

References:

[1] Soibam et al. (2015) Geological Society London Special Publication 413: 301-331

