Using High Resolution Databases for Road Stretch Forecasting

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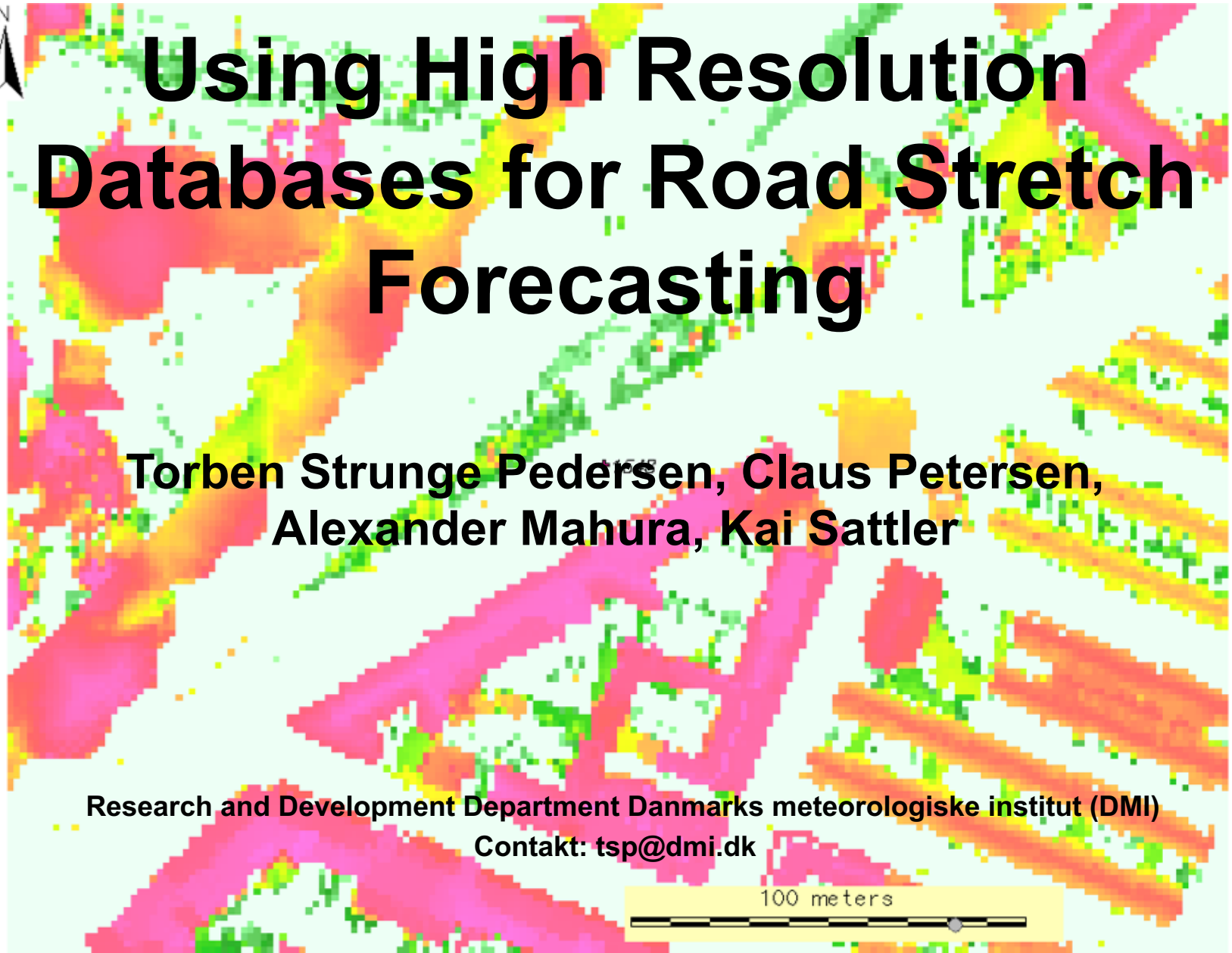

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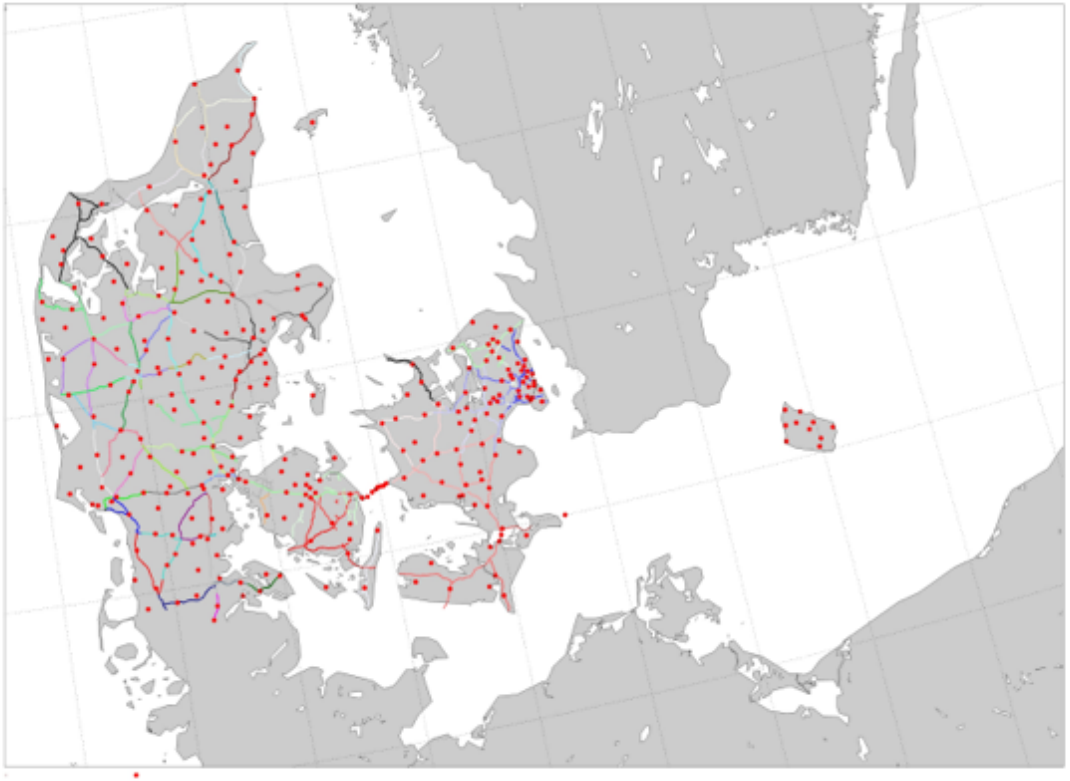
Road Stretch Forecasting



370 Road stations

153 Routes

22840 Parts with 500 m or less between points

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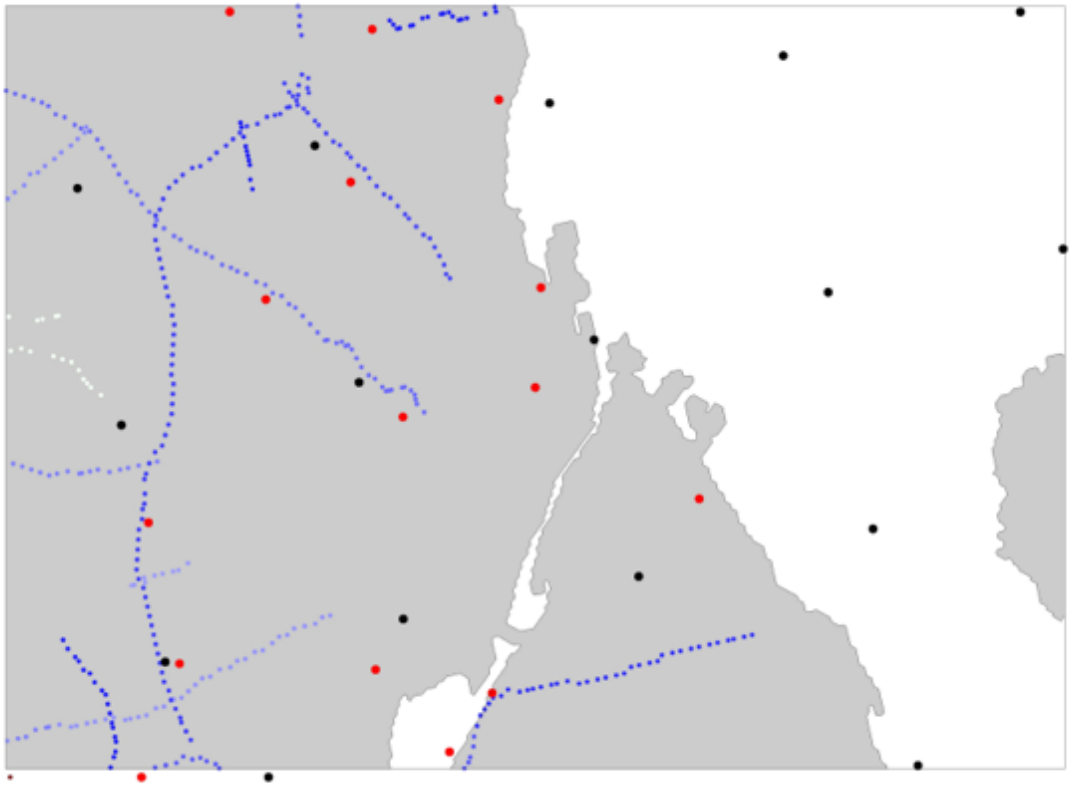
Road Stretch Forecasting



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Points

Atmospheric model
With 5 km resolution

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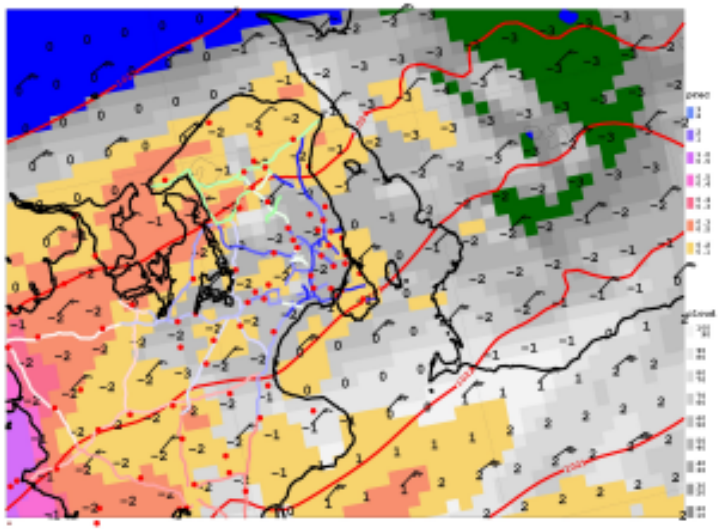
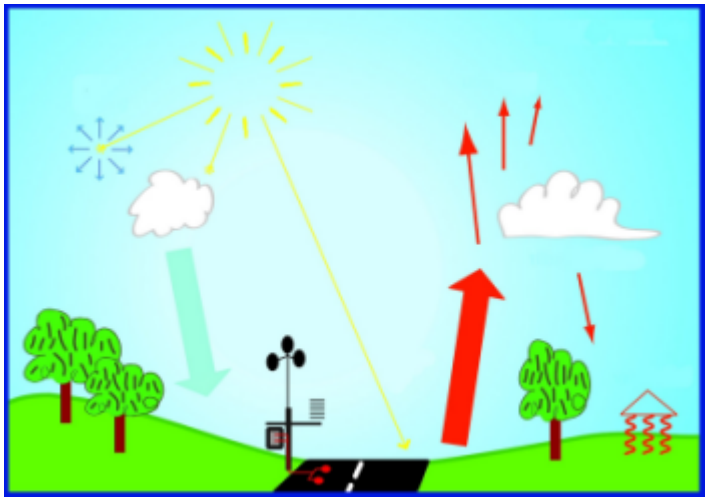
Road Stretch forecasting
Large scale and local features

- 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
  - 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)

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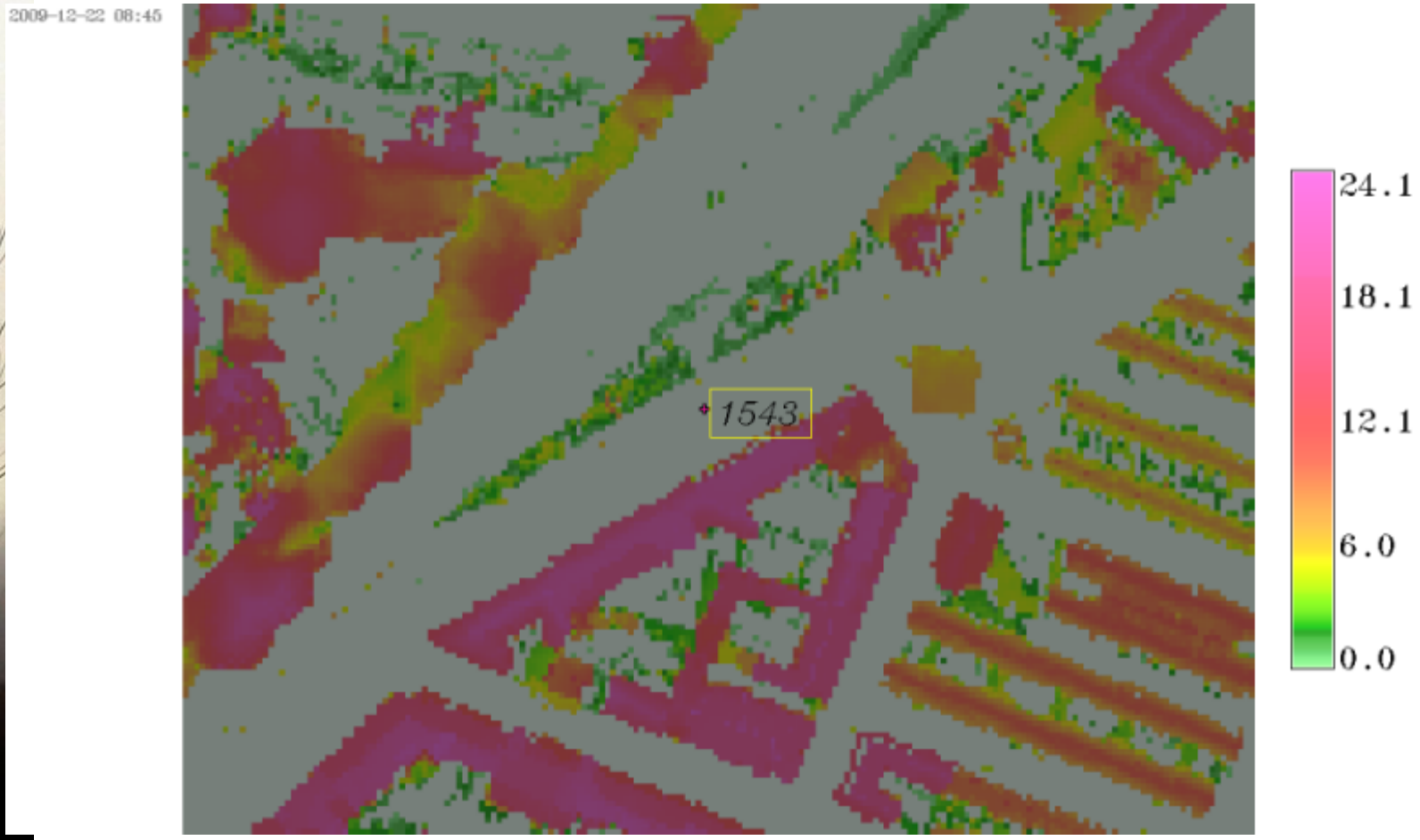
OBTAINING LOCAL INFORMATION

Application of the Danish Height Model at a single site

Øster Voldgade (station number 1543)

Height profile and shadow effects



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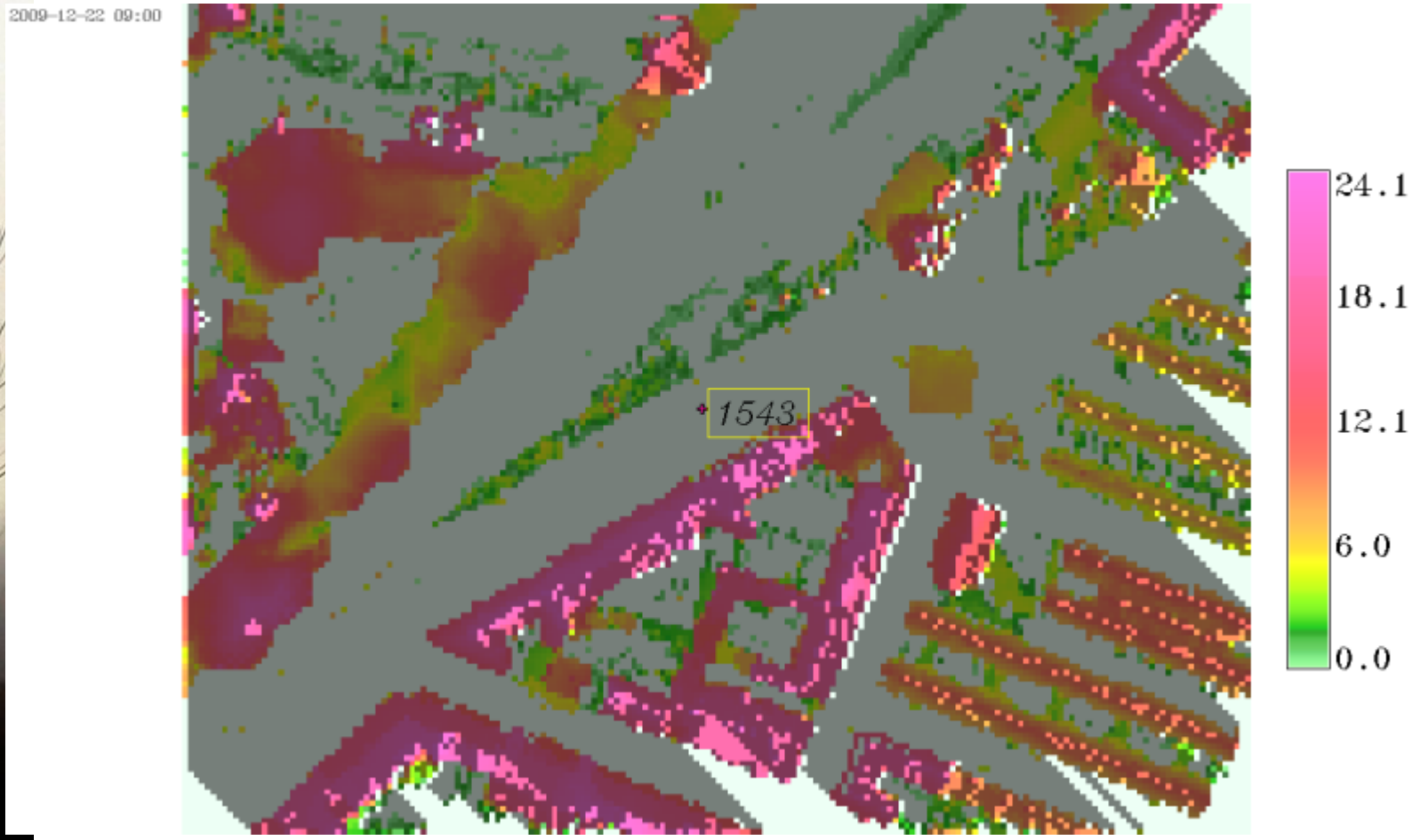

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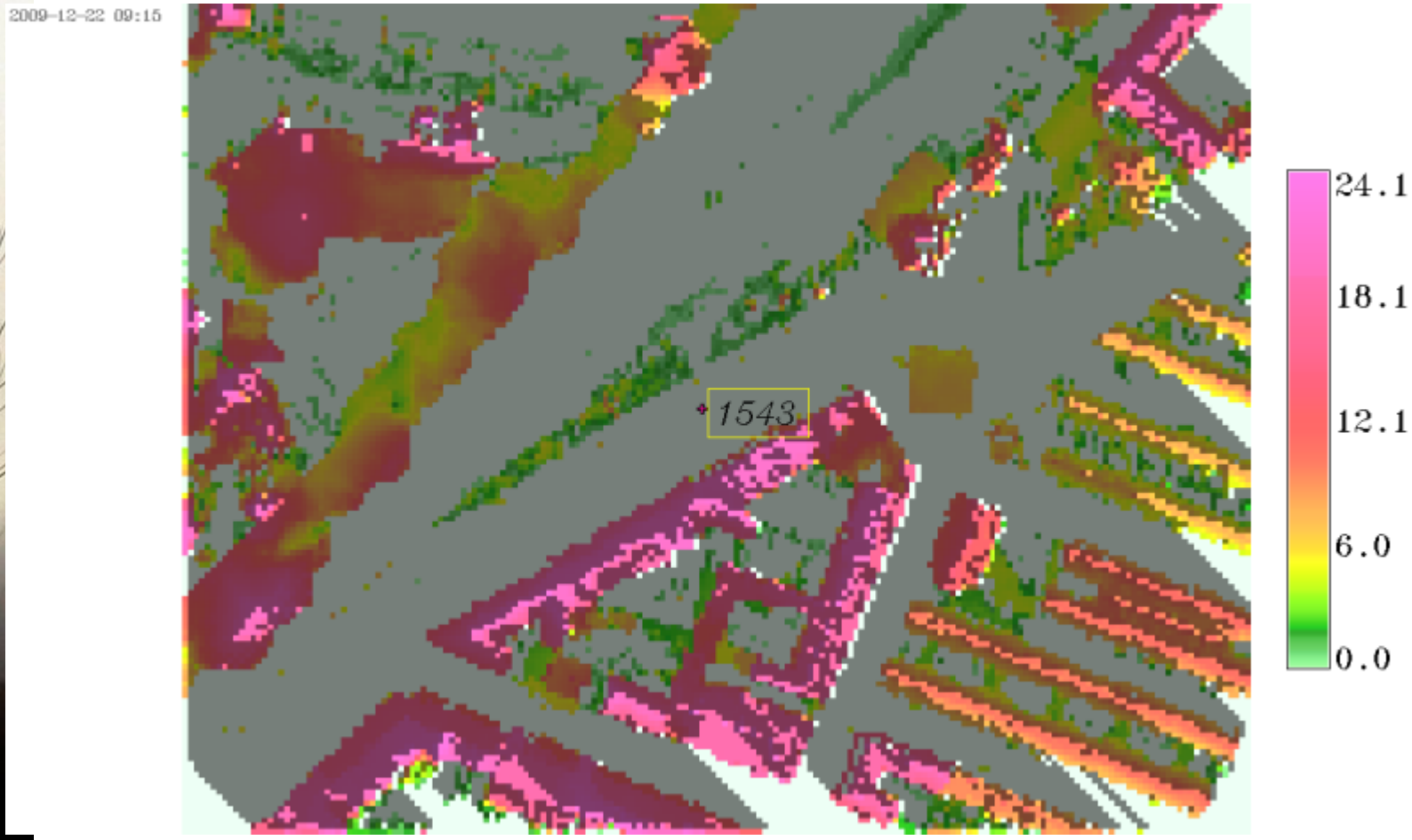

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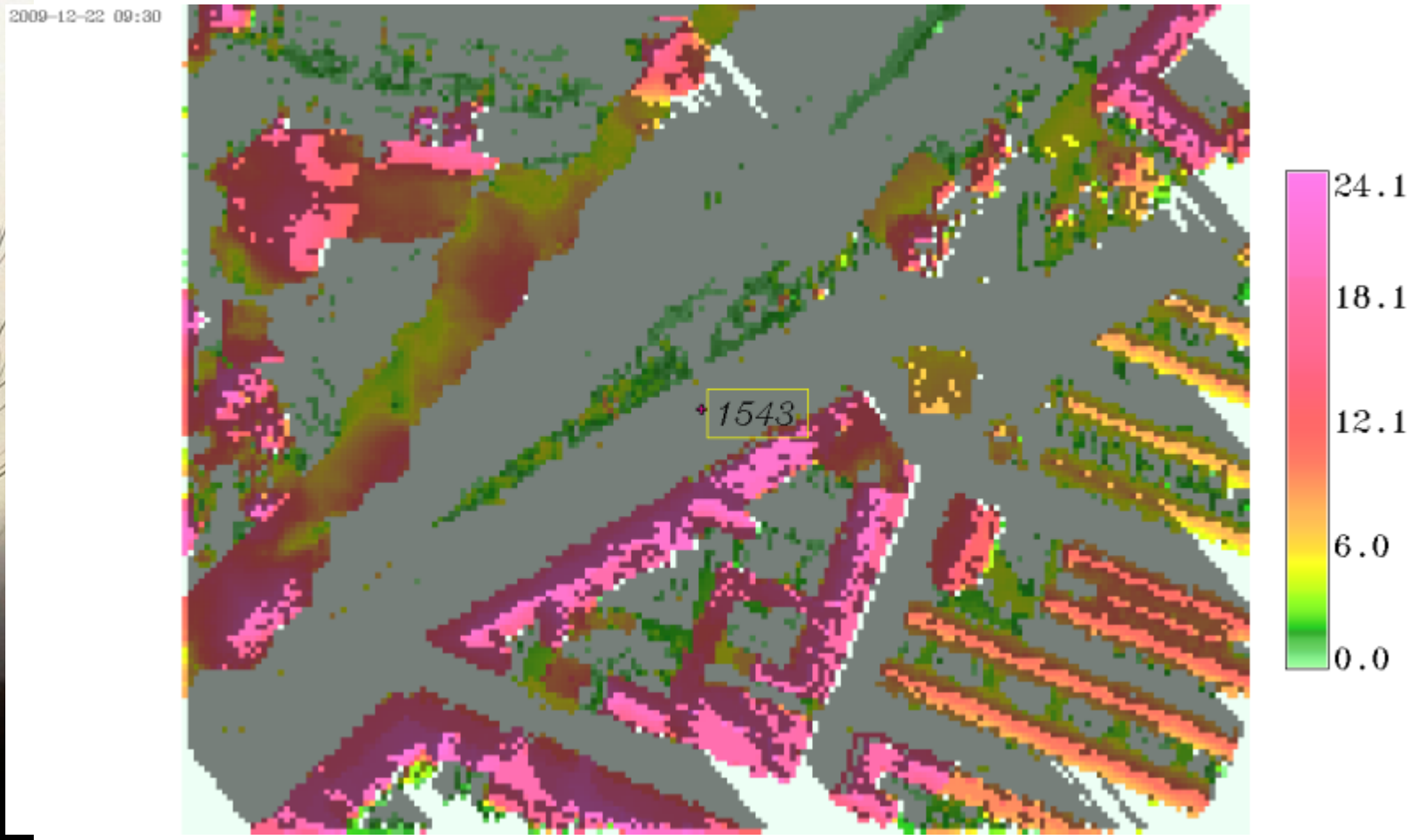

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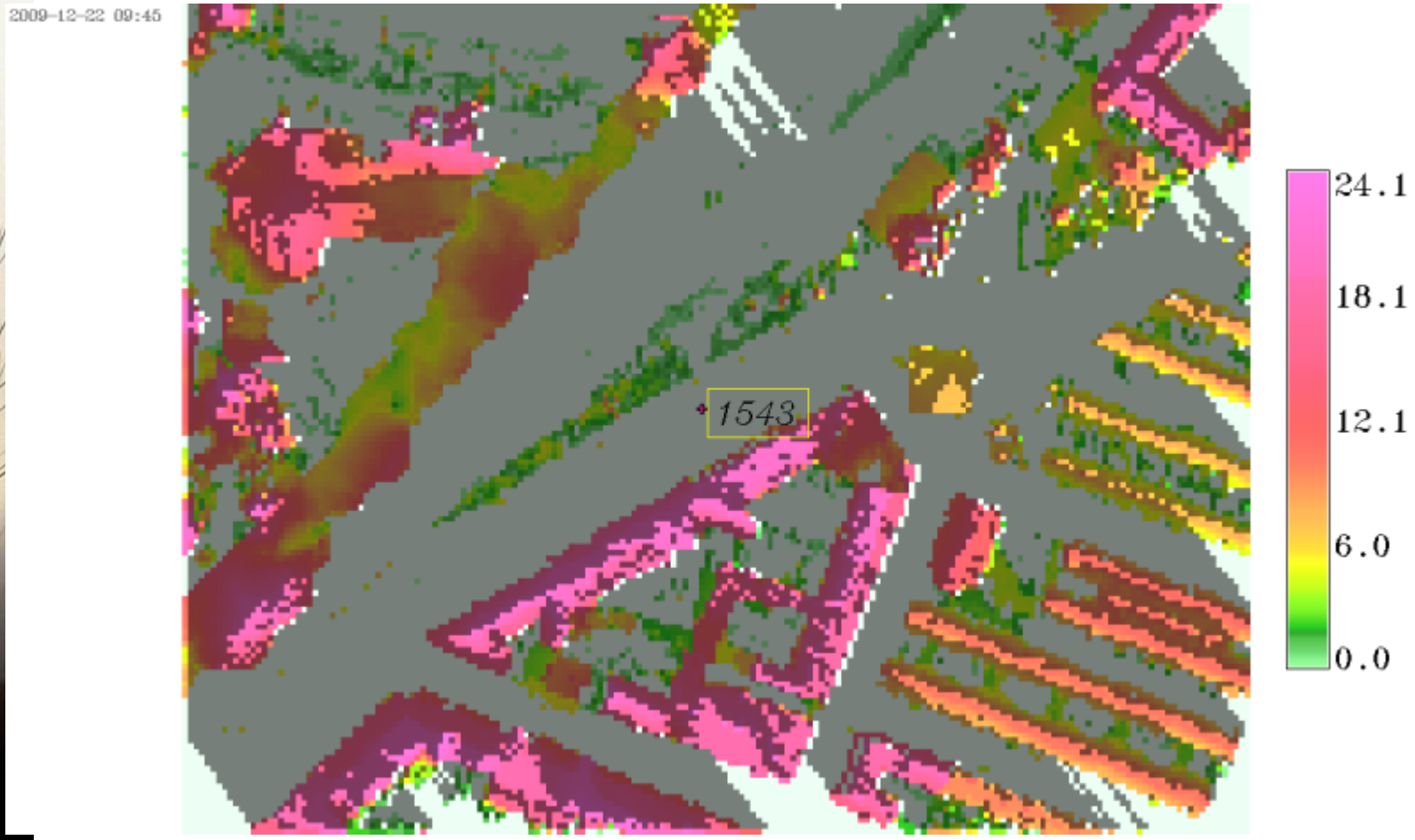

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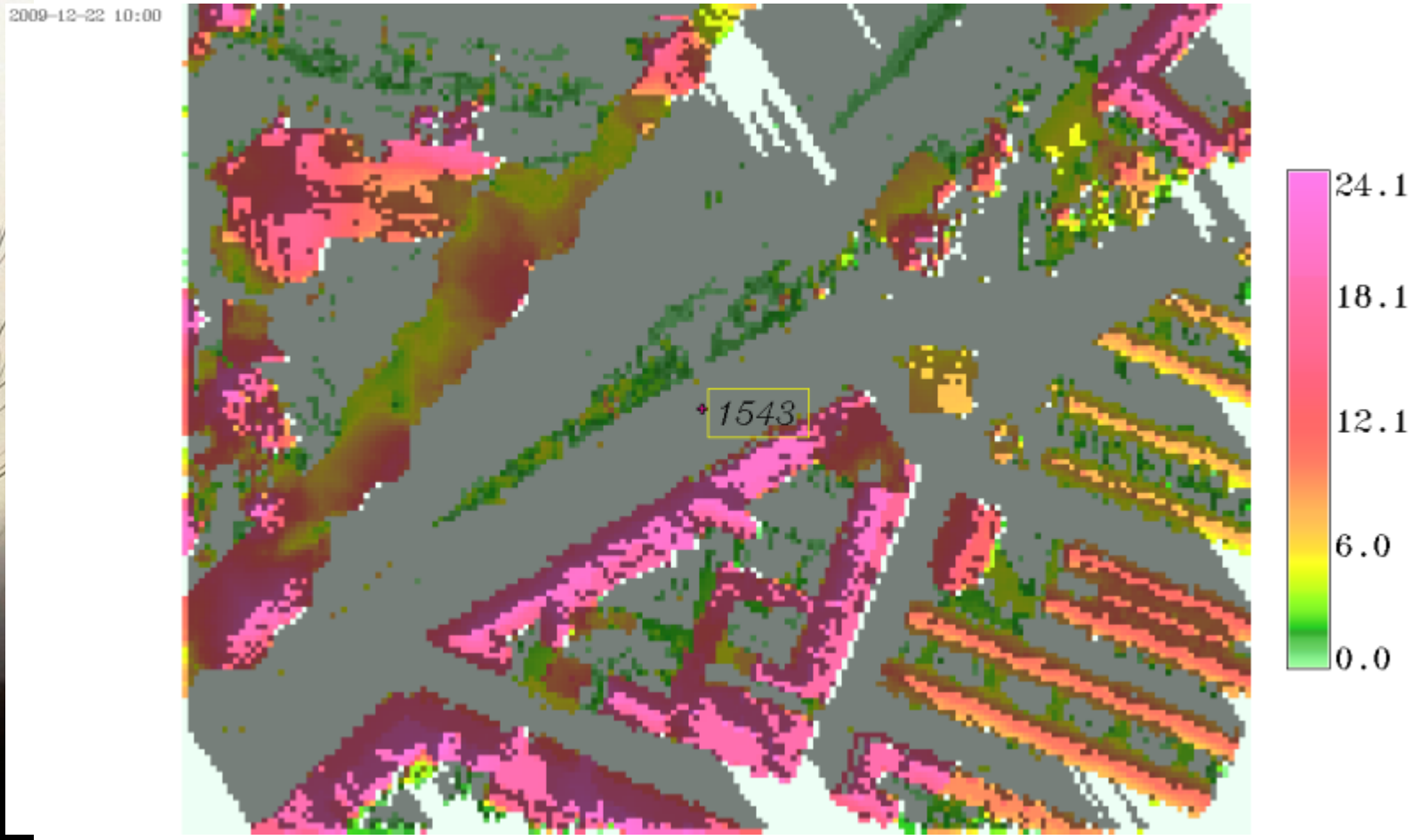

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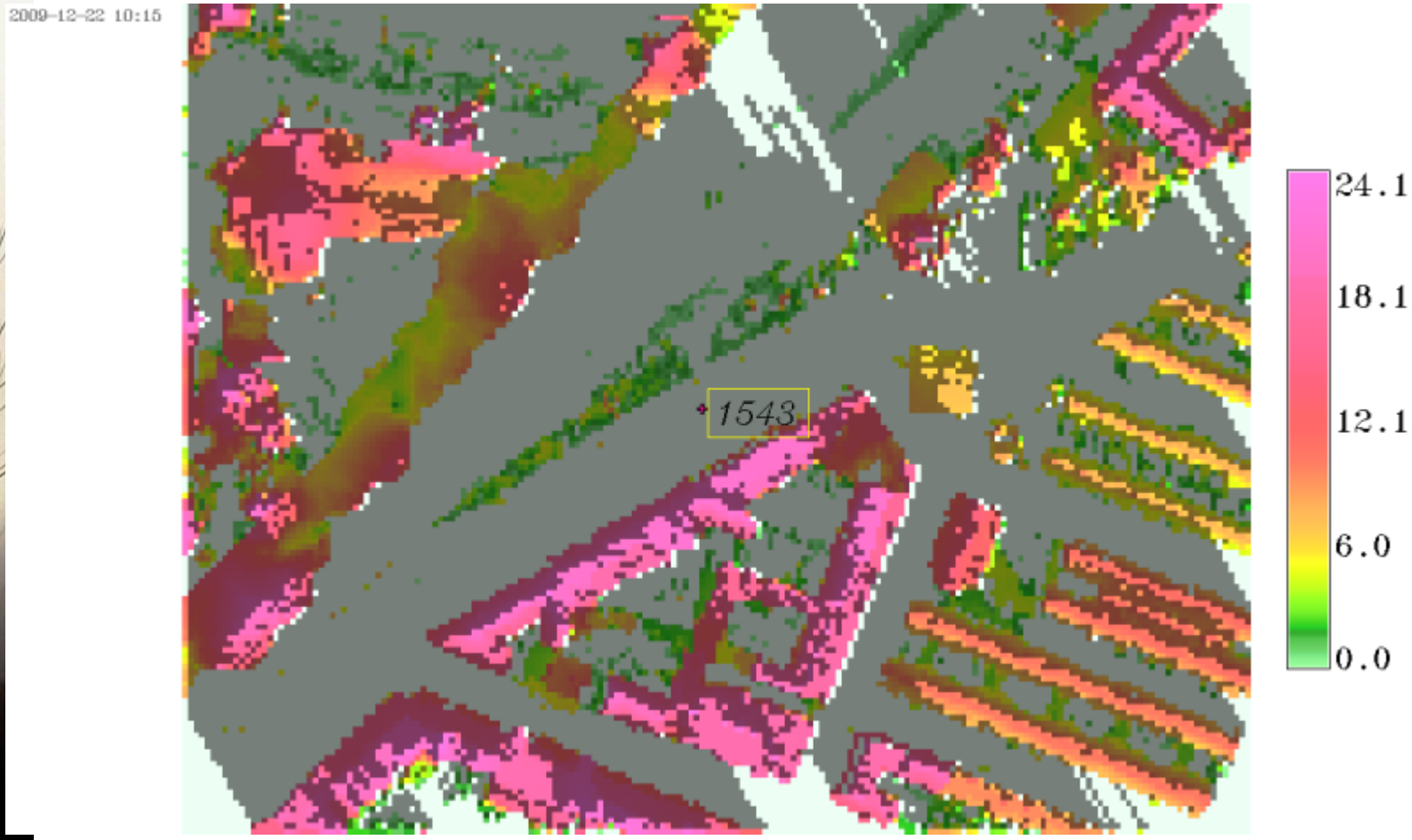

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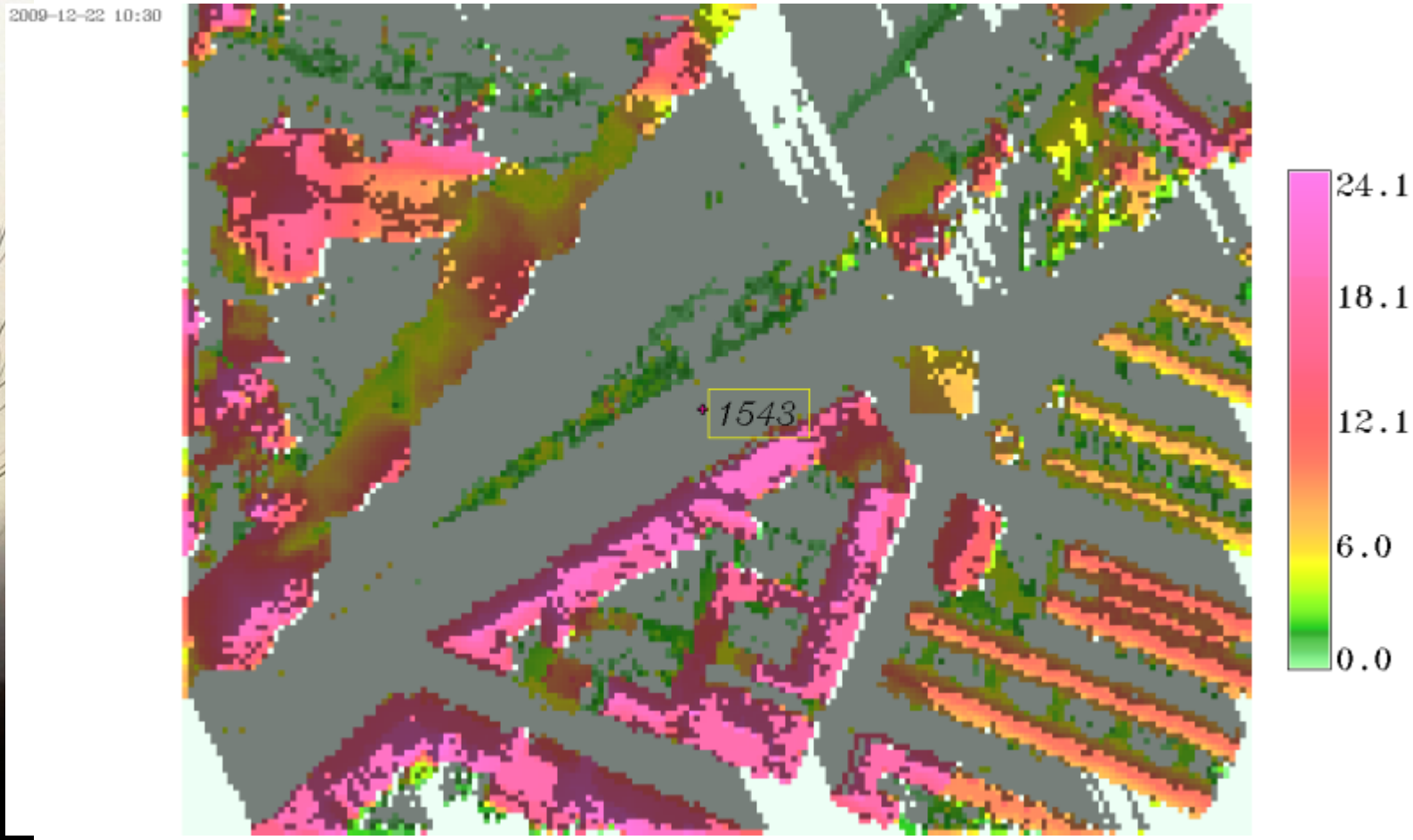

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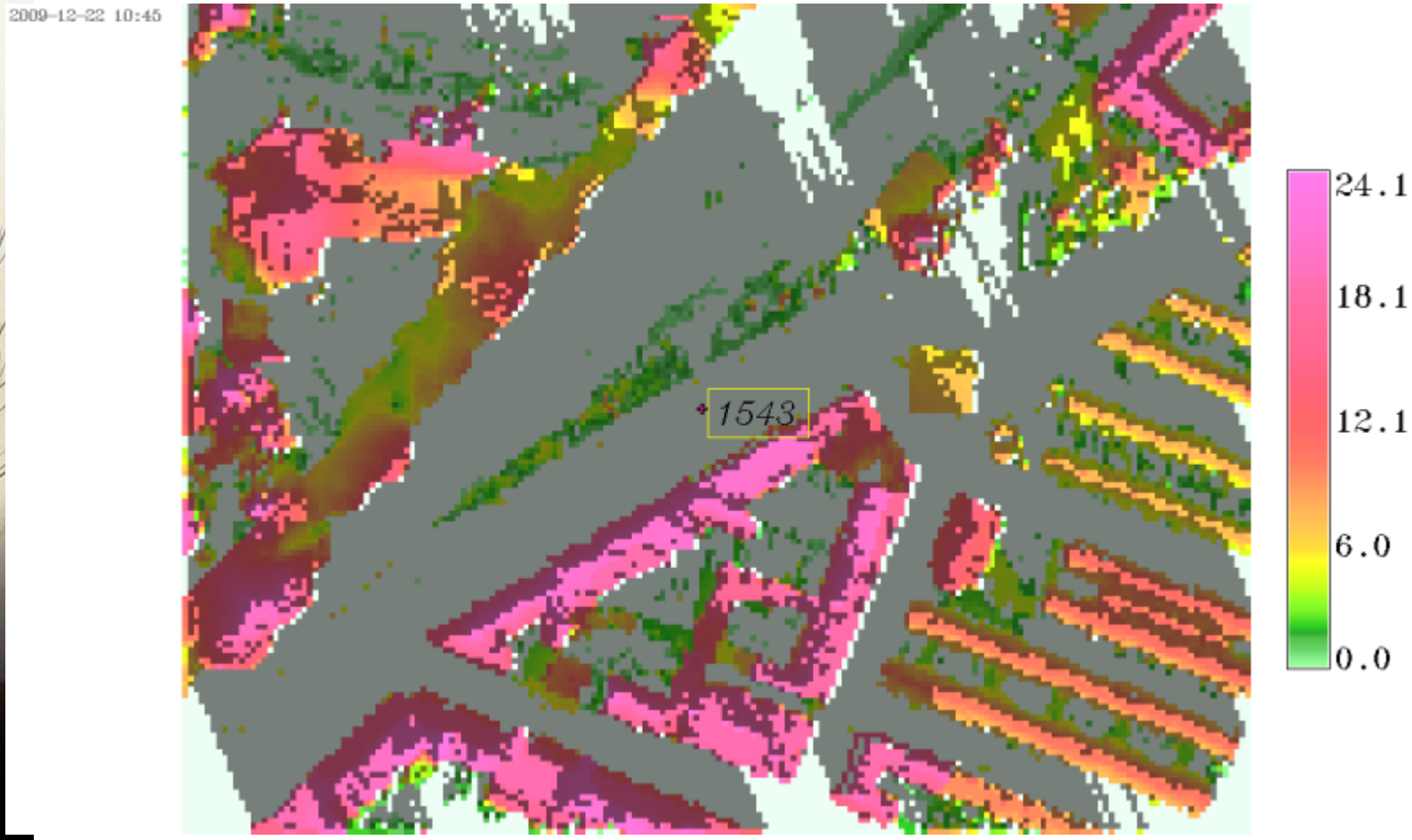

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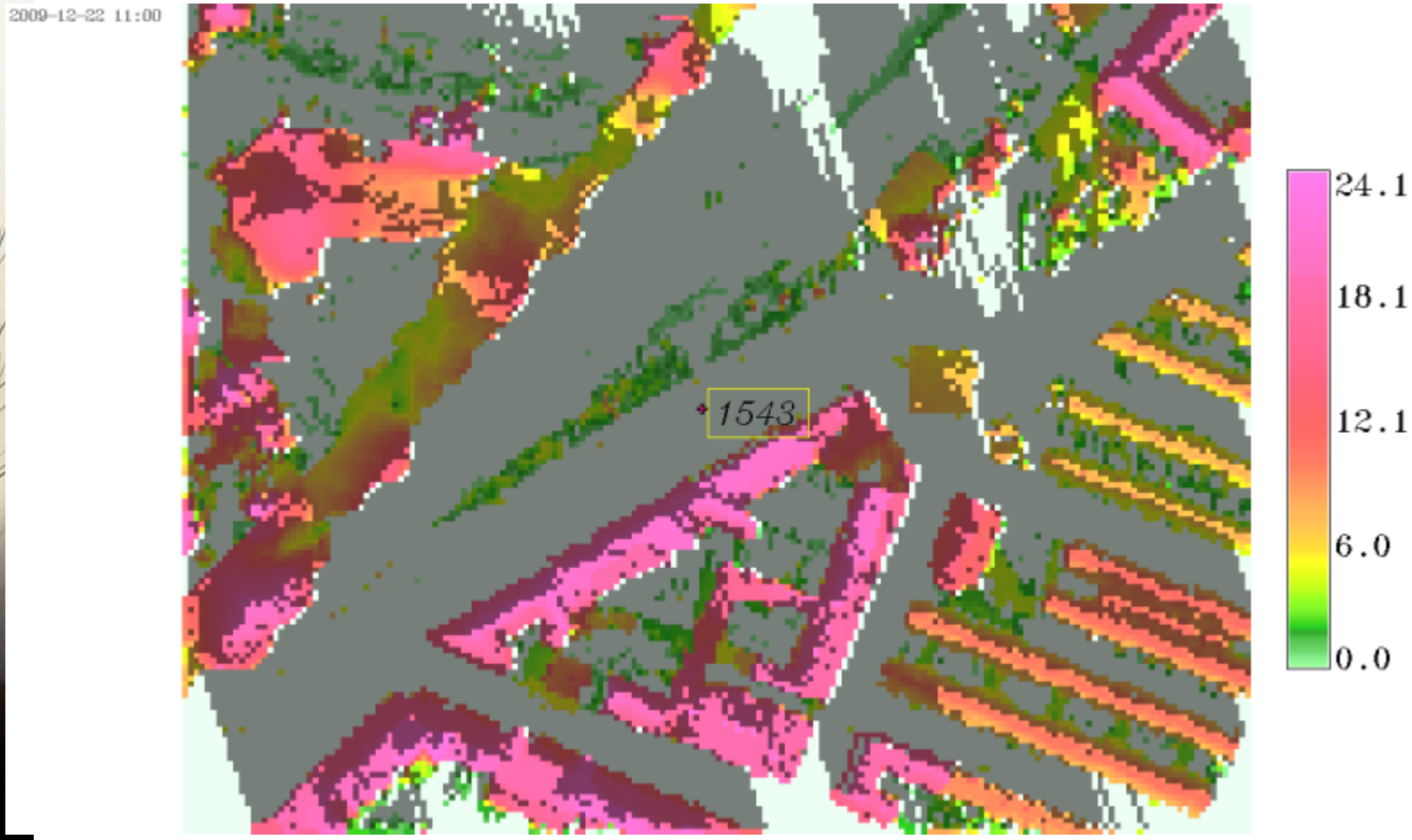

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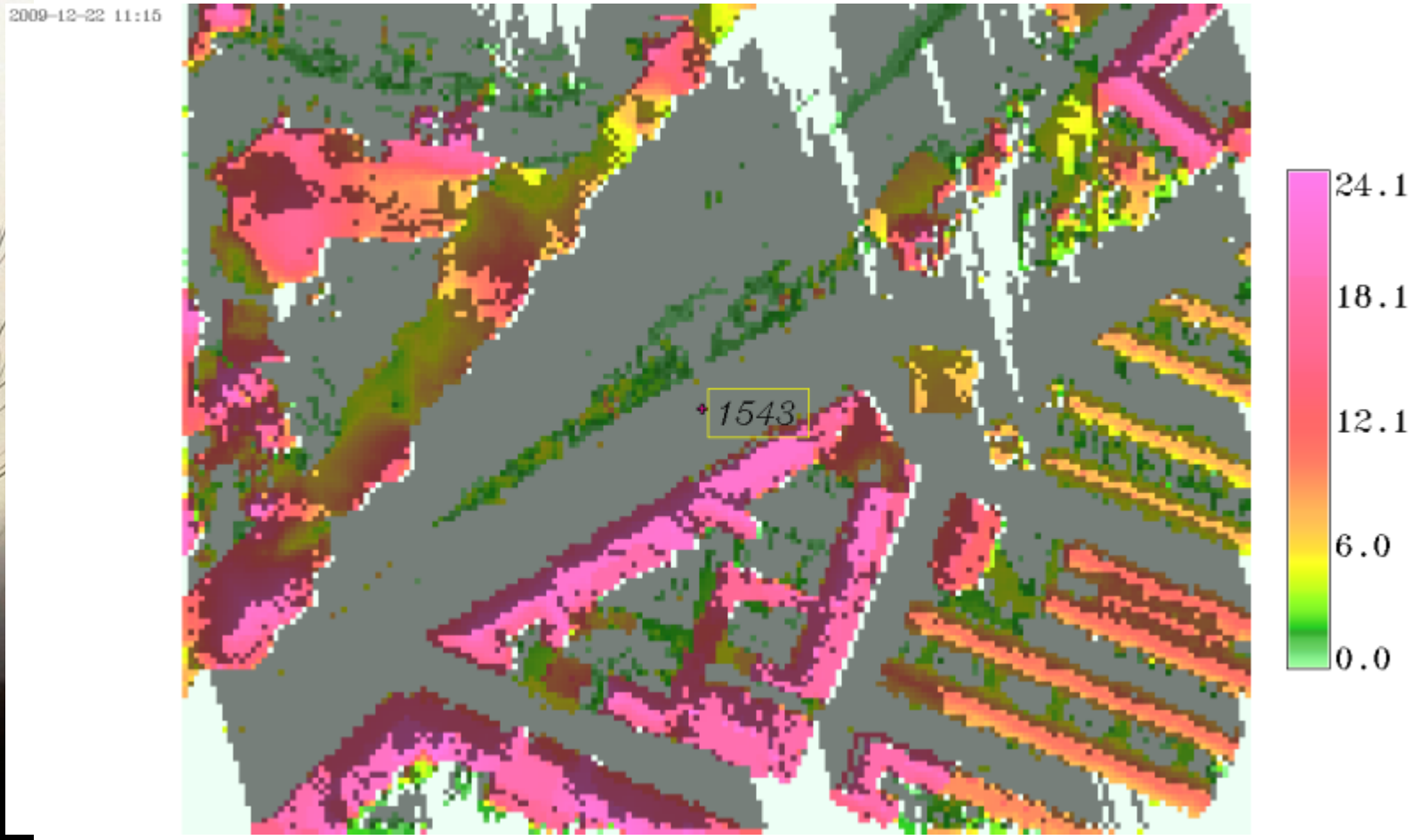

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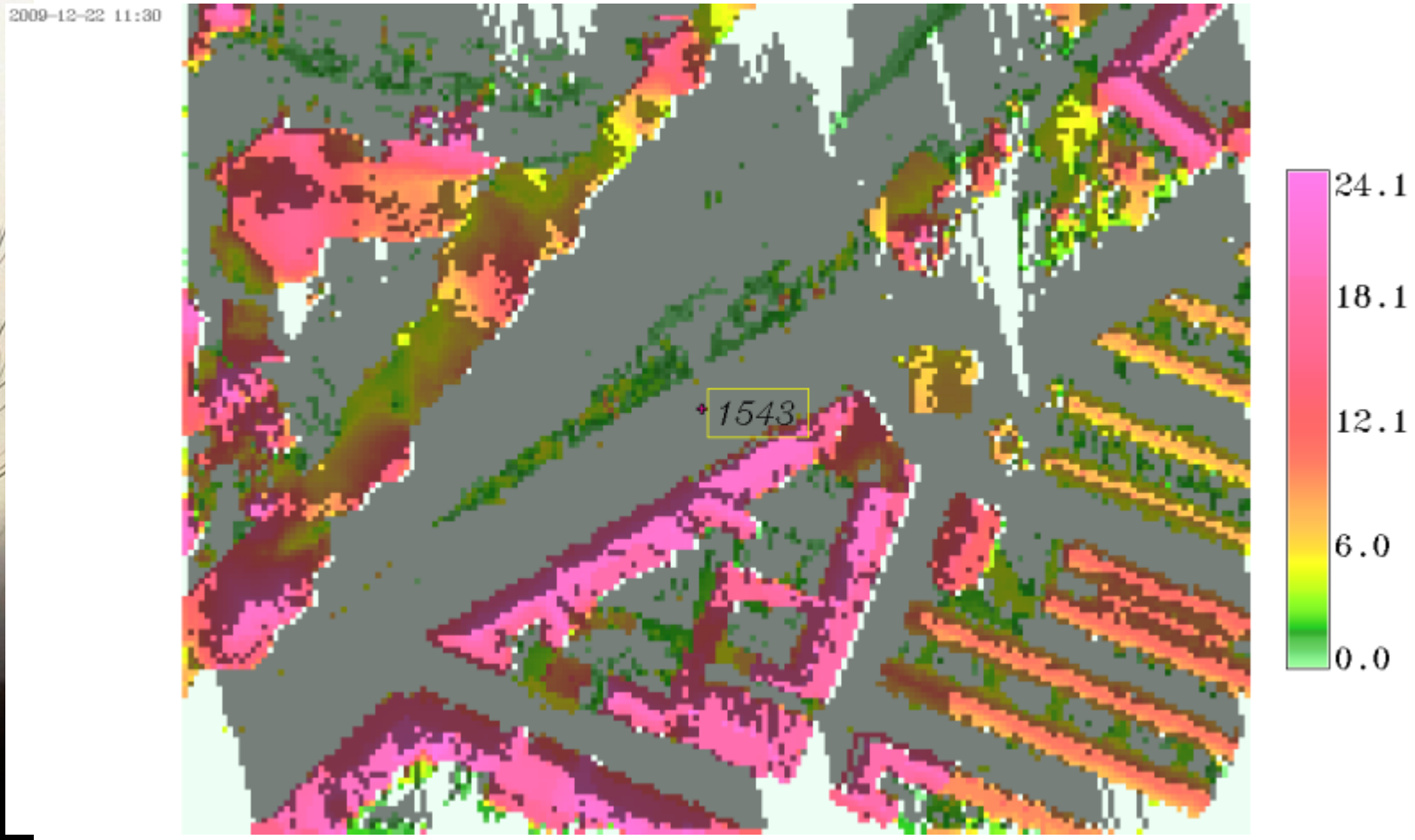

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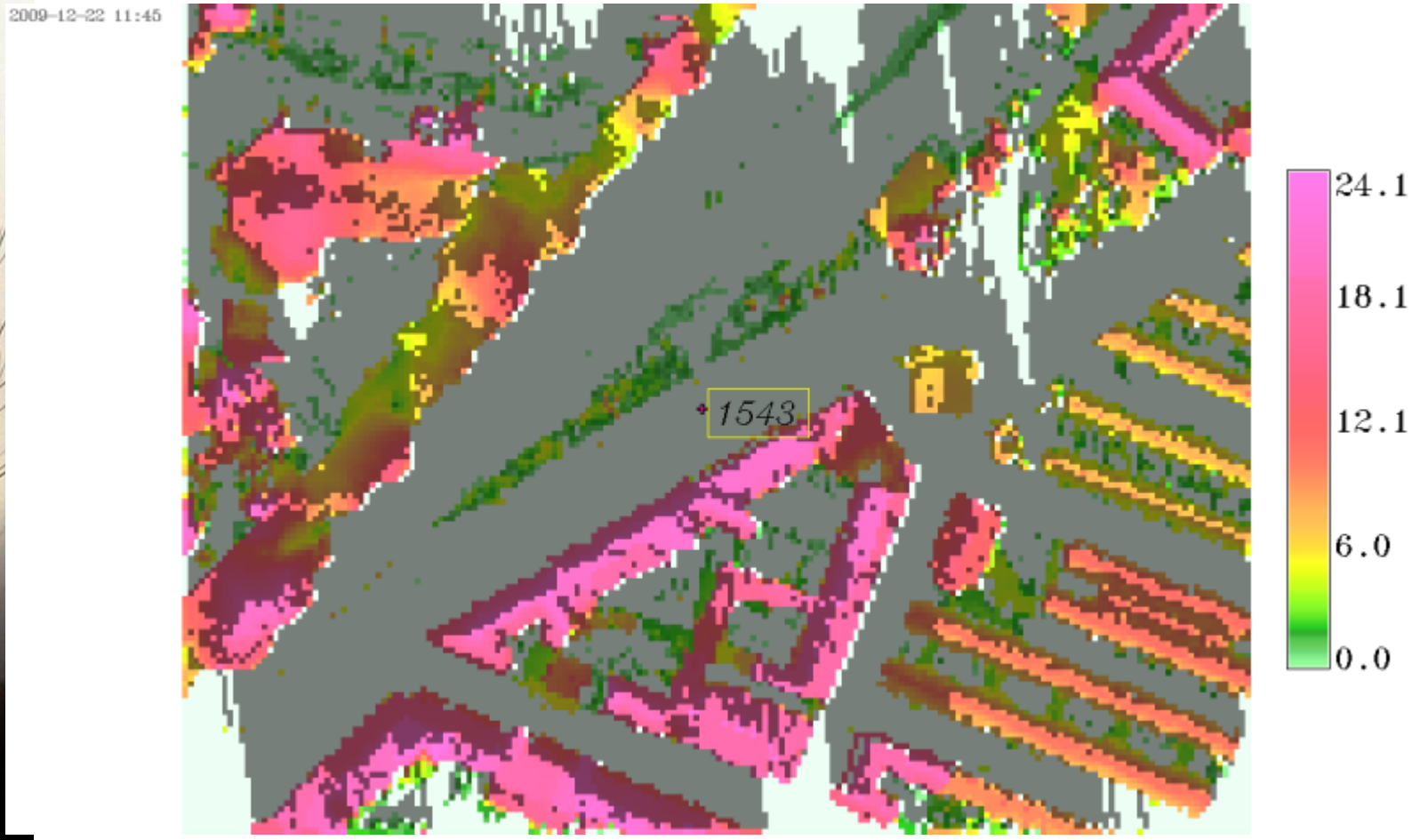

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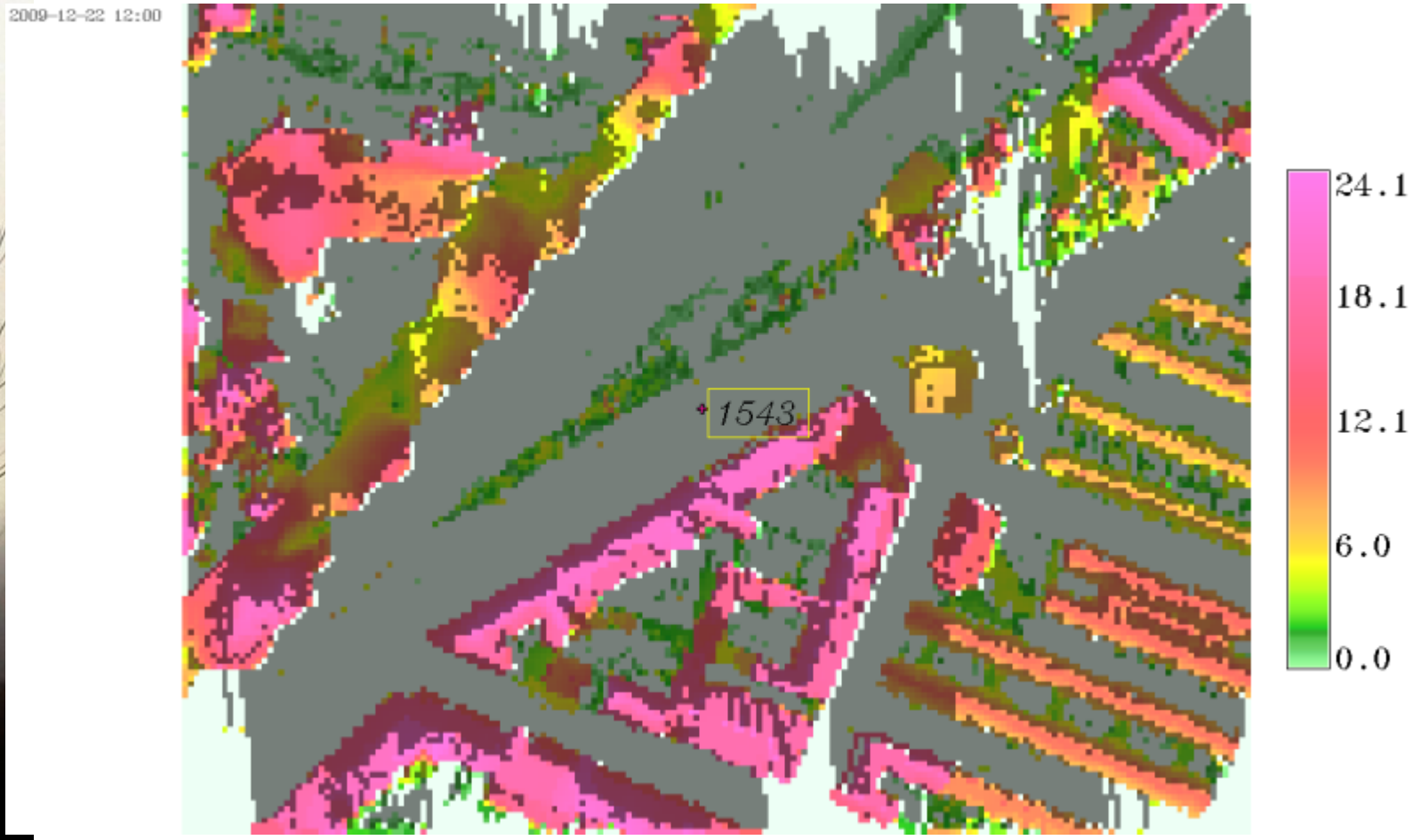

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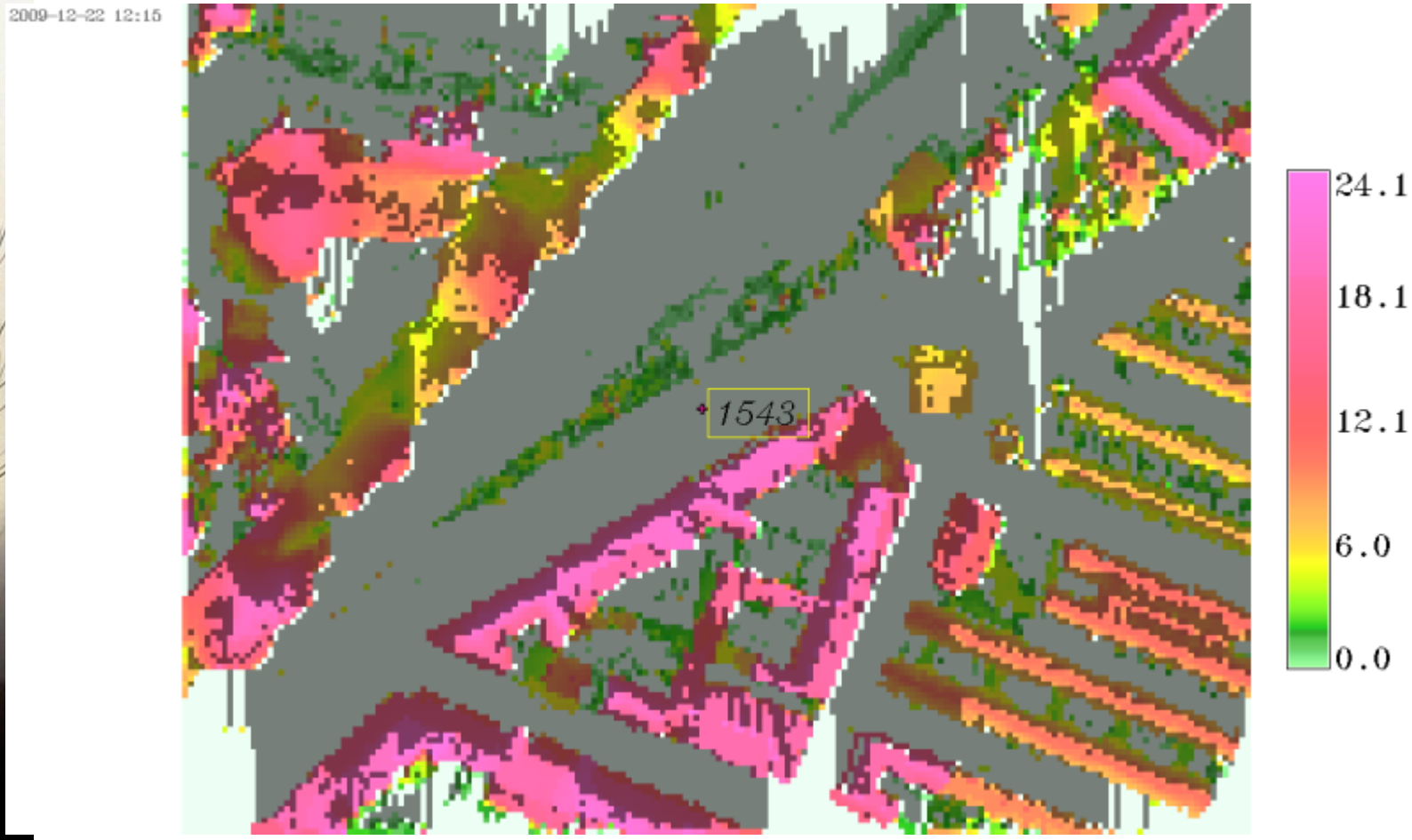

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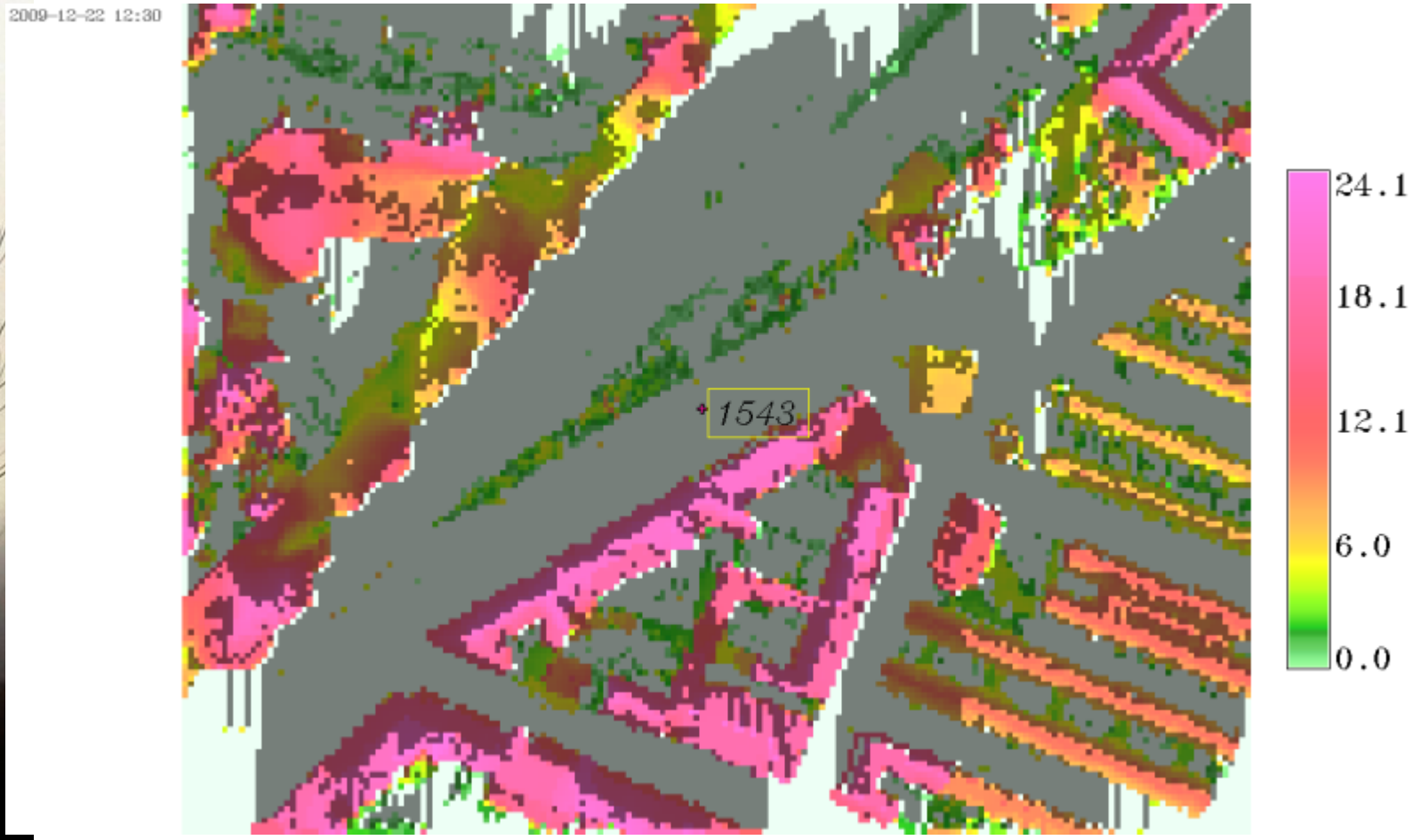

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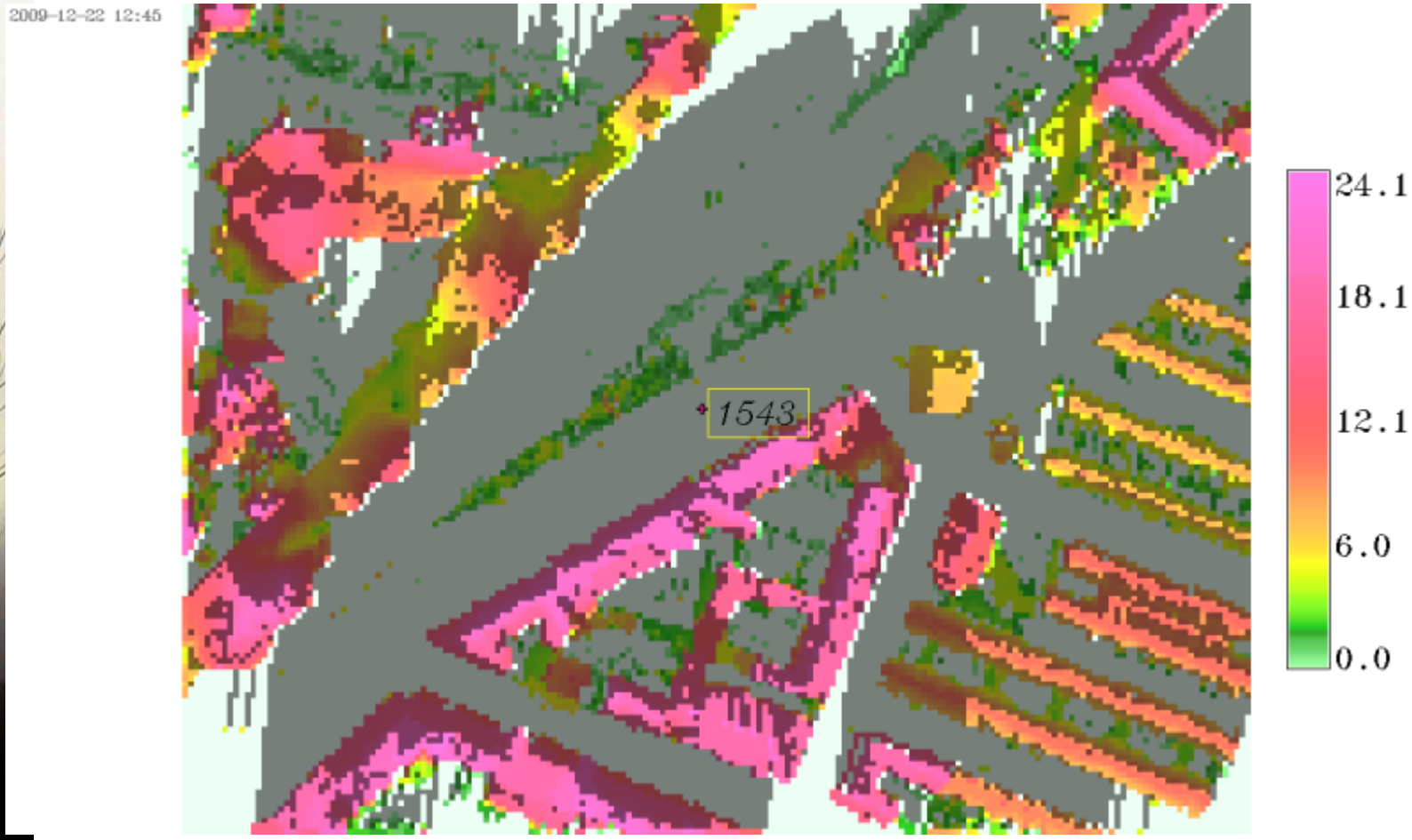

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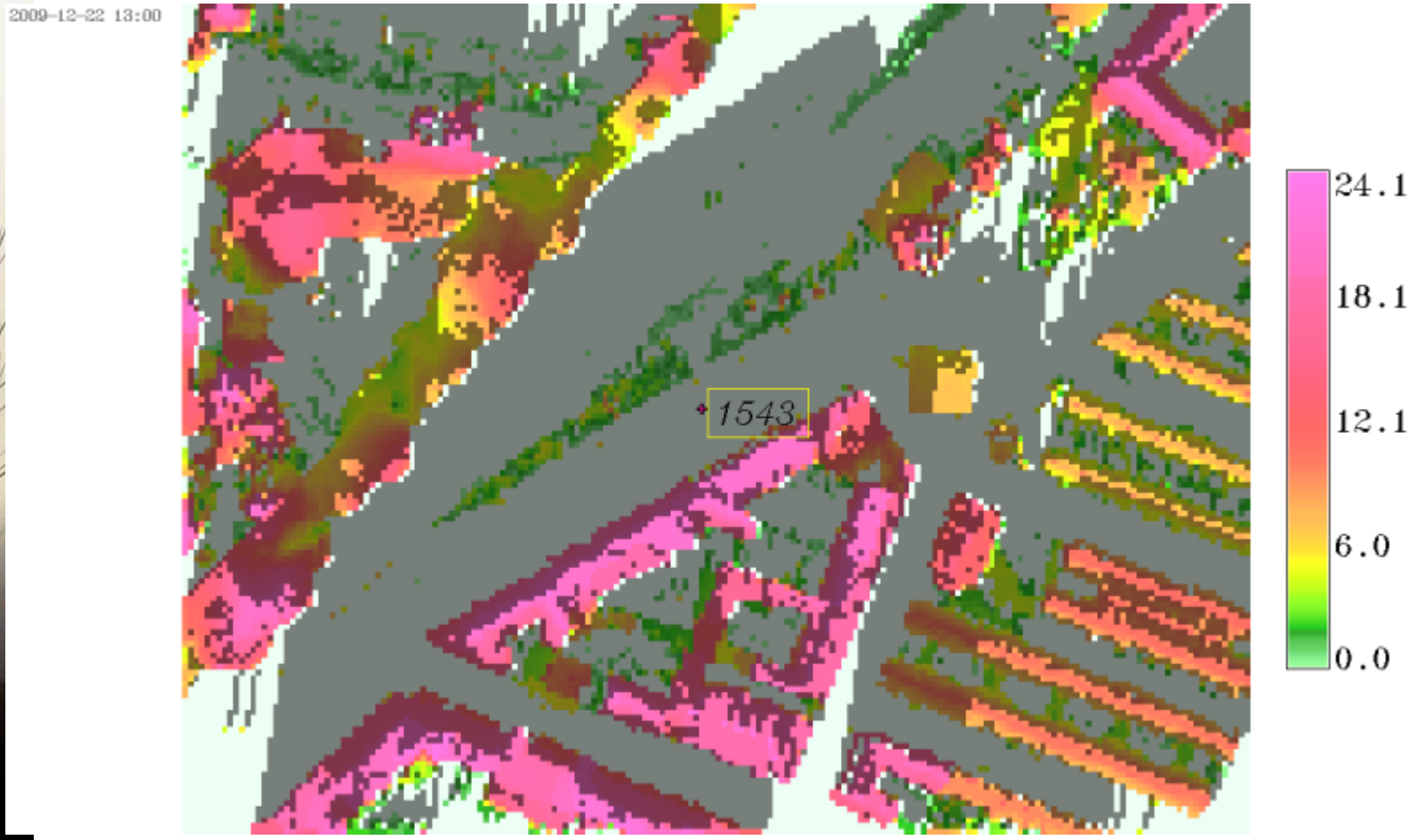

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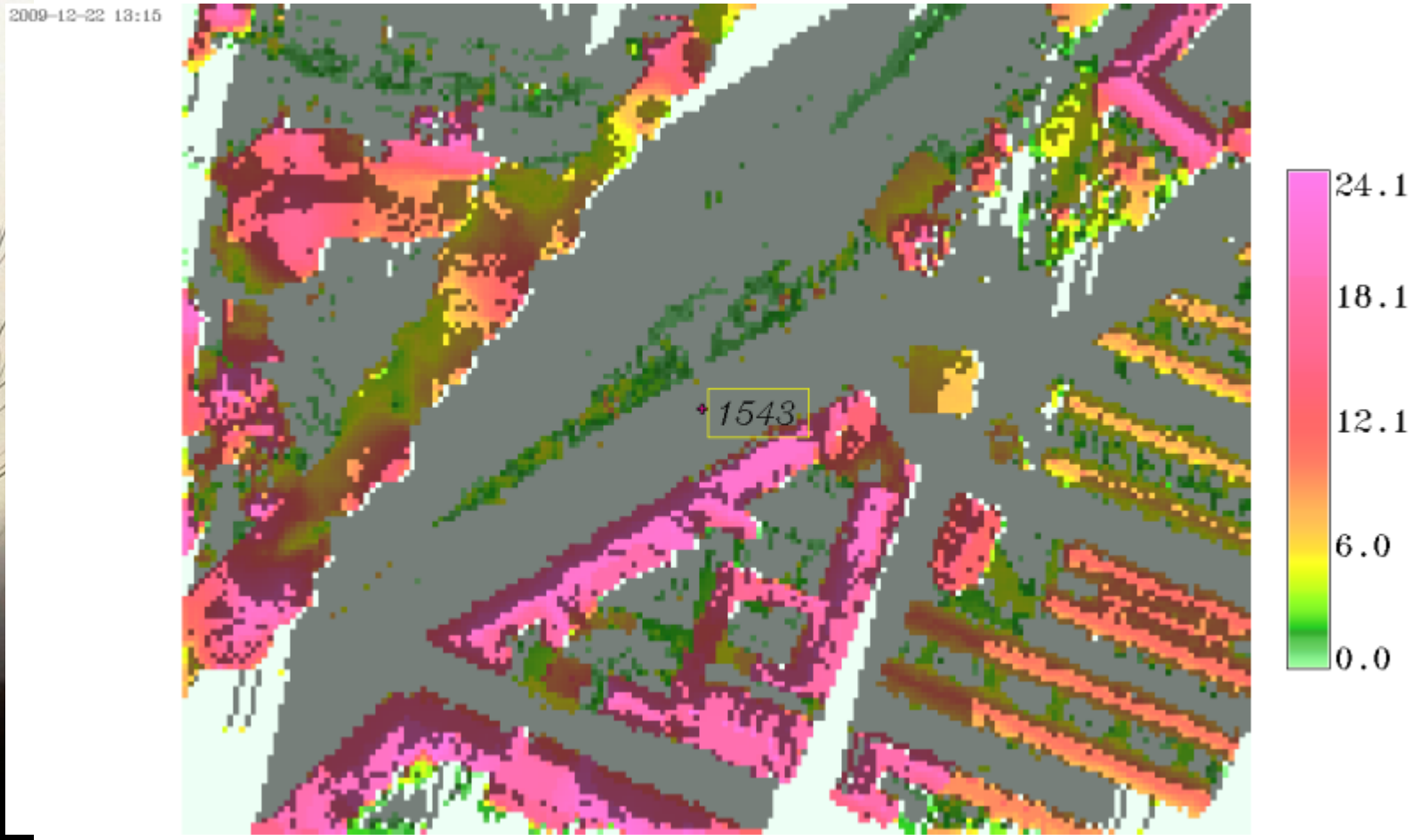

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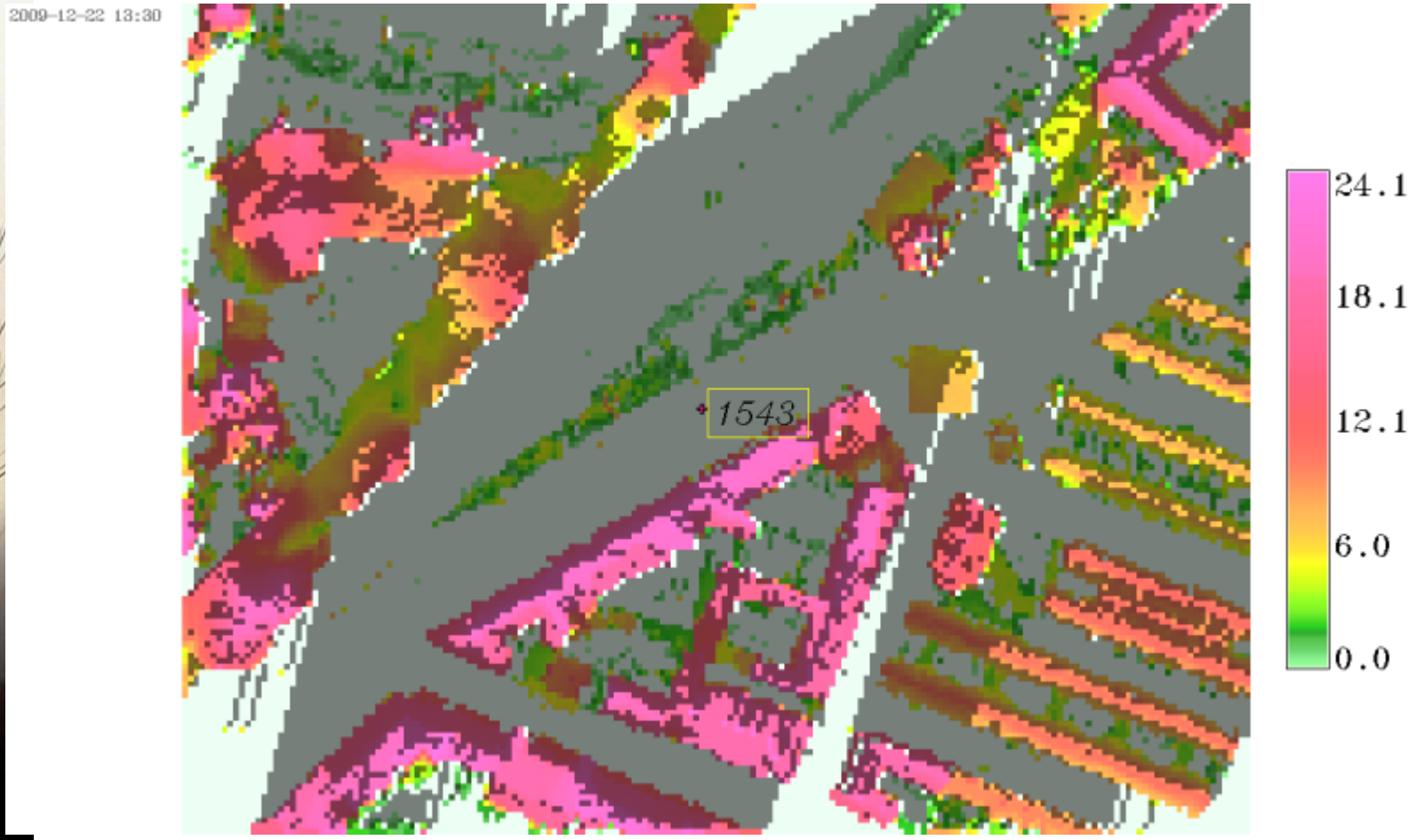

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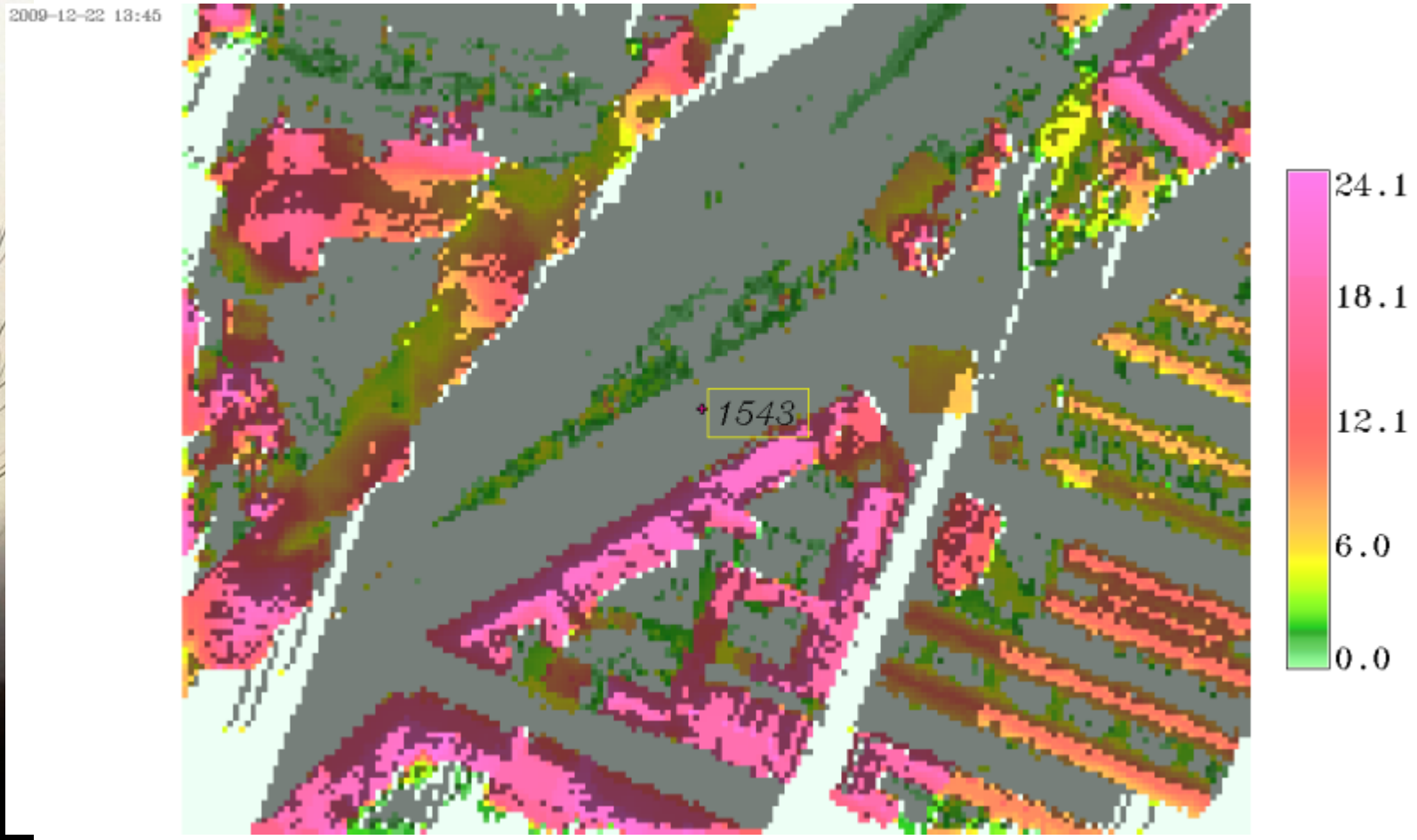

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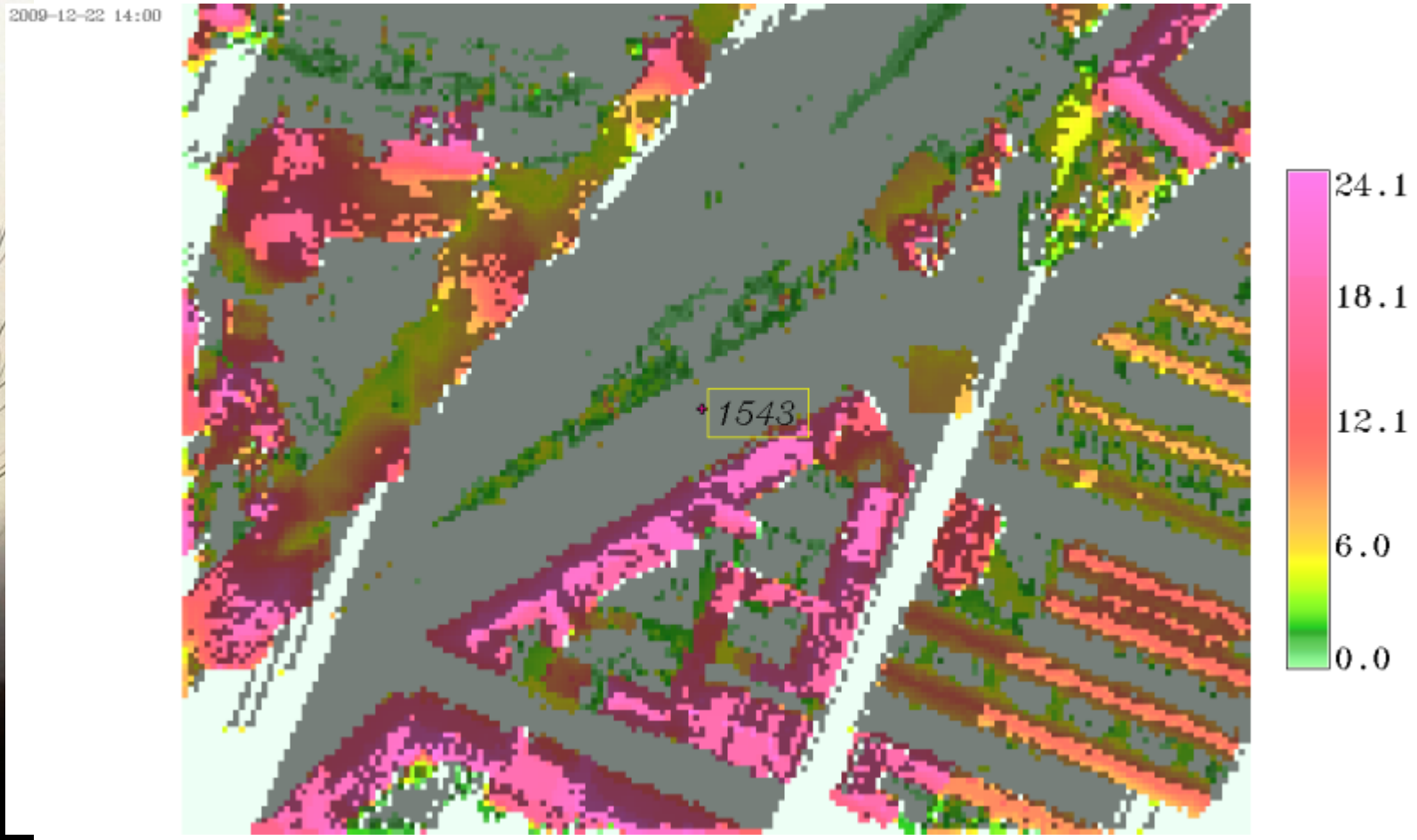

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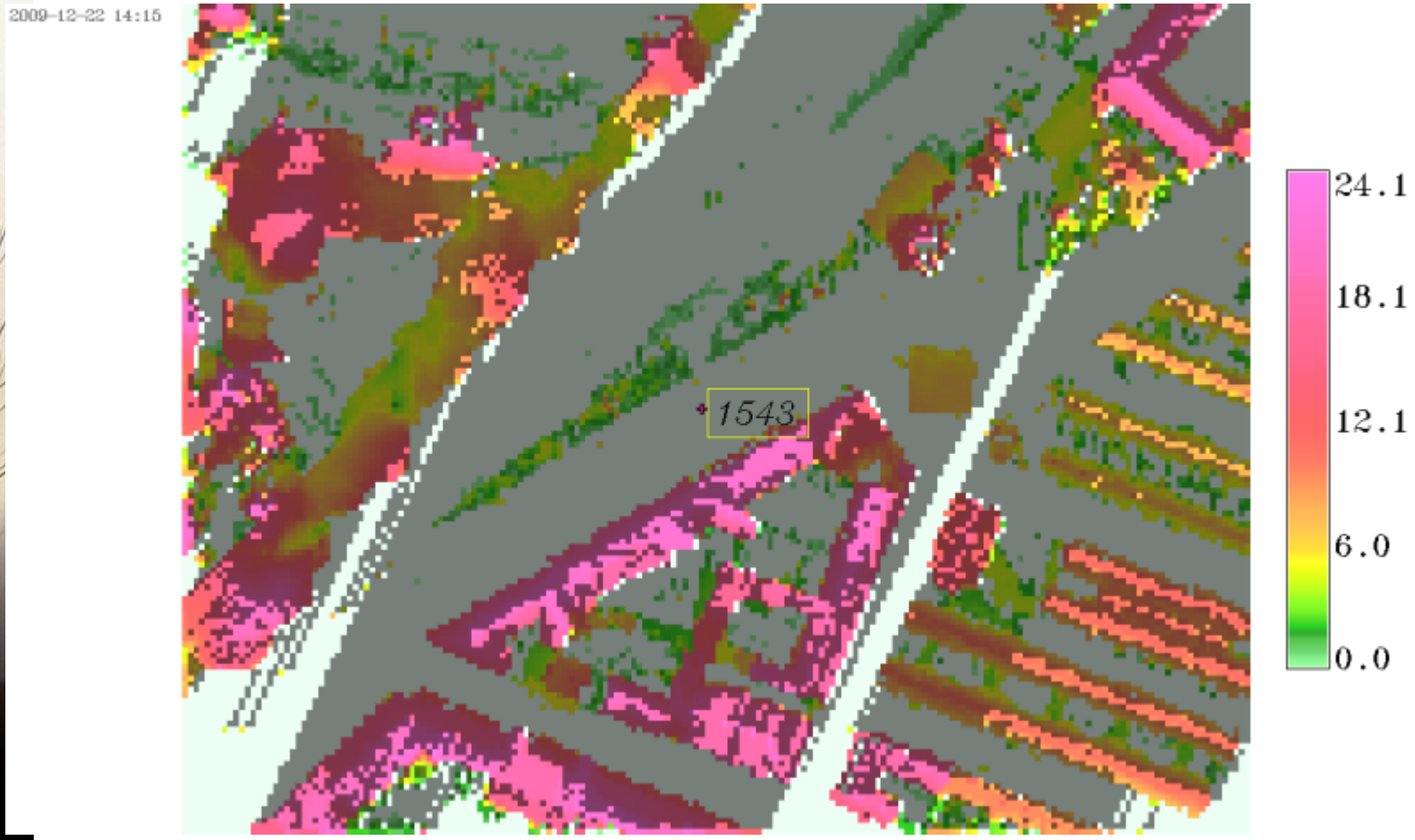

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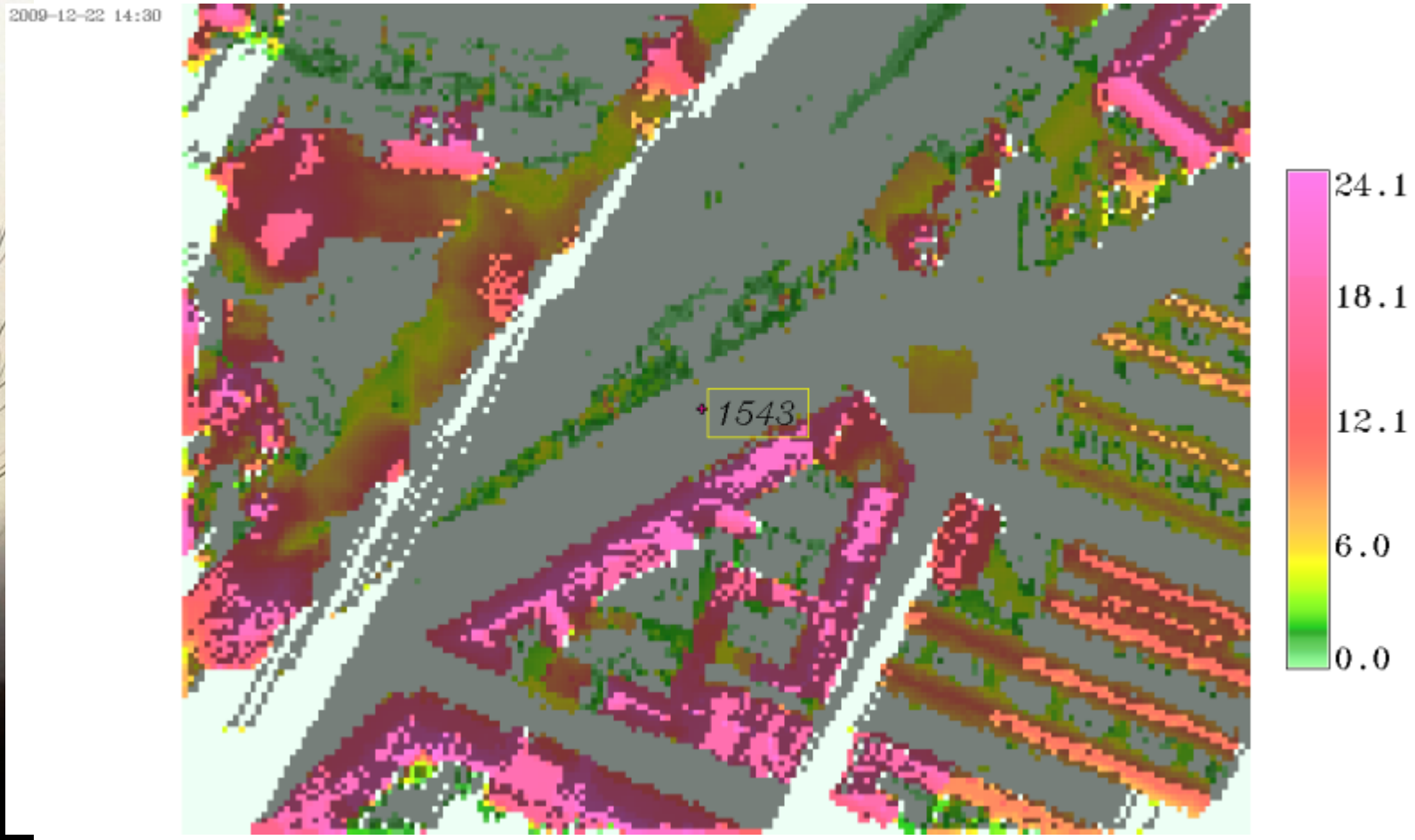

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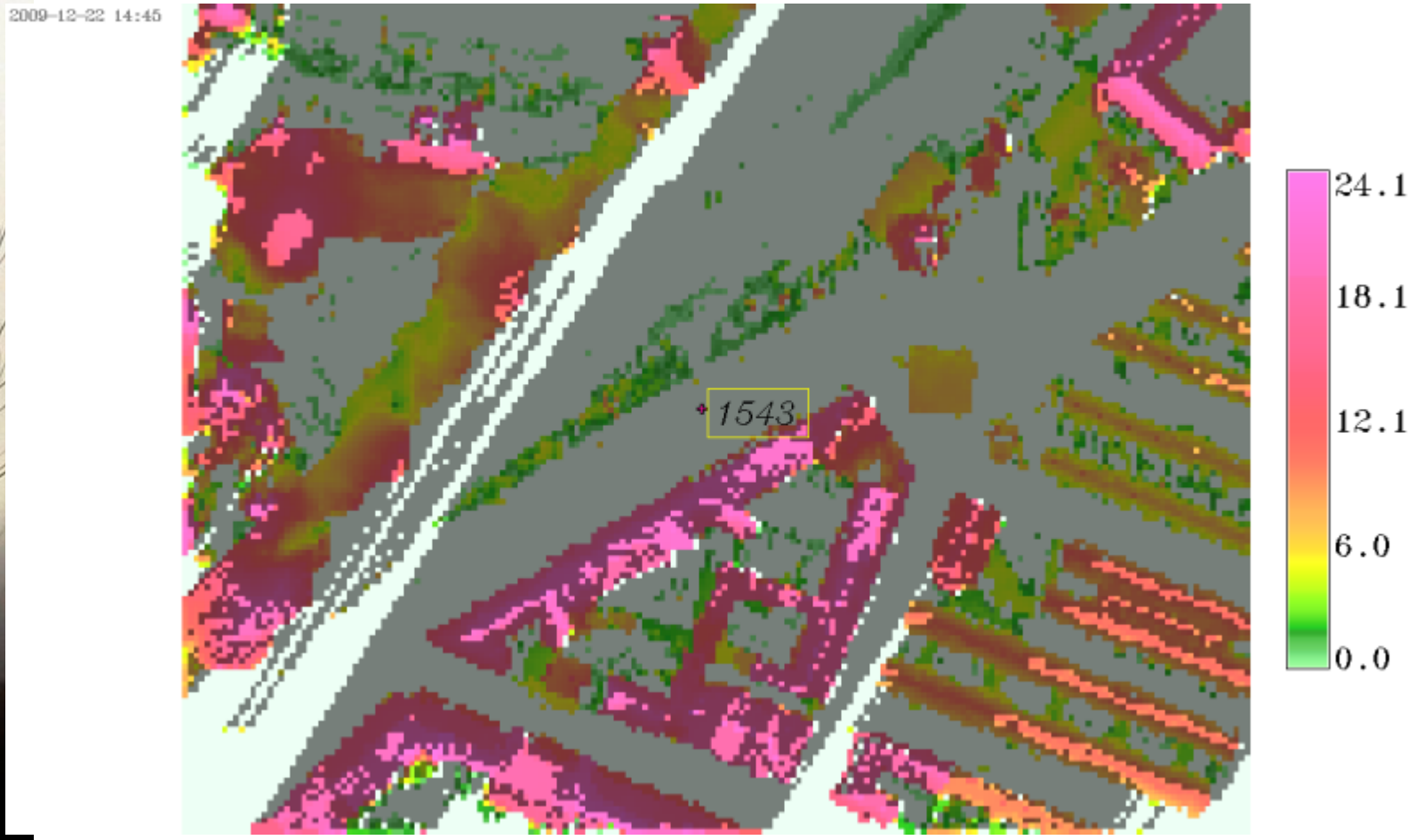

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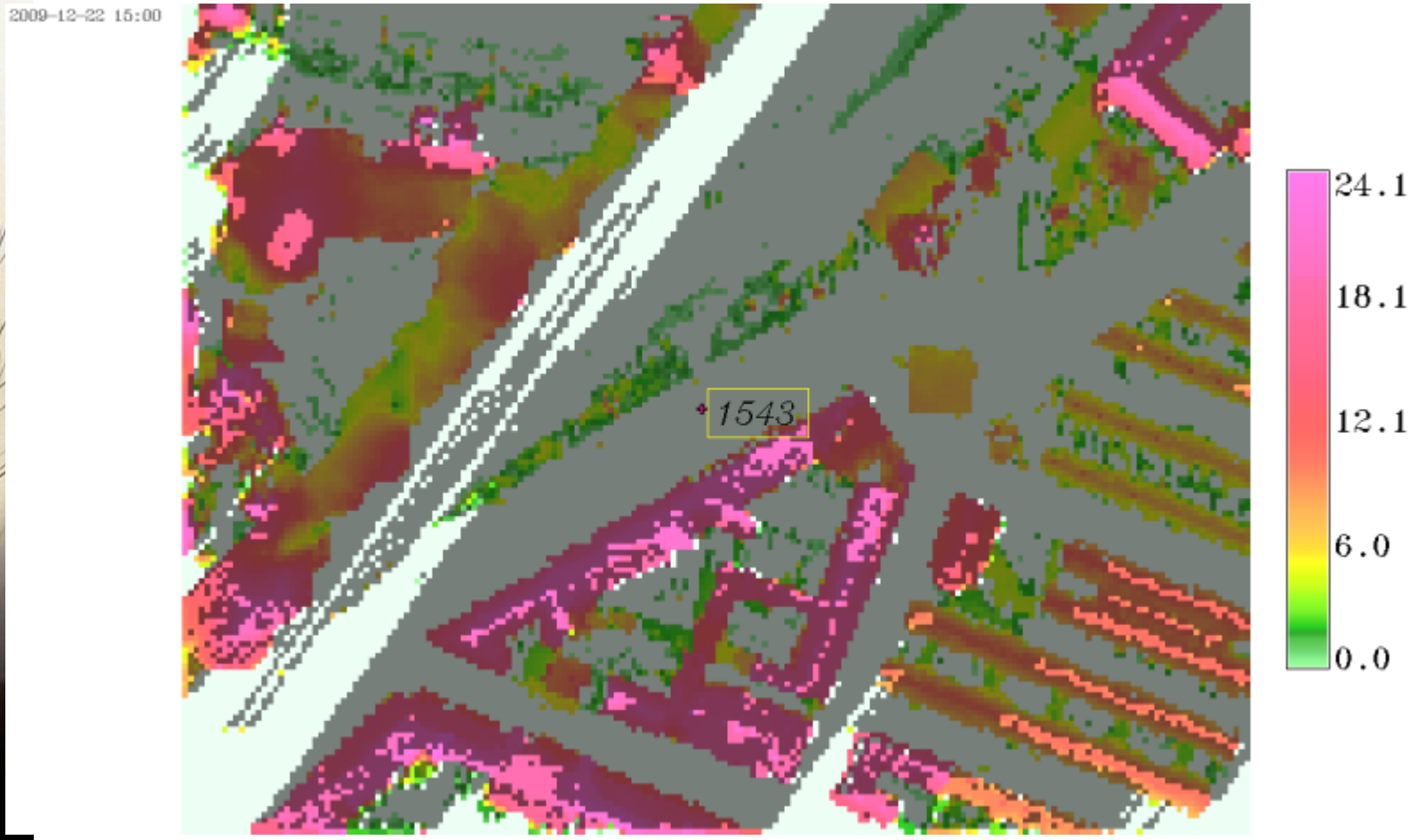

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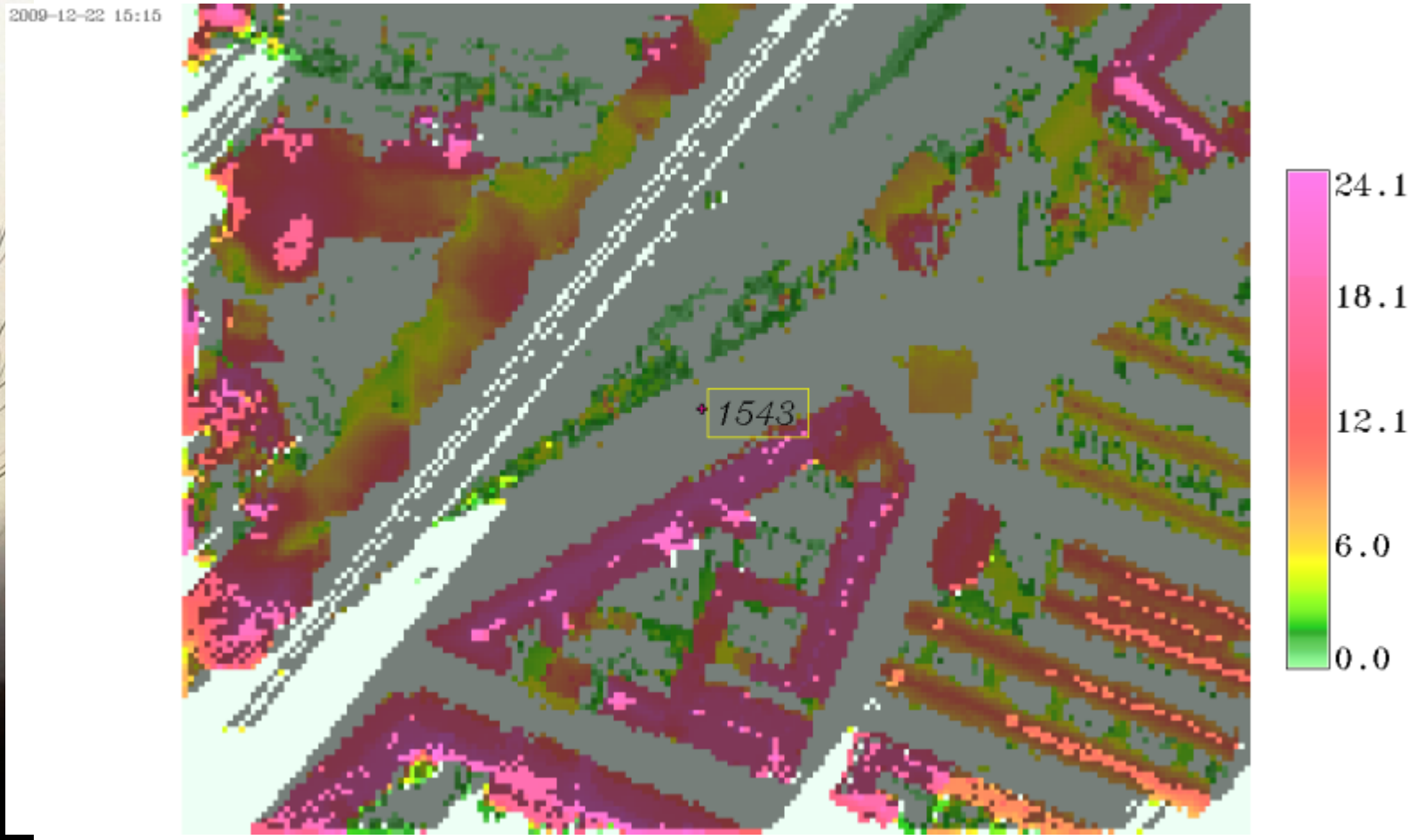

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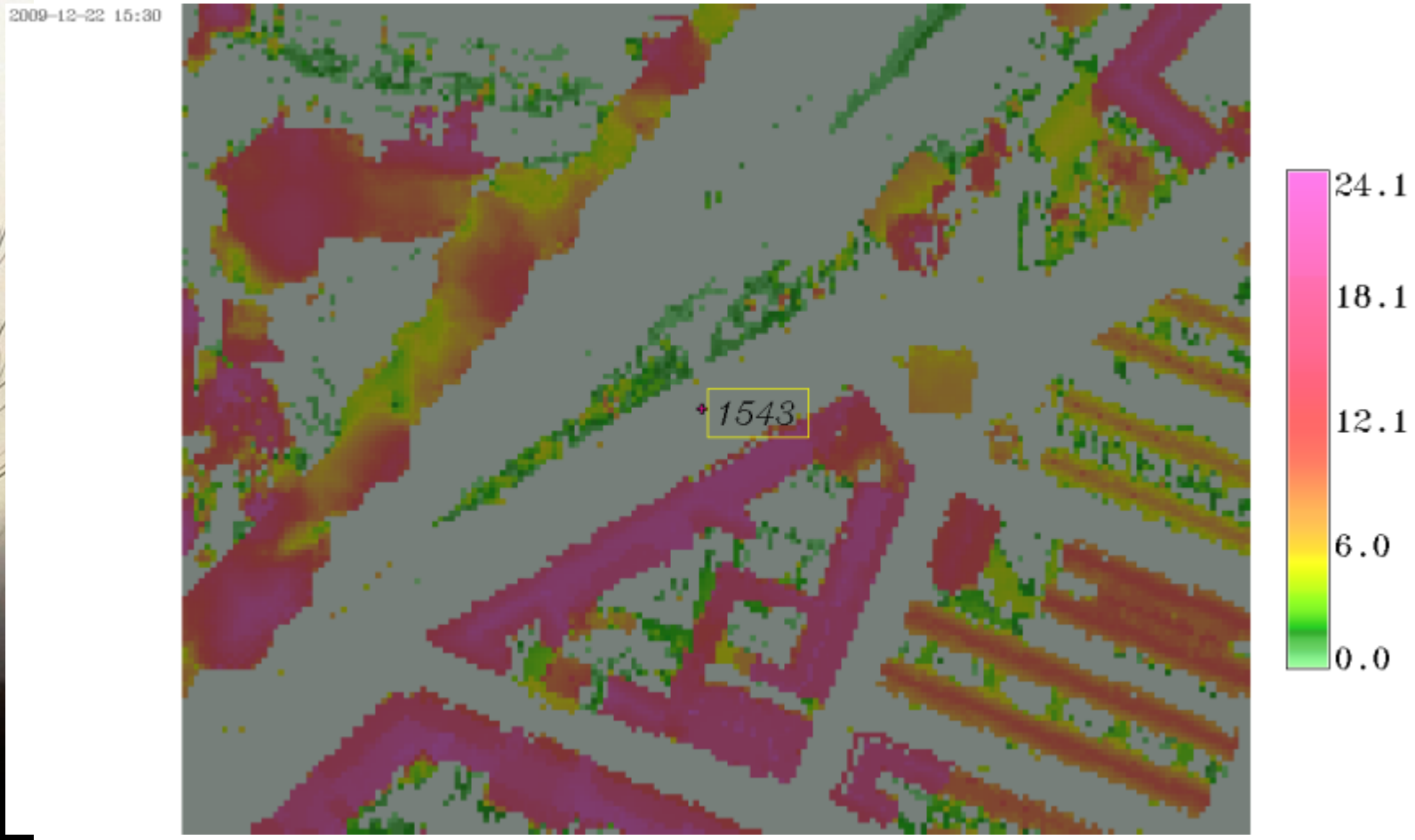

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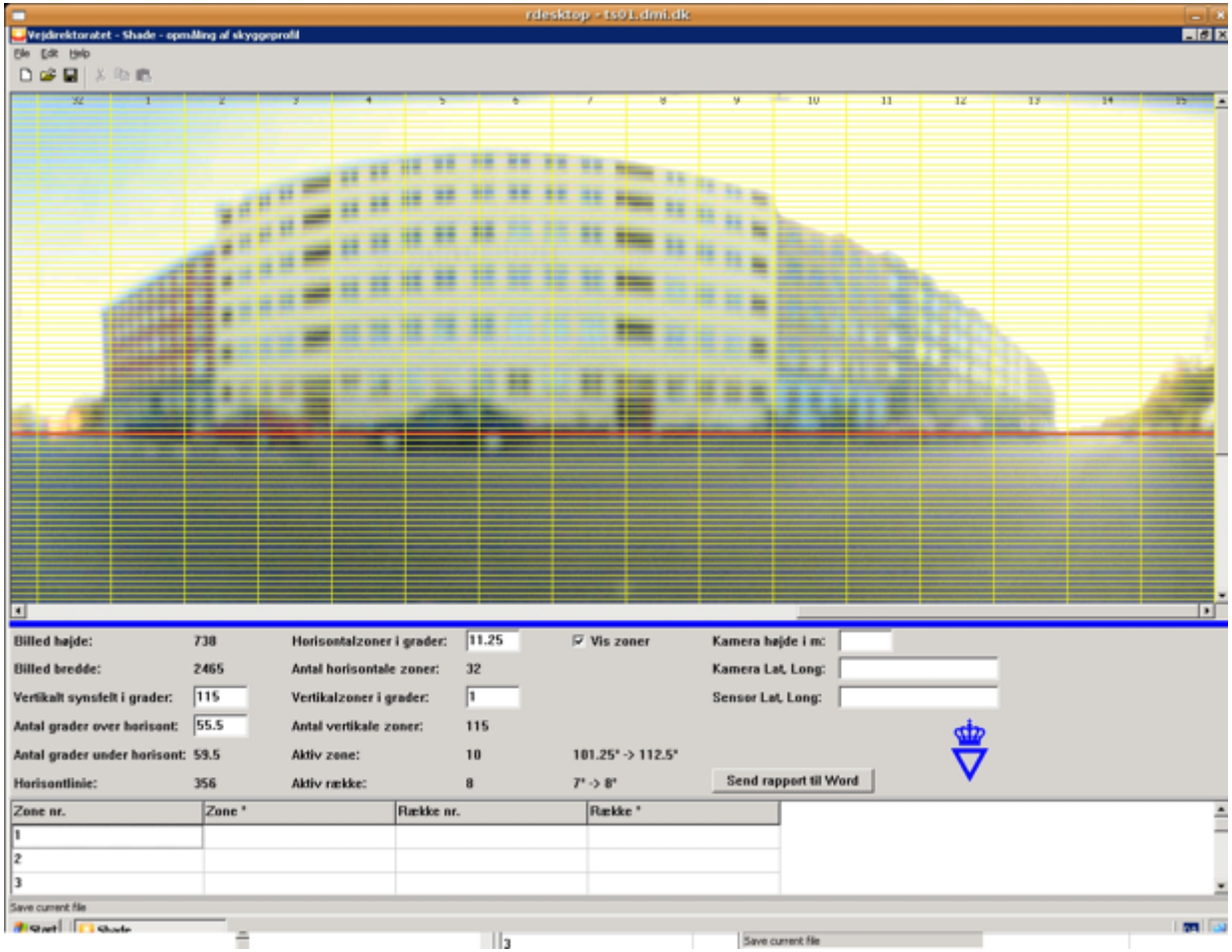
Different methods to obtain shadow and skyview angle



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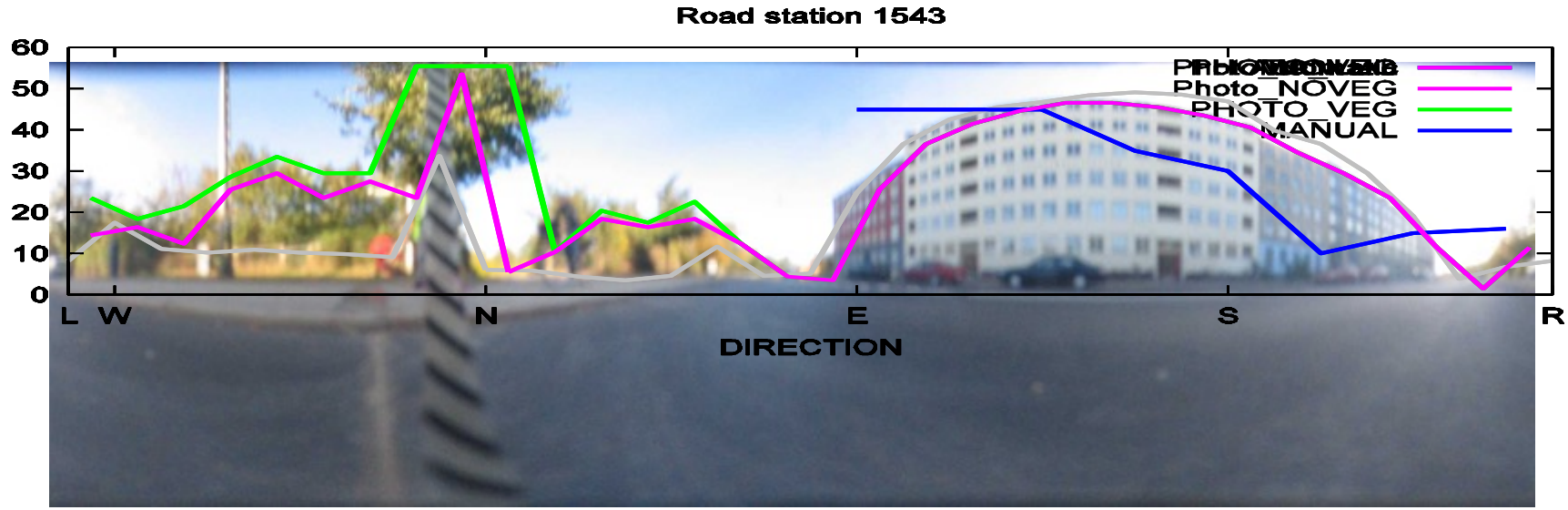
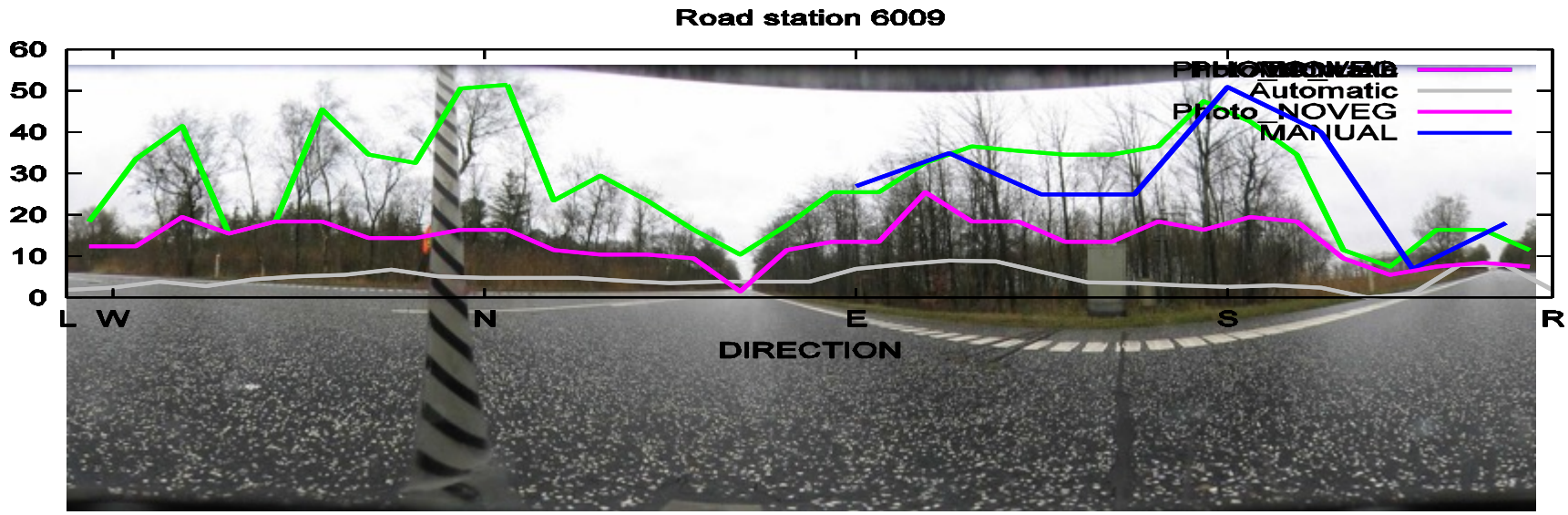


Different methods to obtain shadow and skyview angle - Transparency properties



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).**

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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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