MPD heat maps – ny metod för att dra nytta av texturvärden

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Destia & Colas

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FINLAND'S BIGGEST INFRASTRUCTURE SERVICE COMPANY

"

We do more than 1000 projects per year

REVENUE

603,4

€ million

COMPARABLE OPERATING PROFIT

20,0

€ million

CUSTOMER SATISFACTION

49

Net Promoter Score

OCCUPATIONAL SAFETY

6,1

accidents per million working hours

PERSONNEL

1639

Destia employees (31 December 2022)

EMPLOYEE SATISFACTION

37

eNPS average in 2022

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INFRASTRUCTURE FROM DESIGN TO CONSTRUCTION AND FROM MAINTENANCE TO INNOVATION

ENERGY SERVICES

- Construction services
- Power grids
- Wind power construction

RAIL AND URBAN SERVICES

- Railway construction and maintenance
- Urban and rock construction
- Foundation engineering
- Aggregates and circular economy

URBAN DEVELOPMENT AND DESIGN SERVICES

- Infrastructure, urban and traffic design
- **Infra asset management**
- Telematics
- Project development
- Electric charging
- New services

ROAD SERVICES

- Road and street construction
- Bridges

MAINTENANCE SERVICES

- Road and street maintenance
- Area-wide projects

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INFRA ASSET MANAGEMENT

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Pioneer within Infra Asset Management

Expert in the field of infra asset management

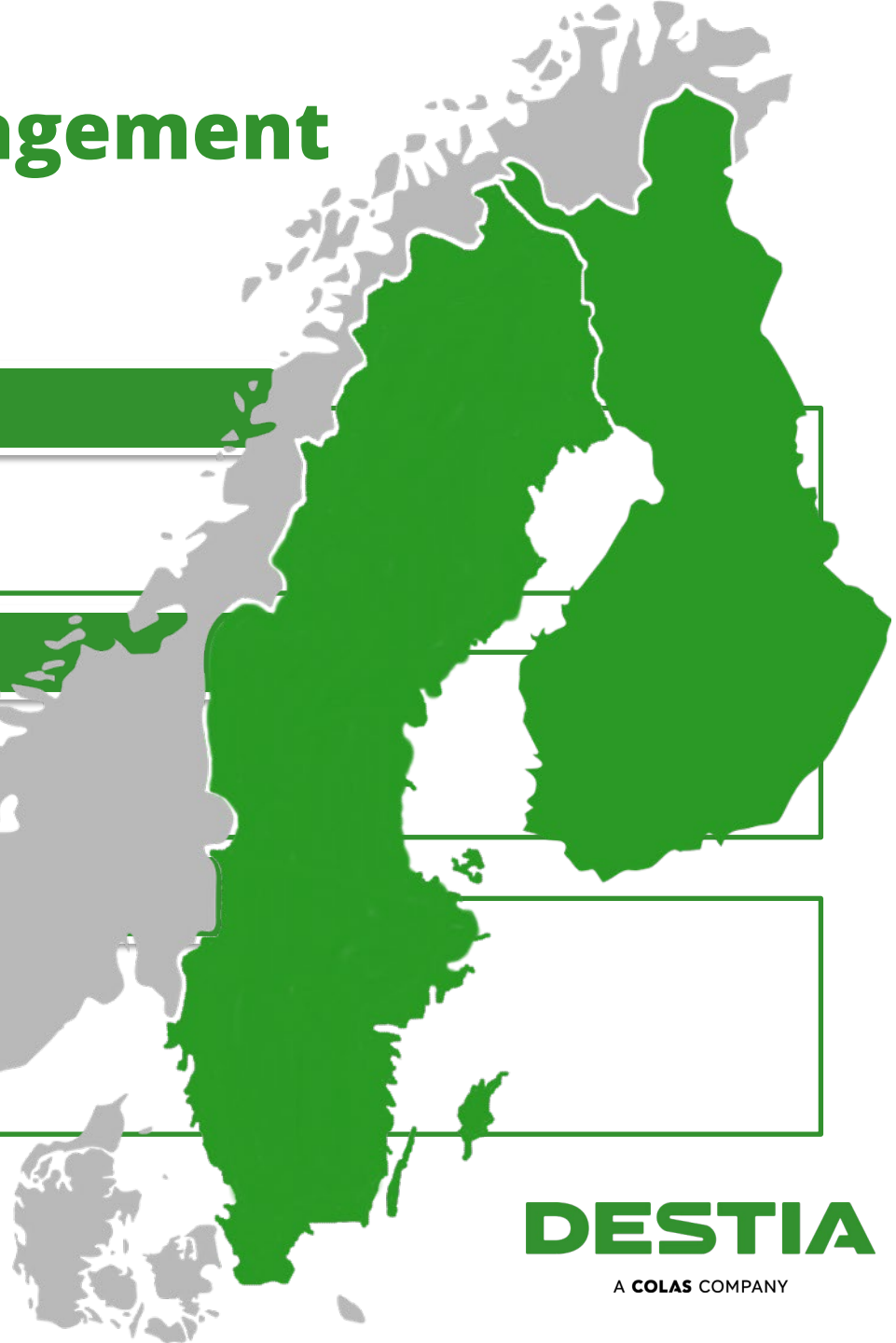
- 30 years experience of road network condition measurements
- ~20 permanent experts (+ another ~ 20 during season)

Customer orientation

- All size projects
- High customer satisfaction

Special competence

- Highly developed measurement equipment and applications
- Consultancy services
- Experts in condition management



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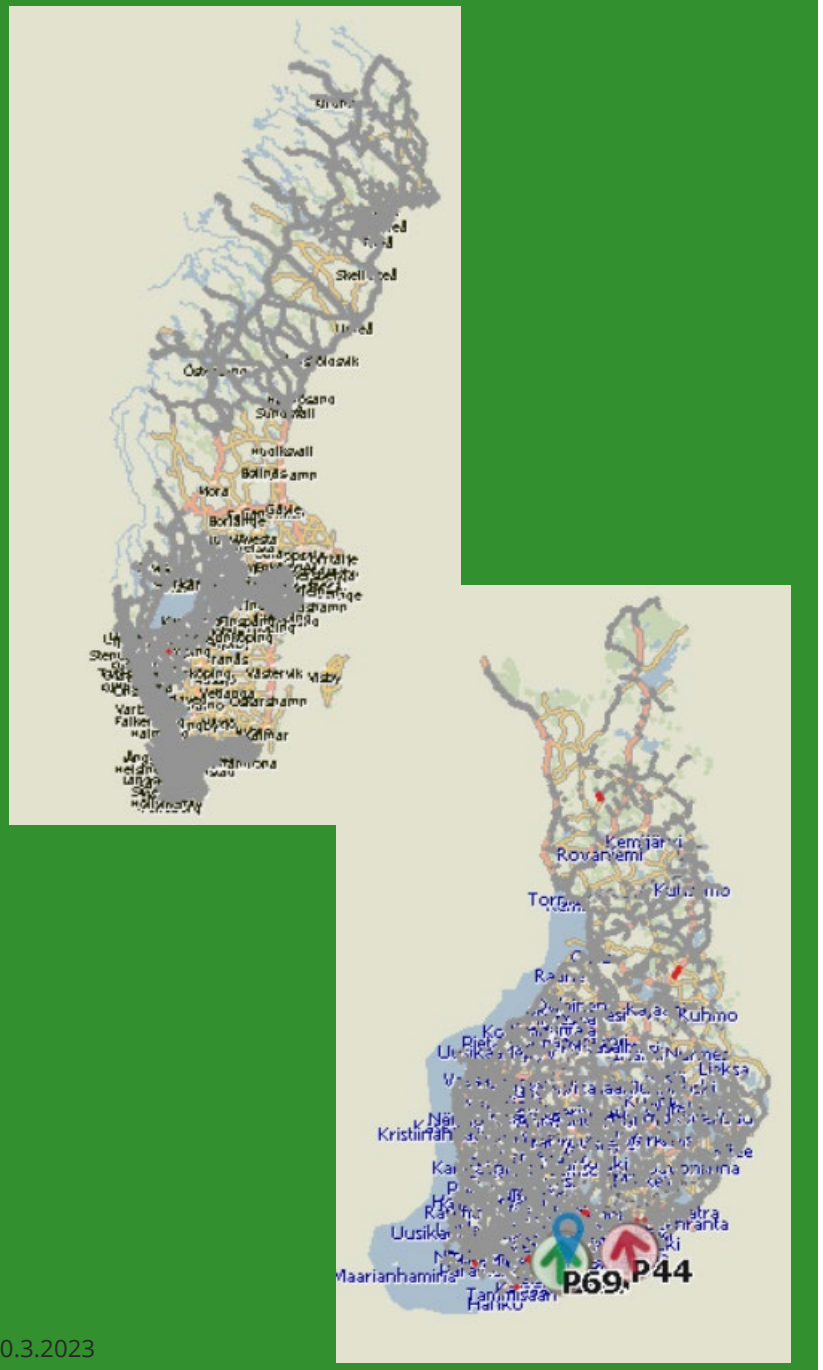


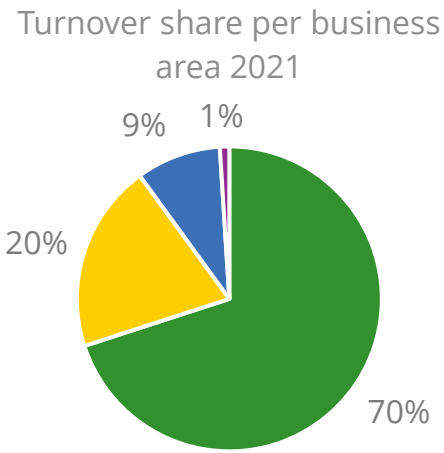
Significant projects 2022

- **Road area measurement – Sweden 45 000 km**
  - Pavement condition (rut, IRI, texture…)
  - Images (still- & 360-pictures)
  - Colored point cloud
- **Road surface measurement – Finland 43 000 km**
- **GPR – pavement thickness measurements in Finland - 4000 km + samples**
- **Road furniture inventories**
- **Cities**
  - Helsinki, Joensuu…
- **Finavia (airports)**

DESTIA NOW PART OF THE COLAS GROUP

- **French stock exchange listed company, Bouygues S.A largest owner.**
- **One of the worlds largest corporation within construction and maintenance of infrastructure.**
- **2021 turnover 13,2 B Euro, roughly half from international activities**
- **57 000 employees in about 50 countries in 5 continents**

- **Colas turnover per buiness area 2021**
  - Road construction and –maintenance (70 %)
  - Building material (20 %)
  - Rail construction (9 %)
  - Other (1 %)



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3 ”MPD heat maps”

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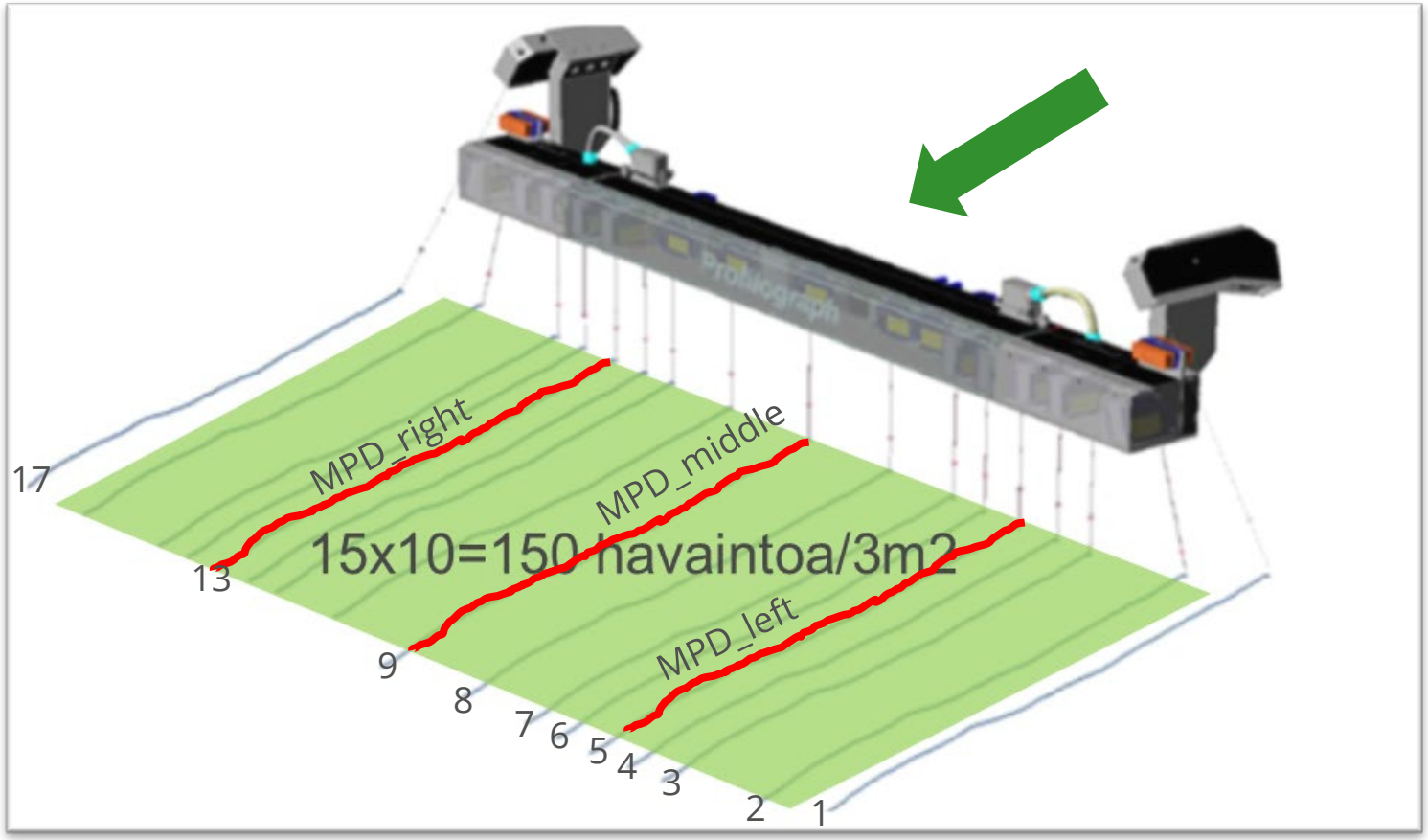
MPD (Mean profile depth)

- Measurement and calculation of MPD defined in ISO standard
- Measured usually from three lines (left and right wheel paths and middle of the lane)
- Results with 1 m, 20 m etc. intervals
- Producing information on surface macrotexture properties



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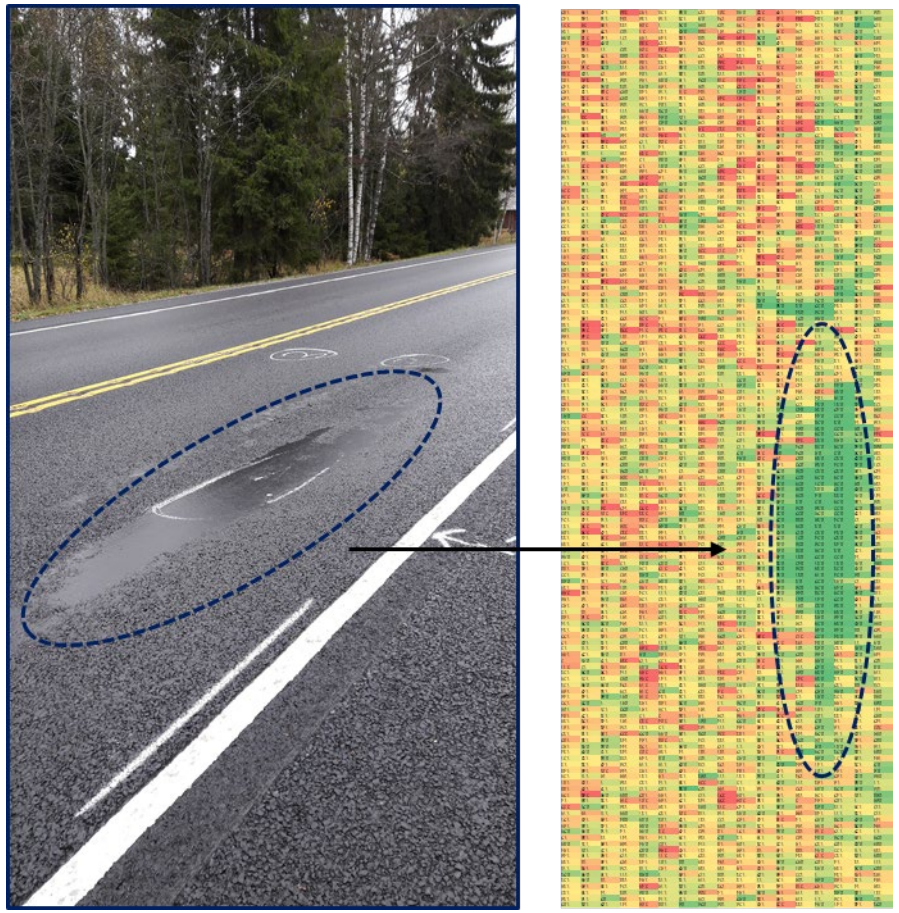
How about producing texture information from all 17 lasers and with 10 cm intervals?

- Destia started to explore mm scale data from each point laser around year 2016
- It was found out, how to extract data and calculate texture parameters such as ”MPD”
- First experiments from new pavements in co-operation with Finnish Trafikledsverket
- Promising results, good correlation with visual observations (segregation, bleeding etc.)



- ➢ Large amounts of data
- ➢ How to extract information easily?
- ➢ What kind of color scales to use?

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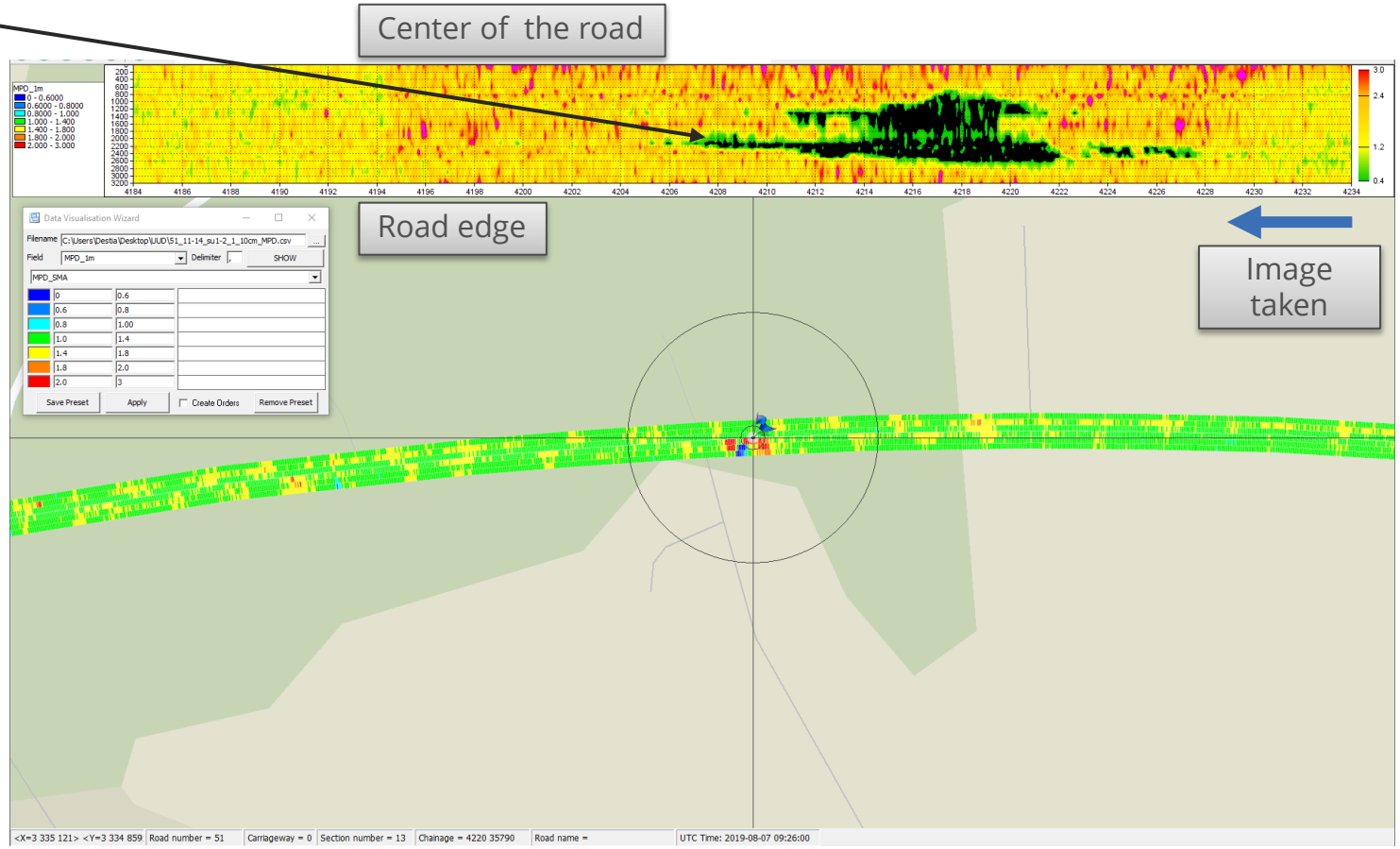
Visualizion of ”MPD” data with maps

Example of segregation and texture data: low values with blue/black & high values with red



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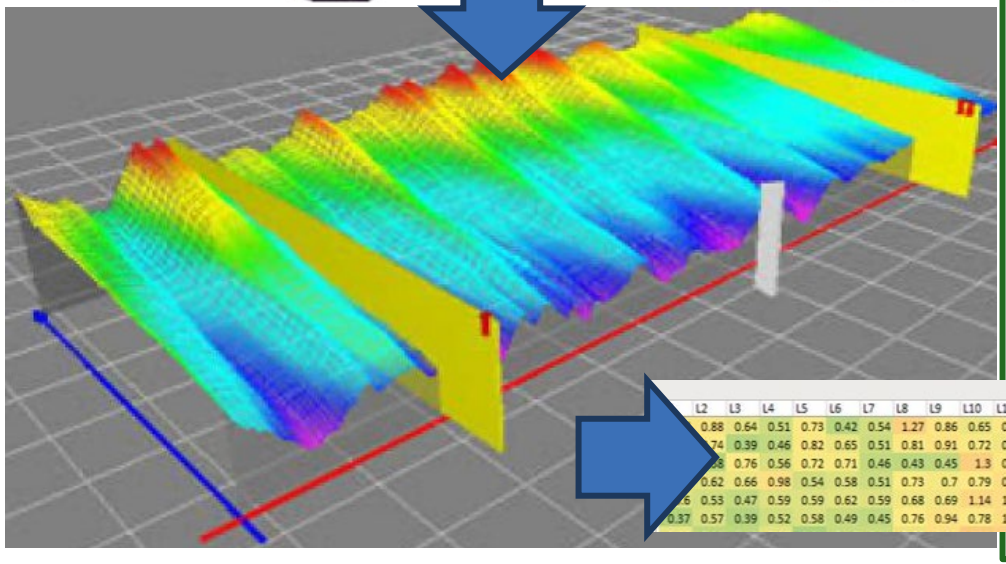
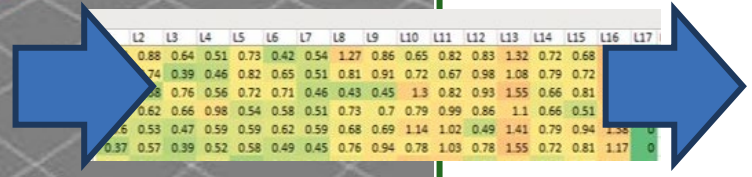
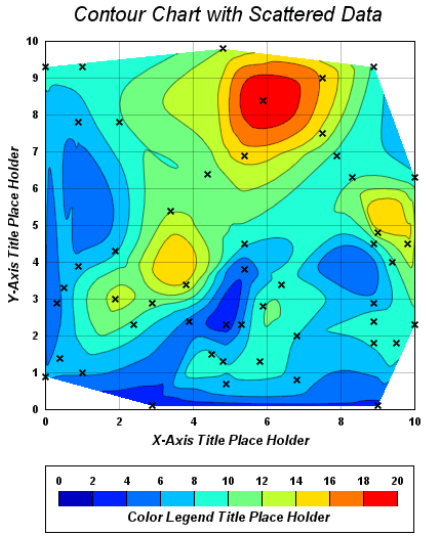
We are using a component called ChartDirector to create the MPD contours.
The laser data points are uniformly spaced 10cm in longitudinal direction
and in transverse direction the position is based on LaserPosition of the beam used.

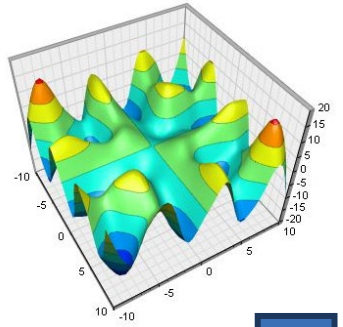


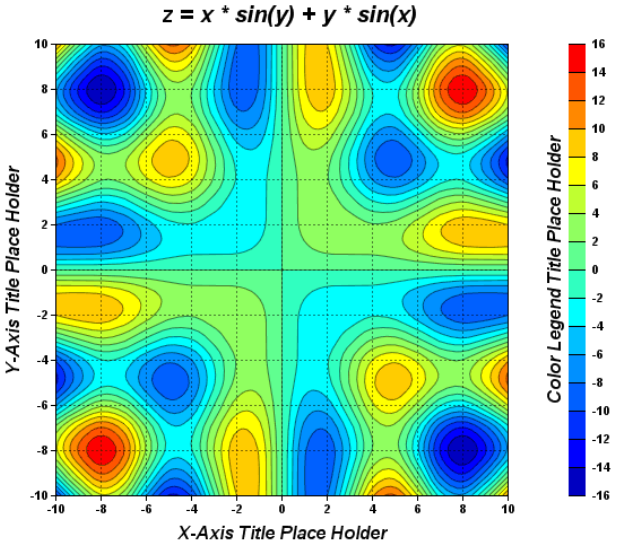


ChartDirector component: Contour Charts / Heat Maps



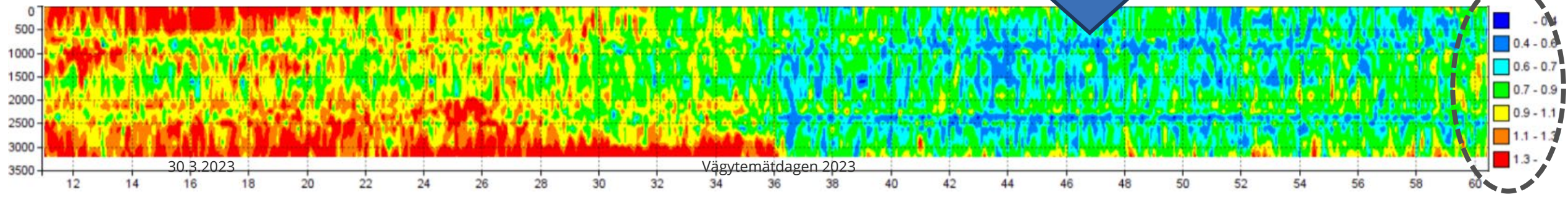
- This contour chart uses scattered data points (instead of gridded data points).
- The "X" symbol in this chart is added by a scatter layer, so you can see the positions of the data points.
- Note the smooth contours, even in regions where the data points are sparse. This shows the usefulness of ChartDirector's spline surface fitting method.



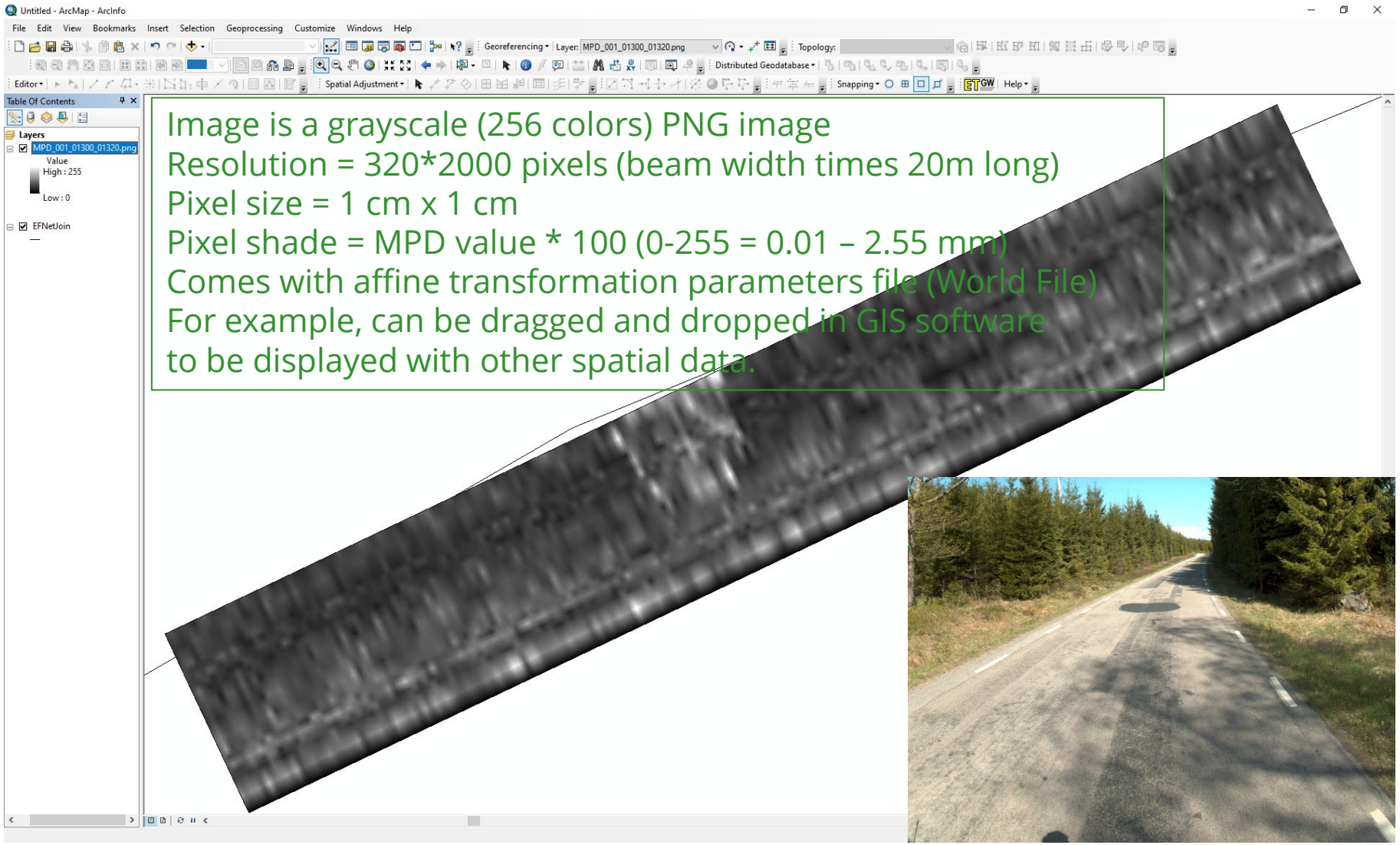


- In a contour chart, the input data are the values of some points on the xy plane. ChartDirector uses advanced surface fitting techniques to compute the surface, and visualizes the results as colors and contours on the xy plane.
- Note the detail, smooth and fully anti-aliased contours in this chart. ChartDirector supports spline surface fitting. This produces smooth contours, even if the input contains only a few data points.

Typical relative laser positions (mm) "0, 298.7, 301.5, 110, 130, 120, 110, 230, 300, 300, 2[illegible] 110, 120, 130, 110, 301.5, 298.7"



Gray scale maps instead of colored maps -> easier to change color scale



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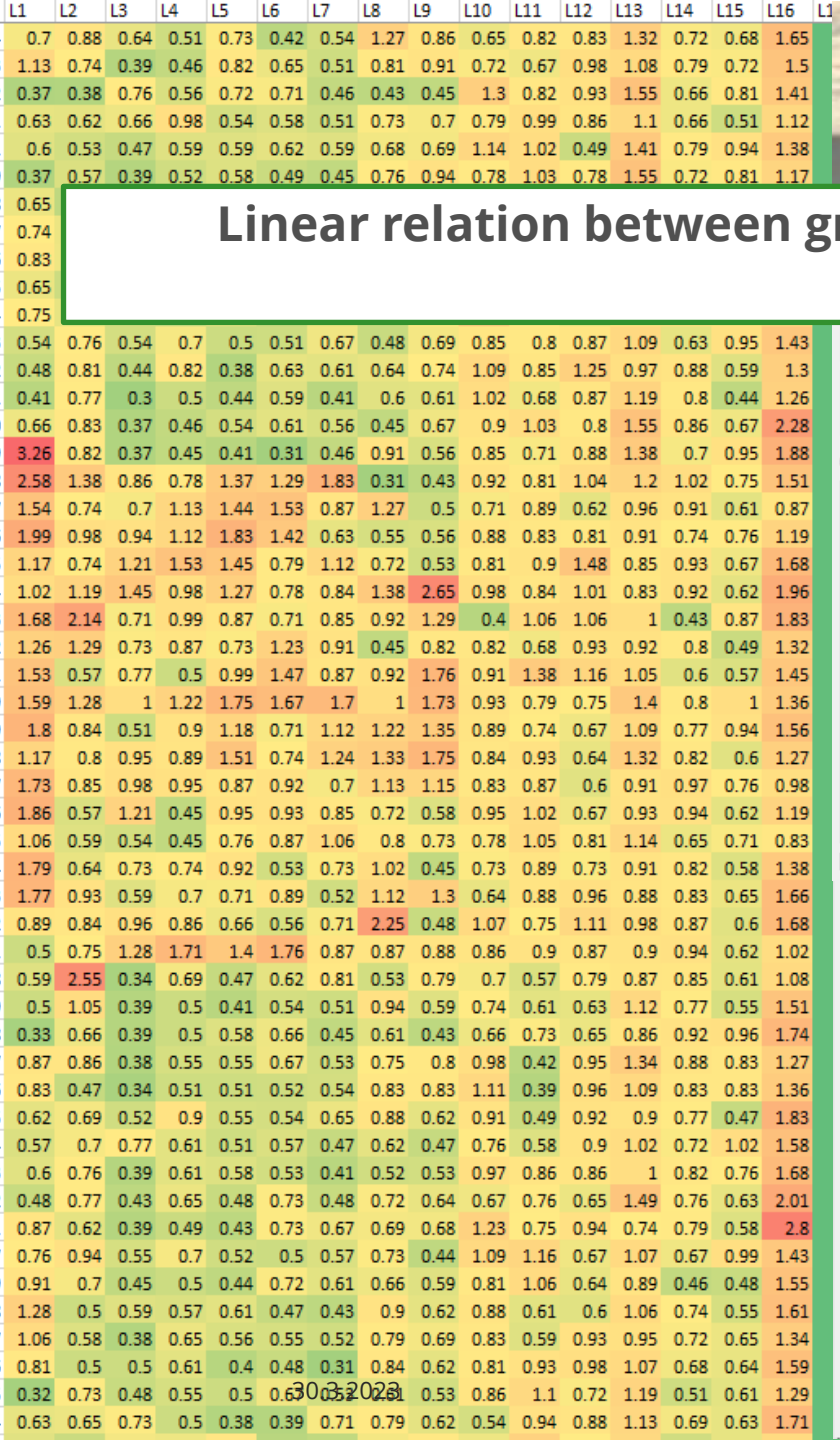
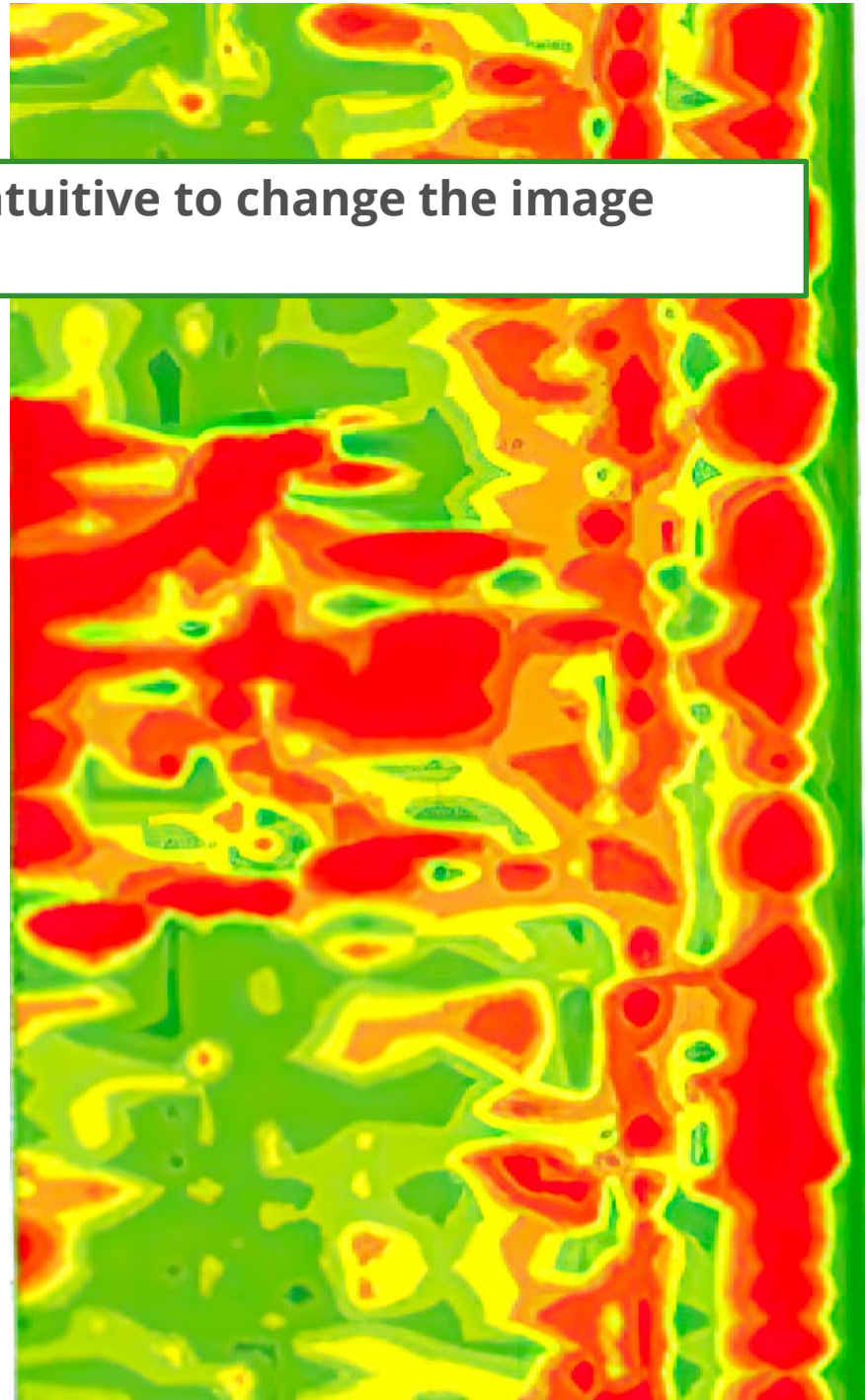
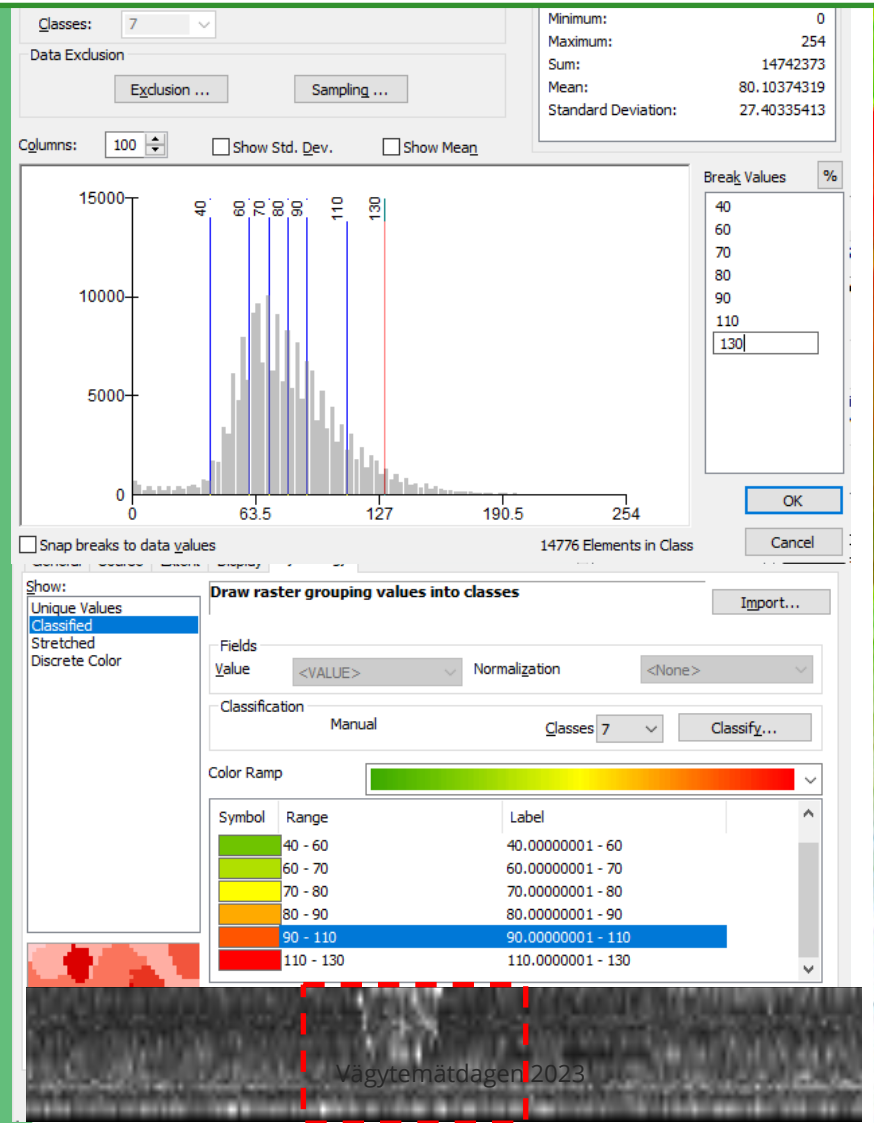
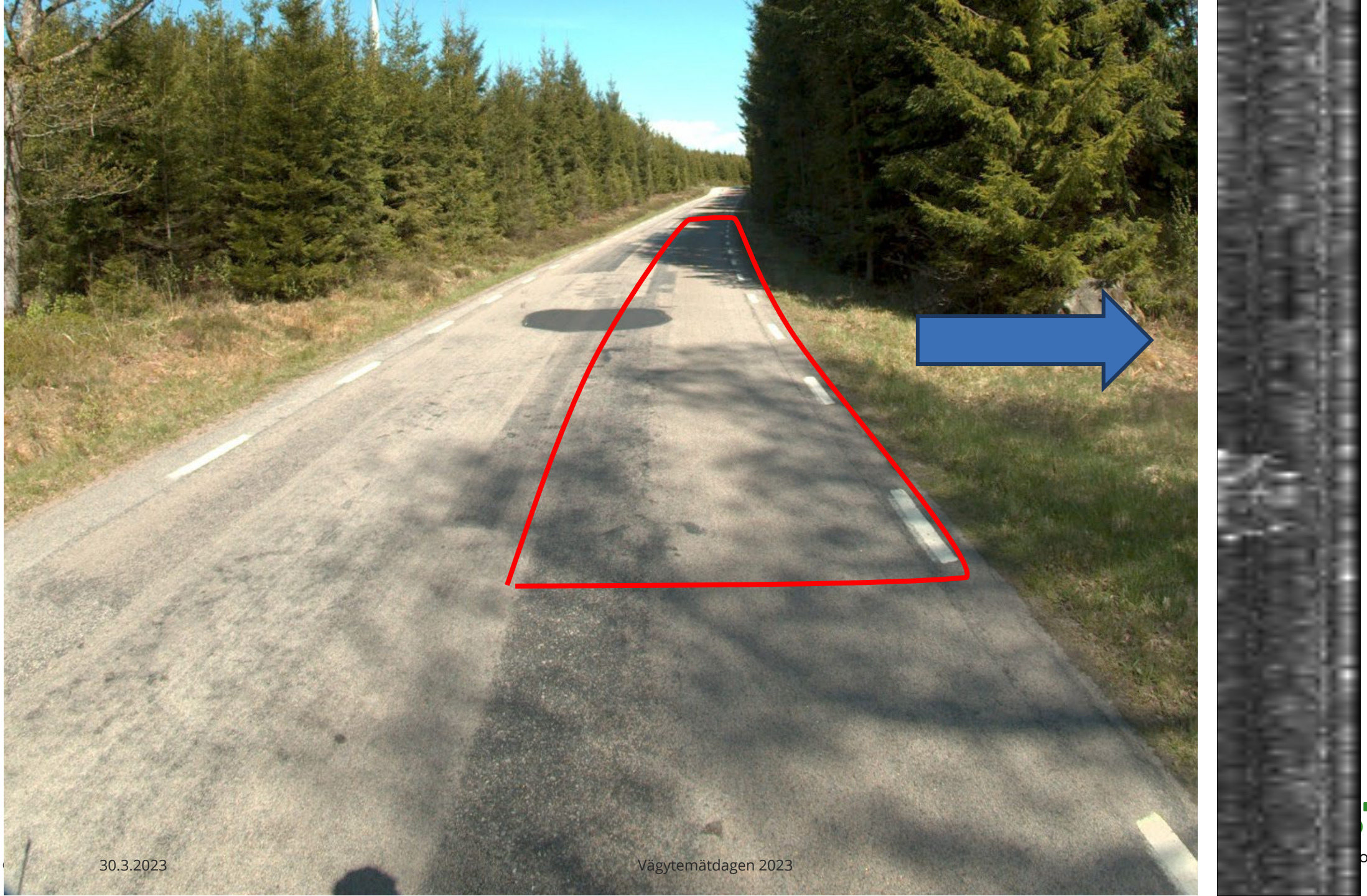
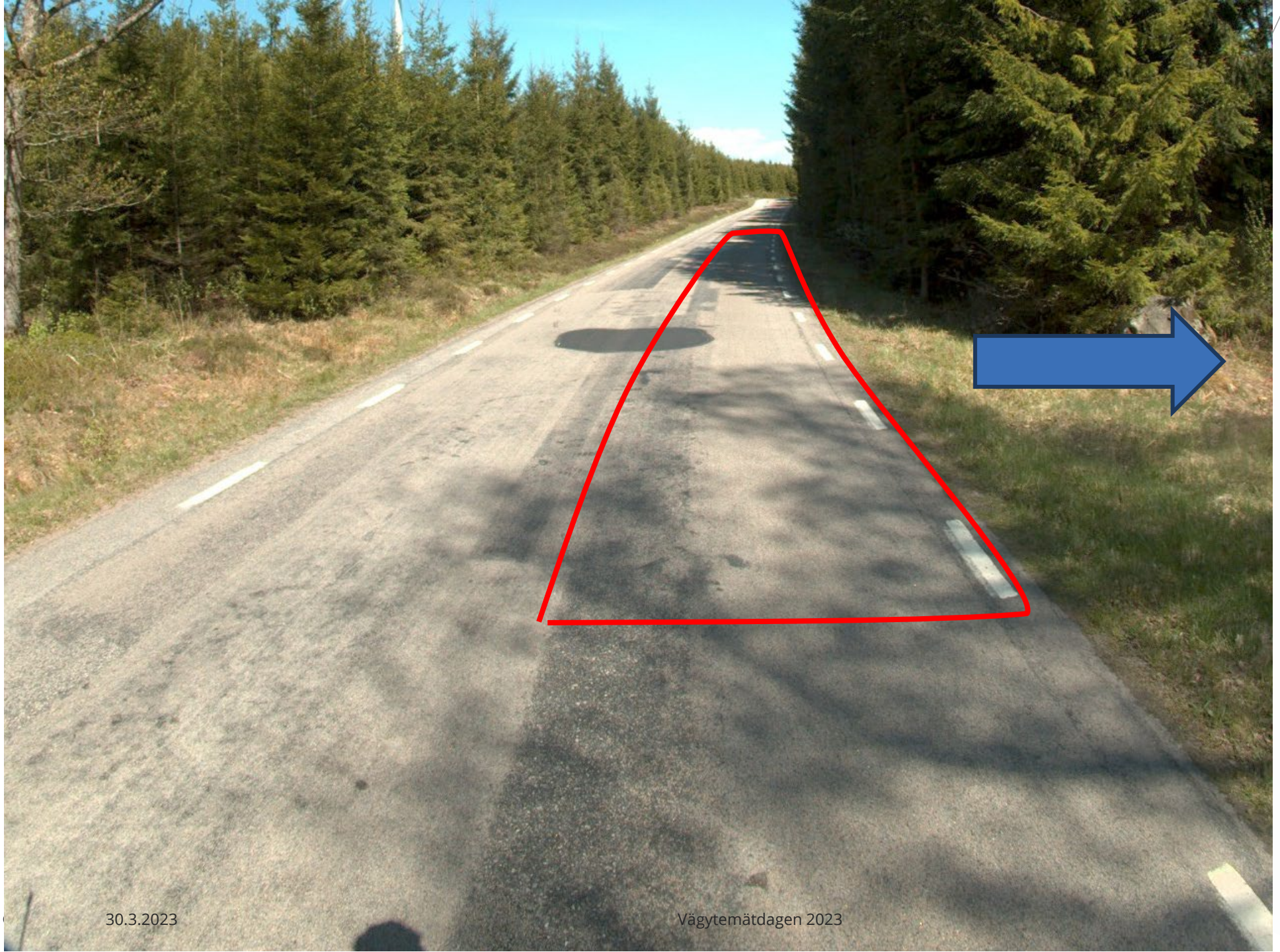
Linear relation between grayscale colors and MPD makes it intuitive to change the image classification and palette.

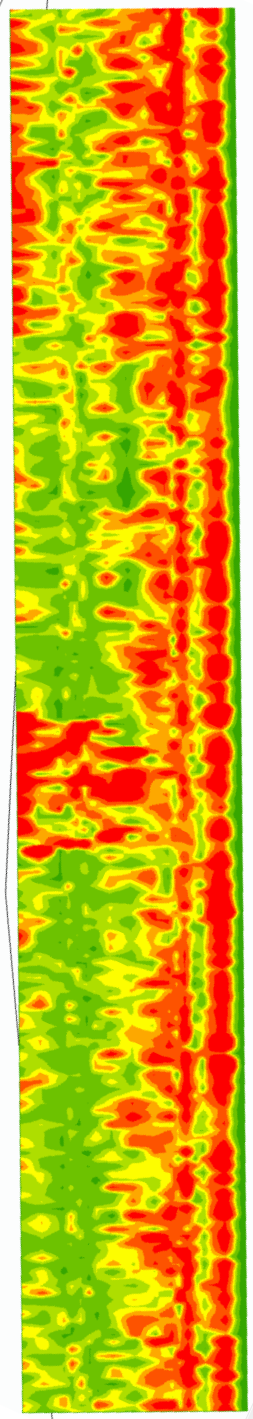


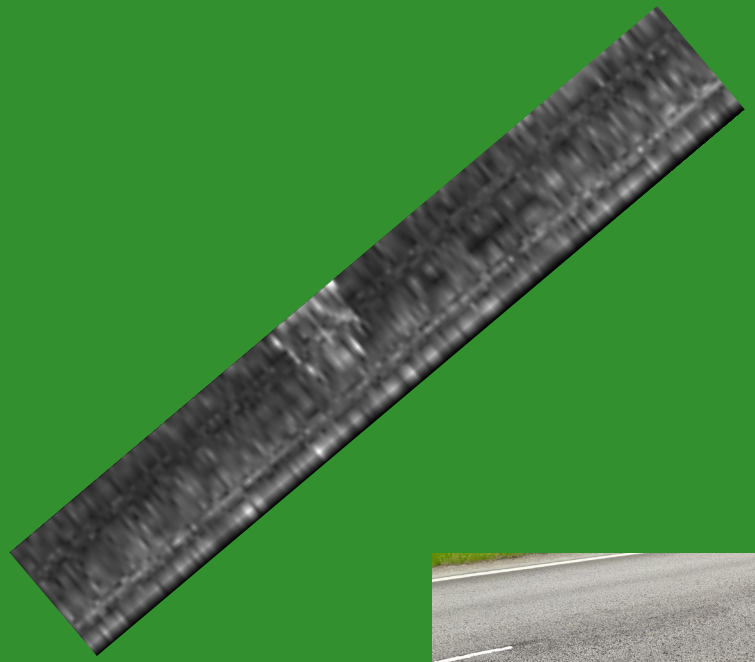


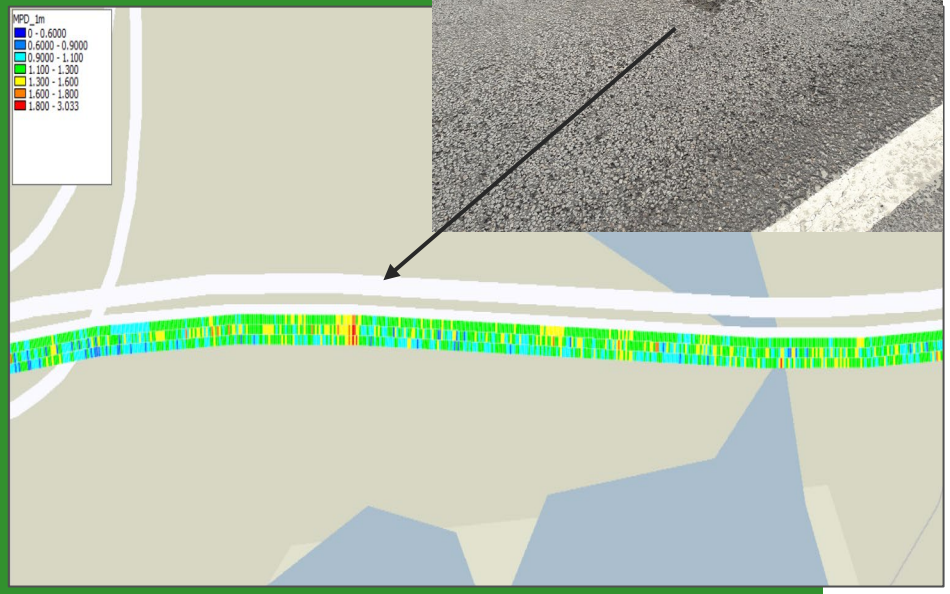












Summary & future steps

- Surface texture data can be extracted from 17 point lasers with 10 cm interval
- Visualization of data with help of gray scale, georeferenced, contour maps
- Coloring of “MPD heat maps” can be done easily on the project/object level
- Destia is able to produce surface texture maps from network level projects
- Potential applications of ”MPD” maps tested in Finland: quality control of new pavements, pavements under warranty, planning of actions…
- Hopefully more experiences from Sweden
- Exploring other ways of using texture data

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Thank you!

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