

Abstract:

The Geneva foreland basin, located in the westernmost part of the North Alpine Molasse Basin, contains a preserved molassic succession relatively understudied compared with the underlying geological formations. Several projects were done in the Geneva area by the academic community and by the oil industry. These works have generated a lot of data, some of those have been used in this study.

Indeed, the dynamic of deposition of the Tertiary sediments of the Geneva Basin is still barely known. The differences in thickness, the lithological complexity of this succession and the absence of some intervals of the Molasse on the basin raises questions about the structural architecture of the basin.

This work focused on the preserved lower freshwater molasse of the Geneva Basin and unravels the internal heterogeneity associated with specific stratigraphic intervals. The Molasse intervals, studied in this work, display significant differences in thickness, geochemistry and petrology from one site to another allowing the development of a chemostratigraphic correlation. A geochemical study of the Molasse succession in the Geneva Basin has never been done before.

The material from 3 principal wells and the data from 8 secondary boreholes are used to correlate the stratigraphic units.

The analytical methods include: QEMSCAN® (petrographic analysis), X-ray Fluorescence (major elements oxides composition), X-ray Diffraction (clay fraction mineral analysis) and ICP-ES and ICP-MS (trace and rare earth elements analysis), macroscopic observations of samples and microscope observations of thin sections. This work uses the petrography, the geochemistry, conceptual models, 3D basin model and lithology as the basis of a predictive model for vertical and lateral facies distribution of the preserved Tertiary sediments of the Geneva Basin.

Keywords: Geneva Molasse Basin, petrography, chemostratigraphy, 3D basin model, Tertiary sediments, Swiss Molasse Basin, QEMSCAN, ICP, XRF, XRD.