Detailed Analysis of the Rupelian Ru-1 Transgressive Surface in the Type Area (Belgium)

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The Rupelian-1 transgressive surface in the type area in Belgium coincides with the NP22/23 boundary. In the direction of the basin the surface is characterised by a phosphate bed, and towards the continent by flat black flint pebbles. The phosphate covers the fine glauconitic Ruisbroek Sand whereas the pebbles overlie a group of estuarine, lagoonal and lake deposits. Above the phosphate occurs the Boom Clay and above the pebbles the Berg Sand. The detailed paleontology of the phosphate bed reveals details about the sedimentary evolution around the transgressive surface. At the lowest sea-level position an undeep regional erosional space is cut whilst landwards a soil develops. After a slight sea-level rise lagoonal clays are deposited in the erosional space and swamp clays are deposited landwards over the soil. Further slow sea-level rise results in the deposition of the fine glauconitic Ruisbroek Sand with many reworked microfossils and land-derived organic matter. At the same time landwards, lagoonal and estuarine sediments accumulate over the earlier swamp clays. When the sea-level rate of change approaches the level for the onset of the transgression, sediment influx from the land stops and the sea bottom is now colonised by burrowing crustaceans, fishes, Cerianthidae and different other sea worms, large oysters which carry the symbiotic marine pelecypod Martesia; also wood fragments perforated by Teridinidae are floating in. When the sea level still rises, shore erosion starts and a Berg Sand facies of coastal sand is formed as indicated by the presence of characteristic large Cyprinidae, often with both valves together. Before transgressive sediments are deposited, phosphate is carried in from the open sea as shown by the phosphatization of all previously mentioned organisms and burrows at the sea floor. The first indication of a new type of transgressive sediment is the presence of numerous mm-sized agate grains and some flat black flint pebbles mixed with the phosphates; the pebbles are much more abundant landwards in the top of the estuarine and lagoonal sediments. The new sediments are brought in from the west by marine currents. Continued increased rate of sea-level rise leads to reworking of the phosphatized sea bottom, forming a lag bed consisting of phosphate impregnated, slightly transported, fossils and burrows; more landwards, the black pebbles are swept over an abrasive surface formed by the transgression. At this time some of the rounded phosphate fragments and admixed pebbles acquire a glauconite staining. Before the transgressive silty clay sedimentation spreads over the phosphate bed, a significant number of elasmobranch and teleost fishes strand on the shore, decomposing quietly as indicated by the preservation of almost intact microbones, articulations and teeth, sometimes even still grouped as derived from individual specimens. The overlying transgressive silty clay sedimentation remained initially very shallow as indicated by the presence of oysters colonised by Clionidae sponges, which can support some brackish water, and by the presence of some rare gutters. At the same time landwards the coastal erosion continues to produce Berg Sand type coastal sands overlying the black flint pebble layer and containing levels of Cyprinid valves. Subsequent rapid sea-level rise deposited deeper water Boom Clay over all the former deposits. Pyrite, as observed in the wood fragments, can have formed rapidly after burial.