

Subduction Tectonics of the Barbados Accretionary Prism - Role of the Decollement - A review

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The Barbados accretionary prism has been studied by several scientific drillings; DSDP Leg 78A, ODP Legs 110 and 156. During these projects and associated studies, most of the accretionary prism process has been verified, chiefly as the process of offscraping, subordinately of underplating, both responsible for thickening of the prism. The most striking understanding is that the decollement zone is sustained by high pore-fluid pressure, which further sustains high porosity of the sediments in the zone. In the end of 1996 Leg 171 is planned for LWD (logging-while-drilling) to the decollement zone.

Within the 30 to 40 meters thick decollement zone remarkable deformation and mineralization are going to occur. One is strong shearing characterized by scaly foliation development. Clay mineral C-S structure is the characteristic result in the scaly cleavage. The methane-bearing fluid seepage along the fractures which were opened and sustained by high pore-fluid pressure gives the room for manganese mineralization for several stages. Strong

shearing intermittently occurs along the zone plays a pump effect to push the fluid advection. Clay mineralogy change from the kaolinite-dominated composition in the subjacent strata to the smectite-dominant composition in the decollement zone must be the chief cause to set the zone in the definite horizon of early Miocene radiolarian-rich clayey zone. Smectite may have a significant structural role for deformation and permeability during compaction and shearing.

Thus the mechanically and chemically controlled decollement zone is sharply demarcated within the lithological boundary which might be attributed to the paleoceanographic change in the low latitudinal Atlantic Ocean.

References

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