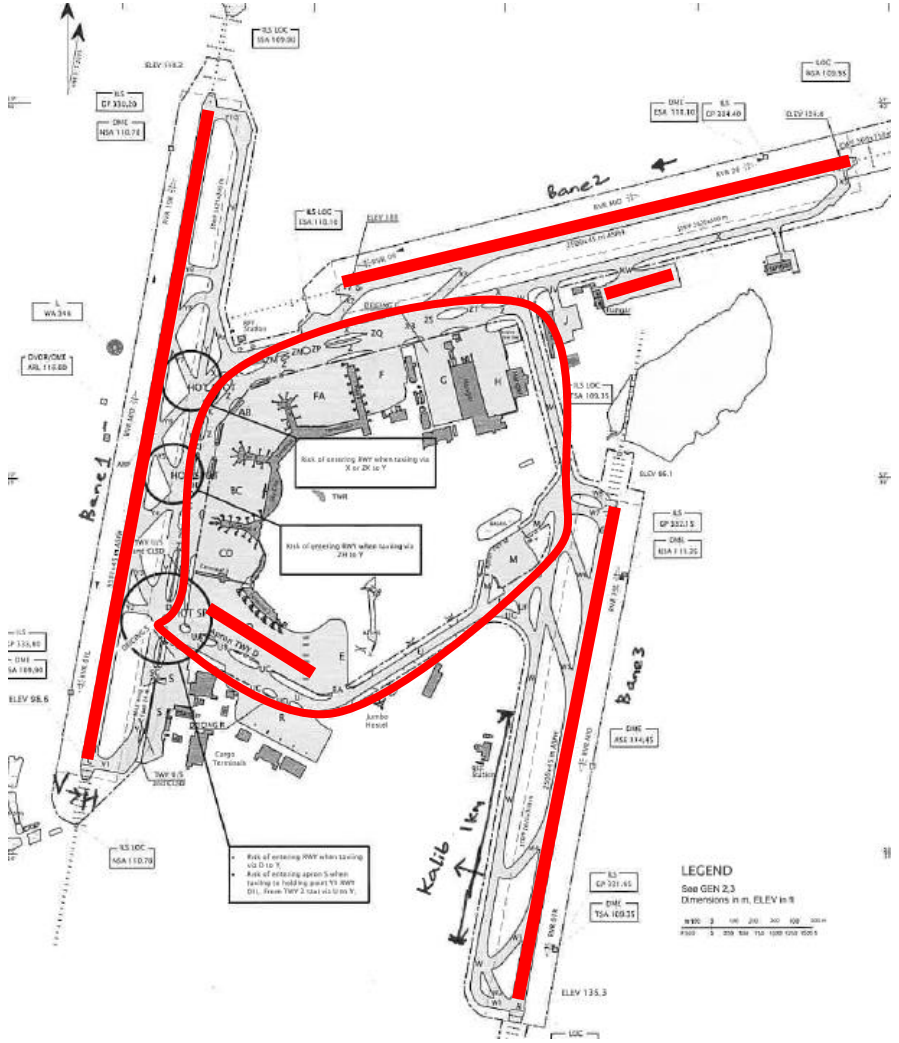
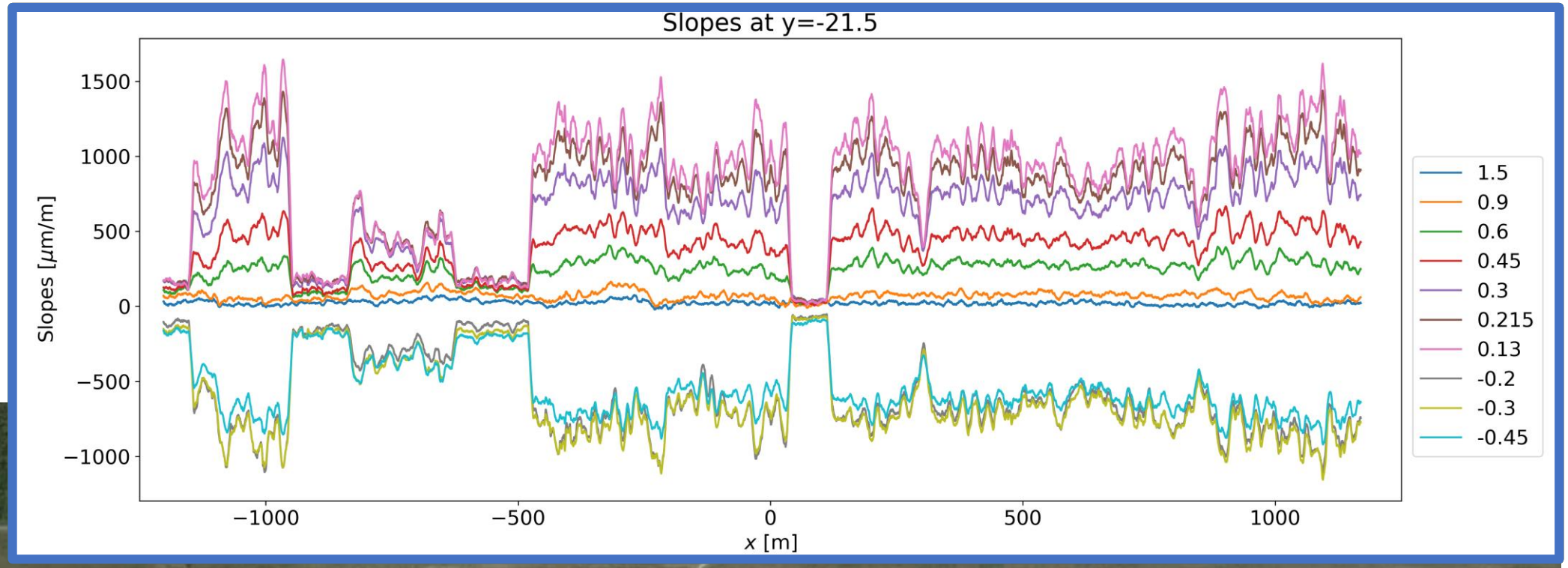
Airport Measurements with the Traffic Speed Deflectometer

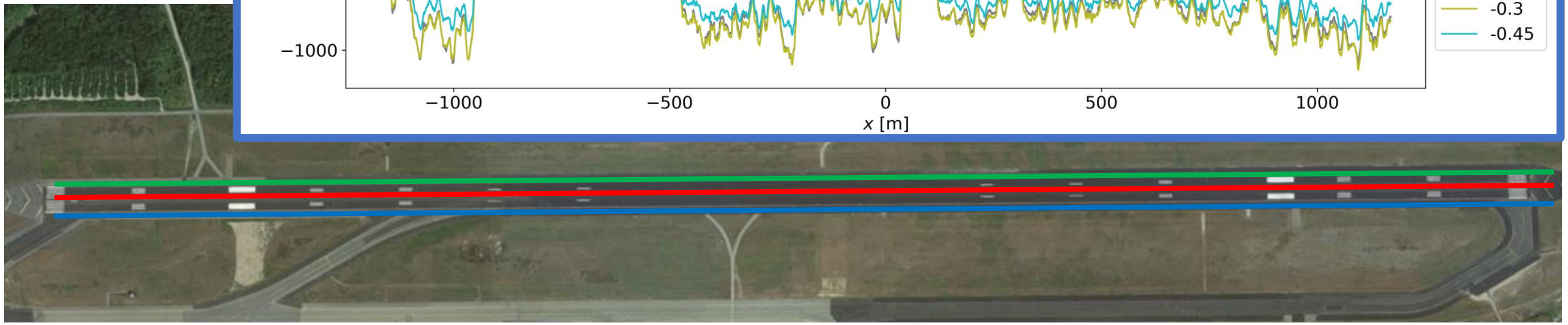
Measurement overview

- Measured pavements
  - Runway 1
  - Runway 2
  - Runway 3
  - Apron
  - Parking lot
  - Loop around terminal bulding



Examples from runway 2



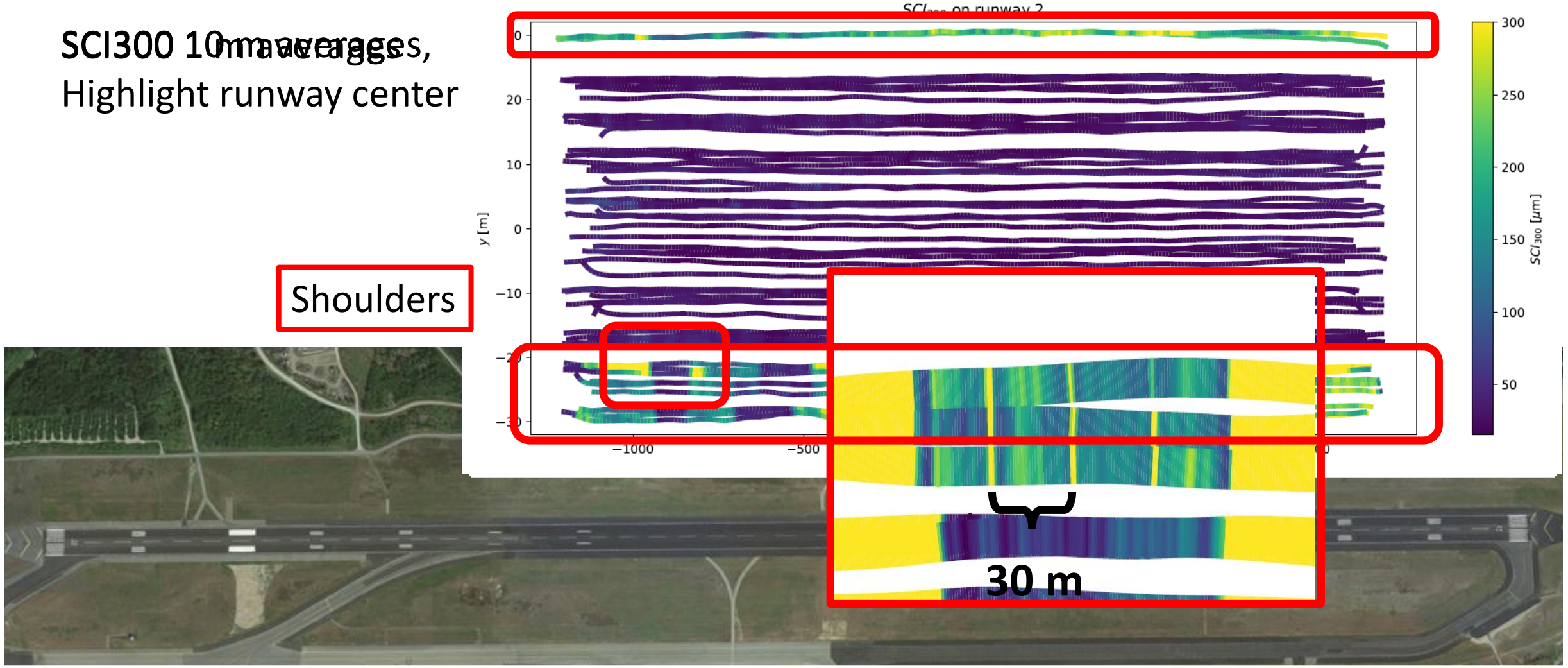


SCI300 on runway 2

2D map of pavement performance

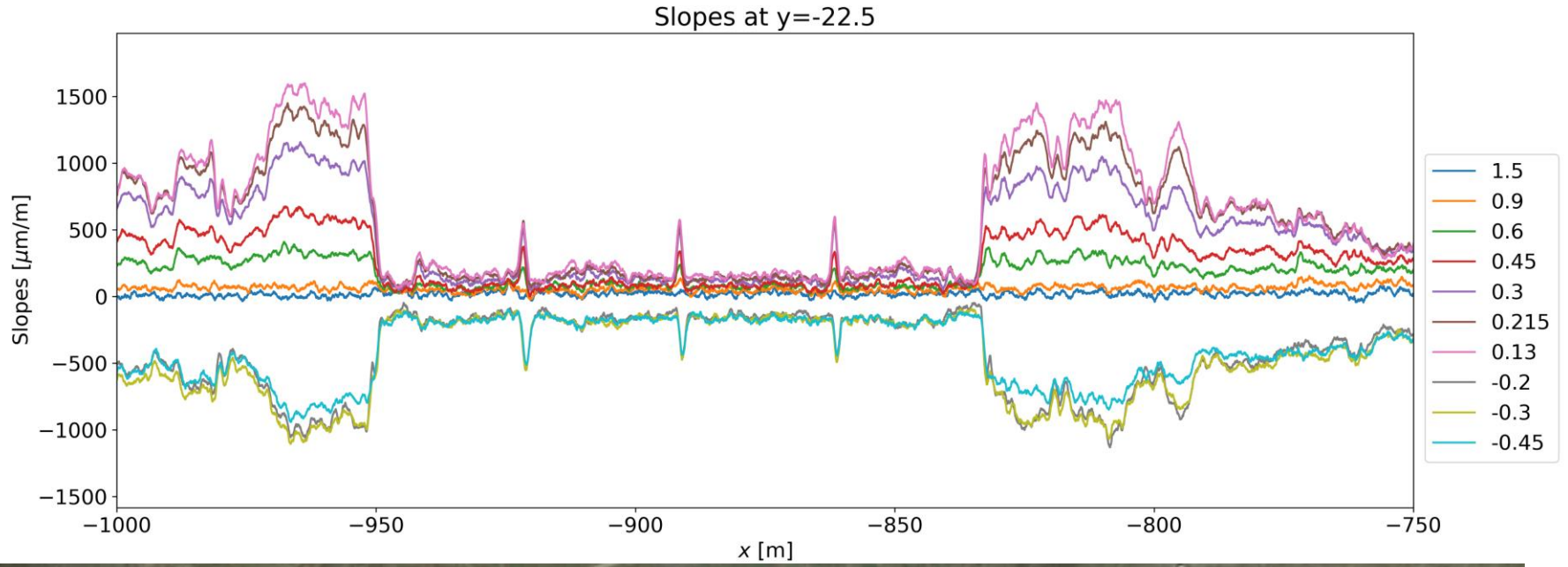
SCI300 10 m averages,
Highlight runway center

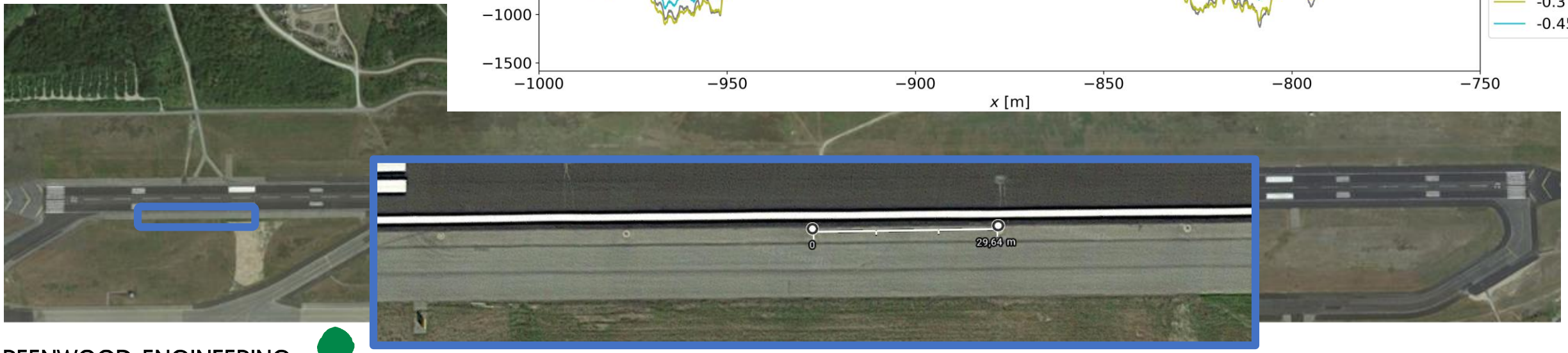
Shoulders



Slope spikes on runway 2

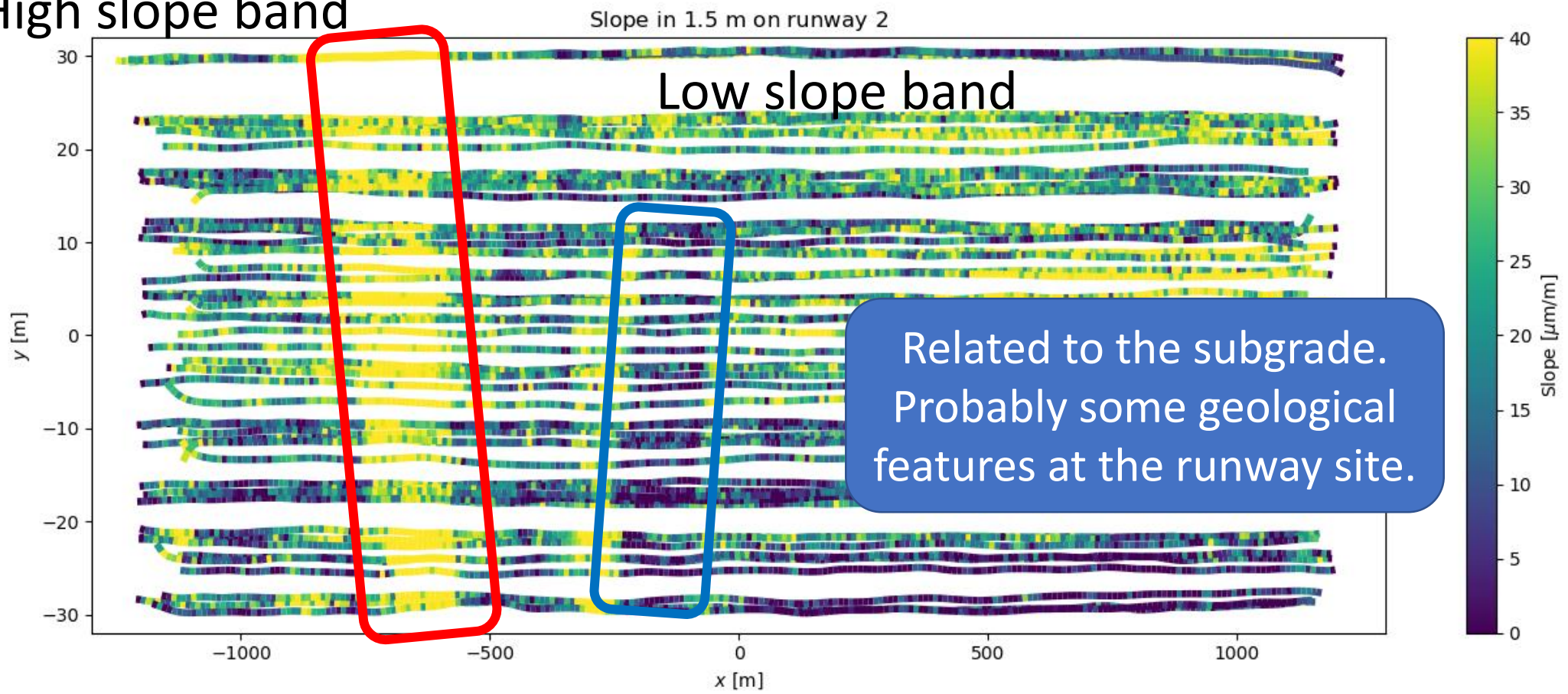
- TSD is able to consistently pick up the same feature.
- Feature is around 80 cm wide. An FWD would never find this.





Slope in 1.5 m on runway 2

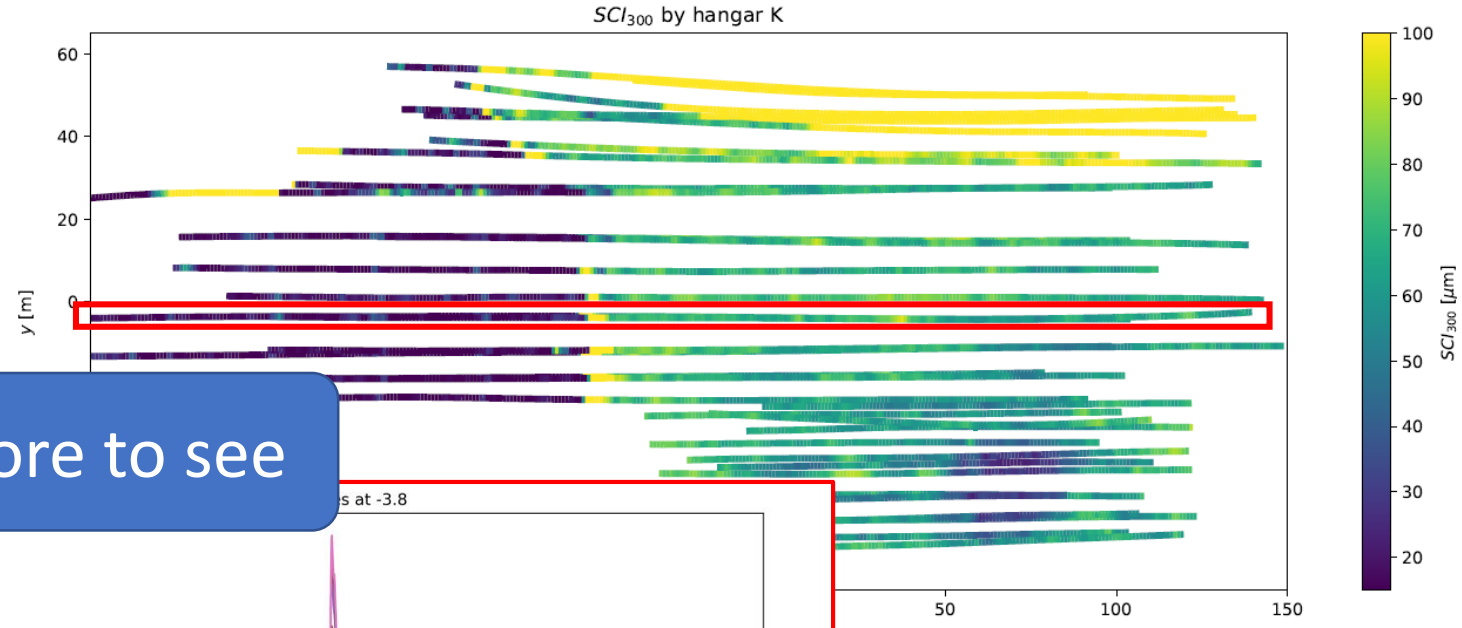
High slope band



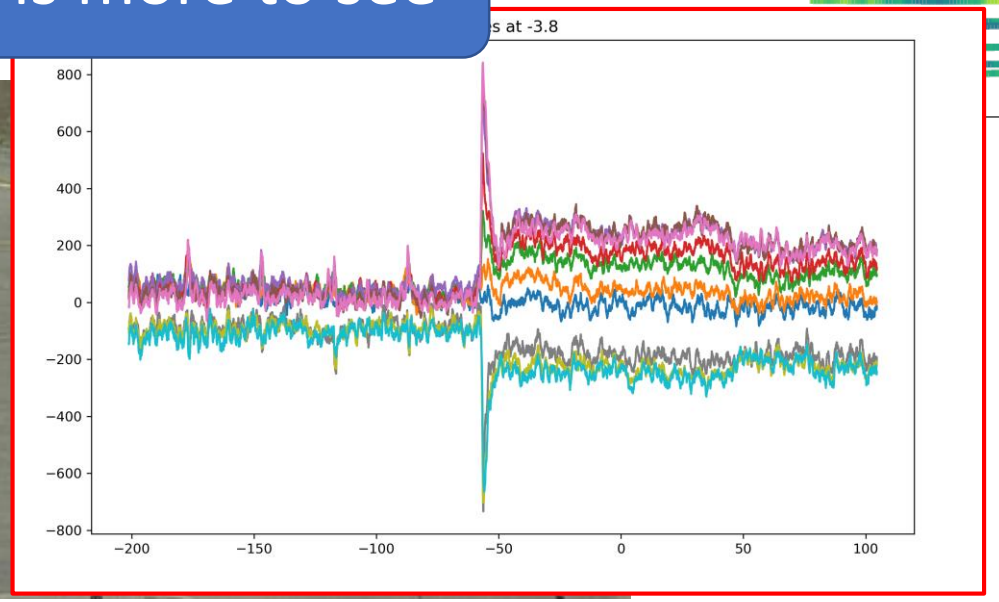
Related to the subgrade. Probably some geological features at the runway site.

SCI300 at parking lot

- New and old pavements are clearly visible
- New problems might be developing near edge of new pavement



But there is more to see

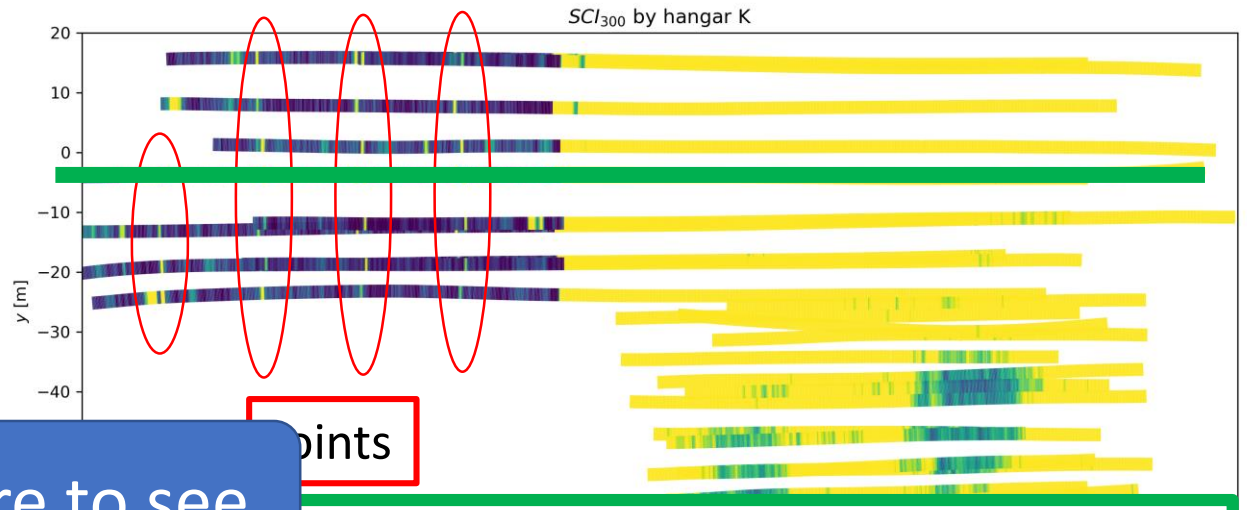


SCI300 at parking lot

Challenging conditions:

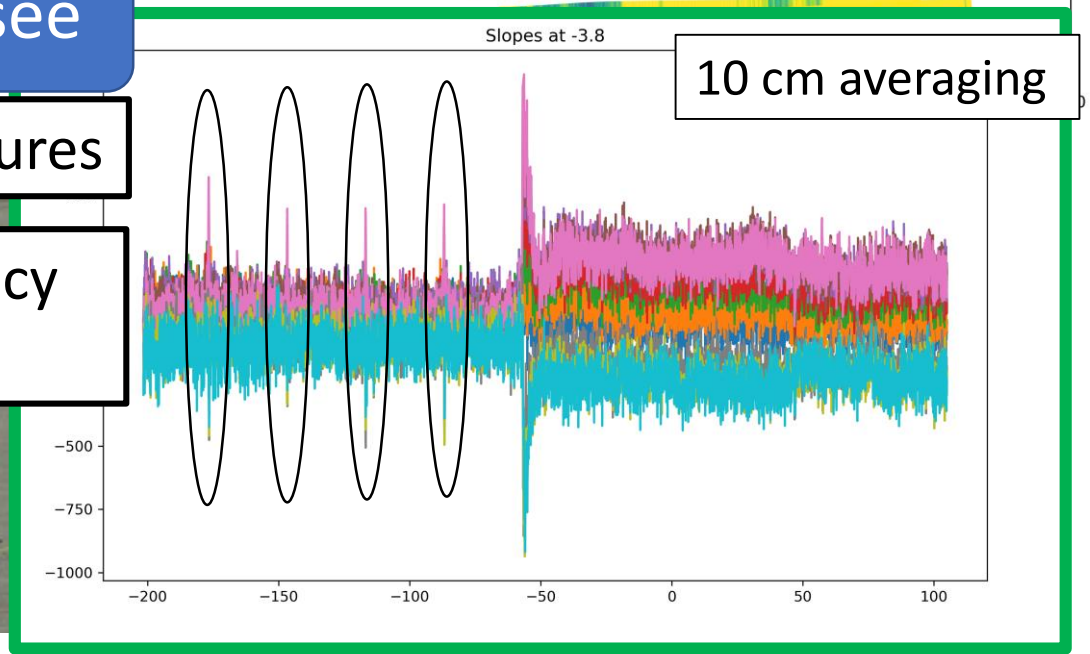
- Designed for airplane loads
- Concrete plates are covered with an asphalt layer

But still we are able to detect the joint movement



oints

s more to see



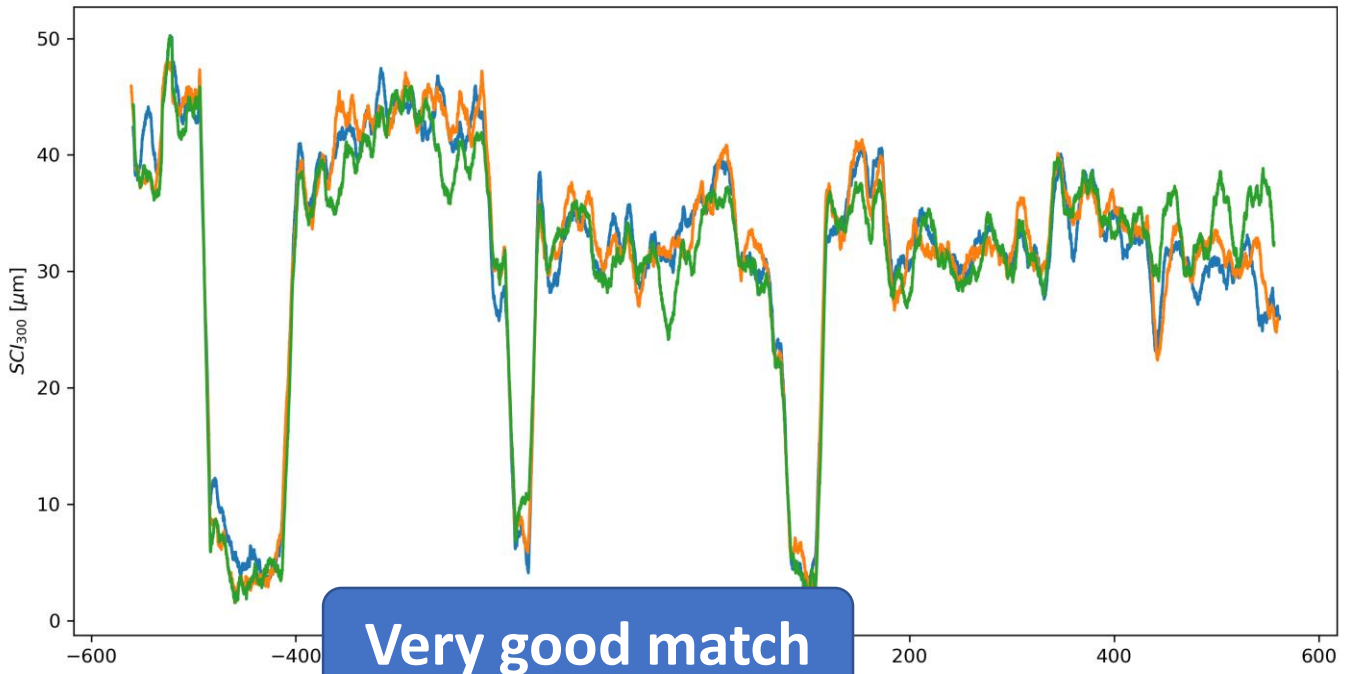
10 cm averaging

Clear joint signatures

Possible due to high accuracy in short reporting intervals

Loop around terminal building

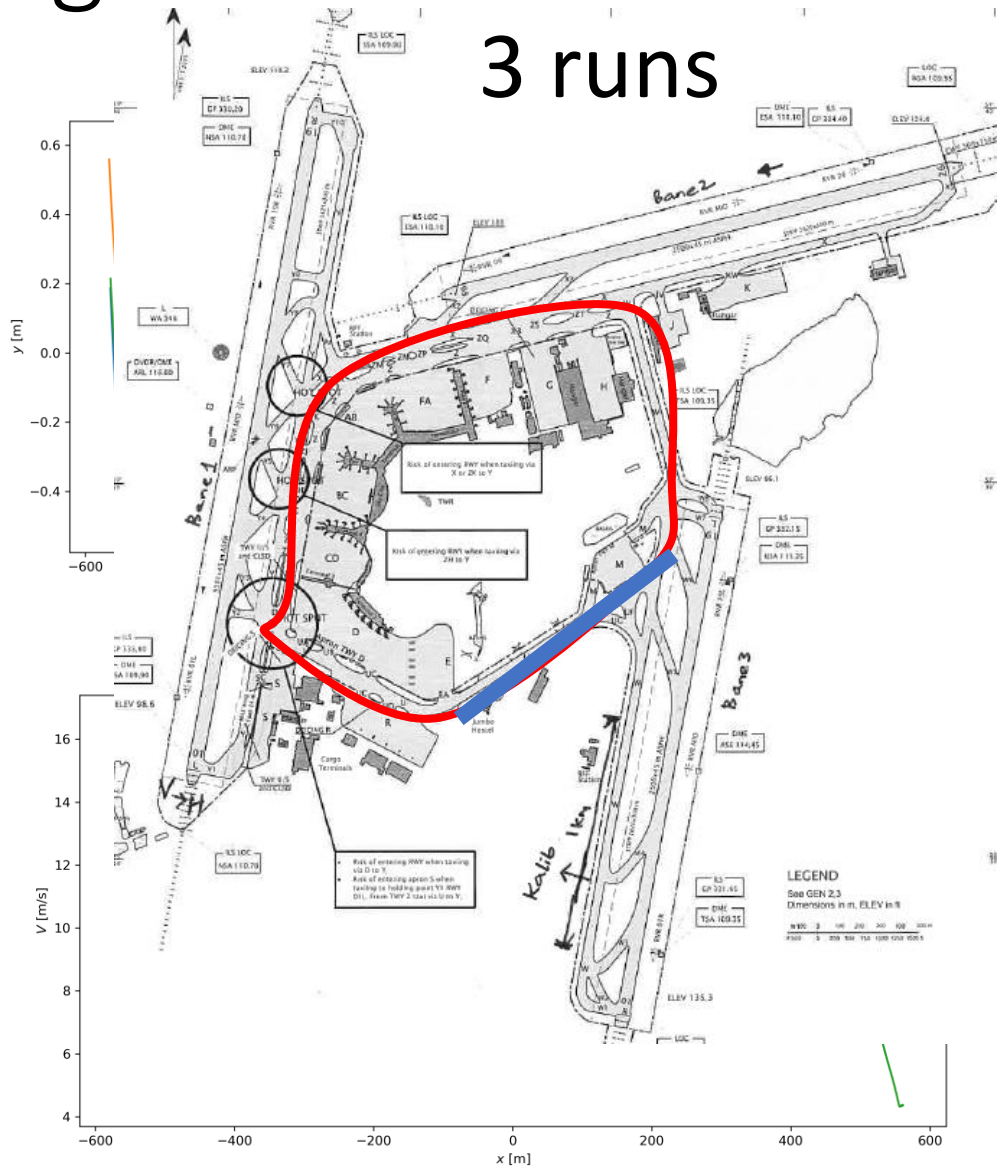
SCI300



Very good match

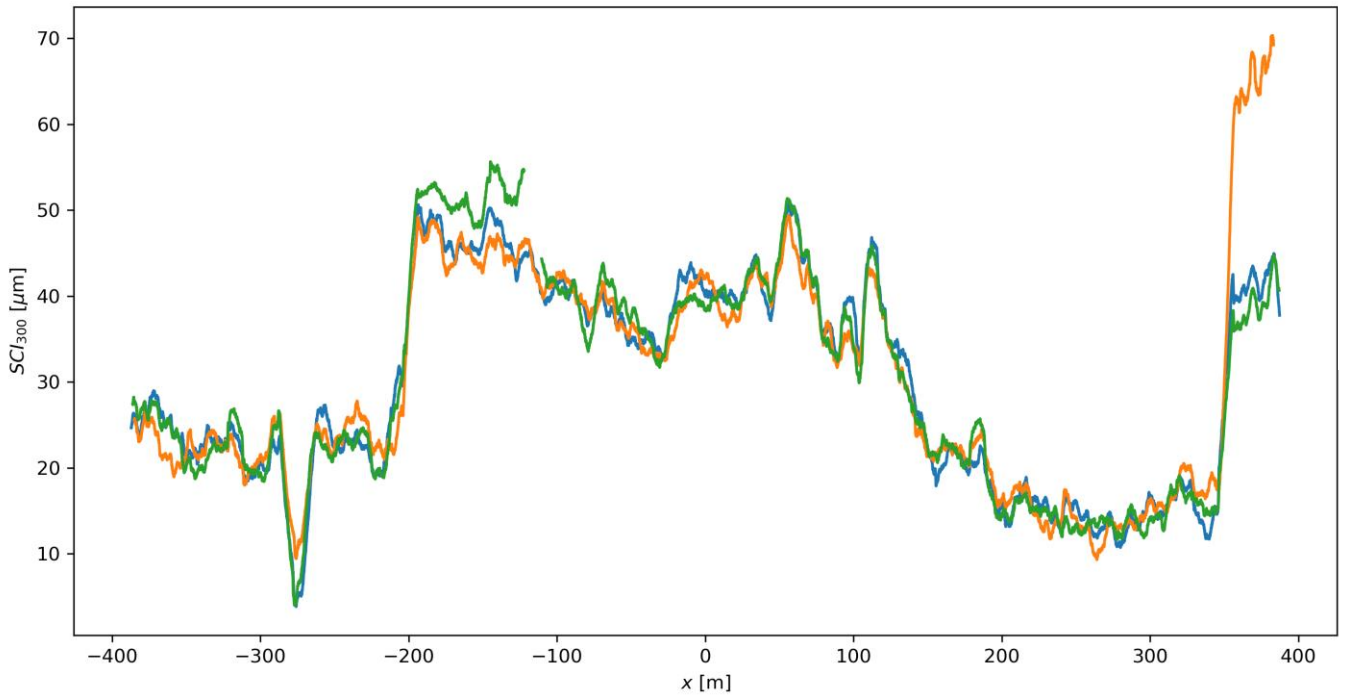
Why not perfect match?

3 runs

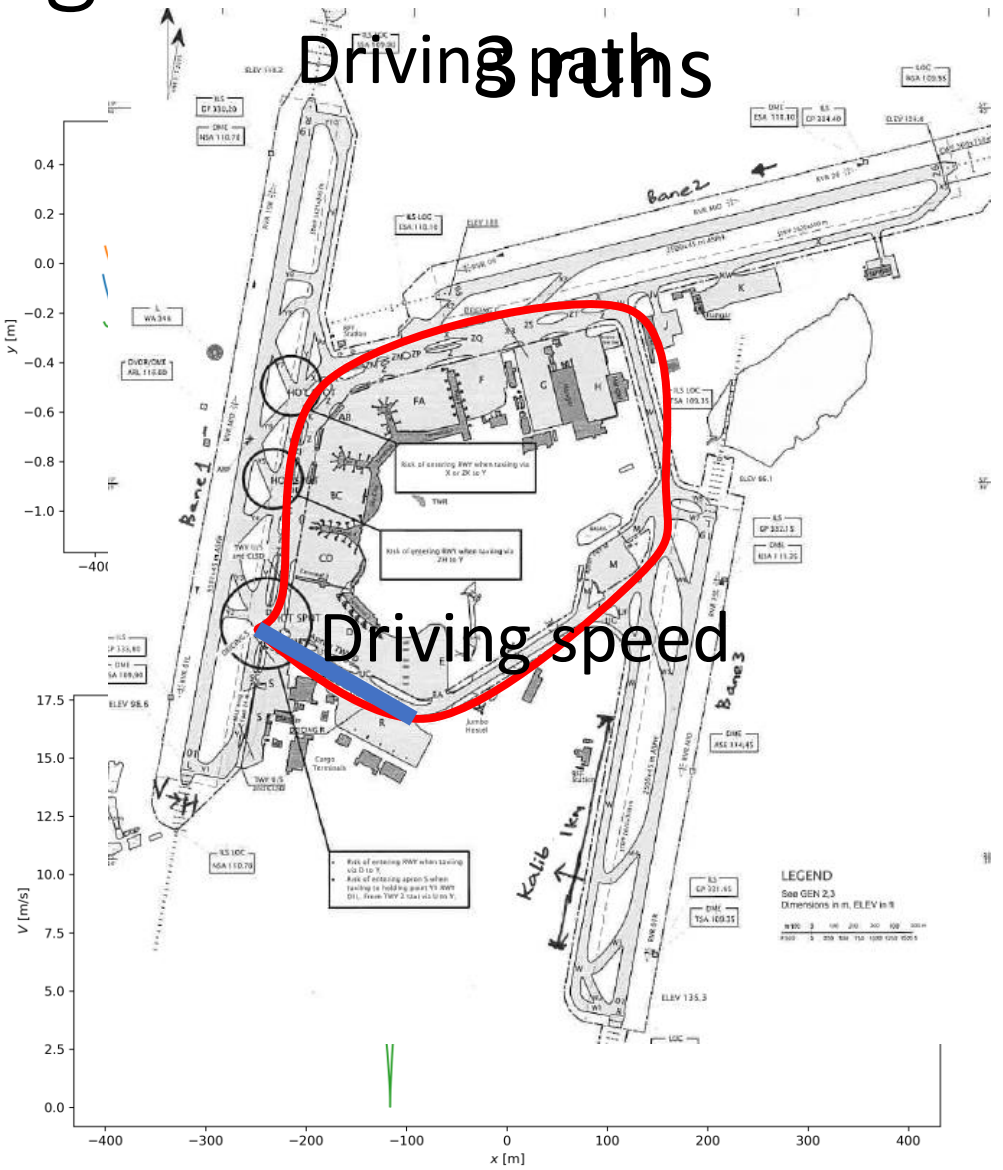


Loop around terminal building

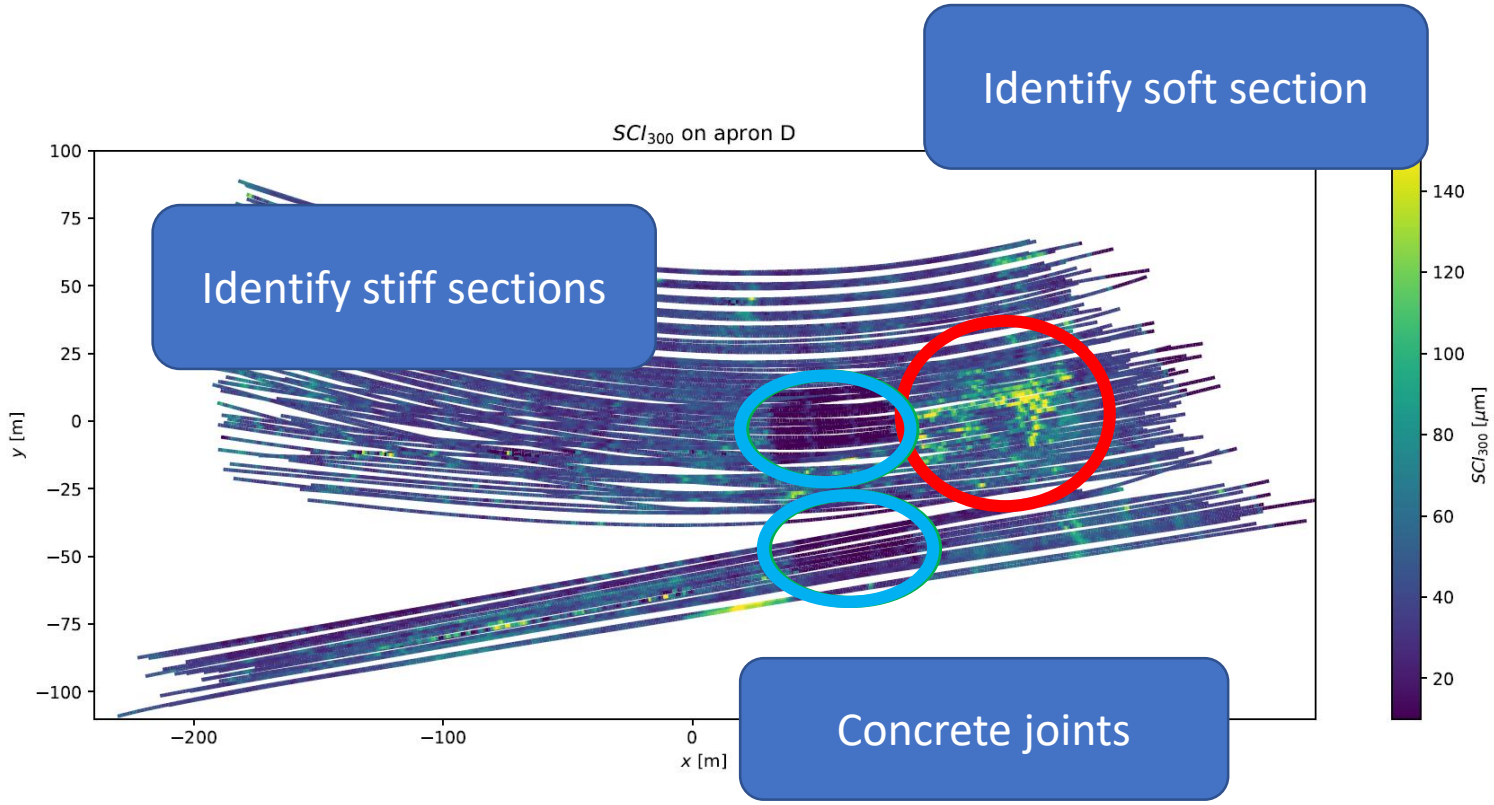
SCI300

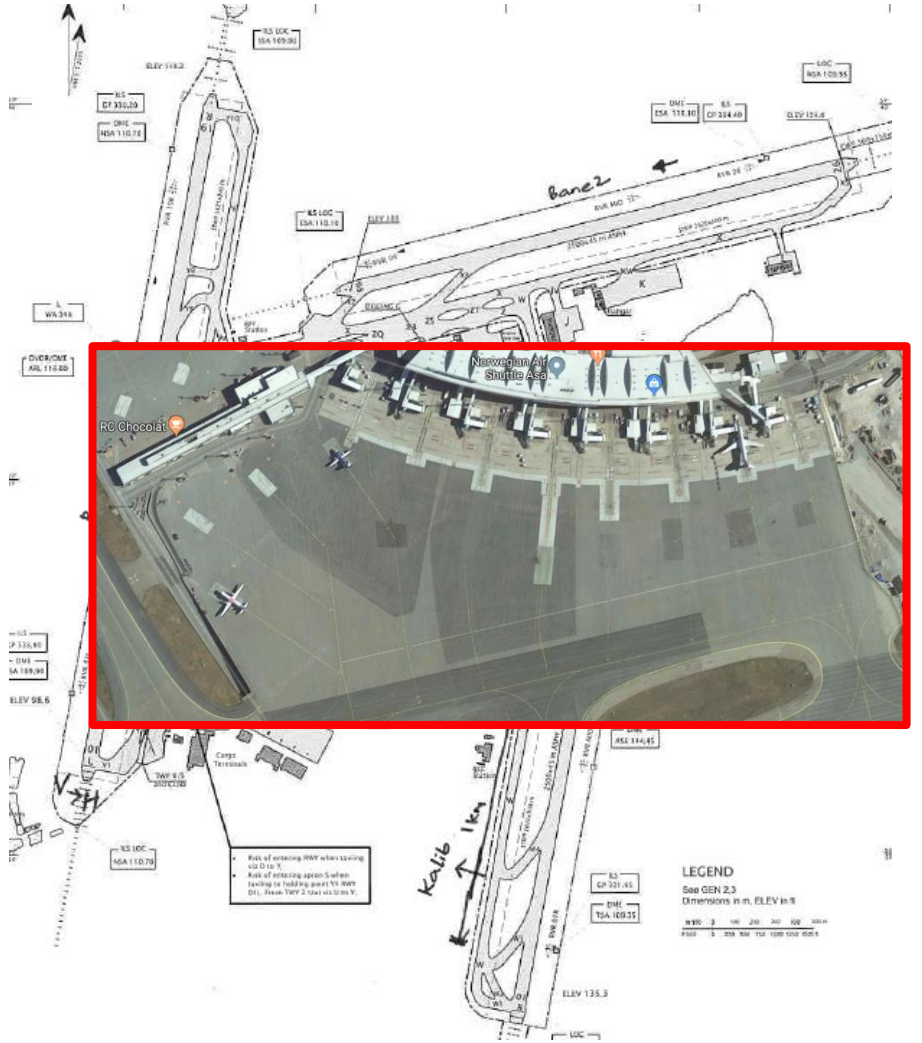


Driving 3 runs



Apron

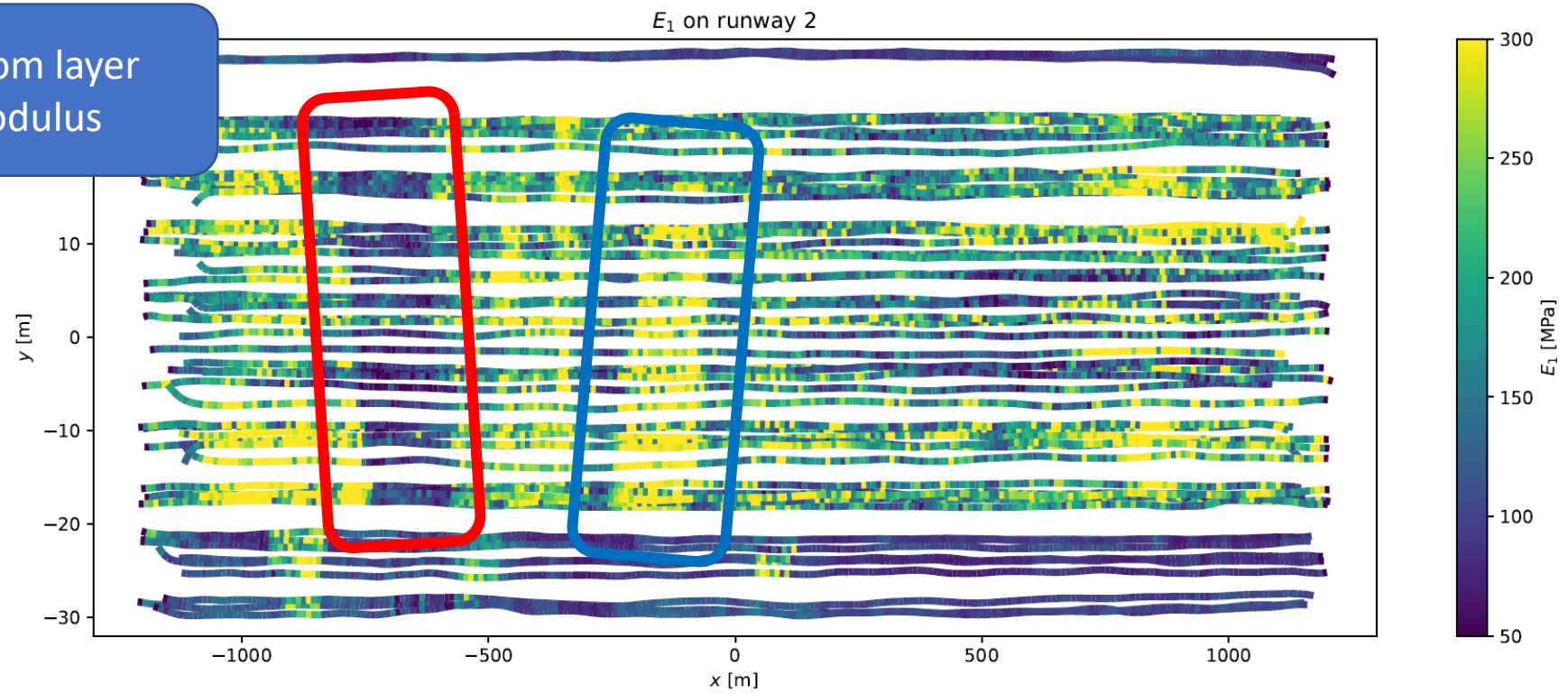

SCI_{300} on apron D
Identify soft section
Identify stiff sections
Concrete joints
y [m]
x [m]
SCI_{300} [μm]
100
75
50
25
0
−25
−50
−75
−100
−200
−100
0
140
120
100
80
60
40
20


Bane2
Norwegian Air Shuttle Asa
RC Chocolat
Kalib
1 km
LEGEND

Back-calculation on runway 2

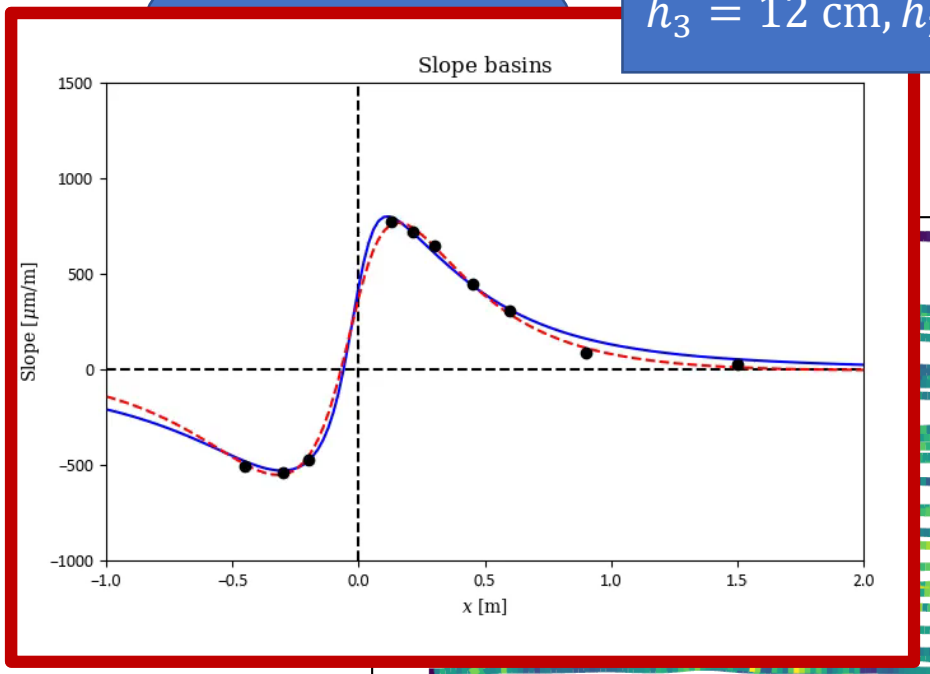
- Three layer model with layer thicknesses $h_3 = 25\ \text{cm}, h_2 = 30\ \text{cm}, h_1 = \infty$

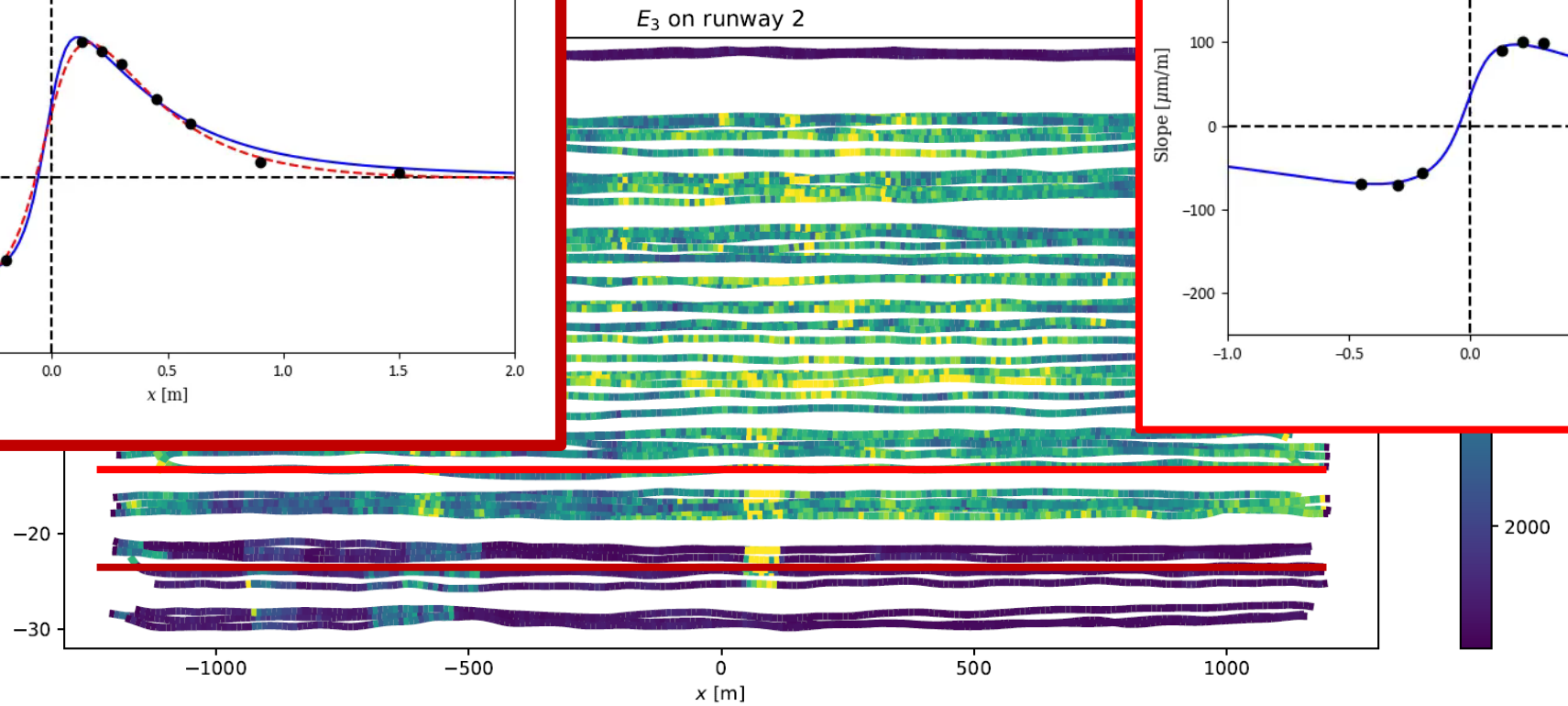
Bottom layer modulus

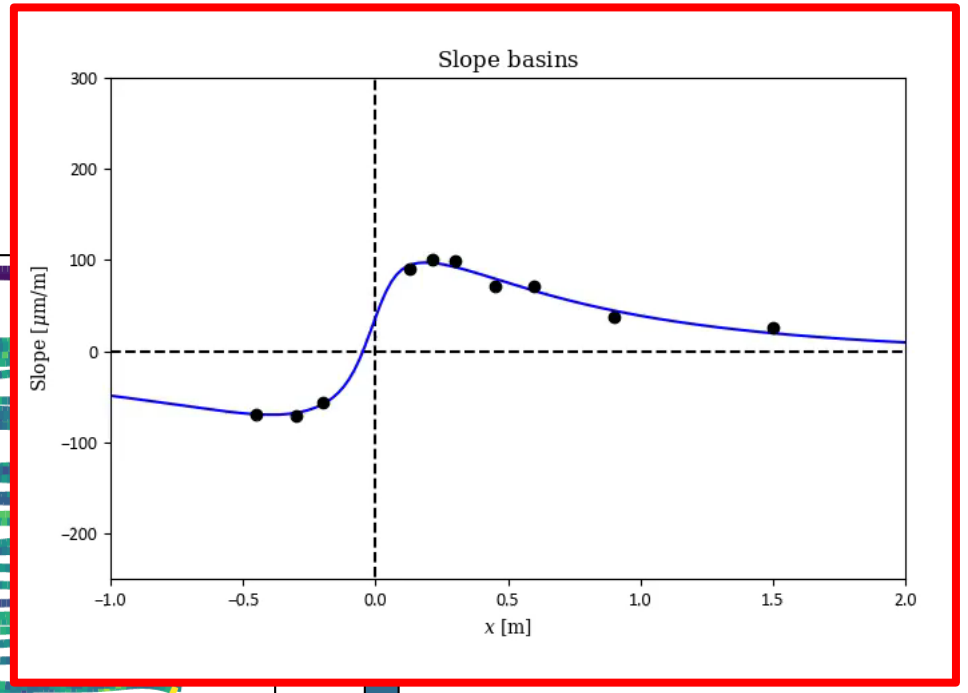


Back-calculation on runway 2

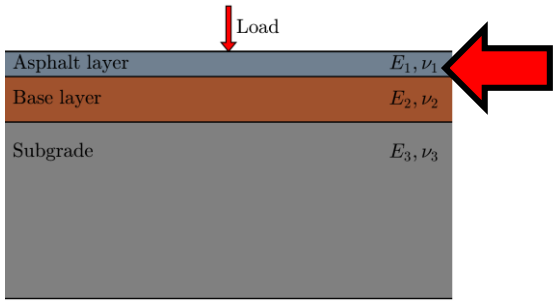
$h_3 = 12$ cm, $h_2 = 30$ cm, $h_1 = 100$ cm

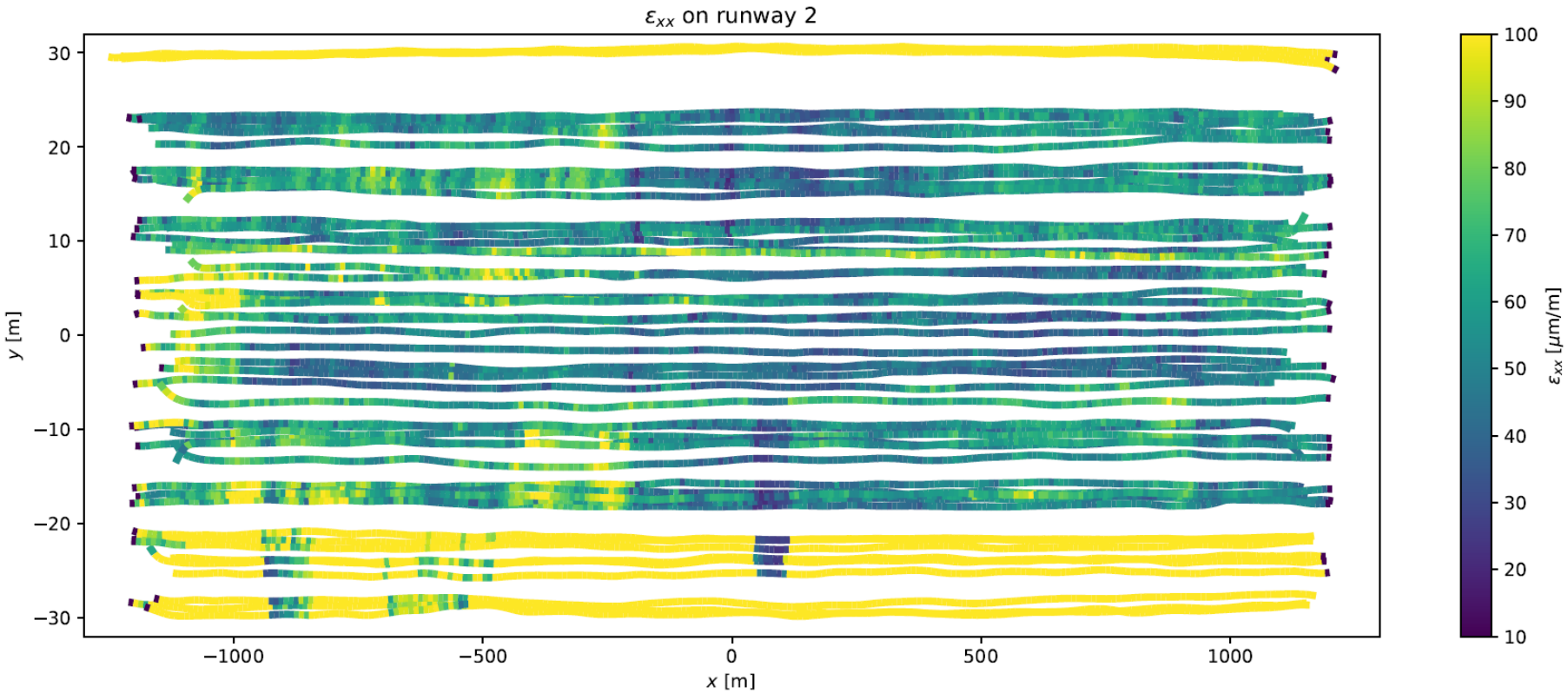




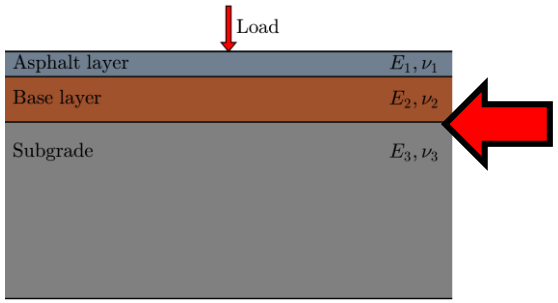


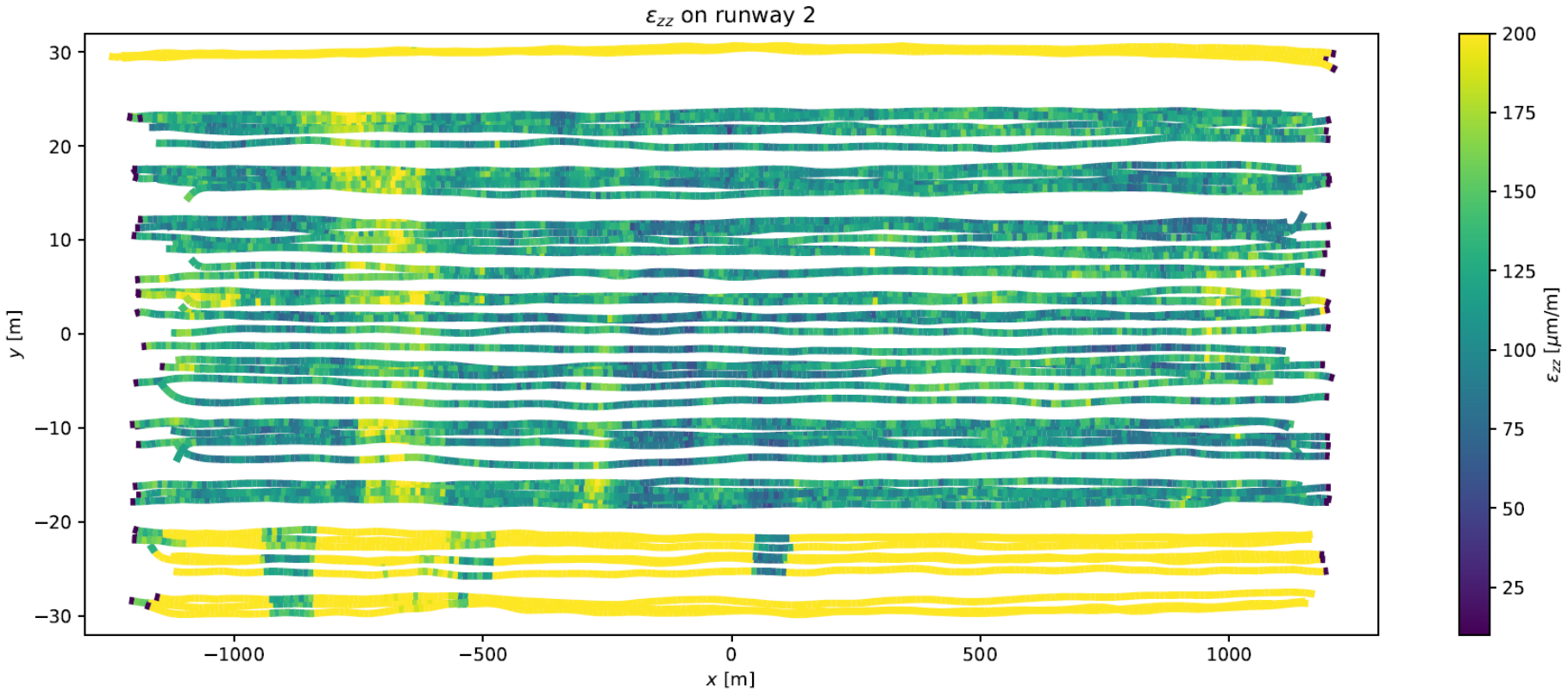
Back-calculated horizontal strain





Back-calculated vertical strain





Conclusion

- Measured 350 km of airport pavement
- Demonstrated ability to measure pavement behavior with high repeatability and continuous sampling
- Demonstrated ability to identify highly localized pavement defects and concrete joints
- Demonstrated ability to identify areas with low/high subgrade bearing capacity
- Back-calculated elastic moduli and pavement strains


Questions?