Zaherite and artificial mudbanks

Mudbanks are calm patches of water within an agitated sea, formed due to wave damping; they appear close to the shoreline of Kerala during the SW monsoon. They are known fishing grounds and help in protecting the coast from erosion. The mudbank sediments are characterized by the presence of abnormally high water content and lack of shear strength.

XRD studies of sediments from Alleppey mudbank have shown the presence of a mineral, namely zaherite, which has not been reported so far from this area. Zaherite ($Al_{12}(SO_4)_5(OH)_{26} \cdot 20H_2O$) is a hydrated aluminium sulphate[1] and was first reported from the Salt Range of Pakistan (M. A. Zaher, unpublished). It has a density of 2.007 and occurs as extremely fine tubular and fibrous grains. Though electrostatically neutral, zaherite is bipolar. The concentration of zaherite in the mudbank sediments of Alleppey determined by chemical analysis varies between 2% and 3%. It is not found in sediments collected from the adjoining non-mudbank areas.

Mudbanks, as a rule, occur in shallow waters with their seaward periphery confined to the zone, where the wave base confronts the seafloor strongly. Bathymetry has a key role in delineating the seaward periphery of mudbanks. In this zone, a large quantity of wave energy is transferred to the seafloor, a phenomenon which is maximum during the SW monsoon. Due to this, the bottom sediments undergo intense churning and are brought into re-suspension. During this process, the adsorbed cations are stripped-off from the flocculated clay minerals due to the energy imparted by the waves, making them negatively charged. These charged minerals again flocculate by adsorbing cations from sea water. But when zaherite is present in the sediments, the clay minerals get attracted towards the positive end of zaherite rather than the less active sodium, potassium or magnesium ions available in sea water. In this process, the clay minerals flocculate by randomly sticking to zaherite grains and settle down. Due to this random orientation, the sediments remain loosely packed. Loose packing with edge-to-edge and edge-to-face arrangement of mineral grains of mudbank samples has been noticed in the micrographs of SEM, which corroborates the above view. This observation was also reported from the sediments of Quilandy mudbanks[2].

Since the sediments are loosely packed, they carry large quantity of pore water. Hence the volume of mudbank sediments is relatively higher than that of the adjoining sediments. As a consequence of the increase in volume, the area stands out as an elevated platform above the seafloor forming a mudbank. Since the energy transmitted by the pounding waves is maximum at the seaward periphery of the mudbank, this platform has maximum height in the region. Towards land, the height of the platform gradually reduces imparting a wedge-shape to it. Existence of a wedge-shaped profile with increasing seaward thickness along the axis of the Alleppey mudbank, determined using the echogram[3], substantiates the above view. This platform of sediment column with loose mud at the top and a strong base of consolidated mud at the bottom with transitional boundary in between, efficiently resorbs the wave energy resulting in the quelling of waves.

From the present study, we presume that the high content of phosphate in mudbank sediments is due to its adsorption on the surfaces of bipolar zaherite. During monsoon, due to the heavy pounding of waves, the adsorbed phosphate comes out. The presence of a large number of PO_4^{3-} ions in pore water further enhances mud dispersion.

If zaherite or similar type of minerals can be introduced in the required proportion into the clay where other conditions for the formation of mudbanks are satisfied, it may be possible to create mudbanks artificially.

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Conferences and global warming

At present, a large number of scientific conferences are being organized on various topics. For example, during the period April 2005–March 2006, about 60 conferences and workshops were organized by the Indian Institute of Science, Bangalore. The travel of the delegates to and from the conference venue inevitably contributes to global warming. As a token contribution towards the reduction of global warming, scientists and scientific associations may consider the possibility of reducing the number of conferences. For example, annual conferences may be replaced by biennial ones, and so on.

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