



The Lower Cretaceous Chouf Sandstone of Lebanon: is it a syn-rift clastic sequence?

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The lowermost unit of the Cretaceous succession onshore Lebanon is a widespread prominent sandstone formation traditionally known as the “Grès de Base”. The Chouf Sandstone is one of the most distinctive geologic units in Lebanon and is extensively quarried as building sand. The formation commonly consists of a brown to white sandstone with associated claystones, shales, locally volcanics and lignites. Based on outcrop samples taken in the central and northern parts of Mount Lebanon the petrographical composition of the typical Chouf Sandstone is dominated by monocrystalline quartz (85-95%) indicating a well-sorted sandstone. Sedimentological observations suggest deposition of the formation was typically in fluvial, coastal plain and deltaic environments.

The Chouf Sandstone is variable in thickness, ranging from a few metres to 300 m. In certain areas rapid lateral thickness changes have been reported which may reflect a paleo-topography or syn-depositional block faulting. Similar thickness variations in the underlying Upper Jurassic formations might be interpreted as the result of syn-rift normal faulting.

In order to test the syn-rift nature of the Chouf Sandstone, modern high-resolution satellite data sets (with ~ 0.75 m horizontal and 4 m vertical resolution) were used to derive thickness data points for the Chouf Sandstone in NW Lebanon. One important reason to use high-resolution satellite data for onshore Lebanon is the general lack of structural measurements on the existing vintage geologic maps. In lieu of these basic data, the common surface point method was used to derive this information in a consistent manner across the study area.

First results obtained by remote sensing techniques do reveal local variations in the thickness of the Chouf Sandstone, on order of tens to hundreds of meters. These isopach variations in a map-view sense are interpreted to be the result of deposition in individual extensional half-grabens in a much larger overall basin. As the overlying Lower Cretaceous neritic carbonate formations do not exhibit these thickness variations, the syn-rift character of the Chouf Sandstone appears to be a reasonable interpretation at this preliminary stage of this ongoing study.