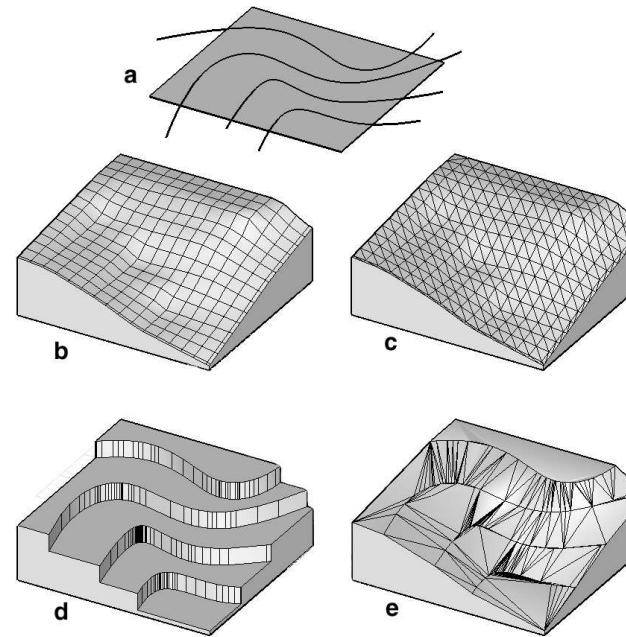


# Population and Housing Statistics – The use of 3D models

An explorative study



[https://docs.qgis.org/2.2/en/docs/training\\_manual/rasters/terrain\\_analysis.html](https://docs.qgis.org/2.2/en/docs/training_manual/rasters/terrain_analysis.html)

Day 1

SESSION 2: COOPERATION BETWEEN NMAs AND NSIs

Vilni Verner Holst Bloch (Statistics Norway)



# Why 3D?

- Local climate
- Steepness
- Exposition
- Pollution
- View
- Wind
- Sun hours
- Noise level
- Landscape type
- Access to coast line ...

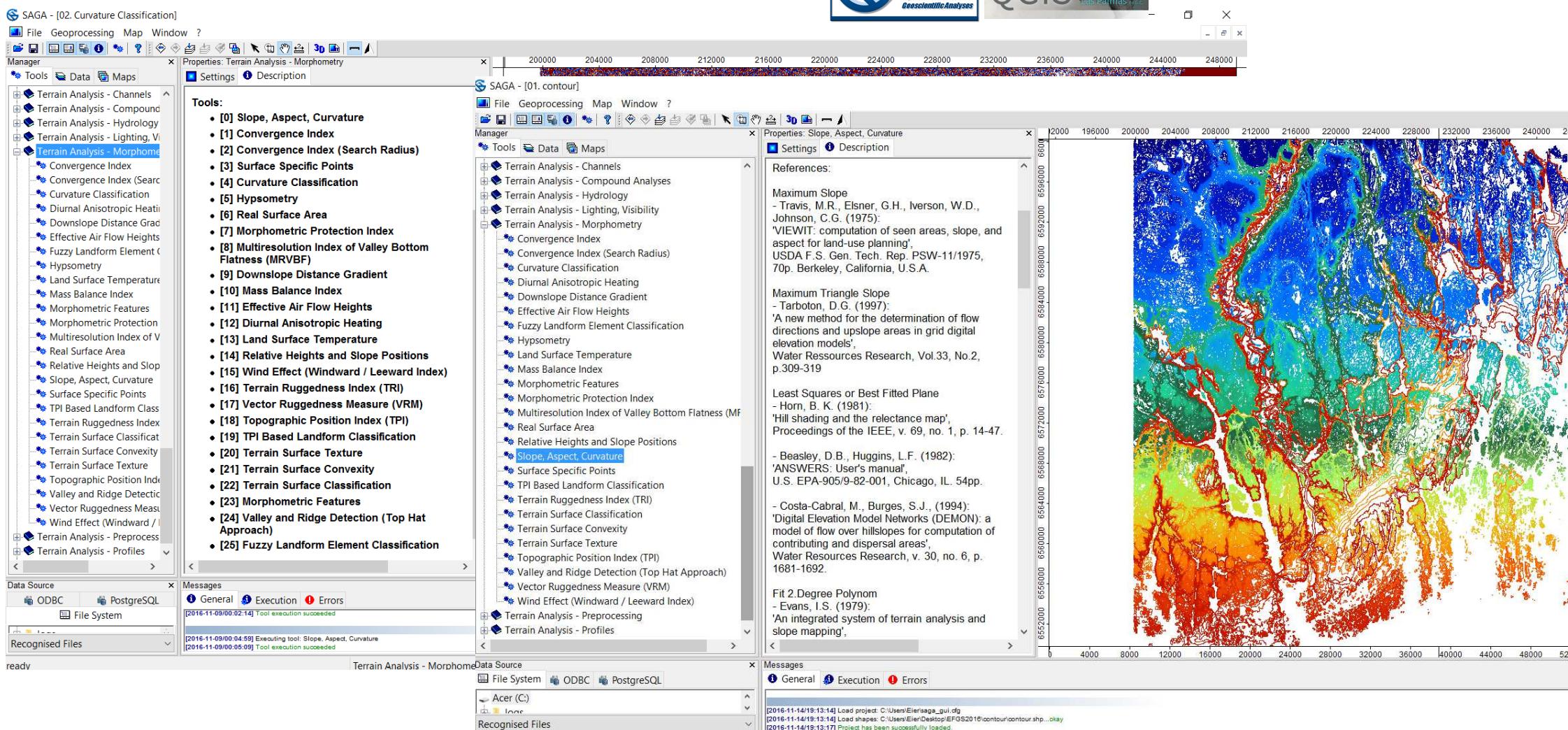


Pinterest. Photo by Anda Bereezky





# Tools – SAGA GIS / QGIS



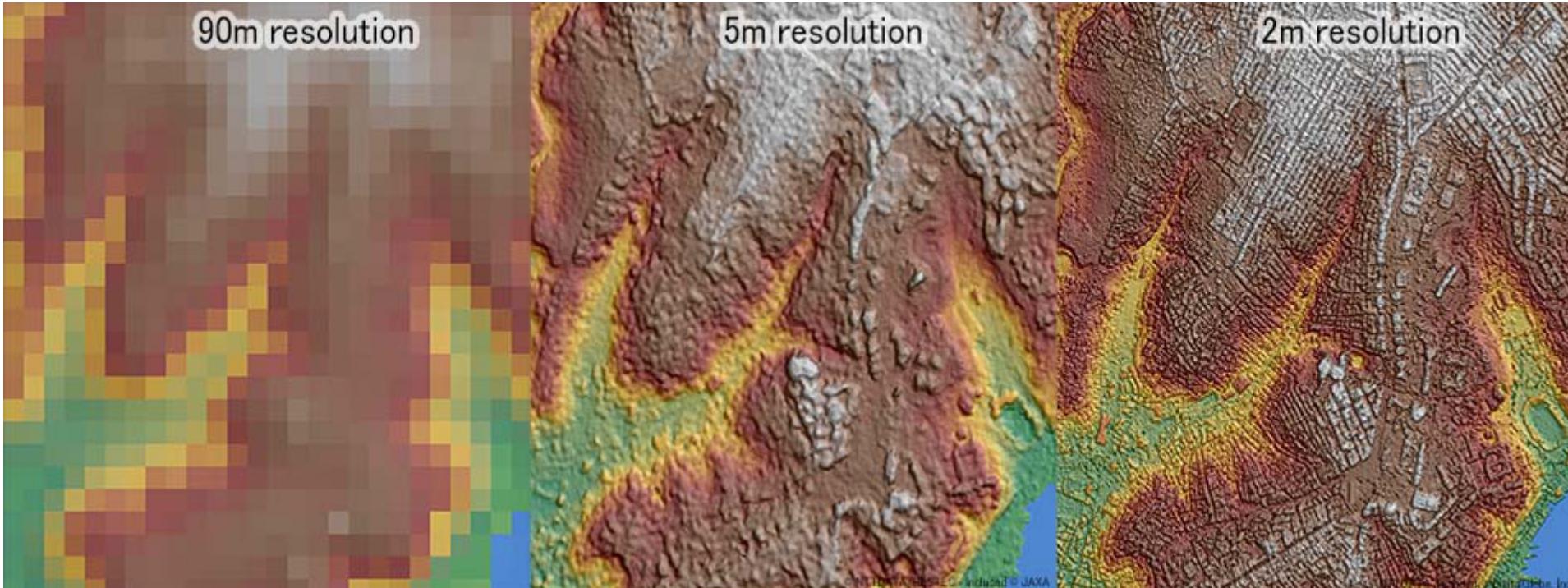
Documentation, references and functionality

# Study area

- DTM 50 - National
- DTM 10 - National
- DTM 01 - 2020



# Resolution

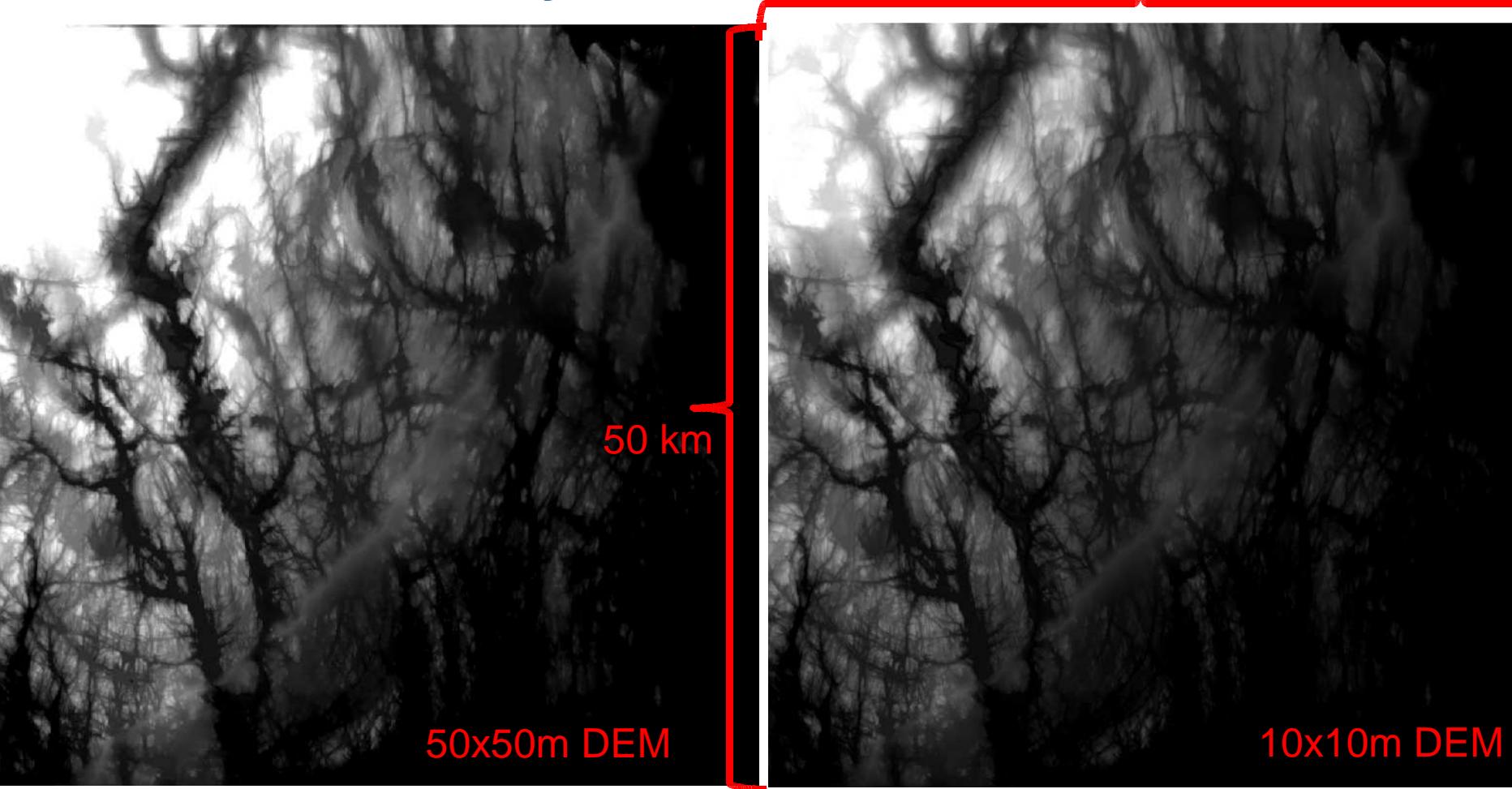


Copyright© 2016 NTT DATA CORPORATION and RESTEC.

<http://aw3d.jp/en/>

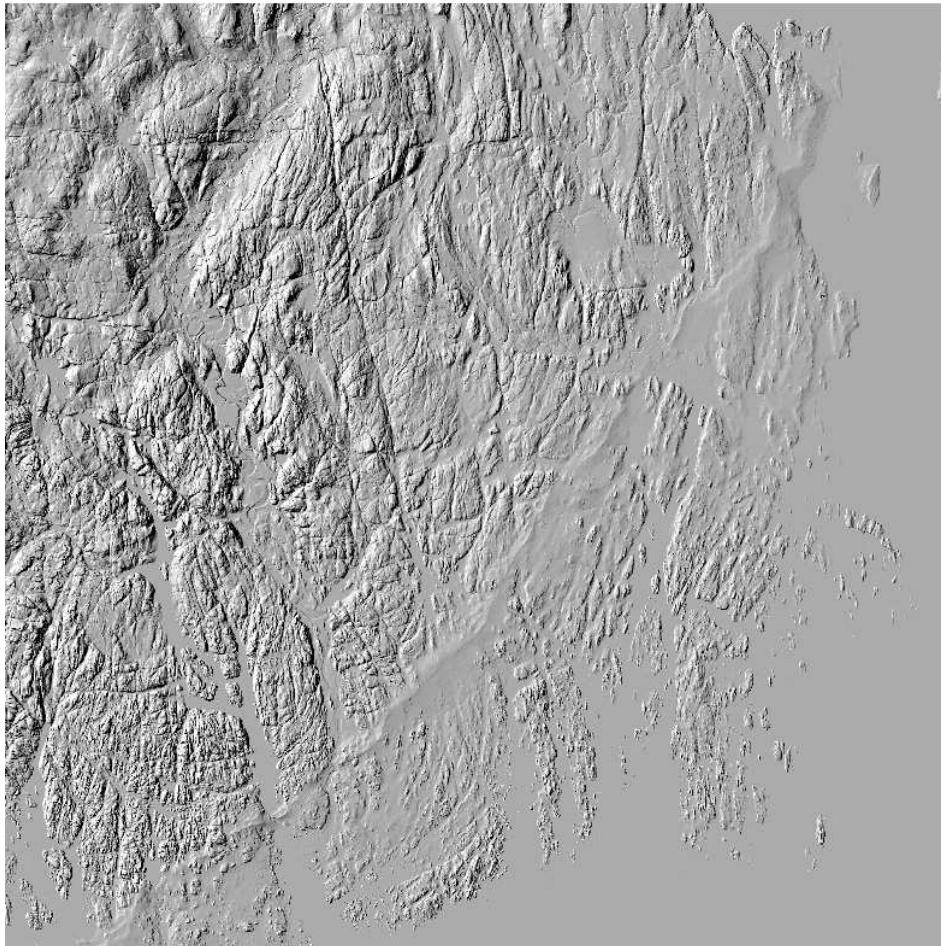
Different scales/resolution and different landscapes/topics

# Data – Study area





# 10x10m DEM Hillshade



Grid Name 6502\_4\_10m\_z33

Projected Coordinate System : UTMZone33

[+proj=tmerc

+a=6378137.000000 +b=6356752.314245  
+towgs84=0,0,0,0,0,0,0 +lat\_0=0 +lon\_0=15  
+k\_0=0.9996 +x\_0=500000  
+y\_0=0 +no\_defs]

West 199 800

East 250 200

West-East 50 400

South 6 549 800

North 6 600 200

South-North 50 400

Cell Size 10

Number of Columns 5 041

Number of Rows 5 041

Number of Cells 25 411 681

No Data Cells 0

Value Type 4 byte floating point number

Value Minimum -7.400 000 095 367 432

Value Maximum 620.599 975 585 937 5

Value Range 627.999 975 681 304 9

No Data Value -32767

Arithmetic Mean 90.668 164 027 111 97

Standard Deviation 117.329 752 502 554 37

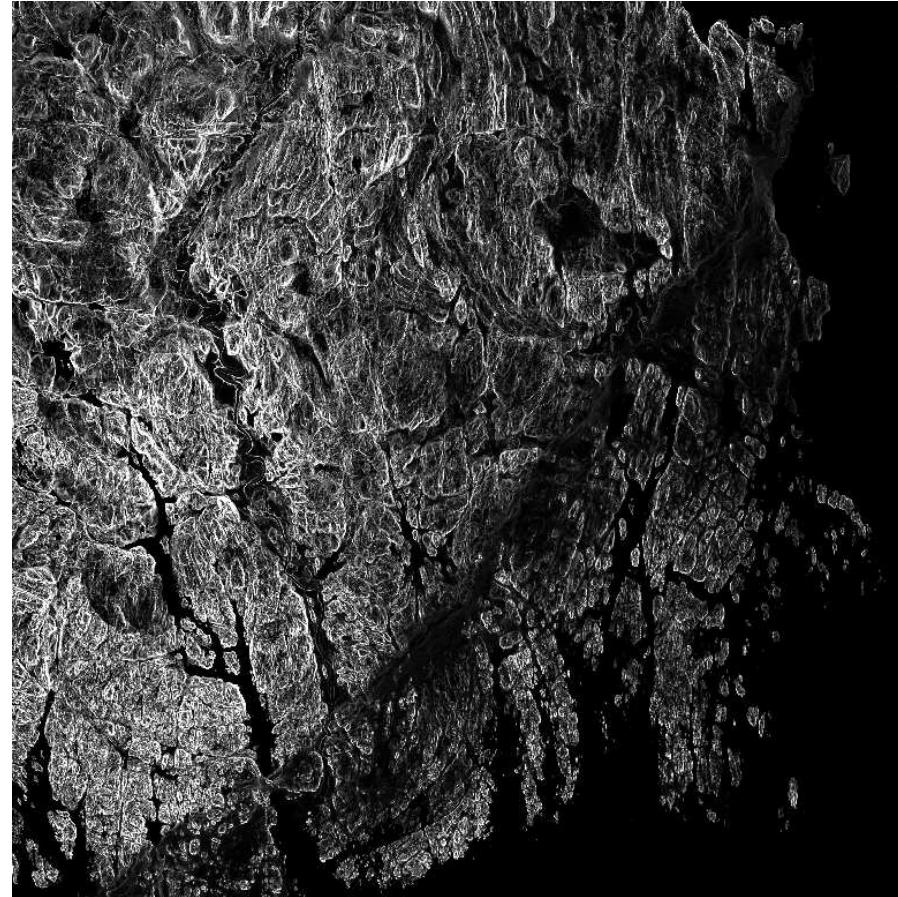
Memory Size 96.94 MB



# Relief

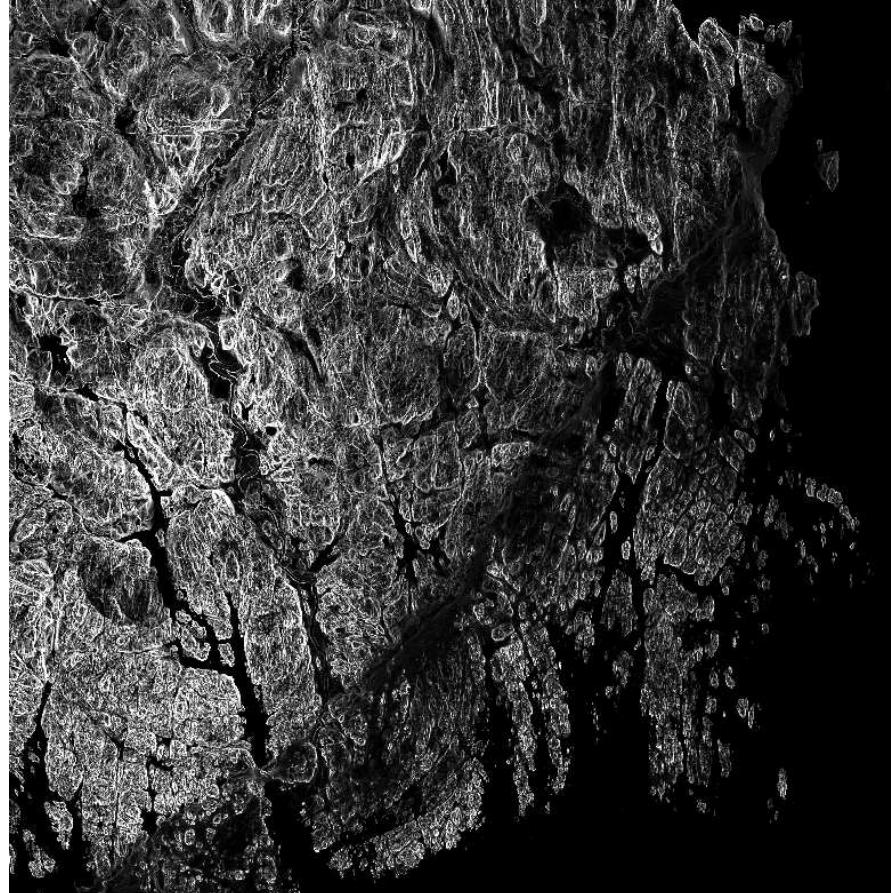


# Ruggedness

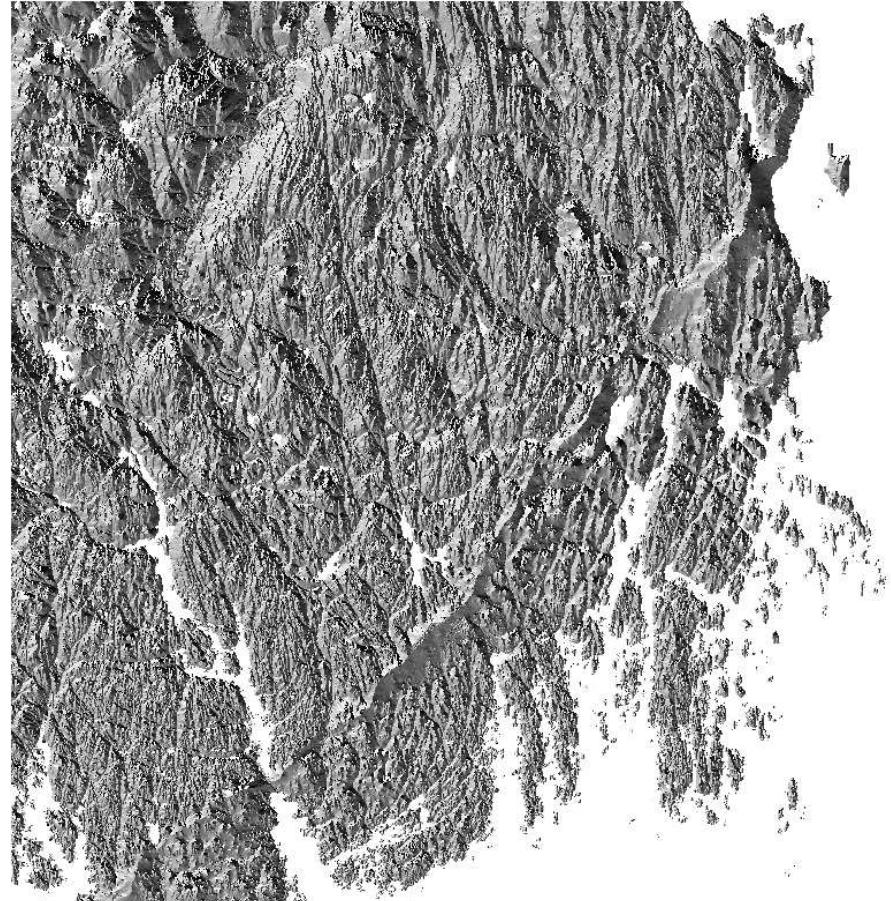




# Slope

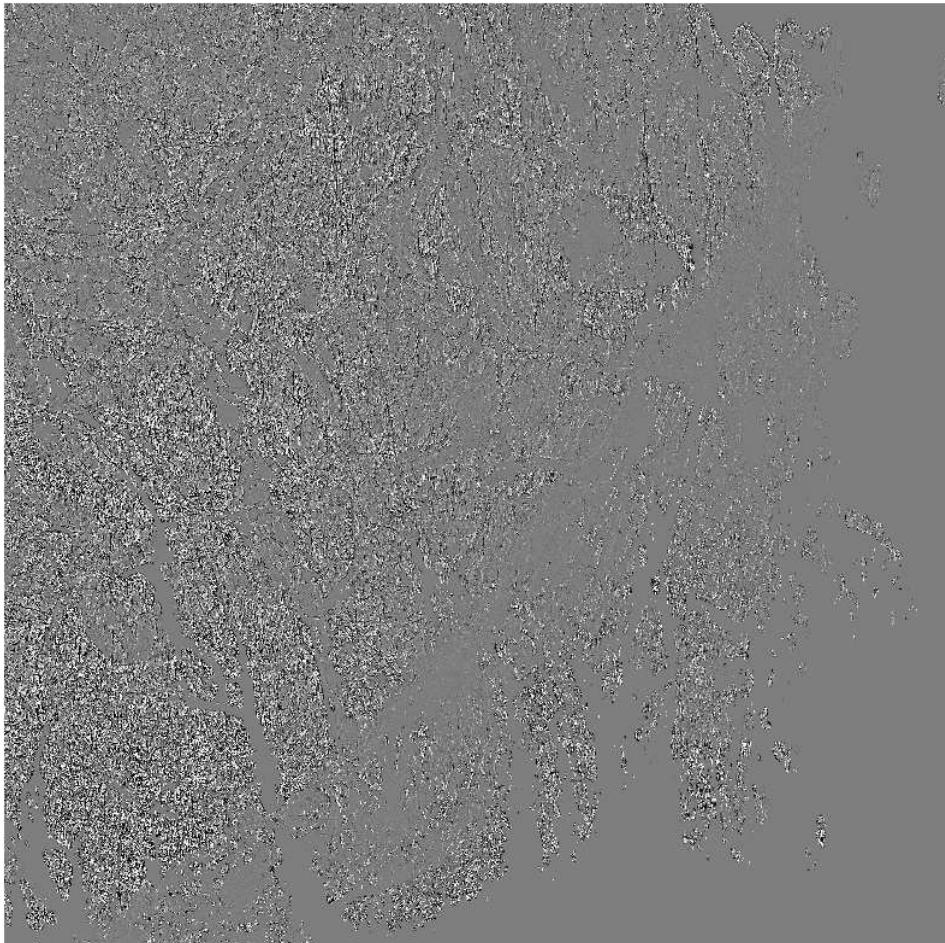


# Aspect





# Topographic Position Index



## Description

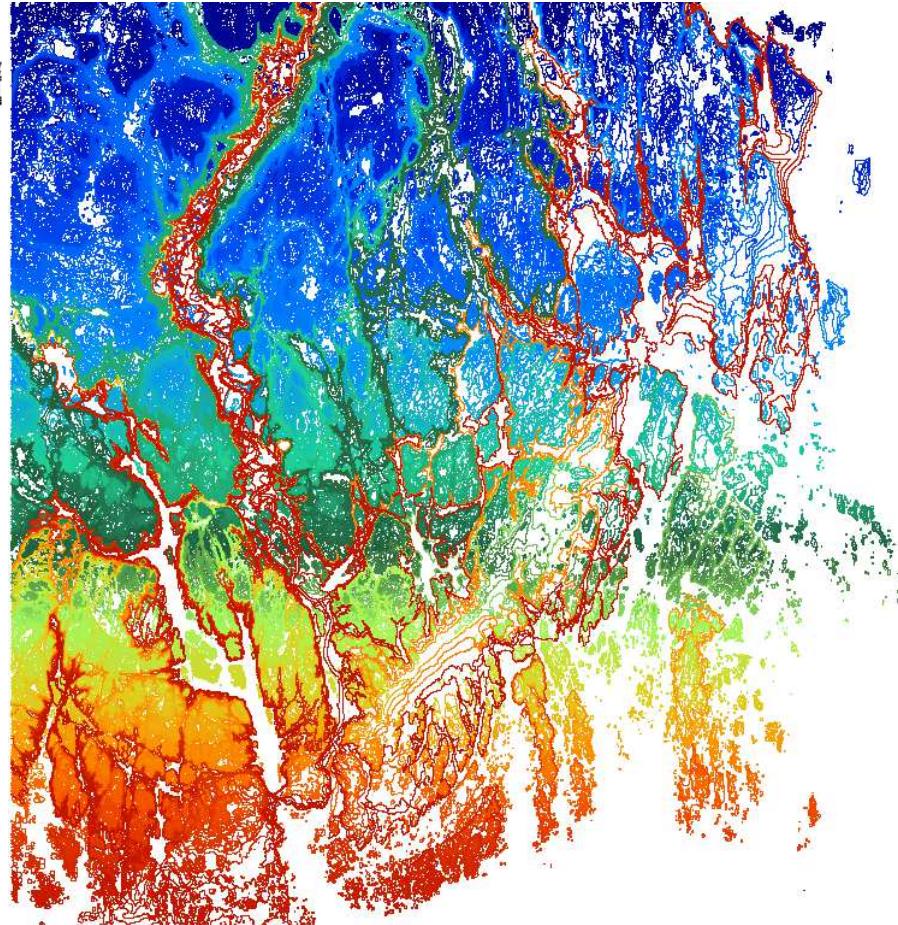
Topographic Position Index (TPI) calculation as proposed by Guisan et al. (1999). This is literally the same as the difference to the mean calculation (residual analysis) proposed by Wilson & Gallant (2000).

## References:

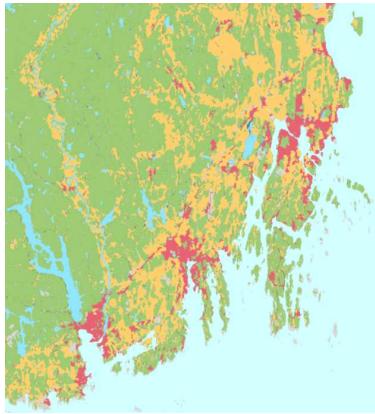
- Guisan, A., Weiss, S.B., Weiss, A.D. (1999): GLM versus CCA spatial modeling of plant species distribution. *Plant Ecology* 143: 107-122.
- Weiss, A.D. (2000): Topographic Position and Landforms Analysis. poster.
- Wilson, J.P. & Gallant, J.C. (2000): Terrain Analysis - Principles and Applications.



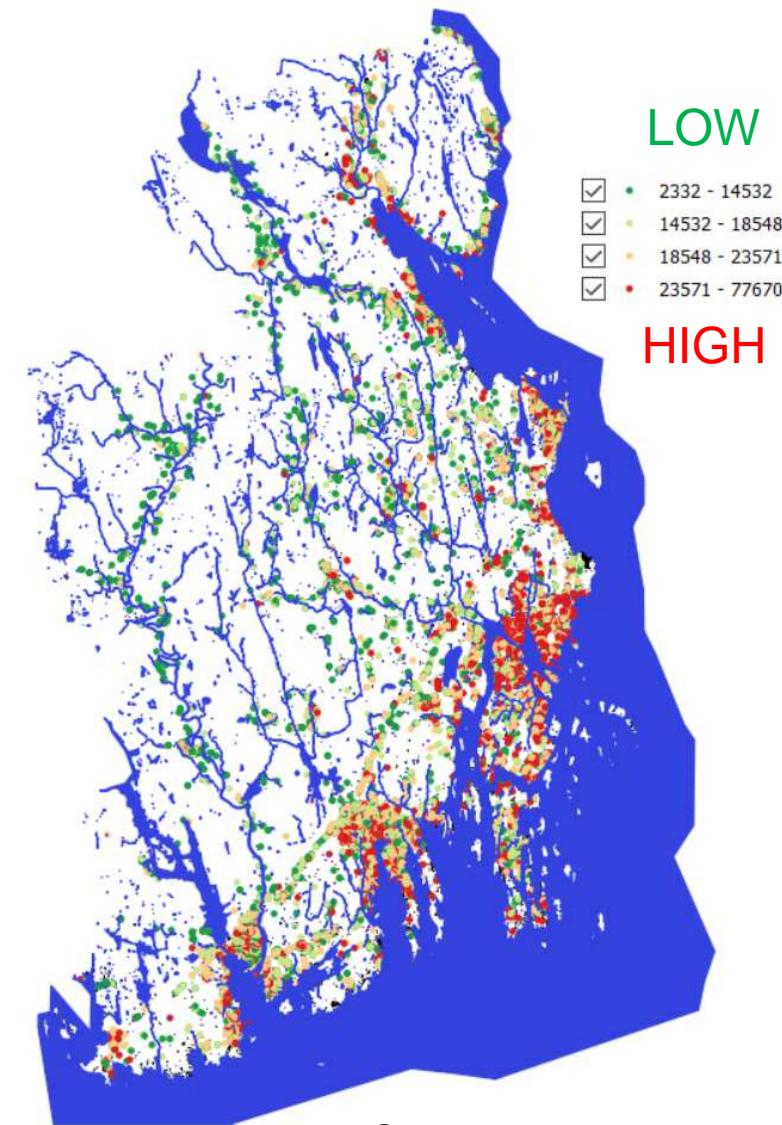
# Contour



# Dwelling prices



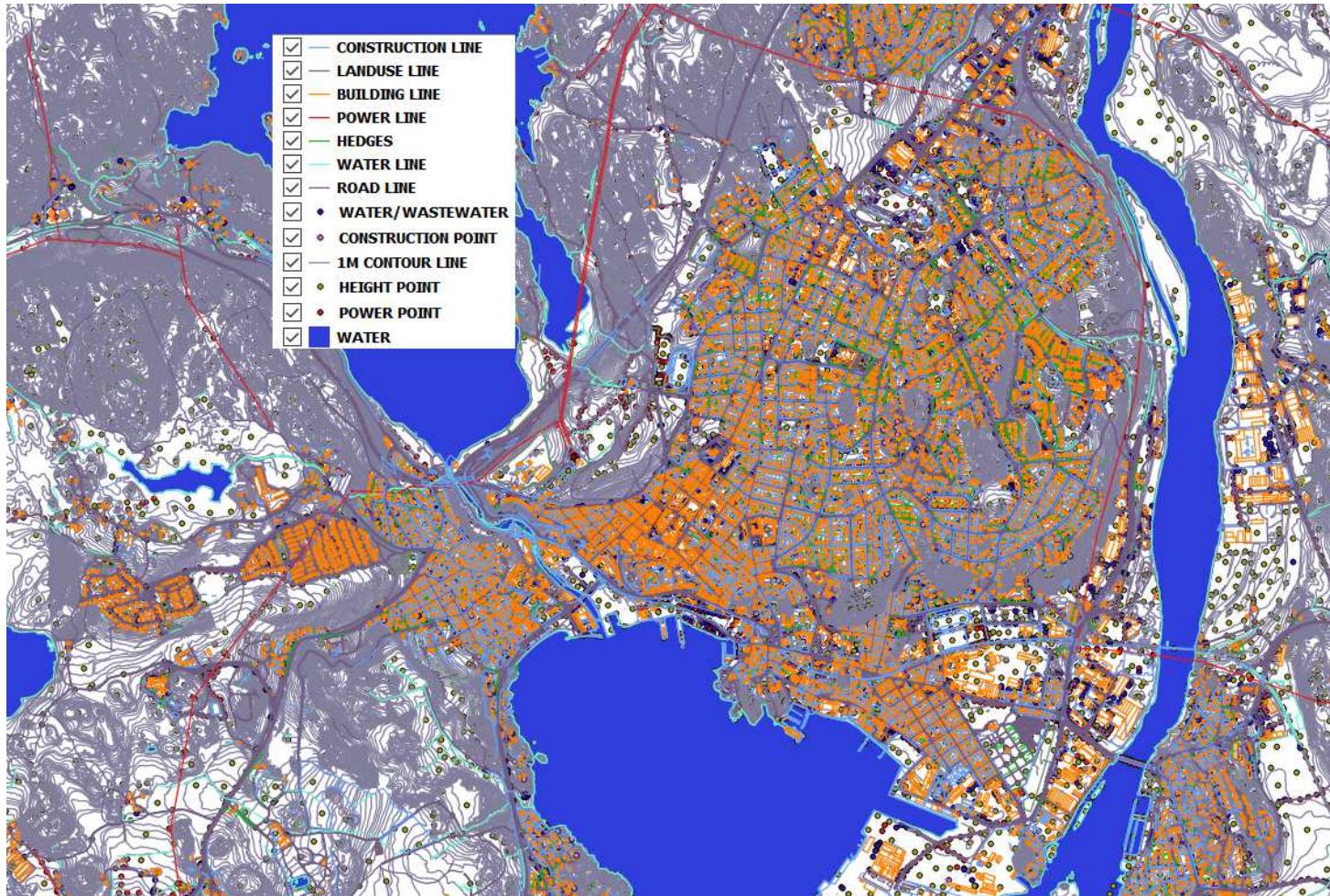
Access to coastline



Central areas

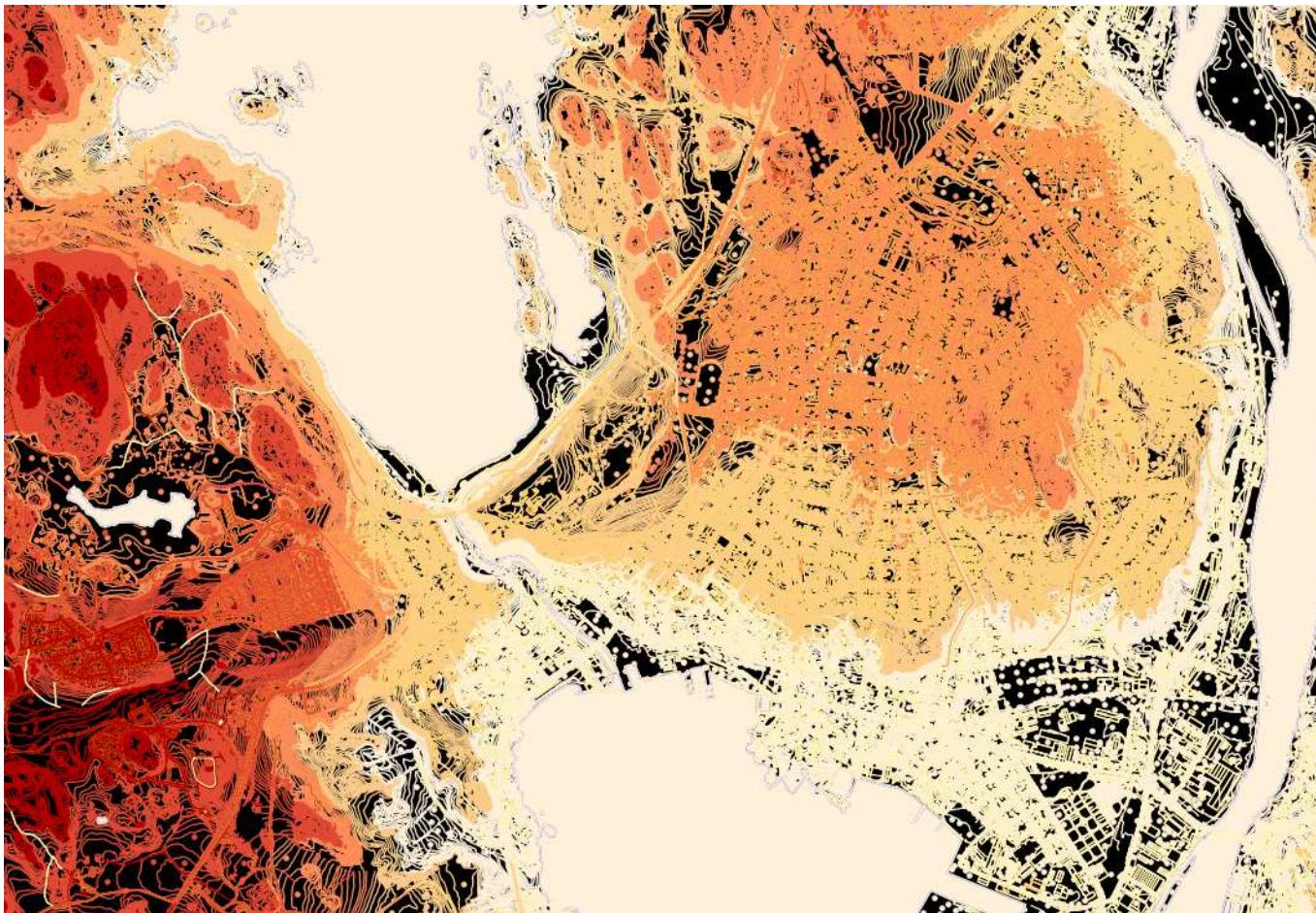


# Vector data 1:1 000 with Z values



Larvik, Vestfold County

# Visualisation of «ground truth»



Larvik, Vestfold County

Black areas are where Lidar comes in within 2020

# Summing up 3D

- Need sub 10 m DEM for local issues
- Plenty of functional analysis in FOSS GIS
- A lot of data shuffling  
(projections, formats, statistical units)
- Most analysis are fast – some are really sloooow
- Need for common framework  
(local to global – DGGS OGC perhaps)
- Programming producton line and implement parts in  
statistical tools (i.e. number of sun hours)

# Thank you for your attention



## Questions ?