Das Lebensministerium

UFIPOLNET

Street detailed calculation of the air quality in Saxony

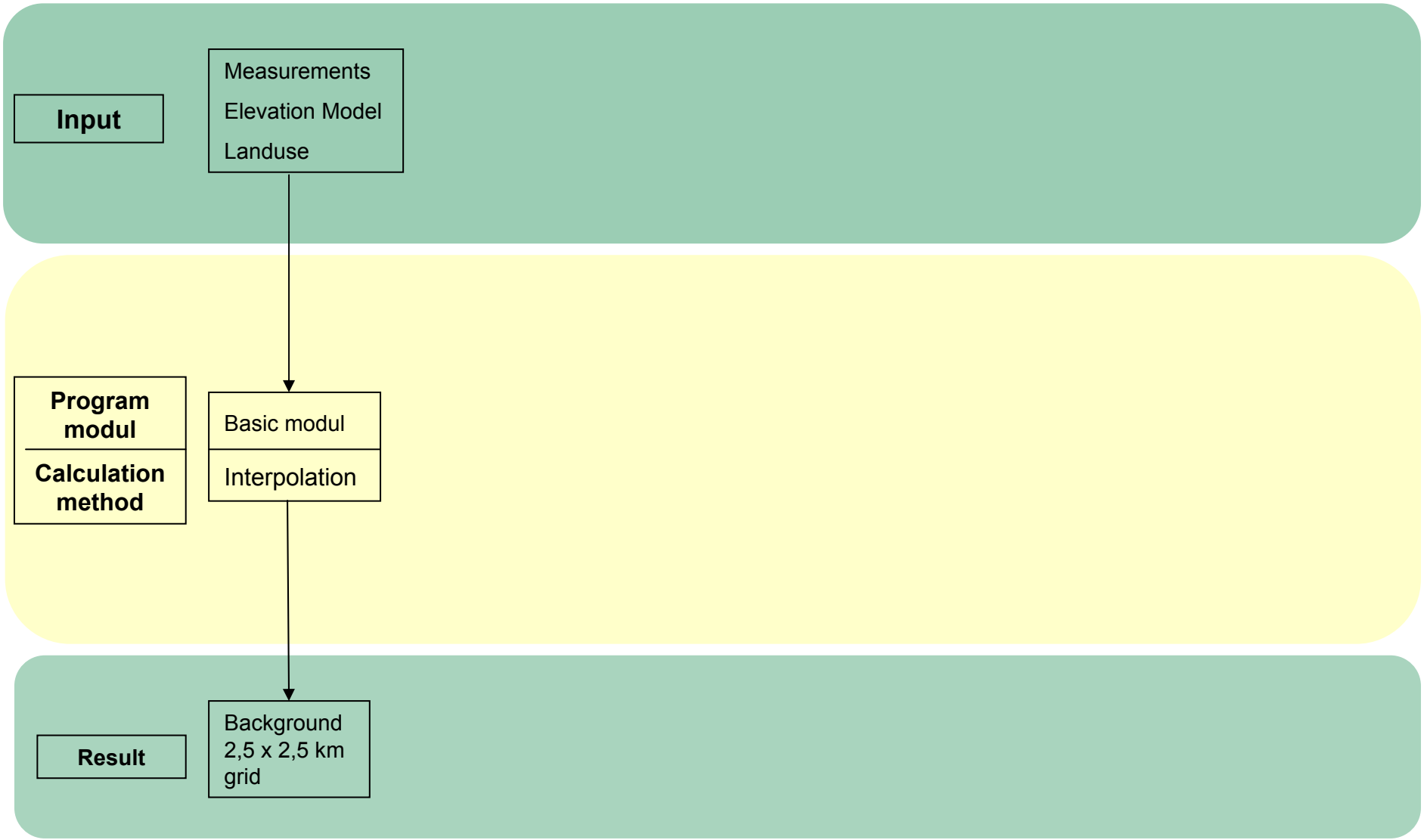
Freistaat Sachsen

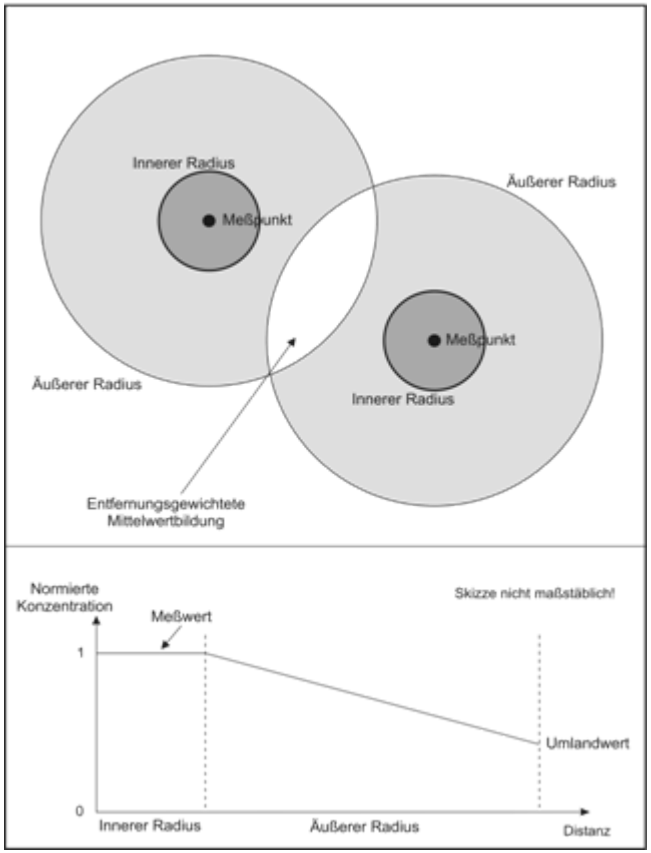
Landesamt für Umwelt und Geologie

Introduction: The requirement of a street detailed calculation of the air quality

- The council directive 1996/62/EG, which is effective in Germany since 2002, requires air quality regulations if the limit values are exceeded.
- In Saxony the limit values for PM_{10} and partially NO_2 were exceeded in the cities of Leipzig, Dresden, Chemnitz, Görlitz and Plauen.
- Traffic is a main emitter of those substances.
- The is a large variability of air pollution within the urban area. The main factors are traffic density, frontage development and the distribution of other emitters.
- The two major purposes of street detailed calculations are:
  1. Calculation of the present air quality within the urban area to determine limit violations for areas where no measurements are taken.
  2. Evaluation of the success of air quality regulations through calculations of case scenarios.

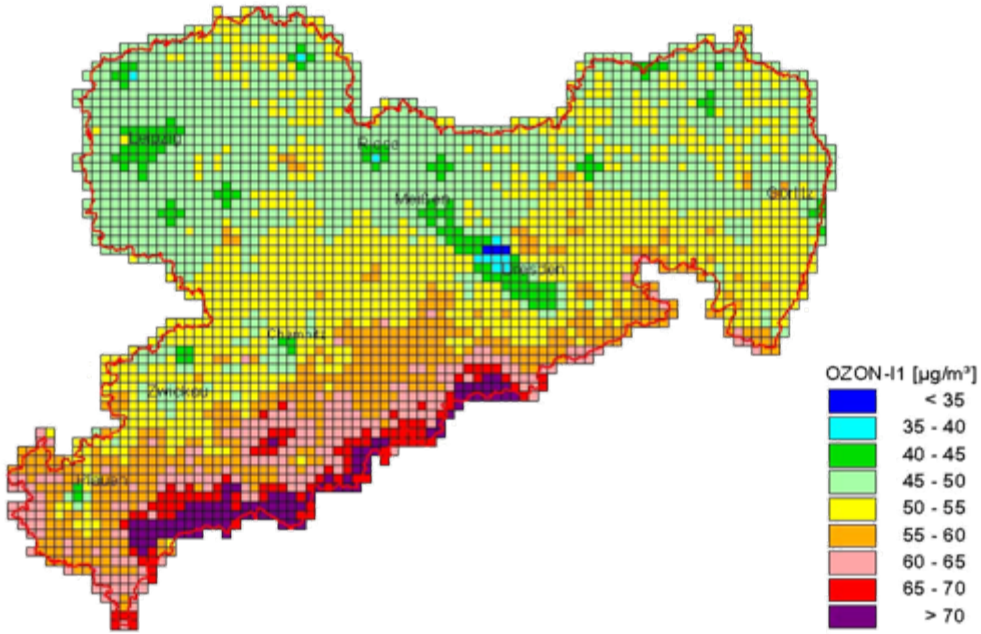
Schematic flow of street detailed calculation of air quality





Schematic Sketch of the Radial Interpolation

Results: Annual Ozone concentrations Summer 2002 in Saxony



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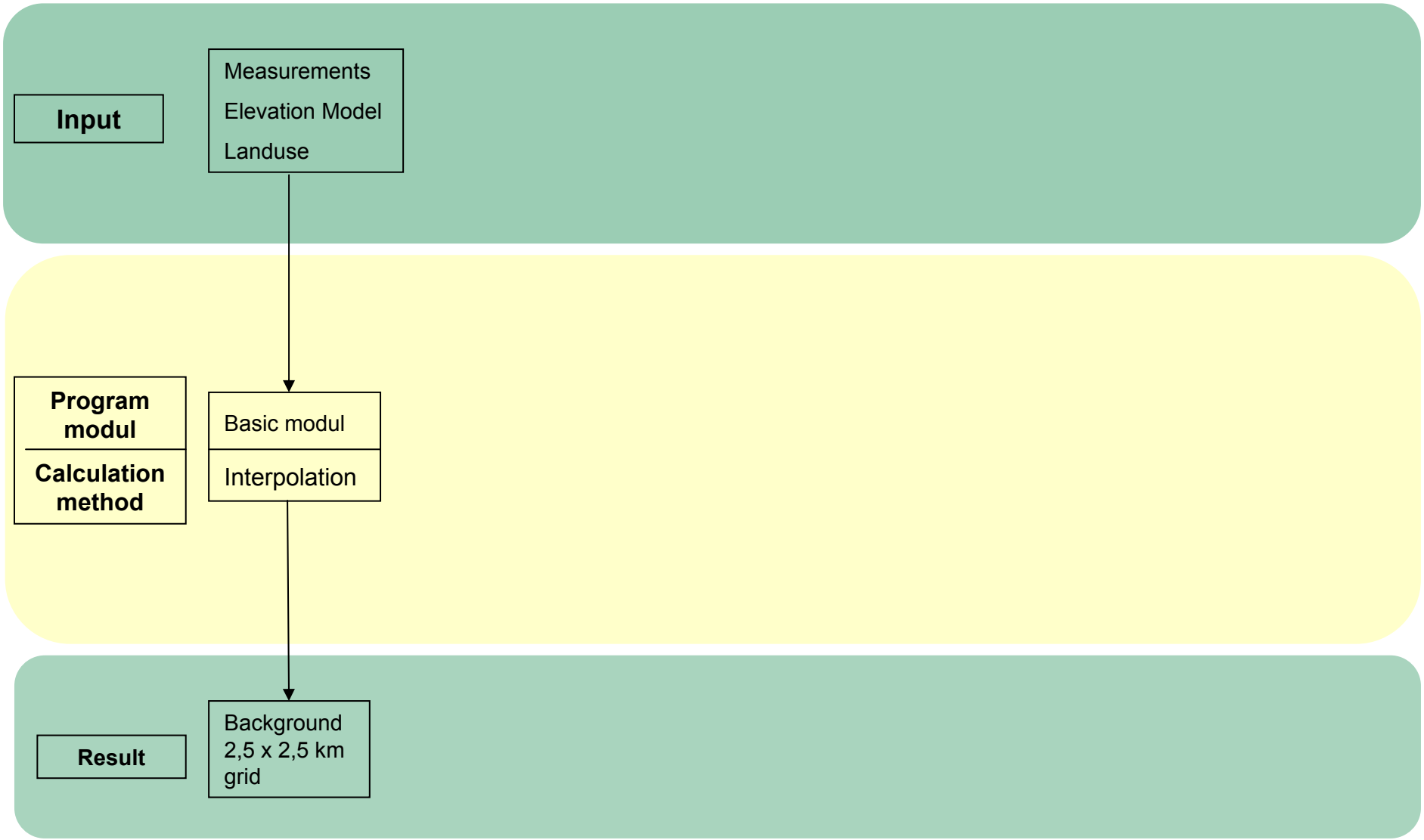

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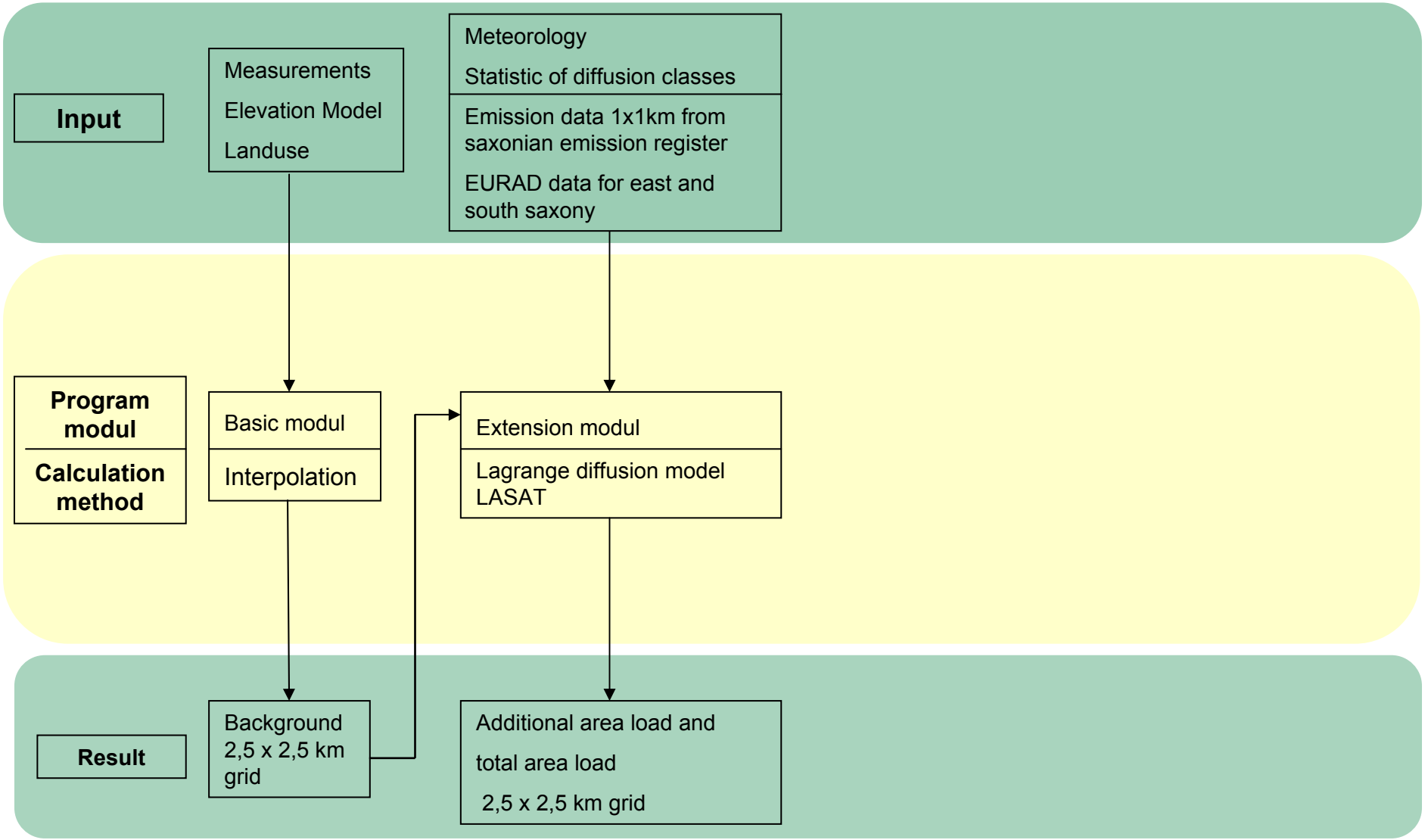

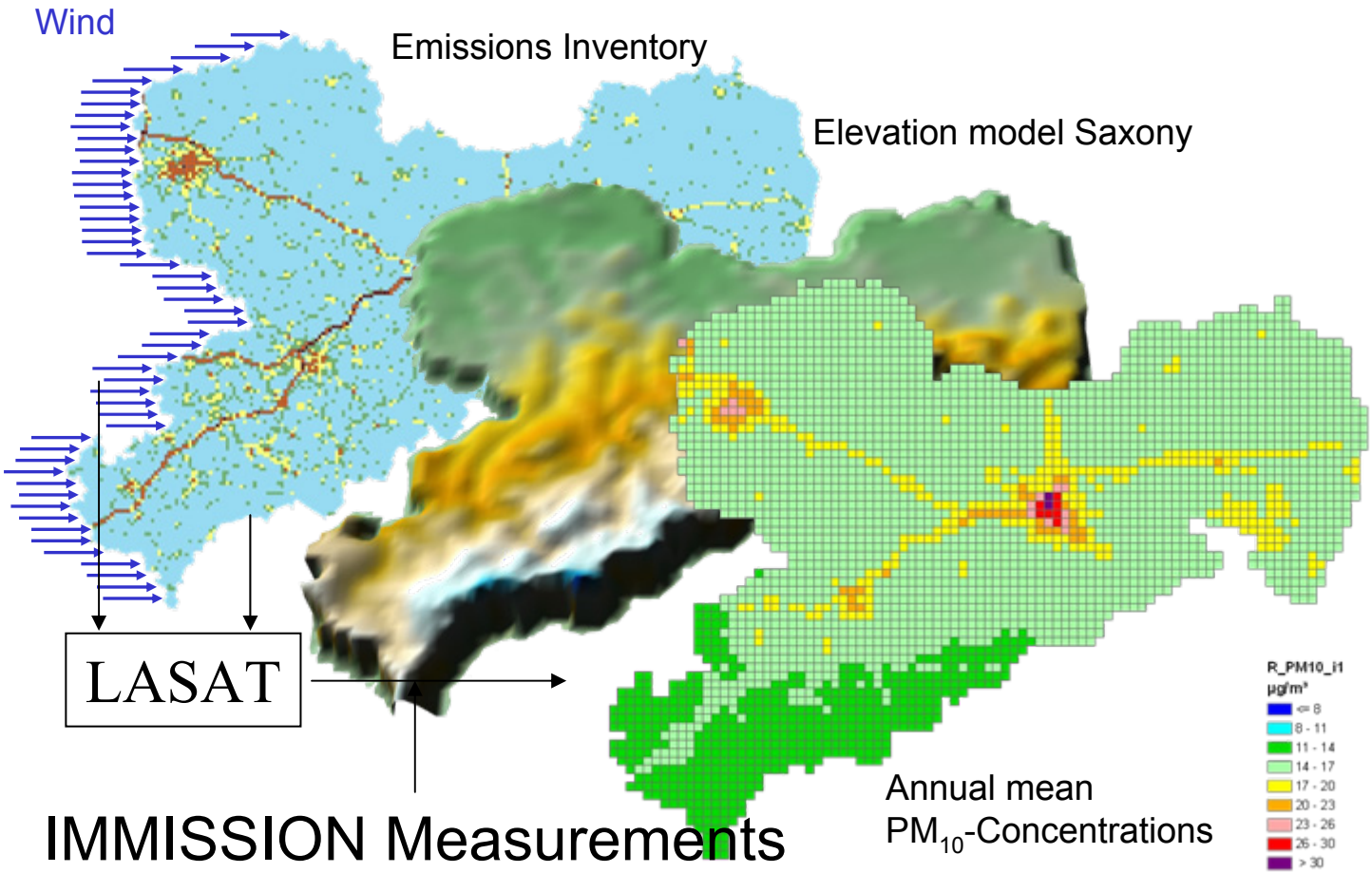

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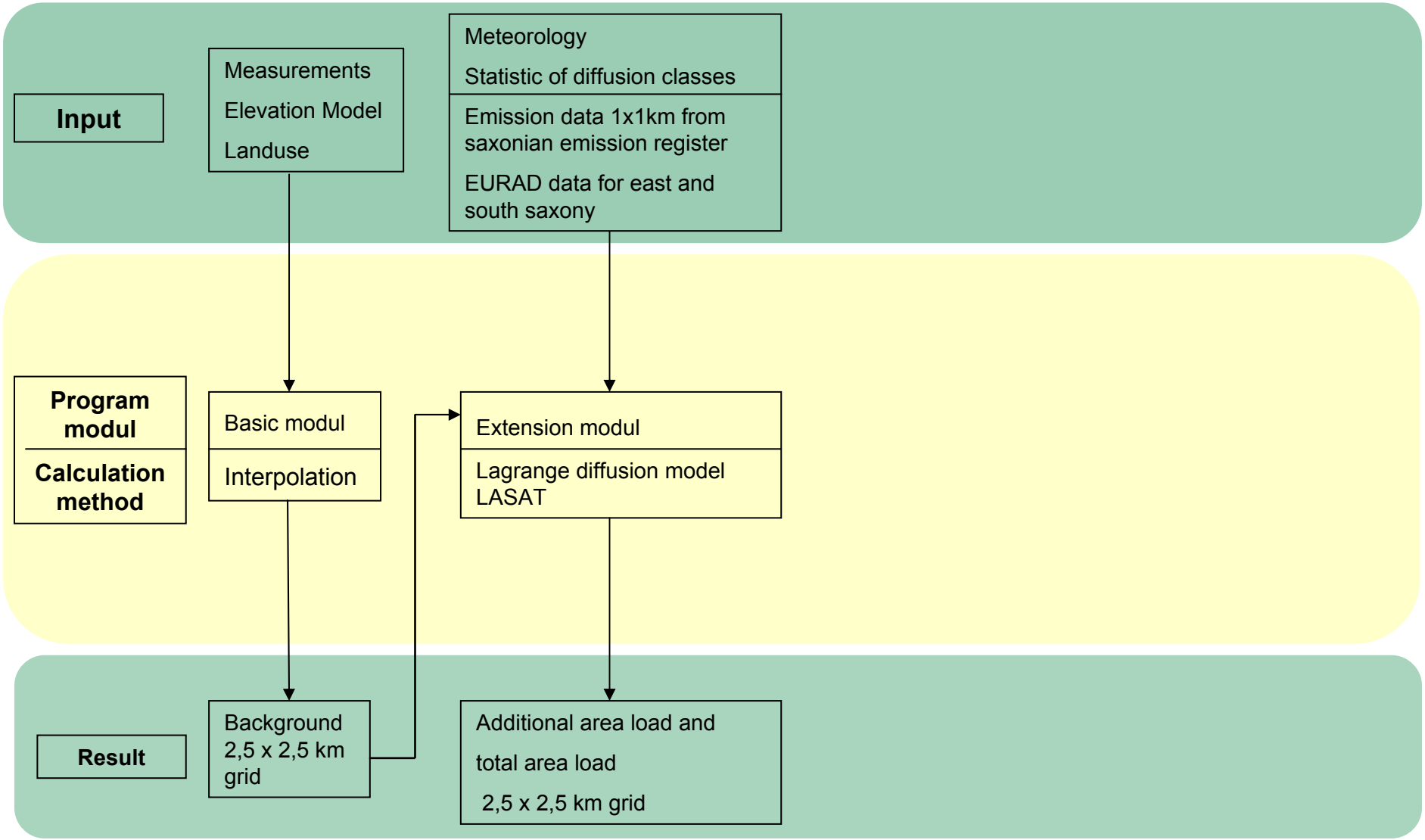

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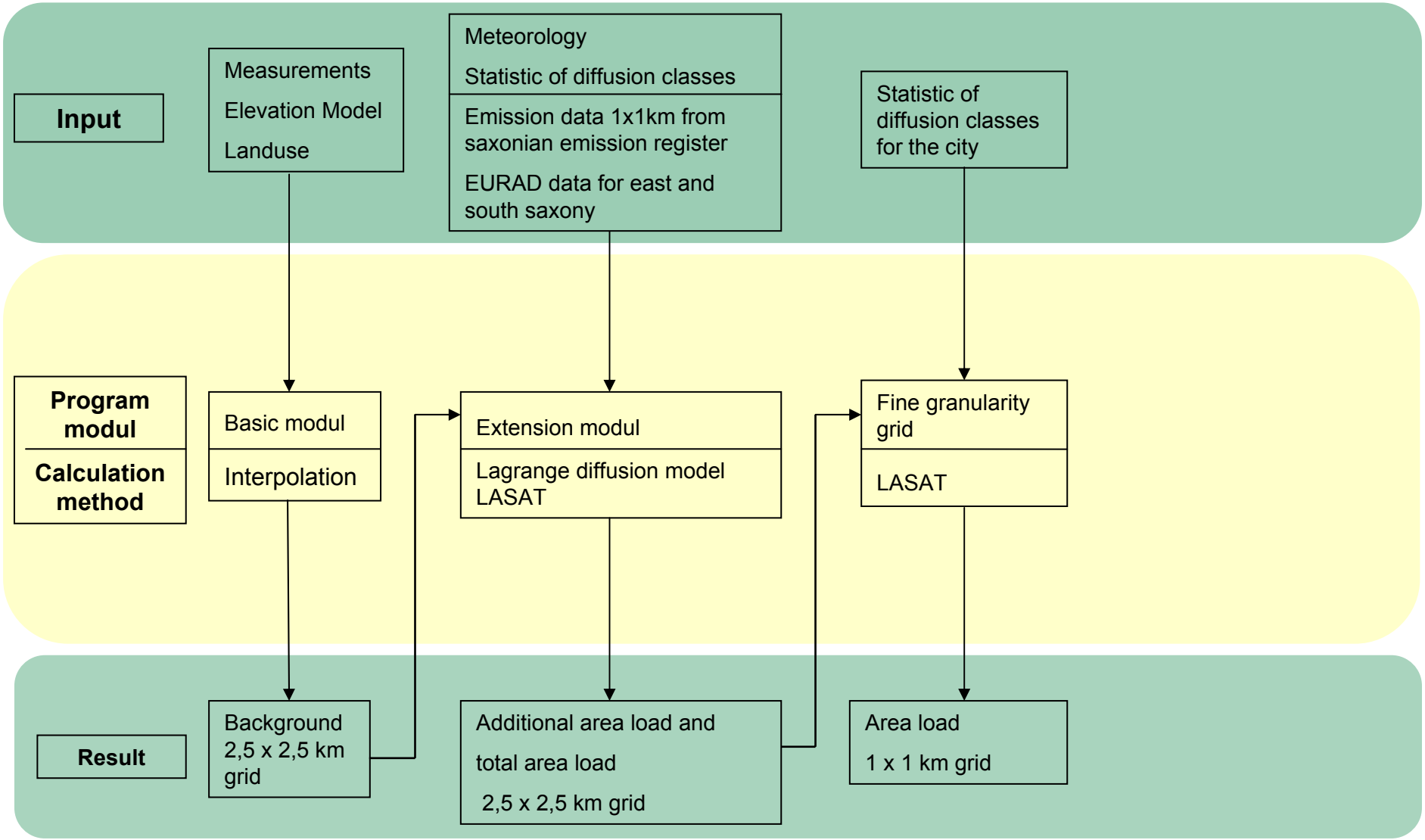

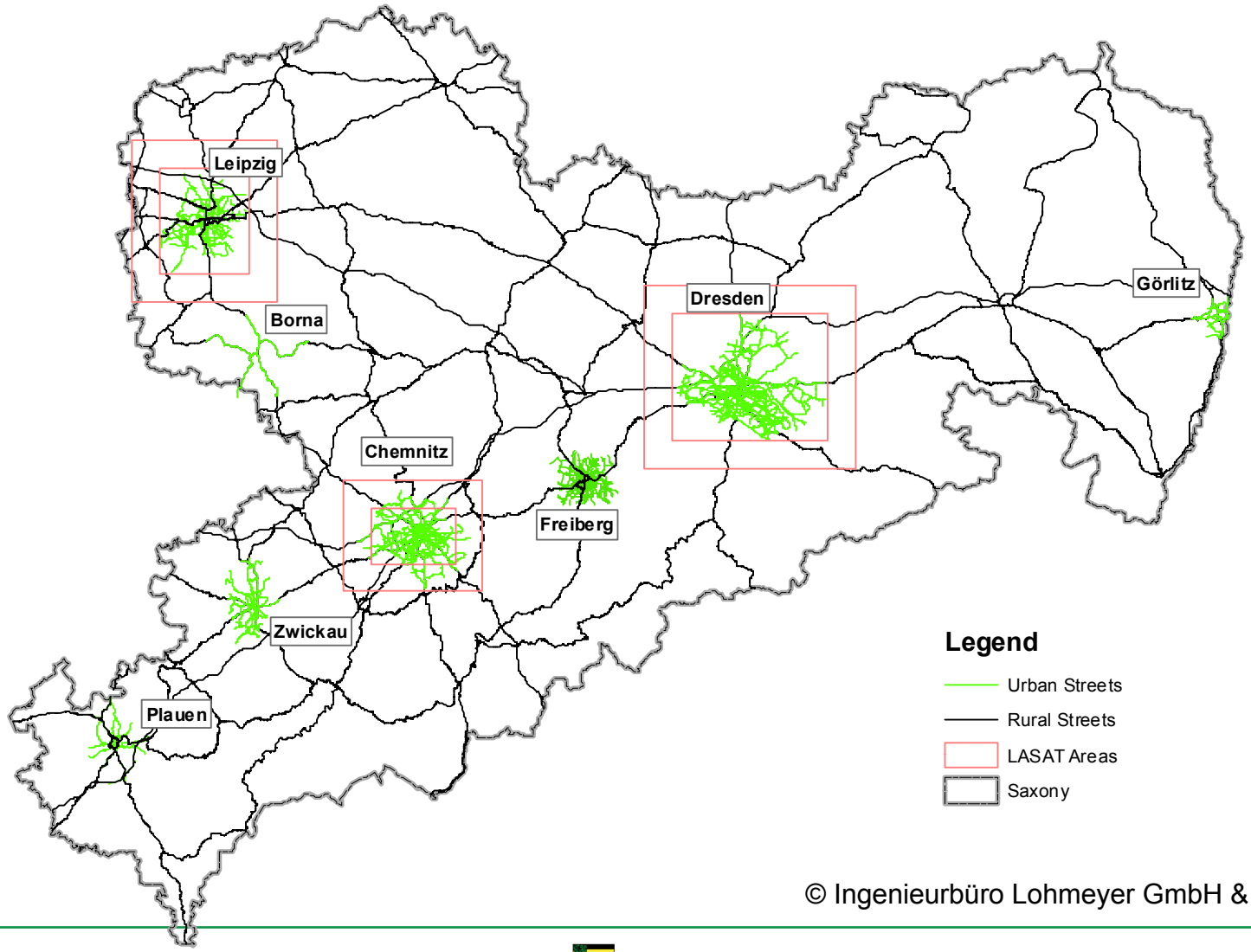

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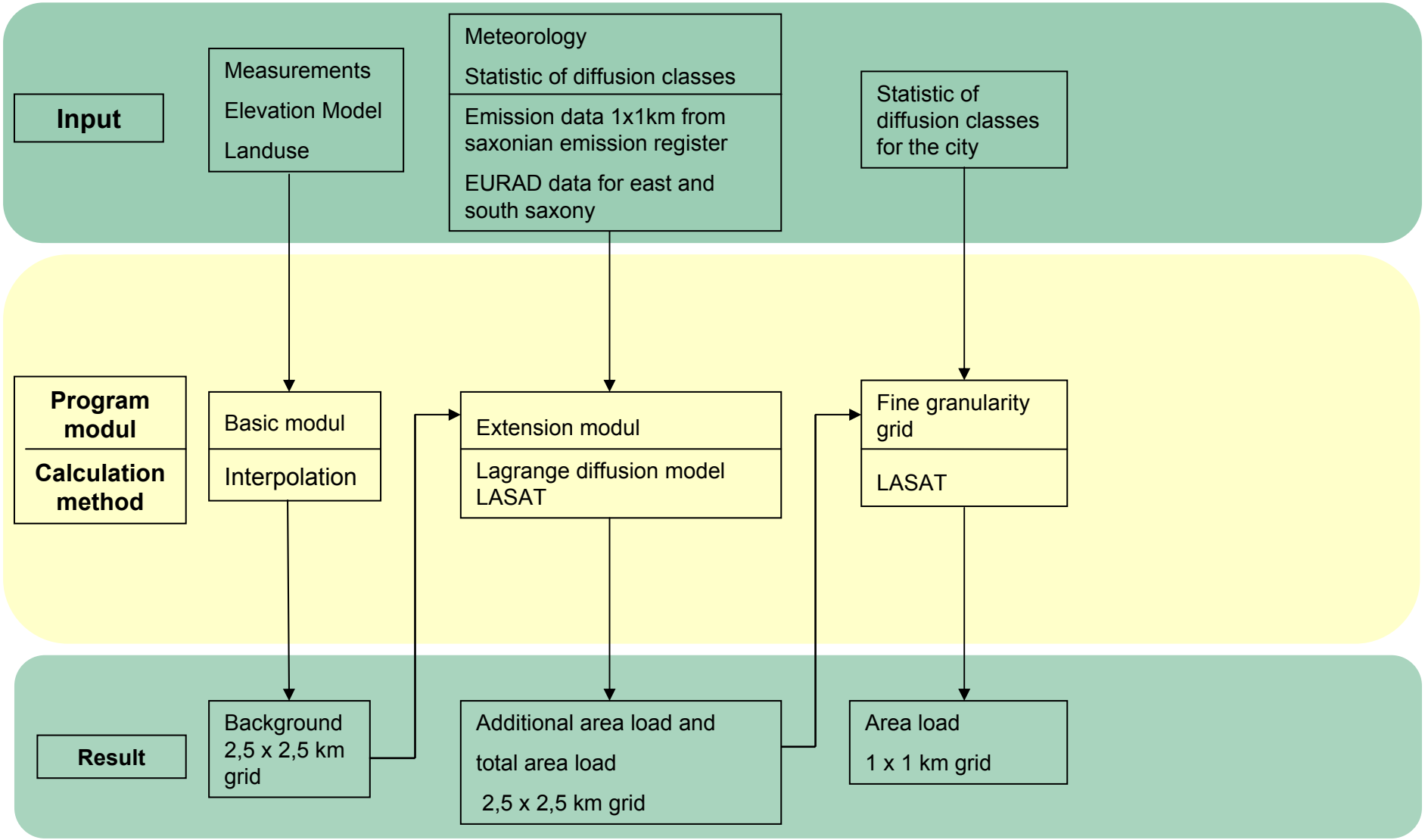

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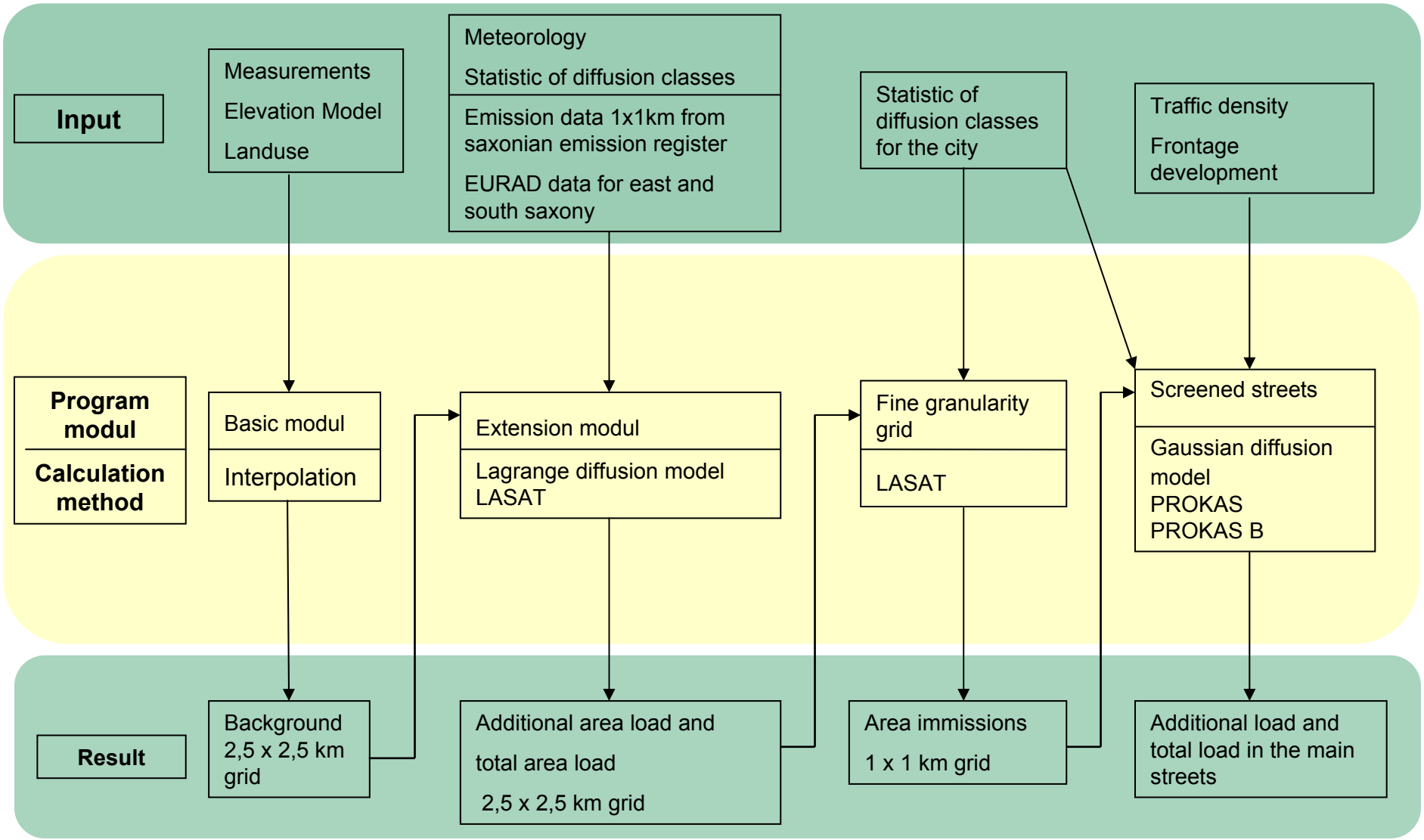
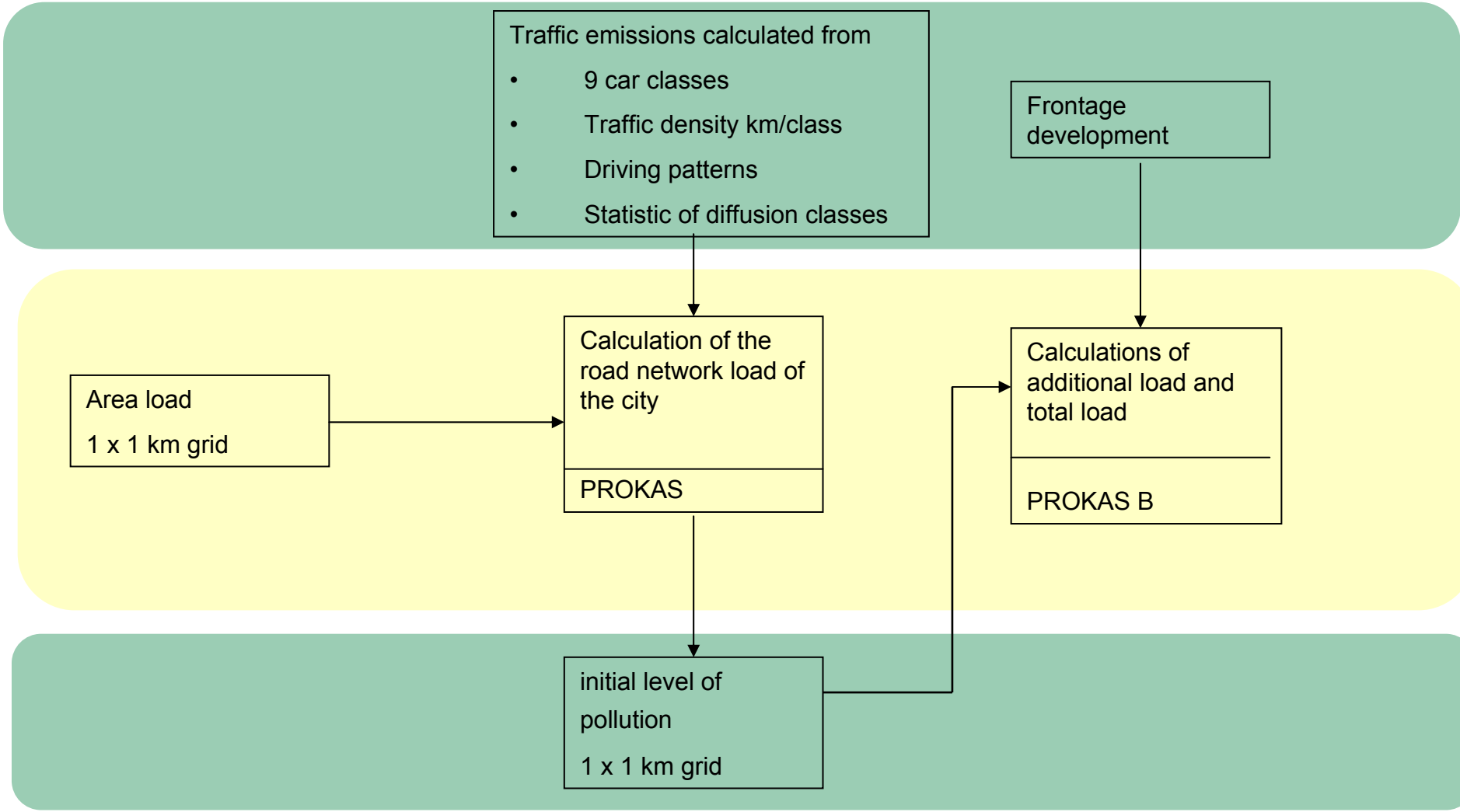
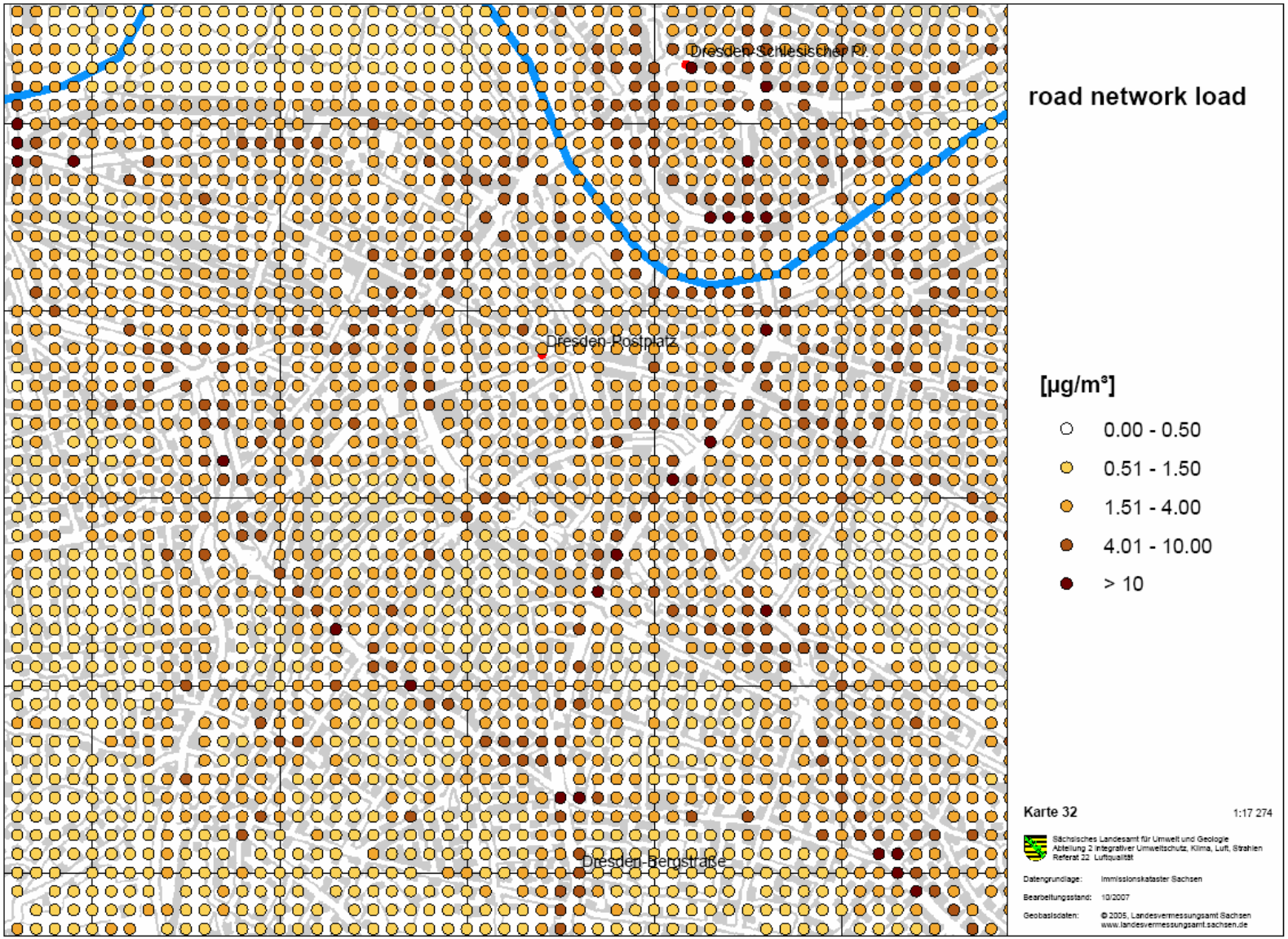
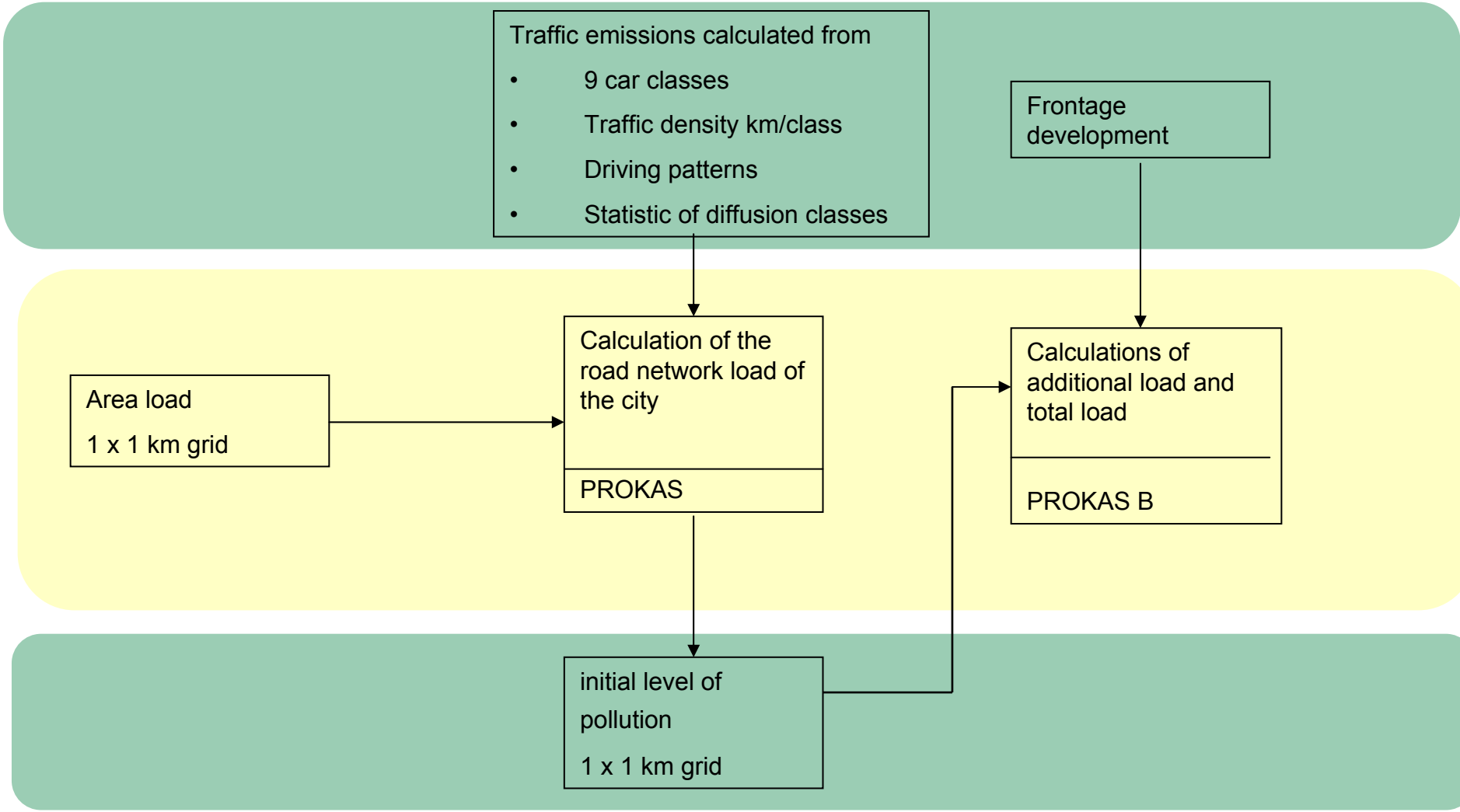


Screening of the street sections

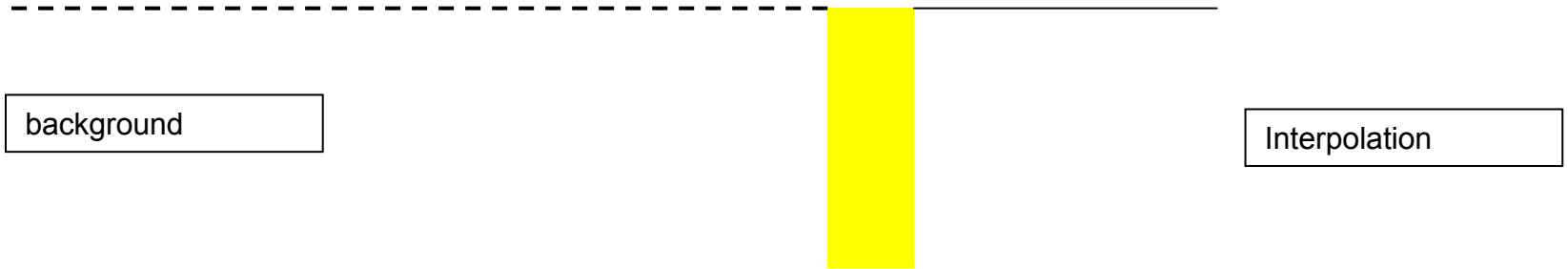



Dresden-Schlesischer Pl.
Dresden-Postplatz
Dresden-Bergstraße
road network load
[µg/m³]
0.00 - 0.50
0.51 - 1.50
1.51 - 4.00
4.01 - 10.00
> 10
Karte 32
1:17 274
Sächsisches Landesamt für Umwelt und Geologie
Abteilung 2 Integrativer Umweltschutz, Klima, Luft, Strahlen
Referat 22 Luftqualität
Datengrundlage: Immissionskataster Sachsen
Bearbeitungsstand: 10/2007
Geobasisdaten: © 2005, Landesvermessungsamt Sachsen
www.landesvermessungsamt.sachsen.de

Screening of the street sections



Sources of a calculated immission value



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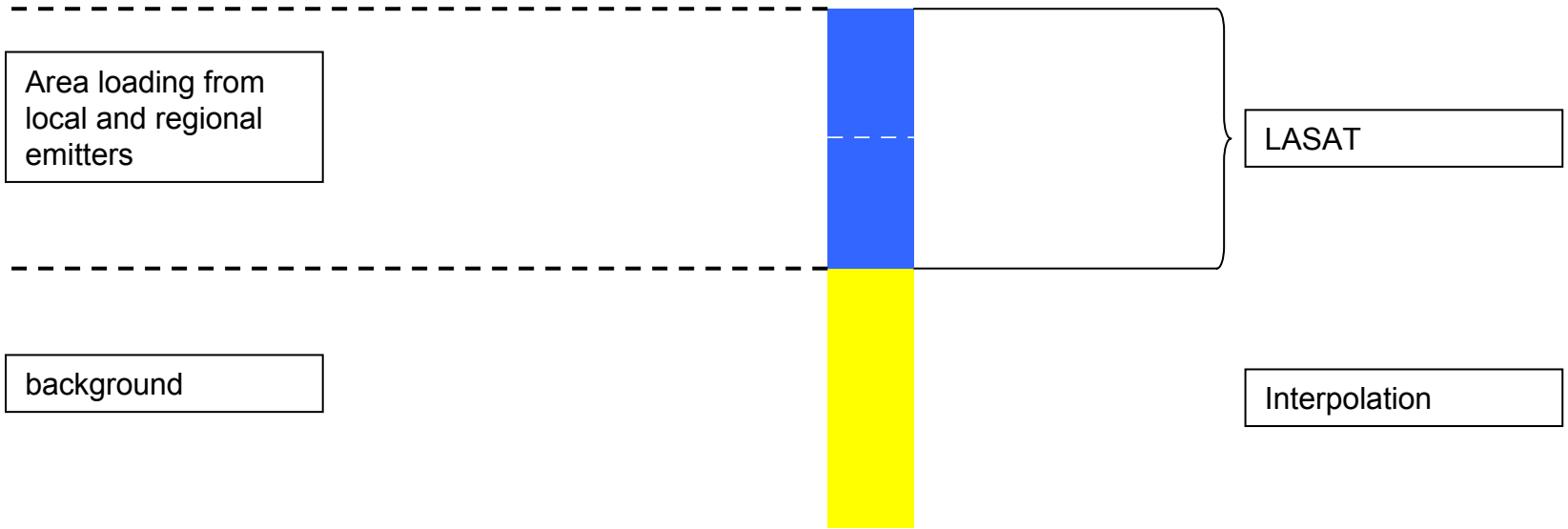

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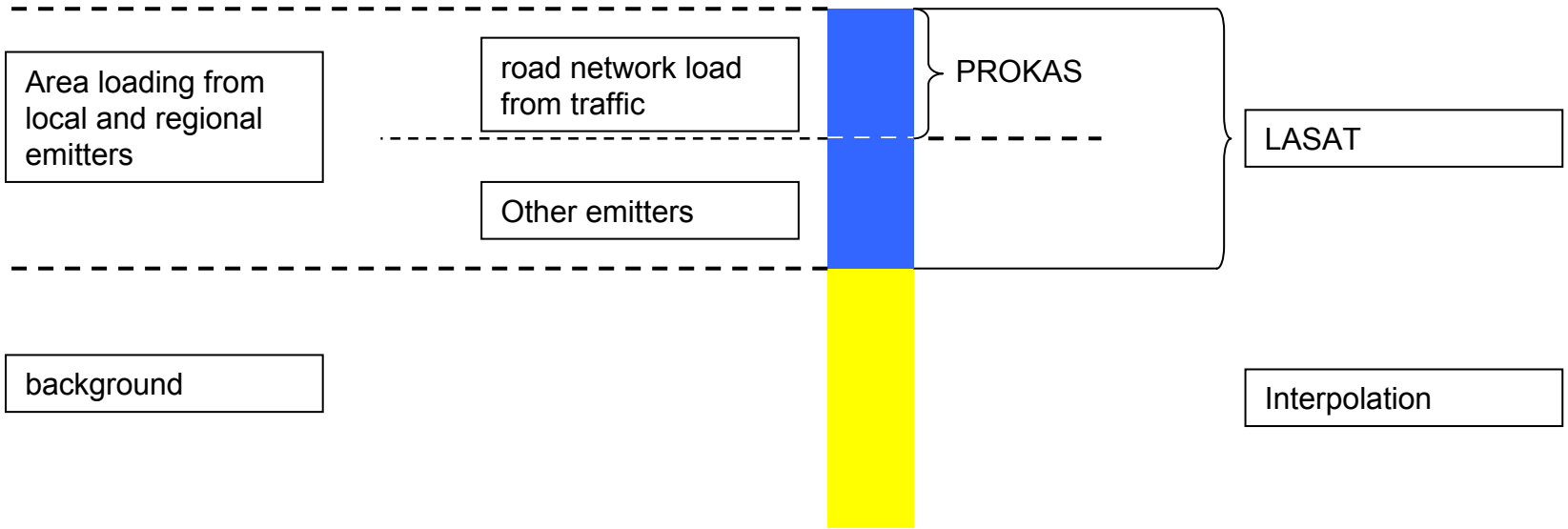

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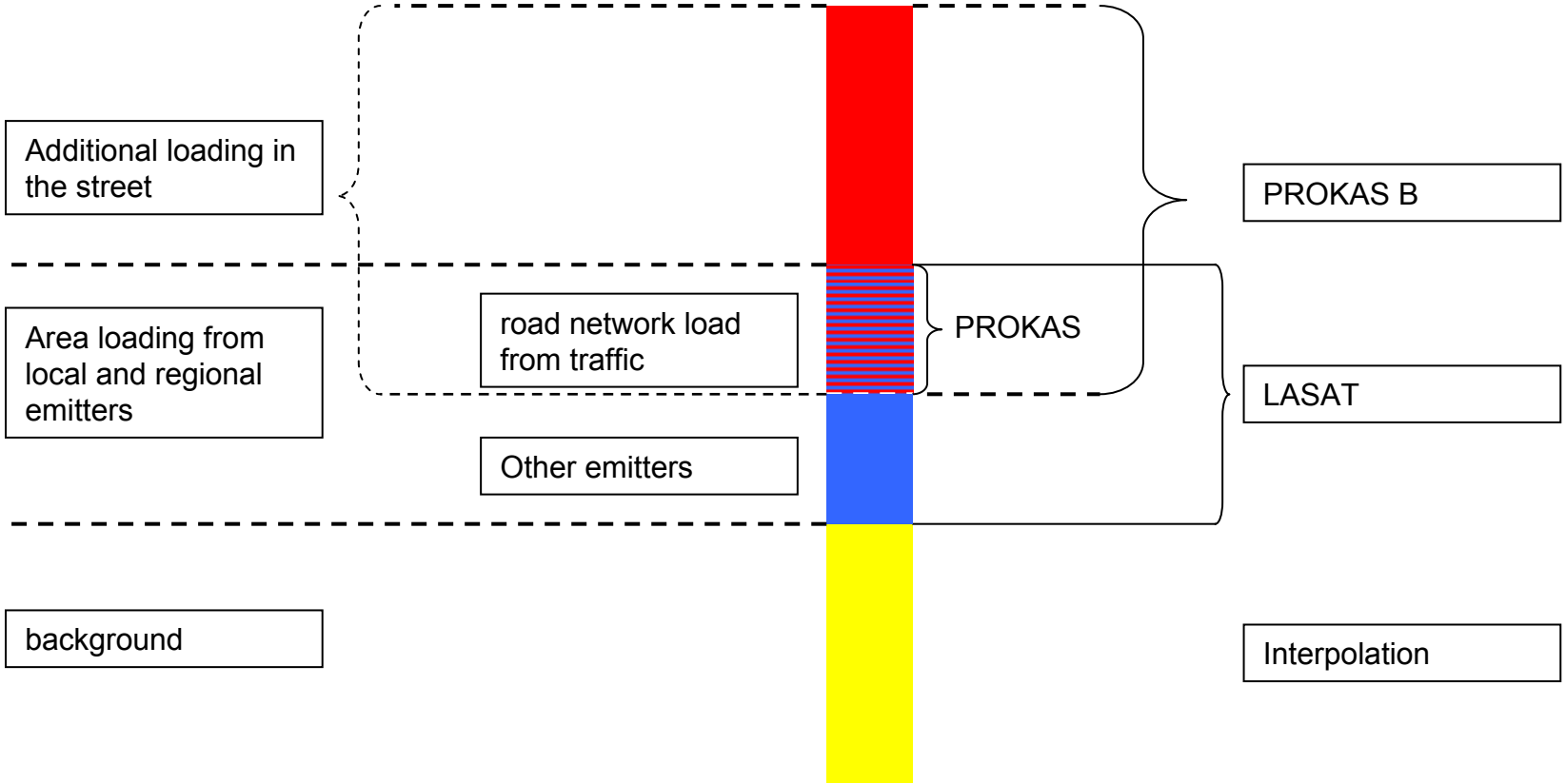
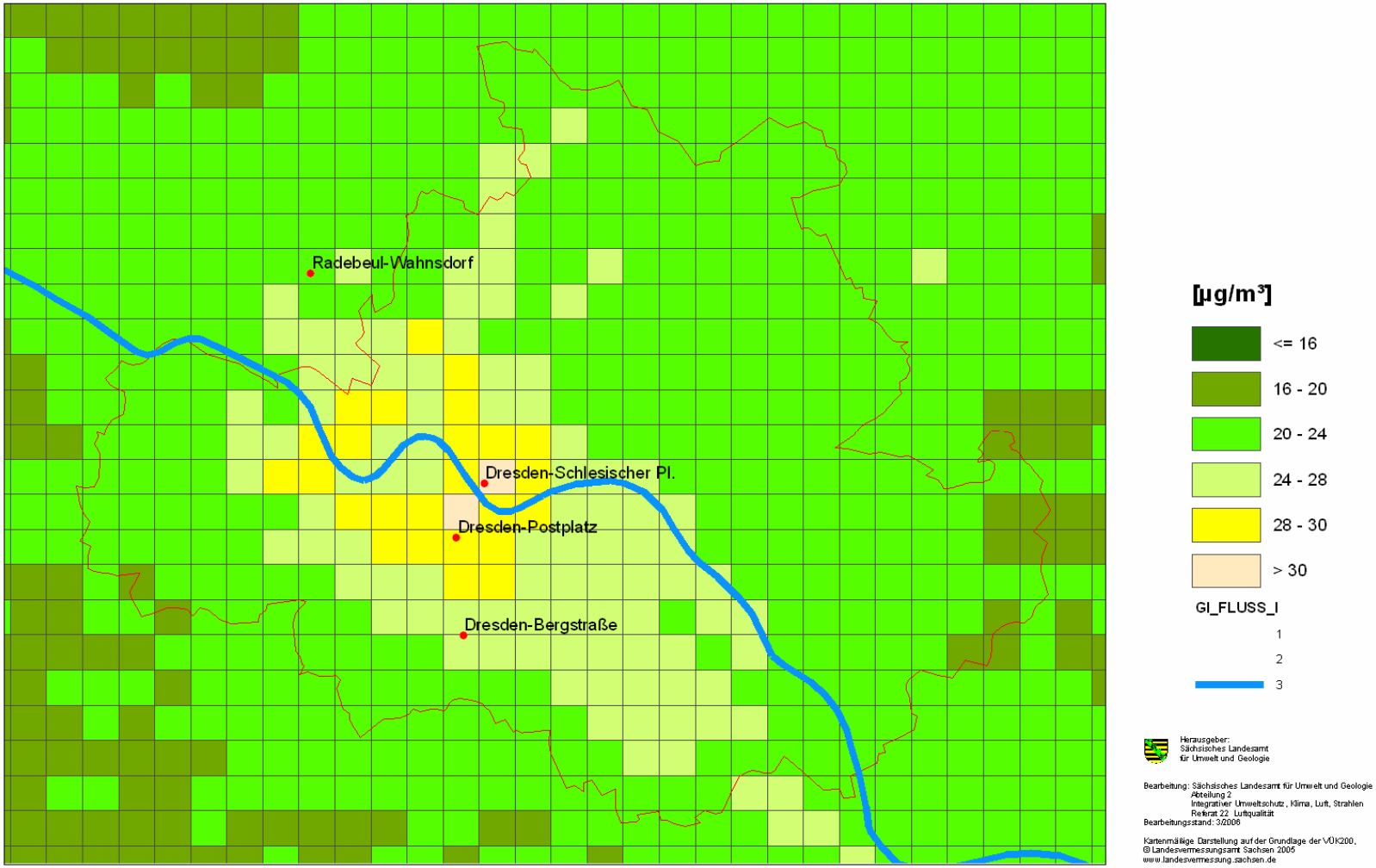
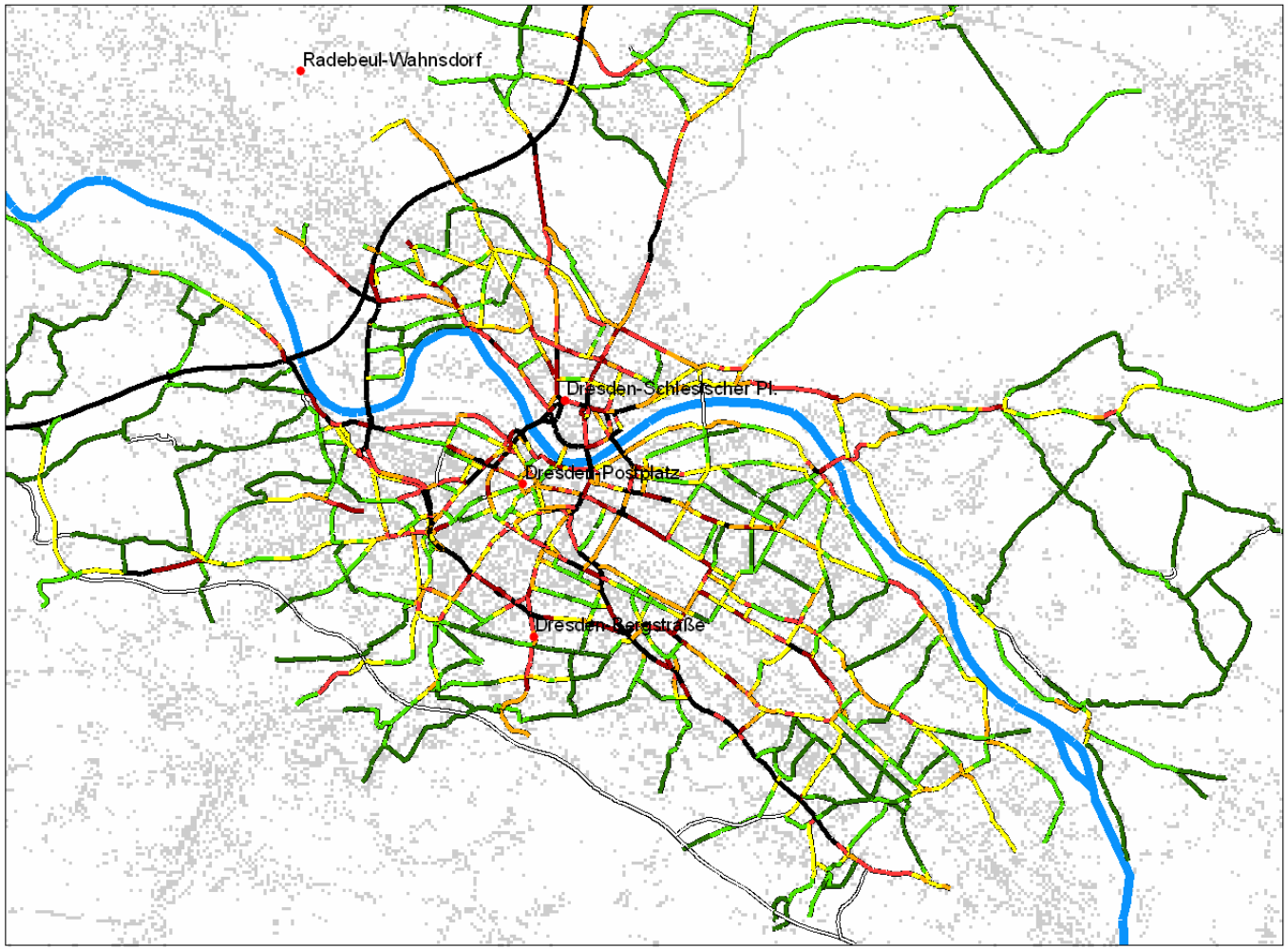


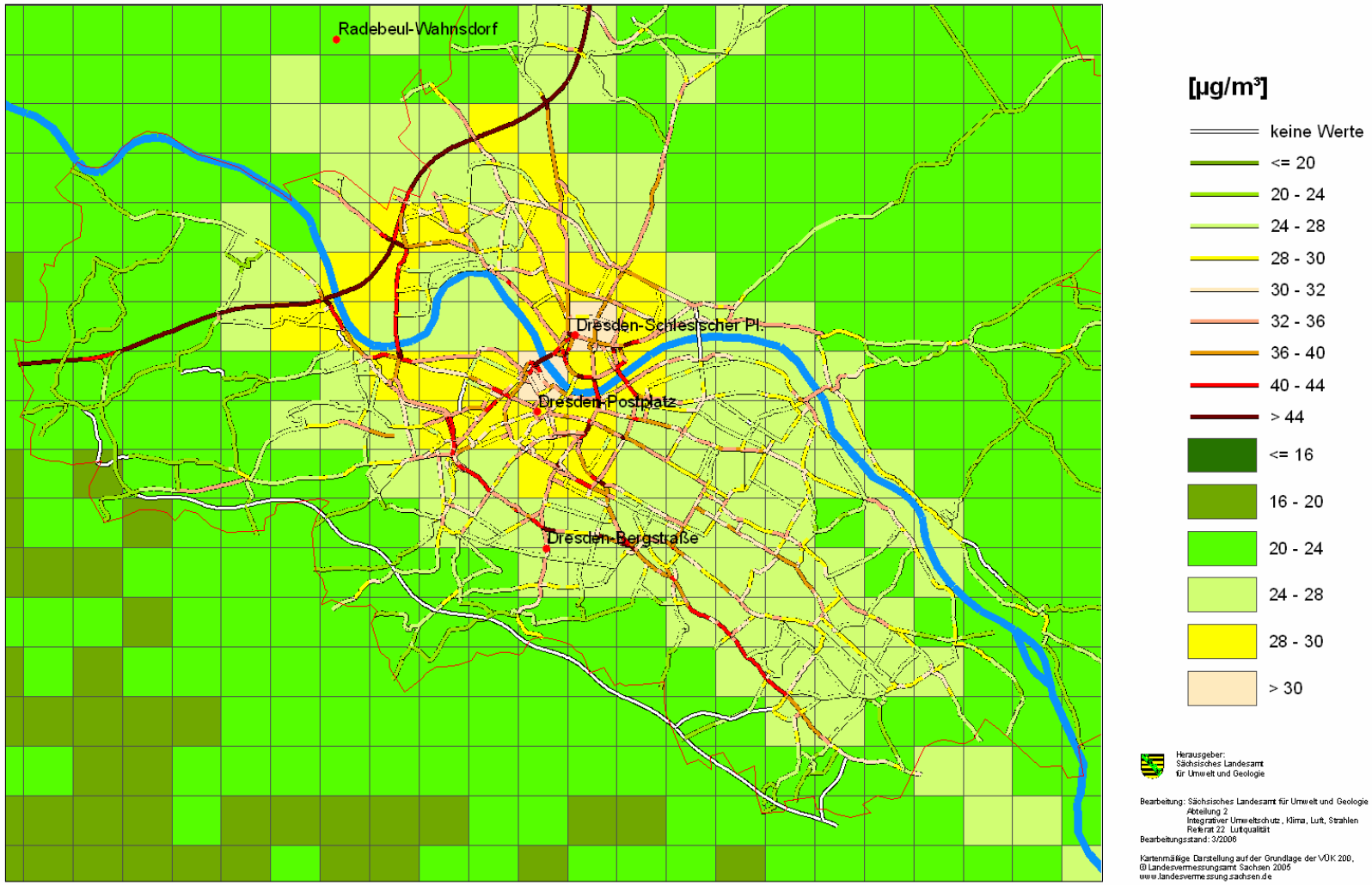
Modeled anual mean values of PM_{10} (Mean 2001-2005)



Modeled anual mean values of PM_{10} – additional load for local traffic (mean 2001-2005)

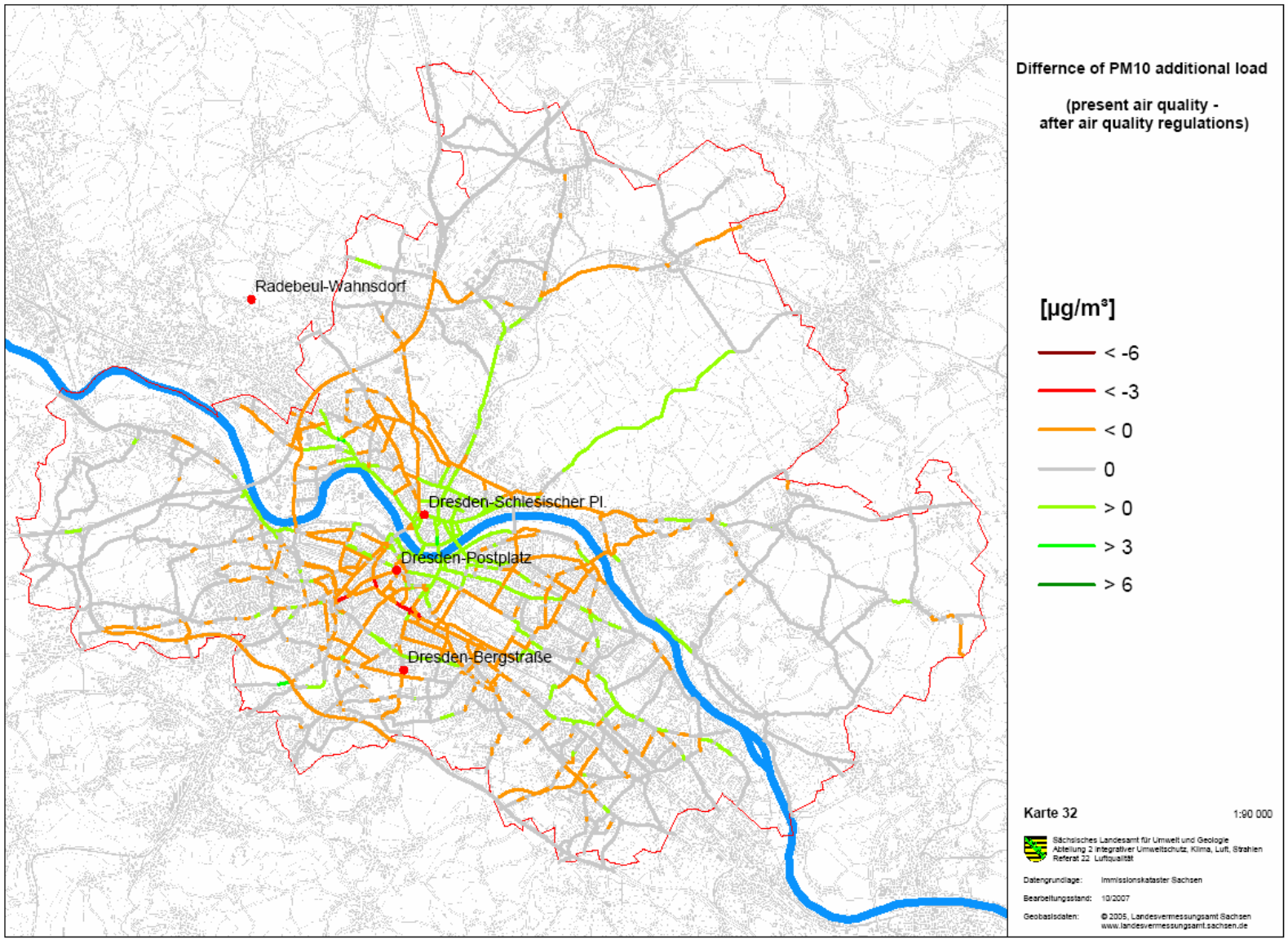


Modeled anual mean values of PM_{10} – total load (Mean 2001-2005)



Comparison Model / Measurement

	Dresden -Bergstraße	Dresden – Mitte	Dresden – Nord
Measured			
PM_{10}	33	31	33
NO_2	58	31	47
Calculated			
PM_{10}	31	30	35
NO_2	49	31	49


Radebeul-Wahnsdorf
Dresden-Schiesischer Pl.
Dresden-Postplatz
Dresden-Bergstraße
Differnce of PM10 additional load
(present air quality -
after air quality regulations)
[µg/m³]
< -6
< -3
< 0
0
> 0
> 3
> 6
Karte 32
1:90 000
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Abteilung 2 Integrativer Umweltschutz, Klima, Luft, Strahlen
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Possible sources of error and limits of this method

- Erroneous input data
- Not enough background and urban background measurement sites for better differentiation of the area load
- Additional load from other emitters will be calculated using one regional factor
- Road network load is the mean of 100 values per 1 x 1 km area. Thus overstating the initial level of pollution for high immissions areas and underrating areas with low immissions.
- Fault tolerances of up to 50% for calculated immissions of the different diffusion models for the annual means.