



The enigma of the Jonah high in the middle of the Levant basin and its significance to the history of rifting

Sagy et al., 2015

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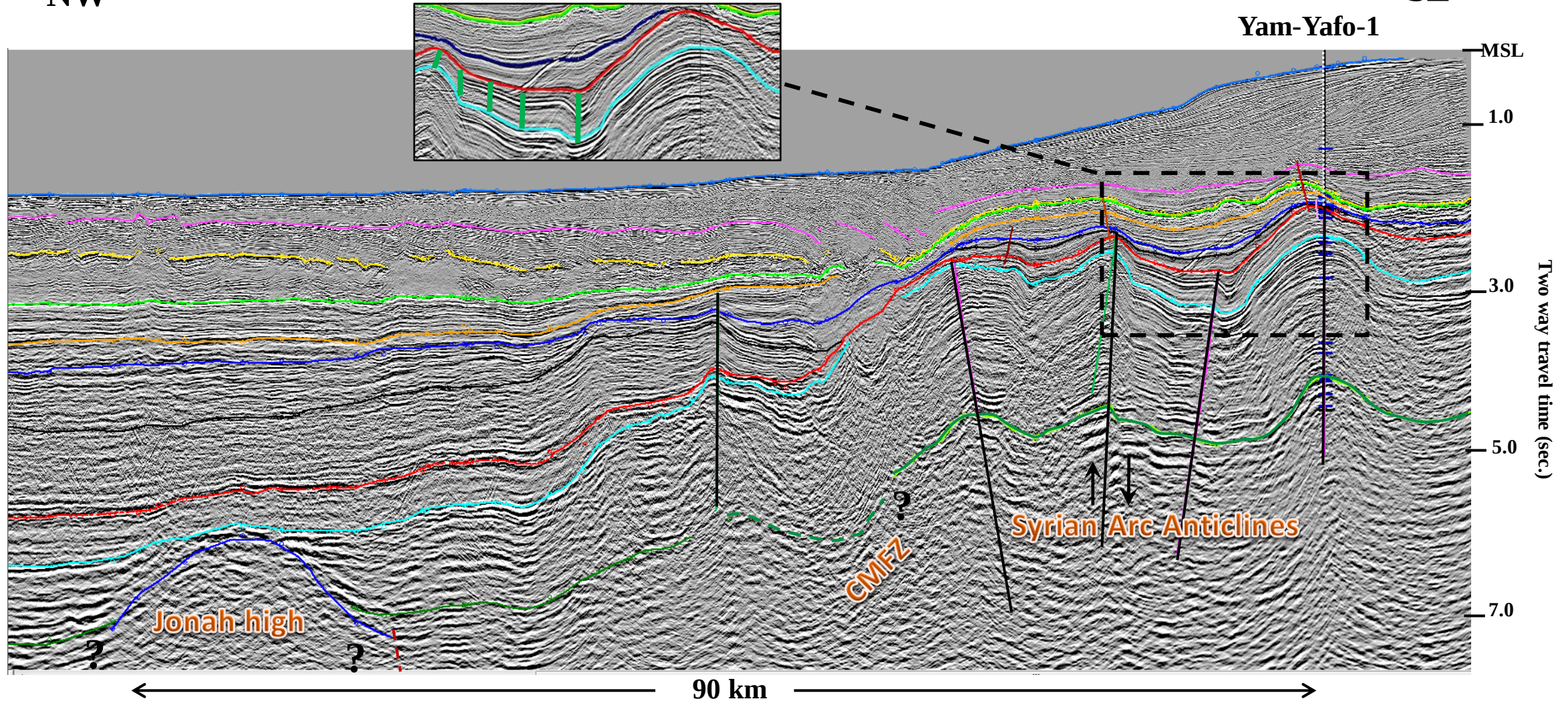
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Line IS-2035

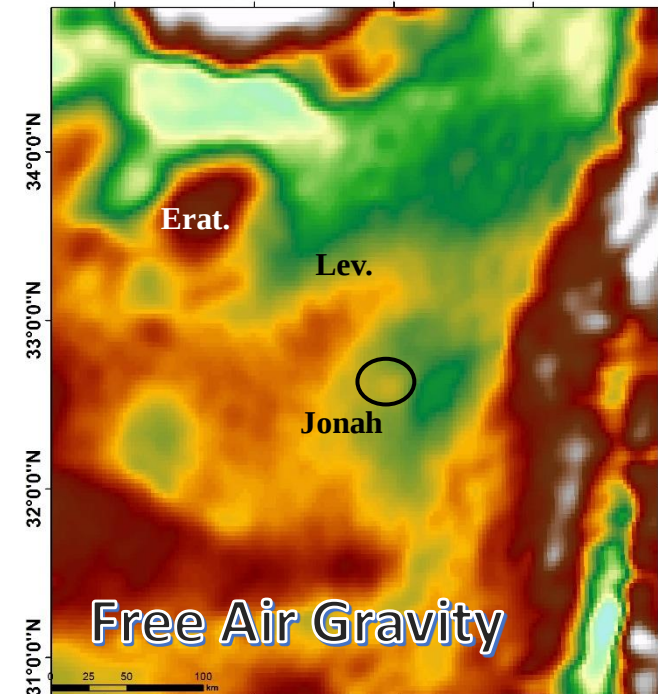
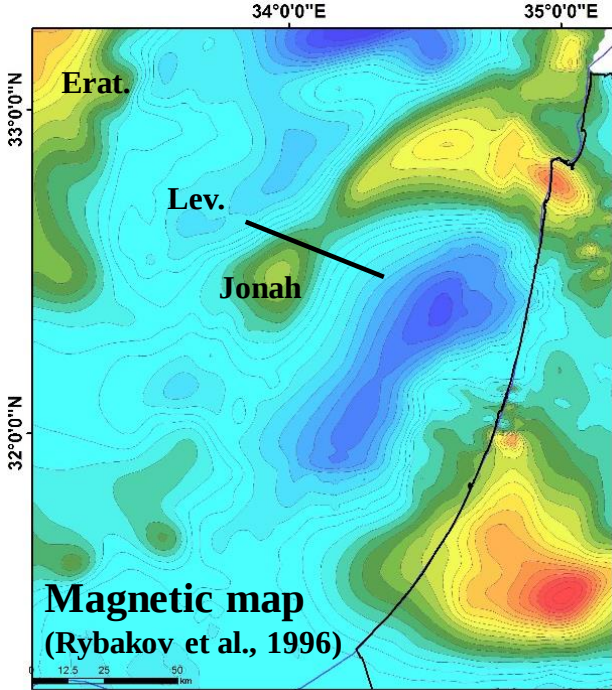
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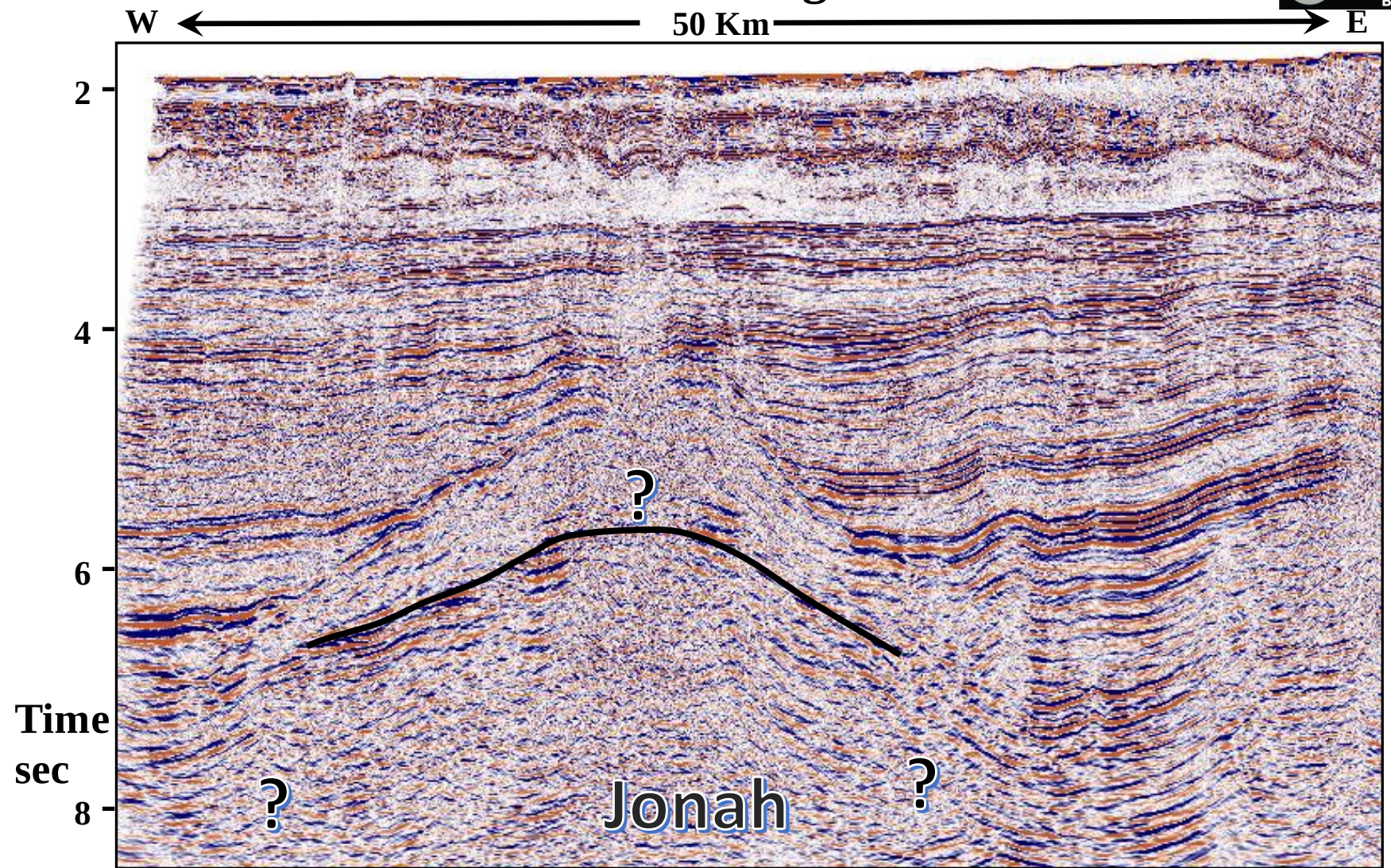


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|-------------------|--------------------|------------------|------------------|------------------------|-----------|
| Sea Floor (10) | Base Pliocene (8) | Late Miocene (6) | Base Miocene (4) | Base Santonian (2) | Top Jonah |
| Mid. Pliocene (9) | Base Messinian (7) | Mid. Miocene (5) | Base Saqiye (3) | Base Late Jurassic (1) | |

Modified from Steinberg et al., 2011; Sagy et al., 2015



Line IS-4045 Time migrated



Ancient horst?
(Gardosh et al., 2008)

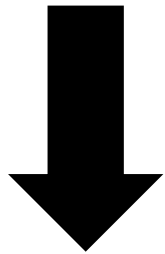
Syrian Arc fold?
(Gardosh et al., 2008)

Deep seated magmatic intrusion?
(Ben-Gai and Folkman, 2004)

Volcanic edifice?
(Rybakov et al., 2011)

The Enigma of Jonah high:

Horst?



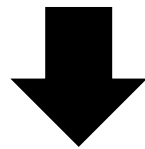
Rifting stage

Amount of extension

Heat flow

Reconstruction of plate's fragments

Fold?

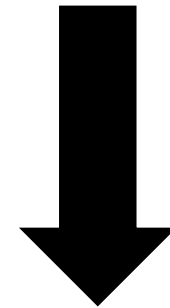


Post rift contractional phase –

the equivalent of the onshore

Syrian Arc fold system?

Magmatic body?



Rift related magmatism?

Early Cretaceous magmatism?

Tertiary magmatism?

Objective:

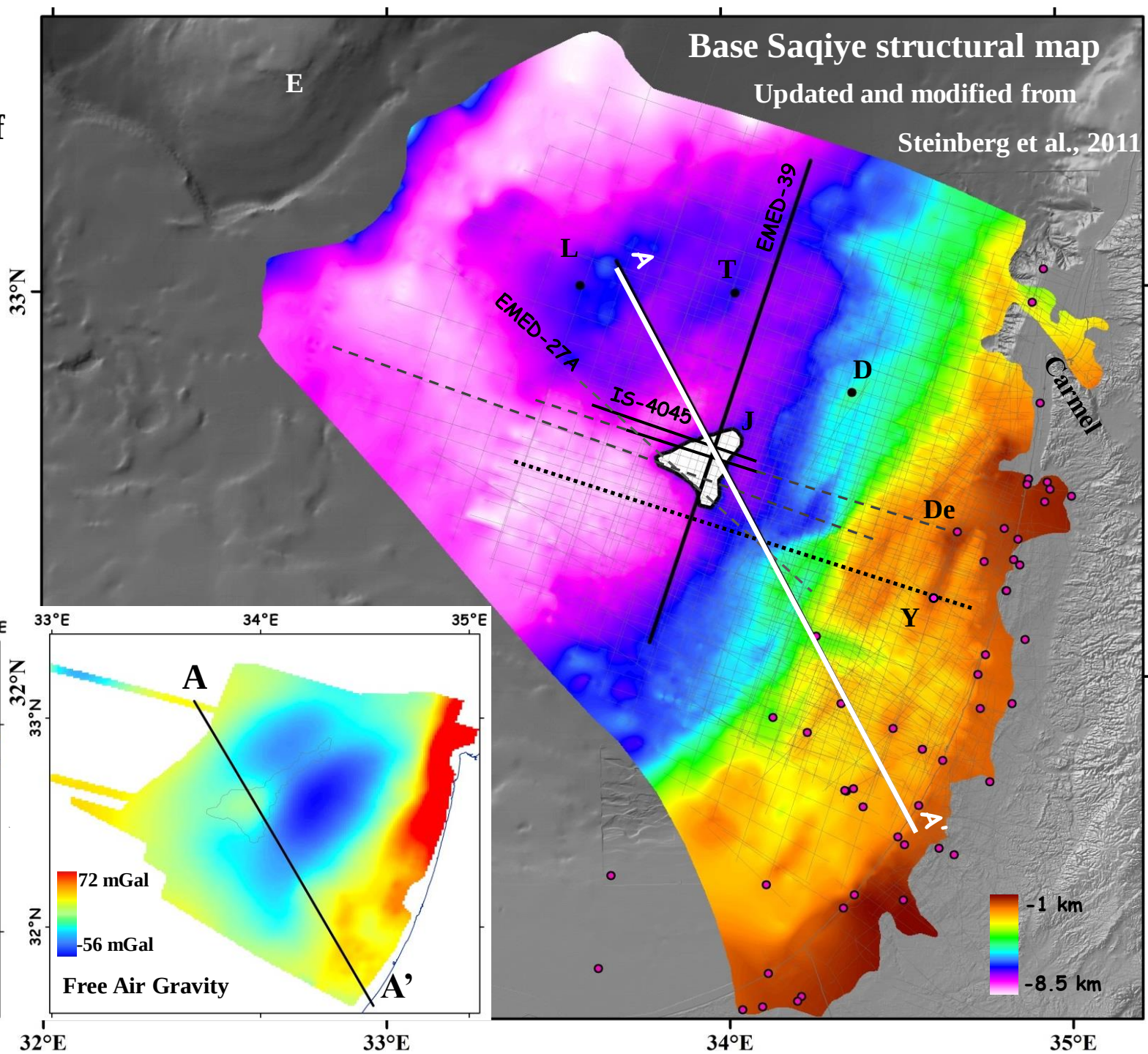
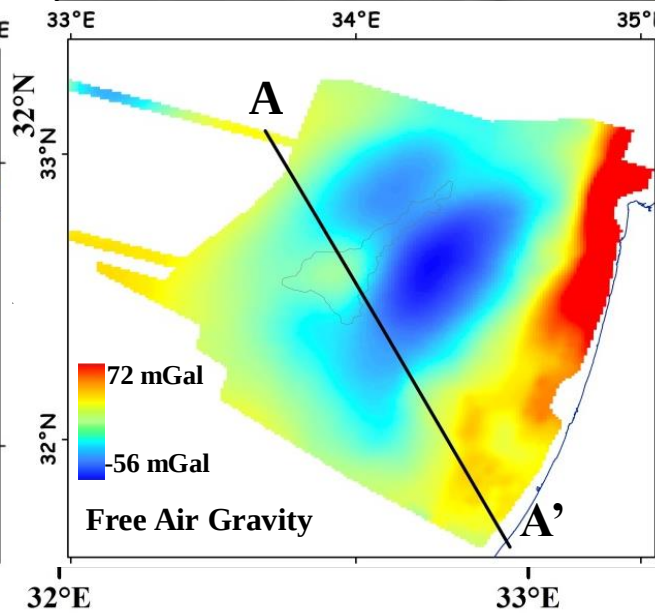
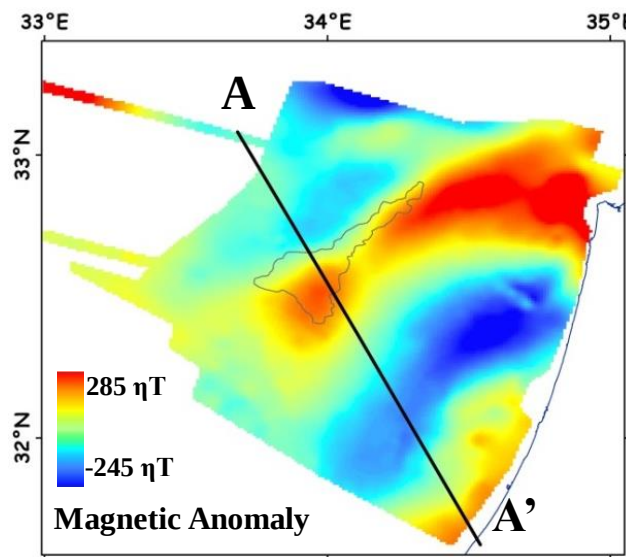
Explore the origin and evolution of Jonah high

Specific aims:

- **Internal reflections: artifact? flat? folded? intrusive?**
- **Geometric relationship - between structure and bordering reflectors**
- **Deeper boundaries: defining the bordering faults**
- **Gravity and magnetic data: do they fit to the proposed model?**

Data and Methods:

- ★ Regional interpretation on ~27, 000 km of 2D seismic lines
- ★ Processing raw data of 5 seismic lines performing Pre-stack Depth Migration (PSDM)
- ★ Gravity and magnetic modeling along profile A A'

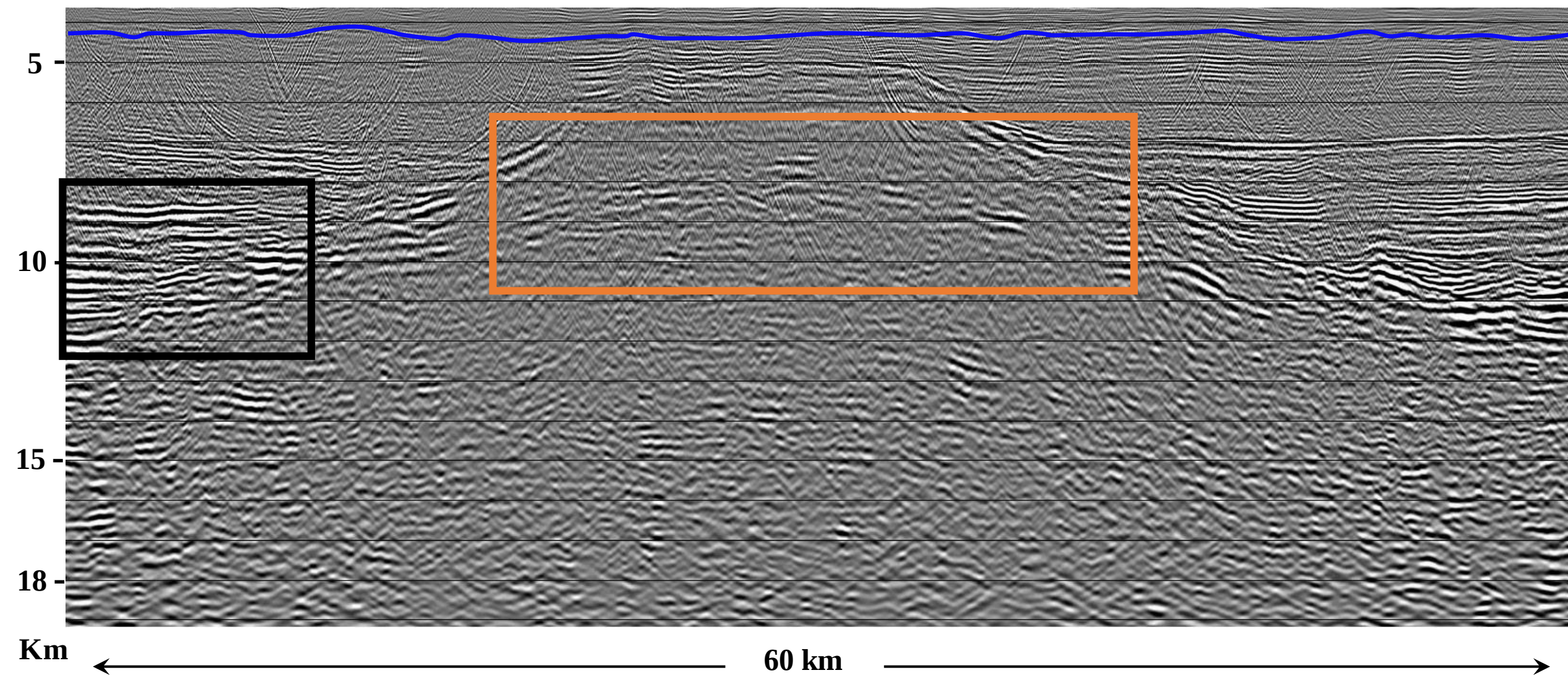


PSDM of line EMED-39

S

$V = 4000$ m/s below mid. Miocene

N

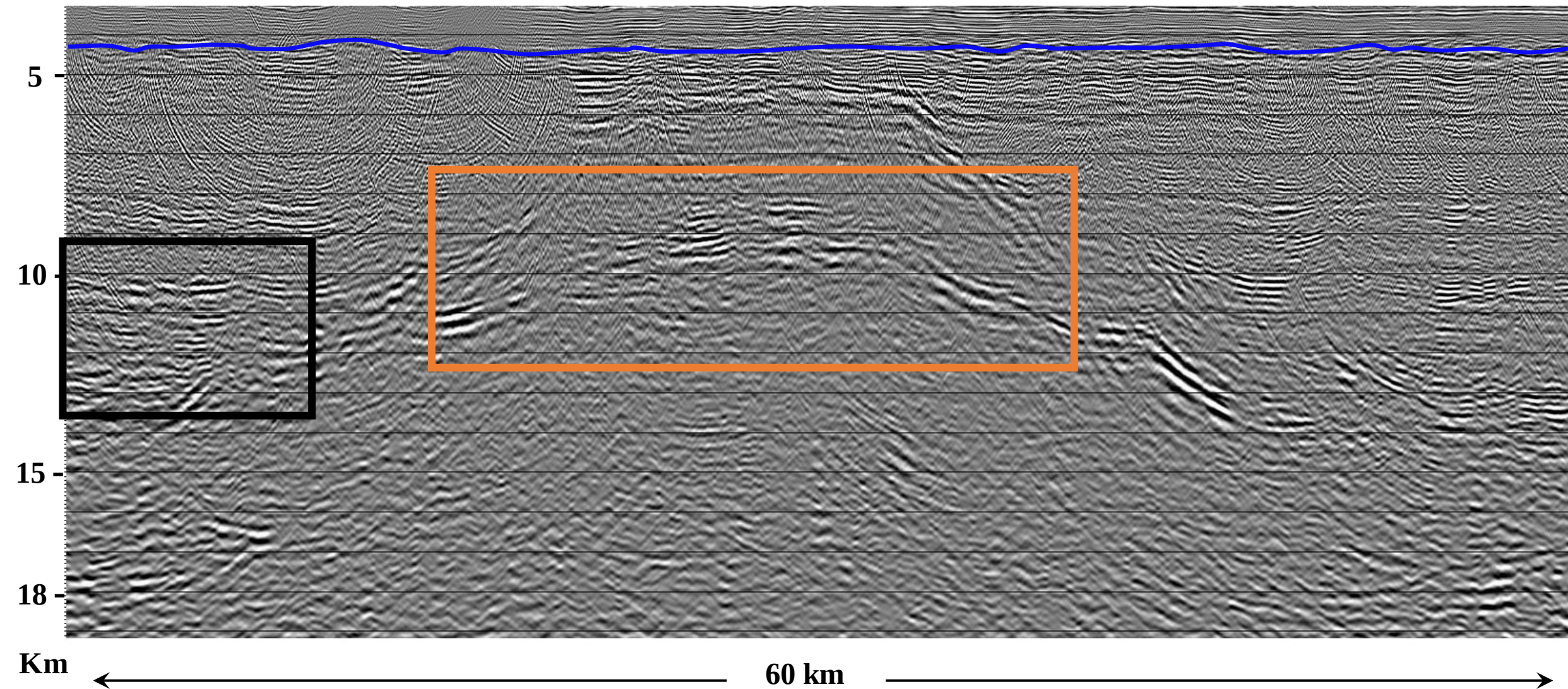


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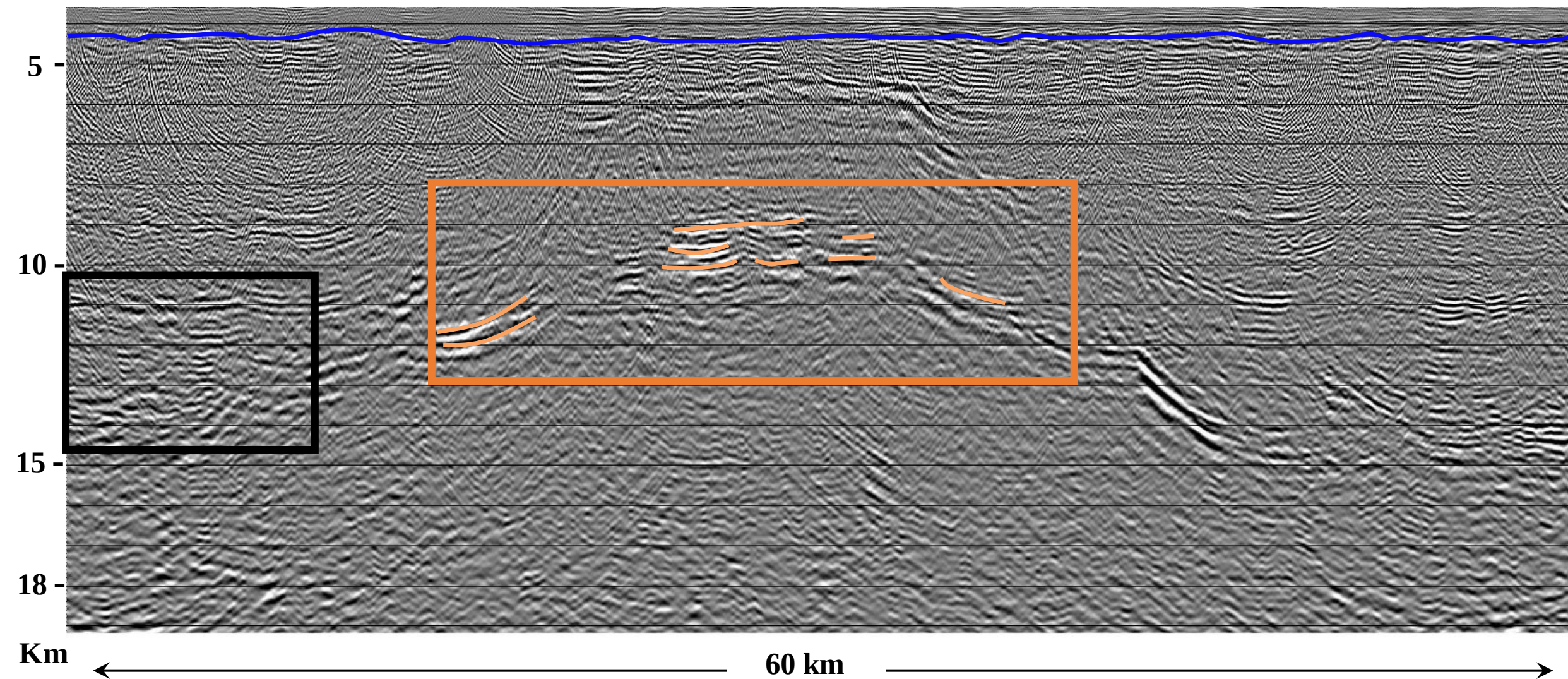


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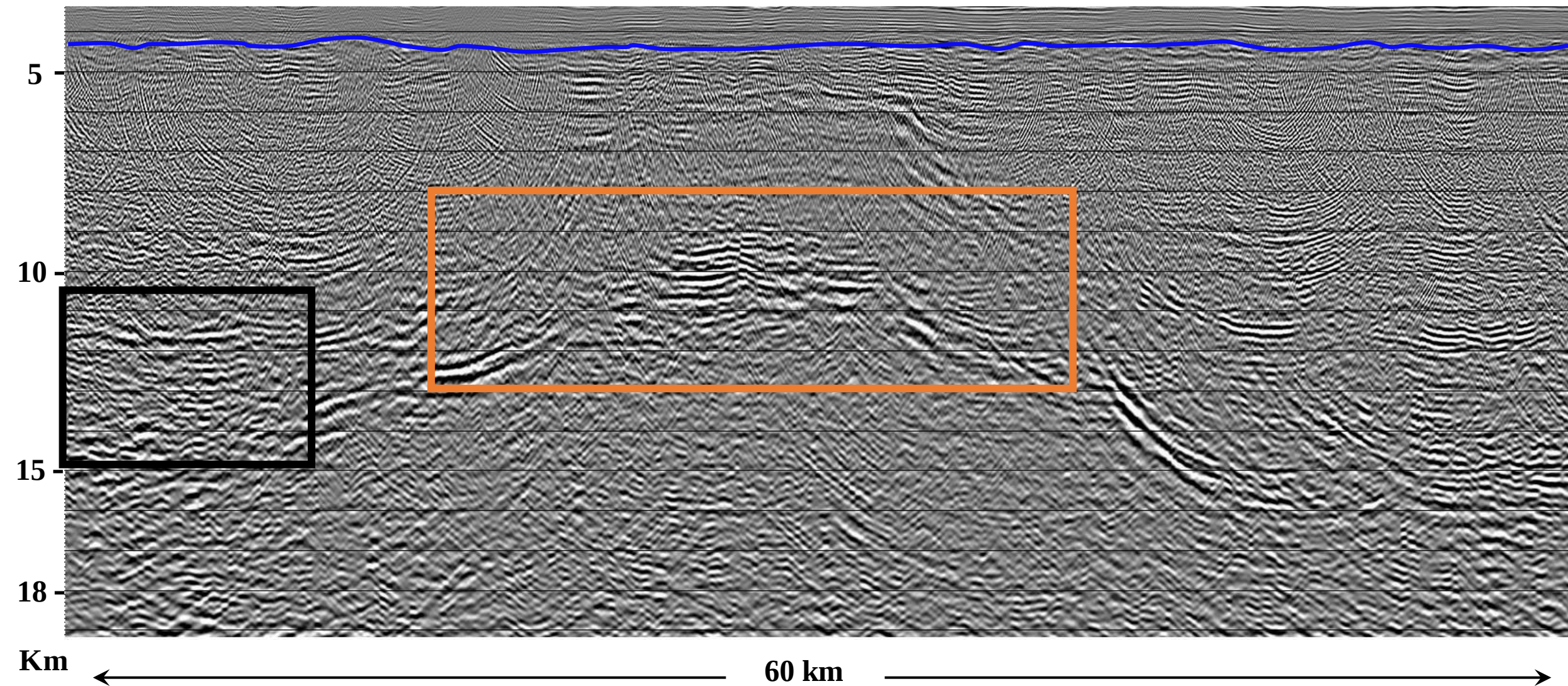


PSDM of line EMED-39

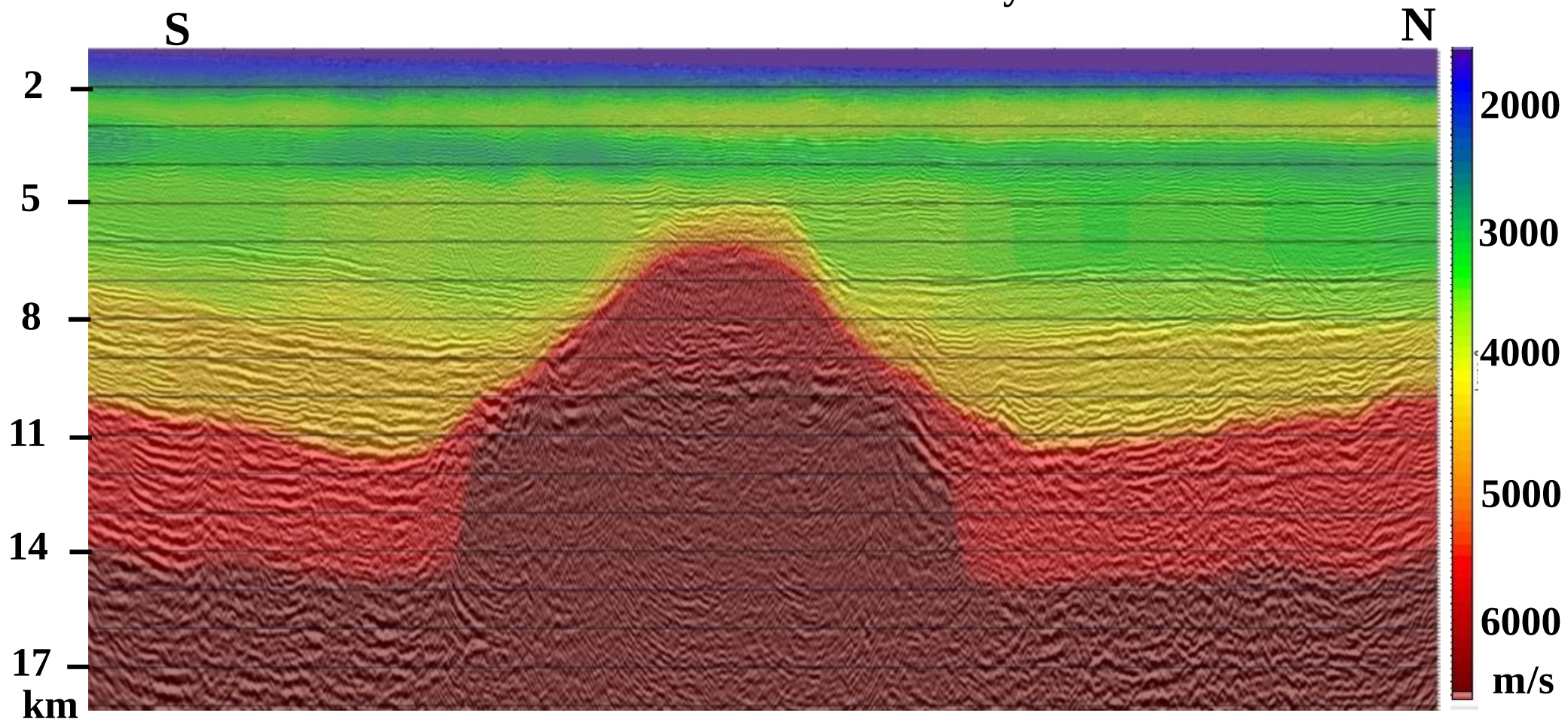
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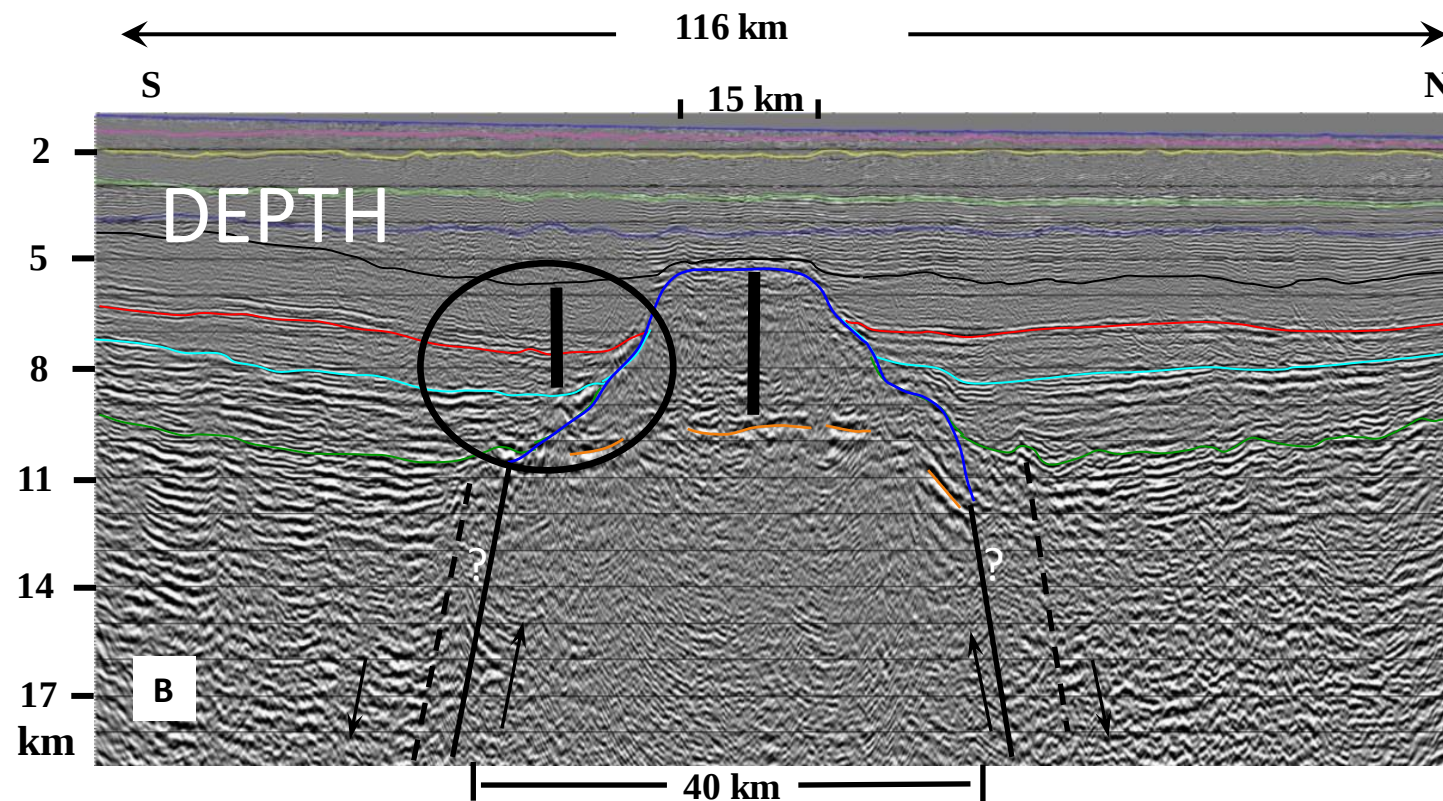
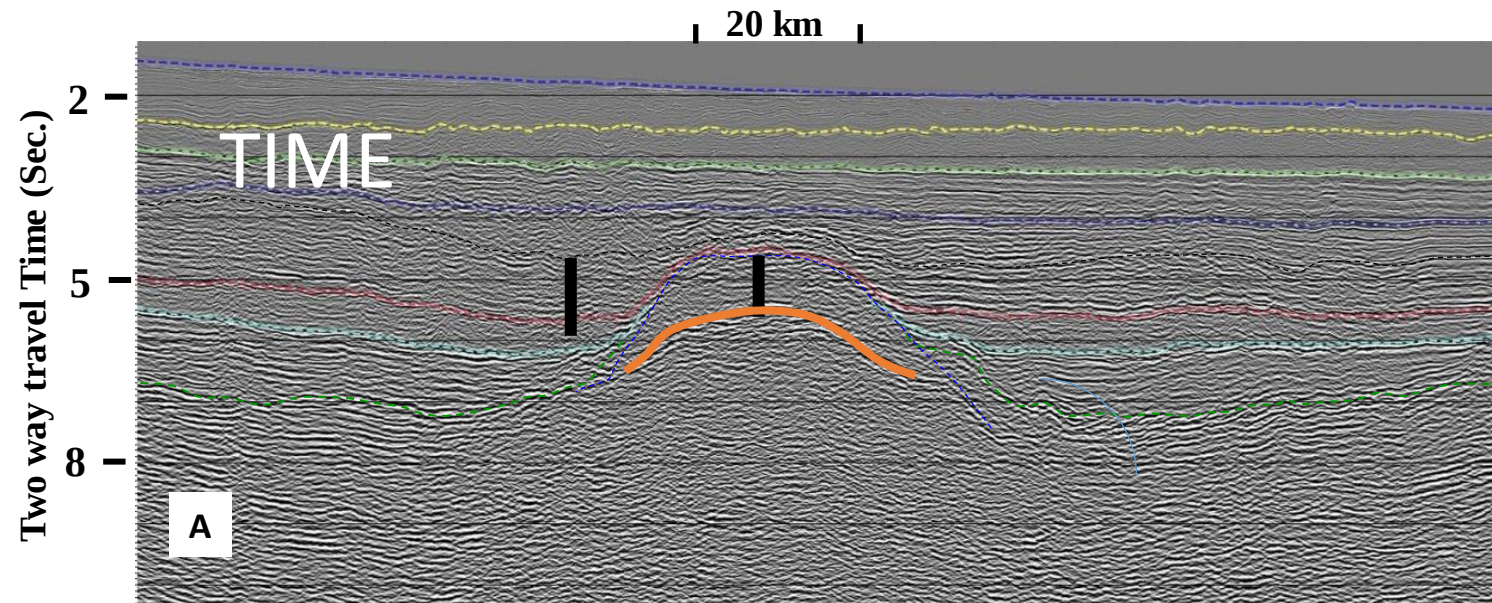
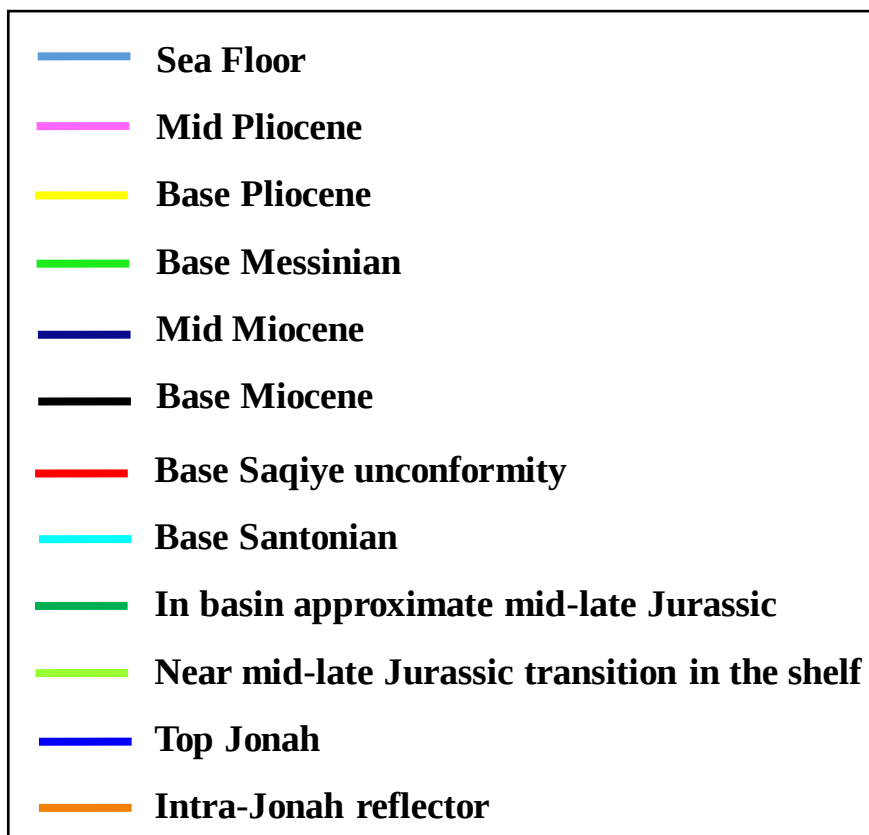
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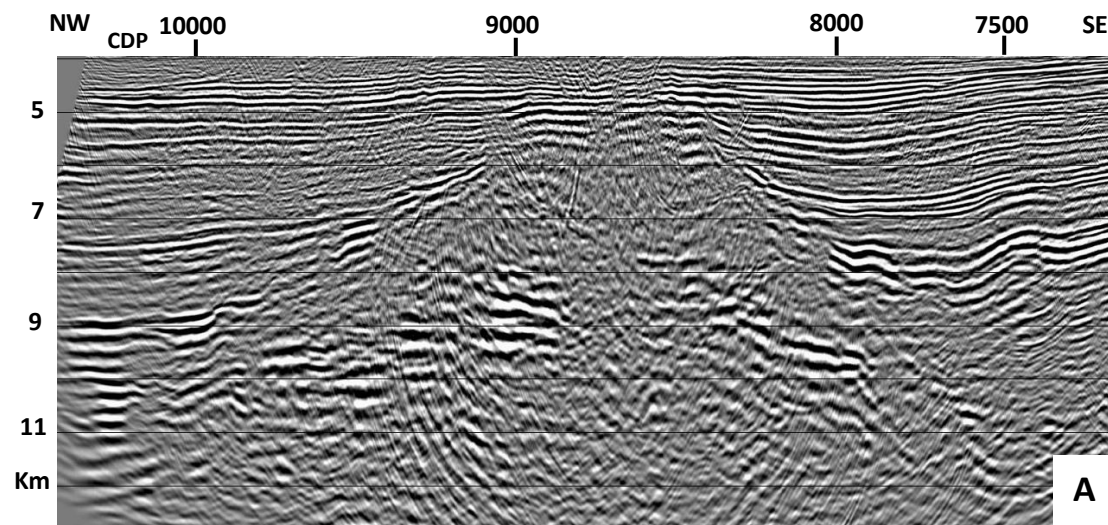
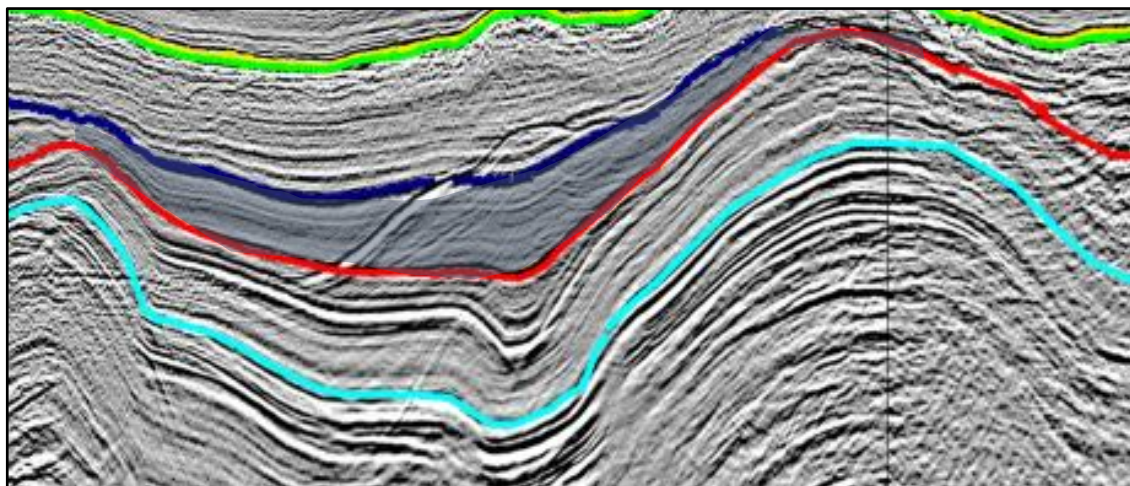
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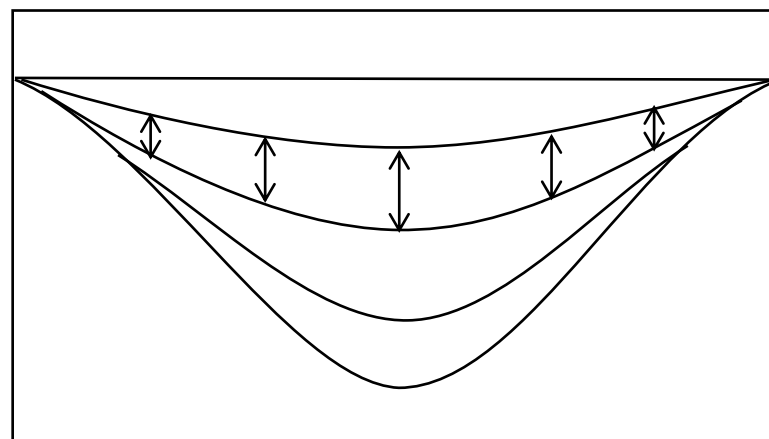
Line EMED-39 final interval velocity model

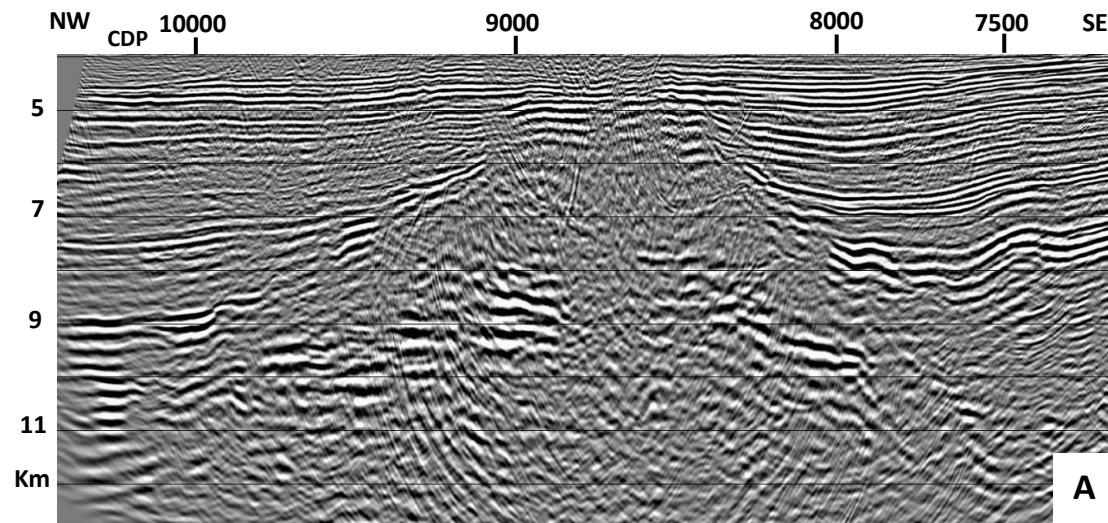
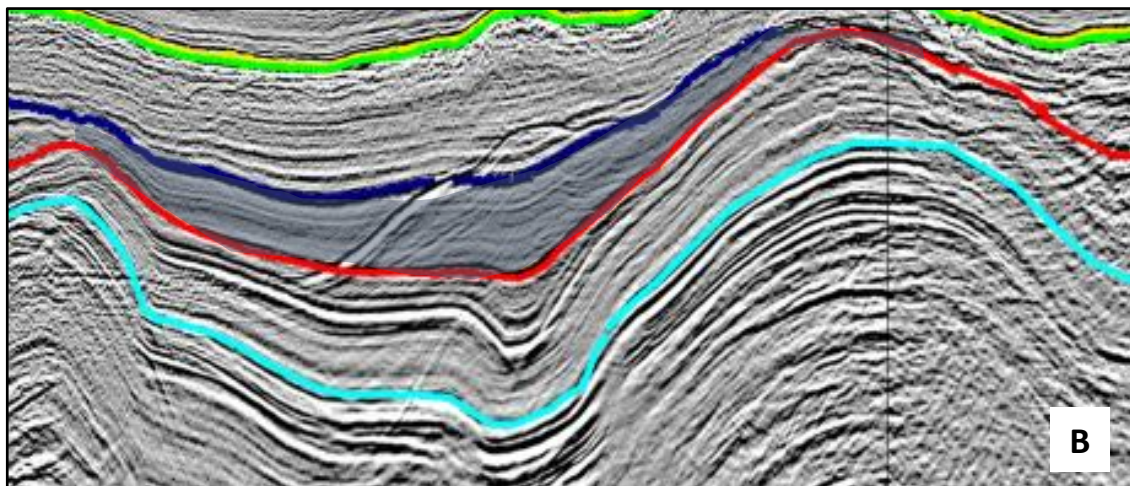




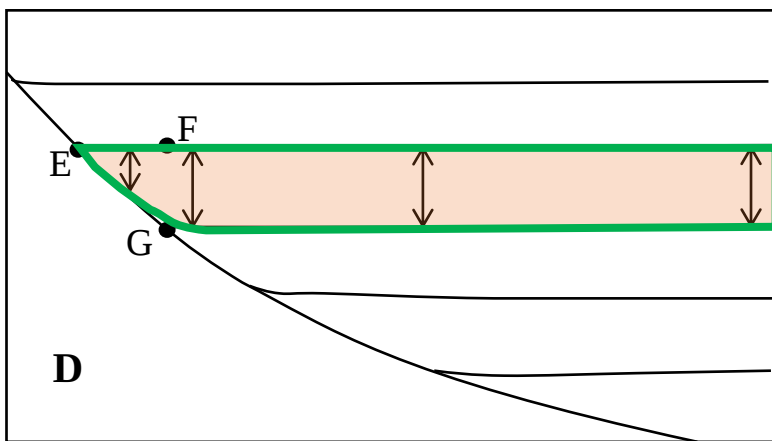


Typical Syrian Arc
syn-tectonic deposition

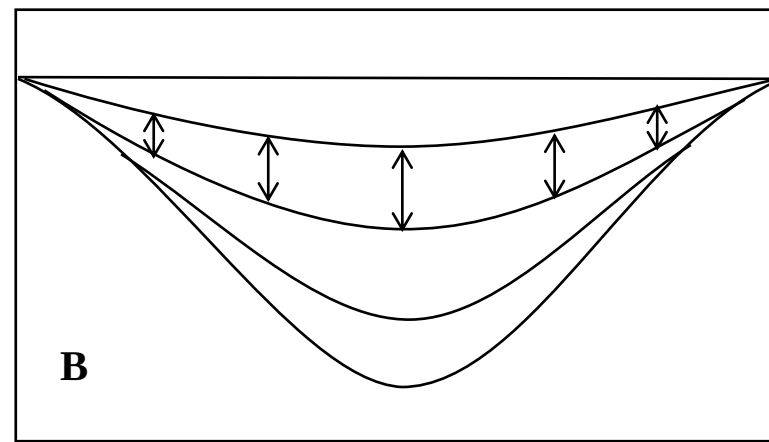




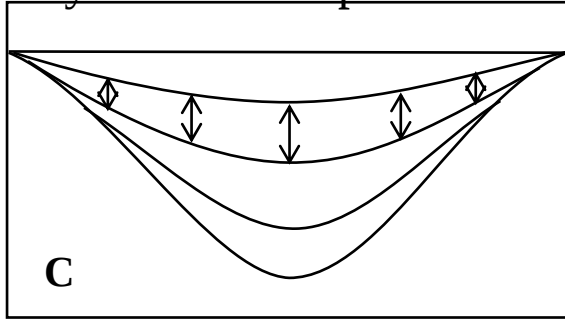
Gradual burial of pre-existing relief by onlapping strata



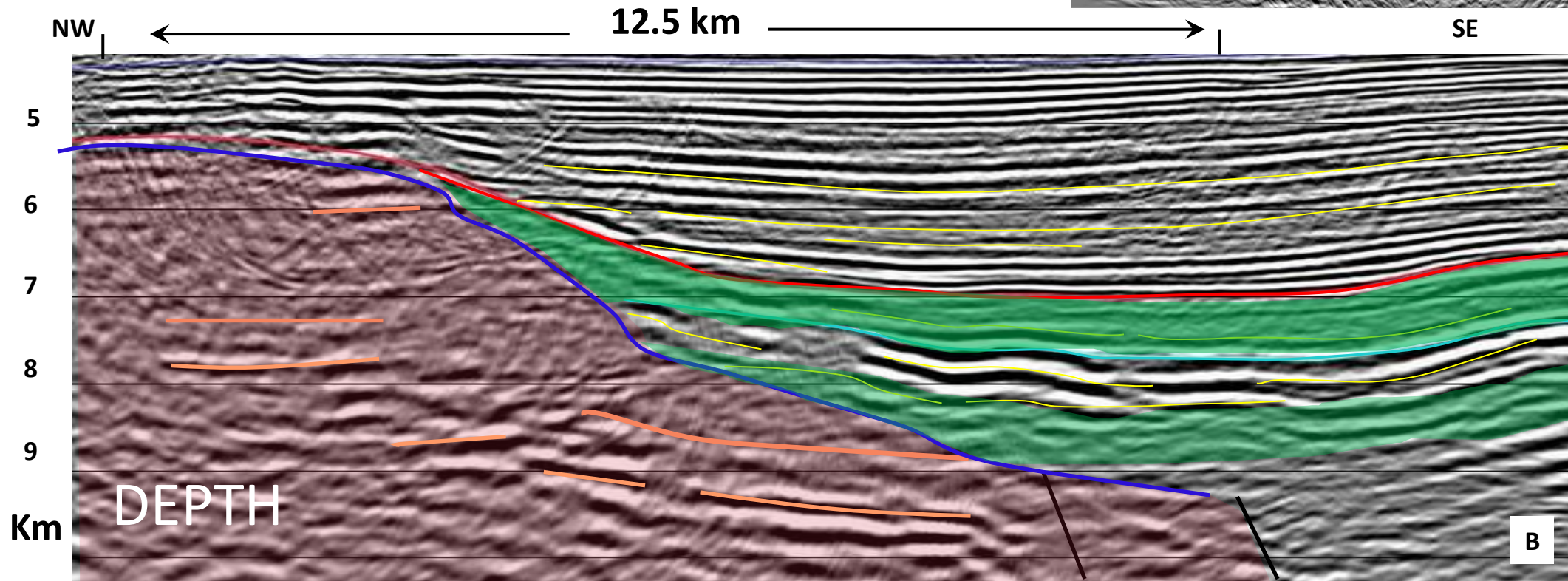
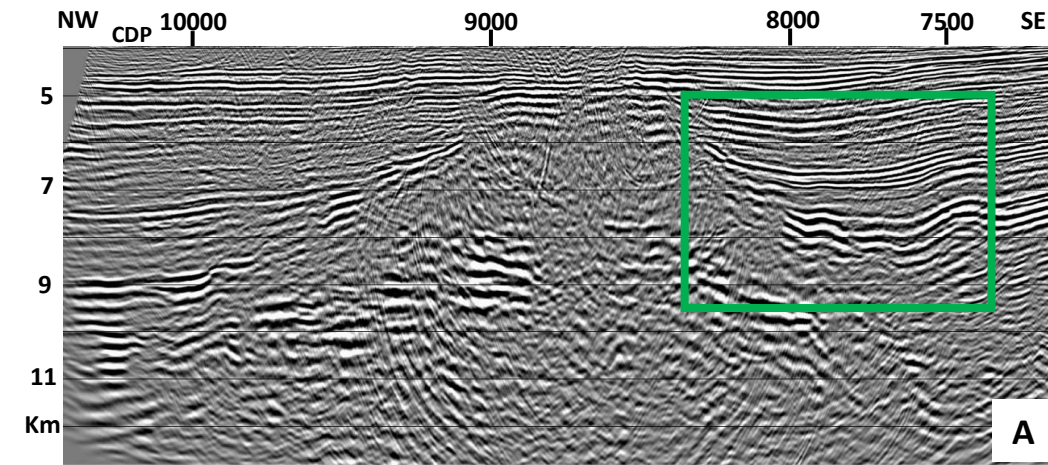
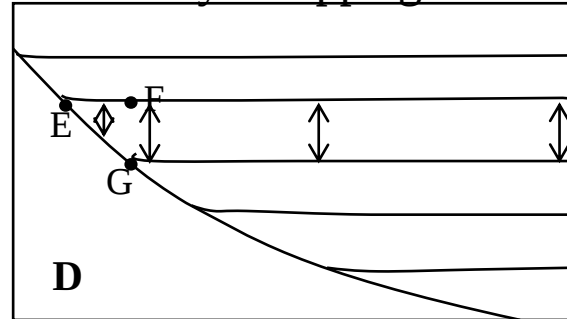
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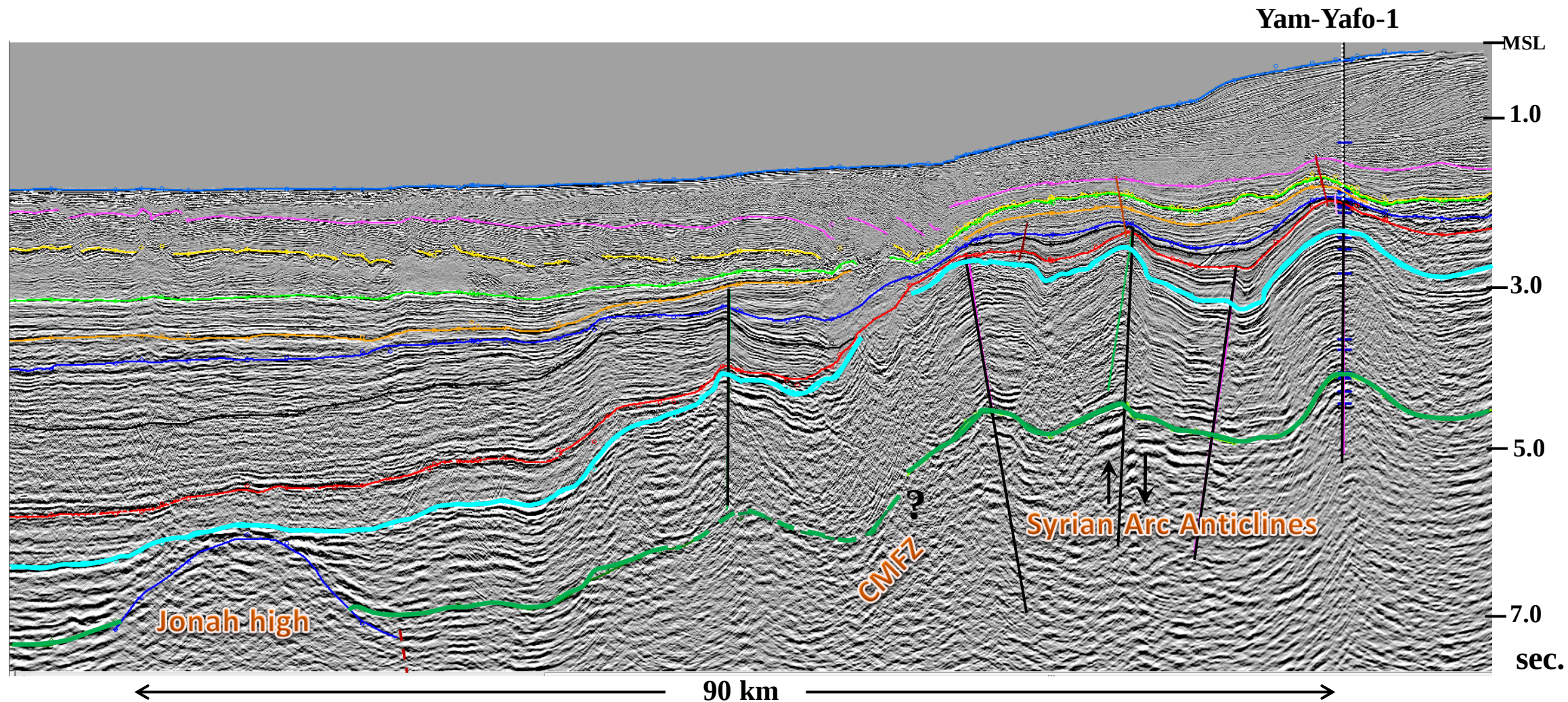


Horst not reactivated

Burial history

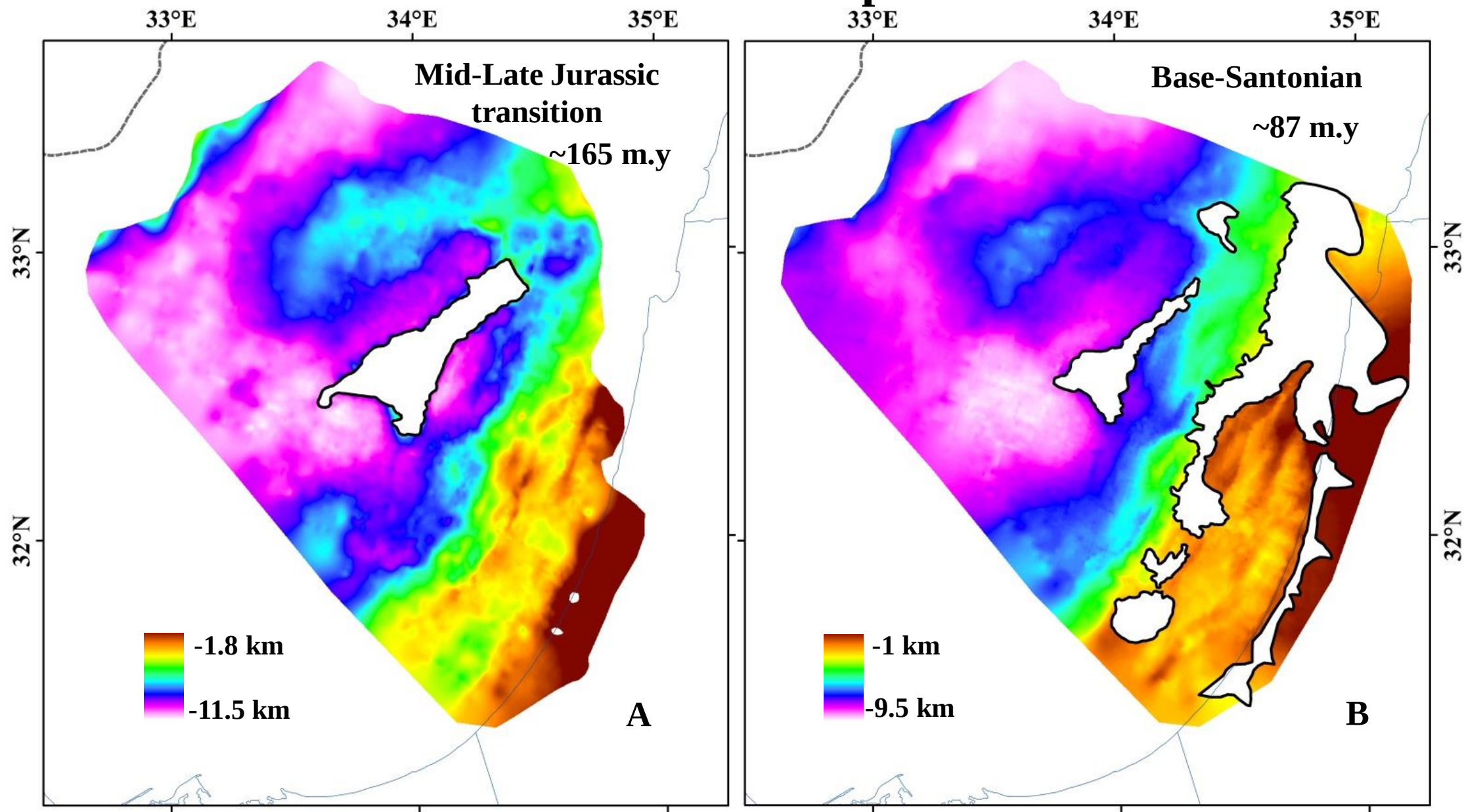
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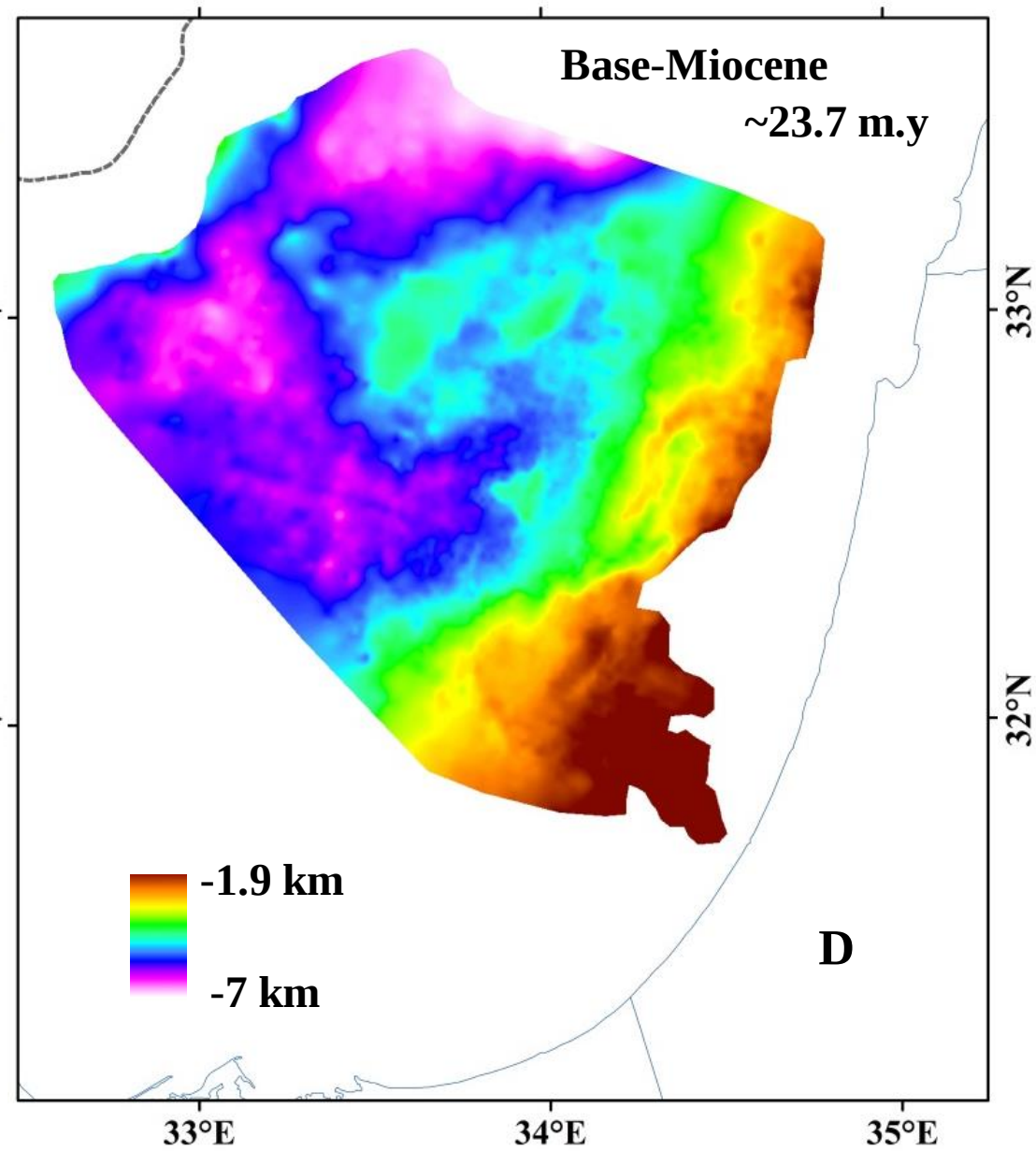
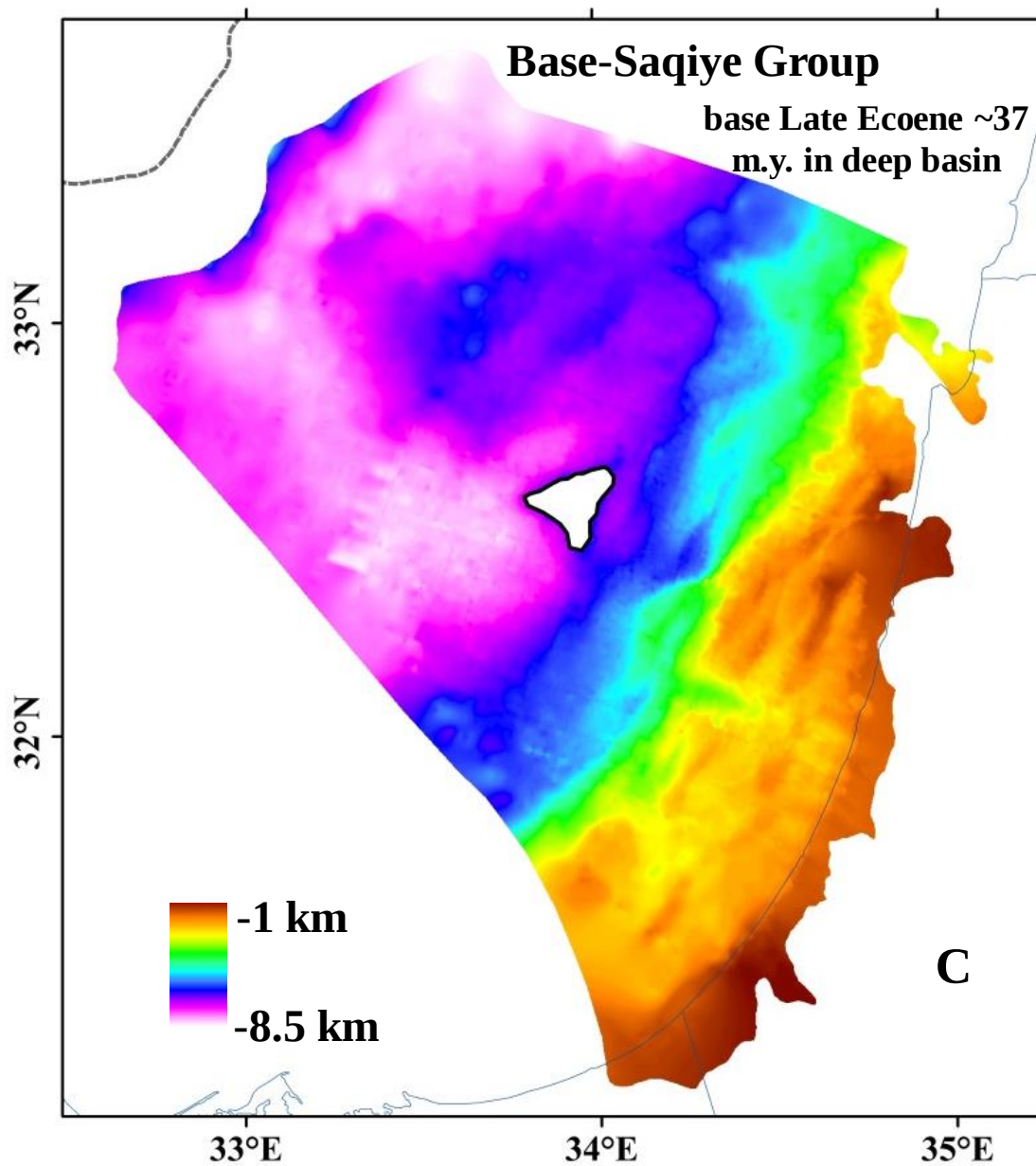


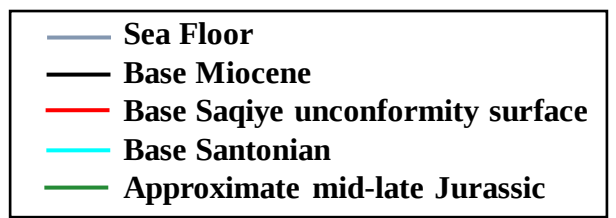
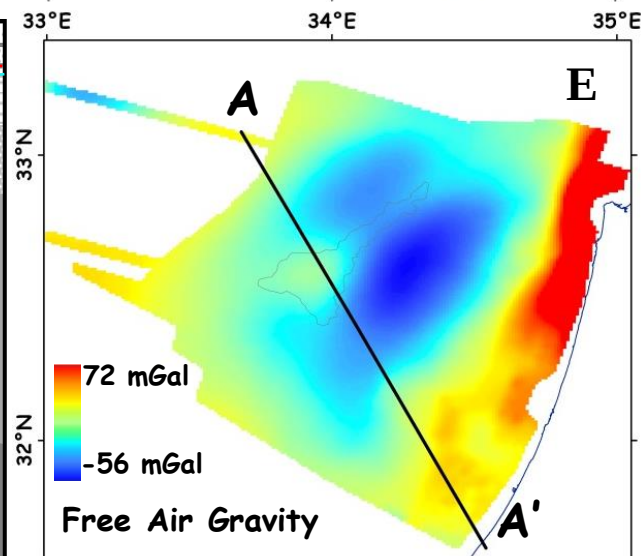
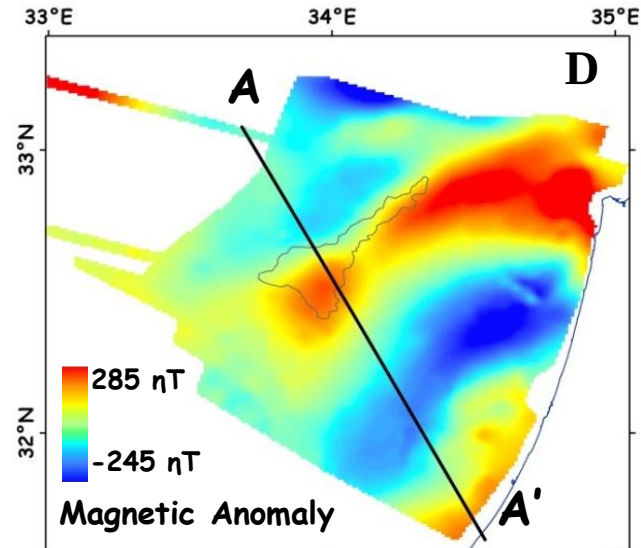
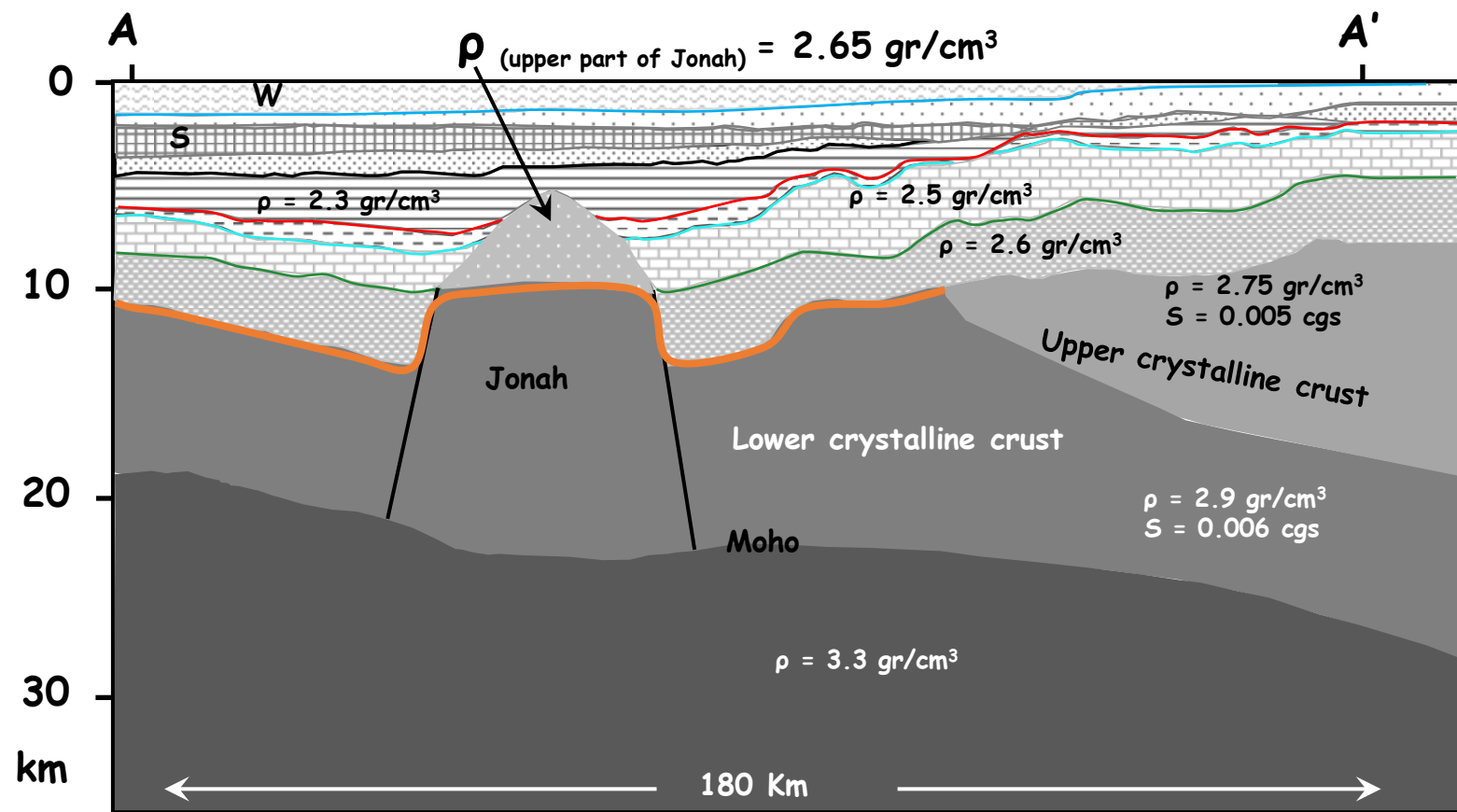
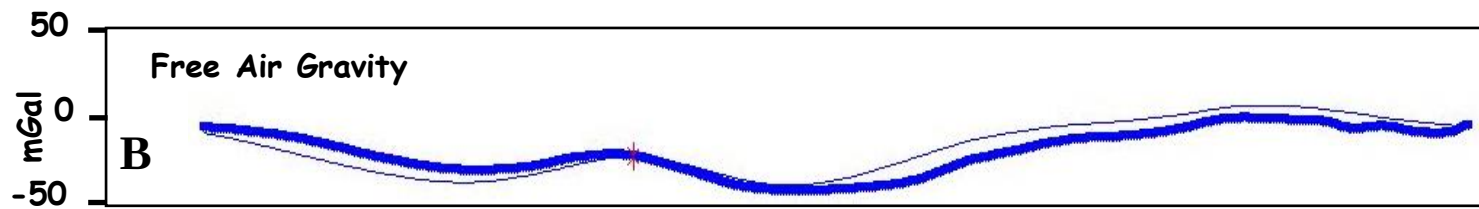
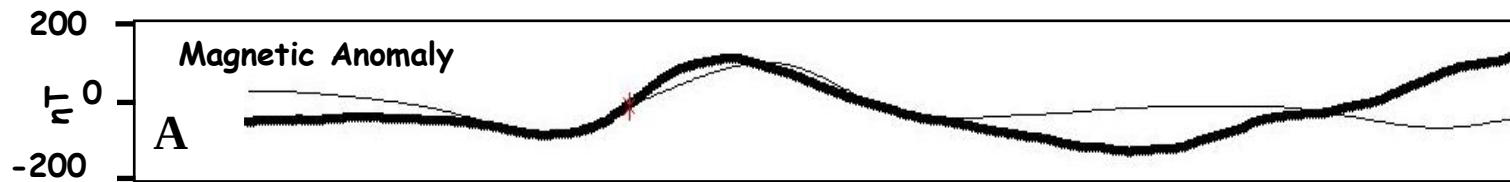
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Structural Maps



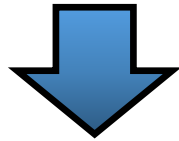
Structural Maps





Conclusions

- **Jonah is an ancient horst probably formed during late Paleozoic – Early Mesozoic rifting.**
- **During its long history (~140 m.y.) it was never reactivated tectonically.**
- **Gradually buried by onlapping sediments and coevally, was shrinking due to lateral retreat of its walls.**
- **It probably was occasionally growing upward by carbonate buildup that kept it high relative to its surrounding seafloor.**



HORST & GRABEN STRUCTURE



The lithosphere was not ruptured during the Early Mesozoic rifting

A thinned continental crust underlie the Levant basin and not an oceanic one