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Inheritance of Paleozoic basement structures in the northwestern Alpine foreland (Eastern France) – Paleogene transtensive reactivation and Neogene to recent transpressive inversion

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The crystalline Paleozoic basement of Eastern France is dissected by the roughly ENE-WSW striking Permo-Carboniferous Burgundy trough system. Sediment fill thicknesses reach more than 800 meters. Within the trough system the La Serre massif is part of a major horst structure that appears to have been exhumed along an oblique low angle detachment fault *(Coromina & Fabbri 2004)*. During the Cenozoic the Burgundy trough system was reactivated several times. It is also suspected to be related with the neotectonics of the area.

During Eo-Oligocene times the European Cenozoic rift system developed, featuring the prominent NNE-SSW striking Rhine and Bresse grabens. The intracontinental Rhine-Bresse transform zone linked the opening of these two grabens in a sinistral transtensive manner via reactivation of the Burgundy trough system *(Lacombe et al. 1993)*. This reactivation resulted in normal and transtensive strike slip faulting along Paleozoic trough faults and the further exhumation of the La Serre horst.

The onset of Alpine orogeny in Neogene times led to a change in the state of stress throughout the Rhine Bresse transform zone from transtension associated with WNW-ESE extension to transpression and/or compression with NW-SE directed shortening. In a first step this change induced the formation of the thin-skinned Jura fold-and-thrust belt, its northwestern propagation front being controlled by the pre-existing configuration of basement structures throughout the transform zone since these struc-

tures dissect the décollement horizon of the thrust belt within Upper Triassic evaporites. Probably in a second step the stress field change also caused a thick-skinned inversion of the Rhine-Bresse transform zone by dextral transpression. This led to a complex interference of thin- and thick-skinned tectonics.

While the formation of the thin-skinned Jura folding is supposed to have ceased in Early Pliocene times, seismological data and geomorphic observations imply that thick-skinned deformation is still ongoing *(Giamboni et al. 2004)*, making a better understanding of this youngest deformation very important for future seismic hazard considerations.

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