Very Low Term (250 Myr) Quantification of the Eustasy During Mesozoic – Cenozoic Time Based on Coastal Onlap Measurement at the Tethys and World-Scale

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The fathoming of the eustasy is still debated. This study is focused on the very long-term variations (250-350 Ma) during the Meso-Cenozoic with two main questions: at what time is the highest sea level and what is its amplitude? Relative sea-level variations (continent-scale) or absolute sea-level variations (world-scale) are defined by the intersection of the coastal onlap at the studied period on the present-day hypsometry (altitude distribution of one or all continents). This method has been applied to a new paleogeographical dataset for the Meso-Cenozoic: one at the Tethys-scale (project PeriTethys, [1]), a second at a global-scale (IUGS/GMW project “Changing Earth Face”, [2]). First results are based on the present-day continental hypsometry. The main question is: did the present-day altitude distribution represent the past? The present-day continental topography is different from past one, mainly Upper Jurassic – Lower Cretaceous time, where large intracontinental basins (intracratonic basins, large passive margins, rifts…) with low relief, occurred. New measurements of the relative and absolute sea level have been carried out using the Amazon present-day hypsometry, which could be the best analogue of the Upper Jurassic-Lower Cretaceous time. At Tethys-scale, the amplitude of the highest sea level (Cenomanian) would be +250 m above present-day sea level. At world-scale, the amplitude of the highest sea level (Cenomanian – Maastrichtian) would be +100 m above present-day sea level. In conclusion, the most realistic value for the highest sea level (Upper Cretaceous) should be more around 100 m than 250 m as suggested by numerous studies (e.g. [3]).

[1] Dercourt, J., Gaetani, M., Vrielynck, B., Barrier, E., Biju-Duval, B., Brunet, M.F., Cadet, J.P., Crasquin, S. & Sandulescu, M. (2000). Atlas péri-Téthys. Paleogeographical maps. Commission for the Geological Map fo the World, Paris, 24 pl.

[2] Vrielynck, B. & Bouysse, P. (2001). Le visage changeant de la Terre. L’éclatement de la Pangée et la mobilité des continents au cours des derniers 250 millions d’années en 10 cartes. Commission de la Carte Géologique du Monde (Commission for the Geological Map fo the World), Paris, 30 p. + 1 CD

[3] Haq, B.U., Hardenbol, J. & Vail, P.R. (1987). Chronology of fluctuating sea levels since the Triassic. Science, 235: 1156-1167.