Fixing poorly sampled geophone array data by dynamic time warping
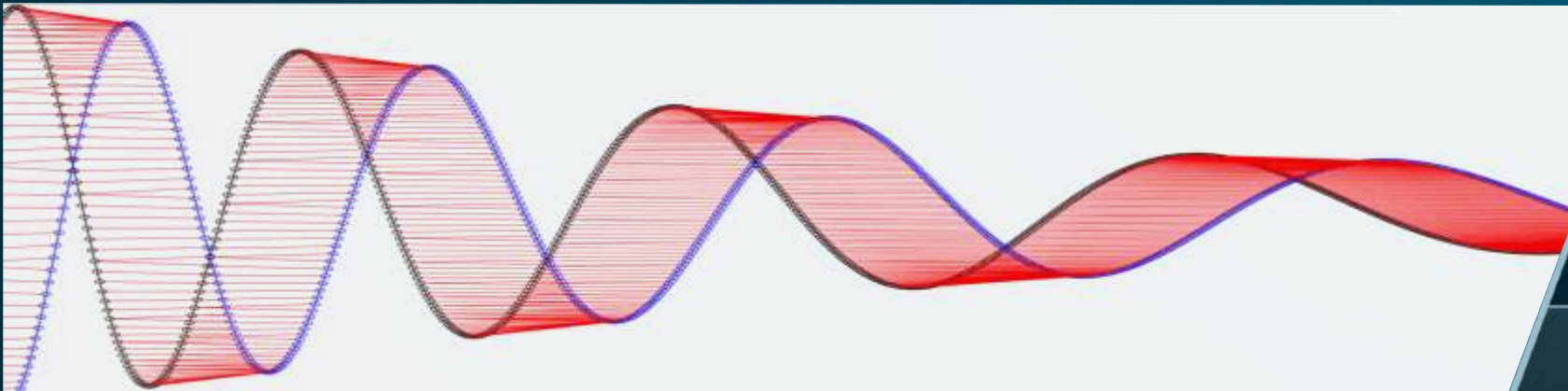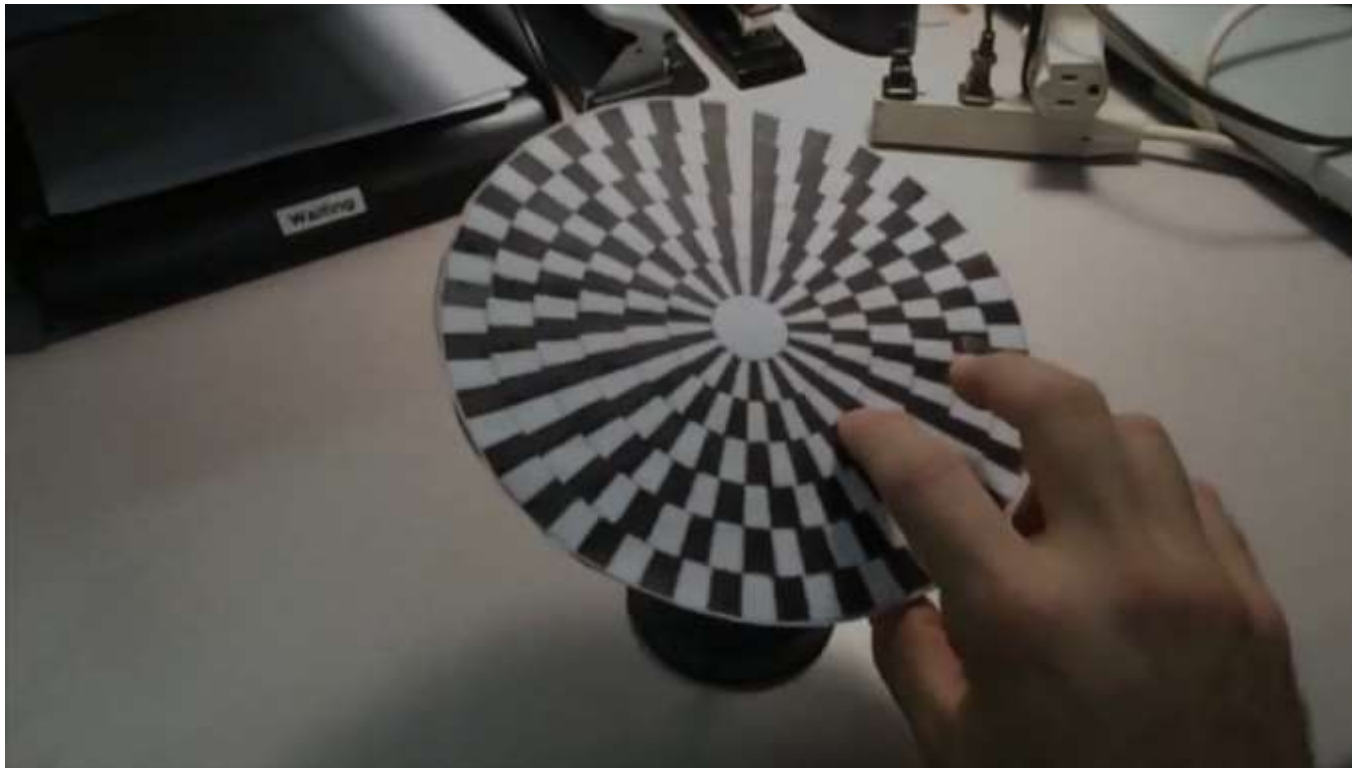
Rowan Romeyn (UiT), Alfred Hanssen (UiT) & Tor Arne Johansen (UiB)

Discrete Sampling and Aliasing

Continuous signals become indistinguishable or distorted when inadequately sampled as discrete signals

From Twitter - @TheEllenShow

YouTube – Jesse Mason https://www.youtube.com/watch?v=QOwzkND_ooU

Dynamic Time Warping - DTW
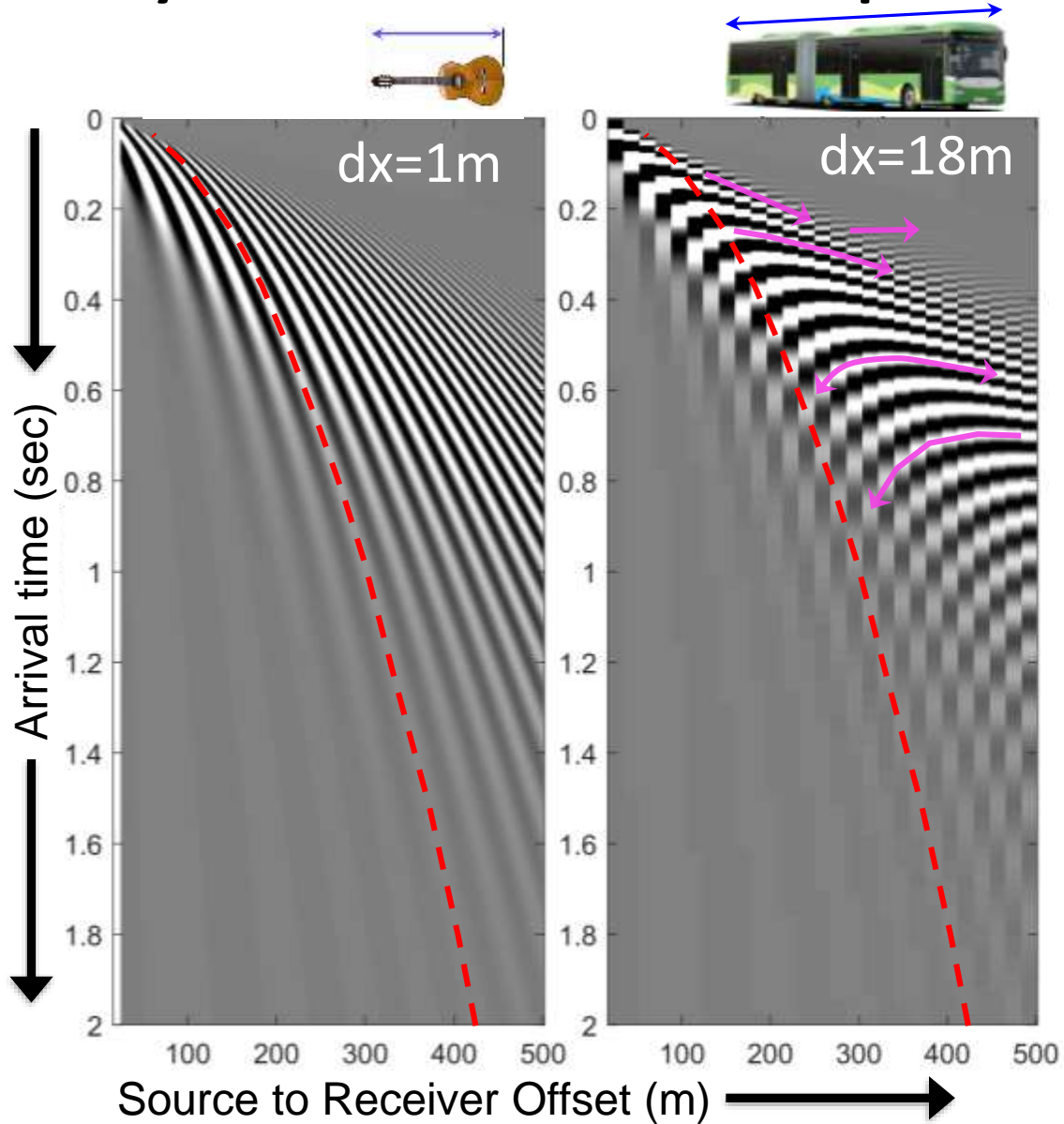

YouTube – freedrum https://www.youtube.com/watch?v=wLoSOz8e3qE
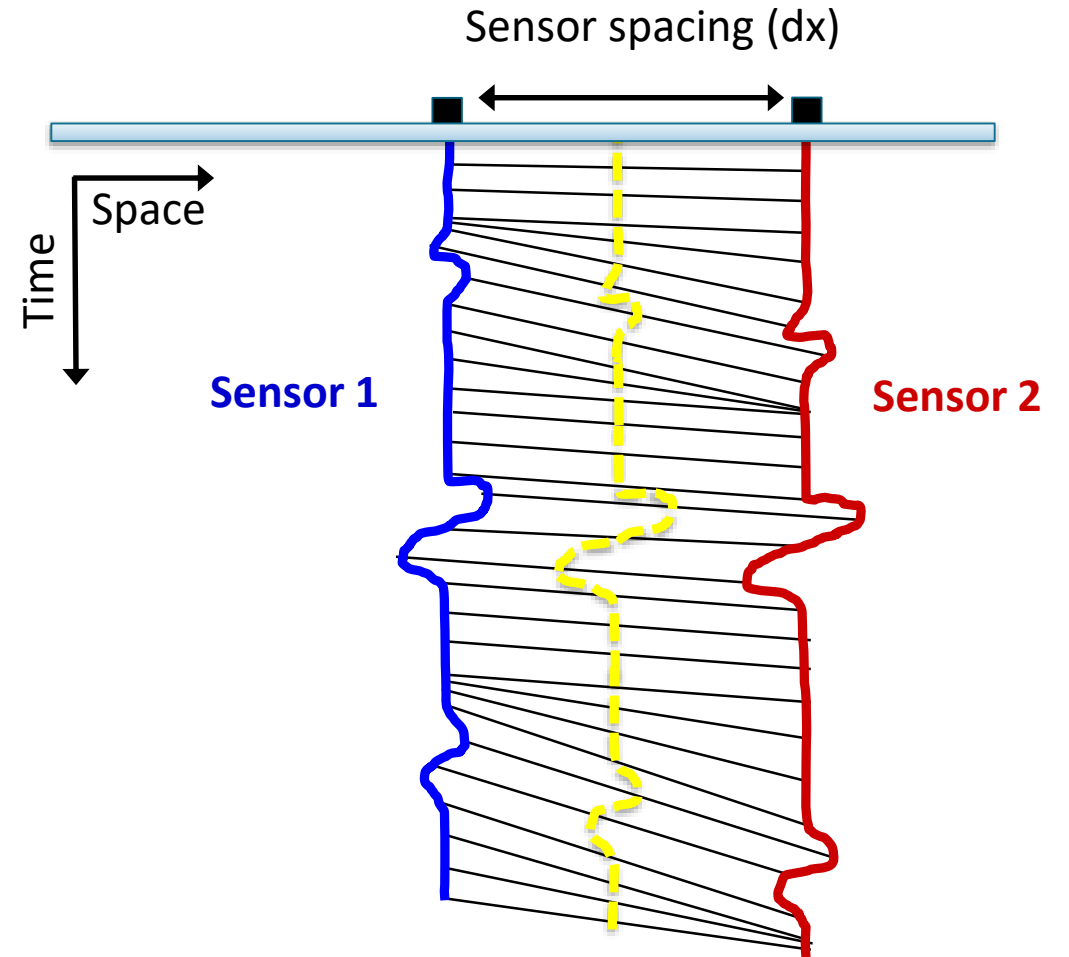
- DTW applies local stretching and squeezing to optimally match a pair of time series.
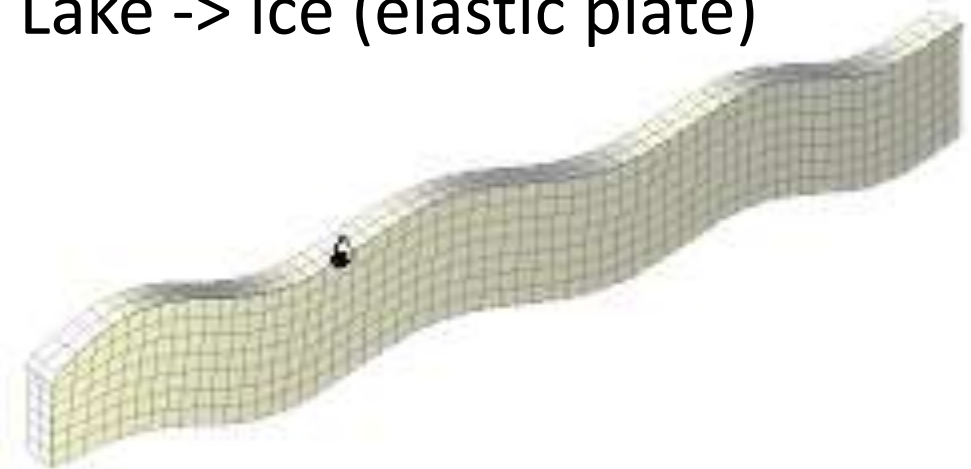- Alignment of signals forms the basis of our interpolation method
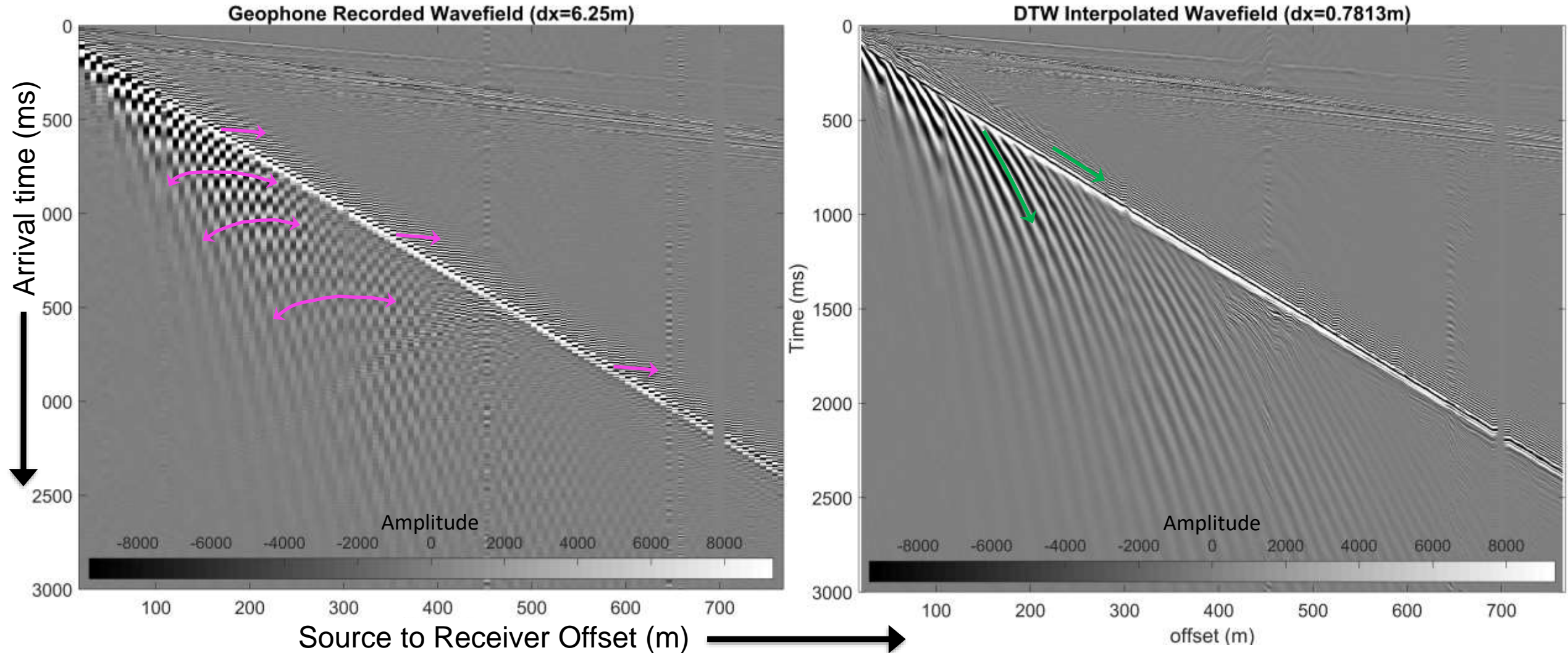
Synthetic wavefield example

dx=1m

dx=18m

Arrival time (sec)

Source to Receiver Offset (m)

- Instead of a stone -> pure impulse

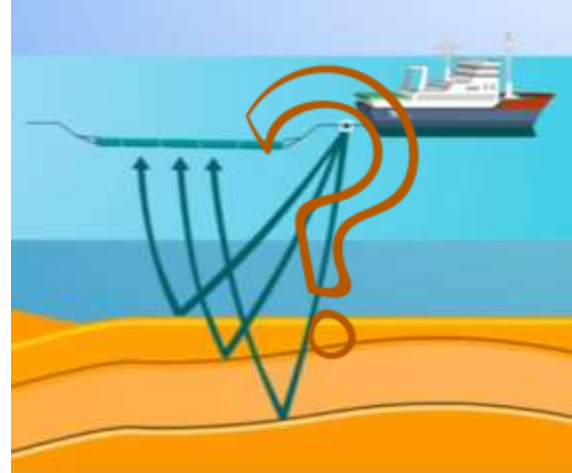- Lake -> ice (elastic plate)

Real data – geophones on floating sea ice

Conclusions

- Dynamic time warping interpolation
  - ➢ Data adaptive
  - ➢ Can fix spatial aliasing problems in seismic data
  - ➢ Do more with less

YouTube – Total https://www.youtube.com/watch?v=8HY1g7cDKjQ