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Stress and strain modelling in the Central european basin system during the Mesozoic

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The Central European Basin System (CEBS) is composed of a series of sub-basins. It includes, as the largest areas, the Polish Basin, the North German Basin and the Norwegian-Danish Basin plus several other smaller structures. During the Mesozoic, the CEBS was characterized by a phase of "differentiation", that is a complex pattern of contemporary differential uplift and subsidence in adjacent basin areas. These regional units are partially related to deeper crustal and lithospheric structures. Furthermore, the general stress field did not change much until the onset of the Alpine orogeny.Consequently, the deformation patterns resulted from the interaction between regional variations in lithospheric and crustal rheology together with variations at the stress boundaries of the basin system. A suitable large scale 3-D viscous thin sheet, finite element model has been built in order to explain the major deformation patterns of the basin area. These features are analyzed in the context of rheology and stress dynamics. The main goal is the evaluation of the non-linear interactions between the global stress field and the local strain system, which has been carried out in two steps: 1) a study on the effects due to the slightly changing boundary conditions and 2) the evaluation of the role played by the rheological structure of the lithosphere. Concerning the first step, various boundary conditions have been tested in relation with the most likely stress pattern as derived from plate tectonic models. In doing so, the interactions between the opening spreading of the Middle Atlantic Ridge and the Alpine Front compressional collision induced by Africa-Eurasia continental convergence are investigated and simulated as principal subjects. Concerning the second step, attention is also focused on the role played by the different lithospheric levels and on the impact of lateral rheological heterogeneities on the stress and strain system. Subsequently, these two contributions are linked and fitted together. This study is presented

as a new stress-strain model which attempts to give an explanation concerning the differentiated behaviour of, at least, the major structural units of the entire area of the CEBS for a long period of its evolution.