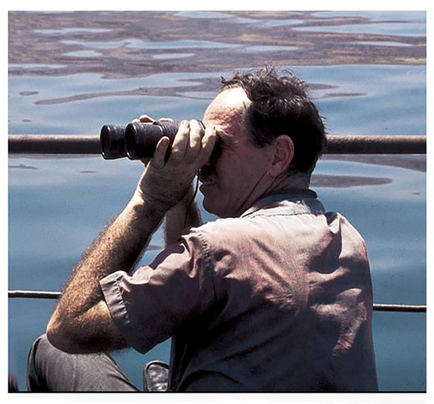
3D Quantitative Seismic Fault Analysis: A Case Study from Offshore Israel



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1. Introduction

The Israel Slump Complex[1], located at the eastern Levant Basin, is considered one of the largest landslide complexes in the world. ISC features numerous fault systems. These systems comprise extensional growth faults accompanied by antithetic systems, both overlaying the "Mavqi'im" evaporitic layer. We analyze the displacement patterns of these systems, for highlighting the relation with seismic stratigraphy and to reconstruct their evolution. The main database for is the "Gabriella-Yizhak" survey (Fig. 1).

Figure 1. Location map.

2. Methods

3D seismic interpretation is used for delineating internal structures and fault zones (Figs. 2,3). Nine seismic horizons, a-i, are picked for measuring displacements and their spatial spatial distribution (Fig 4).

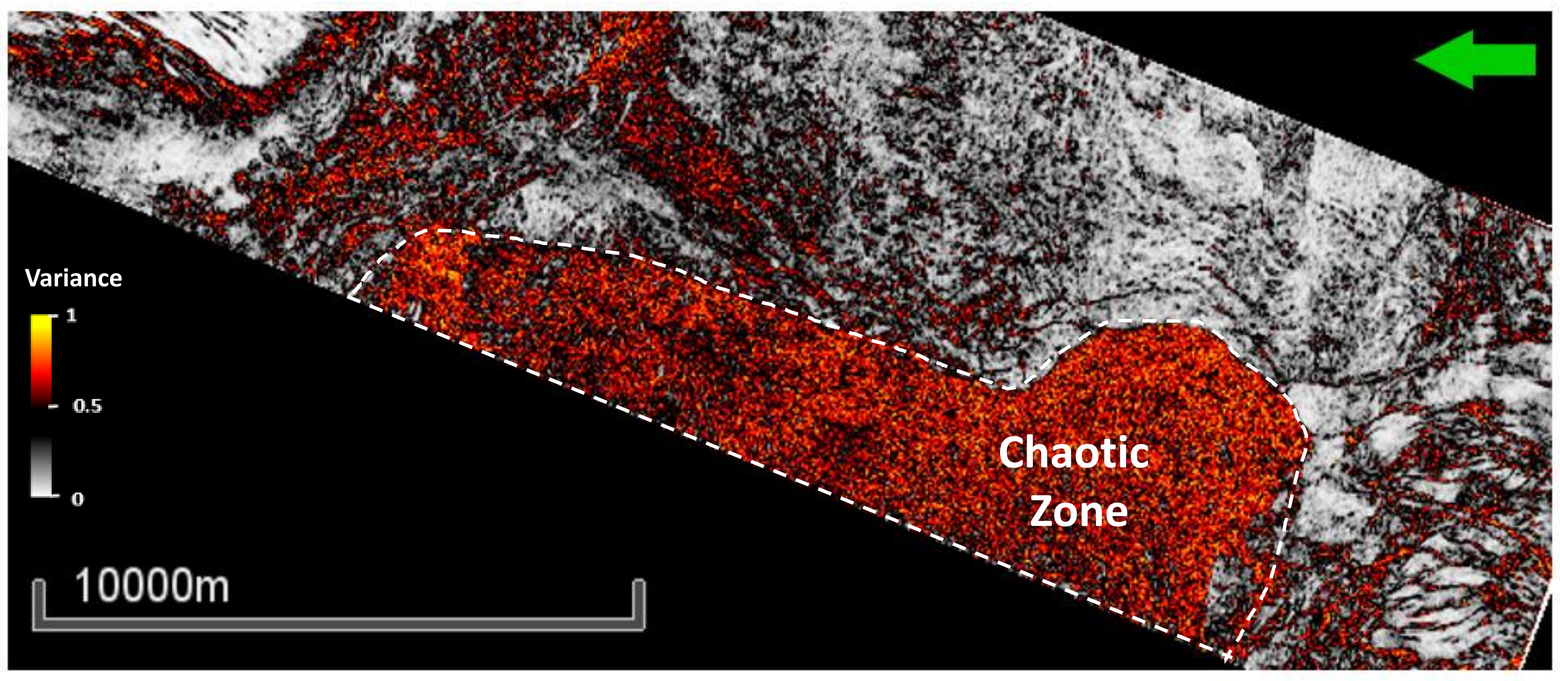
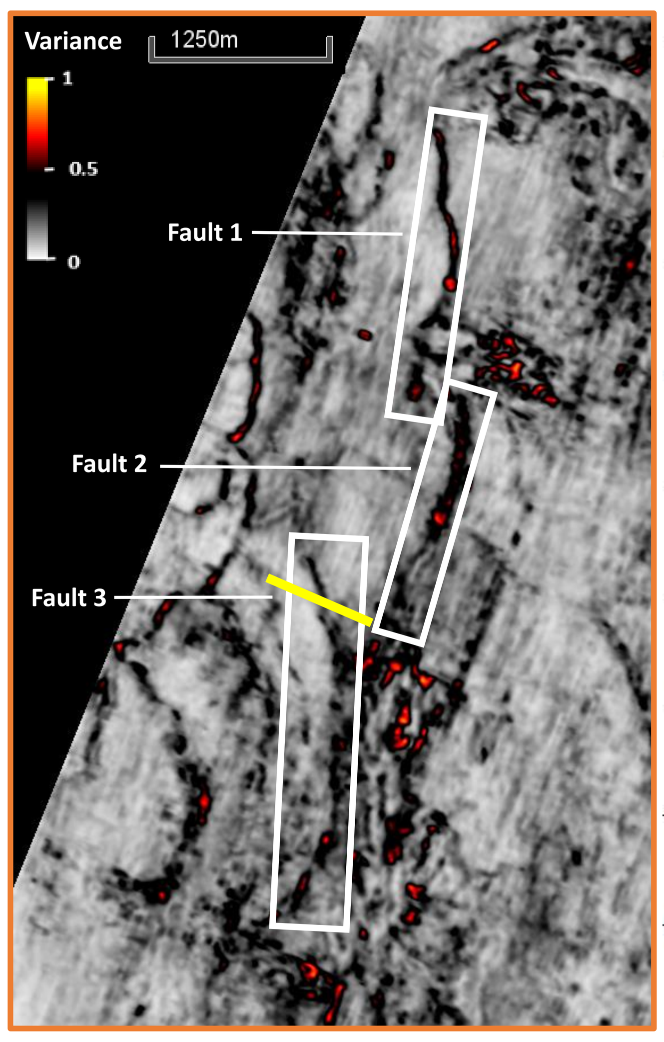


Figure 2. The Chaotic Zone[2], underlying the Plio-Pleistocene fault systems.



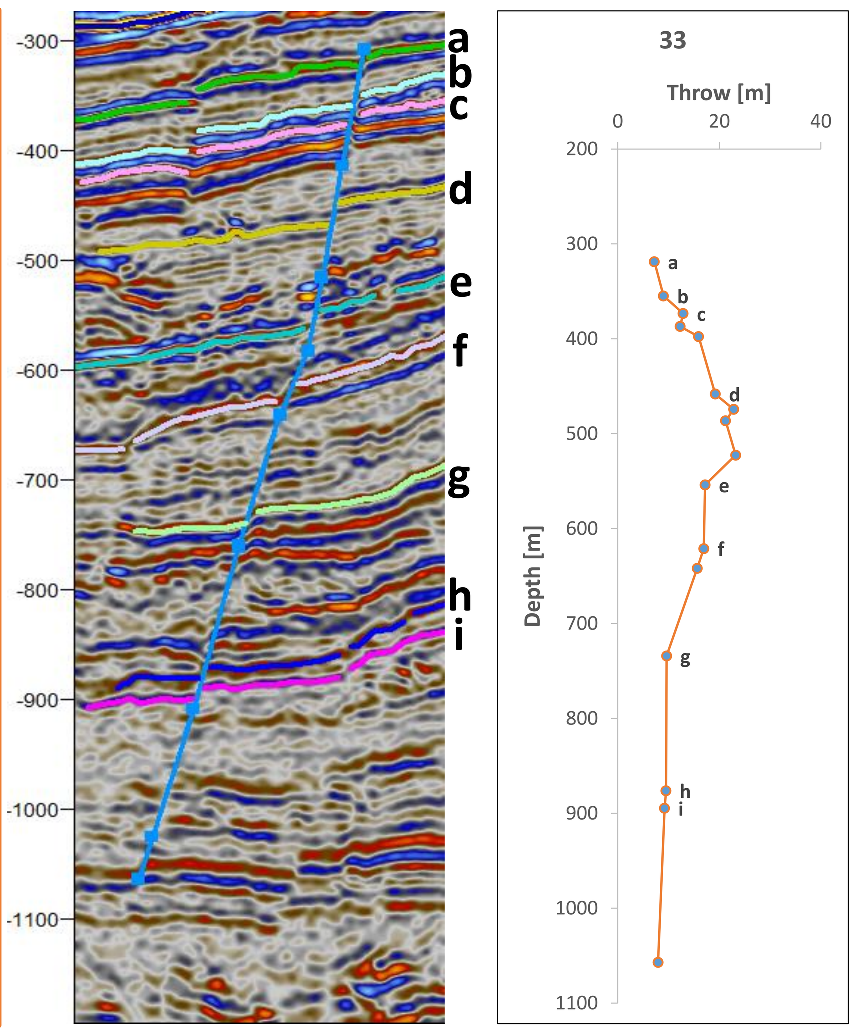


Figure 3. The northern Fault Zone. **Figure 4.** T-z plot for inline 33.

Displacement patterns allow to distinguish between buried and syn-depositional stages of the faults, when compared to the "ideal, blind" model[3] for displacement on fault surfaces (Fig 4). M and C type throw patterns[4] highlight facias changes.

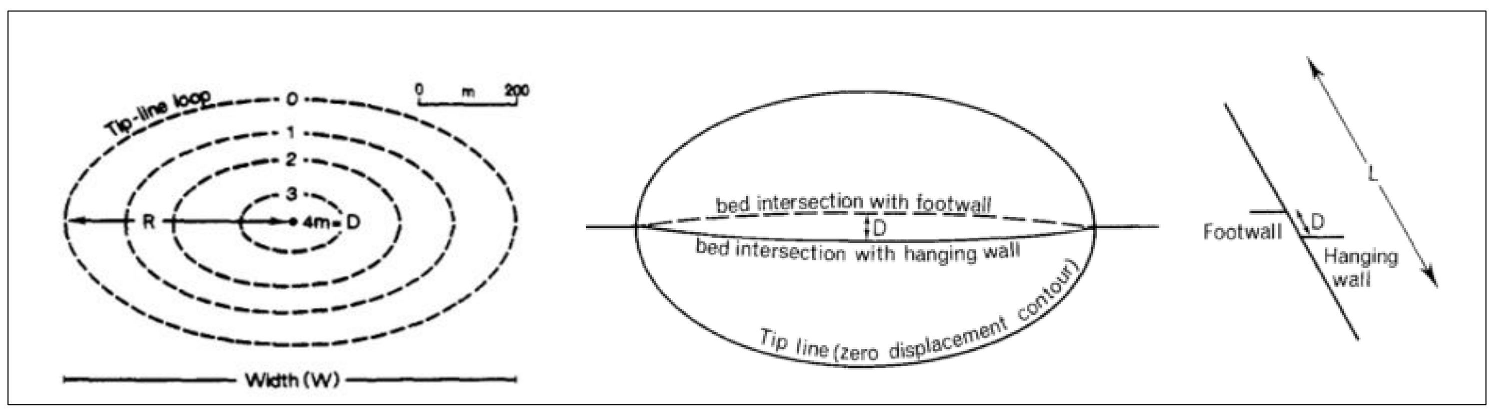


Figure 4. The "ideal, blind" model for displacement distribution of normal faults, Modified by Barnrtt et al (1987).

3. Displacement Analysis

Fault 1

Changes between M-type and C-type patterns are identified in Inlines 3 and 14, respectively (Fig. 5). These patterns indicate facias changes within Fault 1 surface. The tips present a graduate closure.

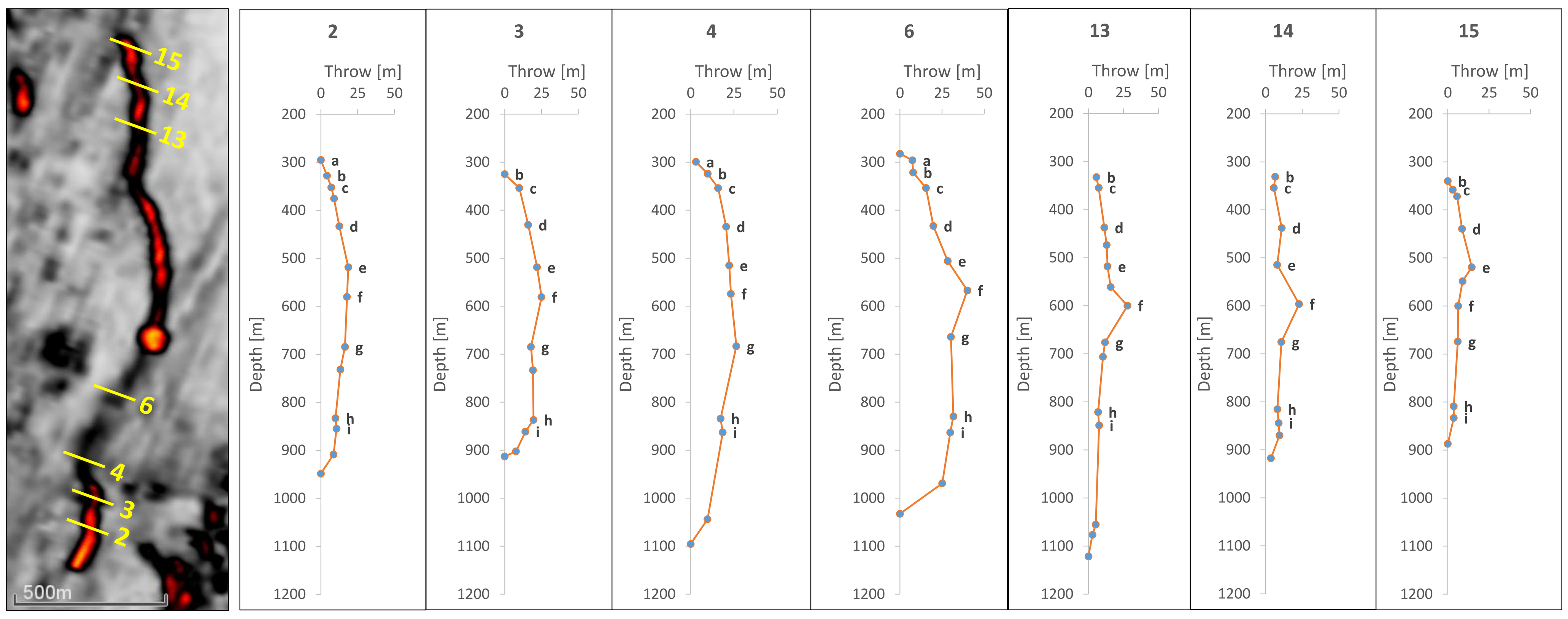


Figure 5. T-z plots for Fault 1, Z = 424 m.

Fault 3

Fault 3 presents changes in displacement patterns as some of the throw profiles show an increase of displacements at large depths. Most of these profiles are focused at the fault's center.

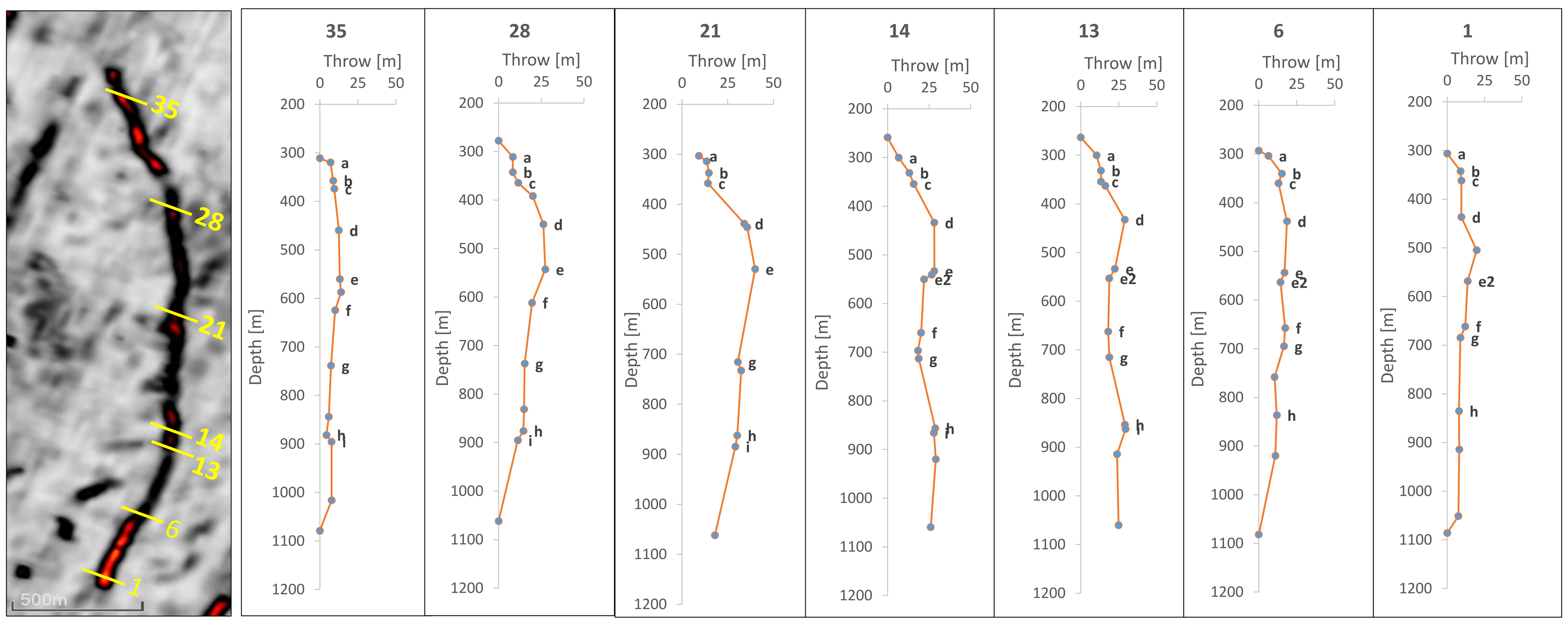


Figure 6. T-z plots for Fault 3, Z= 352 m.

4. Conclusions

- The displacement pattern of fault 1 is consistent with the classical model for blind faults.
- Fault 3 show variations in displacement patterns. Some of the throw profiles shows increase in throw at large depth. We interpret it as related to the ISC.
- Changes of C and M type patterns within all faults indicate local facias changes.

5. Bibliography

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6. Acknowledgments

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