

Subsidence and relative sea level rates in the Bengal delta

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Subsidence in delta plains is a critical factor that plays on present, past and future relative sea levels. Also, subsidence in delta plains may vary depending on the time scale considered. We here provide results from Holocene subsidence rates in the Bengal Delta and analyze together the different driving forces that act on subsidence. Rates and spatial distributions of sedimentation and subsidence have been determined in the Bengal Delta through the Holocene. This has been achieved by reconstructing relative sea level history over the Holocene according to the stratigraphic records. Results provide evidence of moderate Holocene subsidence over the delta, gently increasing seaward from 2 ± 0.7 mm/yr in the middle fluvial delta to 4 ± 1.4 mm/yr in the lower tidal delta while ~ 150 m of sediment may be deposited near the present shoreline over the Holocene. The potential contributions of sediment compaction, sediment isostasy and glacio-isostatic adjustments are computed by numerical modelling and considered on regional 2D stratigraphic models to test the validity of the models. Results suggest that sediment compaction, i.e. the mechanical and chemical compaction of the underlying sedimentary column that react to the load of sediment deposited, may be on major control on the subsidence and rates. Also, sediment isostasy may be significant in such extreme context of sedimentation and tectonic heterogeneities may significantly change the subsidence pattern over the delta plain. Both sediment compaction and isostatic adjustments are processes that are modulated by the geological history of sediment deposited over the delta and in particular recent subsidence rates may be strongly influenced by the early Holocene fast sea level rise. This has direct implications on our understanding of present and near future relative sea level rise and challenges human societies on managing their negative impact on such processes.

Mots-Clés : Niveau Marin, Isostasie sédimentaire, Delta

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