



Detailed morphostratigraphy analysis as a key to reconstruction of uplift and paleogeography – a case study from the Judea Mountains

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The 800-1000 m high, Judea Mts, form part of the mountain backbone of central Israel. This area was submerged under the sea until the Middle Eocene. Post Middle Eocene rocks, however, were largely eroded from the uplifted ridge. Therefore, reconstruction of the uplift stages and paleogeography of the Judea Mts in this study is based mainly on a detailed morphostratigraphic analysis.

The morphostratigraphic analysis is based on identification and mapping of geomorphic surfaces (GS), which are low-relief terrains, formed by subaerial erosion or marine abrasion during periods of tectonic stability. The relicts of these GSs were identified by analysis of about 300 topographic profiles along major and secondary water divides, where these relicts are best preserved. Only widely distributed, continuous and close GSs remnants and only GSs discordant to geologic structure and lithology were considered useful in this study. The height of the slopes that separate between the GSs represents the amount of uplift during tectonic events, followed by stream incision and denudation.

Five major GSs, separated by slopes of ca. 100 to 200 m height were recognized: the uppermost Halhul, Jerusalem, Shilo, Upper Shefela and Lower Shefela GSs. These GSs and the slopes separating them record a sequence of four uplift and three intermediate stability phases:

1. A major Late Eocene folding and uplift, followed by erosion of several hundred meters.
2. An Early Oligocene stability phase and formation of the uppermost Halhul GS, probably as part of the formation of the extensive Arabian Plateau. The age of this phase is based on marine clasts which derived from the Judea Mts.
3. A Middle Oligocene, 200 m or less, minor uplift phase.
4. A Late Oligocene stability phase, when wide valleys of the Jerusalem GS crossed over the mountain plateau from east to west, before the formation of the Dead-Sea Rift.
5. An Early to Middle Miocene fast major uplift phase of about 500 m, which triggered deep incision of west and east flowing streams, resulting in the formation of the present regional water divide along the uplifted ridge. Two short breaks in the uplift process are represented by the narrow Shilo and Higher Shefela abrasion surfaces, cutting into the uplifting western mountain front.
6. A Late Miocene to Late Pliocene stability period, when the Lower Shefela surface was formed by multiple abrasion and denudation events.
7. A Late Pliocene 100-150 m minor uplift phase, associated with a gentle general tilting to the west.