

**Identification of Levee Subenvironments in Deep Marine Channel Levee Systems: Criteria for Interpretation from Observations at Outcrop**  
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Submarine channel-fills form important hydrocarbon reservoirs in many areas of the world, including the Gulf of Mexico and West of Africa. Consequently, their architectures and morphologies have been a focus for sedimentary and stratigraphic research over the past two decades. Typically, they preserve a complicated stratigraphic record that makes them a challenging target to interpret and exploit. In contrast, levees that form adjacent to submarine channels, which build through overspill of sediment gravity flows from the channel itself, are less well studied. This is despite them representing a primarily depositional record coeval to the evolution of their genetically related channels and/or down dip deposits. The assumed simplicity of levees may be part of the reason that they have received less attention, combined with the fact that ancient outcrops are prone to weathering due to their fine grained nature; and that confident identification is not unambiguous. Thin-bedded sections may be encountered within many wells, but establishing criteria to distinguish between large scale 'external' levees and smaller scale 'internal' levees, and other channel margin thin-beds is problematic. In addition, intra-levee stratigraphy, hierarchies of levee elements, and stacking patterns of levees have not been developed and applied in a similar way to that of channel-fills. Taking this approach could provide important information on the evolution and stacking of adjacent channel-fills and the down-dip extent of sand. Criteria for the recognition of levee subenvironments, and a suggested hierarchical nomenclature, are drawn from the outcropping Upper Cretaceous Rosario Fm. of Baja California, Mexico, and from the late Permian Laingsburg Fm. of South Africa.