# Results of the fault mapping on seismic competition

Following the ground breaking work of Wu ([FaultSeg3D: Using synthetic data sets to train an end-to-end convolutional neural network for 3D seismic fault segmentation](#)) in 2019 numerous vendors have implemented Wu like fault detection algorithms into their software and are showing very nice results in webinars and trade shows.
Typically the seismic quality and the faults usually used in these example cases is very good.

We wanted to find out if these very efficient modern machine learning based fault detection algorithms perform equally as good on not so perfect data.

We provided a training seismic dataset from the Ichthys Field on the NW Shelf of Australia to train the models along with some synthetic fault models from Schlumberger and Equinor.
The blind dataset that we provided to the contestants comes from the Adele seismic survey that is located some 15 to 20 km to the NE of the Ichthys seismic survey.
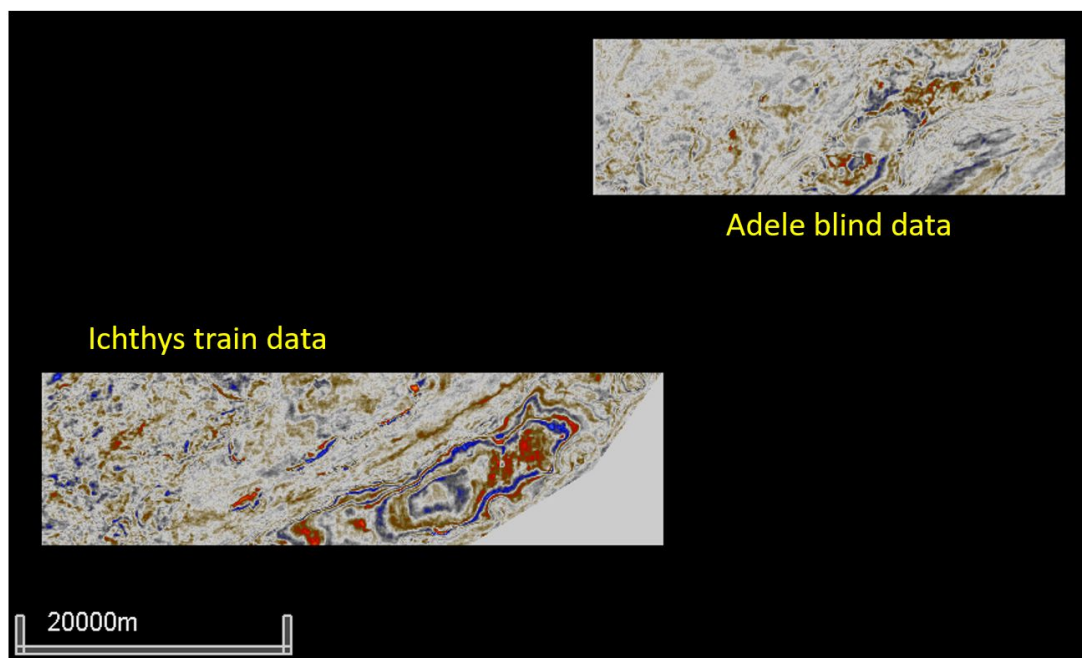
A total of 80 teams signed up for the competition but only 5 submitted a valid scored fault cube in the end. This is surprising given that we waived the necessity to submit any code and simply asked that the participants to be able to describe their approach in words such that no commercial or intellectual property was infringed.

Perhaps this seismic cube was simply too hard to map faults or the technology is still too immature?
We will perhaps test the waters with another benchmarking exercise at some later moment to find out

The winner of the competition was determined by evaluation of the fault prediction results (from the contestants) to 19 experienced geoscientists who work normally with seismic. The evaluators ranked the fault prediction results in terms of output usefulness in seismic interpretation workflows on a scale from 1 to 10.

The Winner is Sparveon followed by Equinor and Woodside

I rate my expertise as a structural geologist	I think the automated fault interpretation of company 1 is...	I think the automated fault interpretation of company 2 is...	I think the automated fault interpretation of company 3 is...	I think the automated fault interpretation of company 4 is...	I think the automated fault interpretation of company 5 is...
4	5	1	3	1	1
2	2	1	2	2	1
4	2	2	2	2	2
9	3	1	3	3	2
6	4	1	3	2	2
6	6	1	6	5	2
4	7	2	8	2	4
5	4	1	3	2	2
7	2	1	5	2	2
6	3	1	3	3	1
7	3	1	5	3	2
9	7	2	7	6	5
9	7	2	8	4	5
6	3	1	4	2	1
10	2	1	3	2	1
10	1	1	2	1	1
10	7	1	3	5	1
Average	4.00	1.24	4.12	2.76	2.06
Expretise weighted average	27.29	8.24	28.18	19.88	14.24
	equinor	anonym	sparveon	woodside	potraz

Even the winning team did not score particularly high on this dataset getting a score of 4.12. Vendor based proprietary workflows that we ran internally on these datasets scored a little bit better amongst the judging panelists but are of course excluded from this competition.

All the submitted fault cube predictions and the blind seismic data can be accessed here
https://drive.google.com/drive/folders/1Hu4VJN9xLOWixSMdf2xN6fRk0zmOz-1J?usp=sharing

A powerpoint with the comparison of the fault mapping data can be found here
https://drive.google.com/file/d/1xbUrHuLGbNkAQGolVpjJiuZSxKlcPMdN/view?usp=sharing

The winning algorithm from Sparveon did a relatively good job in picking the large regional faults that no other teams or any of the vendors managed to map properly. Sparveons' fault prediction were quite thick (no fault thinning was applied) and therefore to precisely determine the exact fault locations is difficult.

Equinor did a much better job in finding the smaller/subtle faults but did not manage to produce consistent fault planes.
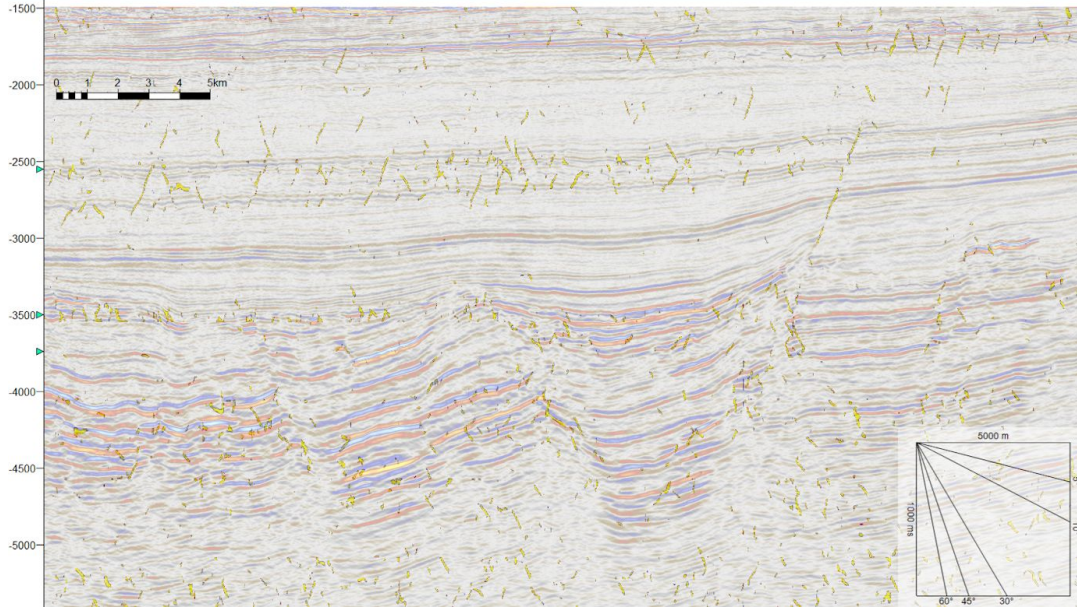
Below are few inline interactions from the three winners:

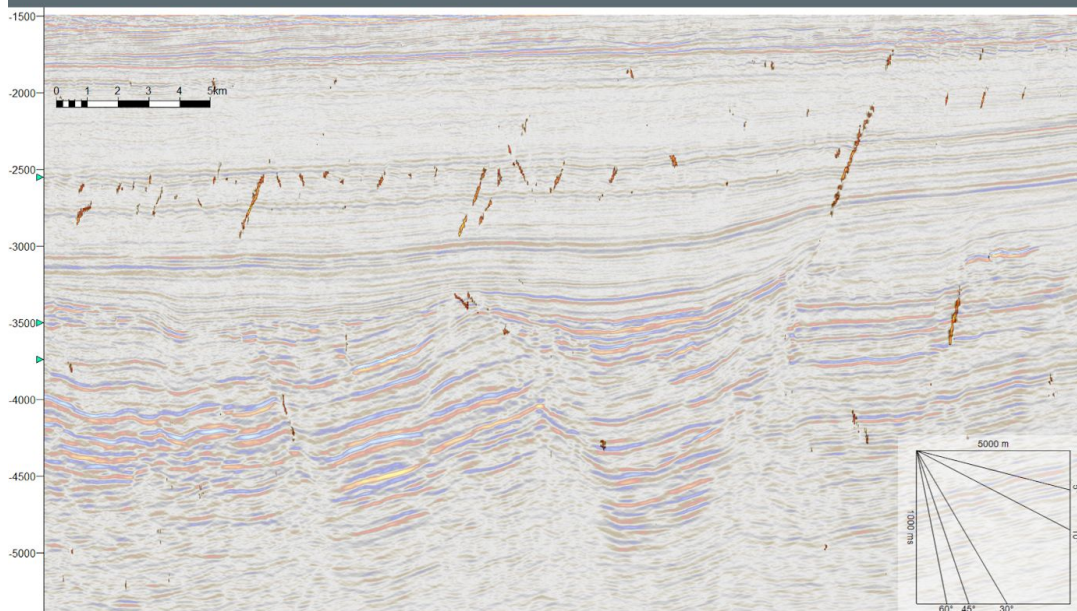A powerpoint with the comparison of the fault mapping data can be found here
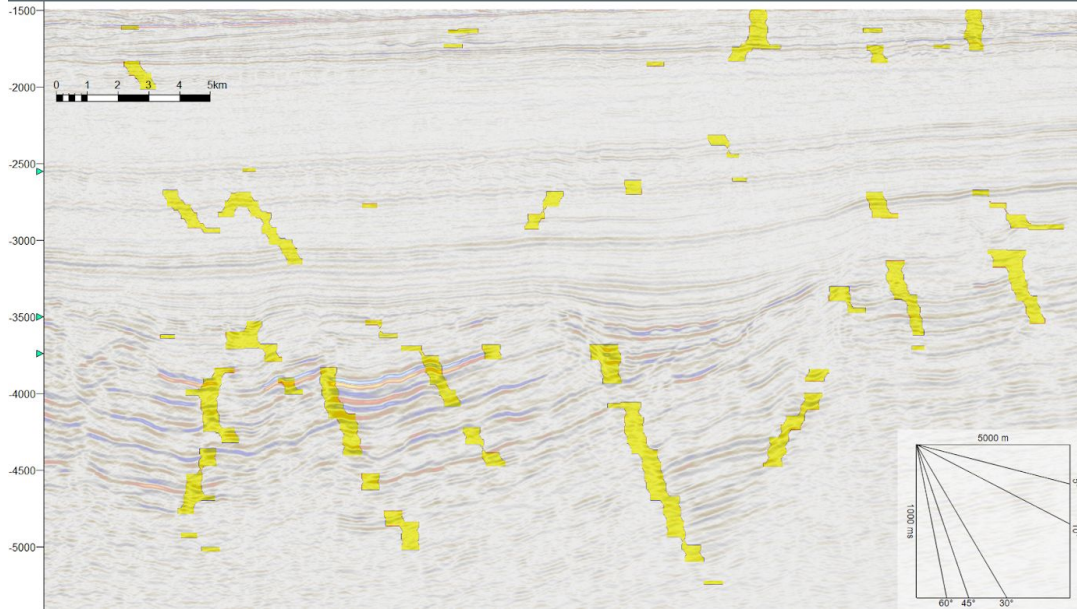https://drive.google.com/file/d/1xbUrHuLGbNkAQGolVpjJiuZSxKIcPMdN/view?usp=sharing
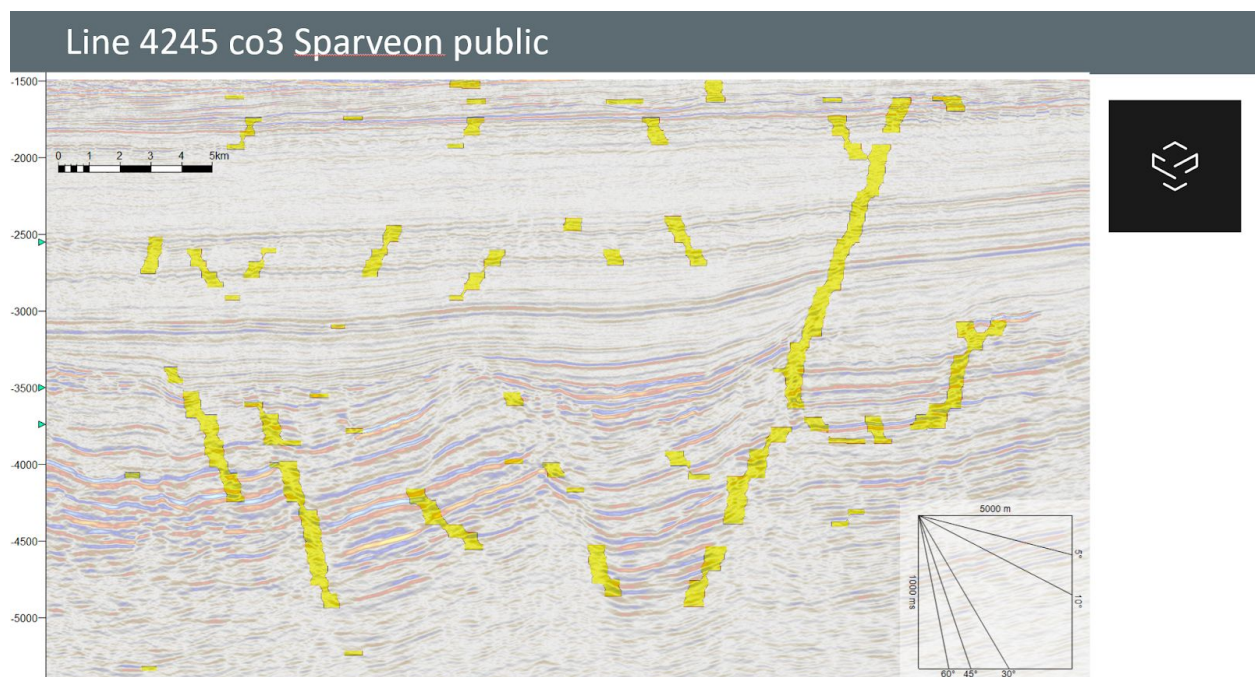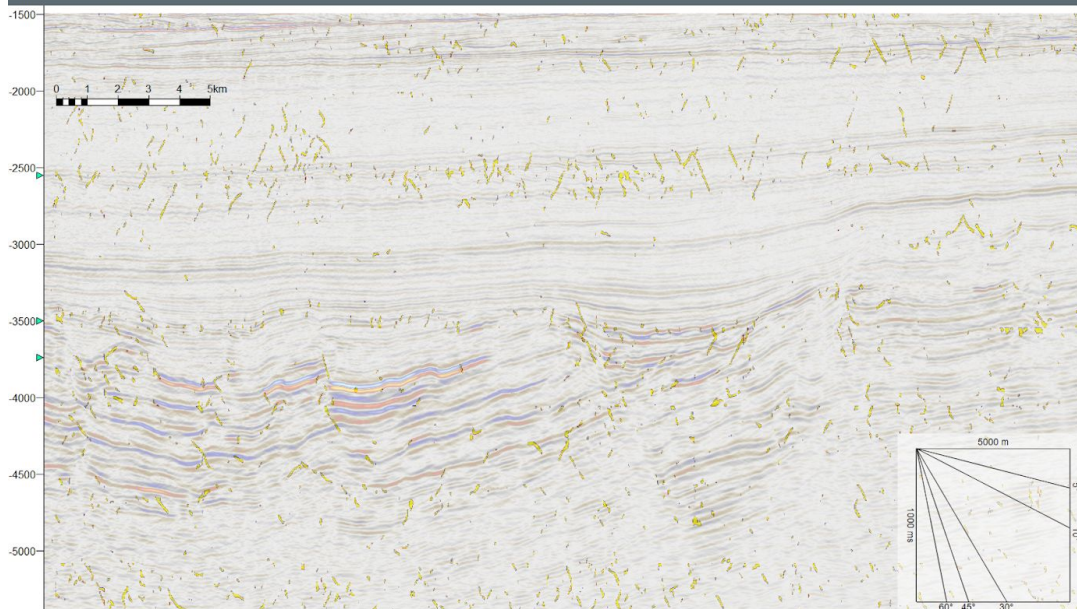
Line 4245 co1 Equinor public

Line 4245 co4 woodside

Line 4385 co3

Line 4385 co1

Line 4385 co4