

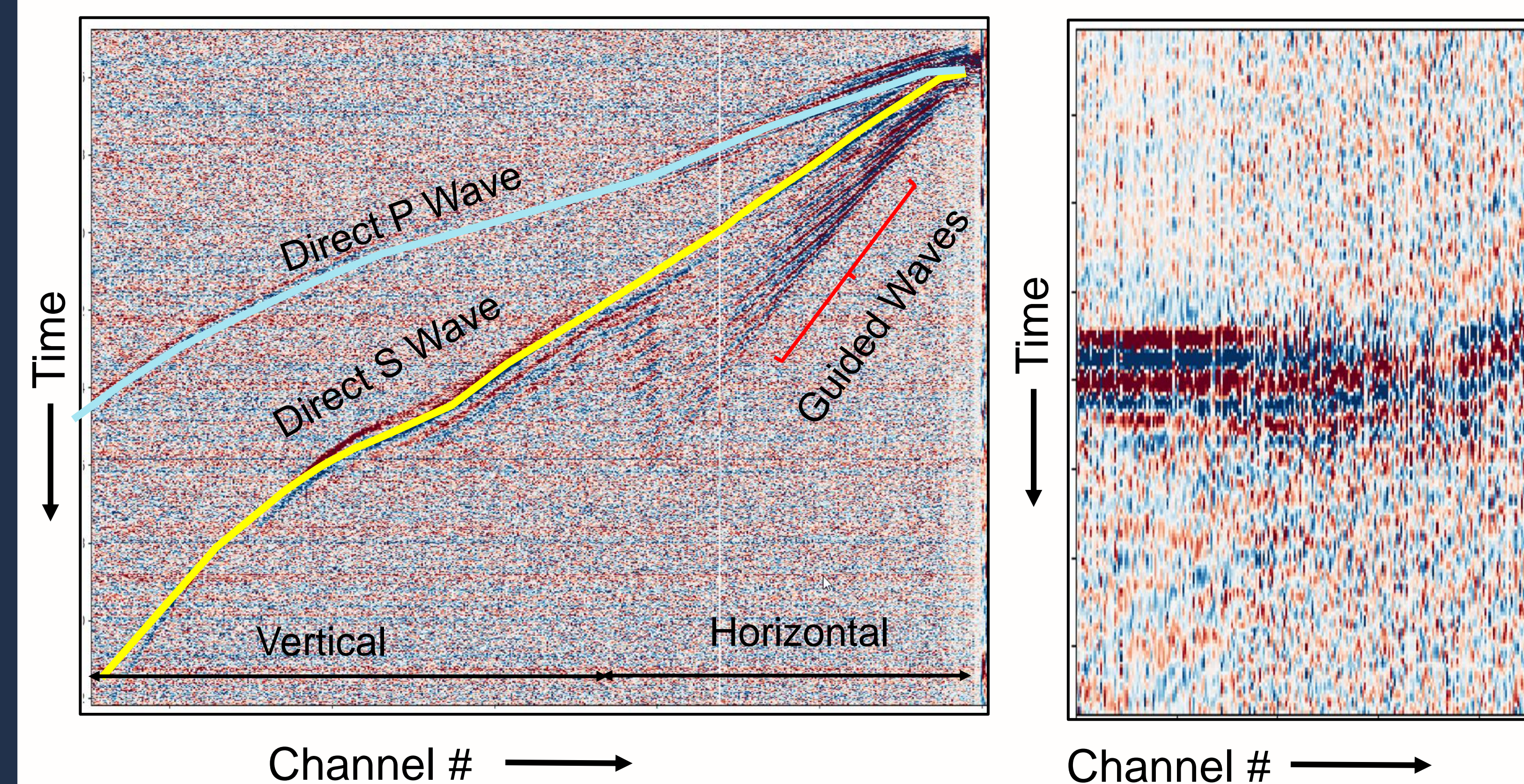
Auto-Detection of Microseismic Events for Characterization of Hydraulic Fracturing in Unconventionals



Objectives

- Automatic detection of microseismic events based in downhole, cross-well DAS in Eagleford shale recorded over 11 days for 15 fracturing stages, with STA/LTA
- Interpret the observed data to characterize the induced fractures for implications on real-time decisions during well completions

Method

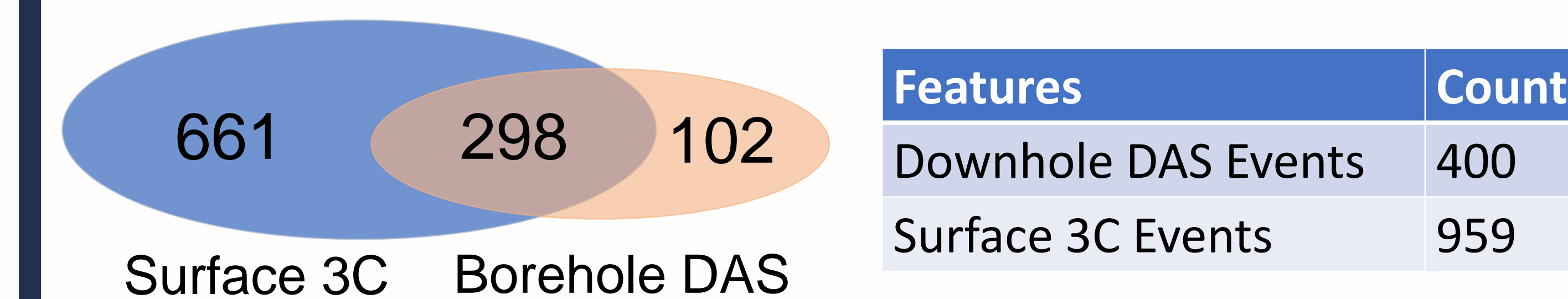
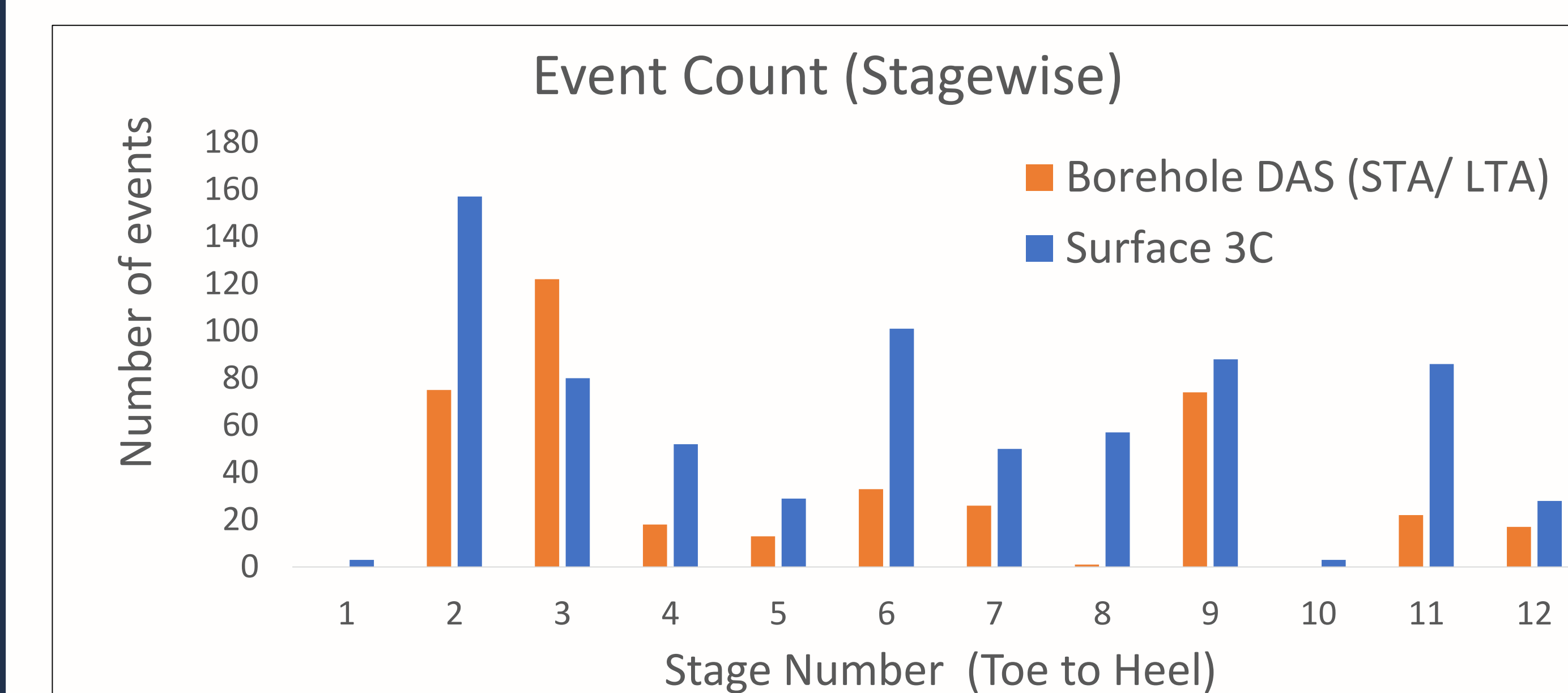


(a) Downhole DAS

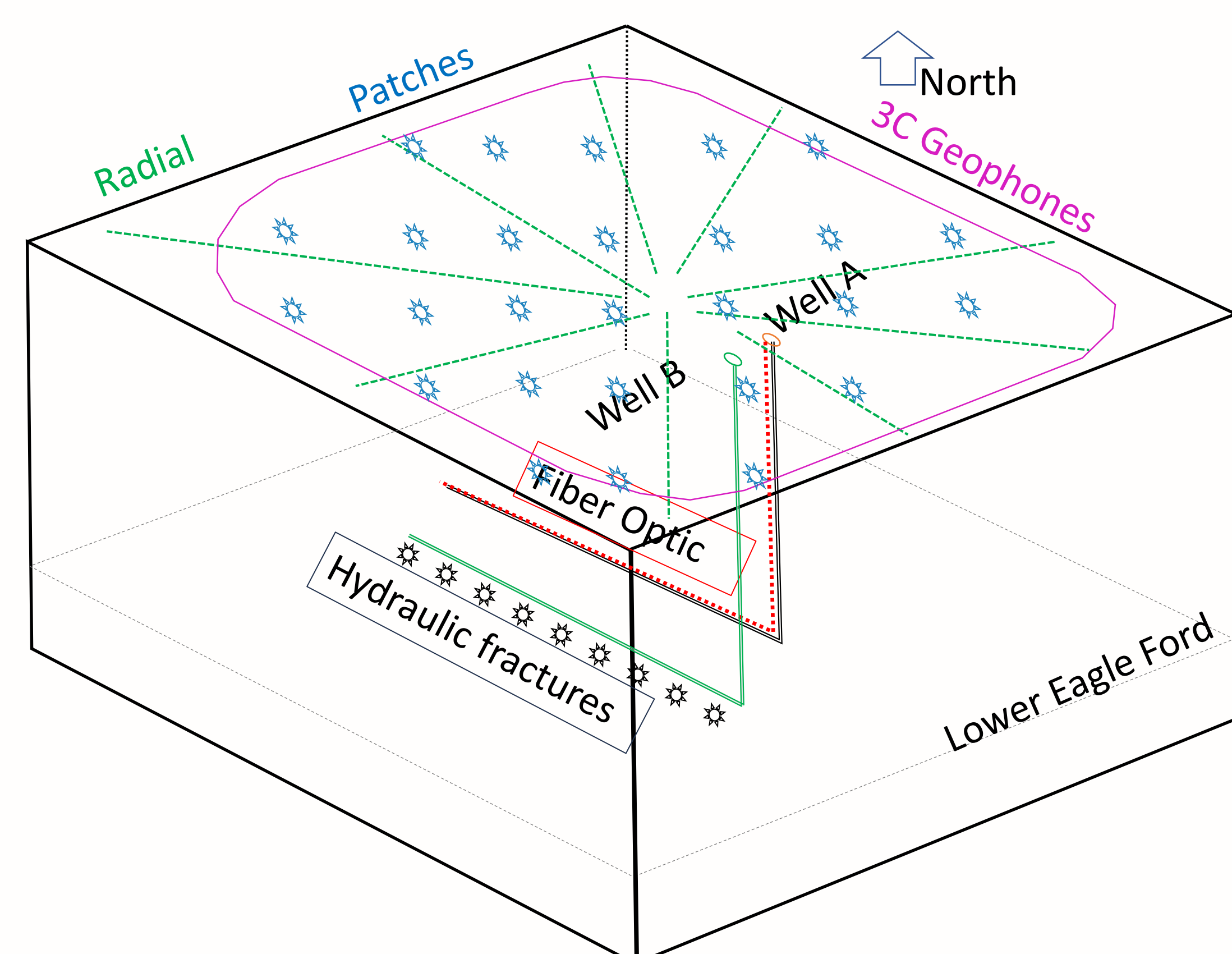
(b) Surface Regular Grid 3C

Example of same event seen in surface 3C and downhole DAS

Results



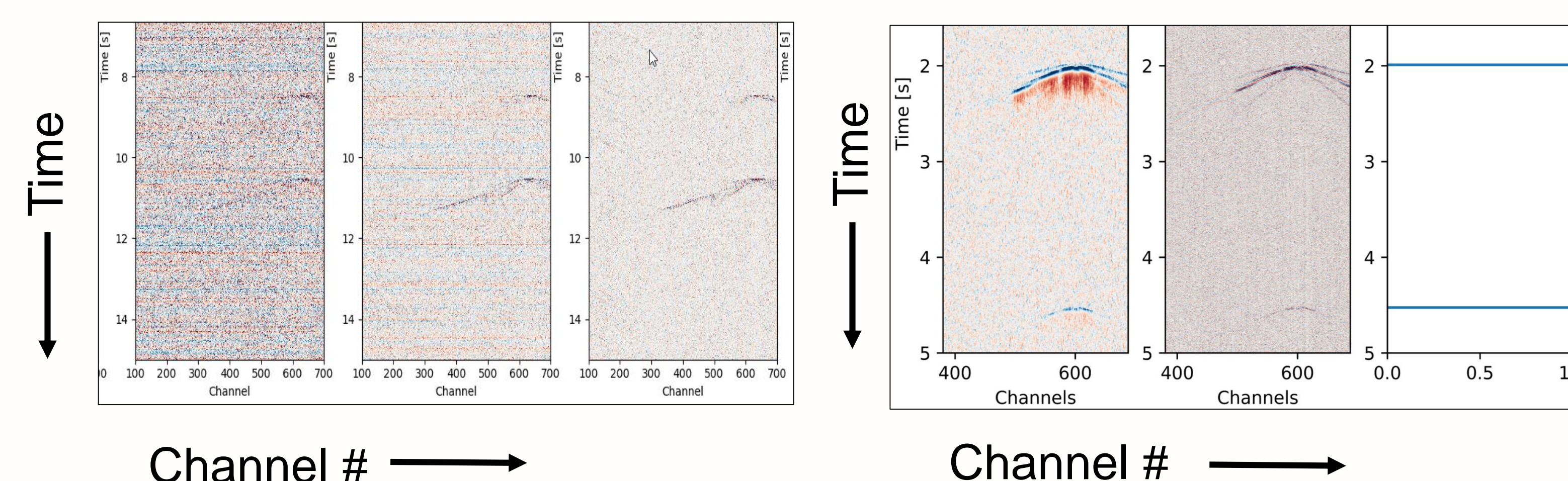
Receiver Geometries



- Surface 3C Geophones
- Surface Receivers Radial Array
- Surface Receivers Race Track Array
- Surface Receiver Patch Array
- Fiber Optic DAS, DTS
- Hydraulic Fractures

Different Arrays for Microseismic Acquisition

Processing and Results



- 400 total events detected in DAS by the STA/LTA
- 102 unique DAS events not observed in surface receivers
- 24% of detected surface events were detected in DAS

Conclusion

- This demonstrates a feasible approach for near real-time feedback to completions team
- Additional events in downhole DAS were detected, not detected with the surface 3C grid
- Downhole DAS and Surface 3C receivers showed distinct event distribution stage by stage

Current Research

- Comparing event location results:
 - inversion of surface data
 - joint inversion of downhole DAS and surface data
- Constraining focal mechanisms from polarity shifts

