
The Hasbaya Asphalt (Lebanon) Revisited: Some Remarks from Detailed Field Mapping, Petrographic and Geochemical Studies

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The asphalt of the Hasbaya locality occurs in Coniacian to Maastrichtian strata (Chekka Formation) consisting of soft, light colored clayey marls and chalky limestones. Equivalent formations are known to include major source rocks in the Eastern Mediterranean Basin. This contribution discusses some results from detailed field mapping of the hydrocarbon occurrence, petrographic and geochemical (e.g. stable isotope and gas chromatography) analyses.

The total thickness of the strata overlying the Chekka Formation in the Hasbaya area (~1500m) results in insufficient overburden settings for oil maturation, even at high geothermal gradients (~45°C/km). Previous studies indicated that the Hasbaya asphalt is immature and located in its source rock. Detailed field mapping was achieved to assess the hydrocarbon impregnation intensity of the chalky lithologies. A color index chart was prepared from the differentially impregnated rocks, including a scale from one (dark brown, highly impregnated) to ten (cream, not impregnated). Plotting and superposing the impregnation intensity contours on the geological map showed that the Hasbaya hydrocarbons are fault controlled. Although most of the analyzed samples exhibited severe degradation, those less altered revealed elevated amounts of branched aliphatics and elevated contributions of n-alkanes. This distribution may characterize organic matter of a clear thermogenic origin, which was exposed to biodegradation processes. Consequently, results of this study suggest that the structurally controlled Hasbaya asphalt may contain hydrocarbons migrated from deeper sources. This is also supported by the total thickness of the overlying strata (insufficient for oil maturation) and the geochemical data which could invoke a thermogenic origin.
