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Structural Configuration of Swiss Molasse Basin: Western Part

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Seismic data in the greater Geneva area and in the Canton Vaud, calibrated by wells and outcrop information, give a good structural definition of the Molasse Basin between the Jura and the alpine front, except for the part underlying the Lake of Geneva where seismic resolution is too poor.

In the **Geneva area**, the Molasse Basin consists of two parts:

a) The **"Geneva cuvette"** stretches from the Jura outcrops to the Salève thurst fault. It is limited to the west by the Vuache wrench fault. The Lower Freshwater Molasse (USM) unconformably overlies the relatively undisturbed and karstified Barremian carbonates, which dip southeastwards towards the frontal depression of the Salève. Seismic data can be properly calibrated with the deep Humilly-2 well and provide structural information down to the Palaeozoic. The Vuache wrench fault and the Salève thrust seem associated with deep-seated Permo-Carboniferous faults. Mesozoic and Molasse sediments are affected mainly by NW-SE trending wrench faults with little vertical throw.
b) The **"Bornes Plateau"** stretches between the eastern flank of the Salève and the front of the subalpine Bornes Massif. It is limited to the NE by the prealpine nappes thrust front, where it joins up with the "Geneva cuvette". Seismic data can be tied to the Faucigny-1 deep well. The lower part of the Tertiary sedimentary fill consists of Lower Marine Molasse (UMM) onlapping northwestwards onto Barremian carbonates, but most of the Tertiary fill is made of USM deposits, affected by numerous thrusts. The western front of thrusted molasse seems to coincide with a hinge zone forming the NE continuation of the Salève. The Molasse Basin of the "Bornes Plateau" overlies a SE-dipping Permo-Carboniferous half-graben limited by a major fault zone directly underlying the alpine front. The Mesozoic sequence thins towards the latter front.

In the **Canton Vaud**, seismic data can be tied to wells such as Essertines-1 and Savigny-1. In the NW part of the Molasse Basin, deposits onlap towards the NW a relatively undisturbed, SE-dipping, eroded Mesozoic surface and are essentially affected by transcurrent faulting with little vertical throw. In the SE part of the Molasse Basin, a SW-NE trending, fault-associated hinge line underlies the western front of thrusted molasse sediments. SE of this hinge line, UMM sediments seem well developed underneath the thrusts of USM. A major thinning of the Mesozoic sequence occurs towards the alpine front. Important faulting at Permo-Carboniferous level might be present underneath the latter front.

In summary, seismic data reveal striking similarities in the structural configuration of the Molasse Basin between the greater Geneva area and the Canton Vaud: a SW-NE trending, deep-seated and probably fault-controlled hinge line separates the Molasse

Basin in two parts: to the NW, a relatively undisturbed basin thinning out towards the Jura and filled essentially with USM deposits. To the SE, an older and deeper basin where UMM sediments are present and overlain by thick thrusted USM deposits. This configuration resembles that recently described from seismic in the Molasse Basin of Central and Eastern Switzerland.

The Mesozoic strata in the Swiss Molasse Basin: An overview

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Based on surface data and on 8000 km of seismic lines, 24 exploration wells have been drilled within the last 30 years through Swisspetrol and its partners in the Swiss Molasse Basin and adjacient regions. Of these wells 19 drilled into or through the Mesozoic strata.

Two characteristic stratigraphic sequences, mainly influenced by basinal facies in Western Switzerland and platform facies in Eastern Switzerland, show the different evolution during Mesozoic times. The Mesozoic sediments are bordered by two main unconformities. Below the underlaying "Base Triassic Unconformity" cristalline basement or permocarboniferous sediments are found. Above the predominantly carbonaceous sediments of Mesozoic age, the clastic Molasse sequence is overlaying the "Base Molasse Unconformity". These two unconformities mark not only two tectonic events but also a change in the depositional environment.

The facies and distribution of Mesozoic sediments in the Swiss Molasse Basin show the migration of the trough axis and the depositional environment during time. These movements are induced by tectonic movements along different tectonic trend lines. Transpressive faulting is an important process in forming the Mesozoic realm in the region of the future Swiss Molasse Basin.

The Basal Tertiary unconformity in the Helvetic realm

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In the Helvetic domain, including the Aar Massif, the onlap of shallow water sediments on the basal Tertiary unconformity which occurred between the Middle of the Paleocene and the Late Eocene, reflects the progradation of the coastline in NW direc-