

Supplementary Material for “Eighty million years of folding migration: new perspective on the Syrian Arc from Levant basin analysis”

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This file includes:

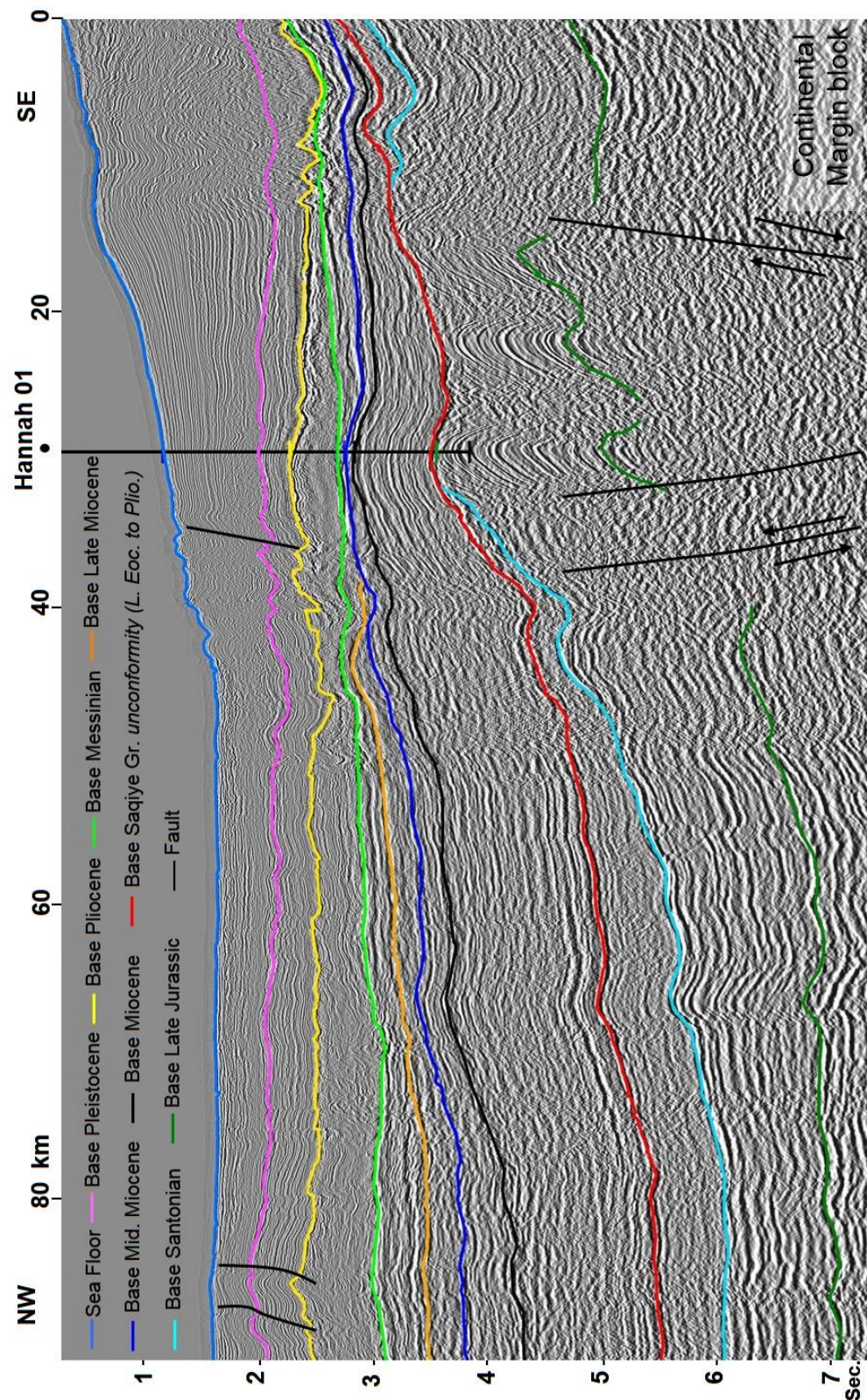
- Description of seismic interpretation and its correlation from shelf to deep basin
- Figure exemplifying various types of thickness variation in the Levant basin
- Figure demonstrating the application of horizon flattening for identifying syn-depositional thickness variation
- Reference list

Seismic interpretation: tying seismic horizons in the deep Levant basin to oil wells in the Israeli shelf area

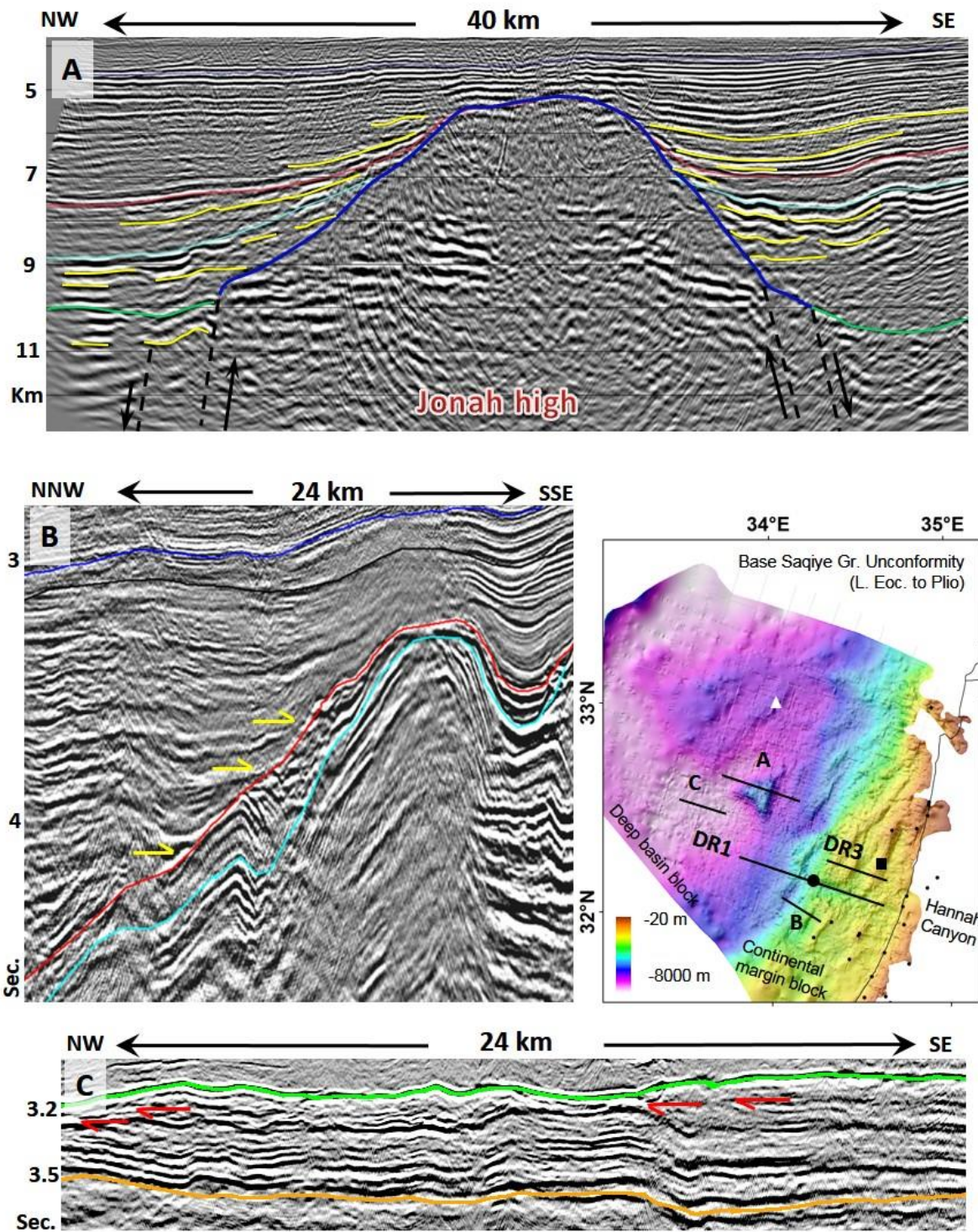
Chronostratigraphic interpretation of seismic horizons along the Israeli continental shelf is well established and calibrated by numerous wells drilled during several decades of exploration that penetrated down the Jurassic section. However, extending this interpretation westward into the deep Levant basin crossing the ~1.5 km structural step of the continental margin fault zone (CMFZ) is not obvious. In most of the area key deep basin reflectors approach the CMFZ and stop; therefore correlating these reflectors with their time equivalents in the upper block was impossible for several years. Luckily, in 2001 the Hanna-1 well was drilled within an ancient canyon incised across the CMFZ step (location in map of Fig. DR2) penetrating the deep basin red, black, and blue reflectors that invade eastwards within the canyon (Fig. DR1, DR2b). For the first time the Hanna-1 well allowed correlation between the deep basin and the shelf area (Gvirtzman et al., 2008). Then, in 2009 the Tamar discovery penetrated the Lower Miocene Tamar sands (<http://www.offshore-technology.com/projects/tamar-field/>) in the deep basin confirming this correlation at least down to the Early Miocene (black horizon Fig. DR1). Further

details can be found in the supplementary material (GSA DATA REPOSITORY 2011118) of Steinberg et al. (2011) and in Gvirtzman and Steinberg (2012).

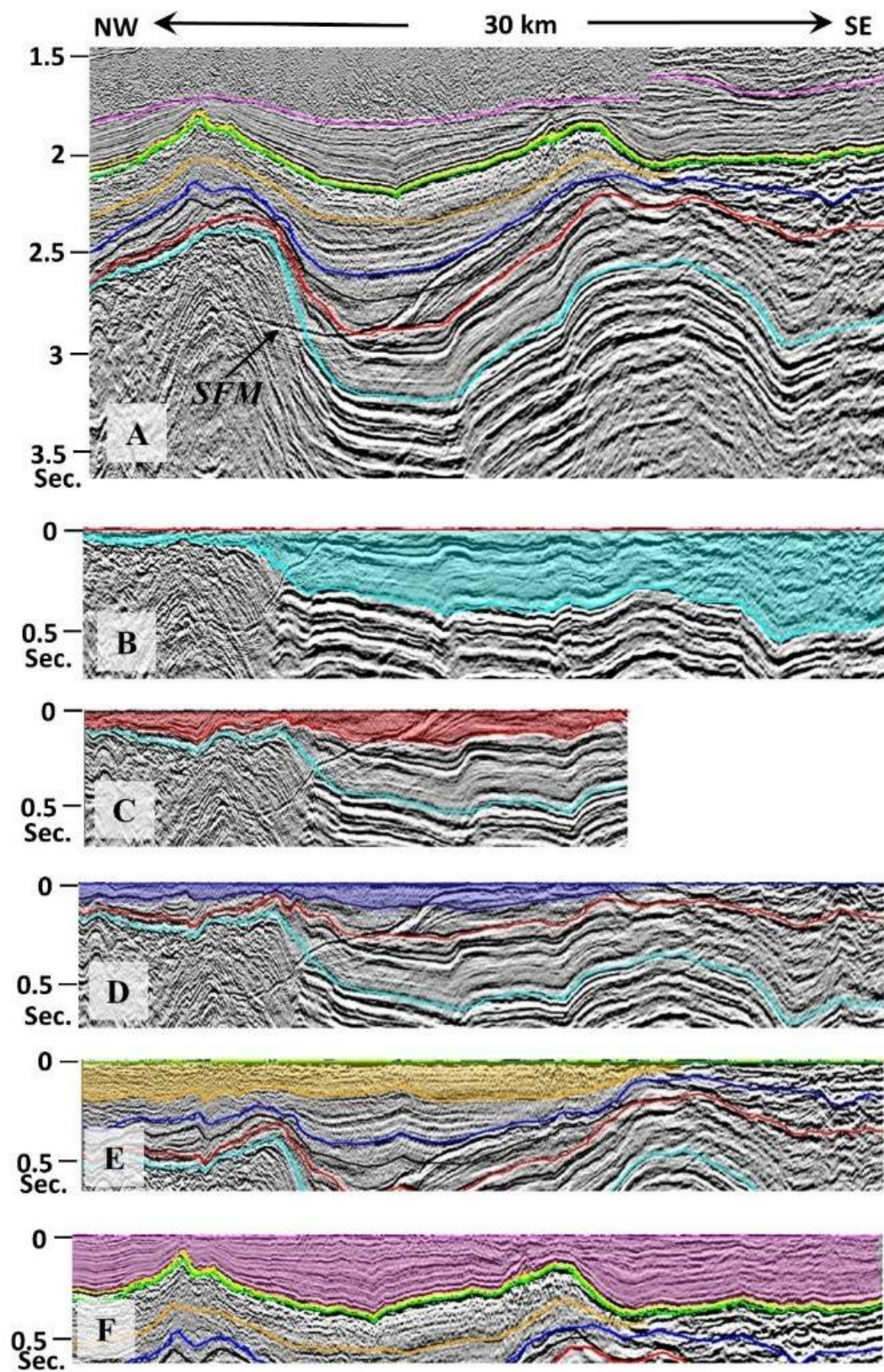
The interpretation of a thick Oligo – Miocene section in the deep basin was also suggested to continue northward offshore Lebanon by the works of Hawie et al (2013, 2014). In the shelf area however, this section thins due to erosion or non-deposition, at places even below seismic resolution, and hence its interpretation was constrained by several offshore wells (inset in DR2). Deeper horizons: base Sakiye group unconformity (Late Eocene in the deep basin to Pliocene onshore) –red and base Santonian - turquoise horizons were penetrated in the shelf area and were interpreted towards the deep basin based on their seismic appearance as demonstrated in Steinberg et al., 2011 (for the former) and in Sagy et al., 2015 (for the latter).



DR-1: Seismic line showing the correlation of seismic horizons from the continental margin to the deep Levant basin (location in DR-2) threw the Hannah well. Note the thick Oligo-Miocene section (red to yellow) in the deep basin thins towards the continental margin in the east.



DR-2: A) Parallel reflectors onlapping the Jonah high indicating gradual burial of a pre-existing seamount, depth-migrated section (modify from Sagy et al., 2015). B) On-lap along the Continental Margin Fault Zone (Gvirtzman et al., 2008; Gvirtzman and Steinberg, 2012; Bar et al. 2013). C) Truncation of the Late Miocene by the base Messinian (green horizon). Inset map of seismic lines, background shaded relief of base Saqiye group unconformity (red horizon) from Sagy (2016) displaying the Hannah canyon incising the continental margin. Black circle – Hannah-1, square – Yam Yafo-1, triangle – Tamar-1 wells. Black dots represents wells used for seismic interpretation.



DR-3: Horizon flattening exemplifying syn-deposition thickness variation (location in DR2, horizon color code as in DR1). A) Time migrated section (SFM denote seafloor multiple). B) Section flattened by the Base Late Eocene (red) display thickness variation of the Santonian –

Middle Eocene section. Similarly flattening by the Base Miocene (black, C), Base Mid. Miocene (blue, D), Base Messinian (green, E), Base Pleistocene (pink, F) display thickness variation of the underlying layers.

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