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## **Tectonics of the Western Jura Fold-and-Thrust Belt: from the Geneva Basin to the Bienne Valley (France). Mapping and forward modelling.**

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The arcuate Jura Mountains Fold-and-Thrust Belt (FTB) is situated in the NW Alpine Foreland and its formation is related to the Alpine orogeny. The western part of the Jura FTB, investigated here, is situated in France to the north of the Geneva Basin (Switzerland). The geothermal project "GEOthermie2020" of the larger Geneva area allowed us to re-assess the structural geology and the kinematic evolution of the internal part of Western Jura FTB from the Geneva Basin (Switzerland) to the Bienne Valley (France).

Stratigraphic harmonization, new geological and tectonic maps, new seismic interpretation, and a new near top Basement surface were used to construct a kinematic model. This model using forward modelling techniques has been developed in the software Move<sup>tm</sup> by Petroleum Experts. The forward model relies on fault-bend fold, trishear, and fault-parallel flow algorithms, and provides a valid and balanced cross-section. The model is constrained by surface, well and seismic data. Therefore, the depth of the near base Mesozoic horizon has been well constrained by seismic depth-converted lines. Thus, we can show, that the top basement under the Jura domain is dipping 1.7° to the SE, whereas under the Geneva Basin it is dipping between 2.7°-3.3° to the SE. The results of our modelling show a shortening of 23.6 km for the western Internal Jura FTB along a basal detachment and a forward stepping deformation accompanied by minor back-stepping thrust sequences. The first deformation is attributed to the thrusting of the Crêt de la Neige anticline followed by the Crêt Chalam thrust and its imbrications. Then, the Tacon thrust and finally the Bienne thrust nucleate. Imbricate fault-bend folding explains the high southern slopes of the anticlines found in this area. In addition to the primary décollement level situated at the base of the Keuper Group evaporites, three other detachment levels are found in marly layers. Using such a multiple thrust horizon approach avoids having to introduce thick unaccounted for evaporitic duplexes in the Keuper units, basement horst, or inverted Permo-Carboniferous grabens. The change in dip of the top basement located under the SE flank of the Crêt de la Neige anticline, at the transition of the Jura FTB to the Molasse Basin, is considered to be linked to a preexisting Paleozoic normal fault and could correspond to the northern edge of a suspected Permo-Carboniferous graben interpreted on seismic lines under the Geneva Basin. This step can be considered as an initiation point for structures developing in the detached cover.