Brittle tectonics analysis in view to reconstruct the geodynamical evolution using palaeostress analysis. Examples in chalky Cretaceous and Carboniferous limestones in NW Europe.

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Palaeostress reconstruction is a powerful method of tectonic investigation in the platforms, basins and continental domains to reconstruct the geodynamic evolution using small brittle fractures (1). This method of inversion, based on the analysis of fault-slip data sets, appeared in the seventies (2), developed during the eighties, is now a standard approach (3). With these technique, it is possible to propose regional palaeostress fields evolution and to related them to major tectonics events. Two examples of brittle tectonics analysis at regional scale will be presented.

The Chalk formations in NW Europe have been investigated in terms of brittle tectonics and palaeostress analysis. Studies of mesofaults and joints reveal that extension has prevailed since the Cretaceous. The palaeostress field evolution in NW Europe recording in Chalk formations is complex but representative of a relay zone between the Atlantic opening and the Tethysian dynamics, where compressional events along crustal regional structures periodically related to tectonic inversion phases interrupted a regional extensional regime (4). These study is a typical example of brittle tectonics investigation in marine sediments with subsurface deformation in terms of faulting due to regional palaeostress fields evolution in a platform environment.

The second example is a brittle tectonics analysis in Carboniferous limestones in Belgium where a direct link has been established between karstification (subsurface alteration) and brittle tectonics (5). In particular, the beginning of the karstic process is directly connected to the influences of tectonic regimes. The process of karstification is supported by large scale system of jointing activated during continental periods. In these case, brittle structures, and in particular joints, integrated to the regional tectonics, can be interpreted as records of the palaeo-environment during continental periods.

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