

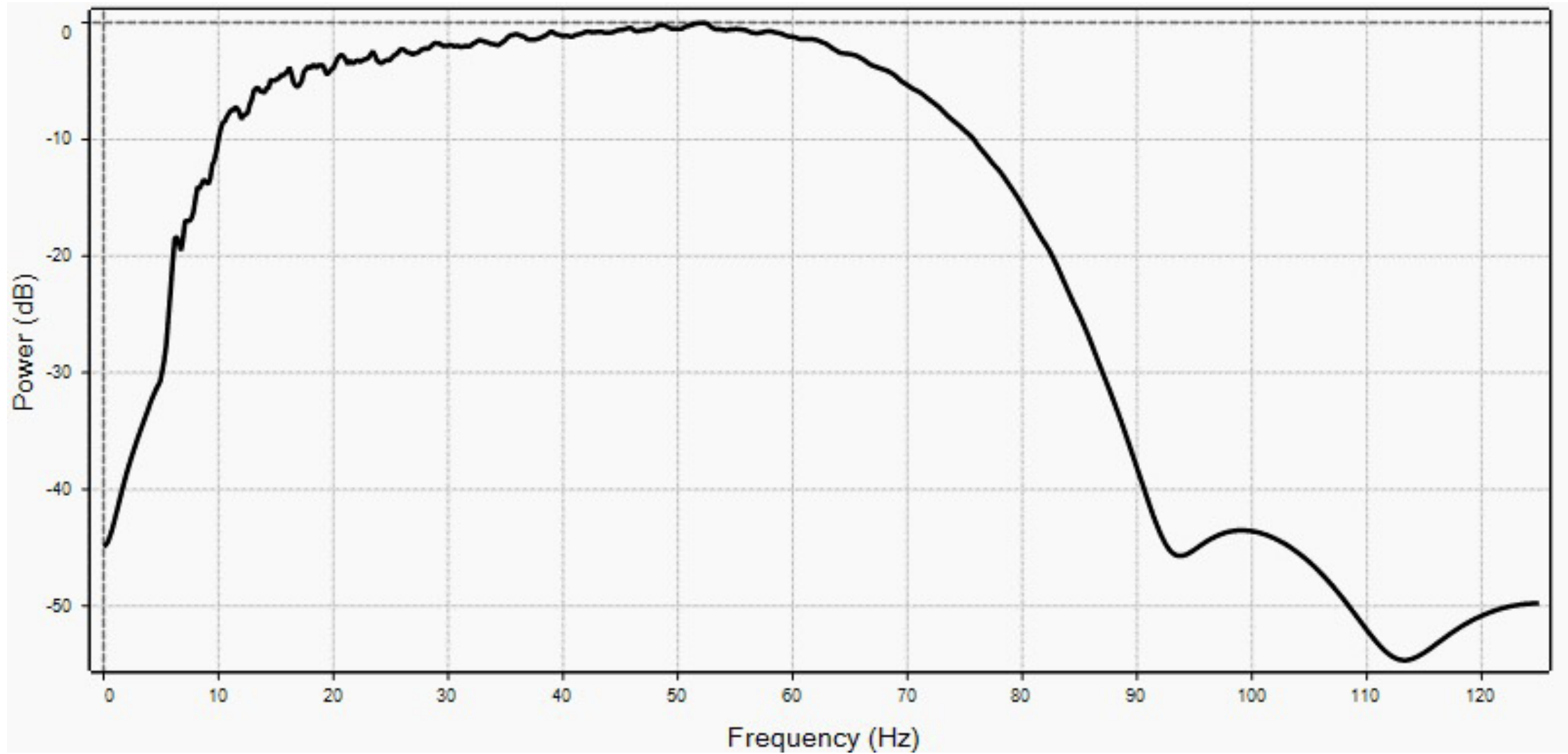
Supporting Information for **Alghuraybi et al.**  
(2023 - TEKTONIKA)

*A Snapshot of the Earliest Stages of Normal Fault Growth  
Activity*

Ahmed Alghuraybi<sup>1</sup>, Rebecca Bell<sup>1</sup>, Christopher A. Jackson<sup>1</sup>

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Engineering, Imperial College London,  
London, UK

**Figure SI-1**



**Figure SI-1.** Frequency spectrum for the 3D seismic reflection dataset used in this study. The figure shows that the dominant frequency ranges between 40 – 60 Hz depending on the depth interval within the seismic survey.

Table SI-1 – Palynological samples

| Sample number | Sample depth (m) |
|---------------|------------------|
| 1             | 1264             |
| 2             | 1294             |
| 3             | 1297             |
| 4             | 1300             |
| 5             | 1309             |
| 6             | 1360             |
| 7             | 1372             |
| 8             | 1387             |
| 9             | 1399             |
| 10            | 1432             |
| 11            | 2627             |
| 12            | 2657             |
| 13            | 2663             |

Data source: Norwegian Petroleum Directorate Factpage -  
<https://factpages.npd.no/en/wellbore/pageview/exploration/all/6678>

Figure SI-2

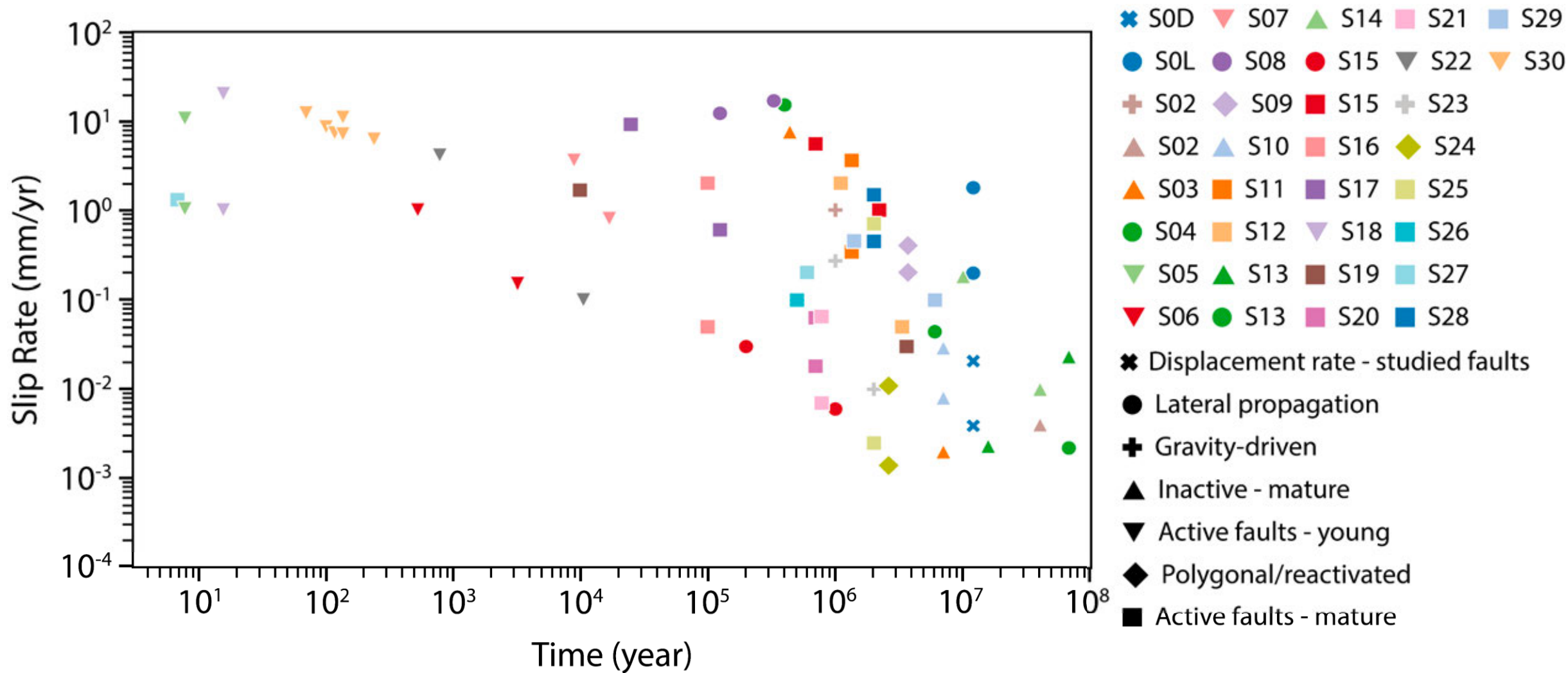
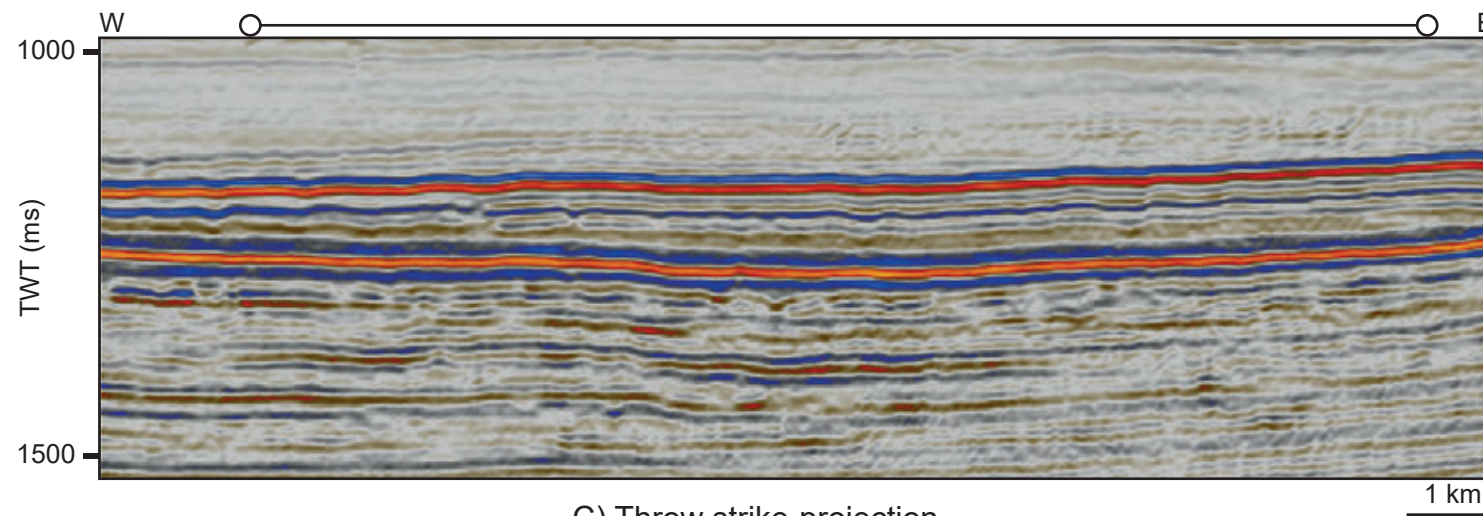


Figure SI-2. A plot showing the compiled data from 29 different studies in addition to data from the current study. Detailed information about each study are provided in Appendix 5.

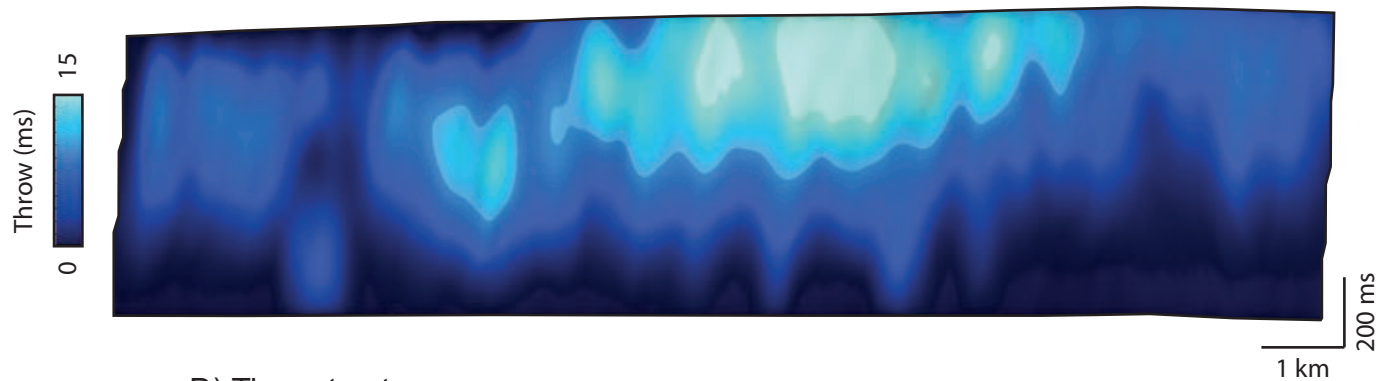
**Figure SI-3** – A detailed overview of all studied faults **(A)** a strike-parallel seismic section, **(B)** a strike-perpendicular (dip) seismic section, **(C)** strike-projected throw distribution along the fault surface, **(D)** A time-structure map of the base syn-kinematic horizons (H4) denoting the fault map location and the location of sections **(A)** and **(B)**. **(E)** Expansion Index (EI) values showing potential across fault thickening (i.e., syn-kinematic growth) at the H4 level.

# Fault 1 summary

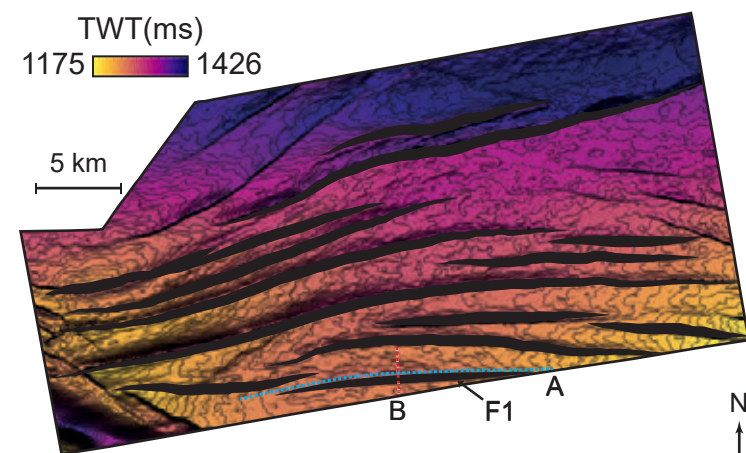
## A) Strike section



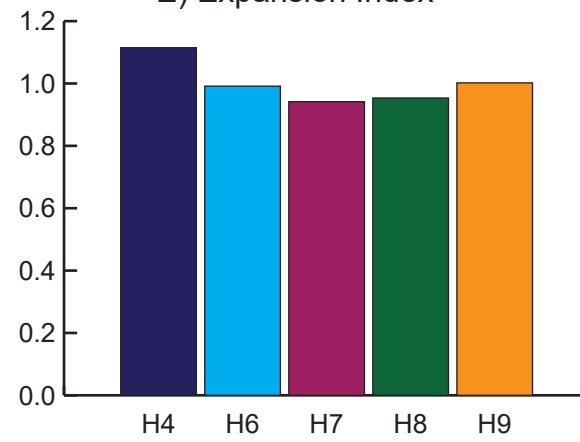
## C) Throw strike-projection



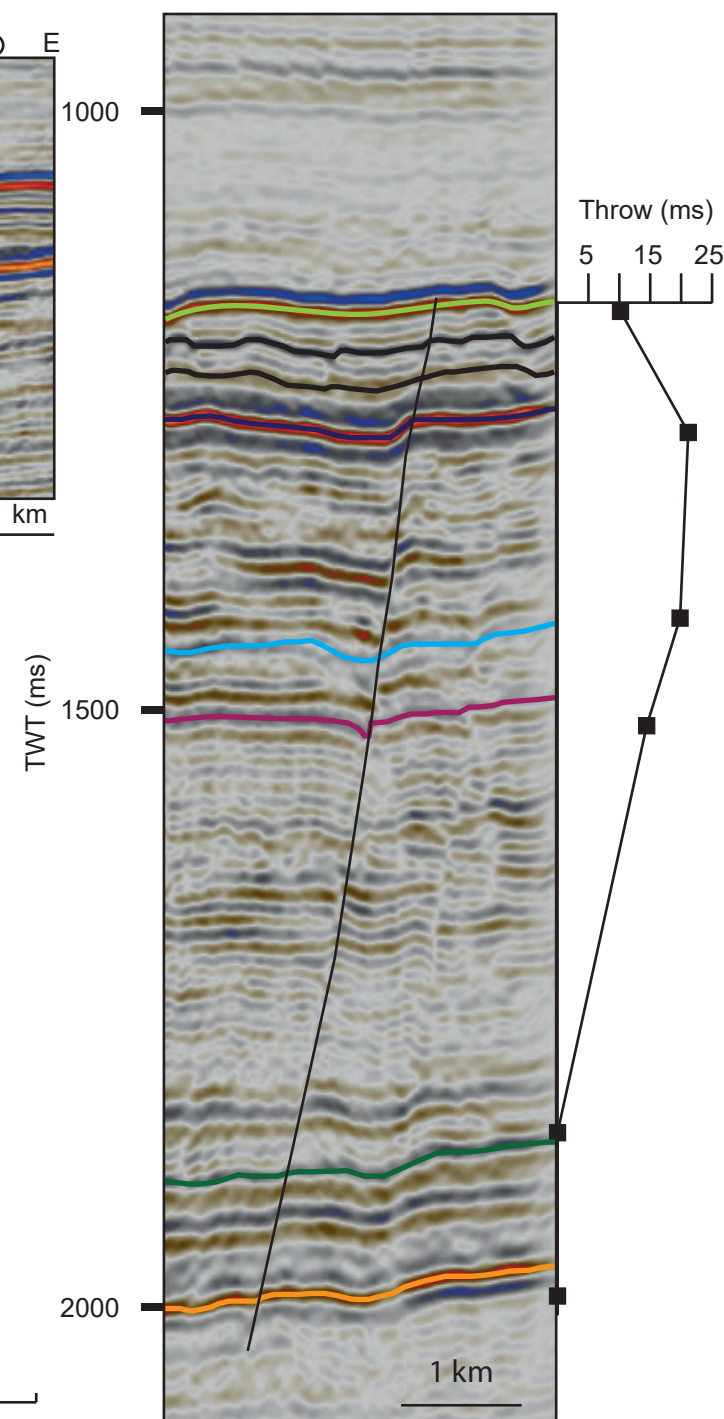
## D) Time-structure map



## E) Expansion Index

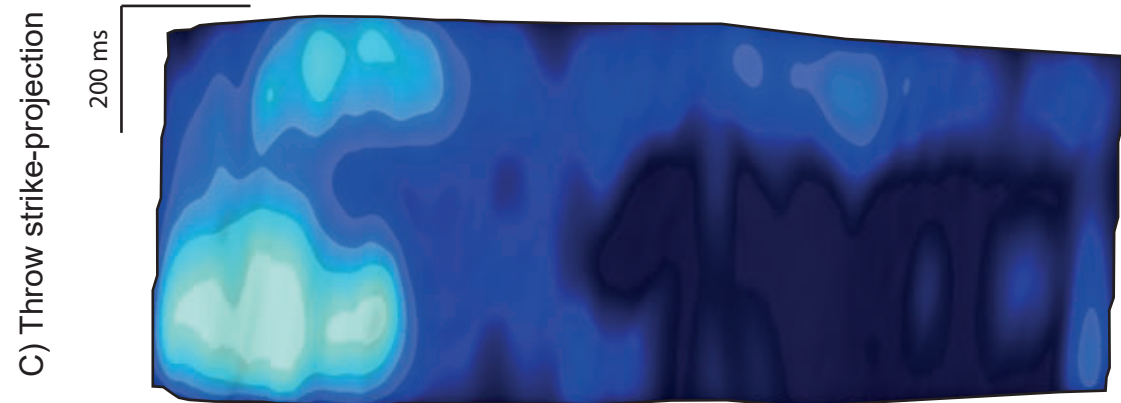
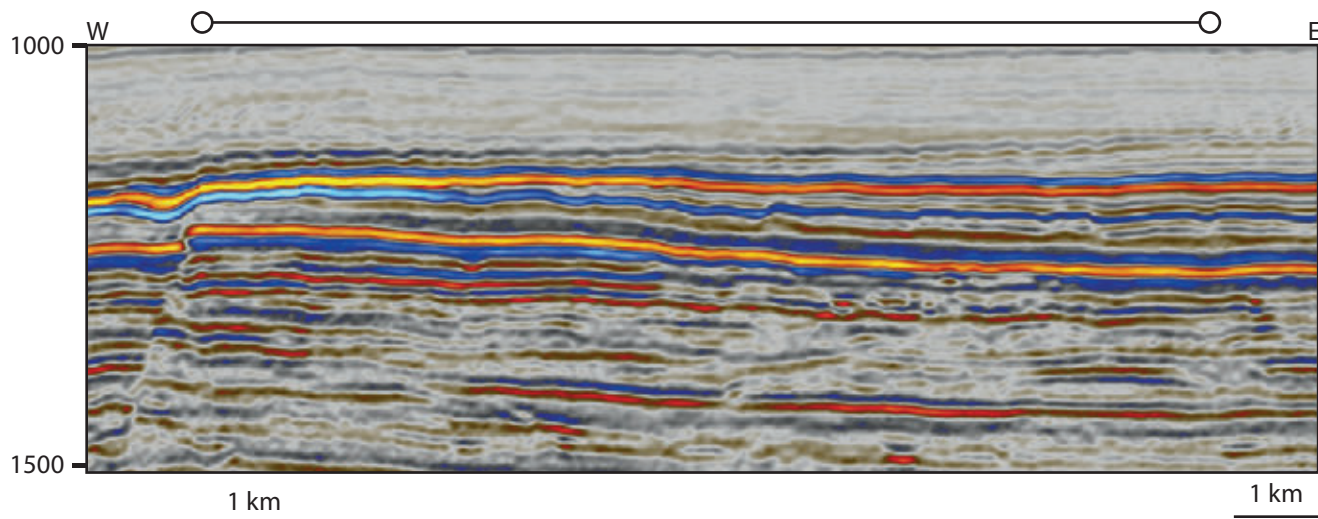


## B) Dip section

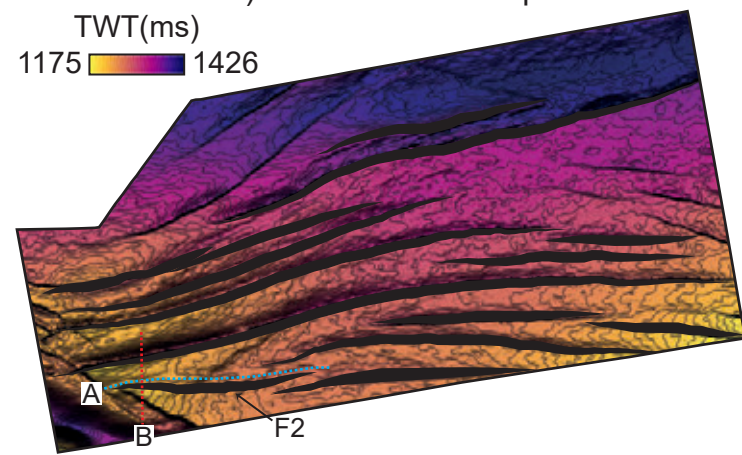


# Fault 2 summary

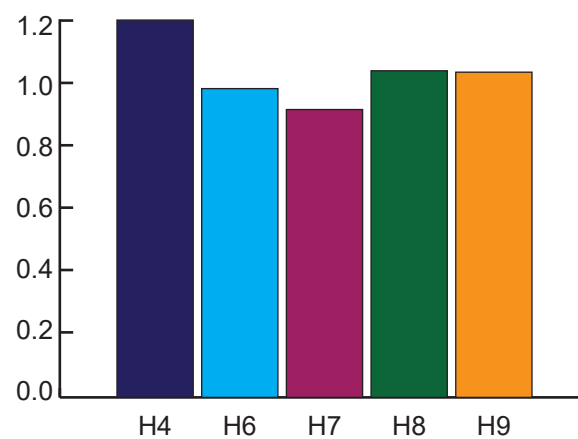
## A) Strike section



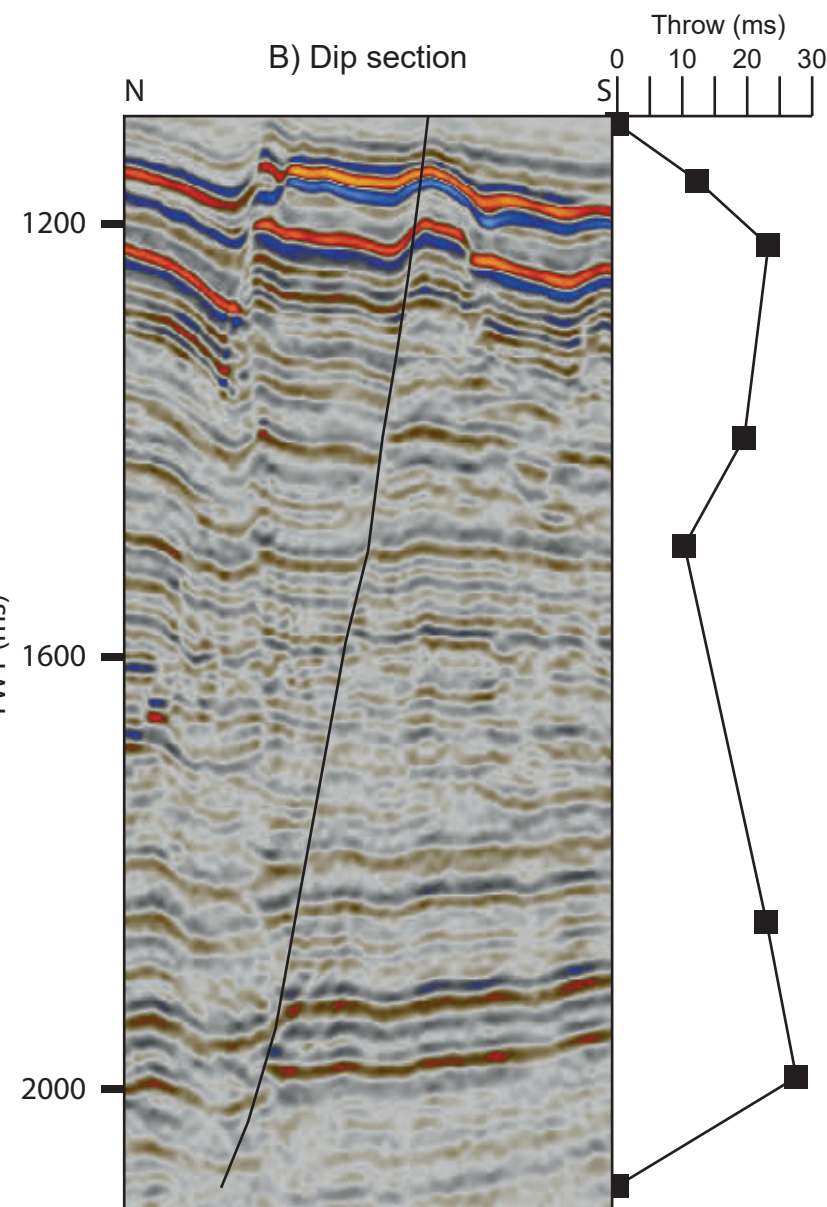
## D) Time-structure map



## E) Expansion Index

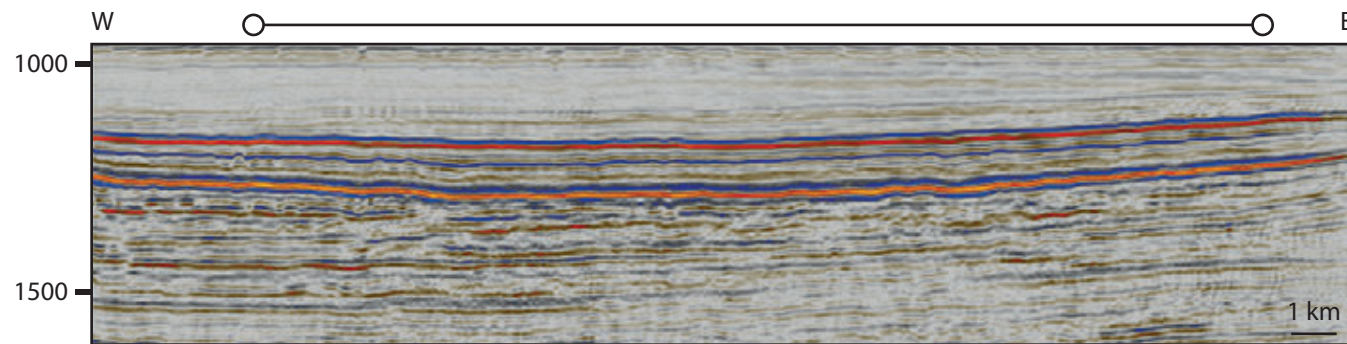


## B) Dip section

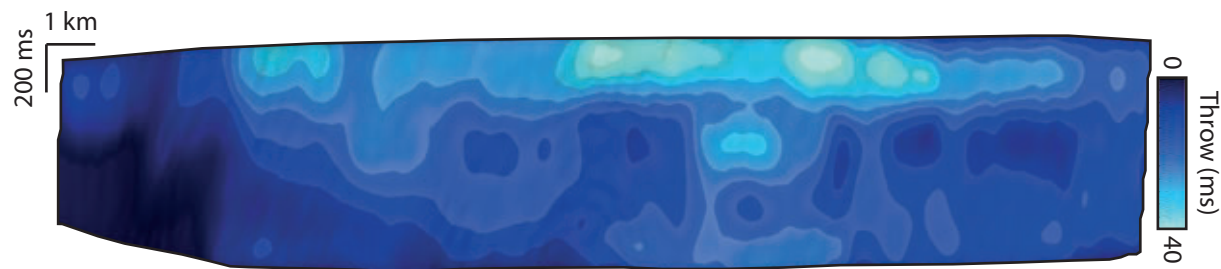


# Fault 3 summary

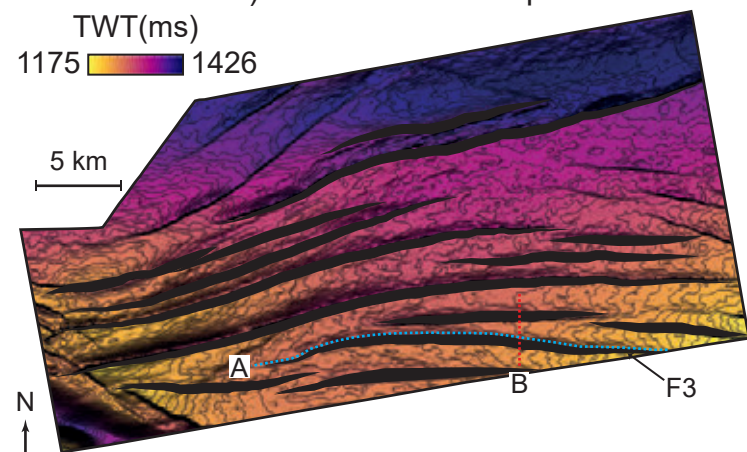
## A) Strike section



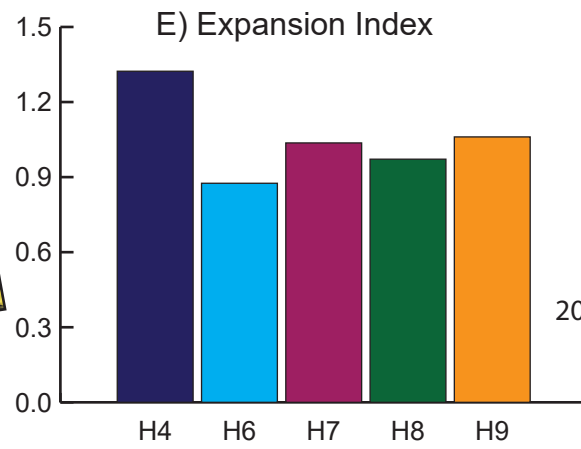
## C) Throw strike-projection



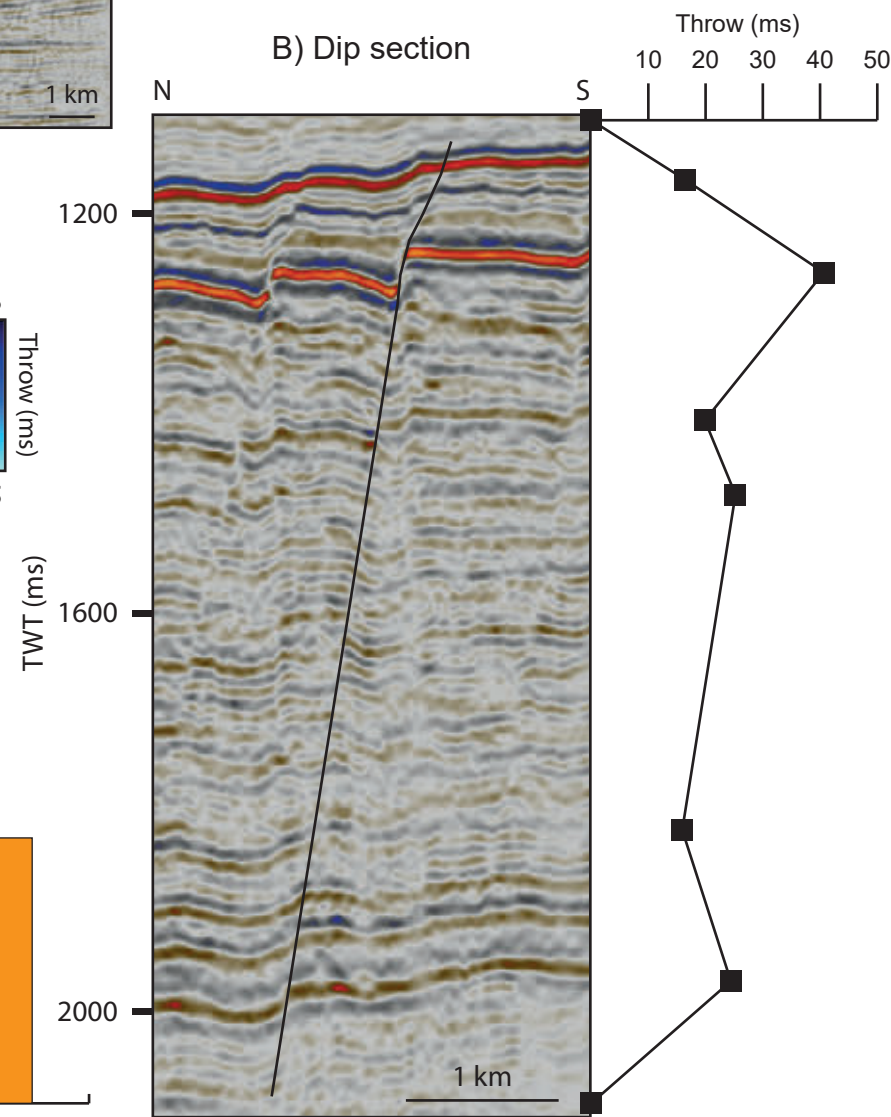
## D) Time-structure map



## E) Expansion Index

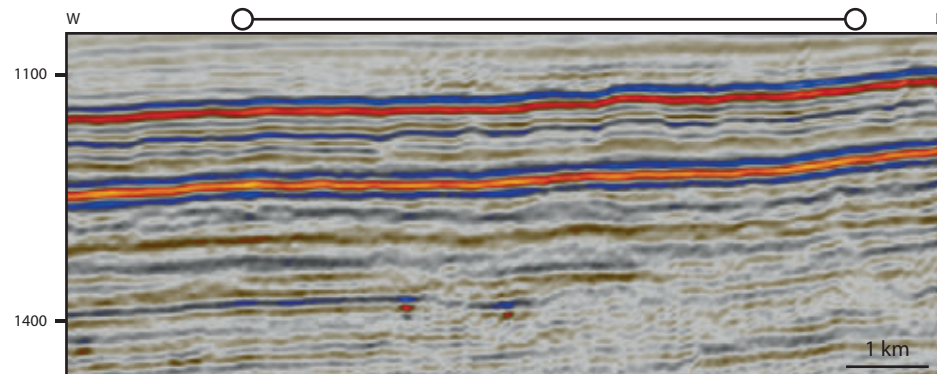


## B) Dip section

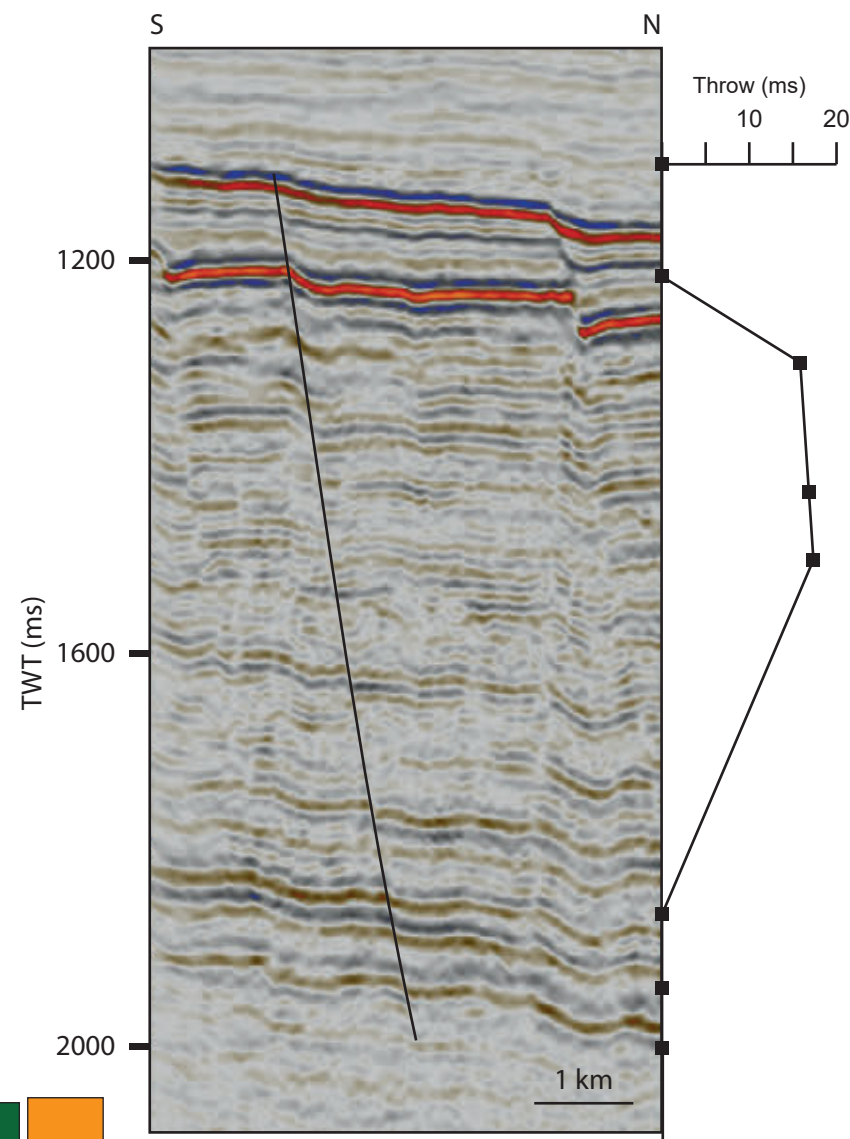


# Fault 4 summary

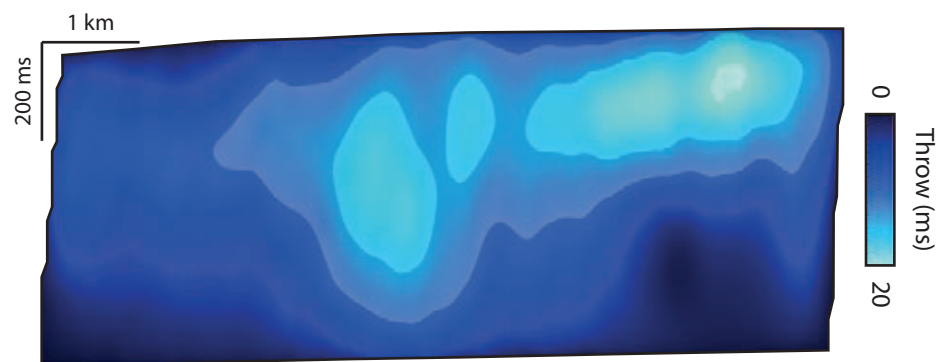
A) Strike section



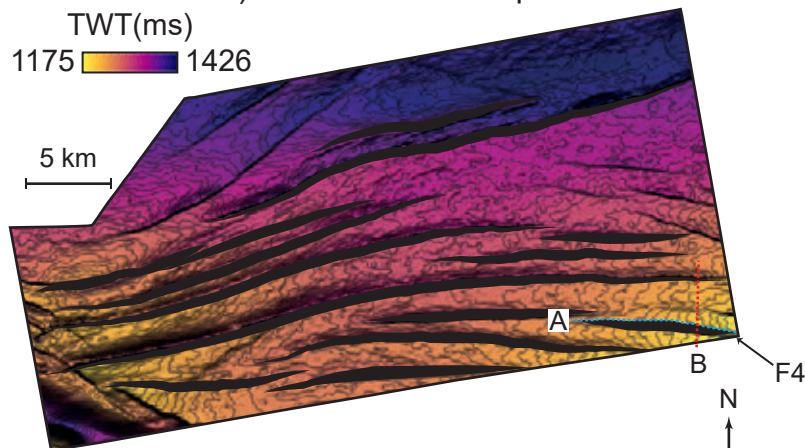
B) Dip section



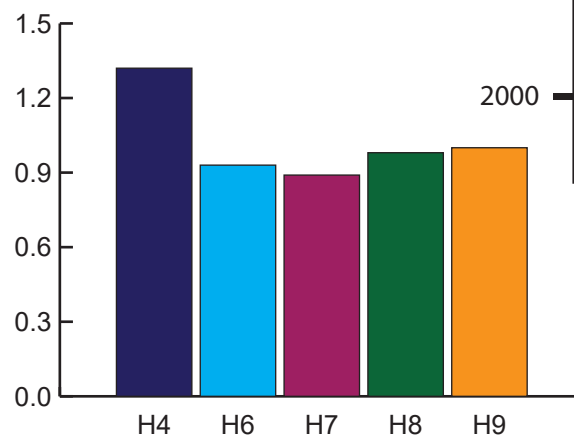
C) Throw strike-projection



D) Time-structure map

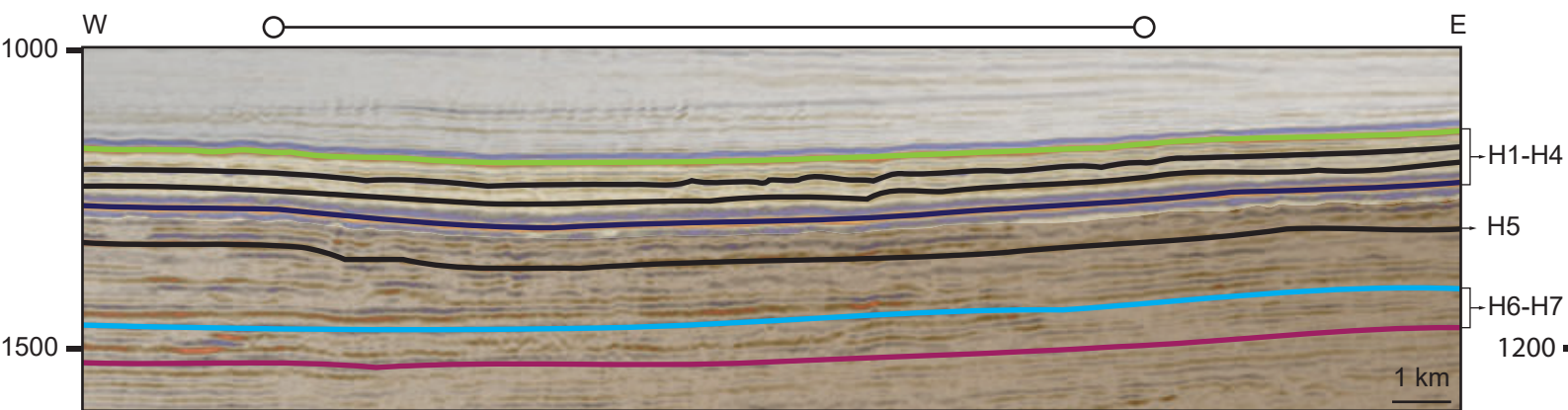


E) Expansion Index

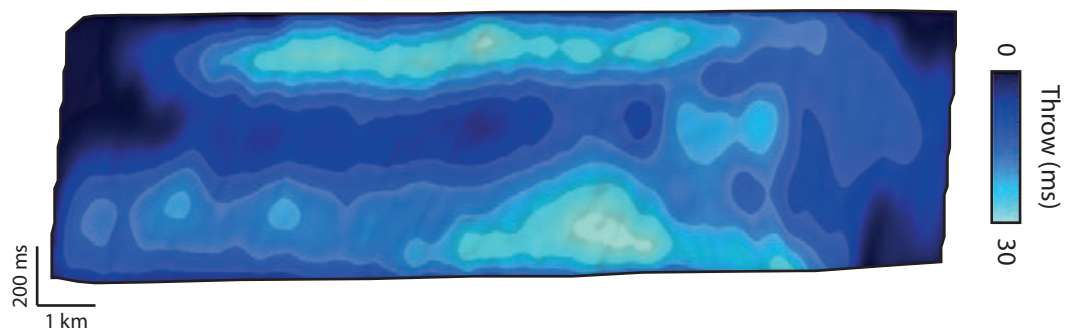


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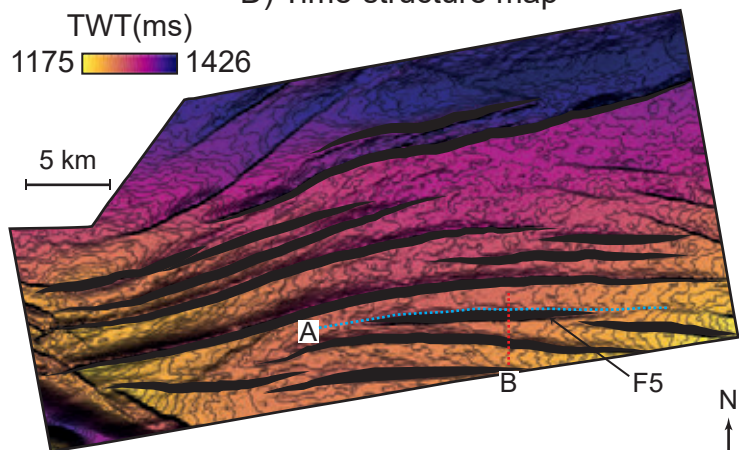
A) Strike section



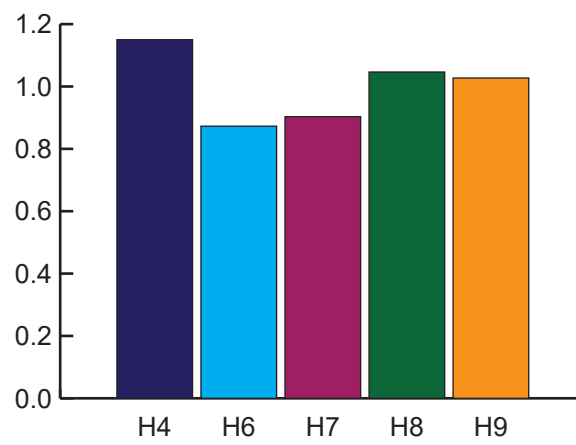
C) Throw strike-projection



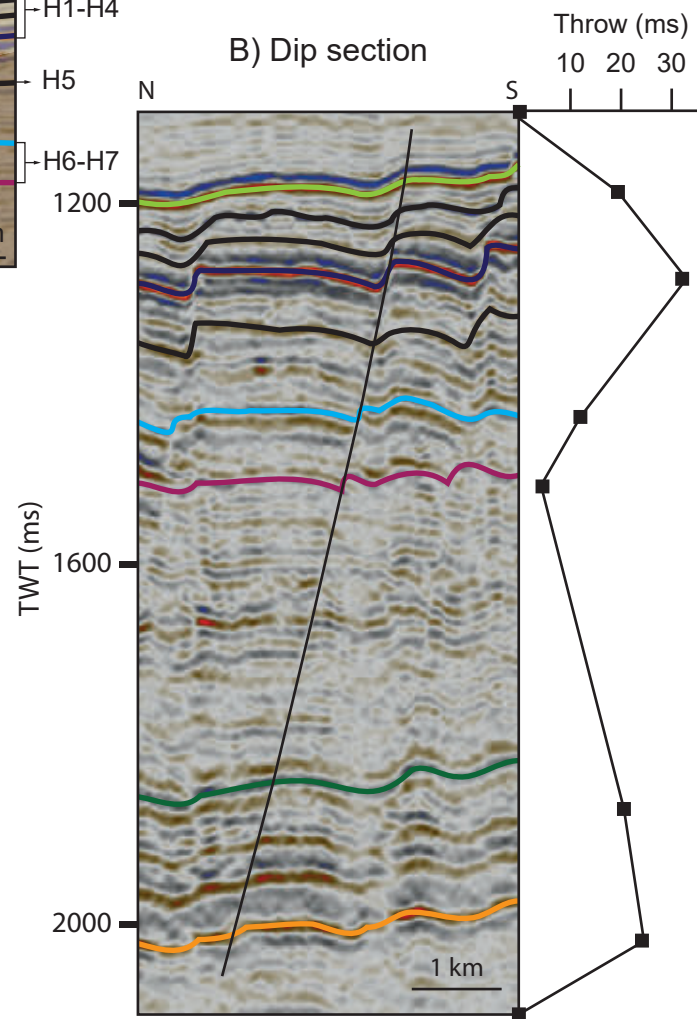
D) Time-structure map



E) Expansion Index

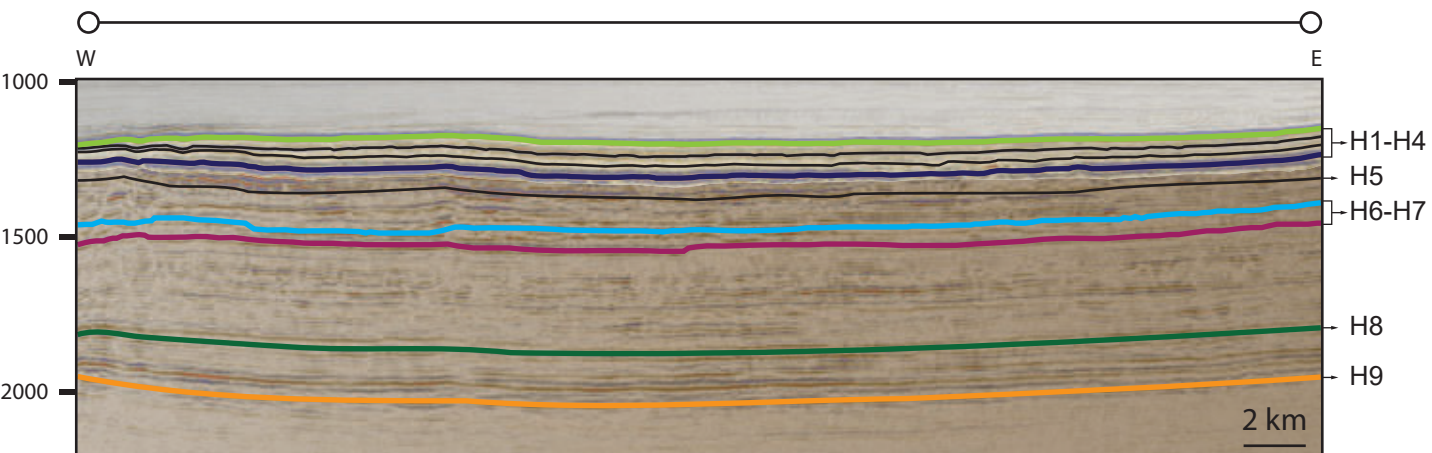


B) Dip section

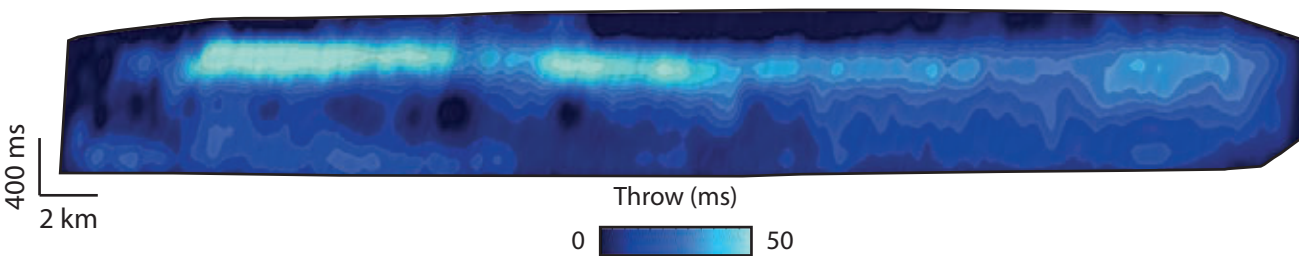


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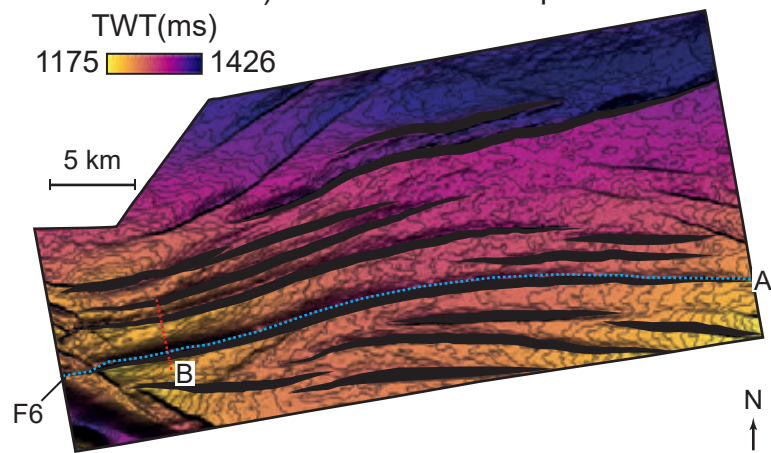
A) Strike section



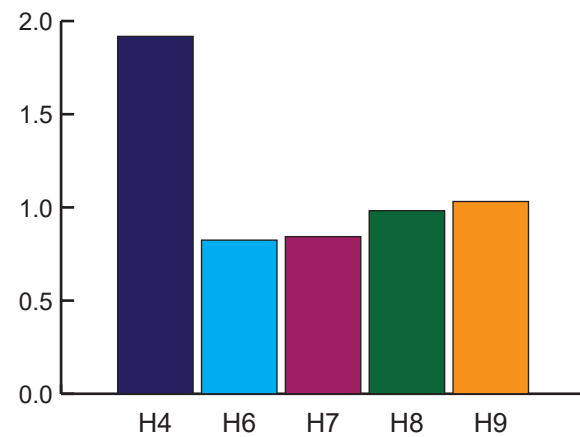
C) Throw strike-projection



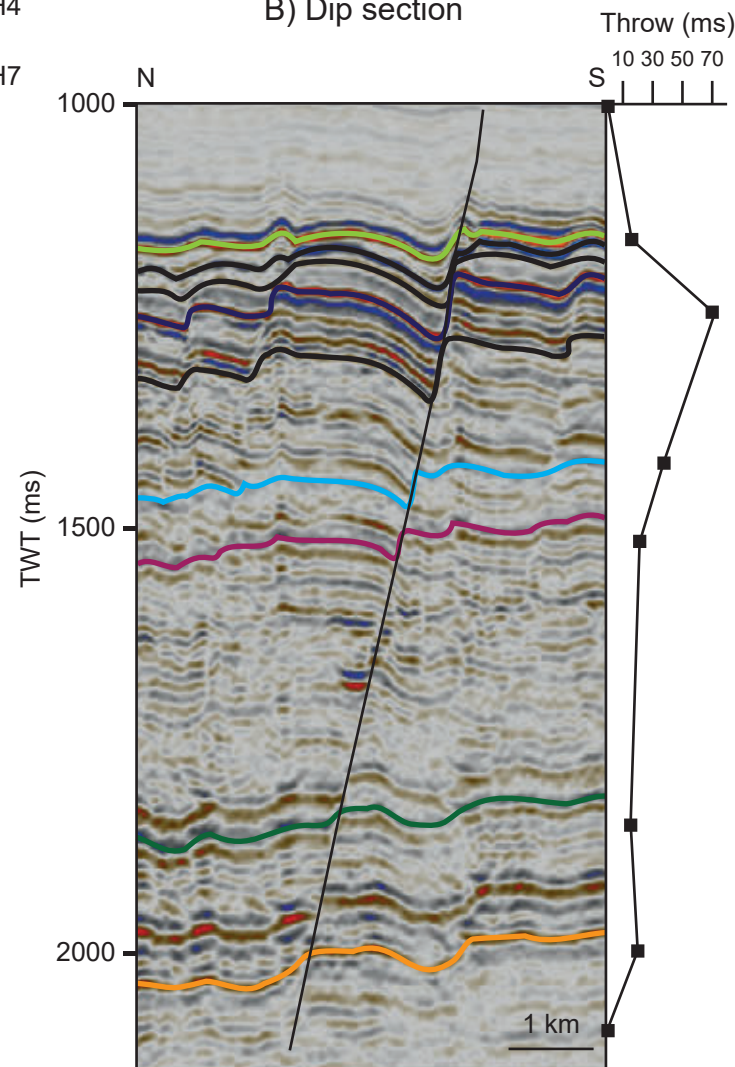
D) Time-structure map



E) Expansion Index

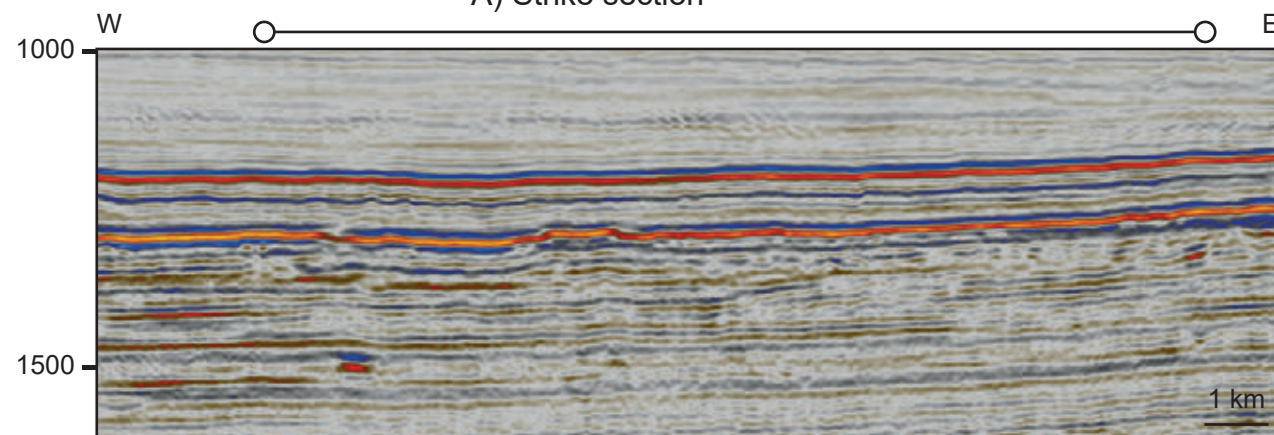


B) Dip section

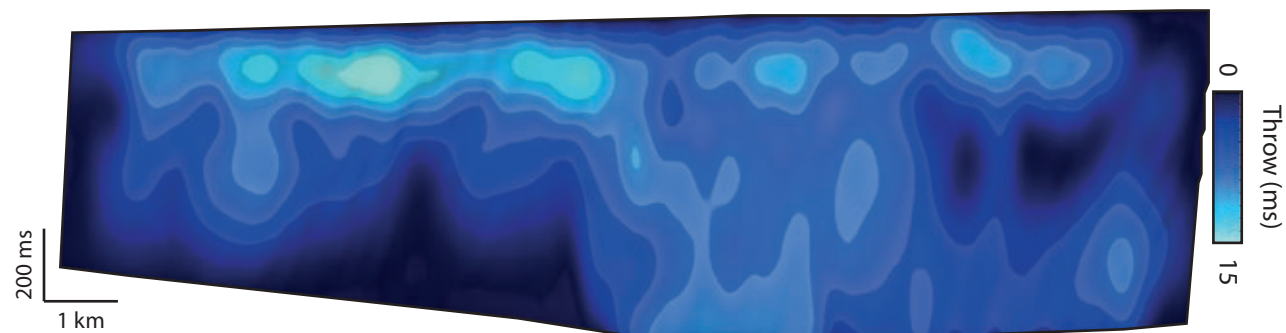


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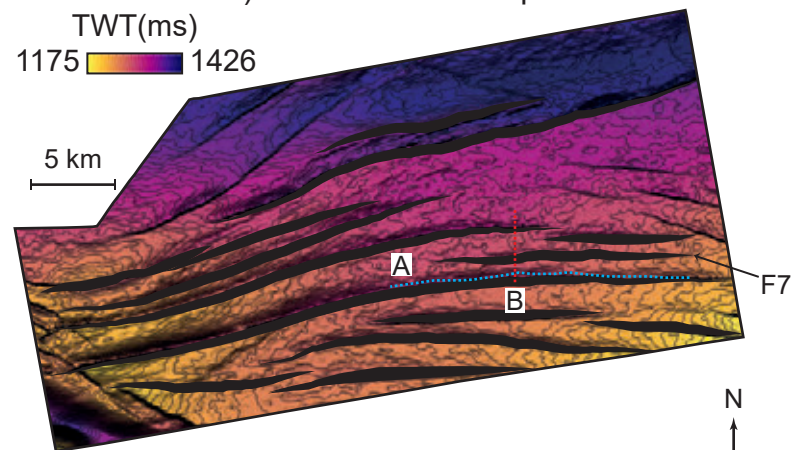
A) Strike section



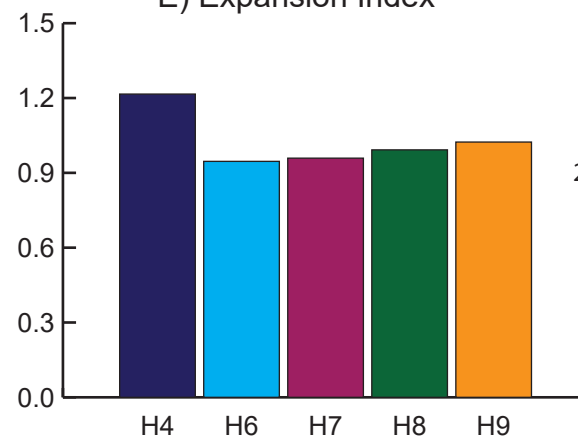
C) Throw strike-projection



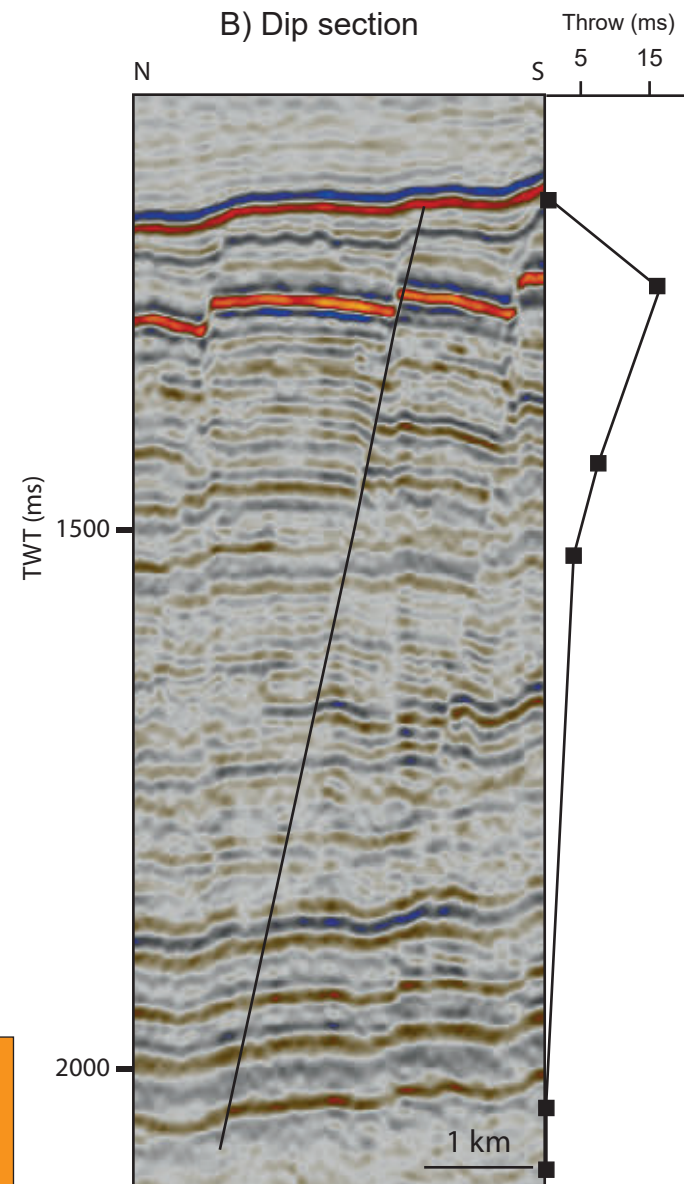
D) Time-structure map



E) Expansion Index

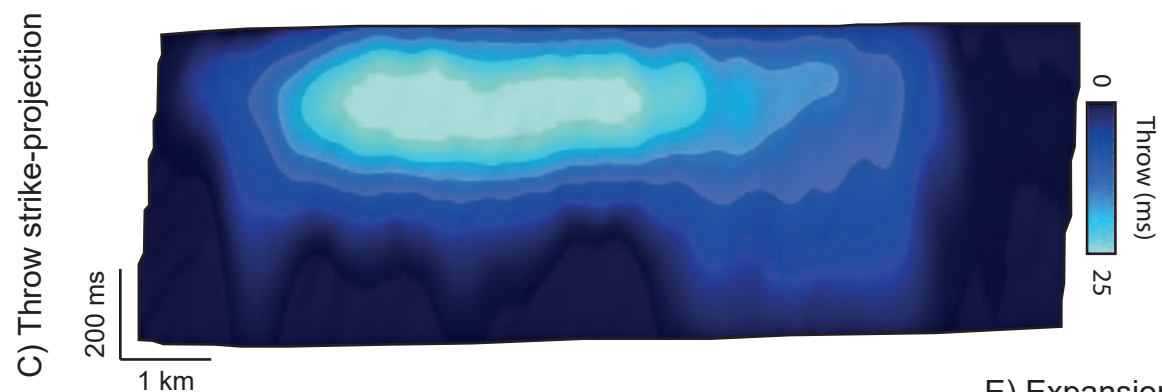
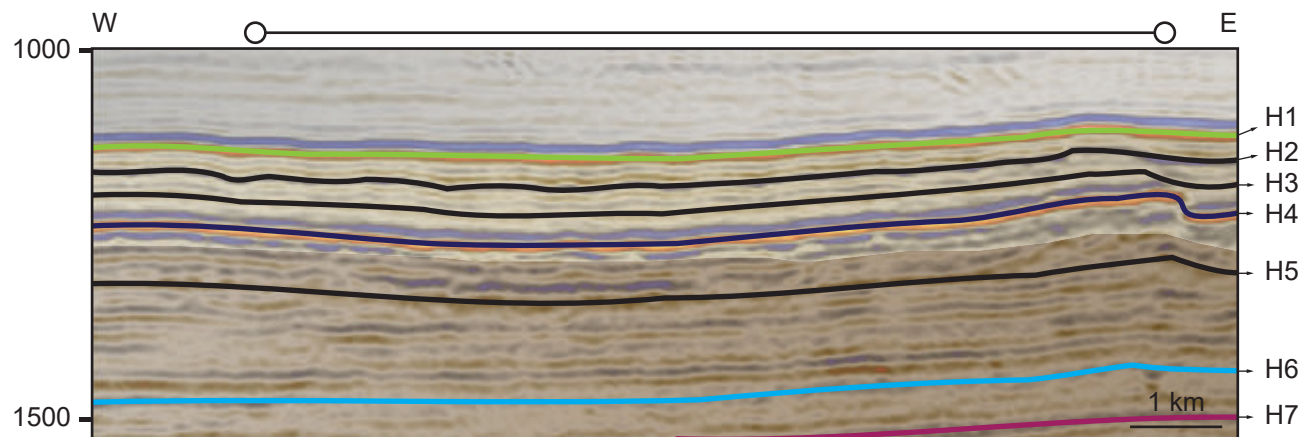


B) Dip section

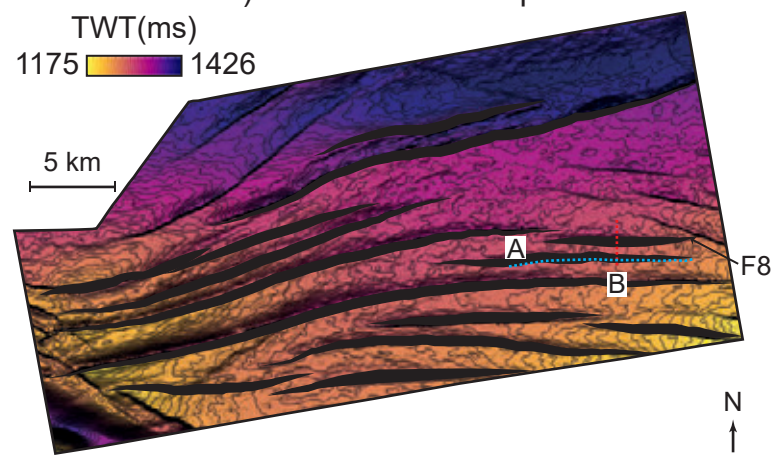


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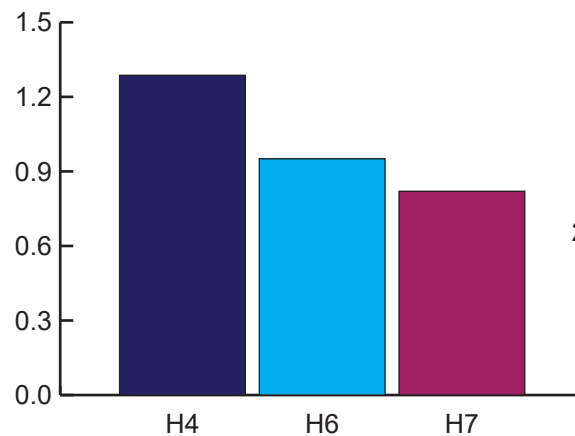
A) Strike section



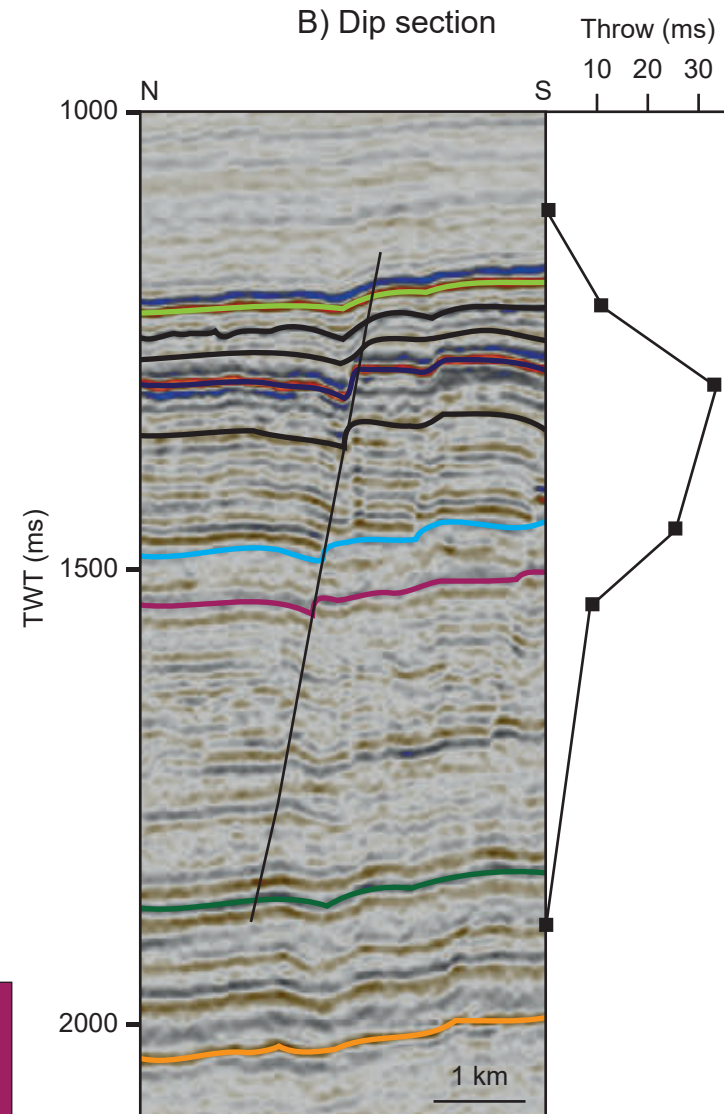
D) Time-structure map



E) Expansion Index

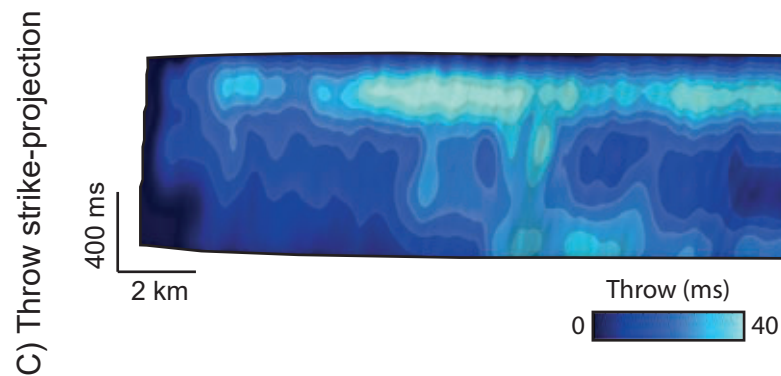
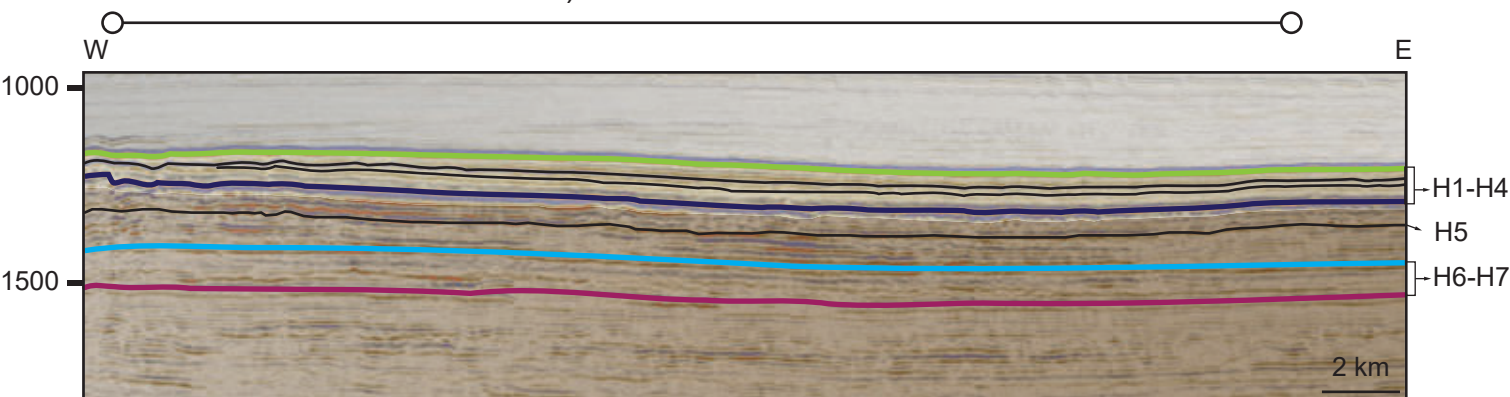


B) Dip section

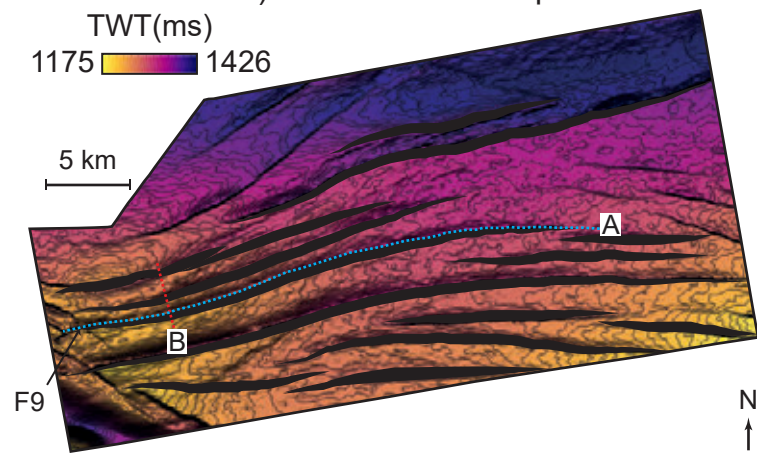


# Fault 9 summary

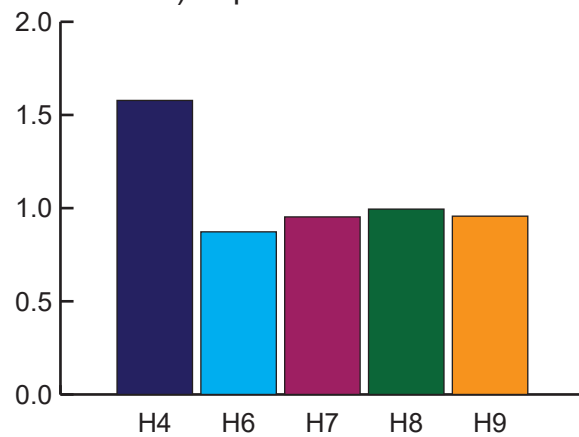
A) Strike section



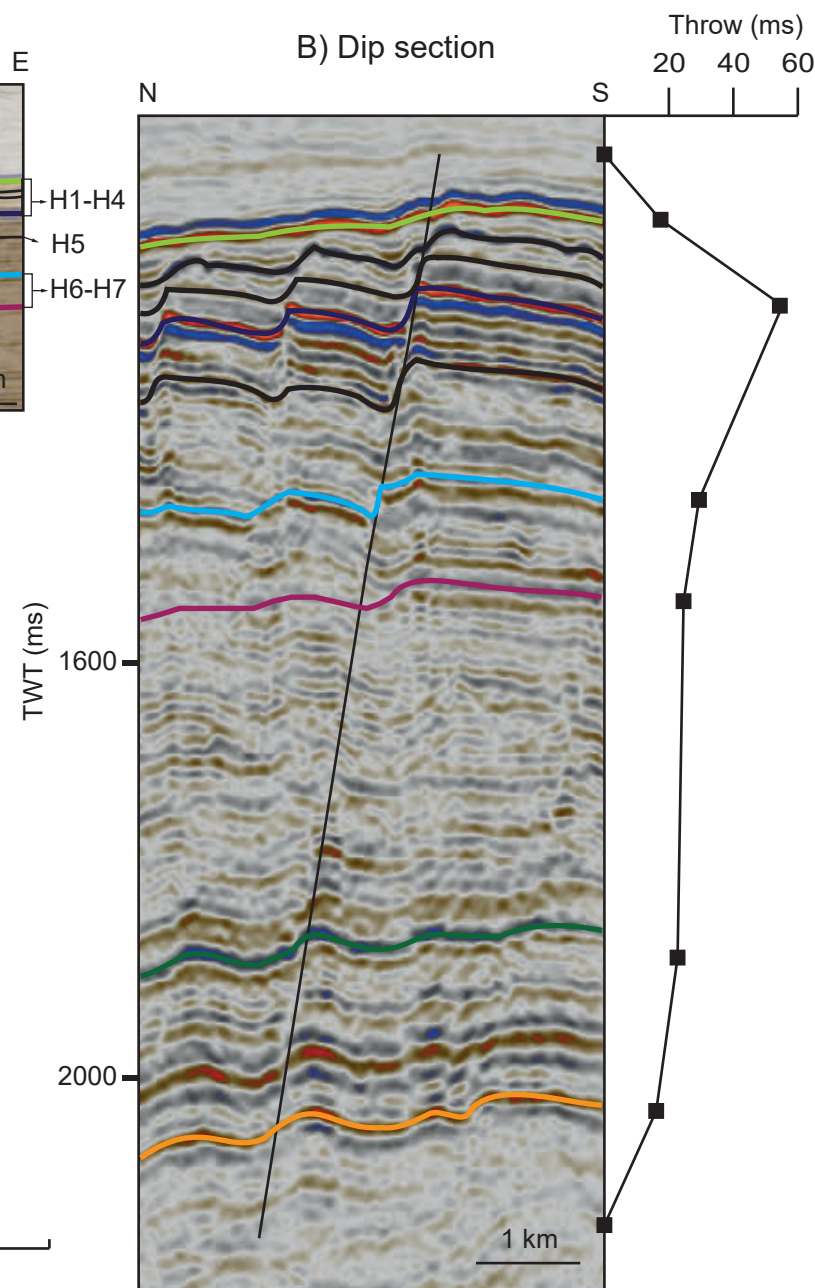
D) Time-structure map



E) Expansion Index

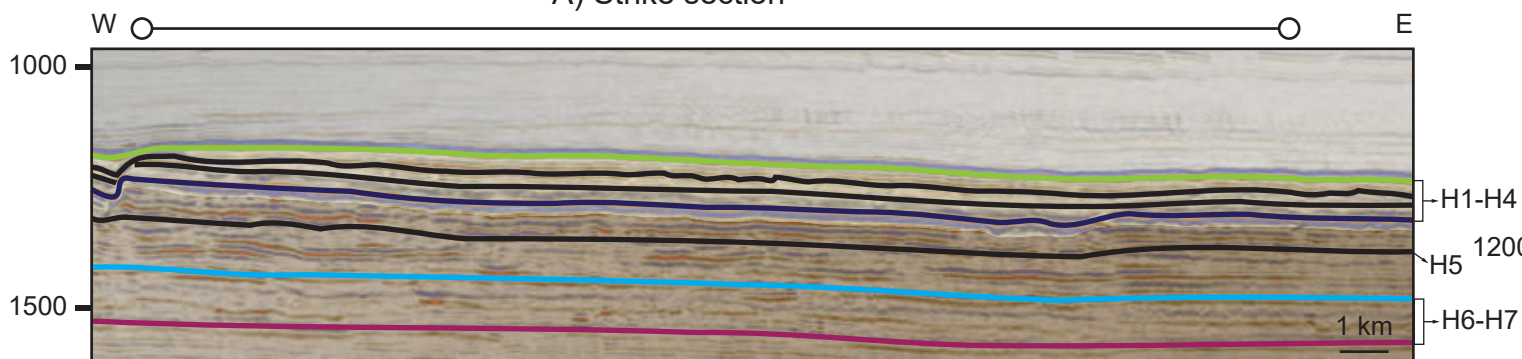


B) Dip section

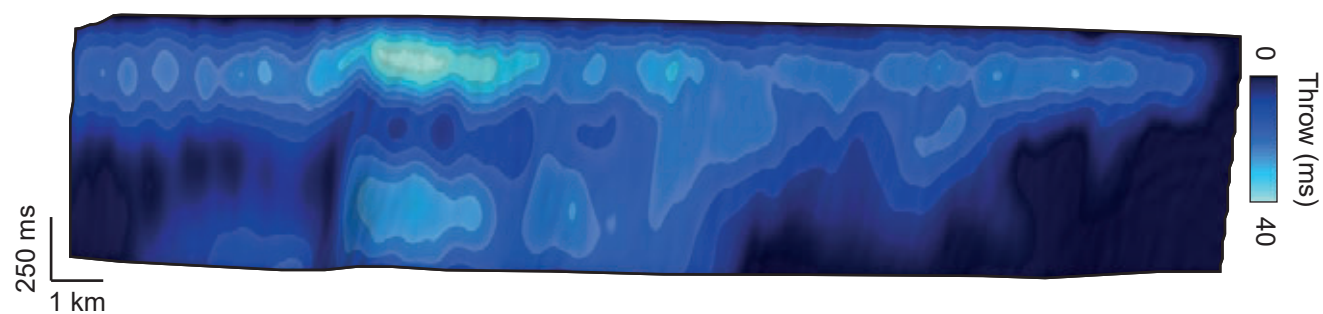


# Fault 10 summary

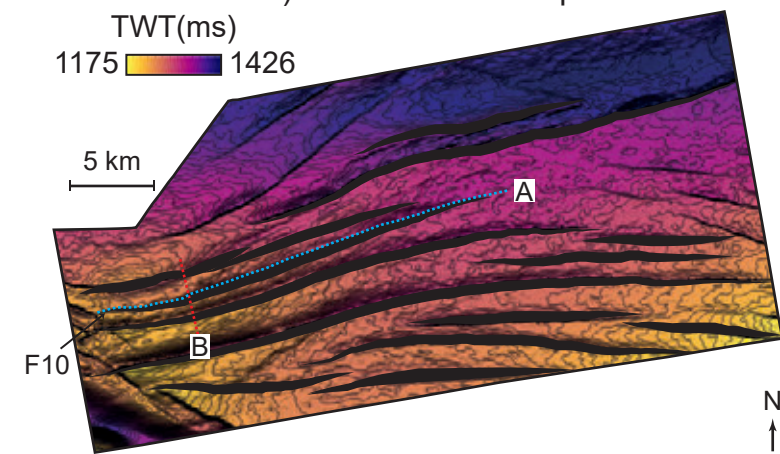
A) Strike section



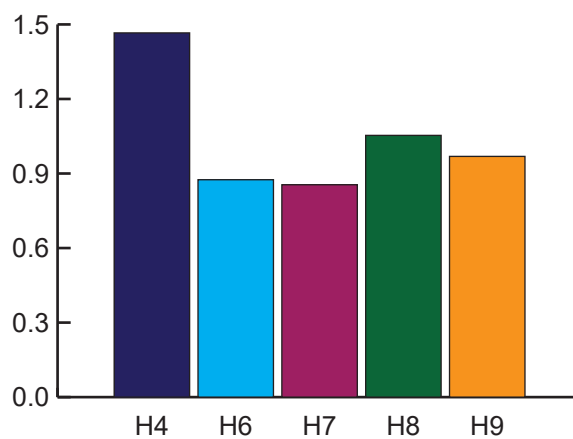
C) Throw strike-projection



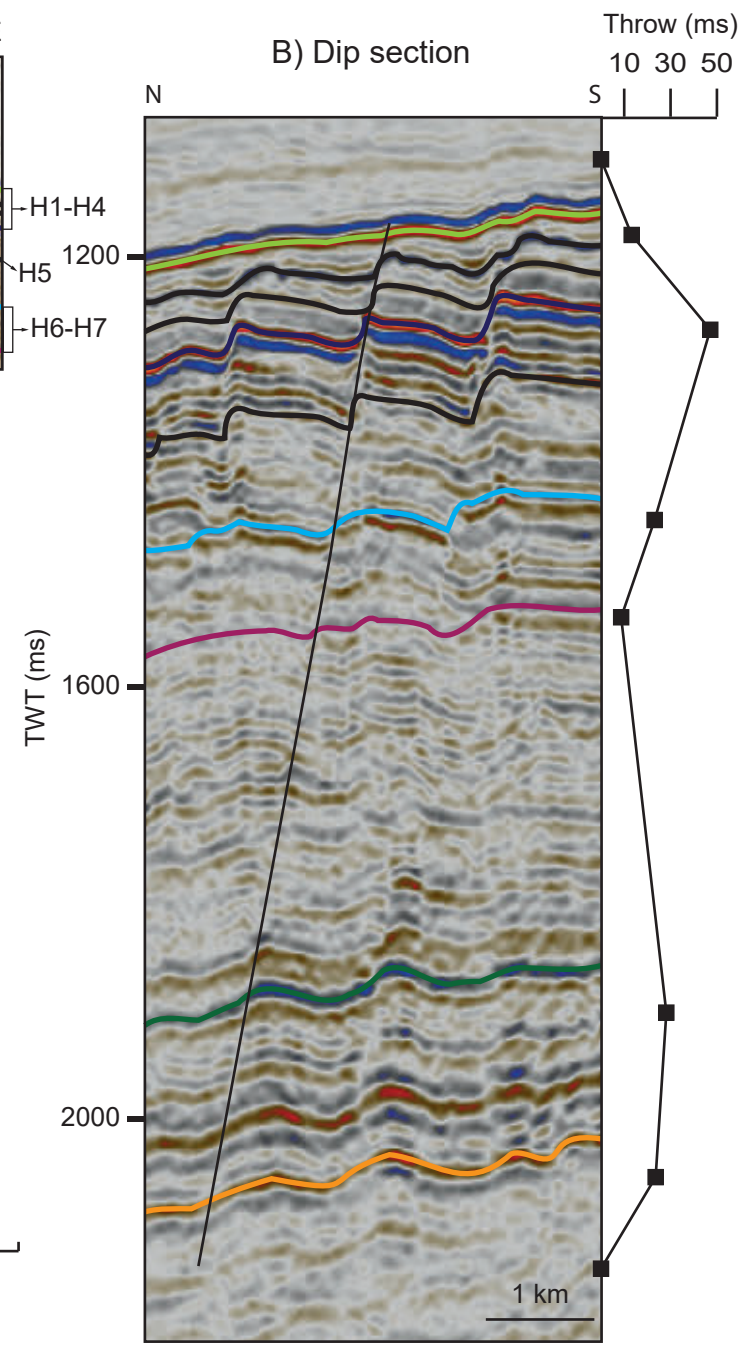
D) Time-structure map



E) Expansion Index

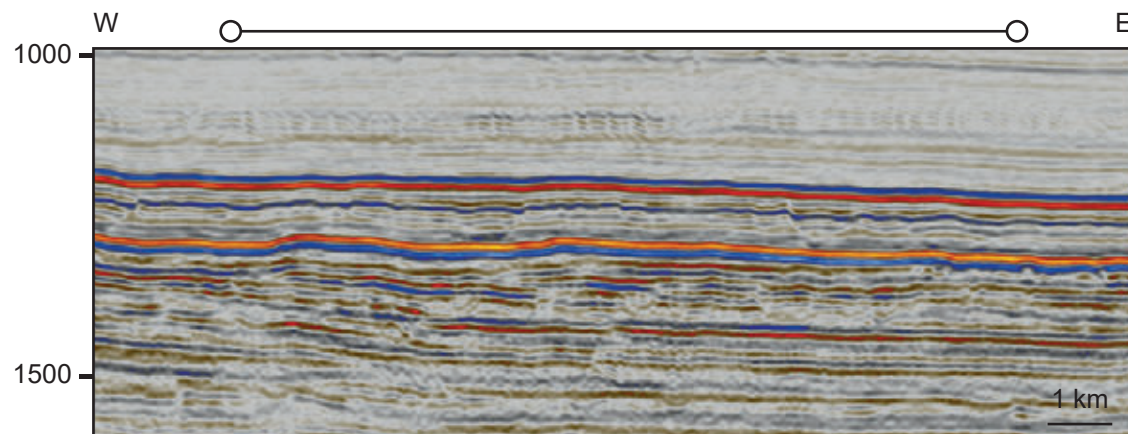


B) Dip section

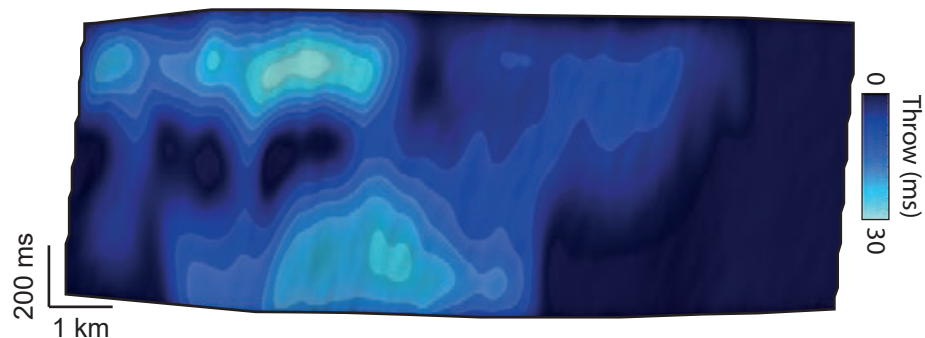


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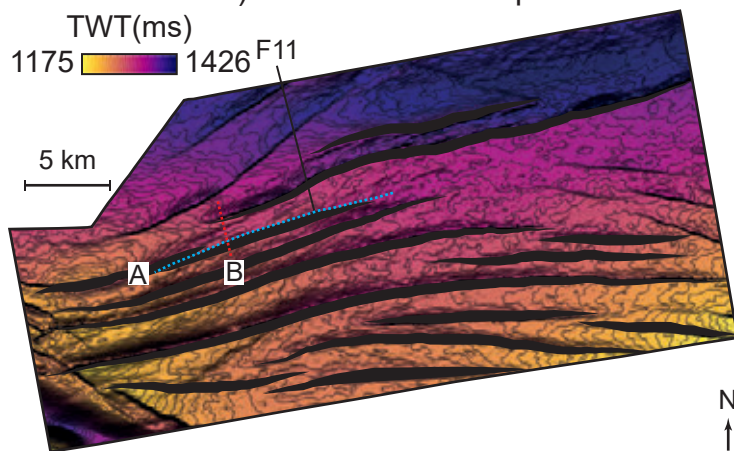
A) Strike section



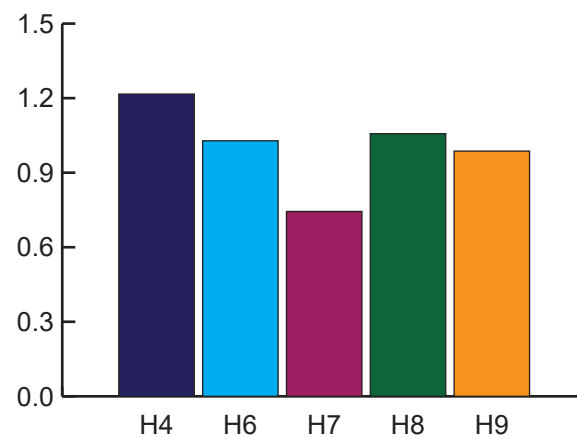
C) Throw strike-projection



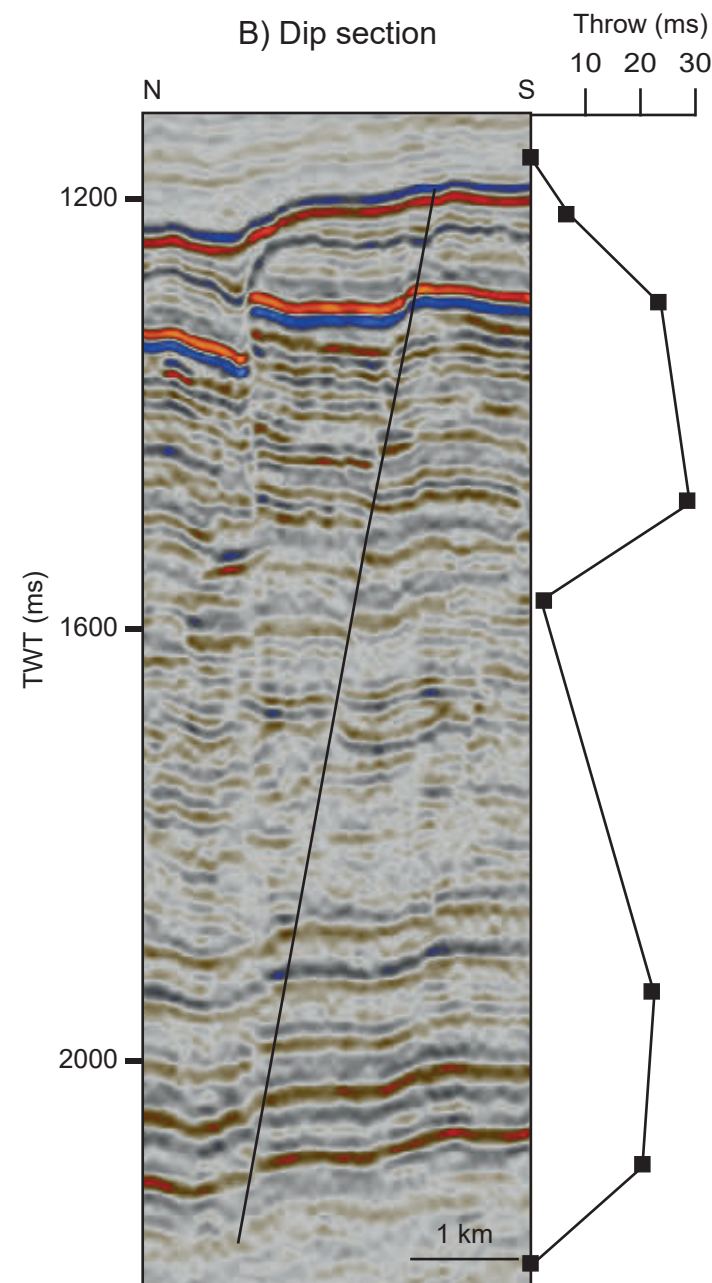
D) Time-structure map



E) Expansion Index

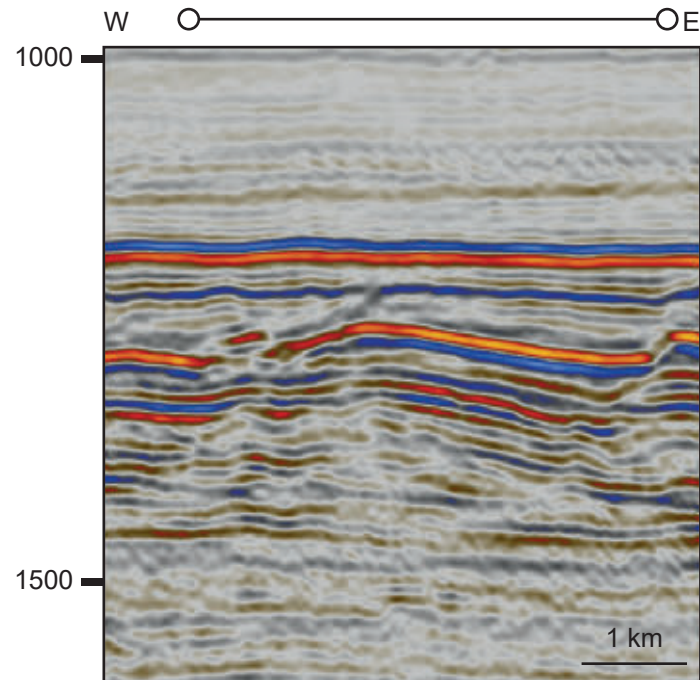


B) Dip section

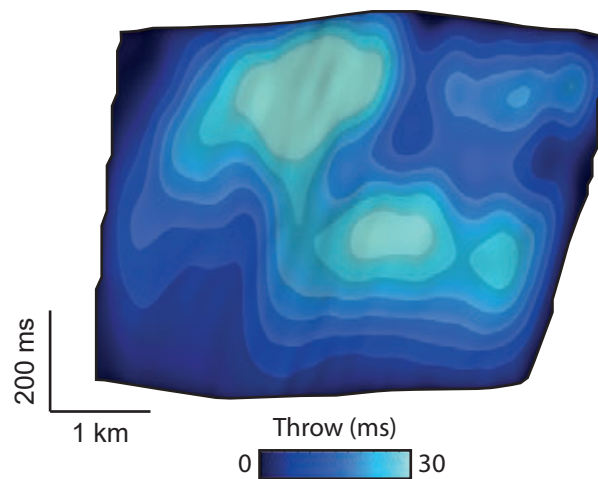


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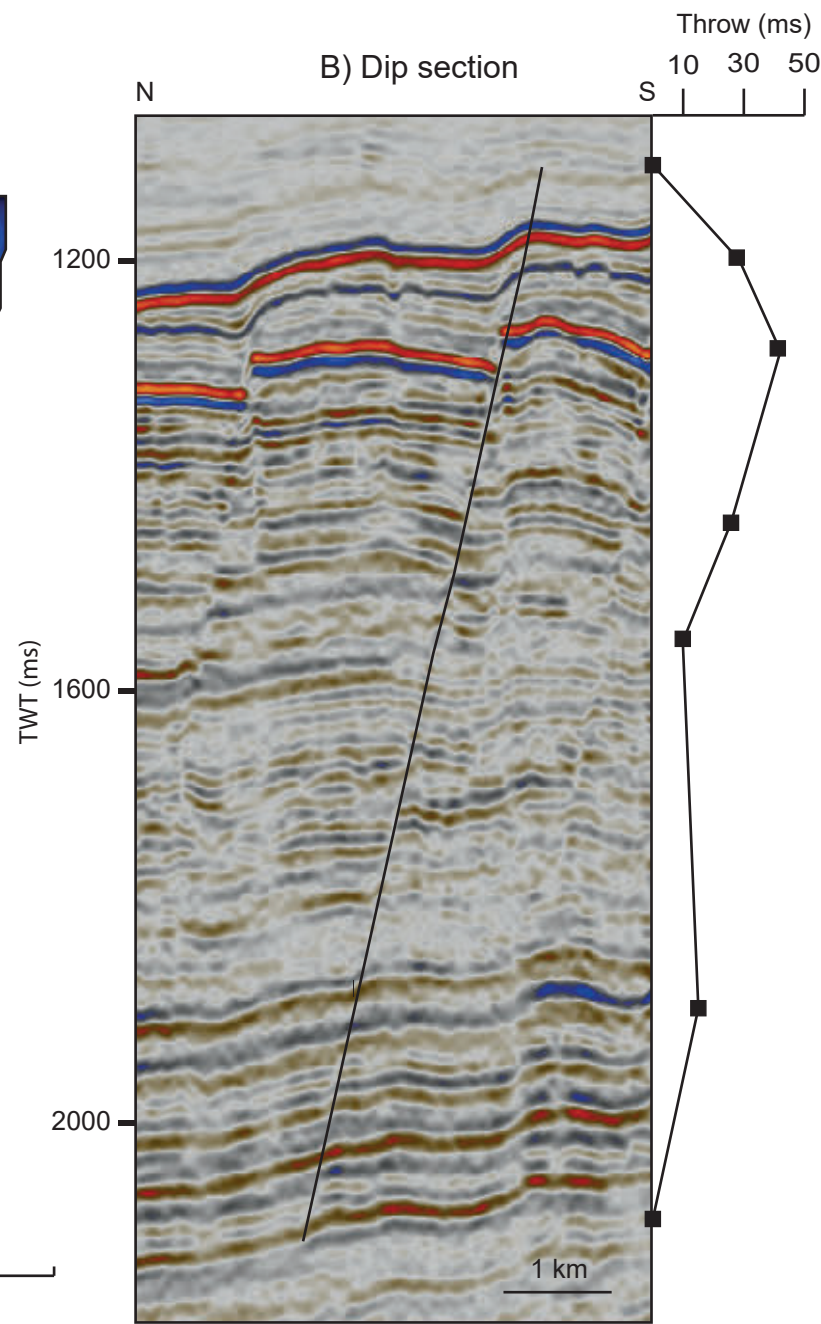
A) Strike section



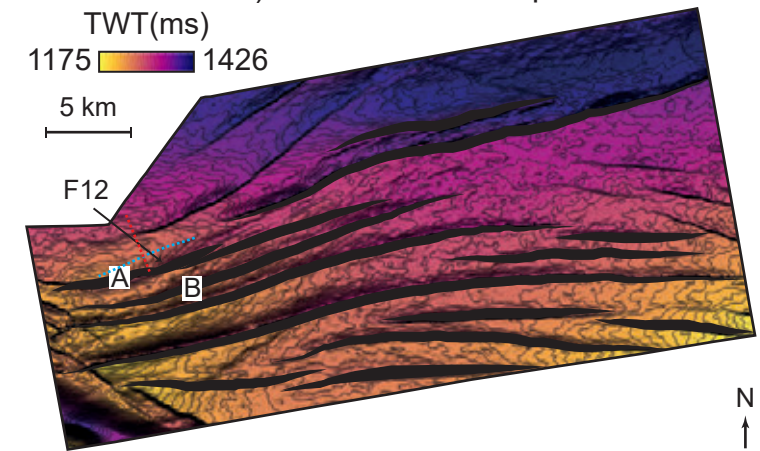
C) Throw strike-projection



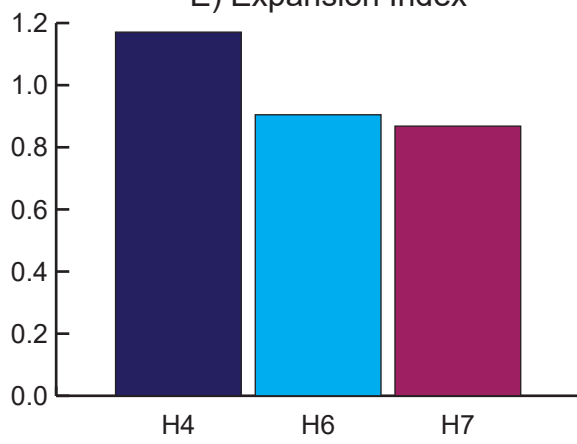
B) Dip section



D) Time-structure map

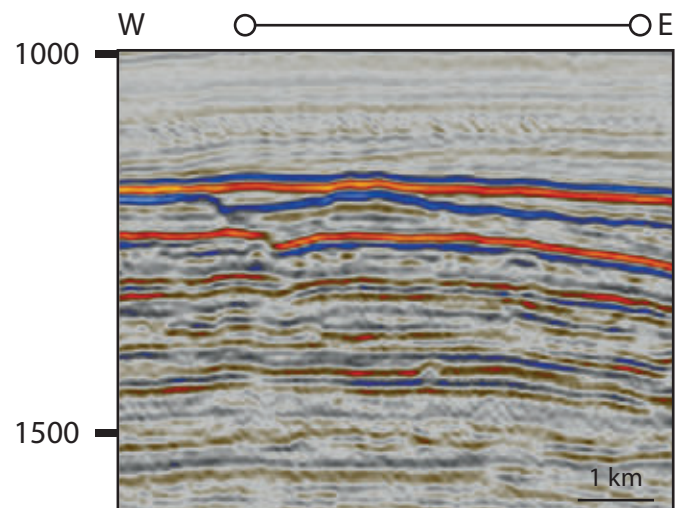


E) Expansion Index

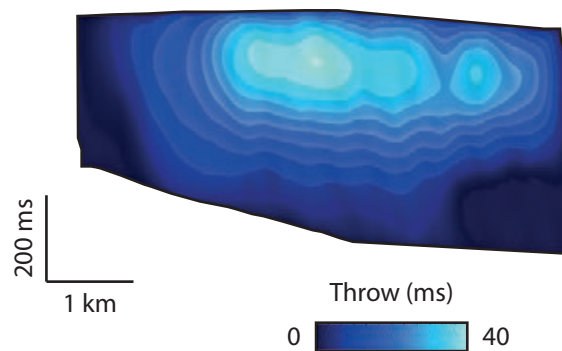


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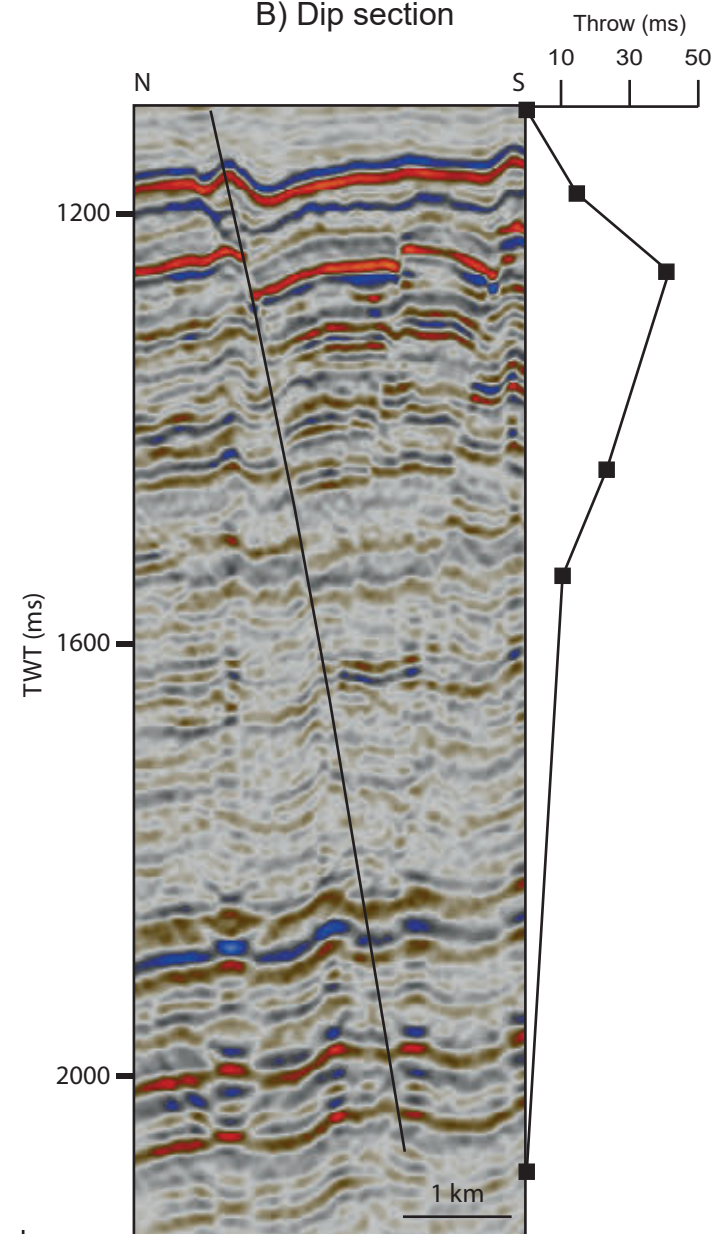
A) Strike section



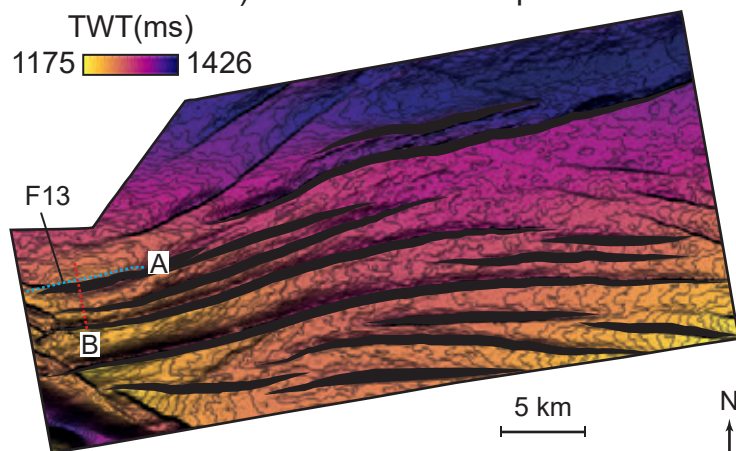
C) Throw strike-projection



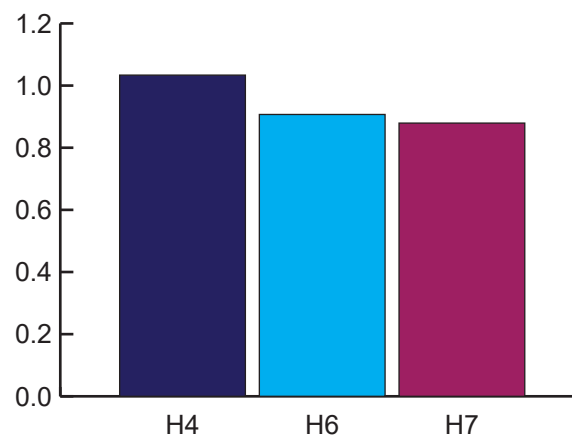
B) Dip section



D) Time-structure map

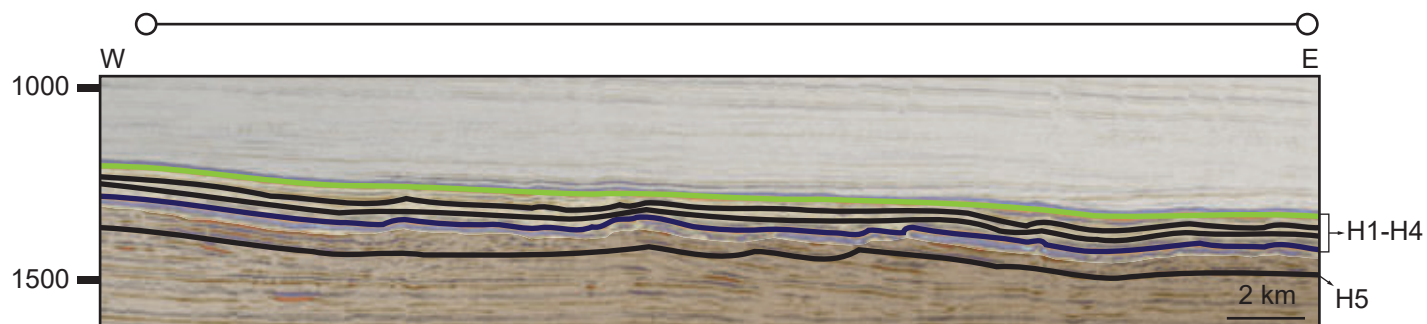


E) Expansion Index

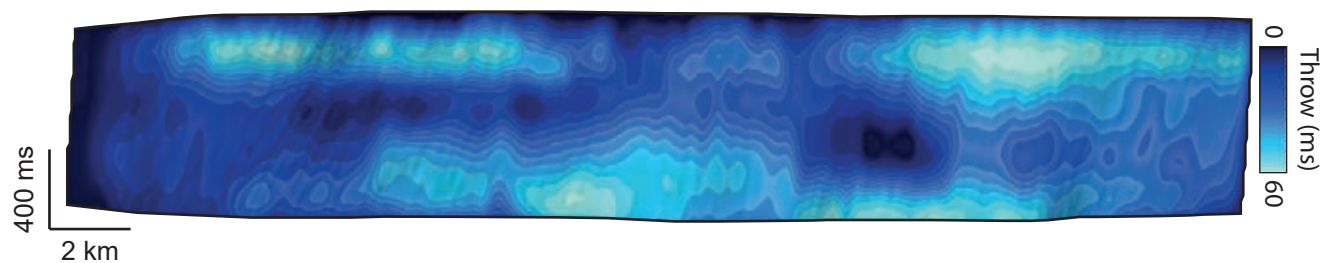


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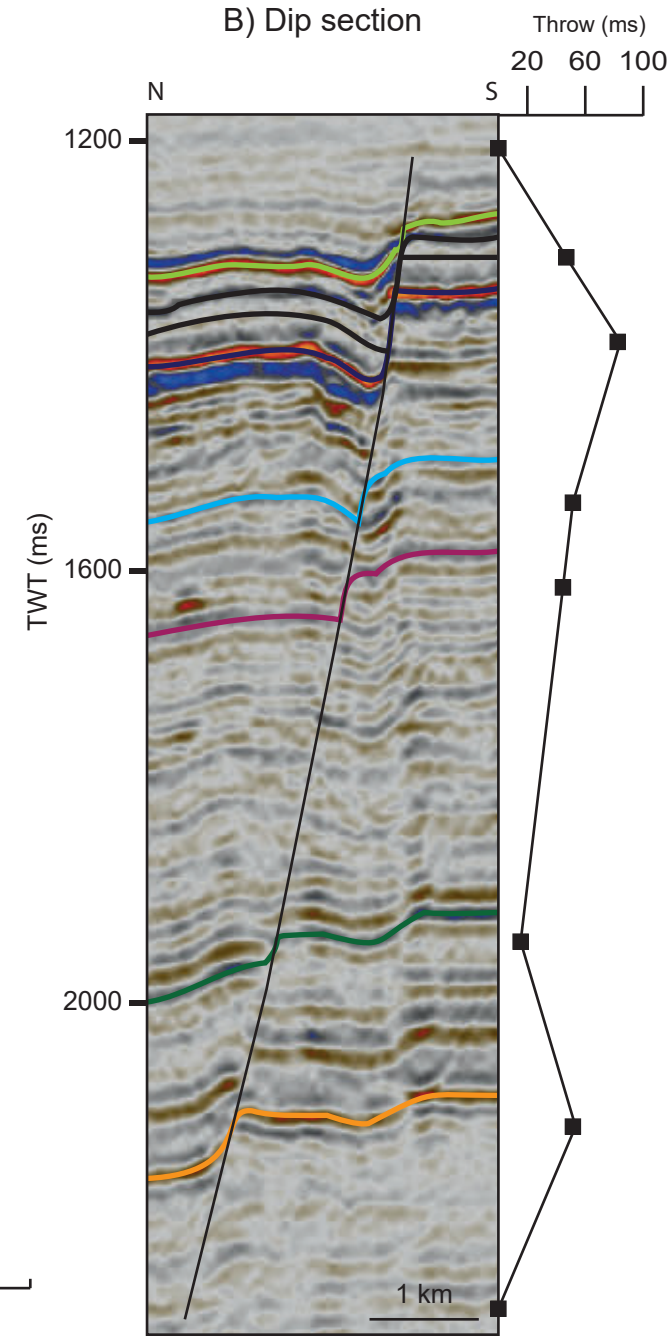
A) Strike section



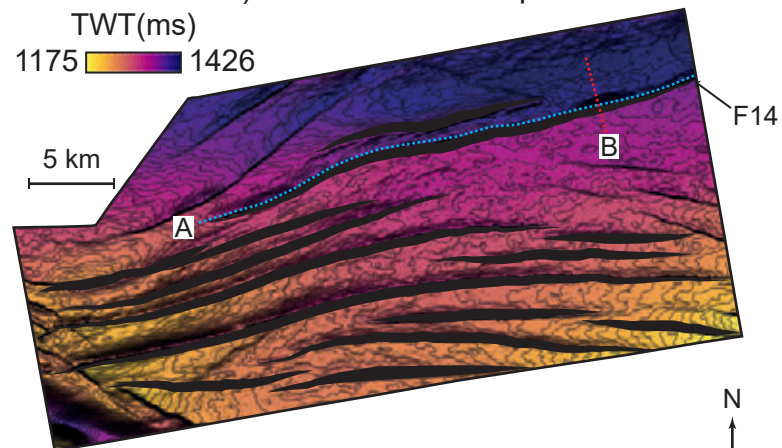
C) Throw strike-projection



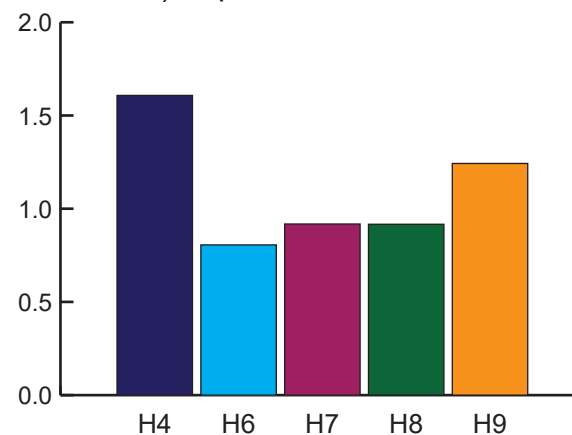
B) Dip section



D) Time-structure map

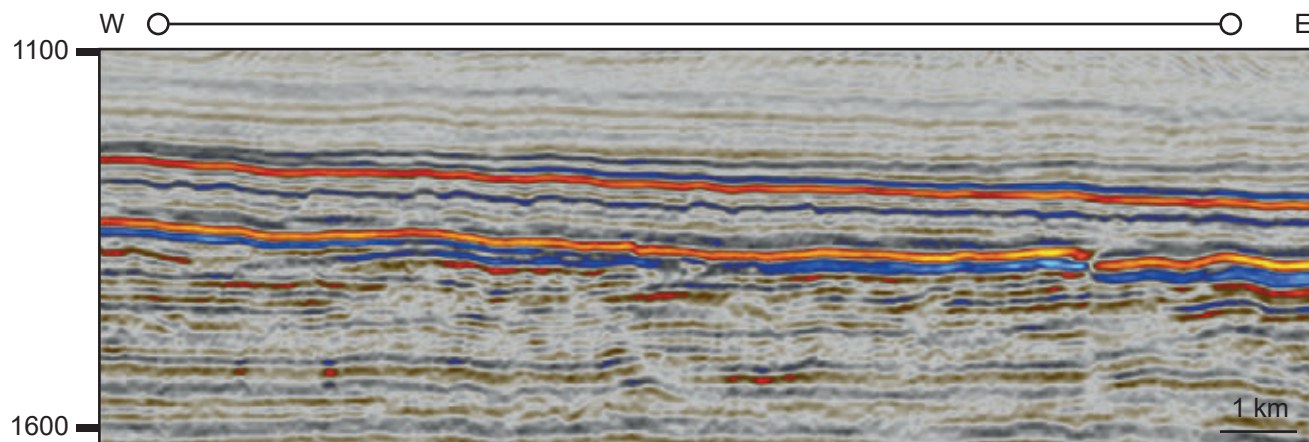


E) Expansion Index

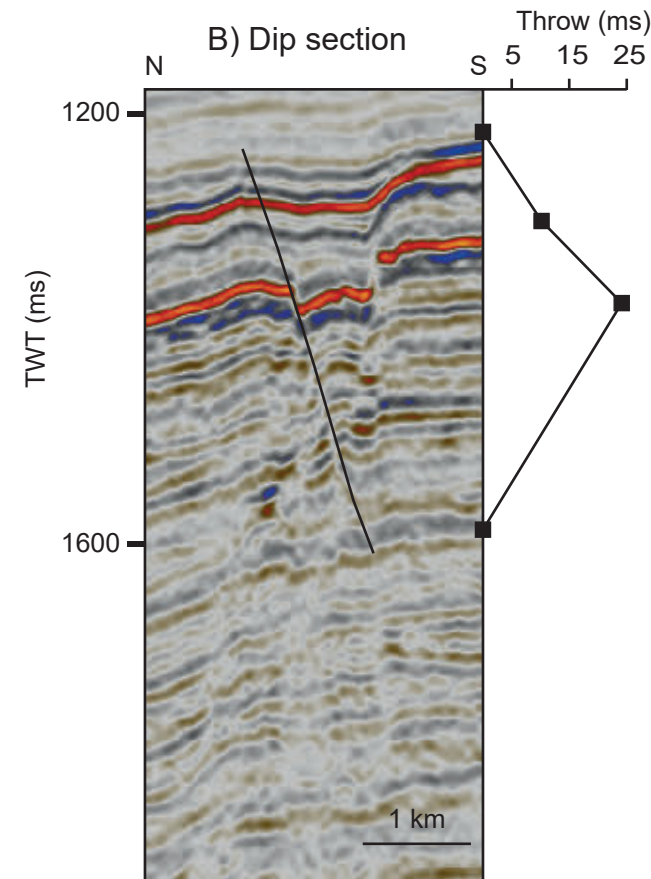


# Fault 15 summary

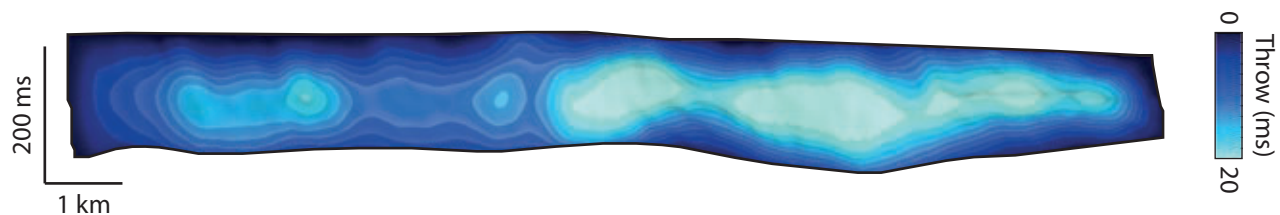
A) Strike section



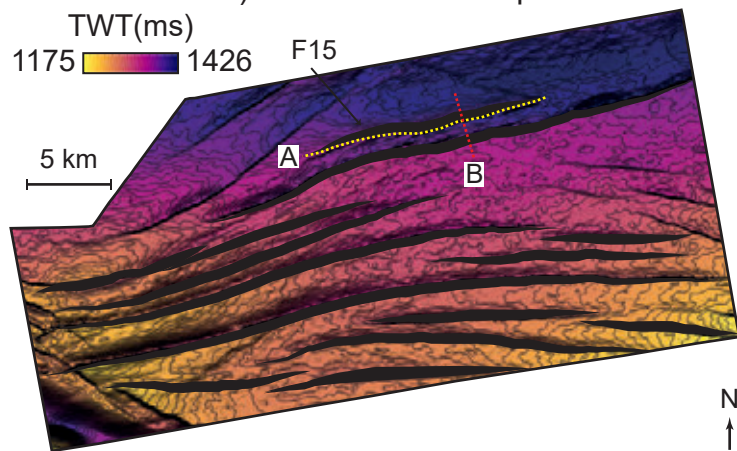
B) Dip section



C) Throw strike-projection



D) Time-structure map



E) Expansion Index

