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Palynostratigraphy In Tectonic Interpretation And Basin Analysis , Neogene, Papua New Guinea.

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Palynofacies analysis is the study of all the organic particles present in a palynological sample, including particles of wood, leaf cuticle and other higher plant tissue, insect remains, fungal spores, marine plankton, and the spores and pollen of land plants. It is used in palaeoenvironmental reconstructions and can provide information on processes such as bottom water oxygenation, distance from shore, climate changes, and characteristics of terrestrial vegetation. Variations in abundance, type, and fluorescence of contemporaneous and reworked palynological particles have been documented through a lithologically monotonous sequence of lower Pliocene mudstones of the Orubadi Formation, in the Puri Anticline of the Papuan Foreland Basin, Papua New Guinea.

Foraminiferal assemblages have allowed recognition of four cycles of bathymetric change, and an overall shallowing-up within this Papuan Foreland Basin section (Haig and Medd, 1996). Reworking of microfossils into the basin reflects the stratigraphic units being exposed and eroded during that time in the New Guinea Highlands. Taxonomic studies of dinoflagellate cysts indicate several episodes of reworking to at least as far back as the Cenomanian. This reworking occurs in pulses, which are interpreted as being due to individual thrusting events in the hinterland; the New Guinea Fold and Thrust Belt. In addition, contemporaneous palynofacies assemblages provide information about changes in altitude, gradients, climate, and terrestrial vegetation. These support the hypothesis that hinterland thrusting events are reflected palynologically in the foreland basin, and are followed by infilling of the basin.

Fluorescence of palynological particles may be affected by age, oxidation and thermal maturation and may therefore provide information about tectonic and palaeogeographical events in the source area of the particles. Palynological particles in this section have been found to have different fluorescence properties and therefore different sources; 1) rocks at the southern (proximal) edge of the fold and thrust belt - not greatly affected by tectonic events, 2) rocks at a more distant location within the fold and thrust belt - affected by tectonic controlled changes in gradient, orographic rainfall and fluvial transportation; and 3) contemporaneous vegetation - affected by tectonic-controlled changes in altitude and fluvial transportation. Variation in the fluorescence of palynological particles from these sources has allowed interpretations to be made about timing of thrusting events, resulting changes in the weathering and transportation regime, location of sources of reworking, and the variations in accommodation space in the foreland basin. Thus, palynostratigraphy is demonstrated to be of considerable potential value as a means of investigating terrestrial and palaeoceanographic changes in the modelling of tectonic and basinal processes, particularly in such monotonous sedimentary sequences as the Puri Creek section.

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