Title :
Towards modelling the evolution of the intra-plate stress : application to the Eurasian plate 20 Ma.

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Abstract :
In this study, we propose investigating the evolution of the intra-plate stress. We use the classical characterisation of forces acting regionally on a plate such as 'slab pull/suction', 'ridge push' and 'mantle drag' as used by Forsyth & Uyeda (1975), Chapple & Tullis (1977) and later by Wortel et al. (1991) and Govers & Meijer (2001). So far, the connection with the underlying mantle flow was oversimplified and implemented via a coupling coefficient in the direction of the plate motion and we propose improving this specific interaction. As the shear stress field under the plates is unknown in the past (no tomography models), we propose using a mantle flow simulation induced by the imposition of past plate motions on top of a 3D spherical mantle convective code. To that purpose, we employ the new plate motion reconstruction developed by Stampfli and colleagues and a 3D convective code where plates are dynamically coupled to the mantle (Quéré & Forte, 2006). The first plate on which we apply this method is the Eurasian plate as Eurasia is a large plate with a small velocity (not attached to its own subduction zone) and the debate on the main driving forces acting on Eurasia is still going on. The stress field resulting from all plate tectonic forces will be calculated by assuming mechanical equilibrium in an homogeneous elastic shell using the plane stress approximation. As we do not have access to a World Stress Map in the past, the predicted paleo-stress field will then be interpreted and compared to basin extensions and orogenesis observations which will provide new clues to oil exploration teams.