

A Holistic Approach of the Sedimentary Basins Genesis

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The formation of the sedimentary basins and continental passive margins has long been explained by numerous physical models, usually built on one passive margin claimed to be “typical”. Nevertheless, passive continental margins are so diverse that the existence of an unique thinning process can be put into question. The recurrence of some general features (abrupt thinning, large transitional domain, whether oceanic, continental or mixed) pleads however in favour of general rules.

No margin presents all the features needed to support a general model, but each margin supplies pieces of the jigsaw. Understanding the thinning process can therefore only be reached using a holistic approach, comparing many different margins. The main, and most difficult, trick is to distinguish and to decipher local (as probably the presence or absence of a sag basin) and general characteristics (the abrupt thinning for instance). The thinning of passive continental margins is usually explained by models using pure stretching or simple shear, with or without depth-dependent thinning process. These models imply hypothetical extensional structures and large horizontal movements between the two conjugate margins. The holistic approach has to be therefore combined with precise kinematic reconstructions. This approach allows us to propose some general rules for the early thinning process. The diversity of the final structural morphology seems a matter of tectonic heritage, geodynamic context and probably mantle heat segmentation.