

Plio-Quaternary tectonic activity along the northwestern Jura front (Eastern France)

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At the northwestern front of the Jura mountains between Montbeliard and Dijon the thin-skinned Jura fold and thrust belt that formed during Miocene to Early Pliocene times intersects with the roughly east-west striking Rhine-Bresse Transfer zone. The latter is part of the European rift system and developed during Eo- to Oligocene times along preexisting Paleozoic basement structures. It kinematically linked the opening of the Rhine and Bresse graben in a sinistrally transtensive manner (Lacombe et al. 1993). Results from current paleostress studies show that parts of this intracontinental transfer zone have been transpressively reactivated afterwards.

Recent tectonic activity in the study area is characterized by low to moderate seismicity, and is geomorphologically evidenced by the evolution of the drainage pattern of both the Ognon and the Doubs river that run parallel to the front of the Jura fold-and-thrust belt and the Rhine-Bresse transfer zone. A lateral north-directed shift of the Ognon recorded by the erosion of the its northern terraces (*Campy, 1984*), as well as spectacular paleo-meanders of the Doubs within the city of Besancon document a Plio-Quaternary tectonic uplift in the area located south of the Avant-Monts thrust and north of the Faisceau Bisontin.

However, the style of this recent tectonic activity - Ongoing thin-skinned tectonics of the Jura fold-and-thrust belt or thick-skinned transpressive reactivation of former extensional basement faults belonging to the Rhine-Bresse Transfer zone? - is a matter of ongoing scientific debate. Along the Avant-Monts thrust, industry type seismic reflection profiles show that this fault actually dips steeply and merges with a Paleozoic basement fault below a supposed decollement horizon within Middle to Upper Triassic evaporates. This hints towards the present-day activity of thick-skinned tectonics and is in agreement with latest seismological data (earthquake of Besancon: 02/23/2004, focal depth ~15km, M_w 4.5 Baer et al. 2005) and field studies from neighboring areas (Giamboni et al. 2004).

Optically Stimulated Luminescence (OSL) dating is now being applied to date the terrace sediments of the Ognon river. Beside an estimation of incision rates of the river, the dating of these terraces may also provide long-term uplift rates along the Avant-Monts thrust.

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