

Major Tectonostratigraphic Sequences of Tropical and Subtropical Pangea

Paul E. Olsen¹, Mohammed Et Touhami², Dennis V. Kent^{1,3}

¹Lamont-Doherty Earth Observatory, Palisades, NY 10964, USA,
polsen@ldeo.columbia.edu

²Département des Sciences de la Terre, Université Mohamed Premier, 60,000 Oujda,
Morocco

³Department of Geological Sciences, Rutgers University, Piscataway, NJ 08554, USA

Late Permian to Early Jurassic age successions deposited during 60 million years of pre-drift extension between North America and Africa subdivide into 4 major tectonostratigraphic sequences (TS), based on magnetostratigraphy, seismic profiles and continuous cores. These sequences are, in their up-dip extensions, unconformity bound, and resulted from major extensional pulses

TS I, of Late Permian age, occurs in Maritime Canada and Morocco, and is continental, deposited in semiarid to arid environments. Anisian (Olenekian?) to Carnian age TS II has Carnian age, potentially commercial oil- and gas- bearing, paleoequatorial coals and black shales in the southeast USA. In Maritime Canada and Morocco, Scythian?, Anisian, and Ladinian age strata have eolian sands deposited in arid climates overlain by Carnian age reddish, lacustrine strata deposited in more humid climates. Norian and Rhaetian TS III has basal, potentially commercial gas- and oil- bearing black and gray lacustrine strata in the south, but has red lacustrine strata with dune sands, and halite involved in salt tectonics in to the north in Morocco and on the conjugate shelves. TS IV is latest Rhaetian to at least Sinemurian age, basally containing Central Atlantic Magmatic Province flows. TS IV rests conformably on TS III with no hiatus, except in extreme marginal areas. In the south (USA), TS IV strata contains lacustrine strata with black shales in red beds, but north TS IV contains thick, structurally important salt. Carbonates are present proximal to CAMP basalts, which in eastern Morocco are marine. Younger tectonostratigraphic sequences cover larger areas and growth becomes generally more difficult to discern, with TS IV extending well beyond rift basins in eastern Morocco.

These tectonostratigraphic sequences comprise the most fundamental divisions within the rift sequences and are critical elements of the petroleum system often juxtaposing strata of different climatic milieu.