SEDIMENTOLOGICAL CONSIDERATIONS OF HOLOCENE TUFA CARBONATES, ORISSA STATE, INDIA

1DAS, S. and 2MOHANTI, M. 1Orissa Remote Sensing Application Centre, Bhubaneswar, India; 2 Department of Geology, Utkal University, Bhubaneswar, India.

Holocene freshwater tufas of Orissa State, India have been studied. Sparry and micritic laminae in stromatolitic tufa represent seasonal deposition and contain filamentous and coccoid cyanobacteria and diatoms. Micropores in spar crystals suggest bacterial activity. Aragonitic laminae show radial, bushy and spherulitic fabrics(microbially controlled). Phytohermal (moss-rich) tufas show micritic to microsparry encrustations and reveal epiphytic microorganisms. Pisoids have been formed by development of fine cortical laminae around intraclastic tufa. Vadoids show fine cortical laminae around spherulites and radial needles. Microfabric of speleothemic crusts suggest precipitation of finer crystallites and subsequent transformation to a coarser fabric. Rhombic, needle and spiky cements and neomorphic spar (inverted from aragonite) are developed in vadose setting. CO2 outgassing due to agitation, from waters supersaturated with respect to calcite, is the dominant process. Photosynthetic effects is low due to low residence time of water. Microorganisms and mucilage/EPS initiate crystal nucleation and favour rapid inorganic precipitation. Aragonite precipitation is controlled by Mg and Sr concentrations in the waters. Dolomite precipitation is not favoured due to non-availability of thermodynamically active Mg2+. ?13C and ?18O values indicate deposition at ambient temperature. There is greater contribution of biogenic carbon along with some atmospheric carbon. High ?13C values may suggest partial isotopic disequilibrium due to kinetic effects. Based on several assumptions, ca. 4-5oC change in the climate is estimated. Plant matter in tufas indicate a climatic influence on tufa deposition. The morphology of the deposits are controlled by the substrate slope, plant growth and water flow. Three depositional models are proposed.