Using High Resolution Databases for Road Stretch Forecasting

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Road Stretch Forecasting



370 Road stations

153 Routes

22840 Parts with 500 m or less between points



Road Stretch Forecasting



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22840 Parts with 500 m or less between

Atmospheric model With 5 km resolution

Road Stretch forecasting Large scale and local features

Atmospheric state provided by the Numerical Weather Prediction Model

- Cloud Cover
- Radiation
- Vertical structure of wind, temperature and humidity
- Average grid point temperature

NWP Models provide information for a fixed grid

- Site specific model
 - Shadows
 - Sky view
 - Local observations
 - Local cold air pooling
 - 'Random' distributed points
 - Local wind conditions
 - Local near surface temperature
 - Local terrain features
 - Height
 - Vegetation type and height
 - Buildings
 - Terrain type
 - Traffic

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- Road characteristics
 - Material
 - Road type (bridge, elevated road etc.)





OBTAINING LOCAL INFORMATION THE DANISH HEIGHT MODEL

Horizontal Resolution: 1.6 x 1.6 meter Vertical accuracy: 3 cm Coverage: Denmark Laser scanning from airplane

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- Deduced parameters
- Height
- Shadows
- Sky view
- Terrain type
 - Valley
 - Dimensions
 - Orientation
 - Slope
 - Hill top

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An alternative approach (fish eye)





OBTAINING LOCAL INFORMATION



Application of the Danish Height Model at a single site

Øster Voldgade (station number 1543)

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Different methods to obtain shadow and skyview angle

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Different methods to obtain shadow and skyview angle



ANGLE

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Road station 1543

Different methods to obtain shadow and skyview angle - Transparency properties



Road station 6009

ANGLE

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Other Databases

- Application of the High Resolution Databases:
- Kort & MatrikelStyrelsen (KMS) 10x10 meter resolution database of terrain coverage such as building, water objects, forrest, individual trees, road and many other types.
- Global Self-consistent Hierarchical High-resolution Shorelines (GSHHS) database (evaluate distance and direction to seashore – transport of cool/warm, most/dry air);
- COoRdinate INformation on the Environment (CORINE) database on detailed land cover and use characteristics (classify road stations/ stretches and their surroundings at local and remote scales – clarification on shadowing effects, sky view factor).
- DRD database on driving lanes characteristics (albedo, density, heat conductivity, heat capacity – direct input into RCModel).



Summery

- High resolution databases can provide physiographic data for road stretch forecasting
- Apart from terrain elevation and slope also shadowing and sky view effects can be deduced
- This approach can eliminate manual measurements

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